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SECTION 1.0 INTRODUCTION

1.1 Proponent Information

The proponent is Maryvale Wind Energy LP, a Canadian and German owned and operated corporation. The head office is located at 2300 Yonge Street, Suite 801, P.O. Box 2300, Toronto, ON, M4P 1E4. The proponent's primary contact information is Lisa Fulton, Fulton Energy Research. 796 Dan Fraser Road, RR #3 Westville, NS, B0K 2A0, (tel) 902-759-6626, lisa_fulton@canada.com.

1.2 Project Overview

The name of the Project is Maryvale Wind Project, located in Maryvale, Antigonish County, Nova Scotia. The main entrance road to the project site is located north of the secondary 245 Highway also known as the Sunrise Trail. Figure 1.1 is an overview map showing the project location in reference to Nova Scotia and the other Maritime provinces; Figure 1.2 is a map showing the turbine locations within Project Boundaries. Table 1.1 shows the UTM coordinates, ground elevations, and hub height elevations of the four proposed wind turbine locations.

Table 1.1: UTM Coordinates and Elevations of the Wind Turbine Generators

Turbine Number	Easting	Northing	Elevation (asl)	Hub elevation
1	572700	5064829	238m	323m
2	572941	5065430	234m	319m
3	572450	5064310	216m	301m
4	572759	5064278	220m	305m

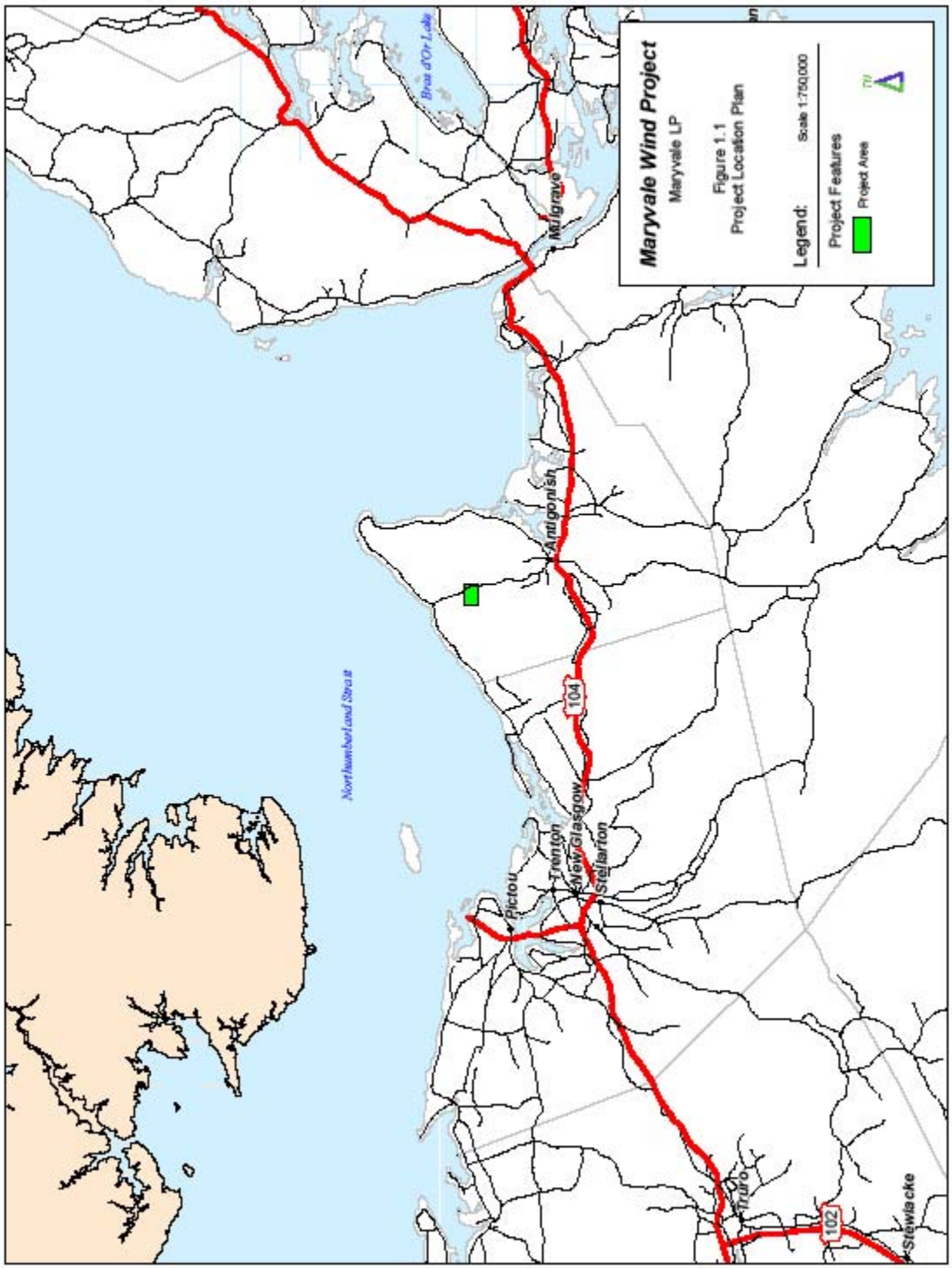
Maryvale Wind Energy LP is responding to a Provincial and Federal strategy to provide approximately 20% renewable power to the provincial grid by 2013. In March 2007, Nova Scotia Power Inc. (NSPI) issued an open competitive Request for Proposals (RFP) for 130 MW for submission by December 2007. RM energy was successful in its submission and has entered into a Power Purchase Agreement (PPA) with NSPI for 6 MW of electrical power from the Maryvale Wind Project. Since that time, RMSenergy has partnered with Dithmarsia Power Corp to create Maryvale Wind Energy LP, a company that will be responsible for the operations of the 6mw distribution Project.

The proposal is to install four wind turbine generators. The turbines will have a hub height of 85m. The rotor diameter of the machines is 77m. The turbine model being used is the Vensys V-77 turbine, a German manufactured model used widely around the world. There are currently 3 such machines located in Higgins Mountain, Nova Scotia, in the Wentworth Valley. The turbines are expected to generate 19.6 MW hrs of renewable power annually to NSPI. For purposes of this document, the Project area is referred to as Maryvale. Figure 1.2 shows the location of the selected turbine sites within the Project area.

It must be noted that the site specific studies carried out at the locations were done so with a 75m radius around each location, giving an area of 3720m^2 to work in for the placement of the turbines. This movement may be required for geotechnical study results, landowner agreements, or municipal setbacks. The Proponent, Maryvale Wind Energy LP, has completed 12 months of wind monitoring directly on site; land acquisition since 2006; and extensive expert studies since early 2008. Another site was initially chosen about 11 km east of its current location but due to the presence of Mainland Moose sign, turbine locations were re-located to a more suitable site where there was existing human disturbance and logging activities. This new site was chosen with the following attributes: large setback distance from homes and noise receptors; the presence of an existing road system; land which has been historically logged; altitude higher than 200m above sea level (asl); and close enough to a distribution power line for financial feasibility.

1.3 Public, Expert and Agency Consultation

During the planning of the Maryvale Wind Project, the Company has consulted with the public on various platforms. An Open House meeting was held at the Four Valleys Volunteer Fire Hall, in Maryvale on April 6, 2009 from 6pm to 8pm. There has been a safety and general information exchange held between the developer and the local fire department on March 23, 2009. The company had already had numerous informal meetings in person and by telephone. Information collected during these meetings assisted in identifying public concerns and issues that needed to be addressed and resolved where possible. Table 1.2 provides a summary of consultations undertaken and a list of contacts with private individuals or corporations with knowledge or specific interests in the Project area.


Maryvale Wind Project
Maryvale LP
Figure 1.1
Project Location Plan
Legend:
Scale 1:750,000
Project Features
Project Area
Northumberland Strait
Bras d'Or Lake
Malagawatch
Antigonish
Pictou
Trenton
New Glasgow
Stellarton
Truro
Stewiacke
104
102

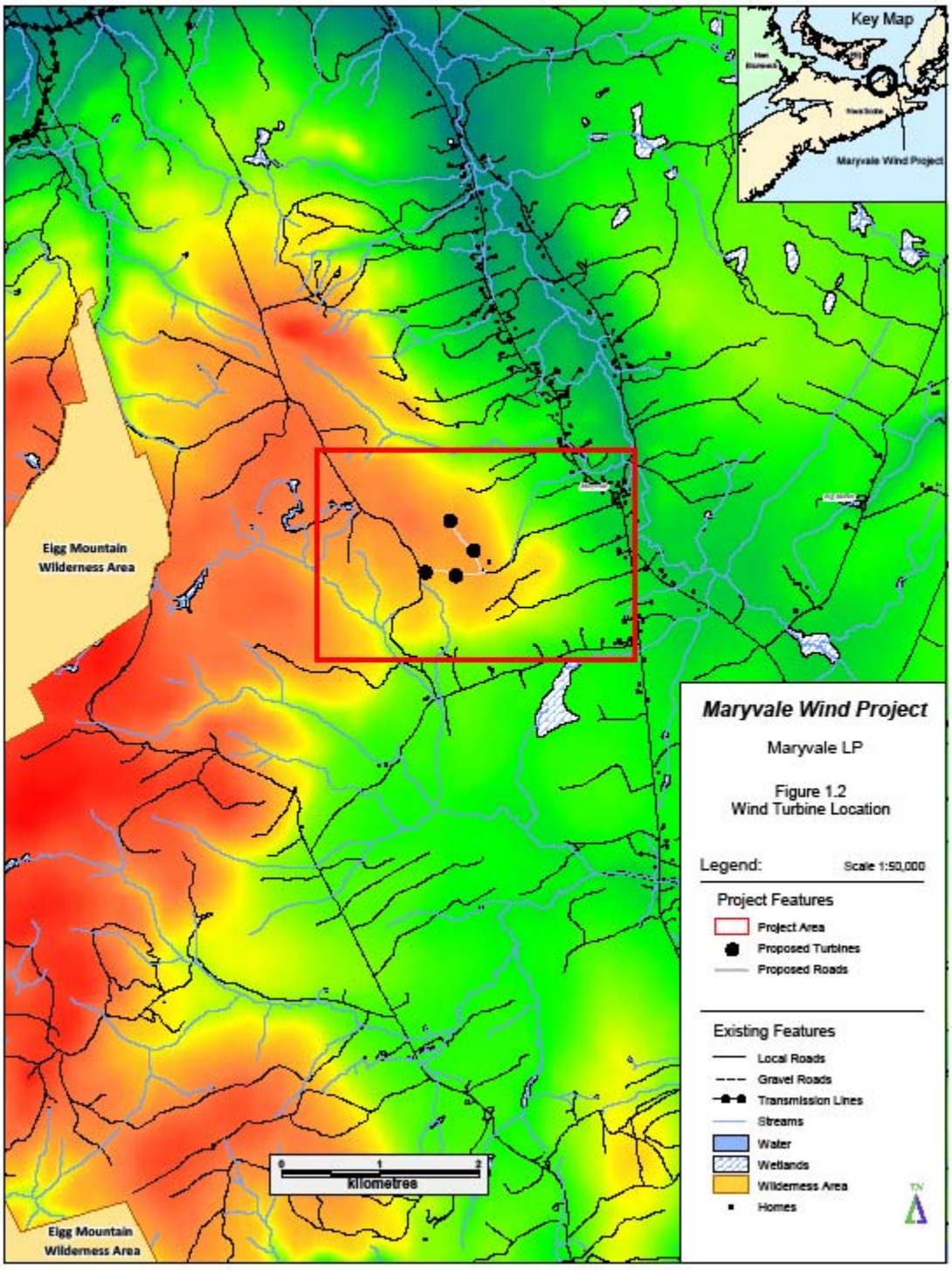

Key Map
Maryvale Wind Project
Egg Mountain
Wilderness Area
Egg Mountain
Wilderness Area
0
1
2
Kilometres
Maryvale Wind Project
Maryvale LP
Figure 1.2
Wind Turbine Location
Legend:
Scale 1:50,000
Project Features
Project Area
Proposed Turbines
Proposed Roads
Existing Features
Local Roads
Gravel Roads
Transmission Lines
Streams
Water
Wetlands
Wilderness Area
Homes

Table 1.2: Consultations Undertaken

Name	Company/ Interest	Method of contact	Concern
Numerous local residents	Revenue generation	In person, phone	Generation of revenue from leasing land for turbine placement
Mary MacDonald	Councillor for Arisaig	In person, email	General project info
Alan Bond	Clerk for Municipality of Antigonish	In person, email, phone	Locations, setback distances, tax revenue
Charles MacInnis	Department of Fisheries	In person, phone	Water crossings, fish habitat
Roger Hunka	Maritime Aboriginal Peoples Council	In person, phone	Scheduling, engagement plan, land use, potential for discoveries
Norma Prosper	Confederacy of Mainland Mi'kmaq	In person, phone, email	Scheduling, engagement plan, land use, potential for discoveries
Stephen Smith	Canadian Wildlife Services	Phone, email	Bird monitoring, location, general info, mitigation measures for bird strikes, post construction monitoring
Carroll MacAdam	Deputy Fire Chief	Phone, in person	General info, mapping and safety procedures
Greg Smith	Fire Chief	Phone, in person	Safety protocol for fire dept, mapping, general info
Chris Sampson	Cape to Cape Trail	Email	Discussion of Project and Cape to Cape Trail
Twila Gaudet	Mi'kmaq Rights Initiative	Phone, in person	Met to discuss project details & potential issues/ concerns
Technical EA Working Group	First Nations Representatives	In person	Information session

During the Open House Session, 12 local residents showed up to see the presentation and ask questions. The meeting was advertised by having posters up at the Fire Hall during the annual taxpayer's meeting, as well as during a couple of weekend events. Flyers were delivered door-to-door within 10 km on all sides of the Project area. Although only two of the meeting's attendants left comments on the comment cards provided, some others agreed to take the cards home and distribute to neighbours who could send them in to a local resident, who would then send them to

the developer with any questions or concerns regarding the proposed Project. To date, no other comment cards have been received.

The meeting covered issues such as: proximity to houses; vicinity to elementary school; economic benefits to the local community; technical specs for machinery and ancillary equipment; noise created by the machines; property values; road safety; and general support for the Project. A detailed overview of the steps taken to build a wind farm, construction schedule, general information and descriptive account of the Environmental Assessment Process and results were presented to the audience.

To date, there are no outstanding objections or concerns raised during general meetings with the local community and consultations with stakeholders.

Local representatives for the company initiated contact with landowners in the Project area to discuss potential lease agreements for turbine sites and to identify landowners who were interested in entering into long-term land lease agreements. These discussions also provided an opportunity to discuss concerns related to wind farm developments. Table 1.3 provides a summary of property identification numbers (PIDs), landowners and lease agreements which are in place for the 4 locations of the turbines for the Project.

Table 1.3: Summary of Landowners and Land Parcels

Landowner	PID	Land Agreement	Size
Ron MacGillavry Holdings	1203405	Yes	100 acres
Ron MacGillavry and Brian MacGillavry	10078822	Yes	100 acres
John and Patricia Teasdale	1203090	Yes	80 acres
Ron MacGillavry Holdings	10106581	Yes	65 acres

The Proponent has been in contact with the Municipality of Antigonish regarding the potential for setback bylaws regarding turbine placement since May 2007. To date, there has not been a bylaw implemented for such development. The nearest municipality with such bylaws is adjacent Pictou County. These setbacks have been used in determining appropriate distances from such landmarks as property lines, houses and maintained roads.

In order to assess the scope of the Environmental Assessment for the Project Registration, the Proponent has contacted and met with the Regulatory Authorities and representatives of other NGO and interest groups. These contacts were initiated over the last couple of years and the information provided formed the basis for the assessment and design of the turbine layout in accordance with the environmental features brought up during these discussions. Table 1.4 identifies the individuals, form of contact and issues of concerns addressed in these meetings. These discussions identified

the scope of the environmental program in terms of the potential Valued Ecological Components (VECs) which apply to the Project area. The identification of potential VECs led to contracting a team of experts in their respective fields of study, to identify and advice on the presence of potential VECs in the Project area.

Table 1.4: Contacts and VECs Identified

Contact	Date	Form of Contact	VEC Identified
Chris Samson	May 2009	Email	Tourism, Cape to Cape Trail
Dan Busby, (formally) CWS	December 2006	Phone, email	Migratory Birds, SARA
Steve Smith, CWS	January 2009	Phone, email	Migratory Birds, SARA
Roger Hunka, Maritime Aboriginal Peoples Council (MAPC)	December 2008	In person, phone, email	Engagement Plan for NS Aboriginals
Twila Gaudet, Mi'kmaq Rights Initiative	February 2008	Phone, in person	Project details, possible issues/ concerns
Don Julian, Michael Cox, Norma Prosper, Confederacy of Mainland Mi'kmaq	January 2007, February 2008, April 2008, respectively	In person, phone, email	Mi'kmaq Ecological Knowledge Study (MEKS)
Mark Pulsifer, DNR	April 2007	In person, phone, email	Wildlife especially Species at Risk and Mainland Moose
Alan Bond, Clerk for Municipality of Antigonish	May 2007	In person, phone, email	Tax revenue for municipality, setback distances, employment opportunities
Mary MacDonald, Council member Municipality of Antigonish	May 2008	In person, phone, email	Tax revenue, setbacks, employment opportunities, visual and noise impacts
Tammy MacLellan, Eastern District Planning Commission	March 2009	Phone	Status of setback bylaws for Municipality of Antigonish
Charles MacInnis	March 2009	Phone, in person	Fish habitat, potential water crossings

Table 1.5 lists the environmental and socio-economic issues identified in these discussions and the action undertaken by the Company to address these issues. The component studies are included in the Appendices of this document.

Table 1.5: Environmental and Socio-economic Issues Identified

Issue	Action being taken
Tax revenue to Municipality of Antigonish	Figure calculated, presented in document
Setback distances to homes	Maintained 1.5km setback
Setback distances to outside property lines	Maintained 130m setback
Setback from government maintained roads	Maintained 1.5km setback
Noise pollution	Contracted noise simulation study – no harmful noise emissions for any of closest receptors
Visual changes turbines will create	Contracted visual studies – presented in document
Mainland moose	Moose PGI survey conducted – none found
Species at Risk	Biologist contracted to survey Project area
Birds (Migratory, Breeding, Stopover)	Birder contracted to survey Project area
Flora	Botanist contracted to survey Project area
Employment Opportunities	Figure calculated, presented in document
Land-lease payments to local landowners	Figure calculated, presented in document
Water crossings, wet areas	Project surveyed, one possible crossing (proper culvert installation), avoidance of wet areas for construction of roads, foundations
Bats	Bat expert contracted to survey Project area
Archaeological sensitivities	Archaeologists performed desktop study, and subsequent field study – no issues
Aboriginal and First Nations interests	MEKS performed by CMM, Engagement Plan put into effect for remainder of planning, construction and operational phases, on-going contact with Mi'kmaq Rights Initiative

SECTION 2.0 – PROJECT DESCRIPTION

2.1 Turbine Locations for Maryvale

The locations selected for turbines are a critical element of power generation efficiency and optimal project economics. The selection of locations is also conditional on the absence of significant ecological or heritage features of the Project area. Site selection; therefore, must consider both of these elements in order to have a successful Project with minimal environmental impacts. The planning and selection process for the Maryvale Wind Project turbine locations followed an iterative approach where each site was assessed both for its energy capacity and the presence of sensitive ecological or heritage resources. Sites which were considered at early stages in the Project have now been scrutinized from an ecological perspective and locations adjusted to mitigate potential environmental impacts. The same level of scrutiny has been applied to the location of access roads in order to minimize ecological impacts on plant communities and aquatic habitat. To the extent possible, access roads follow high ground with the route selected to minimize water crossings. The site locations, listed in Table 1.1 and shown on Figure 1.2 with access road layout, have been derived at using this careful selection process.

The land required to install the Maryvale Wind Project is located on privately owned property only thus not requiring easement over Federal or Provincial lands. Private long term easements are in place to permit the entire installation of this Project, including access roads.

There is no planned second Phase of this Project, as it is proposed that it be interconnected to a distribution sized transmission grid.

All four sites have been studied for various environmental impacts including, but not limited to: visual representation (photomontages, zone of visual influence, shadow flicker analysis); noise levels at various distances and various wind speeds; avian point-counts and species identification; archaeological and Aboriginal impact studies; bat study; Mainland Moose population searches and research; wetland and waterway crossings; botanical and biological habitat; and geological conditions.

2.2 Main Project Components

2.2.1 Wind Turbine Generators

The basic components of the Project include four wind turbines with a corresponding total installed capacity of 6 MW. There will be a pad-mount transformer at the base of each turbine. They will transform the 25kV grid voltage to 600V turbine voltage. Each will be mounted on a concrete pad approximately 3m by 3m. No fencing or gating will be required. Each transformer will be housed in its own locked enclosure.

The proposed turbines are Vensys V-77. The unit is a three bladed, upwind, horizontal-axis wind turbine with a rotor diameter of 77m. The turbine rotor and nacelle are mounted on top of a tubular tower giving a rotor hub height of 61.5m or 85m. The components and dimensions of the 61.5m turbine are illustrated in Figure 2.1a and 2.1b. Service platforms are provided. The tubular tower

Figure 2.1a: External Components of the Vensys V-77 Wind Turbine Generator

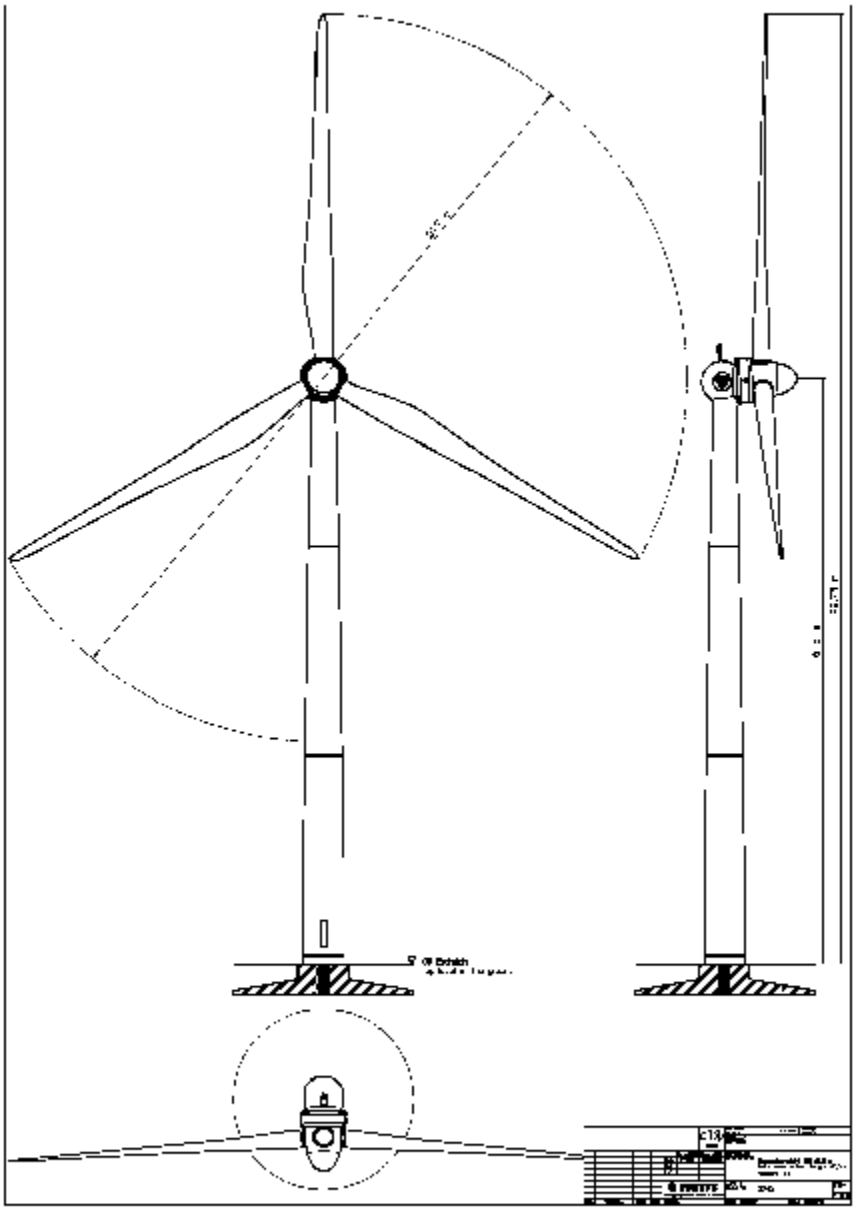
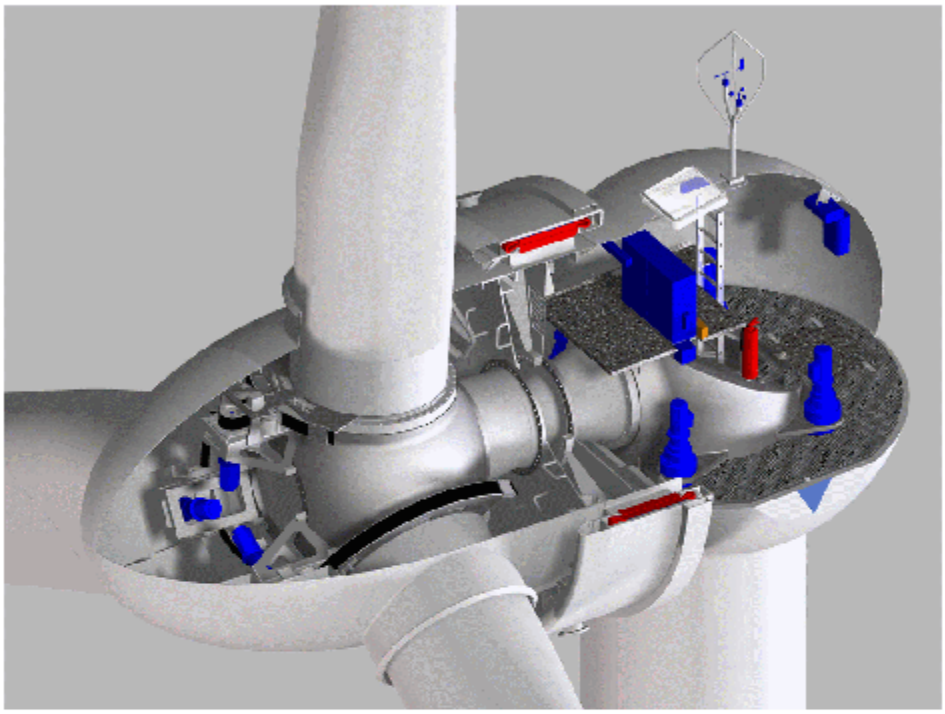


Figure 2.1b: Vensys V-77 Wind Turbine Generator – Internal Components



1 Rotor blade
2 Casted hub
3 Blade pitch system
4 Generator-rotor
5 Generator-stator
6 Yawing system
7 Wind measurement system
8 Machine base
9 Tower
10 Auxiliary crane

is tapered and manufactured in three sections from steel plates. Access to the turbine is through a lockable steel door at the base of the tower. Access to the nacelle is provided by an interior ladder with a fall arresting safety system. Interior lights are installed at critical points from the base to the top of the tower.

The VENSYS V-77 is a gearless wind energy converter and is equipped with a three-blade rotor, pitch control with a rated output of 1.500 kW. This converter generates electric current that is fed directly into the public grid. Optimum aerodynamic rotor efficiency, at every wind speed, is achieved by using variable speed technology.

Highlights:
Highly efficient multi-pole generator
- Direct coupling of the multi-pole generator to the rotor
- *No gearbox required*
- *Practical application of advanced technologies*

-Synchronous generator with permanent magnet excitation
- *High efficiency, particularly at partial load*
- *No energy losses because of an external excitation*
- *No slip rings for external excitation needed*

- External runner concept
- *Compact design, small generator diameter*

- Passive air-cooling system
- *Highly efficient cooling without any additional energy*

Blade pitch system and safety system
- Blade pitch system with tooth belts
- *Lubrication not required*
- *Minimum play in blade drive tracks*
- *Minimum wear*
- *Maintenance free*

- Double-layer capacitor for emergency re-pitching
- *No heavy lead-gel accumulators required*
- *Brush-less pitch motor*
- *Increased lifetime*
- *Maintenance free*

Turbine installation is completed by the mounting of the three-bladed rotor hub to the main shaft after the nacelle assembly has been mounted to the top of the tower. The nacelle of the turbine is constructed of fibreglass and lined with sound insulating foam. This sound insulating foam helps reduce acoustic emissions from the wind turbine.

2.2.2 Electrical Components

NSPI work includes the extension of circuit 4C-430 by approximately 3km to the WTG site and the installation of interconnection facilities including control and communications between the Generating Facility and NSPI Supervisory Control and Data Acquisition (SCADA) system.

The interconnection point is located on NSPI distribution line 4C-430 at a point near 45^0 44.08' $W62^0$ 02.63'. A substation for this wind project is not required as the step-up transformers input electricity directly into the distribution grid for NSPI.

A three week construction period is anticipated to complete the main components and a two week commissioning period will be required after individual turbine commissioning is completed. The wind turbine itself produces 600V and 3 phase power and is sent via underground cables through the foundation base to a transformer pad outside the turbine.

The overhead electrical collector lines will follow the road system close to the ditch to provide reliable ongoing maintenance access. The poles will be placed by an excavator crew using standard methods (i.e. blasting, drilling and/ or jackhammer). Poles will be approximately 55m apart; approximately 55 poles will be required to complete the Project. The collector line circuits will be completed within a two-three week period. Timing and installation will work simultaneously and in conjunction with the turbine erection crew. (See Table 2.1: Tentative Construction Schedule)

2.2.3 Ancillary Components

The delivery roads are currently in place from previous land use and some new roads will be constructed between turbine locations. Figure 1.2 shows the turbine layout and access roads of the wind farm along with other site features. To the extent possible, existing wood lots roads will be used, with appropriate upgrades to meet the load requirements for trucks transporting materials to the turbine sites. The existing road system has no stream crossings. There will be one minor crossing of a brook where the installed culvert will be properly sized to allow free flow of water during a one-hundred year return flow. This crossing location can be seen in Figure 2.2.

The Proponent has contacted NSE in Granton, NS and DFO in Antigonish, NS to present this Project in its early stages and is fully aware of the water crossing and wetland disturbance requirements in force. The Company employs a contractor who holds a license to install water crossings in accordance with NSE Requirements.

2.3 Construction Activities

2.3.1 Surveying and Site Preparation

Site survey and design to determine the best possible locations within the study areas shown in *Figure 2.2: Study Area Boundaries* has been undertaken since February 2008 with consideration given to Valued Ecological Component studies and maintaining voluntary setback distances.

2.3.2 Access Roads

The access roads will be upgraded and built to accommodate the size requirements of the crane and the load specifications to support the delivery of approximately 45 flatbed truck loads of turbine and crane components. The roads will be approximately 6m wide with ditches and culverts added where required to allow for proper drainage. The gravel used to supply the 6" compacted surface will be obtained on

insert figure 2.2 study area boundaries

site from borrow pits and/or along the side of the construction located within the Project boundary. The surface soil and grubbing will be re-located to borrow areas along the road side and graded to prevent erosion and sediment runoff. The ditches will be constructed along the road edge following provincial guidelines and procedures to control for surface water runoff. Crossover culverts or water-bars will be installed under the roads where necessary. This practice ensures that ditching/ roadways do not eliminate gradient flow of water.

To access the turbines, approximately 1.75 km of new road construction will be required and approximately 2.0 km of existing, previously built roads (to support logging activities) will be upgraded. These roads will be upgraded with gravel and ditched to control surface water in all sections. Between turbine locations, it may be necessary to widen roads to accommodate crane travel. In this case, road width would be limited to 10m with ditching as required for drainage.

Figure 2.3 shows the design features which will be incorporated in the construction of access roads for the Maryvale Wind Project.

2.3.3 Water Crossings, Erosion and Sediment Control

There will be one water crossing required for access roads for the Maryvale Wind Project. Culvert size was determined using the 100 year peak flow and based on the drainage area up-gradient of the crossing, a standard headwater depth of 1.5m and a rainfall coefficient of 1.75. The calculation of culvert size was based on the methodology provided in the Nova Scotia Environment, Watercourse Alteration Certification Training Manual, November 2007, *Headwater Depth for Round CSP & SPCSP Pipe Culverts with Inlet Control.* Figure 2.4 illustrates the culvert design features.

The installation will be an open-bottom culvert as the grade of the tributary is much steeper than regulations allow for closed-bottom culverts.

It is important to note that the crossing is going to be newly installed and sized properly to allow for peak flow. The access road for the delivery of the turbines and ancillary equipment will be 6m wide, making it necessary for the culvert to be at least 7m wide. These calculations were calculated by the Company to ensure the culverts met the Project requirements and fell under regulations for NSE. Figure 2.5 is a photo of the existing brook that runs through the Project area currently. It is an unnamed tributary to North Rights River. This photo was taken by Bob Bancroft, Project Biologist, on November 25, 2008.

Figure 2.3: Design Features for Access Roads

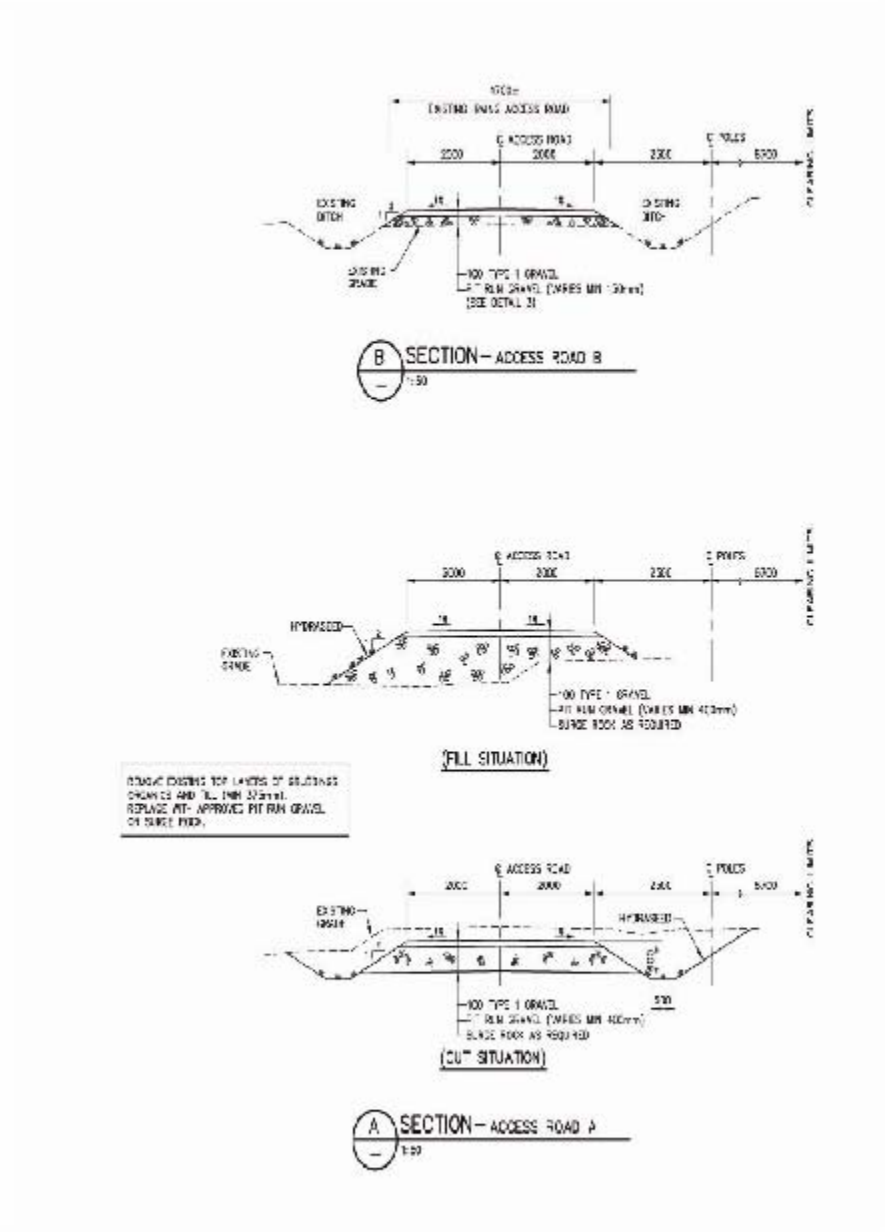
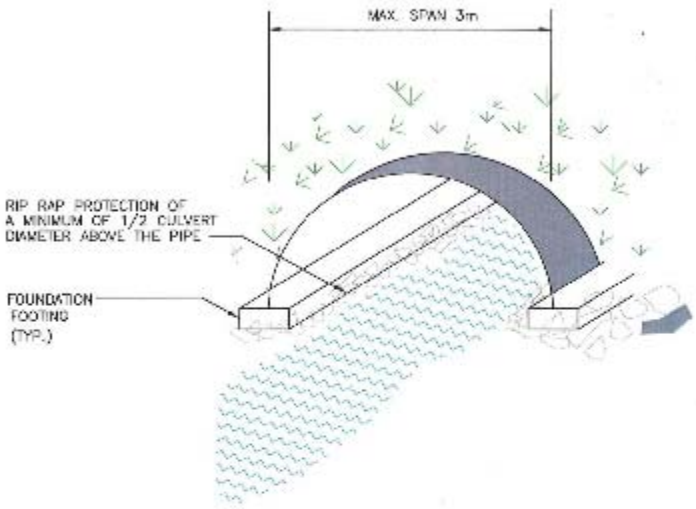


Figure 2.4: Design Features for Open bottom Culvert



Design Features for Closed Bottom Culvert

Figure 2.5: Photograph of stream to have culvert installation, Maryvale Wind Project

The culvert installation, as well as the crossover culverts and water bars will be done under a blanket permit, in the dry, with no destruction or harm to streambeds or fish habitat. In accordance with NSE regulations, an erosion control plan which includes mitigation of potential sediment transfer into watercourses will be in place during construction activities and throughout operation and decommissioning of this Project.

General Measures to Protect Fish and Fish Habitat

- All in-water work will be done while adhering to NSDNR and NS Department of Fisheries and Aquaculture, Inland Fisheries Division, fisheries timing windows for each specific water body to protect local fish populations during their spawning and nursery periods.

- All materials and equipment used for the purpose of site preparation and Project construction shall be operated and stored in a manner that prevents any deleterious substance (i.e. petroleum products, silt, etc.) from entering the water.
- Any stockpiled materials will be stored and stabilized at least 30m from any watercourse.
- Vehicle and equipment re-fuelling and maintenance will be conducted at least 30m from any watercourse.
- Sediment and erosion control measures will be implemented prior to construction and maintained during the construction phase to prevent entry of sediment into the water.
- All sediment and erosion control measures will be regularly inspected to ensure that they are functioning properly and are maintained and/or upgraded as required.
- If the sediment and erosion control measures are not functioning properly, no further work will occur until the sediment and/ or erosion problem is addressed.
- All disturbed areas of the construction site will be stabilized immediately and re-vegetated as soon as conditions allow.
- Sediment and erosion control measures will be left in place until all areas of the construction site have been stabilized.

Measures to Protect Fish and Fish Habitat when Constructing Overhead Power Lines

- Avoid work during wet, rainy conditions
- The removal of select plants may be necessary to accommodate the overhead line. These removals will be kept to a minimum and will not be wider than the right-of-way.

Measures to Protect Fish Habitat when Constructing New Culverts

- Water crossing culverts will be embedded a minimum of 10-20% of the culvert diameter, below the natural channel both upstream and downstream or install bottomless culverts.
- Water crossings will be backfilled with substrate material that is consistent with the existing substrate size and texture and will be maintained downstream of the de-watered work area during all stages of work.
- All sediment and erosion control measures will be inspected weekly. Additionally, the measures will be inspected during and immediately following rainfall events.

2.3.4 Turbine Foundations

Excavation for the turbine foundations will begin by removing topsoil and placing it in a dry pile., Topsoil will later be replaced over the area to provide a natural soil base for regeneration of indigenous plant species. The foundation requires digging to a depth of 3m and a diameter of approximately 17m wide, to the severely fractured bedrock layer typically found in this region under the topsoil mat. The bedrock surface will be levelled, compacted and covered with a 100 millimetre thick levelling layer of concrete to allow an engineered surface to install the bolt ring section and the reinforced concrete structure. When

the foundation construction is complete, the topsoil and gravel mixture will be replaced and compacted in accordance with the engineering requirements for soil density.

The foundations are designed and approved by the turbine manufacturer and certified in Nova Scotia as required. Tests such as concrete air entrapment and structural integrity will be performed by a certified local testing company. The concrete for the foundations will be prepared at a certified batch facility and delivered on site via concrete pumping trucks on a continuous basis during the pouring of the four foundations.

2.3.5 Delivery to Site

Delivery of the tower sections and main turbine components for the Maryvale Wind Project will commence as early as possible in August 2009 as described in Table 2.1: Tentative Construction Schedule. This date will ensure that all road restrictions imposed by the Department of Transportation and Infrastructure Renewal (TIR) are not exceeded resulting in construction delays. Typically, in April or May and as early as March (as is the case in 2009) when the frost recedes, heavy vehicles may cause damage and erosion problems. When this occurs, the shoulders of the road become unpredictable and can lead to vehicle rollover. For safety reasons and logistics, delivery will take place only when safe road conditions are met. The benefits of a clean, gravelled road surface will reduce the potential for negative impacts such as: dust and airborne pollutants; mud on the employees work boots causing a slip or fall; truck tires transferring mud to Highway 245; and cranes driving in between turbine sites and possibly sliding off the roads.

The transportation of wind tower components to the site will include approximately 7 trucks per turbine. Figure 2.6 shows the route selected for transporting turbine components through Nova Scotia following their arrival at the Port of Halifax from Germany.

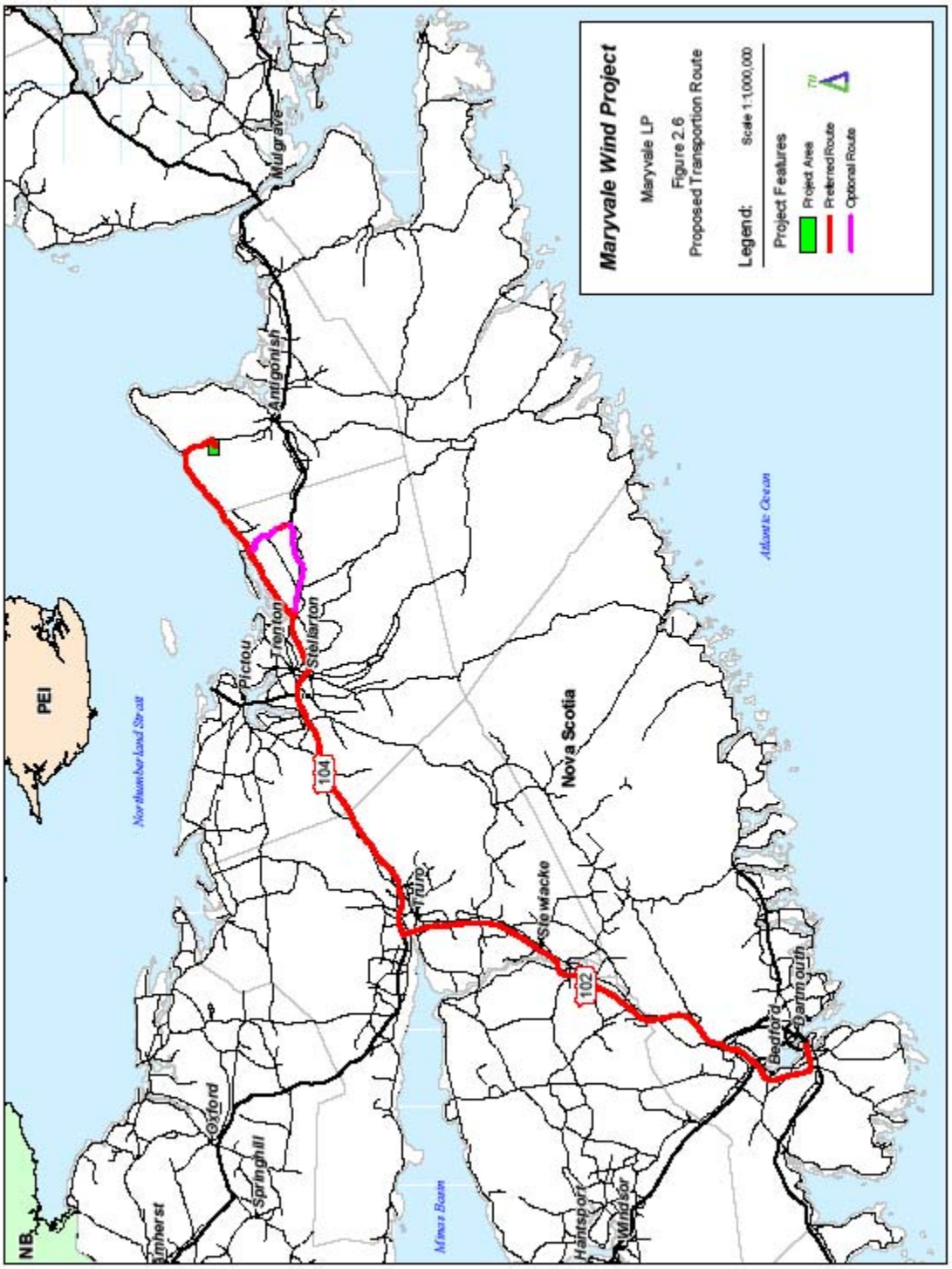
The transportation of the 300 ton erection crane and the crane components will require up to 17 flatbed trucks. The 75 ton and 150 ton hydraulic wheeled cranes will unload the trucks and place each turbine on the setup pad located at each individual turbine location. The first tower section may be placed during unloading for convenience and to minimize the size of the layup area. The erection crane will use a tailing crane to erect the two top tower sections, the nacelle, then the hub and blades will be placed last to complete major construction.

2.3.6 Site Clean Up and Waste Management

Site clean up includes all types of waste removal (oil, grease, garbage, human waste, organic waste and recyclables) and will be carried out in accordance with the requirements of the municipal landfill regulations. A qualified waste removal company will be hired locally to ensure proper procedures are in place throughout all stages of development, construction and operations of the Maryvale Wind Project.

2.3 7 Private Gates

Gates will be required over private land where the landowner has requested. All access roads are privately built and new road construction will also take place on privately owned land. If gates are


Maryvale Wind Project
Maryvale LP
Figure 2.6
Proposed Transportion Route
Legend:
Scale 1:1,000,000
Project Features
Project Area
Preferred Route
Optional Route
PEI
NB
Nova Scotia
Northumberland Strait
Atlantic Ocean
Minas Basin
Mulgrave
Antigonish
Pictou
Trenton
Stellarton
104
Truro
Sie wacke
102
Bedford
Dartmouth
Windsor
Hantsport
Oxford
Springhill
Amherst

installed, proper signing will be in place to ensure safety to ATV, snowmobile, and other recreational users.

2.3.8 Parking and Lay-down Areas

All machinery and turbine components will use existing and/or proposed roads or crane pads for parking and lay-down area. The sites will be complete prior to accepting delivery to allow delivery of the components directly to the individual sites, preventing unnecessary extra movement, lay-down areas and cost.

The lay-down areas will be allowed to re-vegetate naturally. If planting must occur to re-vegetate, the proponent will ensure a variety of species of plants native to the general project area will be used. Should seed mixes not be available, the proponent ensures that plants used in re-vegetative efforts are not known to be invasive.

2.4 Construction Schedule and Major Event Planning

In order to construct the proposed Project, a series of events will need to be undertaken. This EA considered the following construction events as part of the Project scope:

The tentative construction schedule and major events are described in Table 2.1.

Table 2.1: Tentative Construction Schedule

Item	Anticipated Start Date	Anticipated Completion Date
Tree removal	August 14, 2009	August 19, 2009
Clearing and grubbing	August 14, 2009	August 19, 2009
Earth moving – roads	August 19, 2009	August 24, 2009
Earth moving – foundations	August 19, 2009	August 24, 2009
Culvert installations	August 19, 2009	August 19, 2009
Road construction	August 19, 2009	August 24, 2009
Foundation construction	August 24, 2009	August 28, 2009
Pole installations	August 24, 2009	August 30, 2009
String the conductor	August 30, 2009	September 3, 2009
Erection of turbines	August 24, 2009	September 4, 2009
Attachment of blades	September 1, 2009	September 5, 2009

2.5 Operations and Maintenance

2.5.1 Maintenance Management

The daily operations and maintenance will be coordinated by the Proponent though a private maintenance and overhaul facility located offsite. The turbines will operate 24 hours a day and are subject to calendar maintenance and inspection schedules. Malfunctions and parts replacement will be assessed on an individual basis. A spares inventory will be provided by the manufacturer at the maintenance facility and will be available for the recovery of unexpected breakdowns. For maintenance

planning, access to the site will be controlled and managed through private land under the rules outlined in the individual easements. Site access will be carried out on routes pre-planned to reduce excess travel and impact on existing use.

2.5.2 Emissions and Waste Discharge

During operations and maintenance of the proposed Project, emissions will be minimal. The wind turbines, once constructed, generate zero air emissions. Vehicle emissions will be reduced by pre-planned maintenance activities and pre-planned access routes. All waste products will be transferred to the maintenance facility and disposed of in accordance with the municipal waste regulations for collection and safe disposal.

2.5.3 Aeronautical Obstruction Lighting

All four turbines will be lit under the Aeronautical Obstruction Lighting Plan. This is to ensure the boundary of the Project is clear to all aircraft. This is the minimum number of lights Transport Canada will allow under the regulations.

The proposed Aeronautical Obstruction lighting will be installed in compliance with Part VI of the Canadian Aviation Regulations 2007-2 Standard 6321.19 as administered by Transport Canada. The type of lighting will consist of medium intensity (2000 candela) red aviation lights, flashing at 20 flashes/ minute during the night and off during daylight hours (Appendix A-2: Lighting Specs). This complies with CL-864 of Appendix B of the Standard. Figure 2.7 shows the layout of the Aeronautical Lighting Plan as applied for in June 2008. On January 8, 2009, Maryvale Wind Project received approval for its application, file #08-1431. The approval for both Nav Canada as well as Transport Canada can be found in Appendix A-1.

2.6 Decommissioning

The expected useful life of a turbine is 30 years. The output production compared to the running cost in 30 years will determine the need to replace major components to increase productivity or to install new turbines. It is not uncommon for well-maintained projects to have a longer useful life than the design life. If during its useful life, the Project is no longer required to meet the Province's renewable energy needs, turbines can be dismantled and transported to another location.

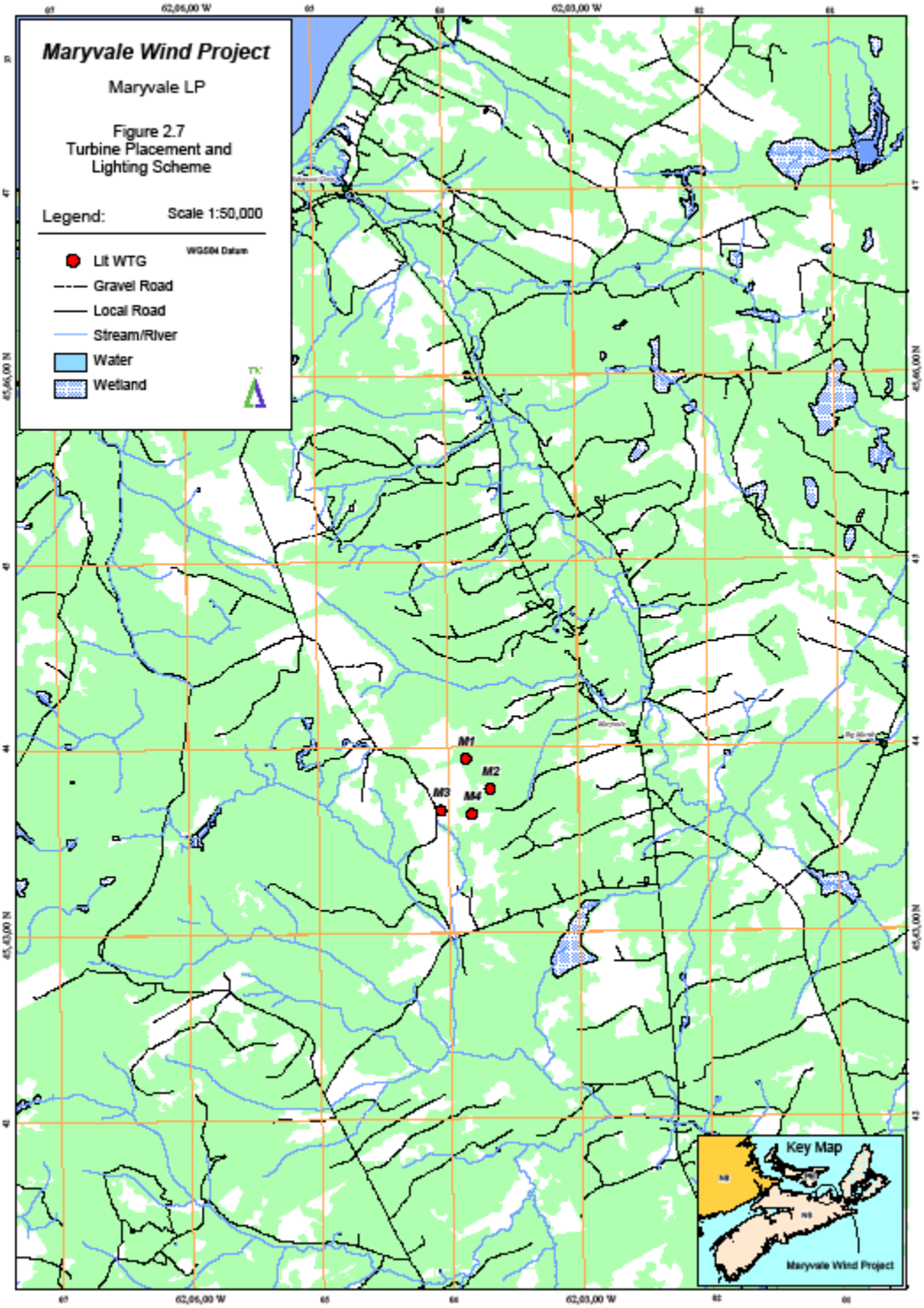
Although no definitive decommissioning plan has been finalized at this stage in the planning process, it is foreseeable that at the end of the Project's useful life, the structures can be dismantled. The steel towers and/or maintenance shop/ control building could be kept to support another wind power generation project, converted to an alternate use, sold to a third party, or dismantled. Dismantling activities for the Project could involve the following works:

- Removal of mechanical and electrical equipment
- Removal of ancillary facilities
- Removal of concrete foundation to a depth that does not interfere with original land use operations

- Demolish remaining site structures
- Fill and grade the turbine site with suitable fill
- Replace topsoil and cultivate and/or seed as required (native and non-invasive species)

The procedures for decommissioning will be the reverse deployment of the construction activities and timing schedule (see Table 2.1). The road system will remain in place for landowner use.

As documented throughout this EA, the Project has been designed to minimize the risk of contamination during its operational lifespan. Containment and storage areas will limit contamination. Any remedial clean-up during the decommissioning or asset transfer will therefore also be limited. Provided the Project is operated and maintained in-line with industry best practices there should be no significant environmental liabilities associated with clean-up or remediation. Regardless of the ultimate outcome, all decommissioning activities will be performed in compliance with the applicable regulations in force at that time.


Maryvale Wind Project
Maryvale LP
Figure 2.7
Turbine Placement and
Lighting Scheme
Legend:
Scale 1:50,000
WGS84 Datum
Lit WTG
Gravel Road
Local Road
Stream/River
Water
Wetland
M1
M2
M3
M4
Key Map
Maryvale Wind Project

SECTION 3.0 – SCOPE OF THE ASSESSMENT

In order to determine the scope of the Project, the proponent has described the Project and sought opinions from the public and regulators on the potential environmental and socio-economical issues related to the Project. Tables 1.2 and 1.4 identify those individuals and groups contacted and who offered comments on the issues. These comments provide the basis for identifying the Valued Ecological Components (VECs) which must be considered in the assessment.

The assessment must also consider the boundaries of the study area which are dependent on characteristics of individual VECs, guidance from environmental guidelines and the regulations and provisions of provincial and municipal building codes and regulations.

3.1 Study Area Boundaries

All lands for the Project are located within a Project boundary identified in Figure 2.2. The study area is different for each individual VEC and area of concern. Separate study areas are listed below with the special boundaries for the individual studies. The study findings are described in Sections 4 and 5. The following is a summary of the environmental studies programs and special boundaries:

- **Flora:** Botany, wetlands and waterways surveys have been conducted on a 40m wide swath along all existing and proposed access routes. These surveys have also been conducted at individual turbine locations at a 75m radius from the GPS turbine coordinates as listed in Table 1.1: *Maryvale Wind Project: Turbine Locations: Coordinates and Elevations.* (See Appendix B-1)
- **Visual:** Photomontages were created for the posters used in public presentations and in this document. The locations were chosen at key points of interest to the community: the elementary school (the closest building to the Project) at a distance of 1.5km to the nearest turbine; a point heading North towards the Project with a distance of approximately 12 km from the nearest turbine; and a point heading South on the Sunrise Trail with good visibility located at a distance of 5km from the nearest turbine. Figure 4.1 is a visual representation map indicating the number of turbines visible for a 50km radius around the center point of the Project. Because the maximum number of turbines visible at any location is four, the visual effect was considered to be minimal in terms of negative impact. Due to the rolling terrain surrounding the Project area, there are only a limited number of areas where one might see all four turbines. Photo Montages were done by Al-Pro of Germany/ Nova Scotia. This involved selecting locations from Figure 4.1 Zone of Visual Influence, and physically going to that location, taking a photograph with a specific set of ranges using a special camera then running a computer program to illustrate, to scale, what four Vensys V-77 turbines would look like from each of the selected vantage points. These Photomontages can be seen in Figures 4.3a, 4.3b and 4.3c.
- **Sound:** A computer analysis was performed by Ortech Power using the decibel (dB) rating of the Vensys 77 turbine at the maximum noise levels. Sound levels from existing data from the Vensys 77 models were extended approximately 2 km away from the proposed turbines with an assumed hub height of 85m. The simulation was run using the noise data for the Vensys 77 turbine at several different wind speeds. The turbine locations and points of reception can be

seen in *Figure 4.2a-d: Noise Simulations*. The results indicated that noise levels at receptor points surrounding the proposed Project are well within normal ranges of ambient noise and the noise created by the turbines is not an issue at distances where these receptors are. (See Appendix B-2) It must be noted that in the survey of receptor points, the receptors included a small hunting camp owned by one of the landowners involved in the Project. This hunting camp is not considered a dwelling as it is rarely occupied, does not have power or plumbing and does not have a civic number. This 'building' is noted as building #12 and highlighted in yellow in each of the simulations as it exceeds sound levels normally encountered under regular ambient levels (as can be expected with a building within 250m of four wind turbines).

- **Avian Species:** Bird surveys using various point count stations were carried out within a radius of 2km from the center point of the Project. These were done over a full one year period, starting in April 2008 and finishing in April 2009. Refer to Appendix B-3 for the summary study results and recommendations. It has been found that only one species of concern has been observed, the Olive-sided Flycatcher. There are some raptors using the area for foraging as well as expected species for this region of Nova Scotia.
- **Mainland Moose Population:** As stated in Section 1 of this document, the initial location for the four turbine wind Project was rejected by the company due to the presence of Moose sign. The current locations were chosen due to the lack of evidence of Mainland Moose activity over the Project footprint. A PGI transect search was performed in May of 2008 with a radial pattern stemming from the center point of the Project. These transect locations can be seen in Figure 4.4. (See Appendix B-4).
- **Bats:** The bat study (field work portion) will be performed in August of 2009. This is because the anticipated study in August of 2008 didn't occur due to complications with the Met Tower, which houses the brackets to lift the Bat Detection equipment. Echolocation equipment will be used to monitor the area for 4-6 weeks during core migration. Once the Bat Study is complete, it will be added to this document as an Addendum. Hugh Broders, a bat expert from Nova Scotia, has completed the desktop study (Appendix B-6); as well he will be conducting the field work portion of the bat study. There have been two bat studies performed at 15km west of the proposed Project, and 65km west. Neither study yielded a migrating population and there have been no indications that the Maryvale site will be part of a migrating path. If these expectations are found to differ Maryvale Wind LP will agree to recommendations made by Hugh Broders, and could possibly include shutting down the turbines for the migration window each fall. The results of the field work of August 2009 will give a more accurate representation to what the Company must commit to, to avoid any negative environmental impact to bats in the area, whether migrating or foraging.
- **Archaeology:** Desktop and field surveys were carried out on all proposed areas of disturbance. Aboriginal land and European settlement features such as cemeteries and homesteads are the primary concern in this area. The focus for the construction phase is along the easements and on the turbine foundation areas. As mitigation, where archaeologically sensitive sites are detected, construction work is subject to a work stop order procedure as laid out in Section 6 of this document. (See Appendix C-1). The desktop and field studies were performed by Davis

Archaeological Resources Inc. and found absolutely nothing of significance within the entire proposed Project boundary.

- **First Nations:** A Mi'kmaq Ecological Knowledge Study (MEKS) was performed for the Maryvale Wind Project area, by the Confederacy of Mainland Mi'kmaq (CMM). Research and interviews with local knowledge holders were conducted over a period of time by expert members of the CMM. Field studies took place to determine any existence of traditional, medicinal or spiritual biology in the area which may be disturbed. There were no discoveries of significance in the report, which was completed in September 2008. (See Appendix C-2). Meetings were also held with Twila Gaudet from the Mi'kmaq Rights Initiative (KMK) to discuss project details and any issues or concerns which may be posed by the implementation of this project. This correspondence is further discussed in *Section 4.3.6 Aboriginal Interests.*
- **Nova Scotia Aboriginals:** The off-reserve population of Nova Scotia Aboriginals is governed by a separate entity than the CMM known as The Maritime Aboriginal Peoples Council (MAPC). There have been meetings and conversations initiated by both sides to maintain open communication between the Company and MAPC for issues such as hunting, fishing, fowling or gathering which may take place during the construction or operational phases of the Project. As a result the Company has formulated an Engagement Plan which covers both First Nations and Aboriginals in the province of Nova Scotia and any concerns which may arise as a result of work on the Project. (See Appendix C-3).

3.2 Provincial Project Categorization

Environmental assessment in Nova Scotia is the responsibility of NSE under the *Environmental Impact Assessment Regulation* made pursuant to the *Environment Act.* Schedule A of that regulation defines those 'undertakings' that may result in a significant environmental impact. Included is "all electric power generating facilities with a production rating of two megawatts or more" are required to submit a registrations document following the guidelines provided in the *Proponents Guide to Wind Power Projects: Guide for preparing an Environmental Assessment Registration Document, May 2007.* Under Schedule A of the Nova Scotia Environmental Assessment Regulations, the Project is considered a Class 1 Undertaking.

To ensure that the Minister has the proper information to make an informed decision in accordance with Section 12 of the Environment Act, this document provides details on the following:

1. The location of the proposed turbines in Maryvale, Antigonish County, Nova Scotia
2. The size and scope of the proposed undertaking
3. Reference to the meetings and consultations that have taken place
4. Steps that have been taken by the Proponent to address environmental concerns
5. Potential environmental effects associated with the construction and operation of the proposed wind turbines
6. Detail of the proposed schedule, and
7. Details on existing land use in the area

3.3 Federal Project Categorization

Since an application has been made to NRCan for Eco-energy funding, the proposed Project is subject to the conditions and requirements of the Federal Canadian Environmental Assessment Act (CEAA). This review is conducted in conjunction with the Provincial registration and assessment process cited in Section 3.1. The federal review process addresses those issues under federal jurisdiction. This document includes those issues pertaining to the federal domain.

For the Project, NRCan is the responsible Authority (RA) and this responsibility falls to this agency to ensure that the screening report is carried out in compliance with the CEAA. The RA's determination is not whether to proceed with the Project, but rather concerns the likelihood of significant adverse environmental effects. The three determination options available to the RA are:

1. The Project is not likely to cause significant adverse environmental effects – following this determination the RA may exercise any power or perform any duty or function that would permit the Project to be carried out in whole or in part
2. The Project is likely to cause significant adverse environmental effects that cannot be justified – following this determination the RA may not exercise any power or perform any duty or function that would permit the Project to be carried out in whole or in part
3. It is uncertain whether the Project is likely to cause significant adverse environmental effects, or the Project is likely to cause significant adverse environmental effects that may be justifiable, or public concerns warrant referral to a mediator or review panel [1]

Following any of these determinations the RA must refer the Project to the federal Minister of the Environment for a referral to a mediator or review panel.

3.4 Study Objectives

Working within the federal, provincial and municipal approval processes and consistent with NRCan's scope of study, the main objectives of the EA are threefold:

1. To identify, define, and assess the potential effects of the Project on VECs. The VECs identified for study represent environmental features that were known to occur or had a reasonable probability of occurrence within the study area, and which subsequently could be affected by the Project (e.g. Wetlands, avian species, terrestrial flora, etc.). VECs selected for assessment within the study area are discussed in more detail in Section 5 and the technical appendices. This approach of focusing on pertinent VECs/key issues for assessment is consistent with the International Association for Impact Assessments (IAIA) best practice criterion of 'focus'.
2. To ensure environmental considerations are explicitly addressed and incorporated into the planning, design and decision-making processes.

[1] *Canadian Environmental Assessment Act (CEAA), 2007*

3. Considering objectives one and two, to design a Project follow-up and monitoring program that contains plans to prevent, mitigate and compensate for the potentially adverse environmental effects of the Project.

3.5 Methodology of Environmental Screening

A key component of the EA methodology is the identification and description of the pre-project baseline conditions. During the preparation of this EA, primary and secondary data collection activities were undertaken to determine key baseline conditions in and around the proposed Project. These studies are referenced in the following Section *(Section 4: Description of the Existing Environment*). The complete studies are presented in the appendices. Each study method was based upon the best practicable science and tools available at the time of survey and through consultation with the Agencies listed in Table 1.2.

3.6 Uncertainty and Data Gaps

Identifying uncertainty and data gaps is important when evaluating the occurrence and significance of potentially adverse environmental effects and their probabilities. In terms of incomplete and unreliable knowledge during writing of the EA, it was determined that existing information about the study area was insufficient for the purposes of the EA. Thus, background data collection studies and desktop work was completed to provide a description of the baseline conditions. The field-based information, collected on the bases of best practicable science and industry accepted methodologies, is considered reliable and suitable for use within the EA. The completion of these background field studies has minimized both uncertainty and data gaps related to the proposed Project and the assessment of its potentially adverse environmental effects.

SECTION 4.0 – DESCRIPTION OF THE EXISTING ENVIRONMENT

Section 4: *Description of the Existing Environment* is based on the discussions and information from stakeholders and regulators which were identified in the Scoping Study (Section 3). This information was used to identify VECs and site specific component studies necessary for the analysis of potential Project specific impacts on these VECs. The findings of these studies were integrated into the Project design through revisions to site plans for turbine locations and access road layouts. This section describes the existing environment of the Project area, identifies VECs and provides a brief summary of their characteristics. Impacts on the VECs and socio-economic issues are identified and evaluated in more detail in Section 5 with mitigation options.

4.1 Aquatic Environment

"Maryvale is located in the elevated hilly areas south of the Cape George area. Some headwaters are located in this area, although the Project has been sited so that only one water crossing installation will have to take place for the construction phase. There are no lakes in this area.

No stream surveys pertinent to this region were located in a literature review of the Inland Fisheries Division Library of the NS Department of Fisheries and Aquaculture.

A network of roads associated with a hunting camp and personal fire wood removal exist in the Project area. This network of roads is currently in place and no culverts have been installed to date. The forested headwater stream is small but contains clear, cold water and offers classic speckled trout headwater habitats for spawning and rearing downstream. A number of small resident trout may be old enough to contribute as breeders and fall spawning adults may move upstream into this area."[2]

4.1.1 Surface Water and Seepage Areas

Field surveys encountered places where groundwater seepage is evident on the forest floor. These were identified in Taylor's vascular plant survey. Mr. Taylor reviewed these areas during his field surveys and concluded that these sites contain terrestrial rather than aquatic vegetation as ground cover. No sites visited near the proposed turbine locations would fall under the definition of wetland as presented in *A Proponent's Guide to Environmental Assessment,* or under the description provided by the *Federal Policy on Wetland Conservation,* Environment Canada.

Figure 2.2 shows the locations of streams, wet areas, and water crossings. The culvert will be a standard open bottom structure. The proponent has decided to limit the use of a CSP tubular structure as the grade at which the stream crosses the proposed road is steeper than the allowable .5% grade. The details used to calculate the drainage area and peak 100 year return model used to size the culvert were the standard as recommended by NSE. The sizing calculation amounted to a smaller culvert size, but in consultations with NSE officials, it has been decided to go with a minimum of 18".

[2] Bob Bancroft

4.2 Terrestrial Environment

Maryvale is located in the eastern edge of the Highlands. The Project is bound by small communities in all directions, although the nearest houses and buildings are a minimum of 1.5km from any nearest turbine. The James River Watershed is to the west of the Project and the town of Antigonish is about 20 km south of the Project. Some higher elevations of the mountainous region support a hardwood forest composed of Sugar Maple, Yellow Birch and to a lesser extent Beech. On shallow soils, Balsam Firs as well as Red and Black Spruce are found. Hemlocks were not found. The area was settled in the 1800's when farmsteads were cleared. This has traditionally been a historically active area being near meeting places for First Nations, and settlements of Scottish immigrants who were the first Europeans to arrive in Nova Scotia.

Soils are categorized by soil scientists as Class 7meaning they have no capability for arable culture or permanent pasture. Farming along the top of the hilly areas has not been in practice in the area for a long time, although pastures can be seen along the lower elevations along the Sunrise Trail. The remaining forest area has been logged since the 1900s and continues today as either industrial sized operations or household sized amounts of firewood being removed by private landowners. The areas which have been cut have been left to regenerate in Balsam Fir.

4.2.1 Flora and Botany

A detailed study entitled "Vegetation of Site Proposed for Wind Turbines for Maryvale, Antigonish County, Nova Scotia" was undertaken by Barry Taylor of Saint Francis Xavier University during late spring and early summer 2008 (See Appendix B-1). The survey encompassed the four turbine locations with a 75m radius search around each one, and access routes to each turbine covering a 40m swath.

The study found Dwarf Ginseng, which was expected to be found. This plant is listed as yellow under the COSEWIC listing but is quite common in the area, therefore making it locally abundant although regionally sensitive.[3] The location of this biological feature was not in an area which will need to be cleared for roads or lay-down and foundation areas for the turbines.

The botany study showed that there is very minimal negative environmental impact in terms of removal of botanical species of interest.

4.2.2 Terrestrial Animals

"Due to the relatively small project area, wildlife is looked at in a more regional manner, noting that the size of disturbance is minimal in comparison to typical forestry operations. The access roads for the turbines are already in place, and the areas to be cleared make up less than 10 acres all together. For this reason habitat fragmentation is not considered likely to occur with the Maryvale Wind Project.

The wildlife in this region is supported by the climate, geophysical features and habitats that have been previously described. Notably, there are natural hardwood habitats, some remaining old field White

[3] Taylor: *Vegetation of Site Proposed for Wind Turbines for Maryvale, Antigonish County, Nova Scotia*

Spruce, younger softwood and mixed wood habitats as well as cutovers. Large mammalian species in this area include black bear, white-tailed deer, Mainland Moose, coyote, bobcat, otter, fisher, snowshoe hare, mink, muskrat, short-tailed weasel, beaver, porcupine, northern flying squirrel, red squirrel and chipmunk.

Striped skunk, red fox and raccoon may also be found outside of the Project boundary. A variety of smaller mammals including mice, voles, shrews and the star-nosed mole inhabit the forest floor and woody debris on it.

Seeps, small (first-order) streams, and the riparian land around them are important habitats for a variety of amphibians – frogs and salamanders. Probable inhabitants include Northern Spring Peeper, Green Frog, Wood Frog, Northern Leopard Frog, Eastern American Toad, Blue-potted Salamander, Yellow-spotted Salamander and Eastern Red-back Salamander. These species are based on the authors experience as a regional biologist for the area. Maritime Garter Snakes are certain inhabitants as well. Because the total area being excavated for road construction and upgrades and foundations does not exceed 5 acres and does not occur in any wet areas, this project's potential negative impact on mammalian and amphibian species is very minimal."[4]

4.2.3 Birds

Birds are vulnerable to disturbance during land clearing operations before the installation of turbines. They can suffer injury or death if they fly into moving turbine blades. They can be particularly vulnerable during spring and fall migrations.

A Bird Monitoring Study has been undertaken by Bruce Stevens. He has consulted with CWS, other birders, as well as previously completed bird studies for wind farms. His study results can be found in Appendix B-3, along with recommendations for a Post-Construction Monitoring Program.

"Spring Migration counts were conducted by area searches along 2 routes labelled A and B. Each route samples most major habitats, and when possible, both were conducted in the same day. The following 47 species were encountered throughout the spring migration period: Double-crested Cormorant; Ruffed Grouse; Red-tailed Hawk; Sharp-shinned Hawk; Wilson's Snipe; Mourning Dove; Hairy Woodpecker; Downy Woodpecker; Northern Flicker; Yellow-bellied Sapsucker; Pileated Woodpecker; Least Flycatcher; Blue Jay; American Crow; Common Raven; Blue-headed Vireo; Golden-crowned Kinglet; Ruby-crowned Kinglet; Winter Wren; Boreal Chickadee; Black-capped Chickadee; White-breasted Nuthatch; Hermit Thrush; American Robin; Northern Parula; Yellow-rumped Warbler; Palm Warbler; Black-and-white Warbler; Black-throated Green Warbler; Ovenbird; Magnolia Warbler; Chestnut-sided Warbler; Common Yellowthroat; Black-throated Blue Warbler; Nashville Warbler; Lincoln's Sparrow; Song Sparrow; Dark-eyed Junco; Pine Grosbeak; Purple Finch; American Goldfinch; Evening Grosbeak; and Common Grackle.

[4] Bob Bancroft: General Literature Review

During the breeding season, a total of 63 species were recorded throughout the study period. Only Olive-sided Flycatcher (*Contopus cooperi*) has a relevant status with COSEWIC; it is listed as Threatened in Nova Scotia. The reason for its decline is listed as unknown. The following observed birds are listed as yellow or "sensitive to human activities or natural events" by NSDNR:

1. Boreal Chickadee
2. Northern Goshawk
3. Olive-sided Flycatcher

Northern Goshawk (*Accipiter gentilis*) was only noted on one occasion, in October. The individual did not appear to be migrating. Boreal chickadees (*Poecile hudsonicus*) have been noted on most surveys, particularly in winter. They are typically found in habitats dominated by spruce, of which there are pockets at this site. Olive-sided Flycatcher was observed singing during several surveys in the spring and summer, and fledged young were seen on one occasion. This species benefits from forest disturbance such as fire or cutting, followed by re-growth.

Of the following 65 species observed, fourteen (14) species were confirmed to breed, fifteen (15) were recorded as probable breeders, 28 species possibly bred, and eight (8) were observed, but showed no evidence of breeding. Canada Goose; Double-crested Cormorant; Bald Eagle; Red-tailed Hawk; Sharp-shinned Hawk; Northern Goshawk; Northern Harrier; Merlin; Ruffed Grouse; Mourning Dove; Wilson's Snipe; Herring Gull; Ruby-throated Hummingbird; Downy Woodpecker; Hairy Woodpecker; Yellow-bellied Sapsucker; Northern Flicker; Pileated Woodpecker; Least Flycatcher; Eastern Wood-Pewee; Olive-sided Flycatcher; Alder Flycatcher; Yellow-bellied Flycatcher; American Crow; Blue Jay; Common Raven; Winter Wren; Red-eyed Vireo; Blue-headed Vireo; Boreal Chickadee; Black-capped Chickadee; White-breasted Nuthatch; Red-breasted Nuthatch; Golden-crowned Kinglet; Ruby-crowned Kinglet; Cedar Waxwing; Northern Parula; Ovenbird; Chestnut-sided Warbler; Yellow-rumped Warbler; Common Yellowthroat; Black-throated Blue Warbler; Mourning Warbler; Blackburnian Warbler; American Redstart; Swainson's Thrush; American Robin; Hermit Thrush; Chipping Sparrow; Fox Sparrow; Dark-eyed Junco; Lincoln's Sparrow; Swamp Sparrow; Song Sparrow; White-throated Sparrow; Evening Grosbeak; Purple Finch; Pine Grosbeak; American Goldfinch; and Common Grackle.

Twenty-seven species were observed during fall migration. They are: Canada Goose; Double-crested Cormorant; Northern Harrier; Merlin/ American Kestrel; Sharp-shinned Hawk; Northern Goshawk; Herring Gull; Northern Flicker; Northern Flicker/ Pileated Woodpecker; Hairy Woodpecker; Downy Woodpecker; Common Raven; American Crow; Blue Jay; Golden-crowned Kinglet; Red-breasted Nuthatch; Black-capped Chickadee; Boreal Chickadee; American Robin; Yellow-rumped Warbler; Ovenbird; Unidentified Warbler sp.; White-throated Sparrow; Dark-eyed Junco; Fox Sparrow; Evening Grosbeak; Pine Grosbeak; American Goldfinch; Unidentified Finch sp.

Raptor counts were conducted on October 4 and 12, 2008. No new species were observed during this time, although some species were so high up that identification was vaguely accurate, and therefore left unknown.

Winter monitoring was conducted on a single route that sampled all major habitat types. The species observed during the 4 months are: Ruffed Grouse; Hairy Woodpecker; Blue Jay; American Crow; Common Raven; Black-capped Chickadee; Boreal Chickadee; Golden-crowned Kinglet; Unidentified Finch; and Bald Eagle.

The preliminary findings of the bird study are:

1. No bird colonies are present in the study area
2. The study area does not appear to be an important breeding area for any bird species at risk (although Olive-sided Flycatcher was confirmed to have bred and is threatened under COSEWIC in Canada)
3. There do not appear to be landforms in the study area that concentrate migrating birds
4. The study area is not an important corridor for migrating raptor species
5. Numbers and species of migrating birds counted during the fall season are representative of what one would expect to encounter in similar habitat types in this region of Nova Scotia
6. There are no lit structures nearby that would attract birds"[5]

4.2.4 Bats

As stated earlier in the document, complications with the meteorological data tower which houses the brackets needed to hoist bat echo-location equipment into the air did not allow for the Bat study to be completed in 2008. Hugh Broders has been contracted to perform the bat study for 2009, which will occur at core migration time, from mid-August to late September 2009.

A desktop study has been completed for the Project (Appendix B-6). This study looked at typical expectations for the region, as well as the two recent (2007) bat studies completed for proposed wind projects near the Maryvale site. These two studies reveal low potential for a migratory path for the species known to be found in migration through and to hibernate in, Nova Scotia.

The problems associated with bat mortality and wind turbines are due to the spinning blades. There are two separate problems here: the physical encounter of the spinning blade hitting the animal; and the phenomenon known as baro-trauma. This basically states that the very low pressure following the sweeping blade, causes the bats' areola (air sacks which fill the lungs) to expand very rapidly causing the blood vessels in the lungs to burst and essentially drowning the animal in its own blood. If there is found to be a migrating population in or around the Maryvale project site, the recommendation of stopping the blades from movement during the night at peak migration (mid August until late September) will be strictly followed.

[5] Stevens, Bruce; *Maryvale Bird Survey- April 2008 to March 2009*

There has not been a field portion of the Bat Study performed for this Project to date and therefore, this recommendation by Hugh Broders is, at best, speculation into mitigation measures which may not be necessary after all. The Proponent felt it was necessary to include the issue in this document however, as results of studies in southern Alberta in recent months have made the baro-trauma phenomenon a newly understood reality and one which can be detrimental to a migrating population passing through a wind farm.

4.2.5 Mainland Moose

The Mainland Moose was listed as an Endangered Species in 2003 and therefore falls under the *Species at Risk Act (SARA).* Originally, the Maryvale Wind Project was situated about 10 km west of its current location. The very first study conducted for the Project was a PGI (Pellet Group Inventory) Moose Transect search. This survey revealed moose pellet piles and the location was instantly removed from consideration.

The Proponent then surveyed the current area using a radial pattern of transect locations stemming from the center point of the Project area. During this survey the technician found no evidence of moose activity in the area. The frequent discovery (entire search area) of deer pellets may be an indication that the habitat is used by deer as opposed to the Mainland Moose. The Proponent has mapped the Project and surrounding area for Summer Thermal Habitat for Moose in Nova Scotia, and is shown in Figure 4.2. This is described as "Thermal cover (dense mature forest, at least 20-30 years old, with closed canopy for shade) is necessary to protect moose from heat stress because although moose are well-adapted to cold weather, they are sensitive to hot temperatures."[6] Those temperature limits are defined elsewhere as 14 to 20 degrees Celsius. This definition was taken from members of the Mainland Moose Recovery Team for Nova Scotia, and derived through discussions of university professors, former and present regional biologists for Nova Scotia, the current Big-Game Biologist for Nova Scotia and other experts in the field.

4.2.6 Other Species of Concern

4.2.6.1 Plants

In Nova Scotia, a data search is required for species of concern. Atlantic Canadian Conservation Data Center (ACCDC) was contacted to provide a 100km search from a center point in the Maryvale Wind Farm area. (See Appendix B-5)

Vascular plants were studied by Taylor in 2008 (Appendix B-1) The field work did not locate any species of concern which were noted in the letter from Nova Scotia Department of Culture, Tourism and Heritage, Heritage Division. (See Appendix C-4).

[6] Nova Scotia Mainland Moose Recovery Team, literature from meeting

4.2.6.2 Invertebrates

The 100 km search yielded some possible butterfly species with red status although the biologist for this report has maintained that the species listed need habitat not found in the Project area to be found.

4.2.6.3 Reptiles and Amphibians

Blanding Turtle, Wood Turtle and the Northern Ribbon Snake were candidates for consideration in this study.

4.2.6.4 Mammals

Moose, lynx and American Martin had red list status for the purpose of this study. Five species were yellow status: Fisher; Southern Flying Squirrel; Eastern Pipestrelle (bat); the Long-tailed Shrew; and the Gaspe Shrew. (Taken from the ACCDC data search results)

4.3 Socio-economic Environment

The socio-economic setting of the Project area is characterized as a rural area which provides employment and income for those in forest related activities, fishing, teachers and professors (St. Francis Xavier University is located approximately 20km away), tourism, manufacturing and services sectors. Soils in the Project area are not suitable for agricultural use and previous farming activities have been largely abandoned.

As with many rural areas of Nova Scotia, a decline in population has occurred in the region. The productive capacity of the traditional industrial sector of the region has aged and now lags behind modern industrial capacity in other areas and countries. This change has led to the closure of industries which were at one time the mainstay of employment incomes and regional revenues. New development opportunities in the region are required to sustain municipal tax revenues which are used to maintain the standards of services provided to the communities.

From a tourism perspective, wind farms can impact scenic landscapes both positively or negatively. Through the scoping process involved with the Maryvale Wind Project it has been determined that this undertaking will not have an impact on visitors' experiences and ultimately will not impact the type of experiences which is and could be offered by this area. The project is very small (four turbines). It is located in an area to the east of the Sunrise Trail, where the ocean views are offered on the west of this trail. The closest tourism destination is the Town of Antigonish. The four turbines will not deflect any of the town's scenic attributes, nor will it interfere with any other tourist activity which would occur while vacationing in the area. The visual impact is minimal when considering elevation, size and placement and location.

4.3.1 Existing Land Use

The land use over the last one hundred years has been very limited farming, mostly forestry themed land use, although others such as; recreational uses, Christmas tree cultivation, and hunting could be

added to this list. All land uses formats still exist, except for farming. No dwellings occupied by people currently exist in the Maryvale Wind Project boundaries.

The Cape to Cape Trail Association of Nova Scotia was contacted in the scoping process for this project. Although attempts to communicate with this organization have not resulted in a reply, through looking at the website and plans/maps of the trails, it has been determined that the location of the trail in this series of tracks and the locations of the towers do not conflict with each other.

Although the above mentioned land use is what can be described as use in the surrounding area, only forestry and recreational use are acceptable descriptions of current land use within the Project boundary.

4.3.2 Air Quality

The generation of wind power is a zero emission way to create electricity. "Green Power" in Nova Scotia is absolutely necessary to offset the huge appetite for household consumption when compared, per capita, to other provinces and countries. Currently, about 90% of Nova Scotia's electricity comes from non-renewable and polluting resources. During the burning process, emissions from coal, oil, petroleum coke, natural gas or other fossil fuelled thermal electrical generation are being released into the air for plants, wildlife, aquatic life and humans to deal with. Air is 78% nitrogen, 21% oxygen and 1% other gasses such as carbon dioxide. The impact of adding large amounts of greenhouse gases (GHGs) and other specific air emissions are CO2e, NOx1, SO2, particulates, heavy metals and salts. These polluting gasses are affecting the province's natural balance and leading to global climate change.

With each turbine producing 4.4 megawatt hours of electricity annually, which is 19.6 megawatt hours total, this will provide electricity for approximately 1500 average Canadian homes. If the electricity used from this number of homes were produced from using coal-fired power plants (which is currently the case for homes in Maryvale and surrounding area) that power production would amount to approximately 13,947 metric tonnes of CO2 released into the atmosphere annually!

4.3.3 Visual Land Features

An assessment of the scenic features of the Project area are identified as a public issue for wind farm developments in Nova Scotia and most other provinces and countries. A series of photomontages were prepared to illustrate the visible effect of the Project. Photographs were taken from three places and computer generated images of the Vensys V-77 turbines were superimposed, to scale, onto the photos in their respective coordinates to provide a visual picture of what the Project would look like from these vantage points. These three points were chosen due to their clear path of view to the project area. Also, all three are on the Sunrise Trail, a popular travel-way for tourists and locals, as well as within view of the closest residences in the project area. A view-plane analysis was conducted to illustrate the distribution of visible turbines over the surrounding area. A visual representation map was created using modelling software showing the amount of turbines visible from all locations within 20 km from the center point of the Project, *Figure 4.1: Zone of Visual Influence*. These analyses and discussion of impacts are presented in Section 5 of this document.

4.3.4 Environmental Noise

Noise is always a concern for a wind project of any size. There is currently no Setback Distance from Wind Turbines bylaw in place in the Municipality of the County of Antigonish, although the council has been working on implementing a bylaw to address distances from houses, roads and property lines. The Proponent has maintained a 1.5km setback from any noise receptor to the nearest turbine. A noise study has been commissioned by Ortech Power, which uses the Wind Pro software to predict the decibel rating at the residences within 2 km of the nearest 85m (hub height) turbines with average wind speeds of 6, 7, 8 and 9 m/s. (See Figures 4.2a, 4.2b, 4.2c, and 4.2d, respectively).

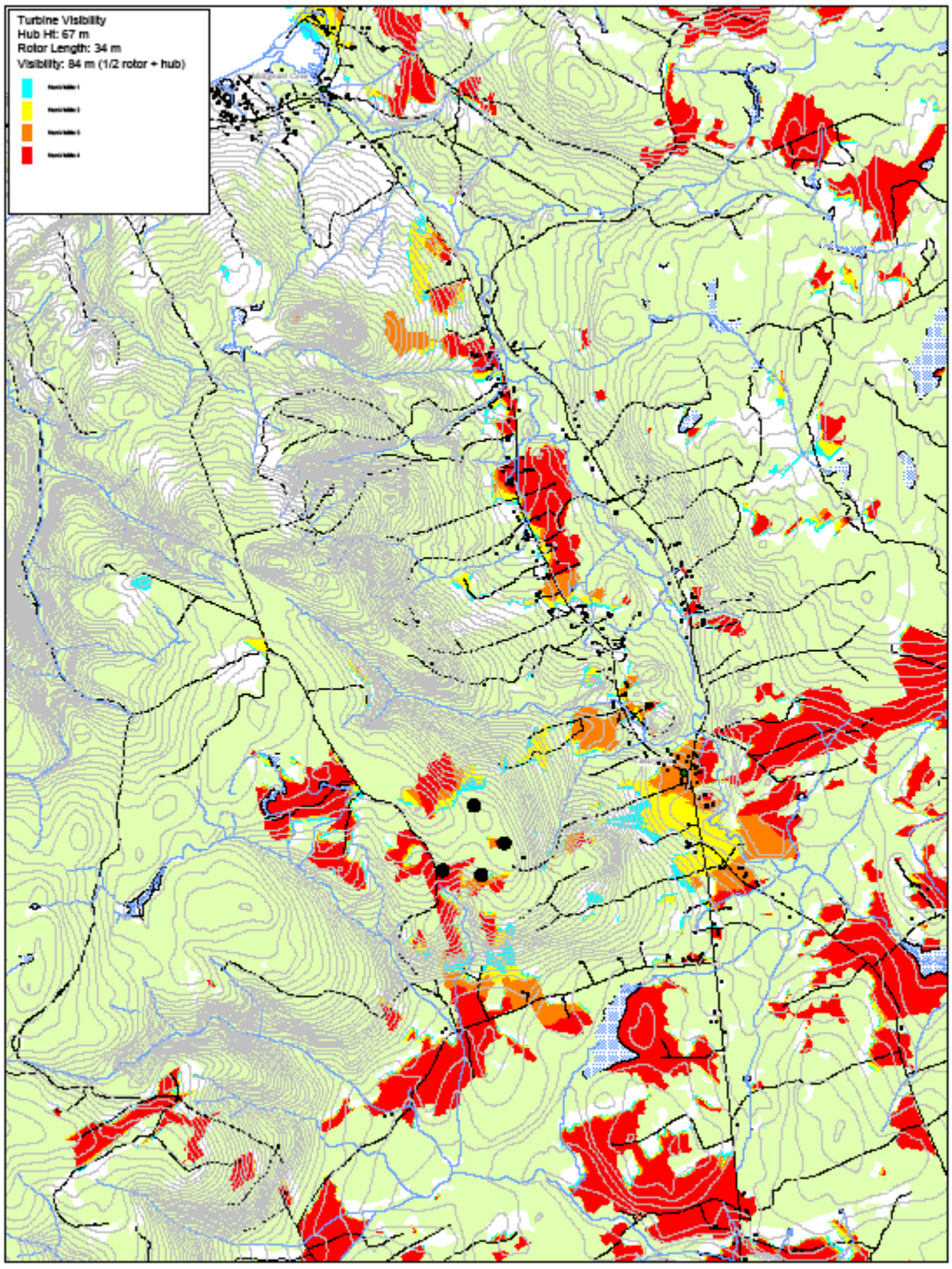
All receptors within 2 km of the turbines were included in this study, with the outstanding four named: the Maryvale Elementary School; the St. Mary's Parish church hall; the Four Valley's Volunteer Fire Hall (outside of 2km range); and John Teasdale's residence (the closest residence). The small hunting cabin owned by Brian MacGillavry, a landowner with the Project, is located approximately 350m from Turbine #3 and has been included in the study. Maryvale Wind LP did not want to exclude any buildings within 2km for any reason as this may raise questions for some. It must be noted, however, that this building (number 12 in the Noise Simulation Models) is not considered a 'dwelling' by municipal standards, and therefore setback distances do not apply, nor do noise thresholds as it is not considered a receptor point.

4.3.5 Public Health and Safety

Safety policies and company procedures have been put in place to ensure the Project complies with all industry standards and good utility practice. Electrical installations connecting to the provincial grid must comply with and maintain certification and liability insurance throughout the life of the Project. In order to obtain a final connection permit, completion certificates from Federal, Provincial and Municipal offices must be granted throughout the construction phase. The Municipality currently has no setbacks in place from residences, although the neighbouring county has setbacks of: 600m from any dwelling; 300m from any government maintained road; and turbine height with blade in vertical position from any outside property line. Setbacks greatly reduce the risk of the general public from being involved in situations that could be hazardous. An insurance policy has been reviewed with an experienced underwriter in the field which identifies areas of concern and how to reduce these risks.

A literature review of possible Human Health effects has turned up no significant risk posed to the human population surrounding the Project area. Health Canada states that there is no significant risk to humans exposed to EMF similar to those which can be emitted from wind turbine generators. This potential issue is further down-graded by the large, voluntary setback Maryvale Wind LP has maintained from residences and other points of reception through-out the planning stages of the proposed Project.

The noise pollution created by the low-frequency vibrations from the turbines, or the noise from the 'swooshing' of the blades has been studied in the Noise Simulation Model, and has been ruled out as a possible negative impact on local residences and points of reception.


Turbine Visibility
Hub Ht: 67 m
Rotor Length: 34 m
Visibility: 84 m (1/2 rotor + hub)

Ice-throw from blades is a possible hazard to those within 1-150m of the turbines, given the right conditions. The Project does not pose a risk as this land is privately owned, and has always maintained 'no trespassing' signs along the existing roads, as well as 'no hunting' signs to ensure no risks are ever posed to the people who may be working in the area (cutting trees for personal use). There could be 3 people potentially working in the area getting firewood. All have signed land agreements for the Project and been made aware of the ice-throw potential the blades may create in certain weather and conditions during conversations with company representatives.

4.3.6 Aboriginal Interests

In accordance with provincial guidelines and regulations, an Archaeological Resource Impact Assessment has been carried out by Davis Archaeological Consultants Limited (Davis) on behalf of the Proponent. The desktop study included: archaeological, historical, Aboriginal, natural heritage, zoological, and botanical resources for both terrestrial and aquatic environments. There are two bands of First Nations reserves located near the Project: Paq'tnkek (Afton) First Nations, roughly 30km east of the Project; and Pictou Landing First Nations, roughly 40km west of the Project.

An MEKS has been completed by Norma Prosper of the Confederacy of Mainland Mi'kmaq. This report has shown no evidence of any significant First Nations sensitive sites within the Project. However, this does not rule out the potential for discovery. The Proponent shall stop work if any archaeological artefact or site is discovered and immediately contact the CMM, the Maritime Aboriginal Peoples Council, the Union of Nova Scotia Indians, as well as the Mi'kmaq Rights Initiative and Nova Scotia Heritage Division, as stated in the Engagement Plan. (Appendix C-3)

Notices of the Project along with a hard copy of the Engagement Plan were sent to the following interest groups of Nova Scotia Aboriginal and First Nations: Roger Hunka with Maritime Aboriginal Peoples Council; Union of Nova Scotia Indians; Chief Anne Francis-Muise with Pictou Landing First Nations; Chief Michael Gerard Julian with Paq'tnkek First Nation; Twila Gaudet with Mi'kmaq Rights Initiative; and Norma Prosper with the Confederacy of Mainland Mi'kmaq.

4.3.7 Heritage Sites, Archaeological Sites and Other Cultural Resources

In accordance with provincial guidelines and regulations, an Archaeological Resource Impact Assessment has been carried out by Davis Archaeological consultants Limited (Davis) on behalf of the Proponent. The desktop study included: archaeological, historical, Aboriginal, natural heritage, zoological, botanical resources for both terrestrial and aquatic environments.

The desktop study determined a low potential for Aboriginal and European discoveries of archaeological significance. After the turbine locations had been micro-sited a subsequent field study was undertaken by April MacIntyre and other Davis staff to eliminate any obvious (to a trained professional) discoveries. Both studies can be found in Appendices C-1a and C-1b

Figure 4.2a: Maryvale Noise Simulation – Vensys V-77 at 6 m/s wind

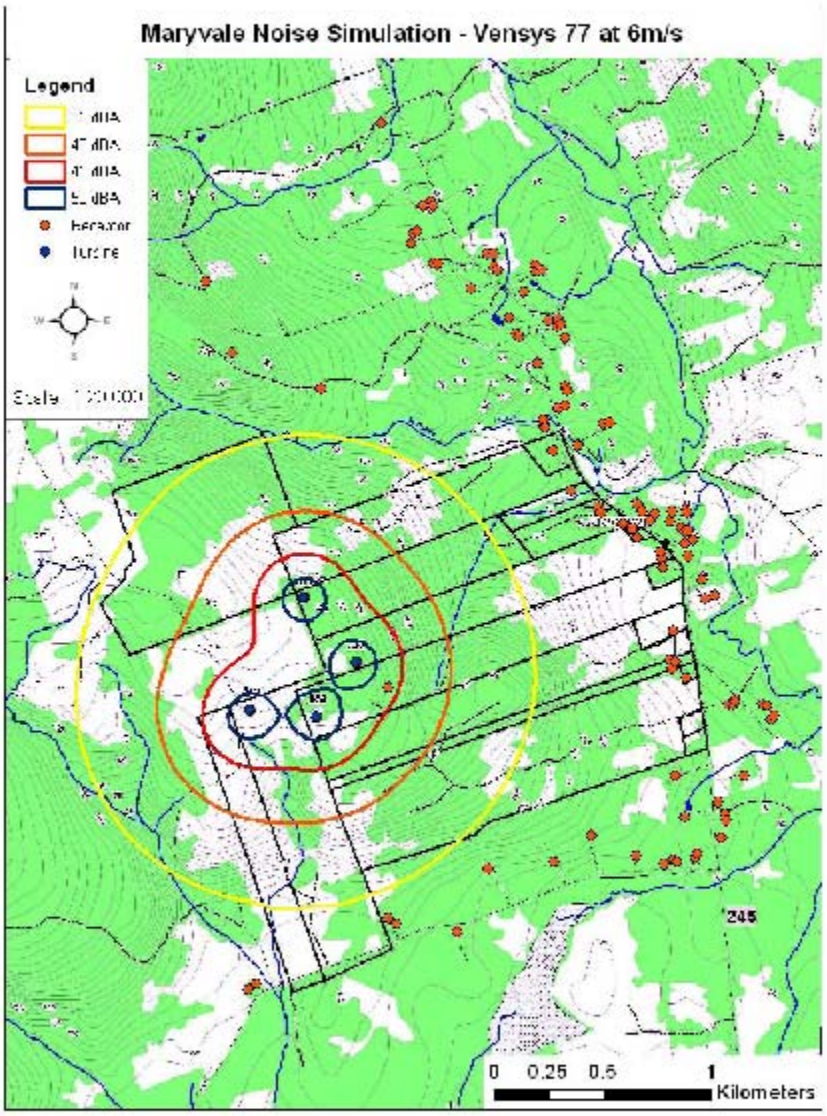


Figure 4.2b: Maryvale Noise Simulation – Vensys V-77 at 7 m/s wind

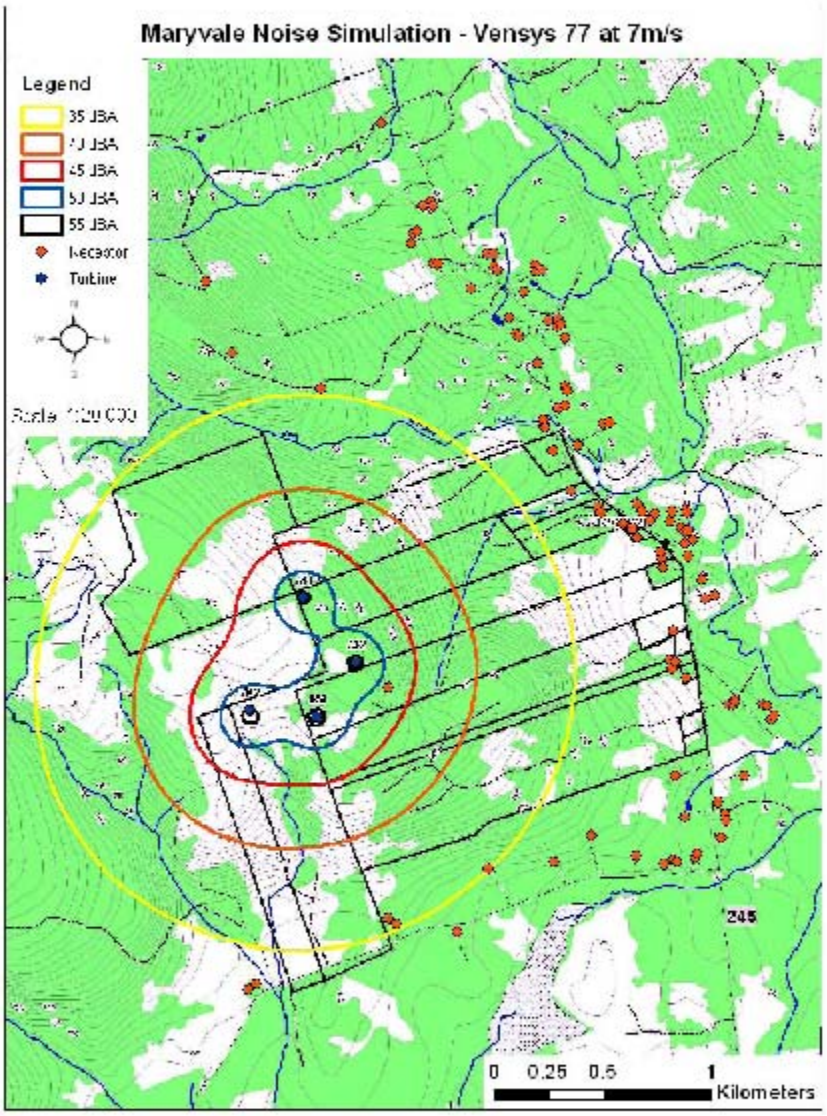


Figure 4.2c: Maryvale Noise Simulation – Vensys V-77 at 8 m/s wind

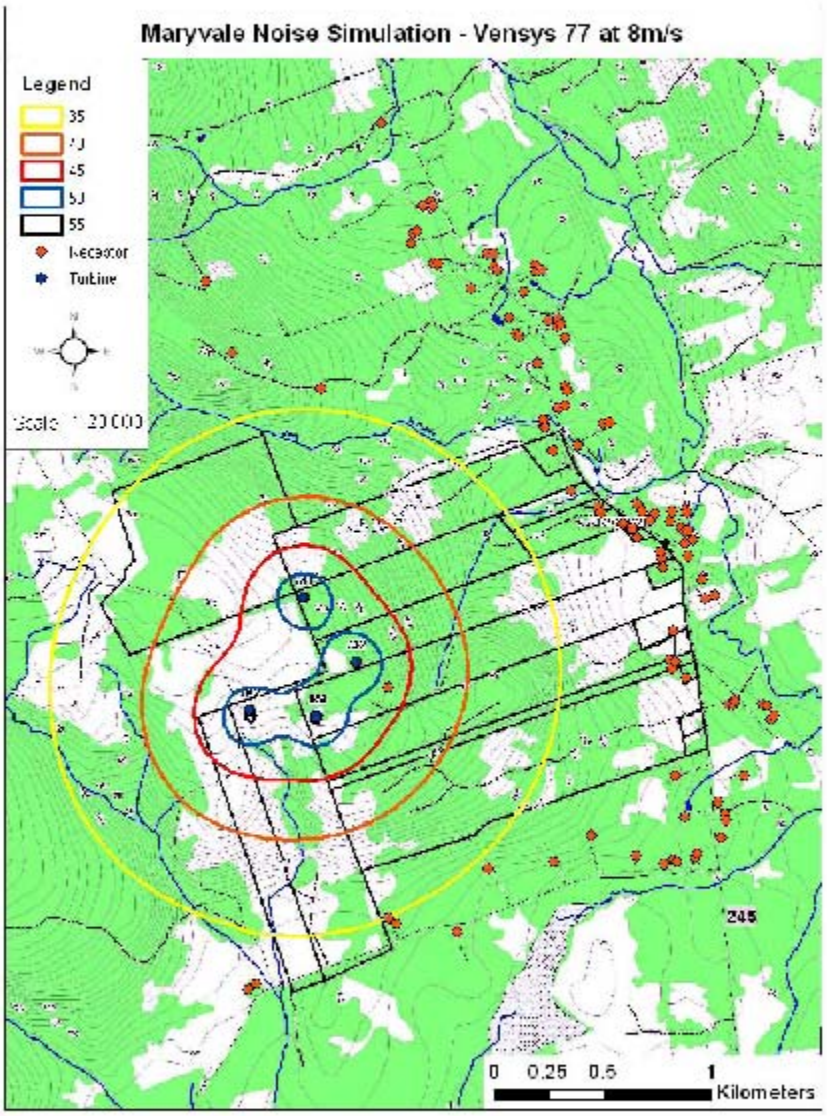
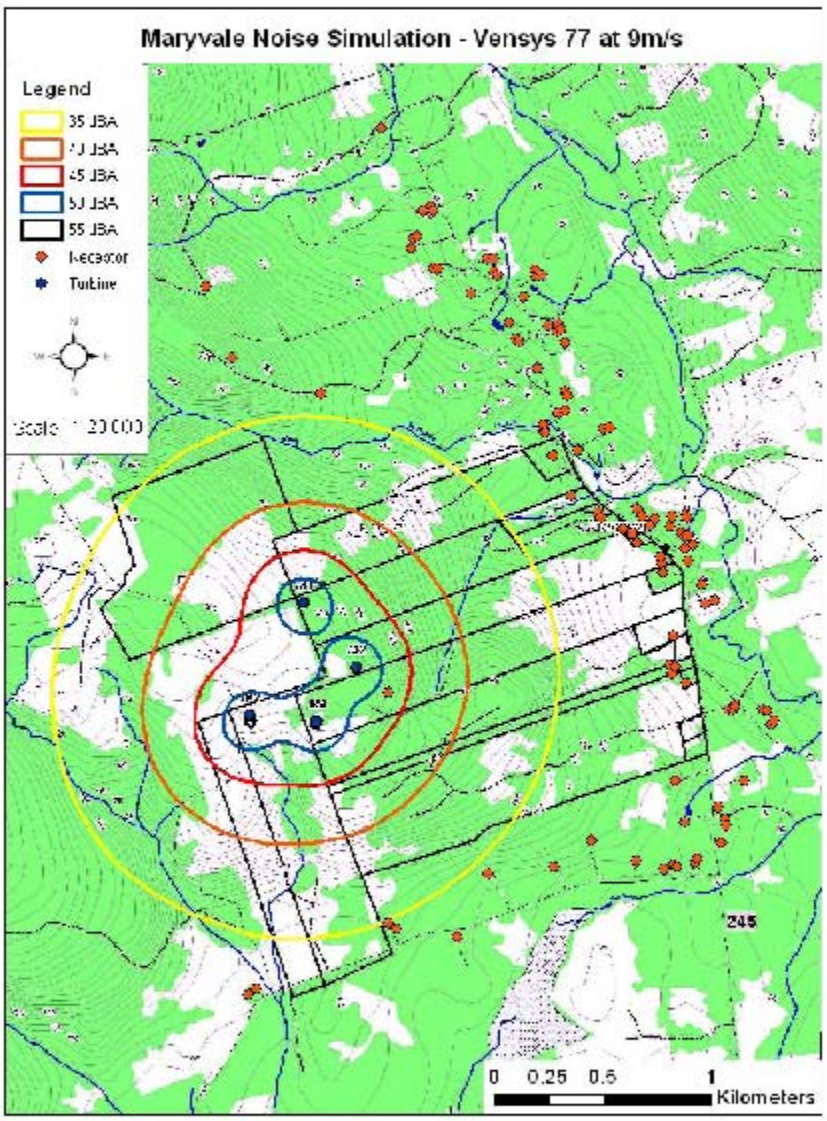


Figure 4.2d: Maryvale Noise Simulation – Vensys V-77 at 9 m/s wind



4.3.8 Waste Disposal

Construction activities at turbine sites generate wastes that must be properly handled and disposed of. The wastes include: domestic wastes at work sites and construction areas; sanitary wastes; wastes associated with the maintenance of equipment; wastes from construction activities; waste packaging; and wood debris and excess soils for cleared areas.

4.3.9 Climatic Fluctuations and Extreme Events

Exposed mountain locations can experience weather extremes. Wind turbines that are installed on these locations must be able to withstand the range of weather conditions that occur in the area. The elevation of turbine sites and the roads used for delivery are not subject to flooding associated with increased sea levels and flooding caused by extreme rainfall events.

4.3.10 Construction Related Traffic

Local traffic in the area includes: school buses carrying elementary children to the school; parents and teachers to and from the school; commuter traffic for local residents travelling to work in and around the area; some recreational and tourist traffic; and trucks hauling loads along the travel route. Heavy machinery will be required to prepare the sites and large trucks to haul the turbines to their locations which will necessitate road usage used. No alterations to existing public roads will be required. Existing roads within the Project boundary will have to be upgraded to deliver the machinery to their respective sites.

4.4 Identification of Valued Ecological Components (VECs)

Based on discussions with stakeholders and regulators as shown in Section 1, the findings of Section 3, and environmental setting described in Sections 4, bio-physical and socio-economic VECs have been identified for the assessment of potential Project related impacts. Eighteen VECs have been identified for further assessment, and are listed below.

Several VECs were identified at an early stage to be of greater complexity or higher relative ecological importance to the surrounding natural environment of the Maryvale Wind Project. Ann expert in the respective field was commissioned to compile a report detailing baseline data and to summarize the level of interaction and/or impact from the Project for these VECs The other VECs, while not unimportant, have been reviewed by: an expert in the field; a government employee within the appropriate department; and a community representative. These stakeholders advised that detailed reports were not required for these VECs but an assessment of potential impacts was necessary for this report. The following summarizes the nature and scope of the VEC related studies and issues. The assessment and mitigations of potential impacts on VECs is provided in Section 5.

4.4.1 Flora/ botany

The presence of plant species of concern within the Project area was considered likely by experts within DNR and NSE. Therefore, the flora of the Project area in the vicinity of the proposed turbine locations and on proposed access roads was identified as a VEC.

A detailed field study of local flora determined that one species identified as important to the local environment was found near Project sites. Dwarf Ginseng is considered a species of regional importance although it is found frequently throughout the Project's surrounding areas. This plant was an expected discovery and it has been determined that the impact from construction and roads will not be of significance to this species.

4.4.2 Surface, Groundwater Quality and Fish habitat

Surface water and fish habitat are protected under the Fisheries Act and are therefore considered a VEC. Discussions were held with NSE and DFO which identified the main waterways associated with the small stream located within the Project boundaries.

Natural drainage networks will be affected by the construction and use of access roads. The presence of the access roads may result in the direct and/or indirect destruction of surrounding aquatic habitat through increased sediment loading in streams, increased erosion and runoff, increased magnitude and frequency of flooding, slope instability and interrupted water flow. In addition, increased traffic along the roads may enhance soil compaction, increase sediment loading and magnify problems associated with altered drainage patterns, such as increased runoff.

In late May or early June, there will be a site visit with the representatives of DFO and NSE to examine the proposed water crossing, and discuss the drainage patterns of the road.

4.4.3 Species at Risk, Wildlife, and Their Habitats

Species at Risk, wildlife and their habitat were identified as VECs through discussions with NSE, DFO, botanists, biologists, birders and the NS Museum. Three desktop studies and five field study reports were commissioned to assess the presence and distribution of species which might be categorized in this VEC. The desktop studies were: the ACCDC Data Collection Survey (Appendix B-5); the Nova Scotia Department of Tourism and Culture, Heritage Division (Appendix C-4); and the Bat Study (Appendix B-6). The field studies included: Mainland Moose PGI Transect Study (Appendix B-4); a one year Bird Monitoring study (to be completed in April 2009, summary of results to date can be found in Appendix B-3); Botany Field Study (Appendix B-1); Bat Migration Monitoring Study (to be completed during August 2009); a biological search for signs, nesting and habitat of mammals, invertebrates and aquatic species (summarized throughout the document);

4.4.4 Avian Species, Including Migratory Birds

There has been extensive reporting of the interaction of avian species and wind turbines. For assessment purposes avian species are included as a VEC for this Project.

Based on information which was gathered initially from Canadian Wildlife Services (CWS), it was determined that the Project is not in a known Migratory Bird Path. Data on local populations of avian species has been compiled from the following sources:

- A full one year Bird Monitoring Study is currently taking place around the Project area.
- A desktop summary of up-to-date sightings during the Bird Monitoring Study

During the Spring Migration portion of the study, 47 species were observed, none of which appear as a listed species. During the Breeding study, 63 species were observed. The Olive-sided Flycatcher (*Contopus cooperi)* is listed as Threatened by COSEWIC. The Olive-sided Flycatcher, Boreal Chickadee, and the Northern Goshawk are listed as 'yellow' or 'sensitive to human activity' by the Nova Scotia Department of Natural Resources.

Northern Goshawk (*Accipiter gentilis*) was only noted on one occasion, in October. The individual did not appear to be migrating. Boreal chickadees (*Poecile hudsonicus*) have been noted on most surveys, particularly in winter. They are typically found in habitats dominated by spruce, of which there are pockets at this site. Olive-sided Flycatcher was observed singing during several surveys in the spring and summer, and fledged young were seen on one occasion. This species benefits from forest disturbance such as fire or cutting, followed by regrowth.[7]

During the Fall Migration study, 27 species were observed in the study area. During the Raptor Watch, which happened on two separate days in October, there were zero observed the first day and 7 individuals on the second.

4.4.5 Existing Land Use

Land use is a public issue of concern to landowners, other stakeholders and various levels of government and is therefore considered a VEC. The land use over the last one hundred years has been forestry, recreational, farming, and hunting. All types of usages still exist, although farming is limited to the low lying areas outside of the vicinity of the boundaries of the Project. The installation of the Project is not predicted to restrict any existing use of land in the area.

4.4.6 Air Quality

The Project rationale is based on provincial, national and global concerns regarding the preservation of air quality and controls on the generation of GHGs. The use of wind to generate electricity provides a renewable resource which does not require the combustion of fuel and the resulting atmospheric emissions. As such, air quality is considered a VEC for this Project.

[7] Stevens, Bruce: *Maryvale Bird Survey: April 2008 to February 2009.*

4.4.7 Environmental Noise

Noise issues are a much publicized impact of wind projects particularly in relation to adjacent residential properties and therefore environmental noise is a VEC for this Project.

4.4.8 Bats

Conversations with government experts early in the planning stages expressed a concern that this was an unknown area for bat habitat. Due to the lack of existing information and concerns related to the interaction of wind turbines and bats, bats were selected as a VEC for this assessment. A six week monitoring study will take place during August-September 2009. In recent months, it has been determined that ground level monitoring is not sufficient to adequately monitor bat migration for wind projects. The bat echo-location equipment will be lifted and attached on the met tower at two different heights to record information from there. The findings of this report will be submitted in an Addendum to the document.

4.4.9 Visual Landscapes

The effects of the installation of wind turbines on the local landscape can be an issue of widespread public debate and therefore the visual landscape is considered a VEC.

A visual study including mapping the Zone of Visual Influence, as well as computer generated (to scale) photomontages has been commissioned and resulting maps and figures are included in the document.

4.4.10 Public Health and Safety

Public health and safety covers a range of activities which include the use of public roads and the safety of individuals and landowners particularly during the construction period. For this reason, public health and safety is a VEC for this assessment.

4.4.11 Heritage Sites, Archaeological Sites and Other Cultural Resources

Provincial guidelines and regulations are in place for the purpose of preserving the historic resources of the province. These resources are considered a VEC for this assessment and an Archaeological Resource impact Assessment was carried out by the Proponent.

4.4.12 Waste Disposal

Waste materials generated by the development are considered an issue of environmental stewardship. Waste management and disposal has been identified as a VEC by the Proponent.

4.4.13 Neighbourhood and Community Characteristics

Neighbourhood and community characteristics are identified as a VEC because of potential impacts on the local community from the Project. This includes tourism related activity in the area.

4.4.14 Climatic Fluctuations and Extreme Events

Climatic fluctuations and extreme events identify potential impacts of the existing environment on the Project and are key elements in establishing safe design criteria for the Project components. Therefore, climatic variations and extreme weather conditions are a VEC for wind power development and Project design.

4.4.15 Soils, Terrain and Vegetation

The topography, soils and vegetation of the Project area are considered a VEC as these features are important considerations in the assessment of environmental conditions and the suitability of the site for the construction of wind turbines.

4.4.16 Construction Related Traffic

The influence of additional construction related traffic on local traffic patterns and public road use is considered a VEC for this assessment.

4.4.17 Aboriginal Interests

Following discussions with First Nations leaders, Aboriginal Interests and associated concerns regarding traditional and contemporary heritage issues are considered a VEC for this assessment. A field study was conducted in June of 2008 by Davis Archaeological Consultants Limited (See Appendix C-1). An MEKS (Mi'kmaq Ecological Knowledge Study) by the Confederacy of Mainland Mi'kmaq (CMM) was conducted from May 2008 to September 2008 (See Appendix C-2). Also, the Proponent has entered into an Engagement Plan with Nova Scotia Aboriginal and First Nations councils relevant to the Project.

4.4.18 Eigg Mountain Wilderness Area

This wilderness area has been identified as a VEC due to its proximity to the proposed project. The boundaries of the wilderness area have been determined through means unrelated to the project. Although the project does not lie within these boundaries, the Proponent looked at the relationship of the area to noise, visual impact and construction/ operation to determine if any impact would result.

SECTION 5.0 – ASSESSMENT OF ENVIRONMENTAL IMPACTS, MITIGATION OF IMPACTS, RESIDUAL EFFECTS AND CUMULATIVE IMPACTS

5.1 Approaches to Assessment of Impacts

This section describes the likely effects of the Project on the environment, cumulative environmental effects, potential for accidents and malfunctions, and the effects of the environment on the Project and includes climatic fluctuations and extreme events.

The process followed by the Proponent ensures that the interactions between the Project components and the environment are adequately described; likely environmental effects are identified and properly assessed; measures are in place to mitigate potential impacts and the importance of any residual effect is determined. This is further documented by considering comments made by stakeholders during the Draft screening process.

5.1.1 Valued Ecological Components

Based on the Scoping Study (Section 1 and 3) and the description of the existing environment (Section 4), the following VECs have been identified and will provide the focus for the evaluation in Section 5:

- Flora/ botany
- Surface, groundwater quality and fish habitat
- Species at Risk, wildlife, and their habitats
- Avian species, including migratory birds
- Existing land use
- Air quality
- Environmental noise
- Bats
- Visual landscape
- Public health and safety
- Heritage sites, archaeological sites and other cultural resources
- Waste disposal
- Neighbourhood and community characteristics
- Climatic fluctuations and extreme events
- Soils, terrain and vegetation
- Construction related traffic
- Aboriginal interests

5.1.2 Potential Interaction on the Environment of the Project

For this assessment, the following activities identify most of the possible Project interactions that would take place and that could cause environmental impacts. To facilitate the evaluation, a reference framework established by the *Canadian Environmental Assessment Act,* was used to determine whether:

- The environmental effect is adverse
- The adverse environmental effect is significant
- The significant environmental effect is likely

Table 5.1: Assessment of Impacts

Valued Ecological Component	Is the environmental effect adverse?	Is the adverse effect significant?	Is the significant effect likely?
Flora/ botany	Yes	No	No
Surface, groundwater quality, fish habitat	Yes	Yes	No
Species at Risk, wildlife & their habitats	Yes	No	No
Avian species, including migratory birds	Yes	Yes	No
Existing land use	No	No	No
Air quality	No	No	No
Environmental noise	No	No	No
Bats	Yes	Yes	Need data from study
Visual landscape	Yes/ no	Yes/ no	Yes/ no
Public health & safety	Yes	Yes	No
Heritage, archaeological sites & other cultural resources	Yes	Yes	No
Waste disposal	Yes	Yes	No
Neighbourhood and community characteristics	No	No	No
Climatic fluctuations & extreme events	Yes	No	No
Soils, terrain & vegetation	Yes	Yes	No
Construction related traffic	Yes	Yes	Yes
Aboriginal & First Nations interests	Yes	No	No
Eigg Mountain Wilderness Area	No	No	No

5.1.3 Mitigation Measures

Mitigation measures cover the broad range of the Proponent's responses to potential impacts of the Project on VECs. Mitigation has and will be incorporated in the design planning and site layout phase to avoid potential impacts on ecological systems. Mitigation can also be in the form of procedures and policies which are implemented in the construction and operations phases to prevent potential impacts

while work is being conducted on site. The following definitions of 'mitigation' will be used by the Proponent:

- *Mitigation as described with respect to a project is the elimination, reduction or control of adverse environmental effects, including restitution through replacement, restoration, compensation or any other means for any damage to the environment caused by such effects.*[8]
- *Mitigation in this section will be described on the basis of "avoidance of" and "prevention of" environmental effects where possible and by the use of good environmental practices where possible as opposed to repairing damage after the fact*

5.1.4 Residual or Net Environmental Effects after Mitigation

The importance of residual effects after mitigation measures is determined using the definitions in Table 5.2.

Table 5.2: Level of Impact after Mitigation (residual)

Level	Definition
High -	Potential impact could threaten sustainability of the resource and should be considered a management concern. Research, monitoring and/or recovery initiatives should be considered.
Medium-	Potential impact could result in a decline in resource to lower-than-baseline but stable levels in the study area after project closure and into the foreseeable future. Regional management actions such as research, monitoring and/or recovery initiatives may be required.
Low -	Impact may result in a slight decline in resource in the study area during the life of the project. Research, monitoring and/or recovery initiatives would not normally be required.
Minimal -	Potential impact may result in a slight decline in the resource in study area during construction phase, but the resource should return to baseline levels of level of impact shown in Table 5-1.

5.2 Evaluation of Impacts

The evaluation of the VECs identified in Section 4 as having potential for impact by the proposed Project are reviewed in this section for each of the following interactions with:

- Boundaries
- Access roads
- Project construction
- Project operation

[8] Natural Resources Canada 2003, Screening of Inland Wind Farms

- Project decommissioning
- Malfunctions and accidents
- Mitigation
- Cumulative assessment
- Sustainable use of Renewable Resources
- Residual Environmental Impact

5.2.1 Botany

Plants

The following lists detail all vascular plants observed at the proposed Project on 26 May, 31 July and 3 August 2008. An asterisk indicates that a voucher specimen has been deposited in the Herbarium of St. Francis Xavier University.

TREES

Scientific Name	Common Name	Notes
Abies balsamea	balsam fir	scattered, more common in clear-cuts
Acer pennsylvanicum	striped maple	occasional in understorey
Acer rubrum	red maple	co-dominant in canopy
Acer saccharum	sugar maple	co-dominant in canopy
Alnus viridis	downy alder	by Highfield Road, and in a wetland
Betula alleghaniensis	yellow birch	Occasional
Betula papyrifera	white birch	by Highfield Road
Betula populifolia	grey birch	by Highfield Road
Fagus grandifolia	American beech	co-dominant in canopy
Fraxinus Americana	white ash	Occasional
Picea rubens	red spruce	Few
Populus tremuloides	trembling aspen	a few small trees beside access road
Prunus pensylvanica	pin-cherry	few, except in cut-overs
Sorbus Americana	Mountain-ash	Few

BUSHES

Scientific Name	Common Name	Notes
Amelanchier sp.	serviceberry	probably *A. arborea*
Diervilla lonicera	bush-honeysuckle	common in understorey
Corylus cornuta	beaked hazelnut	one plant, regrowth near turbine 4
Cornus alternifolia	alternate-leaved dogwood	scattered in mature forest
*Lonicera canadensis**	fly-honeysuckle	common in mature forest
Ribes glandulosum	skunk currant	
Sambucus racemosa	red-berried elder	
Vaccinium angustifolium	lowbush blueberry	Few
Viburnum nudum	wild raisin	common in understorey

HERBACEOUS SPECIES

Scientific Name	Common Name	Notes
Actaea alba	white baneberry	one plant, in mature deciduous forest
*Agrostis gigantea**	red top	logging roads, clearings
Anaphalis margaritacea	pearly everlasting	
Aralia nudicaulis	wild sarsaparilla	
Aster acuminatus	wood aster	
Aster umbellatus	tall white aster	
Aster lateriflorus	aster	edge of forest
Carex crinita/gynandra	sedge	
Carex debilis	sedge	
*Carex deweyana**	sedge	Occasional
*Carex disperma**	sedge	on a hummock in mature forest
Carex lurida	sedge	wet spots
*Carex scoparia**	sedge	
Carex spicata	sedge	
Chrysanthemum leucanthemum	ox-eye daisy	Clearings
*Cinna latifolia**	wood-reed	in mature forest
*Claytonia caroliniana**	spring beauty	few, in mature forest, in May
Clintonia borealis	clintonia-lily	
Cornus Canadensis	bunchberry	
Cypripedium acaule	pink lady's-slipper	two plants by trail
*Deschampsia flexuosa**	common hair grass	Scattered
*Dianthus armeria**	Deptford pink	along Highfield Road
Erigeron sp.	daisy fleabane	*E. annuus* or *E. stigosus*
Epilobium angustifolium	fireweed	
Eupatorium perfoliatum	boneset	pocket wetland
Euthamia graminifolia	narrow-leaved goldenrod	Clearings
Fragaria vesca	woodland strawberry	Clearings
Galeopsis tetrahit	hemp-nettle	along logging roads, disturbed ground
Glyceria striata	fowl manna-grass	pocket wetland
Gnaphalium uliginosum	low cudweed	compacted logging road
Hieracium caespitosum	hawkweed	Clearing
Hieracium kalmia	hawkweed	scattered in forest understorey
Hieracium sp.	hawkweed	probably *H. lachenalii*; May
Huperzia lucidula	shining fir-moss	
Hypericum ellipticum	St. John's-wort	
Juncus effuses	soft rush	wet depressions throughout
*Juncus tenuis**	rush	puddles and wet depressions
Lactuca Canadensis	wild lettuce	cut-overs, along logging roads
Lycopodium obscurum	ground-pine	one plant, in beech-maple forest
Luzula multiflora	common wood-rush	one plant, near turbine 3
Maianthemum canadense	wild lily-of-the-valley	
Medeola virginiana	Indian cucumber-root	
Mitchella repens	partridge-berry	on a hummock in mature forest
Oenethera biennis	evening-primrose	

Oxalis acetosella	wood-sorrel	one stand
Panax trifolius	dwarf ginseng	one plant, in wet clearing, May
*Panicum lanuginosum**	panic-grass	along logging roads, compacted soil
Phleum pratense	timothy	along logging roads
Plantago major	common plantain	compressed soil, logging road
Polygonun cilinode	polygonum	abundant in clearings, climbing over other vegetation
Potentilla simplex	cinquefoil	
Prenanthes trifoliata	lion's-paw	forest understorey
Rubus allegheniensis	common blackberry	massively abundant in clearings
Rubus idaeus	red raspberry	abundant in clearings
Rubus hispidus	dewberry	pocket wetland
Scirpus atrovirens	bulrush	wet spots
*Scutelaria lateriflora**	skullcap	pocket wetland
Solidago puberula	rough goldenrod	
Streptopus roseus	rosy twisted stalk	in mature forest
Triadenum virginicum	marsh St. John's-wort	wet ground on logging roads
Trientalis borealis	starflower	
*Trifolium aureum**	clover	in clearings, along logging roads
Trifolium pratense	red clover	
Trillium cernuum	nodding trillium	
*Trillium undulatum**	painted trillium	
Veronica officinalis	field speedwell	
Viola cucullata	blue violet	wet depressions
Viola macloskeyi	small white violet	wet ground, open area
Viola sororia	violet	scattered in open forest

FERNS

Scientific Name	Common Name	Notes
Atherium felix-femina	northern lady fern	abundant in mature forest
Dennstaedtia punctilobula	hay-scented fern	confluent in clearings
Dryopteris carthusiana	spinulose wood fern	very abundant in mature forest
Phegopteris connectilis	northern beech fern	occasional in dense forest
Thelypteris noveboracensis	New York fern	

Boundaries

The effects on plants and their communities are considered immediate to the areas disturbed during construction of the roads and the turbine pads. For this study, a 40m wide easement along all access roads from the Maryvale Elementary School and linking all four turbines throughout the Project was studied. Each specific turbine site study was conducted within a 75m radius from the GPS location provided by the Proponent as listed in Table 1.1. Construction of the roads and turbine foundation may take place in any area within these bounds including moving a turbine to the outer edges of the radius of the defined study area. The ability to move within the study area boundaries (but not outside of) is

very necessary to provide responsible consideration to many other environmental features within the immediate footprint such as:

- Finding suitable soil conditions for the foundation integrity by means of a geo-tech study performed by drilling and providing a split spoon sample for analysis
- Ensuring previous land use such as foundations do not lie under the surface
- Interference with nesting wildlife at the time of construction (this cannot be responsibly predicted until several days immediately prior to construction).

Regardless of the location of the roads or turbines within this pre-studied area, the overall land use size will not increase; it will merely be relocated within the studied areas. The layup area will remain under 0.5 ha and the roads will be wide enough to provide safe travel for the flatbed trucks and cranes and to locate the collector lines along the ditches.

Access Roads

During construction and operation, vehicular traffic along the designated roads will affect the botany and flora by reducing the habitat directly proportional to the width and length of the road.

Project Construction

During construction, the use of excavators, bulldozers and trucks will impact the plant communities by removing and fragmenting the habitat.

The Project has been planned using primarily all existing roads on previously cleared land. According to Taylor, “In summary, the study area does not appear to succour any plant species of special concern”.

No significant effect on botany and flora is predicted due to proper mitigation methods, siting of turbine locations, and work habits.

Project Operation

Since the Project is largely sited outside of vegetated areas and along existing roads, it is anticipated that any potential effect on plants and their communities will be of a temporary nature.

No significant effect on botany and flora is predicted due to proper mitigation, siting of turbine locations, and work habits.

Project Decommissioning

By following the same work procedures of the construction phase without the actual construction, the disassembly will require using the proposed existing routes and crane pads to remove the equipment. The roads will be left in place and the turbine locations will be re-vegetated as the landowner requires as it ultimately belongs to them; however, typically this would be in the form of merchantable wood as this is the surrounding land use.

No significant effect on botany and flora is predicted due to proper mitigation, siting of turbine locations, and work habits.

Malfunctions and Accidents

The largest risks associated with all phases of any operations involving vehicles and machinery in forested areas are: contamination by petroleum products and spilled waste migrating to the surroundings; and in extreme situations a risk of fire, causing damage if not controlled immediately. Contact with the local Volunteer Fire Department, Chief Greg Smith and his two deputy chiefs has determined that a procedure in place upon commissioning to deal with logistics of fires and spills would outline the appropriate measures for responding. A site map will be provided to the Chief and to the Proponent's employees. Setbacks from sensitive areas will be in place. A list of appropriate contact persons and phone numbers as well as emergency transportation routes has been made available to the Four Valleys Fire Department as part of the outlined procedures. As well, radio communications will be available to the control center to provide lockout confirmation and procedures for safe contact with electrical components. NSE will be notified at the time of any applicable emergencies.

Mitigation

Efforts have been made to ensure that the Project is sited on previously cleared lands along existing roads and not in natural areas. However, limited clearing of trees will be required to facilitate the installation of the turbines and ancillary facilities such as the access roads and collector lines. From the vegetation point of view, the study area contains few constraints for wind power development since the preferred locations for turbines are: exposed, previously cleared areas; typically upland vegetation units; and the properties are entirely located in forestry areas. Before construction, the limits of vegetation clearing will be staked in the field. The construction contractor will ensure that no construction disturbance occurs beyond the staked limits and edges of woodlots and other sensitive areas adjacent to the work areas are not disturbed.

To the extent practical, tree and/or bush clearing where required will take place during late summer of 2009 (after first week of August). Appropriate setbacks will be determined for any discoveries of a listed rare plant species through on-going involvement with CWS and Barry Taylor prior to any construction taking place. These locations would be flagged and setbacks applied by Barry Taylor will not be disturbed by construction crews. Locating the turbine sites outside of vegetated areas has largely precluded disturbance to local flora and its habitat.

A variety of species of plants native to the general project area will be used in any re-vegetation efforts which may take place. Should seed mixes for herbaceous native species for the area not be available, the developer will ensure that plants used in re-vegetation efforts are not known to be invasive.

To ensure that no invasive species be brought in with the equipment used for the construction of the project, the developer will adhere to the following measures:

- Cleaning and inspecting construction equipment prior to transport from elsewhere to ensure that no plant matter is attached tot he machinery (e.g. use of pressure water hose to clean vehicles prior to transport)

- Regularly inspecting equipment prior to, during and immediately following construction in wetland areas and in areas found to support Purple Loosestrife to ensure that plant matter is not transported from one construction area to another.

Cumulative Assessment

In the short term, this Project will have a cumulative effect on the removal of vegetation in the area when combined with logging activities. However, in the longer term, this cumulative impact is negated by logging activities which are taking place regardless of whether any wind power development proceeds. Due to the relatively small footprint of land use necessary to operate this wind project, combining these two activities would not be considered a cause of new significant negative net effects due to the forestry development occurring in the Project area.

Although tree removal is a necessary part of developing a wind project, landowners who typically clear the land for firewood will decrease the amount of tree removal significantly due to the annual income from the generation of wind energy on their land. That is, the revenue derived from having turbines on their land will replace the need to remove trees to gain revenue from their land, resulting in a possible net increase in more mature forest habitat within the project boundaries.

Sustainable use of Renewable Resources

The Project area falls within a region of high wind energy in the province. The generation of electricity at Maryvale offers a sustainable source of renewable energy to supplement the province's power demands. The electricity created by this project will be transferred directly to the distribution power grid and used immediately upon generation. This project does not conflict with the present use of the land for other renewable resources; principally forest products.

Residual Environmental Impact

Although trees will be removed to facilitate this installation and it appears this will be of permanent nature, the impact can be brought to a 'net zero' or to a positive improvement to the surrounding environment for two main reasons:

1. The road improvements provide existing users access to their land which will decrease the use of unused trails and allow those areas to become reforested.
2. Providing a yearly income to the landowners that will more than offset any need to deforest the land surrounding the turbines.

*The level of impact on botany and flora after the protection and mitigation measures have been employed is rated a 'minimal' (i.e. the resource should return to baseline levels).

5.2.2 Surface, Groundwater Quality and Fish Habitat

The Maryvale Wind Project has one small stream running through its boundaries. The streams and wet areas around the Project can be seen in Figure 2.2. As illustrated, the easement roads follow the existing access to the Project area. The initial site plan has remained unchanged due to the fact that the access roads are already in place, which avoid wet areas and include only one water-crossing.

This section refers to the Project having potential for:

- Negative effects on surface water quality, quantities or flow
- Significant sedimentation, soil erosion, or shoreline or riverbank erosion on/or off-site
- Negative effects on fish or their habitat, spawning, movement, or environmental conditions
- Negative effects on groundwater quality, quantity or movement.

Meetings with NSE in Granton and DFO in Antigonish have determined there are no wetlands or water-crossings that are not manageable using the standards laid out for the Watercourse Alteration Permit and that the best course of action was to choose the main route into the Project that avoids rather than crosses significant water courses or wetland areas. The following components have been considered as to how they interact with surface water, groundwater and fish habitat:

Boundaries

The zone of potential interference to the surface groundwater quality and fish habitat could be along roads and power-lines and any area used for machinery assembly or maintenance. The minimum distance between residential houses where groundwater wells are located and turbines is approximately 1.5km. Project activities are sufficiently distant from residential wells so as not to pose a risk to potable water use in the area.

Access Roads

Natural drainage networks will be affected by the construction and use of access roads. The presence of the access roads may result in the direct and/or indirect destruction of surrounding aquatic habitat through increased sediment loading in streams, increased erosion and runoff, increased magnitude and frequency of flooding, slope instability and interrupted water flow. In addition, increased traffic along the roads may enhance soil compaction, increase sediment loading and magnify problems associated with altered drainage patterns, such as increased runoff.

The state of the entrance road, already existing, has been in disrepair for many years. Each year the snow melt and spring rains wash out the road to the extent that it is a challenge for even ATV's to follow the road. This leads to an increase in sediment loading in streams, highly increased erosion and runoff and slope instability. The upgrading of this entrance road will significantly reduce the impacts felt annually by the surrounding ground and surface water areas.

Project Construction

Based upon the turbine locations, the alignment of the power lines, and access roads, it will be necessary to cross one small stream. Construction of the overhead lines will not require in-stream work.

Other potential effects to watercourses from Project construction activities include: possible erosion of stockpiled topsoil into the flood plain areas, which could result in a short-term and spatially limited increase in water turbidity and degradation of the water quality and fish habitat.

Since the culvert installation will be done in-the-dry, the proponent will consider the following:

- Fish passage will be maintained at all times during the construction of the new culvert along with temporary stream diversions associated with the project
    - Fish salvage will be conducted by a qualified biologist prior to de-watering of any isolated section of a watercourse or temporary diversion channel. A summary report of fish captured (i.e. number and species) and replaced will be prior to the Habitat Assessment section within 2 weeks of the salvage
- A detailed sediment and erosion control plan and an emergency response plan will be prepared and implemented by the proponent for all project works to prevent the release of sediment, sediment laden water, or other deleterious substances into the environment, specifically into any waterbody (i.e. watercourse, drainage channel, etc)
- Visual monitoring of the turbidity near the work site should be undertaken on a daily basis. If any changes occur in the turbidity of the water produced by this activity, the works will immediately stop and Mr. Charles MacInnis, Oceans and Habitat Area Chief, DFO, Antigonish, NS will immediately be contacted.
- Any work equipment in or near the water will be free from loose petroleum fluid or lubricants harmful to the aquatic environment. No fuel and lubricant will be stored near the water. An emergency response plan will be developed to avoid any oil spills or any hazardous materials from getting into the water.

These issues are addressed in the EMP and EPP found in Appendices D-1 and D-2 of this document.

Project Operation

No effects to drains, watercourses, fish and fish habitat are anticipated during the operation of the Project.

No significant effect on fish habitat is predicted due to proper mitigation methods and work habits.

Project Decommissioning

Decommissioning activities will include trucking, cranes and heavy equipment to remove the turbines and power-lines with the same interactions mentioned with construction without the construction of road works.

No significant effect of fish habitat is predicted due to proper mitigation methods and work habits.

Malfunctions and Accidents

The risk of malfunctions and accidents is present during all activities of the Project. These risks include a risk of water contamination by: sediment; run-off; spills; vehicle accidents, and; fire.

Mitigation

To prevent any destruction of surrounding aquatic habitat through the means described in 'Access Roads', the developer will follow the Environmental Protection Plan (EPP) and Environmental Management Plan (EMP) as described in Appendices D-1 and D-2, respectfully.

As mentioned above, the intention is to adhere to the buffer zones when working near water bodies. However, in the unlikely event of any unforeseeable interactions, emergency response procedures will be in place to prevent potential impacts on aquatic habitat.

Cumulative Assessment

The potential disruption of surface, groundwater quality, and fish habitat is not predicted to combine with any other activity in the Maryvale area during the construction phases of the Project. During operation of the Project, increased flow of traffic, combined with the existing uses may increase. The cumulative impact of additional accessibility is predicted to be less due to the improved quality of the roads, culverts and ditches.

The potential for increased soil compaction and sediment loading will require the visual inspections to extend beyond the construction phase, for the lifetime of the project and include the stream crossing, culvert and related structures.

Sustainable Use of Renewable Resources

The Project area falls within a region of high wind energy in the province. The generation of electricity at Maryvale offers a sustainable source of renewable energy to supplement the province's power demands.

This Project does not conflict with the water usage in the area as absolutely no water is used in the process of construction, operation, or decommissioning of the wind turbine generators. Also, the placement of these machines in relation to potable drinking wells is far enough away to not pose any risk to contamination of the wells.

Residual Environmental Impact

With the implementation of protection measures to maintain a 30m buffer from any wet area or watercourse, as well as strict adherence to the EPP and EMP, no net effects are anticipated to the surface, groundwater quality or fish habitat. However, in the event that in-stream work is required and/or conditions arise that topsoil is positioned within the flood plain, any associated effects would be both spatially and temporally limited.

*The level of impact after protection and mitigation measures have been employed is rated as 'minimal' (i.e., the resource should return to baseline levels).

5.2.3 Species at Risk, Wildlife and Their Habitats (Excluding Avian Species)

The following references were used by the Proponent and experts to identify the appropriate species of concern for component studies:

- Contact with Bob Olgivie, Manager, Special Places of the Nova Scotia Museum, Heritage Division, was initiated by the Proponent in April 2008 to determine the issues to review and how they interact with the Project area in Maryvale. (See Environmental Screening Letter 08-04-14, Appendix C-4).
- Atlantic Canadian Conservation Data Center (ACCDC) was contacted to provide a 100km search from the center point of the Maryvale Wind Project
- *Species at Risk Act* (SARA)
- *Nova Scotia Endangered Species Act* (NSESA)
- NSDNR General Status of Wild Species List
- *Migratory Birds Convention Act (MBCA)*
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC) rankings

In recognition of SARA, MBCA, COSEWIC, and NSESA, consideration has to be given to those plants, birds, mammals, amphibians, reptiles and invertebrates that are listed as species of concern.

The desktop screenings for the species at risk were reviewed and identified as being known to reside or having the habitat suitable for sustained survival in the study boundaries of the Project area indicating the following species of concern for the region of the Project.

Mammals

"Mammalian species of concern that could utilize the habitat in this general area include the moose and fisher.

Moose

Mainland Moose (*Alces alces americana*) were designated "endangered" in 2003 under the Nova Scotia Endangered Species Act. These candidate wind power sites are associated with historical moose habitats, and may have moose still using them.

Moose sign was found on the initial proposed site for this project. That discovery prompted its relocation. A pellet group inventory undertaken in early May, 2008, found no evidence of winter moose use of the proposed location. (See Appendix B-4)

The issues that continue to place this population in "endangered status" are complex. Basic demographic data (population size, structure, reproduction and mortality) are lacking. As well, it is difficult to accurately identify the dominant cause-effect factors limiting the population.

As a student this biologist assisted William H. Prescott with his field work for a Master's thesis at Acadia University. Published in 1968, it was a study of winter concentration areas and food habits of Nova Scotia Mainland Moose in the late 1960's. It concluded that in northeastern Nova Scotia a habitat of widely diversified vegetation types was the critical factor influencing the use of areas for winter concentration. Typical areas had a belt of open mixed wood along the upper one-third of the slope, usually above 150 m, and lying between the hardwood-dominated hilltops and the softwood-dominated lower slopes. Shelter in the absence of food was not favored by moose. In wintering areas that we surveyed in the Cape George area, moose moved freely and frequently up and down these steep valley slopes associated with the streams and used the adjacent hardwood uplands as well. Later, as the "Lands and Forests" regional biologist for the eastern mainland from 1973-1988, I continued to note this habit, but also located other moose living entirely on the upland during winter helicopter surveys.

Moose were far more plentiful in those decades, and winters were more conducive to achieving flying census results on a more regular basis. For a variety of reasons, including generally milder winters, a moose census has not been flown in this area by Nova Scotia Department of Natural Resources staff since 1995. Sightings, tracks, and pellet piles noted and mapped since 1995 give every indication that there is core moose habitat for the small population to the west of the Cape George area. Therefore, moose are a serious concern with respect to this proposed development.

The many challenges faced by mainland moose have been documented by the Mainland Moose Recovery Team, a team of experts that was assembled to develop a recovery plan for the species that was released in March, 2007. The number of moose on the mainland has declined even though hunting them has been banned since 1981. As a member of the Recovery Team, a number of issues and mortality factors that were raised at team meetings are certainly relevant to the small moose population left in the Cape George area.

Historically, moose populations have collapsed in the past. In 1672 Nicolas Denys wrote that moose had been exterminated on Cape Breton Island by First Nations peoples. Whether population collapses are actually caused by hunting alone is an open question. In recent times moose have also declined in provincial sanctuaries where hunting is prohibited.

The influx of white-tailed deer into Nova Scotia through the early part of the twentieth century has significant implications for moose populations, in part because of inter-specific competition, but also because the deer carry a nematode parasite, *P. tenuis.,* that often is fatal in moose. Dodds noted that winter concentrations of moose in elevated areas of northeastern Nova Scotia were separated from deer populations that wintered in valleys below, and that this offers a reasonable explanation for the

lower infection rates for these moose. A similar phenomenon works on the Cape Breton Highlands. Mild winters in the past three decades have enabled white-tailed to wander these uplands on some winters. During winter aerial moose surveys in the early 1980's, groups of deer were resting on some of the highest lands along this scarp where the snow had blown clear.

Poaching is a factor that becomes critical when populations levels are low. As a former conservation officer, and as working biologist living in Antigonish County with access to local knowledge, I am certain that poaching abetted by the use of four wheel drives, snowmobiles and all terrain vehicles remains a serious factor inhibiting moose population recovery in the Cape George area.

Acid rain is indirectly affected moose populations by depositing and leaching heavy metals like cadmium and mercury into soils and waterways. These are taken up by terrestrial and aquatic plants that are subsequently consumed by the moose that occupy acidified landscapes.

Neurological diseases and nutrient deficiencies are also suspect causes for the demise and currently under investigation. Ecto-parasites like the moose tick are present in this population.

Aquatic vegetation is sought by moose to supplement terrestrial diets for added nutrients. Females (cows) may be pregnant or feeding young, while males (bulls) need massive amounts of nutrients to grow antlers on an annual basis. The general dearth of shallow lakes, swamps and large wetlands with aquatic plants in this upland area is notable. That reinforces the notion that Prescott presented regarding a diversity of terrestrial vegetation being particularly important to moose in this region from a nutritional perspective.

Other factors of concern include access and human presence. Aside from protected areas like National Parks, moose that are subjected to hunting or poaching pressures tend to avoid landscapes that have steady human activities. Roads, forestry operations and human encroachment have created alterations and fragmentation of their habitats.

Summer thermal cover may be important as well. Moose are well adapted to winter conditions, but not as able to cope with hot summers that have become more common. Moose in Nova Scotia are near the southern edge of their North American range. The northwest part of the State of Minnesota is also part of the southern range periphery. Its moose population has declined since 1984. Researchers there identified infectious pathogens including *P. Tenuis,* negative effects of climate change, increased food competition with deer, illegal hunting (poaching) and predation by black bears and wolves as causative agents in the decline. In Nova Scotia coyotes may be occupying the niche once taken by wolves. That study concluded that “the southern distribution of moose may become restricted in areas where climate and habitat conditions are marginal, especially where deer are abundant and act as reservoir hosts for parasites.” Predictions are that the population will not persist over the next 50 years. A modified version of these negative forces may also be operating on the moose population of Nova Scotia.

Figure 5.1 shows the summer thermal cover habitat for moose on the Maryvale Wind Project proposed site and on adjacent land. Three cover types were evaluated - softwood, mixed wood and hardwood. This is based on a 70% or greater canopy closure. Canopy height is related to site productivity and age of

the forest which is generally greater than 20 years. The map shows that little summer thermal cover is available to moose in the Project area, but that much better thermal cover exists immediately to the west of the proposed Project boundary.

Fisher

'A small population of fishers, *Martes pennanti,* exists in the Cape George region. A medium-sized, dark brown-to-black member of the weasel family, fishers are also found in other parts of Pictou and Antigonish County, as well as the province. Although not designated under the Nova Scotia Endangered Species Act, fishers have general status ranking of yellow - meaning that they are sensitive to human activities or natural events. Fishers are a native species but were reintroduced to the eastern mainland during the 1960's. Easily trapped, they inhabit mature-mixed wood and second growth forests. They are adept hunters of squirrels, snowshoe hares, ruffed grouse and porcupines. Fishers travel regular territorial routes, and may cover a circuitous route of up to160 km every week or two. They utilize hollow trees as den sites.

Invertebrates

The Early Hairstreak, The Hoary Comma, the Greenstrippped Darner and the Satyr Anglewing were indentified in the ACCDC data search.

The range map for the Early Hairstreak butterfly indicates a contiguous range to the west and south, with only two distinct populations in Nova Scotia; one in western and the other in central Nova Scotia. Where it is located, this butterfly is usually extremely rare. It has not been identified on or near this proposed Project site.

The Hoary Comma butterfly's normal range is west of this area. Its habitat includes open boreal woodland near streams. This is not the habitat found on this site.

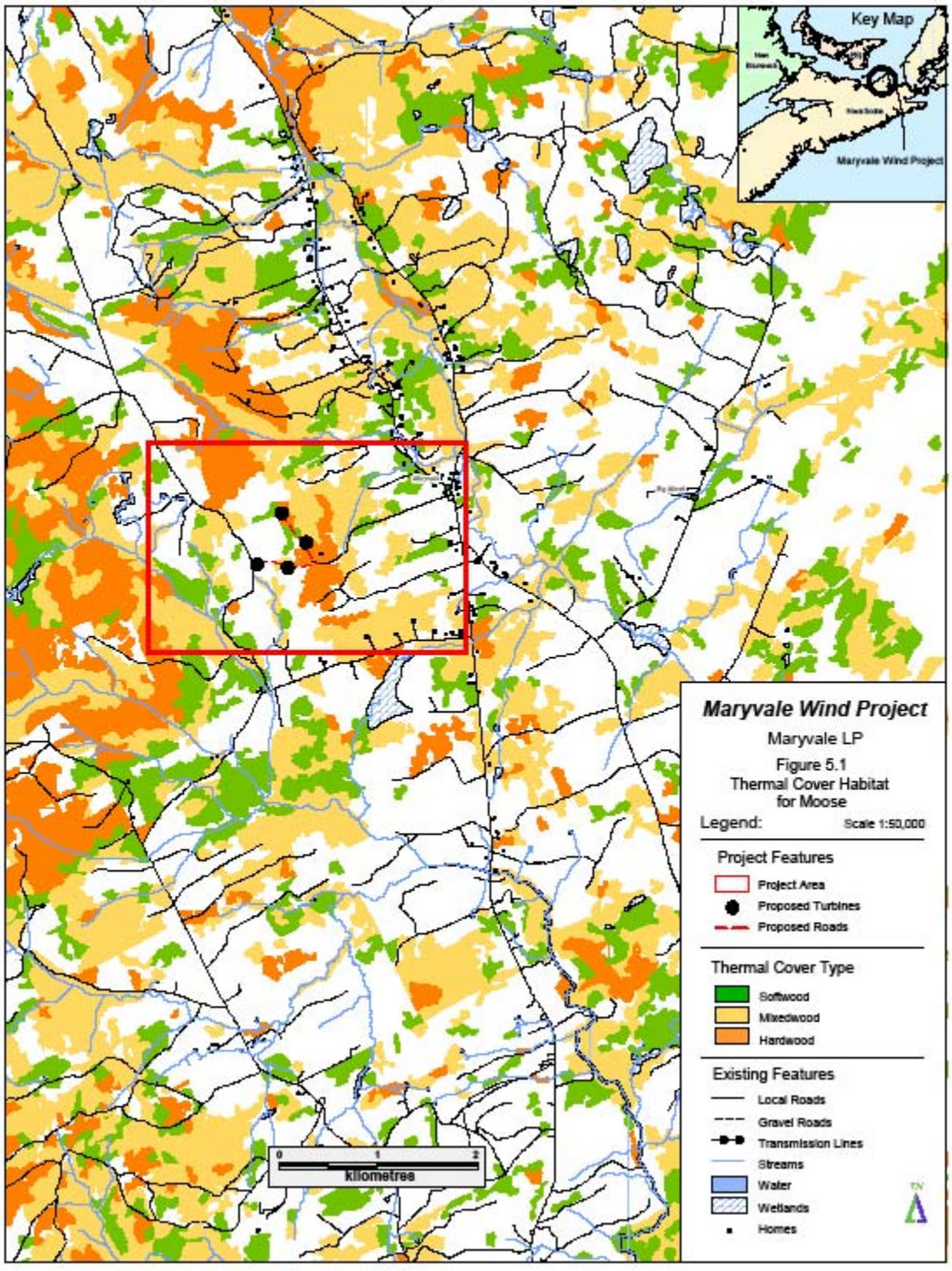
The Green-Striped Darner is an uncommon dragonfly species whose habitat preferences are spring-fed ponds and marshy meadows, and marshy or swampy lakes, ponds and slow streams, especially ones bordered by sedges. Such habitats are not found on these hilltop sites.

The satyr anglewing butterfly prefers openings in riparian woods, marshes, nearby fields and edges and wooded ravines in prairies. It feeds on nettles. The range is from southern NS and northern New England to western boreal Canada and south to Baja, California. The proposed location is out of range, windy and offers little or none of this preferred habitat."[9]

Reptiles

Wood Turtle show up on the 100km radius search from ACCDC. In conversations about the Project boundaries with Mark Pulsifer, Regional Biologist for Antigonish County, and NSDNR field personnel,

[9] Robert Bancroft, Project Biologist


Key Map
Maryvale Wind Project
Maryvale Wind Project
Maryvale LP
Figure 5.1
Thermal Cover Habitat
for Moose
Legend:
Scale 1:50,000
Project Features
Project Area
Proposed Turbines
Proposed Roads
Thermal Cover Type
Softwood
Mixedwood
Hardwood
Existing Features
Local Roads
Gravel Roads
Transmission Lines
Streams
Water
Wetlands
Homes
0
1
2
kilometres

they indicated that no natural habitat for the Wood Turtle exists and is very unlikely to be seen in the area.

The following components have been considered in the interaction with Species at Risk, wildlife and their habitats.

Boundaries

The boundaries searched and considered were quite well defined due to the size of the Project and location of existing roads. However, due to the province of Nova Scotia requiring a 100km search for any recorded species, there is a good indication of possible species which may be present in the surrounding areas. The spatial boundaries for which the Project will physically impact are considerably less than the desktops studies reviewed.

Access Roads

The locations of access roads have been selected to minimize potential impacts on wildlife and Species at Risk. A vegetation survey of the selected routes has been conducted which confirms that plant species of concern have been avoided. The installation of culverts offers potential impacts on the aquatic environment which will be controlled using proper culvert design and installation measures following provincial guidelines. The work will be conducted during the dry season (June 1 to September 30) to minimize risk to aquatic receptors. The noise and human activity associated with road construction will cause some species to leave or avoid the areas of disturbance. Typically, these species will re-acclimate to site once the construction phase is complete.

During the operations phase, turbine sites will be subject to routine maintenance calls and inspections. The vehicles will travel over the access roads to the turbine sites. These activities will be relatively infrequent compared to other site activities associated with tree harvesting and recreational usage by ATVs and snowmobiles. It is unlikely that the site activities during the operations phase of the Project will add significantly to the potential impacts of human activities on the wildlife within the Project area.

Project Construction

The following sections address separately the likely impacts that construction could pose on each of the species groupings identified above:

Fisher

“Fisher has not been sighted by any members of the expert study team while conducting their respective searches. Although known to breed in this area of Nova Scotia, they also avoid contact with humans. If the Fisher is present in the vicinity of the turbines, they could be affected during construction either directly or indirectly. Direct affects of things such as land clearing operations are unlikely as the animals will avoid areas of human activity and noise. Indirect impacts could occur by a reduction in the quality and quantity of their habitat. Since the turbine footprints are under 2% land use of the land base, the loss of productive habitat is considered minimal.

Monarch Butterfly

Monarch Butterflies prefer milkweed habitats not found on or in the vicinity of the turbines sites. They also visit flowers for nectar, particularly flowers of the *Compositae* family. The removal of forest vegetation in these areas will have minimal impact on the available habitat preferred by Monarch Butterflies.

Wood Turtle

Suitable habitat does not exist for Wood Turtles within the Project area. It is unlikely that Project activities will encounter or impact this species.

Mainland Moose

Historically this area was moose habitat. In recent times the site has been cut-over and white-tailed deer occupy the habitat. Moose living in wilderness areas to the north and west may still travel through this area occasionally, but the roads, human activity and relatively close proximity of these sites to a school and community to the east is a deterrent for moose to remain there as residents.

During the construction phase, any moose in the area will likely move away due to the noise and human activity. Studies at operating wind farm sites in Vermont and Gaspe indicate that moose will habituate to operating turbines after the construction phase has passed."[10]

Overall, no significant effect on Species at Risk and Wildlife is predicted due to proper mitigation methods and work habits.

Project Decommissioning

The decommissioning of the Project would involve the dismantling and removal of the turbines. Effects on the species identified, if any, would be comparable to, but less than that associated with construction. In summary, the decommissioning of the Project site will not result in a significant adverse environmental effect on Species of Concern.

Overall, no significant effect on Species at Risk is predicted during the construction activities due to proper mitigation methods and work habits.

Mitigation

Efforts have been made to ensure that the Project is sited on previously cleared lands and not in natural areas. However, limited clearing of trees will be required to facilitate the installation of the four turbines and ancillary facilities such as the access roads and collector lines. From a vegetative point of view, the study area contains few constraints for wind power development since the preferred locations for turbines are exposed, mostly previously cleared areas and typically upland vegetation units. The properties are all previously deforested. Prior to construction, the limits of vegetation clearing will be

[10] Bob Bancroft

staked in the field. The construction contractor will ensure that no construction disturbance occurs beyond the staked limits.

Malfunctions and Accidents

During the operation of the Project, malfunctions are most likely to involve the stoppage of turbines due to a mechanical problem or electrical failure such as a break in a power line or cable. The turbines and electrical systems have build-in safety features which shut down the systems and avoid significant damages to the systems and equipment. There are limited quantities of lubricants present in the turbines.

Given the very limited footprint that would likely be involved in such an event, no significant adverse impact on the identified species of concern is predicted.

Speed limits will be adhered to by all personal to decrease the chances of a vehicular-animal collision. The proponent will not tolerate any misconduct by personal involving the species present within the project boundary or their habitat.

Cumulative Assessment

There are no proposed new works known that will take place in, or in the vicinity of, the turbine sites that might act cumulatively with the construction, operation or decommissioning of the proposed turbines to cause a significant adverse effect on the identified species of concern.

Sustainable Use of Renewable Resources

The Project area falls within a region of high wind energy in the province. The generation of electricity at Maryvale offers a sustainable source of renewable energy to supplement the province's power demands. This Project does not conflict with the present use of the land for other renewable resources, principally forest products.

Residual Environmental Impact

Though the effects are anticipated to be minimal, there is some potential for disturbance of natural features, habitats, and species during the Construction Phase of the Project. These effects are expected to be short-term in duration and spatially limited to the work areas and immediately adjacent areas. Studies related to the sensory effects of constructing and operating wind farms on big game species carried out in the Western U.S. and in the Gaspe region of Quebec have shown that there is no significant effect on the successful hunting practices when comparing before and after installation of wind farms.[11] These studies indicate that species fall under two categories: 1> unaffected by this type of development, given their small footprint and preservation of existing land use; and 2> they can readily adapt to the presence of the wind turbine generators. Once the Project is operating, activity around the facilities will decrease, thus allowing local flora and fauna and wildlife movement patterns to

[11] Strickland and Erickson, 2003

re-establish. Disturbance to local flora, though permanent, will be spatially restricted to the operating areas. The effect of installing the various Project components is anticipated to have limited effect on Species at Risk, other wildlife, and their habitats during construction or operation of the facilities. Based upon the implementation of the protective and mitigation measures coupled with the Project's siting activities, no net loss of wetland functions are anticipated as a result of the Project's construction or operation and maintenance activities. Considering the temporary nature of construction effects, the limited extent of permanent works, and the periodic nature of maintenance activities, it is likely that resident wildlife will adapt to the Project. Overall, no significant negative net effects are anticipated to Species at Risk, wildlife and their Habitats given that the Project is generally sited in areas already cleared for forestry use and away from any sensitive environmental areas such as wetlands. Impacts associated with increased accessibility by humans cannot be ruled out.

*Overall, the level of impact on Species of Concern, after mitigation measures are implemented is rated as "low" i.e., a slight decline in resource over life of Project.

5.2.4 Avian Species

The Proponent has contracted a skilled avian identifier to conduct the one year pre-construction Bird Monitoring Study. The study has been overseen by two biologists to ensure the assessment of impact is reflective of the project and its inclusive activities on the avian population using the area. This study began in April 2008 and was completed in April 2009. The results of the summary of findings (AppendixB-3) were that: no bird colonies are present in the study area; the study area does not appear to be an important breeding area for any bird species at risk (although Olive-sided flycatcher was confirmed to have bred and is threatened under COSEWIC in Canada); there do not appear to be landforms in the study area that concentrate migrating birds; the study area is not an important corridor for migrating raptor species; numbers and species of migrating birds counted during the fall season are representative of what one would expect to encounter in similar habitat types in this region of Nova Scotia; and there are no lit structures currently nearby that would attract birds.[12]

Information relevant to bird populations, bird habitat, and the possible impact of wind turbines was gathered from a variety of sources including: federal and provincial government agencies; the ACCDC; *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds, July 28, 2008 (Environment Canada and Canadian Wildlife Service); Wind Turbines and Birds: A Guidance Document for Environmental Assessment , July 28, 2008 (Environment Canada and CWS);* websites on Species at Risk, bird conservation regions and important bird areas; pre-existing surveys of the site and adjacent areas (including the Maritime Breeding Bird Atlas, The Maritime Nest Records Scheme, the Maritime Breeding Bird Survey, Project Feeder Watch, the Christmas Bird Count, and the Glen Dhu Wind Farm Avian Bird Study, Dalhousie Mountain Avian Study); interviews with local birders; Canadian Wildlife Service; and Environment Canada weather data.

Dan Busby, former Landbird Biologist with CWS, was contacted early in the study and planning phases and determined the Project is not on a major migratory bird flyway according to CWS. Since the findings

[12] Maryvale Bird Study – April 2008 to February 2009; Bruce Stevens

of the bird study were completed, Julie Pacquet of CWS has been contacted. Her recommendations for post-construction monitoring and the process in which to undertake this activity are included in the Bird Study.

No staging areas for shorebirds, waterfowl or land birds were noted. Details on the reconnaissance methodologies and results of the spring, summer, autumn, and winter desk top studies, point counts and migration and breeding bird studies are provided in the Maryvale Bird Study – April 2008 to March 2009, in Appendix B-3.

Boundaries and Environmental Setting

The spatial boundaries encompass the entirety of the area where the turbines are being located and extend to include those areas that are frequented by birds that may be impacted by the construction or operation of the turbines. The temporal boundaries encompass both the Construction Phase and the Operations Phase of the Project.

In conducting the year-long study, the surveyor used 10 point counts and two routes for stopover counts which sampled major habitat types in the area. Having 10 waypoints over this one year period gives an accurate representation of species found not only directly at the turbine locations, but also those using adjacent areas which will not be disturbed for road or turbine construction.

Access Roads

There are approximately 3.7 kilometres of required road construction and upgrades that have the potential to impact the bird population of the area. Road construction will avoid disturbing nesting areas. The clearing and grubbing activities will not take place until after the first week of August.

Project Construction

Construction activities such as clearing, grading and turbine assembly can result in the temporary disturbance of birds due to noise and the presence of humans in the area. Construction activities which may pose a risk to the bird population in the Project area will be monitored and the timing of such activities scheduled to minimize potential impacts, i.e. the clearing and grubbing will not take place during the breeding season, May to late July/ early August.

Construction activities involved with erecting the towers have the potential impact of creating loss of habitat and interference with normal behaviour such as feeding and breeding.

All breeding birds located during the field work, including raptor species, are common throughout the province and thus the Project poses little risk to species of concern.

The Olive-sided Flycatcher, listed as Threatened by COSEWIC, has been observed in the Project area. Potential adverse effects of the habitat of this species in the project area are low considering this species is known to thrive on cut-over areas left to regenerate, which will be the case for the crane lay-down areas cleared around the turbines. The avoidance of disturbing the area in which this species was

observed will eliminate potential loss of habitat, and the cutting and re-generating of turbine sites will increase the potential habitat in the immediate area for possible new members of this species in the project area.

Given the existence and use of access roads to the turbine locations, habitat disturbance may result which will affect a minimal percentage of territories of any given species.

It is unlikely the Project will result in a significant adverse environmental effect on avian population of the province, including species of concern, from the construction activities of the proposed Project.

Project Operation

Several facets of turbine operation may affect bird populations at wind farms. These are: noise from rotor movement associated with the turbine operations; aeronautical lighting; loss of habitat; presence of large moving rotors. These features may result in: an interruption in regular behaviour such as feeding, migrating and breeding; displacement to avoid disturbance; disorientation during flight; and collisions with turbine blades. An increasing number of studies, both by independent academic researchers and the wind industry indicate that mortality from wind turbines vary, but proper siting away from migration paths and nesting areas significantly decreases the instance of bird mortality. The results show that negative impact is generally very low, especially in rural settings as opposed to urban areas with large lighted buildings. There are no structures with lights on them to attract birds to the proposed Project area. Upon erection of the towers, it is regulated by Transport Canada to have Aeronautical Lighting Requirements met. For the Maryvale Wind Project, all four turbines will be lit under the Aeronautical Obstruction Lighting Plan. This is to ensure the boundary of the Project is clear to all aircraft.

The proposed Aeronautical Obstruction lighting will be installed in compliance with Part VI of the Canadian Aviation Regulations 2007-2 Standard 6321.19 as administered by Transport Canada. The type of lighting will consist of medium intensity (2000 candela) red aviation lights, flashing at 20 flashes/ minute during the night and off during daylight hours. This complies with CL-864 of Appendix B of the Standard. Figure 2.7 shows the layout of the Aeronautical Lighting Plan. The type of lights predicted to be used in this installation is detailed in Appendix A-2: Lighting Specs.

The Proponent will not operate exterior decorative lights such as spotlights and floodlights whose function is to highlight features of buildings, or to illuminate an entire building. There is no requirement of the wind farm to operate such lights. Work will be carried out during the day. If the highly unlikely event of working into the evening must occur, lighting for the safety of the employees will be shielded to shine down and only to where it is needed, without comprising safety. There will be no street or parking lot lighting required for this project.

Raptors can be susceptible to collisions with rotor blades. No raptor nests were found within the study area. The proximity of nests and hence the use of the area will likely vary from year to year. Nevertheless, based on the conditions, on what is known and the number of turbines, the number of collisions that might be expected is low. The effect of collisions on local foraging birds, including raptor

populations is not considered to be significant and unlikely to impact any species of concern in the province.

In summary, although there is always a risk of disturbance and collision associated with the operation of turbines, there is unlikely to be a significant adverse effect on the avian population of the province or migrating species, including species of concern, from the operation of the Project.

Project Decommissioning

The decommissioning of the Project would involve the dismantling and removal of the turbines. Effects on the bird population, if any would be comparable to those experienced during Project construction.

It is unlikely the Project will result in a significant adverse environmental effect on avian population of the province, including species of concern, from the decommissioning of the Project.

Mitigation

Limited amounts of clearing and grubbing will be taking place. This work will be done after the first week of August to avoid disturbance during the breeding season.

Habitat fragmentation has been limited by the use of existing roads and cleared areas for turbine placement. By not creating a large amount of loss of habitat, the Proponent is confident that the impact of migrant bird habitat is minimal.

The sites have been selected to have the least amount of impact possible through consultation with the projects botanist, biologist and avian surveyor.

The indirect effects rising from the removal, fragmentation or disturbance of habitat during the Project's construction phase has a potential to negatively affect birds. However, since bird habitat requirements during migration are much less specific than during the breeding season, limited habitat removal and disturbance is not expected to have a significant effect on migrating birds. The removal and fragmentation of natural habitats, especially wetlands and woodlands, has been minimized by avoiding construction in or across any noticeably sized natural habitats. The study area does not support significant numbers of migratory birds and no other species at risk were detected other than the Olive-sided Flycatcher. The study area, although not entirely devoid of natural habitat, has been largely altered for forestry purposes and provides mostly lower quality bird habitat. The design (I.e. turbine shape and lighting) and siting process (i.e. out of flyways) inherent in the Project design, mitigate many of the potential direct and indirect effects of the Project.

Additionally, habitat requirements for birds during migration are much less stringent than for breeding species and limited habitat disruption will have a negligible effect on migrating birds. The main, direct effect of the proposed undertaking on birds is mortality due to collision with turbines during operation. Background information reviewed and field studies has demonstrated that the study area is not in the path of a major migratory path (consultation with CWS, Maritime Bird Atlas, ACCDC), that is does not contain any topographical or other physical features that would concentrate birds, that it does not

provide habitat for breeding species at risk and that it supports generally lower-quality agricultural habitat. Also it has been noted that the small amount of area cleared (for construction) and taken up (for land use of the actual towers) is less than 12 acres in total. These factors lead to the conclusion that the potential for direct avian mortality at the Project is very limited.

The study area meets the general and specific siting guidelines for onshore facilities suggested by Bird Studies Canada, 2003 (BSC). BSC notes that 'the greatest adverse effect that wind energy facilities have on birds is disturbance to breeding and wintering birds (except in areas where poor habitat quality exists, such as forestry, agricultural and industrial area) can proceed with little or no pre-construction monitoring'. For example, bird mortality at a site in southern Ontario, also outside of major flyways, has been demonstrated to be less than two birds per turbine per year. This number is negligible compared to the number of individuals that pass through southern Ontario and, this Project would not have an appreciable effect on local or regional populations in Nova Scotia. However, a bird monitoring program will be established for at least a 2 year period following commissioning of the Project.

Malfunctions and Accidents

During the operation of the wind farm, malfunctions are most likely to involve the stoppage of turbines due to a mechanical problem or electrical failure such as a break in a power line or cable. The turbines and electrical systems have build-in safety features which shut down the systems and avoid significant damages to the systems and equipment. There are limited quantities of lubricants present in the turbines.

Given the very limited footprint that would likely be involved in such an event, no significant adverse impact on the avian species is predicted.

Cumulative Assessment

The clearing of land for wood has been taking place for generations in the project area. The annual royalties for easements for the landowners is seen as an alternative to clearing the wood for income in some areas. This may aid in balancing the removal with the allowance of more mature forest regeneration within the project boundaries.

There are no proposed new works known that will take place in, or in the vicinity of, the turbine sites that might act cumulatively with the construction, operation or decommissioning of the proposed turbines to cause a significant adverse effect on the avian population including the identified species of concern.

Sustainable Use of Renewable Resources

The Project area falls within a region of high wind energy in the province. The generation of electricity at Maryvale offers a sustainable source of renewable energy to supplement the province's power demands. This Project does not conflict with the present use of the land for other renewable resources, principally forest products.

Residual Environmental Impact

The effect of installing the various Project components is anticipated to have limited effect on birds during construction or operation of the facilities. Given that the Project is generally sited in areas already cleared for forestry use, the study areas does not support significant numbers of birds and is not on a major migratory flyway. No significant negative net effects are anticipated to birds, their habitat or staging areas.

*The level of impact after protection and mitigation measures have been employed is rated as "low" i.e. slight decline in resource over life of Project.

5.2.5 Existing Land Use

The Maryvale Wind Project is in the small community of Maryvale, Antigonish County, Nova Scotia. This community has about 200 residents with an elementary school located 1.495km from the nearest turbine site, a church parish, a volunteer fire department with a large community center, beautiful scenery, plenty of forested land and some pastures. The land surrounding the community is used for timber harvesting, farming and recreational activity for the most part.

The Municipality of Antigonish is currently in the process of creating a land-use bylaw dealing specifically with the placement of wind turbines, both small scale and industrial scale. It is proposed that the following minimum setback distances be maintained:

Industrial Wind Turbines:

- Minimum setback from all residences, except residences located on the same lot as the wind turbine, shall be 600m (1968.5 feet). There is no setback requirement from residences located on the same lot.
- Minimum set back 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 1000m (3280 feet). There is no setback requirement form residences located on the same lot
- Minimum setback from all property lines shall be 10m (32.8 feet) plus one times the height of the rotor.[13]

If the turbines in the wind farm fall within these criteria, the permitting process requires an application to the municipal planner for a development permit for each turbine location. Where the Project layout cannot meet the setback criteria, the developer has the option to apply to the adjacent landowner, as well as the municipal council, for a 'variance'. This process is more time consuming than the straight forward approach of permit application within by-law regulations, but it does ensure the developer some room to adjust positioning of some turbines which may be necessary for any number of reasons.

RMSenergy gave a presentation to the Council of the Municipality of the County of Antigonish during their monthly council meeting on April 14, 2008. Since that meeting, there have been conversations and

[13] DRAFT Municipal Planning Strategy and Land Use Bylaw, for the Municipality of the County of Antigonish, May 2008.

emails with various council numbers and employees of the planning department regarding these setback issues and the Proponent is fully confident in their knowledge of the permitting process for wind turbines in Antigonish County.

During the siting process, the developer used these criteria as a starting point for exclusion zones. As stated throughout the EA, each field and desktop study has been conducted in such a manner through which the turbines may be adjusted within a 75m radius of the given coordinates. This would mean that the turbines may be placed anywhere within the 5625m^2 area surveyed around each GPS coordinate found in Table 1.1. When final micro-siting is complete, the development permits will be applied for by the Proponent to the Municipality of the County of Antigonish.

Boundaries

The affect on land use will be concentrated on the individual turbine sites, 0.2ha, during construction reduced to 0.1 ha during the operation and on the easement (spacing 500 m x 20 m wide easement) between turbines which totals 1 ha during construction reduced during running operations to 0.5 ha.

The total land used up for turbines for this Project is:

Turbines: 4 x .2 ha = 0.8 ha

Total roads: 3.7km x 1 ha/km = 3.7 ha

The total land used equals 4.5 ha which is about equal to approximately 11.1 acres.

Access Roads

The access road to be used is already an existing road on privately owned land, which is leased for this Project. The existing road ends at the location of the met tower. From there, access roads tend to follow trails used for the removal of firewood. Where these trails are being used, there is potential for adversely affecting existing land use in terms of removal of forest revenue lands. Access roads may temporarily remove trail-lands from recreational uses during construction.

Project Construction

The affect on land use will be primarily temporary access loss/disruption during the construction of the turbines which will involve the delivery of up to 45 large truck loads. These deliveries may slow or interrupt traffic on the Trans Canada Highway 104 at Exits 27 and 29, through to the secondary 245 highway (Sunrise Trail). However, at no time will private landowners be unreasonably prevented from gaining access to their land.

The sites are located in not easily accessible locations on the mountain south-west of the community of Maryvale. The sites are located on lands owned by three landowners and the selected entrance road accesses only these properties.

No significant affect on land use is predicted due to proper mitigation methods and work habits.

Project Operation

Property owners will derive additional income from lease agreements for easements for access roads and turbine sites. This is considered a positive impact on land of limited capacity for alternative development. The Municipality, which raises a significant portion of its revenue from land use based taxation will benefit from this Project. The Nova Scotia municipal tax base is $5500 per megawatt (nameplate capacity installed) per year. With this 6 mw Project, that equals $33,000 annually for the Municipality of the County of Antigonish.

The daily operations of the wind farm are considered to have a minimal impact on land use. Scheduled and unscheduled maintenance will occur that may affect snowmobile trails, if ploughed, in the winter months. The land is currently used for logging and is privately owned. The landowners will carry out their respective activities as usual, unimpeded by the Project and once the turbines are in place there will be no further impact on land use.

A positive affect on land use is predicted due to revenues derived from leases and taxes.

Project Decommissioning

During decommissioning, land use will have the same footprint as in the operation phase. The process is much simpler due to the process of disassembling the components and placing them directly onto flatbed trucks for removal without requiring storage areas.

No significant affect on land use is predicted due to proper mitigation methods and work habits.

Malfunctions and Accidents

The land being used for this Project is privately owned and is currently used for forestry and recreational purposes such as ATV riding and hunting. The land is not scheduled to be cleared in the next two years, as it is currently in re-growth and not ready for harvesting. The recreational activities are carried out by the private landowners. During construction, these landowners (while accessing the land) may have the increased potential for unsafe conditions due to the presence of large machinery.

Mitigation

Mitigation procedures to reduce the impact of all phases of the Project concerning existing land use will be practiced. Some of the measures are: minimizing the width of roads to a 5m surface; knowing and understanding the timing of traffic; knowing the timing of access to the woodlots and camps by the landowners; and to clear the trees for the easements immediately after cutting to decrease the risk that unsafe areas, brush piles and downed trees pose.

Detailed project construction activities have been, and will continue to be, discussed with landowners to maintain a current understanding of potential impacts associated with land use within the project boundary.

Cumulative Assessment

The cumulative effect on existing land use will be the addition of roads and removal of trees for the purpose of site access and turbine operation. On average, there is 1 turbine for every 90 acres of land within the property line boundaries which equals 2 % of land use that will be required for construction, reduced to less than 1% of land use during operation. The road used to access the site will follow an existing road that will be upgraded significantly. These upgrades will have a positive impact on the silt-laden run-off which currently occurs along the road system throughout the mountainous area.

Sustainable Use of Renewable Resources

The existing land use includes forestry and a hunting camp located on the land held under agreement by the Proponent. Working closely with the landowners has resulted in turbines being located in deforested, unused land where possible. This Project does not conflict with the present use of the land for other renewable resources, principally forest products.

Residual Environmental Impact

By using the siting processes and knowledge from the landowners, there will be no residual environmental impact to the land use in the area.

*Based on the assessment criteria from Table 5.2, the impact on Land Use is predicted as “minimal” (i.e. the resource should return to baseline levels).

5.2.6 Air Quality

Compared to the use of combustion technology, the generation of wind power is a zero emission way to create electricity. “Green power” in Nova Scotia is absolutely necessary to offset the huge appetite for household consumption when compared per capita to other provinces and countries. Currently, about 90% of Nova Scotia’s electricity comes from the combustion of non-renewable resources such as: coal; oil; petroleum hydrocarbons; natural gas or other fossil fuels. The emissions generated are being released into the air affecting air quality for plants, wildlife, aquatic life and humans. These GHGs are affecting the Province’s natural balance and leading to global climate change. The addition of this Project, although small compared to other wind projects in Nova Scotia, follows the objectives of government to reduce these types of emissions and will have a net positive effect on air quality.

It has been mandated by Nova Scotia Environment to Nova Scotia Power that renewable power generation increase to 20% of the province’s production by 2013. The 6mw produced at the Maryvale Wind Project will add to this renewable mix.

The level of dust and vehicle contaminants during construction and operation will be kept to a minimum as describe below under Mitigation.

Boundaries

No air quality concerns exist in the area surrounding the Project site. Wind turbines also differ substantially from most other electrical generation facilities as they do not use a combustion process and therefore do not produce any air emissions. Dust and vehicular emissions may occur during Project construction, similar to logging activities, but the period of heavy traffic will only last approximately 6 to 8 weeks.

Operation and, therefore, generation of electricity without the release of GHG's, will last at least 25 years. The intent of the Proponent is to continue creating power at the project after the 25 year Power Purchase Agreement has been completed by hopefully extending the agreement sometime in the future and possibly retrofitting the components as age decreases their functionality, as opposed to decommissioning the turbines.

Access Roads

As indicated above, dust and emissions in the immediate vicinity of the proposed works during construction may be of some concern.

Project Construction

During construction minor, localized air emissions will occur from operating heavy equipment and temporary operation of generator sets. Additionally, construction related traffic and various construction activities (e.g. excavation, grading, and exposed areas) have the potential to create short-term nuisance dust effects in the immediate vicinity of the Project.

No significant effect on Air Quality is predicted during the construction phase of the Project due to proper mitigation methods and work habits.

Project Operation

During operation, localized air emissions will occur from service vehicles and road maintenance equipment. These events will be short term and temporary. There will be no air emissions from the operation of the turbines.

No significant effect on Air Quality is predicted due to the generating system.

Project Decommissioning

Decommissioning of the Project will involve the dismantling of the turbines and removal of power-lines. Dust and emissions are similar to Project construction and will have minimal, if any, effects on air quality.

No significant effect on Air Quality is predicted due to proper mitigation methods and work habits.

Malfunctions and Accidents

Fire from electrical components has the potential to create air pollution. This is a highly unlikely event. Discussions with the local fire department have resulted in education on safe distances for personnel. A meeting held March 23, 2009 with the Proponent and the Fire Chief, and the two Deputy Chiefs, yielded a good understanding of the road system for the Project, as well as general information and specs of the machines. Finalized micro-sited routes to each turbine will be indicated on a map which will be posted in the fire hall prior to commissioning.

Mitigation

To protect adjacent receptors from potential offsite dust concerns, good site practices during construction will be implemented including:

- Maintaining construction equipment in good running condition and in compliance with regulatory requirements;
- Protecting stockpiles of friable material with a barrier or windscreen. In the event of dry conditions and excessive dust, dust suppression (water and/or calcium chloride sprayed on road surface) and covering loads of loose materials during transport
- In terms of emissions from combustion engines, all construction equipment will be maintained in good working order to minimize emissions. This will assist in minimizing the Project's short-term contributions of GHGs, odour, and other airborne pollutants.

For the operation of the wind farm, no special protective or mitigation measures have been identified. In fact, the operation of the Project will result in a net reduction of GHGs from the offset of fossil fuel power generation.

Cumulative Assessment

Dust is the main concern in the construction and operation of the Project that could have an adverse impact on air quality. The effects are primarily associated with construction and are localized to the Project site. The proposed Project will not act cumulatively with any other activities taking place in the area to cause a cumulative effect on air quality.

Sustainable Use of Renewable Resources

The entire goal of government mandated use of renewable power production is to have sustainable levels of good air quality for the future.

Residual Environmental Impact

The effect of installing the various Project components is anticipated to have no long-term effect on the local air quality either during construction or operation of the facilities. The rationale for the Project is to improve regional and global air quality in the future by reducing the generation of GHGs.

*For the short term, it is not anticipated to have a significant residual effect on Air Quality and therefore, the impact is predicted to be "minimal" (i.e. the resource should return to baseline levels).

*For the regional and global boundaries, this Project will have a positive residual effect on Air Quality over the long term.

5.2.7 Environmental Noise

The Proponent contracted Ortech Power to perform noise modeling simulations for the proposed Project. The criteria consisted of four Vensys V- 77 1.5 MW turbines with a hub height of 85m. The simulation included calculation of noise contours at sound power levels of 35, 40, 45, 50 and 55 dBA around the wind farm as well as the sound power level at each of the receptors within 2km of the closest turbine.

The noise model used was ISO 9613-2 General, which is required by the Ontario Ministry of Environment, since Nova Scotia does not yet have defined guidelines for performing these analyses specifically for wind farms. Ortech is a highly recognized software user in the wind industry in Canada.

The closest noise receptor is 1.49km away from the nearest turbine; this is the Maryvale Elementary School. The Municipality considered noise a major factor when determining the setback distance minimums.

A preliminary noise study by Ortech using a computer generated model for the GPS locations of the closest residences in the area was carried out using maximum noise levels for the Vensys 77 1.5 mw turbine using four separate noise generators: 6m/s; 7m/s; 8m/s; and 9m/s. The full report can be found in Appendix B-2. Table 5.3 shows the noise levels at the four receptors identified as most important. These receptors are the Maryvale Elementary School, John Teasdale's residence (the nearest house), St. Mary's Parish, and the Four Valley's Fire Hall. It should be noted that the hunting cabin owned by one of the landowners was included in the noise simulation model and is identified in the report as #12. It is 250m from Turbine #2 and is not considered a dwelling. The owner of the cabin is fully aware and accepting of the potential nuisance from noise associated with the close proximity of the turbines.

Table 5.3: Summary of Noise Levels at Four Main Receptor Points.

Receptor	Easting	Northing	Elevation (asl)	6m/sec (dBA)	7m/sec (dBA)	8m/sec (dBA)	9m/sec (dBA)
John Teasdale	574,351	5,065,017	74.5m	29.5	31.4	30.7	30.6
Maryvale Elementary School	574,356	5,064,966	75.6m	29.6	31.5	30.8	30.6
St. Mary's Parish	573,872	5,066,080	71.0m	28.1	30.0	29.3	29.1
Four Valleys Fire Hall	573,059	5,067,014	56.5m	25.0	27.1	26.3	26.1

Since this (noise impact) seems to be the most prominent issue for residents living near wind farms, the Proponent felt the best way to mitigate the issue was to voluntary set all turbine locations back from noise receptors to at least 1.45 km.

Boundaries

The study boundary is 2 km from a turbine to an occupied residence. The closest residence is 1.49km from the nearest turbine.

Access Roads

An increase in noise activities along the roads is primarily of concern during construction, with a slight increase in traffic to service the turbines during the operational phase.

Project Construction

During construction, noise will be generated by the operation of heavy equipment at each of the work areas and associated vehicular traffic on-site. The audible noise at receptors beyond the construction area is expected to be a minor, short-term disruption consistent with noise generated by any construction project.

No significant effect on Environmental Noise is predicted due to proper mitigation methods and work habits.

Project Operation

During operations there is potential for limited off-site environmental noise effects from mechanical and aerodynamic noise emitted from the wind turbines. The data indicate that the turbines are located at sufficient distances from adjacent residents so as not to create significant noise impacts.

No significant effect on Environmental Noise is predicted due to proper mitigation through the siting of turbines away from adjacent receptors.

Project Decommissioning

During construction, noise will be generated by the operation of heavy equipment at each of the work areas and associated vehicular traffic on-site. The audible noise at receptors beyond the construction areas is expected to be a minor, short-term disruption consistent with noise generated by any industrial construction project.

No significant effect on Environmental Noise is predicted due to proper mitigation methods and work habits.

Mitigation

It is generally accepted that construction activities will result in short term environmental noise effects. To minimize inconvenience brought on by excessive noise during the construction phase of the Project, all engines associated with construction equipment will be equipped with mufflers and/or silencers in accordance with DOT guidelines and regulations. Noise levels arising from equipment will also be compliant with sound levels established by NSE. To the greatest extent possible, construction activities that could create excessive noise will be restricted to daylight hours and adhere to any local noise by-law(s).

During operation, the Project will be a source of noise emissions. The primary mitigation tool was locating the turbines at a minimum distance of 1450m from the nearest residence/ point of reception.

Propagation of environmental noise emissions from the Project to Points of Reception was modelled using ISO 9613 noise propagation algorithms. This ISO model can account for distance, ground and atmospheric attenuation, meteorological effects, source directivity, and acoustical screening. Among other factors, the noise levels guaranteed by Vensys were found to be within the acceptable limits at all critical Points of Reception within 2000m of one or more turbines for wind speeds of 6, 7, 8, and 9 m/s. Consequently, it is probable that for select cases where there are trees or shrubs in the propagation path between a turbine and a Point of Reception, such that the line of sight is blocked by the foliage, there will be resulting attenuation that has not been accounted for in the modelling. Thus, the values calculated for sound attenuation are likely to be conservative in areas where there is foliage present in the line of sight between any turbine and a Point of Reception. Insulation will be installed in the nacelle surrounding the generator and gearbox to reduce the noise levels as a further precaution.

As an additional precautionary measure for the mitigation of sound levels at residences, the Proponent has maintained turbines are at least 1450m from any Point of Reception, even though the proposed Municipal Setback is 1000m. It is worth mentioning that excellent sites do exist much closer to homes and the economic benefits would be attractive; however, to balance community support with a successful wind farm, the Proponent decided that a larger setback would foster better relationships until more accurate sound predictions can be made and the community has experience with the operation of the site.

For practical purposes, the turbines would be inaudible at 1450m to a dB sounds measuring device; therefore; it is impractical to attempt any kind of ambient noise study when the Proponent is using such large voluntary setbacks. Figures 4.2a, 4.2b, 4.2c and 4.2d show the turbines with a setback of 1450m from the nearest residence.

Studies have been performed at several other wind farms where the turbines are at distances greater than 1450m and the results were inconclusive due to the inability to determine whether the sources of ambient noises were leaves, turbines, traffic, etc. The 200 series highway, which lies directly adjacent to the closest residences will provide additional noise levels. The 1450m setback chosen by the proponent is intended to mitigate the potential addition to this and other background sound sources which might have a combined effect on noise levels under certain wind conditions.

Cumulative Assessment

The other sources of existing environmental noise are chainsaws, snowmobiles, ATVs, and vehicular noise from the 200 series highway. It is predicted that the four turbines in operation will not compound noise levels when combined with existing noise due to the large setback of more than 1450m.

Residual Environmental Impact

The effect of installing the various project components is anticipated to have a limited effect on the environmental noise conditions of the study area during construction or operation of the facilities. The level of impact after protection and mitigation measures have been employed is rated as low (i.e.,slight decline in resource over life of Project) since a new source of environmental noise has been added in the study area. However, on the basis of the model results, no significant negative new effects are anticipated to environmental noise conditions. As mentioned in mitigation, the primary tool to avoid unfavourable interaction with residents was to locate the turbines at a voluntary distance of over 1450m (municipal setback is 1000m).

Based on Table 5.2, with a setback of 1450m, the residual environmental impact is predicted to be "low" (i.e. slight decline in resource over life of Project).

5.2.8 Bats

A desktop study has been conducted by Dr. Hugh Broders, St. Mary's University, to investigate what, if any, risks may be posed by the construction and operation of this wind project. There is no information currently on this exact location whether or not it lies in a migration path. There have been two recent bat monitoring programs take place in the region, Dalhousie Mountain and Brown's Mountain (both proposed wind farms). There was no evidence of migration of known species of bats in those areas. From these studies it was found that bats forage below the level of the turbine blades' swept area. It is recommended that a field study be conducted during the Fall Migration window, typically late August to early September. This field study will include the placement of echolocation equipment, 'AnaBat Detector', on the existing meteorological tower on site at two levels. During the Fall Migration period of 2008, the met tower was under construction and therefore, did not allow the testing equipment access. The field study will be conducted in 2009 and all results will be provided as an Addendum to the document. Due to the results of the other bat field studies carried out in close proximity to the site location, it is not anticipated to be an issue. In the event of the contrary, all recommendations from the study will be followed.

Boundaries

The spatial boundaries encompass the entirety of the area where the turbines are being located and extend to include those areas that are frequented by bats that may be impacted by construction activities or operation of the turbines. The temporal boundaries encompass both the construction phase and the operation of the turbines. Post-construction surveys will be taken, as described in Appendix

Access Roads

The installation of access roads may displace habitat/ foraging area used by bats. The area of the access road corridor is limited and therefore this habitat loss will be small. Given the potential loss of habitat associated with forestry in the area, the incremental loss of habitat is not considered significant to the bat population of the area.

Project Construction

If bats are present in the vicinity of the turbines, their numbers are likely to be low. During construction, bats could be affected both directly and indirectly. Direct impacts might occur during land clearing operations. Indirect impacts could result from a reduction in the quality and quantity of their habitat. Foraging would not be impacted, as the construction would only be carried out during the day. Impacts on bats during construction only appear possible as a result of habitat destruction.

Habitat may be used for foraging, breeding, roosting and wintering. Since there are no caves within the Project footprint or in the vicinity of the four sites, wintering habitat is not impacted. The quantity of potential woodland habitat that will be cut to accommodate the turbines is very small compared to the large spreads of forest cover in the surrounding hills. In this context, potential impacts on bats during Project construction, in comparison to forestry operations over the area, is considered insignificant.

Broders et al. state that Nova Scotia is at or beyond the northern limit of the range of the Hoary, Red and Silver Haired Bat and these are generally rare in the province. Broders will conduct a fall survey (2009) designed to determine the presence of bats at the turbine locations. The results of this work will be submitted as an Addendum to this document.

It is unlikely that the construction of the Project will result in a significant adverse environmental effect on the bat population of the province.

Project Operation

Several facets of turbine operation may affect bat populations at wind farms. These are: noise and rotor movement associated with the turbine operations; low-pressure pockets formed near the swept area at certain speed, temperature and barometric pressure levels; aeronautical lighting; loss of habitat; and the presence of large, moving rotors. These features may result in: an interruption in regular behaviour such as feeding, migrating, and breeding; low-pressure related ailments; displacement to avoid disturbance; disorientation during flight; and collisions with turbine blades.

Bats, as indicated in Broders' study, typically forage at a level below that of the rotating turbine blades. They do, however, migrate at greater heights and this would be when they would be most susceptible to impact. Since there is little knowledge about the factors that influence the risk of collision for bats, it is difficult to estimate the significance of any impact for the population; thus, the impact on the total population is likely negligible.

In summary, although there is always a risk of disturbance and collision associated with the operation of turbines, there is unlikely to be a significant adverse effect on the bat population of the province.

Project Decommissioning

The decommissioning of the Project would involve the dismantling and removal of the turbines. Effects on the bat population, if any, would be comparable to those experienced during Project construction.

It is unlikely the Project will result in a significant adverse environmental effect on the bat population of the province.

Malfunctions and Accidents

During the operation of the wind farm, malfunctions are most likely to involve the stoppage of turbines due to a mechanical problem, or electrical failure such as a break in a power line or cable. The turbines and electrical systems have built-in safety features which shut down the systems and avoid significant damage to the systems and equipment. There are limited quantities of lubricants present in the turbines.

Given the very limited footprint that would likely be involved in such an event, no significant adverse impact on the bat population is predicted.

Mitigation

As the results of the field study won't be available until September 2009 the following conclusions are based on studies conducted in Nova Scotia. It is very unlikely that the area houses a migration path of any sort for the existing bat species which reside/migrate through Nova Scotia. The indirect effects arising from the removal, fragmentation, or disturbance of habitat during the Project's construction phase has a larger potential to negatively affect the bat populations than the direct mortality from turbine collusions. The mitigation of impact focuses on minimizing the disturbance caused by the removal and fragmentation of natural habitats, especially wetlands and woodlands. Construction in or across any noticeably sized natural habitats will be avoided. The study area, although not entirely devoid of natural habitat, has been largely altered for forestry purposes and now provides mostly lower quality habitat. The design (e.g. turbine shape and lighting) and siting process (e.g. outside of migratory pathways) mitigates many of the potential direct and indirect effects of the Project.

The baro-trauma phenomenon, as explained earlier in the document, is a major concern to a migrating bat population and has been studied frequently in Alberta and other areas where large numbers of turbines are currently in operation in migration paths/ areas. If the field study indicates a migrating population (highly unlikely) the Proponent would accept the recommendations of Broders to shut down the turbines at night during peak migration in the late summer.

Cumulative Assessment

There are currently no proposed new works known that will take place in, or in the vicinity of, the turbine sites that might act cumulatively with the construction, operation or decommissioning of the proposed turbines to cause a significant adverse effect on bats.

Sustainable Use of Renewable Resources

The Project area falls within a region of high wind energy in the province. The generation of electricity at Maryvale offers a sustainable source of renewable energy to supplement the local power demands. This Project does not conflict with the present use of the land for other renewable resources; principally forest products.

Residual Environmental Impact

The effect of installing the various Project components is anticipated to have limited effect on bats during construction or operation of the facilities. Given that the Project is on such a small scale compared to all other wind projects in the province, and that the sites and access roads are already in place, the study area does not seem to support significant numbers of bats and is expected that the area is not on a major Migratory route.

*The level of impact after protection and mitigation measures have been employed is rated as “low” (i.e. slight decline in resource over life of Project).

5.2.9 Visual Landscape

The impact associated with the installation of 4 wind turbines on the landscape has been assessed. The first step in this process was to do a virtual Zone of Visual Influence Map which is shown in Figure 4.1. This map shows roughly 50km radius from the locations of the four wind towers and represents how many turbines will be visible from any given location within that study area. From this figure, the Proponent chose 3 locations from which to take photos to be used in photo-montages depicting the expected visual impact from that vantage point.

The population density within 20km is quite low and the resulting impact on viewscape to residences and passing motorists is considered very low when compared to other wind farm communities. The interesting point about installing turbines on rolling hills is that at closer vantage points, fewer turbines are visible as they are hidden behind tree cover and hill tops. As the vantage point gets farther away, the visual impact is greatly reduced due to the overall size of the turbines appearing smaller. Visual impact is very much a subjective matter. In many cases, industrial or commercial operations can provide habitat for some species. For example, the extraordinary Bald Eagle population existing at the Harvey A Veniot Causeway in Pictou, Nova Scotia is a very popular spot for photographs and postcards depicting the soaring raptors even though their very existence is completely dependant on the unsightly commercial development in that area. It is widely accepted that the visible impacts we see everyday such as roads, bridges, twin highways, power-poles or schools are installed to service our daily needs.

The visual impact of installing 4 turbines in an unpopulated area to provide much needed electricity can only be considered a responsible addition to the aesthetics of Antigonish County.

The site is located over 20 km from the nearest town (Antigonish), as well as over 15km from the coastline. The proposed wind Project will be visible in the distance from some areas as seen in the photomontages in Figures 5.2 a through c. The closest locations from the old 200 series highway, the Maryvale Elementary School and the coastal route have been used in the photomontages for this Project.

The debate over whether the view of wind turbines is good, bad or non-intrusive is something that will probably never be resolved. The balance lies within the realization of the need for sustainable, renewable sources of electrical generation and the slight discomfort, or lack thereof, created by the presence of wind turbines. As with almost all developments, whether highways, trails, power-lines or bridges, the initial impact is usually short-lived and soon after construction is complete, becomes a fixture of the recognizable landscape.

The photomontages were contracted to Al-Pro of Germany, with a newly opened office in Pictou County.

Zone of Visual Influence

Figure 4.1 is a computer generated projection indicating the number of turbines and the areas of visibility around the Project site. The number of turbines visible is indicated by the colour code.

The following assumptions were applied to the photos:

- Forest coverage modeled according to 1:50,000 scale NTS mapping dated 1994
- Recent forest clear cutting not represented on NTS maps is not accounted for
- 10 m tree height
- Canopy is considered to be opaque at all times
- 1:50,000 scale digital elevation model
- Observer eye height of 1.5m
- Calculation grid resolution of 25m
- Accurate positioning of the 4 turbines
- Turbine dimensions corresponding to the Vensys 1.5 model with a hub height of 67.5m and rotor diameter of 70m
- Modeled area extends roughly 20km radius around center point of wind Project

Boundaries

The area of visual impact has been studied for a 10km radius or more around the center point of the four turbines by Al-Pro and Nortek Resource Services. The results of the study indicate that the farther away the receptor, the more turbines are visible and are harder to detect. The maximum a person would see is four: this compared to other wind farms, is considered negligible.

Access Roads

No new roads will be visible. The delivery road and access roads are already in place. The access roads being used are currently in place for timber removal. Upgrades to these roads are necessary, although the visual impact of these improved roads is not considered an issue, as they will not be visible from receptor points.

Project Construction

During the construction phase, large transport vehicles and construction cranes will be on-site and in the area to erect the turbines and ancillary facilities. The scale of the equipment required to construct the Project will be larger than what most people are familiar with, even when compared most agricultural equipment. Consequently, construction machinery has the potential to temporarily affect the local viewscape.

The erection of the turbines will change the Visual Landscape. However, local residents have indicated that this change is acceptable and will not be considered significant.

Project Operations

The key potential effect during the operations phase of the Project is visibility and its association with a change in the present viewscape. The diameter of the tower base is approximately 5m, nacelle height is 85m above ground level, and the blades are 34m long. Turbines or a portion (i.e. blades) will be visible for some distance in the surrounding areas. However, visibility of the turbines will vary from receptor to receptor, based upon the following factors:

- Landform shape, largely determined by physiographic conditions and tree cover
- Slope – the greater the slope, the more easily turbines can be seen from greater distances
- Viewing – distance from the turbines reduces scale
- Lighting – primarily affecting night-time visibility

Project operations will change the Visual Landscape, however, local residents have indicated that this change is acceptable and will not be considered significant.

Project Decommissioning

During the decommissioning phase, large transport vehicles and construction cranes will be on-site and in the area to dismantle the turbines and ancillary facilities. The scale of the equipment required to deconstruct the Project will be larger than what most people are familiar with, even compared most agricultural and forestry equipment. Consequently, construction machinery has the potential to temporarily affect the local viewscape.

Decommissioning will restore the landscape to its original form and therefore will have no significant net effect on Visual Landscape/

Mitigation

Construction activities will be confined to the workspace areas which will assist in limiting the potential disruptions to the viewscape. Further, it is expected to take about three days to erect each turbine which will also assist in dispersing the visual changes over the course of the erection period, lasting no longer than two weeks.

During operation, the visual characteristics of the project and the surrounding wooded landscape are considered to exhibit minimal to moderate scenic attributes with respect to landscape distinction. That is, the landform of the study area tends to exhibit indistinct surface patterns due to uniformity in land-use and vegetation. The Maryvale area has a complex terrain and quite a bit of logging has occurred over the last 50 years.

To soften the look of the turbines, the towers will be painted light grey and made out of rolled steel (i.e. they are not steel lattice towers). The nacelle and blades will also be light grey in colouring. Light grey colouring was selected as it is generally understood that this colour blends with the environment more than other colours such as white. The montages were prepared using the general uniformity in landform patterns, limited slope, multiple viewing locations from residences and transportation routes, and moderate scenic attributes throughout the study area. The factors noted above reduce the visibility of the turbines.

Transport Canada's Aerodrome Safety Branch has reviewed the Project to determine lighting requirements with respect to the provision of navigation warning lights to ensure the aeronautical safety of wind farms; it is proposed that all four turbines be lighted for navigational purposes.

As for the property values within the viewscape of the Project, studies carried out in Australia, Europe, and the U.S. all indicated no material effect to property values in the viewscape of a wind farm. No additional protection or mitigation measures are proposed.

Cumulative Assessment

There are no other wind farms in the county. Minor gravel pits and forestry operations are the only major industrial activities within the viewscape of this Project. There is, however, a proposed 60mw wind farm proposed approximately 30 km west of Maryvale on Brown's Mountain. In comparing the Visual Study conducted for Maryvale Wind Project and the Visual Study conducted for the other proposed wind farm, it is believed that the two farms will not have a cumulative effect on each other as they are located in rolling terrain, far enough away from each other that the impact of each farm remains individual.

Residual Environmental Impact

With the implementation of the identified protection and mitigation measures and considering the staggered nature of the construction activities, no net adverse effects have been identified. The installation and operation of the wind turbines will permanently alter the existing viewscape; however, existing landform and appropriate tower colouring and lighting will combine to reduce the extent of this

effect. While it is true that beauty is in the eye of the beholder when it comes to the aesthetics of wind turbines, the fact that local and provincial support for the Project has been overwhelming cannot be overlooked.

The effect of installing the various Project components will have an effect on the local viewscape during construction and operation of the facilities.

*Based on Table 5-2, the impact is predicted as "Low" (i.e. slight decline in resource over life of project).

5.2.10 Public Health and Safety

Safety policies and company procedures have been put in place to ensure the Project complies with all industry standards and good utility practice to protect the public. Electrical installations connecting to the regional grid must comply with and maintain certification and liability insurance throughout the life of the Project. In order to obtain a final connection permit, completion certificates from Federal, Provincial and Municipal offices must be granted throughout the construction phase.

The Municipality of the County of Antigonish has drafted proposed setback distances from public roads, dwellings/houses and non-participating property lines. Setbacks greatly reduce the risk of the general public being involved in situations that could be hazardous such as ice throw from rotating blades. Available statistics suggest that there haven't been any incidents of a non wind farm worker being injured by the operation of wind turbines. An insurance policy has been reviewed with an experienced underwriter in the field to identify areas of concern and how to reduce these risks.

Boundaries

The primary boundaries for public health and safety are access roads and the area beneath the turbines where icing and vehicle accidents are the main concern. The boundaries associated with icing are restricted to the turbine locations. The temporal boundaries include both construction and decommissioning, but are primarily associated with Project operation.

Access Roads

Winter operations will increase the risk of accidents on the access roads and ice shed by the rotor. Generally, the main entrance (privately owned road) is not ploughed during the winter therefore vehicle access is restricted by a heavy snowfall. Snowmobilers who rely on this trail system as a corridor to access their camps and land also pose a safety concern.

Project Construction

Potential effects to public health and safety are largely in the form of increased construction related traffic and unauthorised access by the public to the work sites. Based on construction taking place in the summer months, icing would not to be an issue during construction.

No significant effect on Public Health and Safety is predicted due to proper mitigation methods and work habits.

Project Operation

The Project will not contribute green house gases or other atmospheric pollutants to the environment and thus no air-related public health concern associated with the operation of the Project has been identified.

Accumulation of ice on the turbine blades is possible during the winter months when the turbines may be coated by freezing rain or the interception of low clouds containing super cooled rain. The two hazards associated with ice accumulation on wind turbines include: the danger of falling ice that may accumulate on the turbine itself as a result of freeze-thaw of snow and ice; and the throwing of ice from the moving turbine blades.

Falling ice from an immobile turbine does not differ from other tall structures like communication towers, power lines and antenna masts. The ground area potentially affected by falling ice depends to a large extent on the blade position and the prevailing wind speed. Conservative modelling documented by the Finnish Meteorological Institute (2000) indicates that "when a blade has an azimuth of 90°, wind speed is 10 m/s, and the ice weighs 15.3 kg, the fall distance is about 40 metres. In comparison, when a blade has an azimuth of 0°, wind speed is 20 m/s, and ice weighs 1.5 kg, the fall distance is reduced to about 30 metres". Regarding turbines throwing ice, the throwing distance varies depending upon the rotor azimuth, rotor speed, radius, and wind speed. Also, the geometry of the ice fragments and their mass will affect the flight trajectory. The Finnish wind tunnel studies suggest ice throw from smaller turbine blades (e.g., 15 to 20 m) which have a higher rpm and more blade energy than the GE turbines proposed for the Project, have an average range of 25 to 100 m depending upon the ice fragment's mass. Throwing distances for turbines with a blade length of 30 to 33 m are recorded at <75 m depending upon the mass of the fragments. Based upon the trends shown in the available data, it is expected that ice throw from a 37 to 40 m blade, similar to those used in this Project, would be less than the 33 m blade. This is primarily due to the fact that larger blades tend to turn more slowly when compared to smaller blades, creating less energy to throw the ice. In terms of icefall and throw, it is important to note that the reality of icing is likely limited to a few days per year. That is to say, icing of the turbine blades is not an every day occurrence. The turbines are located on private land away from human habitation and therefore public access is limited and unlikely during adverse weather which could create this condition.

Although highly improbable, any tall structure can collapse. Although very unlikely, there is also the possibility of blade detachment from the turbine structure under extreme conditions. Should either of these events occur, and given the weight of the wind turbine components, there is potential that the collapse zone and/or landing area would be damaged from the impact. The turbines have been designed using engineering design criteria with large safety factors and designs which exceed the extreme environmental conditions for the Project area.

No significant effect on Public Health and Safety is predicted during the operations phase due to the application of proper engineering methods in the turbine design.

Project Decommissioning

The decommissioning of the wind turbine generators (WTGs) would pose safety issues comparable to those associated with Project construction. Comparable safety standards and mitigation strategies will be employed.

No significant effect on Public Health and Safety is predicted due to application of proper safety measures.

Malfunctions and Accidents

If an occurrence were to take place, personnel will use the Emergency Response Procedures which in place during the entire lifespan of the Project. Any malfunction or accident will require the immediate notification of the safety officer who will determine the required response. Prior to commissioning, the Fire Department will be provided with the appropriate maps of the Project site, roads and turbine locations and instructions for site access.

Mitigation

Implementing good transportation planning and safety measures during construction will minimize the potential for traffic-related safety concerns. Public safety has been, and will continue to be, incorporated in the Project design. Land access to the construction site will be controlled through signage and restricted to authorized personnel only. The construction will also employ good site safety practices during the construction phase. The Proponent will ensure that the wind turbines are maintained and operated in accordance with all applicable codes and regulations. Maintenance personnel will continuously undertake additional safety measures, such as automated and manual surveillance and adherence to health and safety policies.

Many of the perceived safety concerns related to Project Operation will be mitigated through the built-in safety measures and standard procedures for wind turbine operation, maintenance and control systems. Critical alarms on-site are directly linked to emergency personnel to expedite response to potential events at the facility. Potential effects due to operation malfunctions are mitigated through this control and alarm system.

Unlike telecommunication towers, the wind turbines purchased for this Project will have a solid conical tower. This design reduces the potential for ice build up on the tower itself as there is no lattice or crevices where ice can accumulate. No other specific protection or mitigation measures are available to address ice fall. In terms of ice throw, when the rotor becomes unbalanced due to a change in blade weighting (e.g., caused by ice build up), the turbine brake is automatically applied to stop the blades from turning (i.e., it shuts itself off). The blades will not restart their movement until the imbalance is removed (e.g., the majority of ice is removed). This design feature greatly reduces the potential ice throw from the turbines on the few days per year when icing is possible.

The structural integrity of the Vensys77 turbine is designed to withstand wind speeds of about 200 km/hr, equivalent to a Level 2 tornado. However, during high wind events (i.e., >25 m/s or about 90

km/hr) the turbines will cease operations. Turbine braking is accomplished by full blade feathering. Each blade is equipped with a hydraulic cylinder enabling the blade to rotate 95 degrees to easily pass the wind without causing lift. In addition, the nacelle has a yaw system that allows the entire blade assembly to be turned so as to not catch the wind. A secondary fail-safe mechanical brake system is mounted on the high speed shaft connecting the gearbox to the generator. The blades of the turbine weigh over six tonnes. Thus, in an extreme weather or unlikely malfunction event where the blades would detach from the rotor, they would drop to the ground rather than be flung a great distance.

Cumulative Assessment

Safety concerning vehicle operation and icing is an issue related to the proposed Project.

There is no interaction with other works or activities taking place in a similar timeframe that would aggravate icing events.

Sustainable Use of Renewable Resources

N/A

Residual Environmental Impact

Icing that may occur during the construction, operation or decommissioning of the Project is not anticipated to have a significant residual effect on Public Safety.

*Based on Table 5-2, residual environmental impact is predicted to be “minimal” (i.e. the resource should return to baseline levels).

5.2.11 Heritage Sites, Archaeological Sites and Other Cultural Resources

In accordance with provincial guidelines and regulations, an Archaeological Resource Impact Assessment has been carried out by Davis Archaeological Consultants Limited on behalf of the Proponent. Discussions were held with landowners to identify any previous settlement foundations and cemeteries. A desk top study indicates that there are no registered Heritage Sites of any kind identified on the sites at this time. An archaeological field study in accordance with the Special Places Protection Act of Nova Scotia Tourism, Culture and Heritage (Permit # A2008NS50) was conducted at the selected turbine locations and along the access road corridor.

The field study was conducted over and around the selected turbine locations and along the access road corridor to identify and map potential historical resources in the work areas. Discussions were held with landowners to identify any previous settlement foundations and cemeteries. Davis did not find any evidence of any archaeologically significant artefacts or locations.

In addition to the above surveys, the Proponent has conducted many hours of site investigations along all existing and proposed corridors and construction pads. The Proponent has conducted extensive searches for obvious indications of previously settled lots along all easements and turbine pads. The

proponent will directly supervise machinery operations (excavators and bulldozers) to ensure that excavation and clearing does not take place outside the designated area of the plan.

The Confederacy of Mainland Mi'qmak (CMM) has conducted desktop and field work for a Mi'qmak Ecological Knowledge Study (MEKS) for the Project area. This report concludes that there are no known areas within the footprint of the proposed Project which would contain significant finds.

As for the Nova Scotia Aboriginals not living on reservations, the Proponent has been in contact with Roger Hunka of the Maritime Aboriginal Peoples Council (MAPC). During these meetings, Mr. Hunka was presented with maps and descriptions of the Project area, as well as all reference material and studies conducted for the Project to date. The results of these meetings are that the Project does not interfere with a significant amount of landmass; and that there are no known significant sites within Project boundaries which are of concern to this Aboriginal Group.

Boundaries

The Boundaries include any path, road and construction area to be disturbed by any phase of construction or operation or decommissioning of the Project.

For the MEKS, the boundaries for the field work portion of the study include the physical footprint of the Project area and roughly 100m outside of that zone. The interview and desktop study boundary ultimately extends from Mulgrave to Colchester County and all lands in between.

Access roads

Along all site access roads the potential to find foundations, cemeteries and tools exists and during road repair or construction these resources may be lost or damaged.

Project Construction

Given the potential for the discovery of as-yet undiscovered artefacts, there is some potential for these resources to be lost or damaged over the course of Project construction activities. As with most areas in Nova Scotia, there is also a limited potential to discover burial areas.

No significant effect on Heritage Sites, Archaeological Sites and Other Cultural Resources is predicted due to proper mitigation methods based on avoidance and work controls.

Project Operation

Once the turbines, access roads, power lines, and ancillary facilities are installed, no additional effects on historical and/or archaeological resources are expected.

No significant effect on Heritage Sites, Archaeological Sites and Other Cultural Resources is predicted due to proper mitigation methods and work controls.

Project Decommissioning

No additional effects on historical and/or archaeological resources are expected during the decommissioning phase of the Project.

No significant effect on Heritage Sites, Archaeological Sites and Other Cultural Resources is predicted due to evidence resultant from the Davis Archaeological Study and the MEKS.

Malfunctions and Accidents

No interaction is expected to occur in conjunction with accidents due to pre-planned construction paths which have been reviewed previously.

Mitigation

The project access road layout and selection of turbine location avoids potential heritage sites, archaeological sites and other cultural resources. Should an undiscovered site be exposed, the Proponent will immediately stop work at the location and immediately notify the N. S. Museum personnel, the RCMP and Davis Archaeological Consultants Ltd. Employees and contractors will not work at the discovery location until such time as the Project Manager, having consulted with Robert Ogilvie , Director Nova Scotia Department of Culture, Tourism and Heritage and/or Davis Archaeological Consultants Limited and/or the Aboriginal Interest Groups, advises as to the disposition of the discovery and authorizes a continuation.

Cumulative Assessment

There are no known activities scheduled in the area which could compound the Project's effect on this environment.

Sustainable Use of Renewable Resources

N/A

Residual Environmental Impact

The effect of installing the various Project components is anticipated to have limited effect on historical and archaeological resources during construction or operation of the facilities. The areas where such resources may occur have been surveyed and no areas of significance were discovered. No significant negative net effects are anticipated to historical and/or archaeological resources.

*Using Table 5-2, the level of impact after protection and mitigation measures have been employed is rated as "minimal" (i.e. the resource should return to baseline levels).

5.2.12 Waste Disposal

Waste disposal will be managed on a full time basis by a locally owned and operated waste disposal company, in accordance with the procedures of Antigonish County Solid Waste Management and

internally managed by the Proponent's Safety Officer to ensure that policies are in place to follow a rigid reduction and recycling program which meets or exceeds these requirements.

Excess soils from foundation excavations will be re-used in the construction of roads or used for fill in select areas of the Project sites. Any soils excess to these requirements will be offered to landowners or placed in selected borrow areas for future use.

Boundaries

The Boundaries include any lay down area, path, roads and/or construction area to be disturbed by any phase of construction/operation or decommissioning of the Project.

Access Roads

Waste will be managed along all site access roads.

Project Construction

Waste will be generated during construction. Waste includes: domestic wasteat work sites and construction areas; sanitary waste; waste associated with the maintenance of equipment; waste from construction activities; waste packaging; and wood debris and excess soils from cleared areas.

Project Operation

Waste generated during the operation of the Project will include replacement parts which will be repaired or recycled as scrap metal. Lubricants will be collected and recycled at provincially approved facilities. Waste will not be allowed to accumulate on site.

Project Decommissioning

Decommissioning of the turbines will generate significant waste materials; much of which will have retained value as functioning equipment or value as scrap metals. To the greatest extent, these materials will be re-cycled. Foundations and non-metal debris will be broken up and used as fill or stockpiled in a borrow pit for future use. Other waste will be removed by a licensed waste hauler for disposal following the regulations set out by Antigonish County Solid Waste Management.

Malfunctions and Accidents

Waste resulting from malfunctions or accidents will be collected and removed from the site. These materials will be sold as scrap for recycling or collected for disposal following the regulations of Antigonish County Solid Waste Management. Lubricants will be collected and recycled at provincially approved facilities. Soils which might be contaminated by petroleum products will be removed for disposal in a provincial approved facility.

Mitigation

Accident prevention is the fundamental principle for mitigating accidents and malfunctions. Safety policies and operational procedures will be followed during the construction phase. The personnel involved with the Project will be experienced and trained and the construction will be supervised by individuals with prior experience in the construction of wind farms. The design and materials used in the construction will meet or exceed the requirements of engineering designs. The turbines are constructed to the highest standards of the industry and have an excellent performance history.

Maintenance is the key element to mitigating malfunctions during the operational life of the Project. The Proponent will have a maintenance base near the Project site and will have trained personnel to service the equipment to the manufacturer's specifications.

Cumulative Assessment

To the extent possible, waste materials from the Project will be re-used or re-cycled. During construction some non-recyclable waste will be generated requiring disposal. The cumulative effect of the limited quantities of such waste will be minimal.

Sustainable Use of Renewable Resources

Over the life-cycle of the Project, the generation of waste will be minimized. The Proponent will follow the principles of 'reduce, reuse, and recycle' during all stages of the Project.

Residual Environmental Impact

There will be no residual impact as all waste will be handled and removed according to municipal by-laws and Nova Scotia Environment standards and guidelines.

*Using Table 5-2 the residual environmental impact is predicted to be "low".

5.2.13 Neighbourhood and Community Characteristics

Neighbourhood and community characteristics are identified as a VEC because of potential impact on the local community from the Project. The characteristics of the local community are well understood and appreciated by the Proponent. Not only have there been numerous meetings and conversations with local residents, but the Proponent has been working in the county for over two years on wind farms. Specifically, dealing with the community based issues and concerns raised during the planning process of proposed projects. Maryvale Wind LP has partnered with RMSenergy, a local firm. Community related issues are also discussed in: Section 5, Existing Land Uses; Visual Landscape; and Noise.

Boundaries

Potential impacts on neighbourhood and community characteristics are viewed within the boundary of Antigonish County and the residents in the immediate vicinity of the Project.

Access Roads

New roads within the Project area will be considered a positive impact by landowners and others using the area for recreational activities.

Project Construction

During the construction phase, large transport vehicles and construction cranes will be on-site and in the area to erect the turbines and ancillary facilities. The scale of the equipment required to construct the Project will be larger than what most people are familiar with, even most agricultural or timber harvesting equipment. Since the delivery road and access roads are privately owned, the movement of this construction machinery does not have the potential to temporarily affect the local usage. The movement of machinery on public roads will strictly adhere to safety requirements and be conducted at times which are considerate of the neighbouring residents.

The Project will provide employment opportunities to the local population. RMSenergy is a local firm which will employ strictly local equipment operators, truck drivers, labourers and support personnel during the construction phase. These employees will be drawn from the local labour supply. Economic spinoffs will occur principally to suppliers for the construction industry including repair and maintenance operators and fuel suppliers. Employment incomes will have a multiplier effect on the local economy.

The construction activity during erection of the turbines will have temporary low impacts on traffic. Employment in the construction sector will have a positive impact on the local economy as enhanced incomes and multiplier effects.

Project Operation

The neighbouring community will become accustomed to the routine activities of the operation of the wind farm. This stage of the Project will provide long term employment opportunities for maintenance and operations personnel. The Municipality will receive tax revenues from the development and the community will derive economic benefits from enhanced incomes and associated multiplier effects.

The operations phase will have minimal impacts on the local traffic. Long-term employment will have a positive impact on the local economy through enhanced incomes and multiplier effects.

Project Decommissioning

During the decommissioning phase large transport vehicles and construction cranes will be on-site and in the area to dismantle the turbines and ancillary facilities. The scale of the equipment required to de-construct the Project will be larger than what most people are familiar with, even most agricultural and forestry equipment.

Decommissioning will restore the land use to its present state which will have no net effect on the neighbouring communities.

Mitigation

Construction activities will be confined to the workspace areas which will assist in limiting the potential disruptions to the neighbouring community. Since the nearest noise receptor will be 1.45km from the turbines, construction and operations will have no effect on the neighbourhood and community surrounding the Project.

During operation, the generation of electricity from each turbine will be a positive impact on the neighbouring community through annual royalty payments made to the landowner, a $5500 per nameplate capacity megawatt municipal tax to be paid to Antigonish County and the use of local labour for maintenance of roads and power line corridors.

Cumulative Assessment

There are no other wind farms in the vicinity of the neighbouring community. It is therefore determined that the small wind Project in Maryvale will have no cumulative impact with the 60mw proposed wind farm 30km west of the area. There will, however, be beneficial cumulative effects combined with the proposed 60 mw farm as a portion of those proposed turbines will be in Antigonish County, which will ultimately gain tax revenue from the development.

Residual Environmental Impact

With the implementation of the identified protection and mitigation measures and considering the dispersed nature of the construction activities, no net adverse effects have been identified. The installation and operation of the wind turbines will permanently alter the existing viewscape; however, existing landform and appropriate tower colouring and lighting will combine to reduce the extent of this effect. Noise issues have been mitigated by placing turbines well over the proposed Municipal draft setback distances of 1000m from a house or building (i.e. church, school).

*Based on Table 5-2, the impact is predicted as “low” (i.e. slight decline in resource over life of project).

5.2.14 Climatic Fluctuations and Extreme Events

Climatic fluctuations and extreme events identify potential impacts o the existing environment on the Project and are key elements in establishing safe design criteria for the Project components. Climatic variations and extreme weather conditions are considered a VEC for wind power development and project design. The assessment of Effects of the Environment on the Project and the Effects of the Project on the Environment is further considered in Section 6 of this registration document.

The Proponent has carried out almost one full year of recording meteorological data from the met tower in Maryvale. From this work, as well as studying the Maryvale area, it has been determined that the area has the potential to generate a great amount of electricity through the construction of wind turbine generators. Due to the distribution power-lines that run through this area, and the lack of large transmission lines, it has been determined by NSP and the Proponent that 6 mw of power can be generated and added to the regional power grid. This data has been thoroughly analyzed by a reputable

company to determine the turbine suitability. Research of existing public data was also carried out and compared to the operating equipment parameters and it has been determined that the site is suitable for this Project and can produce electricity safely and predictably.

Boundaries

The effects of climate fluctuations and extreme events are considered within the Project boundary. Setback distances, the Project location on private lands and the design criteria for turbines and electrical equipment are considered sufficient controls for risk to address public safety as a result of extreme events. The design criteria for turbines exceed the maximum wind conditions which can occur at the site.

Access Roads

Potential impacts on access roads would occur as a result of extreme environmental rainfall. The 100 year maximum rainfall condition has been used in culvert design to control runoff and prevent damage and washouts on access roads. To the extent possible, access roads have been located at elevations which minimize low wet areas that collect runoff water and water crossings.

Project Construction

Extreme weather conditions may hamper the construction phase of the Project. Safety requirements and procedures will consider wind conditions and lightening particularly during the lifting operations for the installation of the turbines. The movement of equipment to the site will be over highways and local roads which are less susceptible to extreme weather conditions than other modes of transport. The plan for the construction phase will incorporate contingencies for weather conditions and consider seasonal conditions.

Climate conditions and extreme weather events may have temporarily low impacts on Project construction activities.

Project Operation

The influence of climate change falls within the design parameters of the Project and therefore, it is unlikely that climate change will have a significant impact on the wind resources of the Project area and the viability of the Project.

The engineering design for the turbines exceeds the potential extreme wind conditions by a significant margin of safety. As a safety measure, turbines will be shutdown during extreme wind conditions. It is highly unlikely that extreme wind conditions will have a significant impact during the operation phase of the Project.

Climate change and extreme weather conditions will have a minimal impact on the operations phase of the Project.

Project Decommissioning

During the decommissioning phase large transport vehicles and construction cranes will be on-site and in the area to dismantle the turbines and ancillary facilities. These operations will be conducted when weather conditions permit. For safety reasons, decommissioning will not be conducted under extreme weather conditions.

Extreme weather conditions may delay decommissioning but will have no significant net effect as the work will only be conducted under favourable conditions.

Mitigation

Construction activities will be guided by safety procedures and conducted by experienced personnel. This will mitigate the impact of extreme weather conditions from a safety and loss perspective. Typically, extreme events are short lived (a few days) and therefore the delays are manageable and can be addressed in the contingency plan for the Project.

The design criteria for turbines and access roads exceed the potential environmental conditions which might be encountered during extreme events. The Project has been designed to mitigate extreme conditions which might be encountered. .

Cumulative Assessment

Cumulative negative impacts related to Climate Change and extreme events are not anticipated.

Residual Environmental Impact

Extreme weather conditions may have low residual impact on construction costs due to lost time and additional fees for cranes and other equipment.

*Based on Table 5-2, the impact is predicted as “Low” (i.e. slight decline in resource over life of Project).

5.2.15 Soils, Terrain and Vegetation

The topography, soils and vegetation of the Project area are considered a VEC as these features are important considerations in the assessment of environmental conditions and the suitability of the site for the construction of wind turbines.

Published historical data from the Department of Natural Resources in the 1960’s, classes the soil from an agricultural perspective as a class “zero”, meaning the quality of the soil does not support sustainable farming even with considerable amounts of soil amendment and yearly field work. The Project therefore does not compete with the existing commercial use as forest land. These issues are further discussed in Existing Land Use Section 5 and Botany and Flora Section 5.

Boundaries

Potential Impacts on soils, terrain and vegetation are considered in the immediate area disturbed by construction of the roads, lay down area and the turbine pads. There will be a 40m wide easement along all access roads from the interconnection point and linking all turbines throughout the Project. The lay down area will be under 0.5 ha. Specific turbine sites were considered within a 75 m radius from a central GPS location selected by the Proponent. Construction of the roads and turbine foundations may take place in any area within these bounds including moving a turbine to the outer edges of the radius of the defined study area. The ability to move within the study area boundaries (but not outside of) is very necessary to provide responsible consideration to many other environmental features within the immediate footprint such as:

- Finding suitable soil conditions for the foundation integrity by means of a geotechnical study;
- Ensuring previous land use such as foundations does not lie under the surface;
- Interference with nesting wildlife at the time of construction (this cannot be responsibly predicted until several days immediately prior to construction);

Regardless of the location of the roads or turbines within this pre-studied area, the overall land use size will not increase; it will merely be relocated within the 150m studied areas and the roads will be wide enough to provide safe travel for the flatbed trucks and cranes and to locate the collector lines along the ditches.

Access Roads

During construction, approximately 2km of new access roads will be constructed, although existing access roads will be widened. These activities will require the removal of vegetation, alter the terrain and cover existing soils with rock and gravel fill suitable for road building. Ditches will be constructed where required and culverts will be lengthened at existing sites or installed where proper crossings are required. These activities will follow provincially mandated methods which to minimize potential environmental impacts, and control erosion and potential siltation of water bodies and wetlands.

The installation of access roads is expected to have a low impact on the terrain, soils and vegetation.

Project Construction

During construction, the use of excavators, bulldozers and trucks will impact terrain, soils and vegetation. All potential turbine locations have been assessed for plants and plant communities of special concern, and artefacts of archaeological, First Nations and Nova Scotia Aboriginal interests. No such artefacts have been identified.

Construction of the turbine foundations will require the excavation of existing soils and the construction of concrete foundations for the towers and infilling and grading around the tower bases for the crane pad and the lay down are for the turbine components. These activities will alter the surface soils and

vegetation in the immediate area of the turbine. With the exception of an access area for maintenance, once turbine construction has been completed, the areas will be allowed to naturally re-vegetate.

This area has been subject to significant human activity over the past century with attempts to establish farming and subsequent logging activities. These anthropogenic activities have altered terrain, soils and vegetation.

The impacts of construction activities on terrain, soils and vegetation are predicted as "low" due to areas with sensitive vegetation being avoided.

Project Operation

Once construction has been completed, Project operations will consist of accessing the sites for maintenance operations. No further impact on terrain, soils and vegetation is anticipated.

No significant effect on terrain, soils and vegetation is predicted.

Project Decommissioning

Decommissioning will involve dismantling the turbines and any ancillary electrical equipment and the removal of concrete and steel foundations. By following the same work procedures of the construction phase without the actual construction, the disassembly will require using the proposed existing routes and crane pads to remove the equipment. The roads will be left in place and the turbine locations will be re-vegetated as the landowner requires. Typically, this would be in the form of merchantable wood as on the surrounding land or a mixture of plant species which are common to the area. Introduction of exotic plant species will be avoided.

No significant effect on terrain, soils and vegetation is predicted due to proper mitigation methods.

Malfunctions and Accidents

The largest risks to terrain, soils and vegetation associated with malfunctions and accident involves vehicles and machinery accidents resulting in contamination by petroleum products and the risk of fire. There will be onsite procedures in the form of an emergency response plan for reporting and responding to such accidents.

The Emergency Response Plan will be prepared in consultation with the local fire department Chief (Greg Smith) and will establish procedures to be in place upon initiatizing construction to deal with logistics of fires and spills. A site map will be provided to the Chief and to all employees along with emergency call-out numbers. During commissioning, the emergency response procedures will be maintained as will radio communications to the project control centre to provide lockout confirmation and procedures for safe contact with electrical components. NSE will be notified at the time of any applicable emergencies.

Mitigation

Efforts have been made to ensure that the Project is sited on previously cleared land along existing roads. However, limited clearing of trees will be required to facilitate the installation of the turbines and ancillary facilities such as the access roads and collector lines. The soil, vegetation and terrain of the study area contain few constraints for wind power development since the preferred locations for turbines are: exposed, previously cleared areas; typically upland vegetation units; and the properties are entirely located in forestry areas. The proposed sites have all been previously cleared.

Prior to construction, the limits of vegetation clearing will be staked and the construction contractor will ensure that no construction disturbance occurs beyond the staked limits. Edges of woodlots and other sensitive areas including wet areas are not to be disturbed.

Stream crossings and culvert installations will be scheduled for dry periods and low flow conditions (June 1 through Sept 30 as required by NSE). This schedule, along with adherence to the Nova Scotia Environment's Erosion and Sediment Control Manual, will mitigate potential discharges of sediment into streams.

Cumulative Assessment

In the short term, this Project will have a cumulative affect on the removal of vegetation in the area when combined with logging activities. However, in the long term, this cumulative impact is negated by logging activities which are taking place regardless of whether any wind power development proceeds.

Land-use for the Project represents relatively small footprints of less than 2% of the properties involved. Since forest harvesting is scheduled to take place on the same land as the turbines, the combined use would not be considered a new significant negative impact. The use of the land is at the discretion of the landowner.

Sustainable Use of Renewable Resources

The Project area falls within a region of high wind energy in the province. The generation of electricity in Maryvale offers a sustainable source of renewable energy to supplement the province's power demands. This Project does not conflict with the present use of the land for other renewable resources; principally forest products.

Residual Environmental Impact

The Project will alter the present status of terrain, soil and vegetation, although these features have been altered through previous anthropogenic activities. The road improvements will provide the existing users with better and safer access to the area. This will allow many of the small trails and roads to go unused and become re-forested.

*The level of impact on terrain, soil and vegetation after protection and mitigation measures have been employed is rated as "minimal" (i.e., the resource should return to baseline levels).

5.2.16 Construction Related Traffic

The influence of additional construction related traffic on local traffic patterns and road use is considered a VEC. During the construction phase, additional truck traffic over local roads to the Project area will increase during daylight hours and for a very short period of time as reflected in the construction schedule. Most traffic related trucking activity will occur when the turbine components are trucked to the site. Trucking and earthworks for construction of roads and turbine installation will be on private land. The work site will be "off-limits" to the public for safety reasons and to prevent onsite congestion for Project vehicles.

The transportation of turbine components will require trucking from the manufacturer/supplier to the site over major highways. Ground transportation of the turbines will be arranged by Vensys in 2009. Transportation will be planned and undertaken by a logistics company and a customs broker to determine the delivery schedule and border crossing/docking rules.

The transportation route can be seen in Section 2 in *Figure 2.6: Proposed Transportation Route.*

Boundaries

Potential impacts of construction related traffic are considered within the context of the neighbourhood and community within the boundary of Antigonish County. The transportation route for turbine components follows the TransCanada Highway which is a multi-lane controlled access highway over much of its length. Since this highway is intended for the purpose of commercial trucking it is not considered within the boundary for assessment of potential impacts from the Project.

Access Roads

Construction related traffic will have potential impacts on local roads when equipment and trucks are arriving on the site. Public access will be curtailed along the present roads during construction as a matter of public safety and to prevent congestion which would impede the work.

Project Construction

Dump trucks may be commissioned from local owners for daily on-site trucking of bulk materials (gravel, fill and rock). These trucks may arrive on-site in the morning, work onsite during the day and leave the site in the evening. Under these circumstances, early morning and late evening traffic could increase on the local roads around the Project area. Heavy equipment will likely arrive on-site on transporters, and remain on site for the duration of the contract period. The operators of this equipment will travel daily to the work site in cars or pickup trucks. This will add a small number of cars on the local roads in the morning and evening.

During the construction phase, large transport vehicles will carry turbine components to the construction sites. The components for each turbine will be transported on approximately 8 large tractor trailers. It will require approximately 45 trucks to transport all the turbine components to the site. The scale of the turbine equipment will be very large and therefore slow moving. Consequently,

the movement of these components has the potential to temporarily affect the local public roads and access roads. The movement of machinery on public roads will strictly adhere to safety requirements and be conducted at times which are considerate of the neighbouring residents.

The large cranes used in the assembly of the turbines will be brought to the site in components and then assembled on-site. Transporting the various components of cranes to and from the Project site may hinder traffic on public roads near the Project site for short periods during the commissioning and decommissioning of the Project. Following completion of each turbine, the crane will be disassembled and moved to the next location. These activities will be confined to the Project area and will not hinder traffic on public roads.

Vehicle activity during the construction phase and erection of the turbines will have temporary low impacts on traffic.

Project Operation

The maintenance operation for the Maryvale Wind Project will be based out of the maintenance facility for Dalhousie Mountain. This is not located in the Maryvale area, and any components which need maintenance will be worked on directly on-site, with the Dalhousie Mountain base housing spare components.

The Project operations will include commuting of staff to the Project area for scheduled and non-scheduled maintenance which will be a minor increase in local traffic.

The operations phase will have minimal impacts on the local traffic.

Project Decommissioning

During the decommissioning phase, large transport vehicles and construction cranes and earth-moving equipment will be on-site and in the area to dismantle the turbines and ancillary facilities. The impacts on traffic during the decommissioning phase will be similar to that of the construction phase.

Vehicle activity during the decommissioning phase of the turbines will have temporary low impacts on traffic.

Mitigation

The proponent will consult with the local manager of Nova Scotia Transportation and Infrastructure Renewal (TIR) to develop a working plan for transportation management. The Proponent will make all necessary applications to TIR to comply with the permitting requirements for excess and oversize loads.

The mitigation of potential impacts on local traffic will focus on preventing congestion through the management of trucking schedules, the management of materials supply schedules and proper controls on truck traffic at the entrance to the Project area. The work site will be “off-limits” to the public for safety reasons and to prevent on-site congestion for project vehicles. The Proponent will have site plans and personnel at key points to direct traffic and maintain flow.

Cumulative Assessment

The activities associated with construction related traffic will be confined to the construction and dismantling periods of the Project. The increased levels of truck traffic on the Trans-Canada Highway associated with this Project are within the capacity of a four lane controlled access highway. Although there may be short-term truck traffic congestion particularly near the entrance to the site, no long-term impact is likely.

Residual Environmental Impact

With the implementation of the identified protection and mitigation measures, construction related activities will have no significant residual impact on local traffic.

*Based on Table 5-2, residual environmental impact is predicted to be "minimal" (i.e. the resource should return to baseline levels).

5.2.17 Aboriginal Interests

Aboriginal interests and concerns regarding traditional heritage issues are a VEC for this assessment. Desk top surveys using maps and information from the Museum of Nova Scotia, a meetings with The Confederacy of Mainland Mi'kmaq (CMM) as well as a completed MEKs, meetings and other communications with the Maritime Aboriginal Peoples Council, and an information session between the proponent and the Technical EA Working Group at the Office of Aboriginal Affairs indicate that no known Traditional Aboriginal sites exist within the Project boundary. No objections to the Project have been raised in these consultations.

The proponent has commissioned desk top and field studies by Davis Archaeological Consultants (Appendix C-1) and a Mi'kmaq Ecological Knowledge Survey (MEKs) by The Confederacy of Mainland Mi'kmaq (Appendix C-2) to ensure no important unknown sites are disturbed.

The Proponent has also established an Engagement Plan (Appendix C-3) for all planning, construction and operations phases of the Project with: The Confederacy of Mainland Mi'kmaq; Afton First Nation; Pictou Landing First Nation; the Mi'kmaq Rights Initiative; Union of Nova Scotia Indians; and the Maritime Aboriginal Peoples Council.

Boundaries

The boundaries include any path, road and/or construction area to be disturbed during any phase of construction, operation or decommissioning of the Project.

Access Roads

Aboriginal interests are to be considered along all site access roads. Visual evidence indicates very low potential to find foundations, cemeteries and tools associated with previous human settlement in the area. The results of the studies confirm this.

Project Construction

Given the potential for the discovery of as-yet undiscovered artefacts, there is some potential for these resources to be lost or damaged over the course of Project construction activities. Site monitoring will be conducted and the Engagement Plan will be used to preserve any aboriginal heritage sites identified during construction.

The Proponent has engaged in communications with representatives of all significant Aboriginal Interest groups regarding the routes and seasonal land-use such as harvesting, gathering and fishing. These activities are addressed in the Engagement Plan and have been done so in a manner as to not disrupt either the construction or operations of the Project, as well as the traditional harvesting, gathering or fishing rights of the Aboriginal groups.

No significant effect on First Nations or Aboriginal Heritage Sites or other Cultural Resources is predicted due to proper monitoring methods, avoidance and work controls.

Project Operation

Once the turbines, access roads, power lines, and ancillary facilities are installed, no additional effects on First Nations or Aboriginal heritage sites are expected.

The Proponent has engaged in communications with representatives of all significant Aboriginal Interest groups regarding the routes and seasonal land-use such as harvesting, gathering and fishing. These activities are addressed in the Engagement Plan and have been done so in a manner as to not disrupt either the construction or operations of the Project, as well as the traditional harvesting, gathering or fishing rights of the Aboriginal groups.

No significant effect on First Nations or Aboriginal Heritage Sites or other Cultural Resources is predicted due to proper monitoring methods, avoidance and work controls.

Project Decommissioning

No additional effects on First Nations or Aboriginal Heritage Sites or other Cultural Resources are expected during decommissioning.

No significant effect on First Nations or Aboriginal Heritage Sites or other Cultural Resources is predicted due to proper monitoring methods, avoidance and work controls.

Malfunctions and Accidents

No interaction is expected to occur in conjunction with accidents due to pre-planned construction paths which have been reviewed previously.

Mitigation

Site planning and monitoring will be used to mitigate potential impacts on this VEC. First Nations personnel have conducted an MEK study and all work areas had been identified for assessment as

potential sites of concern or interest. Should any undiscovered sites of interest be identified, the CMM will be notified along with Mr Roger Hunka (Maritime Aboriginal Peoples Council), Mrs. Twila Gaudet (Mi'kmaq Rights Initiative), Mr. Robert Ogilvie (Manager, Special Places, Nova Scotia Museum), and if necessary, the RCMP. Work in the area of the find or artefact will be suspended until the site has been investigated. The Project plan may be altered to establish an exclusion zone around the artefact site. The project manager will authorize continuation only after having consulted with the above mentioned individuals.

The implementation of the Engagement Plan put in place with the separate Aboriginal and First Nations groups will be adhered to and has been developed to balance the Project activities with traditional Aboriginal uses.

Cumulative Assessment

There are no known activities scheduled in the area which could compound the Projects effect on this environment.

Sustainable Use of Renewable Resources

With consultations held throughout the EA process, the Proponent is confident that the resource potential of the Project area will not be significantly altered through the installation of the four turbines for the purpose of creating this sustainable form of power production.

Residual Environmental Impact

The effect of installing the various Project components is anticipated to have limited impact on Aboriginal interests and archaeological resources. The construction and operation of the wind farm has a very small footprint and the historical evidence indicates the limited use of this area by First Nations, Aboriginals and early European settlers. No significant negative net effects are anticipated to historical and/or archaeological resources.

*Using Table 5-2, the level of impact after protection and mitigation measures have been employed is rated as "minimal" (i.e. the resource should return to baseline levels).

5.2.18 Eigg Mountain Wilderness Area

The Eigg Mountain Wilderness Area is a designated wilderness area set out by NSDNR. It lies to the southwest of the Maryvale Wind Project.

Boundaries

The boundaries of the wilderness area have been set out and are a fixed (imaginary) line where the inside is considered within the boundary of the wilderness area and outside of this boundary is not considered part of the wilderness area.

The Project area is completely on private lands, and with no plans of any future phases of this project, expansion of the current boundaries is out of the question.

Access Roads

The use of existing roads for this Project will eliminate further fragmentation of habitat in the area. The Project is located between the Sunrise Trail (200 series highway) and the Highfield Road, which has been used for over 100 years as a path between Antigonish and Truro, NS. The internal Project roads will be an upgrade of existing trails, and therefore, no impact on the wilderness area is expected from the use of access roads for this project.

Construction

Noise from construction will be heard up to 1.5km away, on days where it is not very windy and the air is still. The temporary noise created by this construction is comparable to any road construction activity, which occurs rampantly throughout NS every summer; or logging activity, which occurs throughout the rural forested areas of Nova Scotia, including the project area, on a regular basis.

The Eigg Mountain Wilderness Area is approximately 2km from the outer boundary of the project area, and construction of the project is not expected to have a negative effect on the area.

Operation

The operation of the four wind turbines will have the effects of noise or visual impacts from the boundaries of the wilderness area. As can be seen from the Noise Simulation (Appendix B-2) the 35 dB rating extends approximately 1.3km from the turbines. The closer one gets to the turbines, the higher dB rating is emitted from the turbines. Since the boundaries, at this point, of the wilderness area are fixed, and there is not potential for future phases of the Project, the effects of noise from the machines are not expected to have a negative impact on the wilderness area.

The visual effects are two-fold: aesthetics and shadow flicker. As stated throughout this document, the argument of whether the sight of wind turbines is pleasant or not will not be won. The Zone of Visual Influence map (Figure 4.1) and the photomontages predict what the visual impact will be.

Shadow flicker occurs under sunny conditions when the rotating blade of the turbine passes through the path between the sun and a receptor. Figure 5.3 shows the potential impact of shadow flicker around the Maryvale Wind Project, specifically with the residents and Eigg Mountain Wilderness Area in mind. The analysis shows the potential areas affected and the number of hours per year under which this condition could occur. The map shows that this effect will not have a negative impact on the wilderness area.

Decommissioning

The decommissioning phase of the Project will have the same effects as the construction phase.

Malfunctions and Accidents

Possible malfunctions and accidents would include emergency stopping of the machines for regular or unscheduled maintenance of the machines. Since the boundaries of the project and the wilderness area are 2km apart, there will be no effect from this. Any personnel attending to the machines for maintenance would not cross over wilderness boundaries or travel through the area at any time during these situations.

Possible ice-throw would not affect the wilderness area as the distance the ice may go is significantly less (one twentieth) than the distance from the turbines to the outer boundaries of the wilderness area.

Mitigation

The Project is 2km from the outer boundaries of the Eigg Mountain Wilderness Area. With no other phases of the project occurring, this distance will remain stagnant. No roads are proposed between the closest turbine and the wilderness area. There is a frequently used road existing between the outer bounds of the project and the wilderness area.

Study results from post-construction monitoring programs for birds, bats and Mainland Moose will be shared with NSDNR to maintain accurate, up-to-date records of species in the area.

Cumulative Effects

The noise and visual effects created by the wind farm will adversely affect the wilderness area. Human activity taking place between the Project and the wilderness area will continue to take place, although the road between will not be used by the Proponent for any phase of the Project. There will be no cumulative effect of the Project on the Eigg Mountain Wilderness Area.

Sustainable Use of Renewable Resources

The Project area falls within a region of high wind energy in the province. The generation of electricity in Maryvale offers a sustainable source of renewable energy to supplement the province's power demands. This Project does not conflict with the present use of the land for other renewable resources; principally forest products.

Residual Environmental Effects

The effect of installing and operating the various Project components is anticipated to have limited impact on the Eigg Mountain Wilderness Area. The construction and operation of the wind farm has a very small footprint and the spatial boundaries set out in distinguishing the wilderness area indicate the use of this area by the biological world is that which would be expected in any rural setting. No significant negative net effects are anticipated to proximity to the wilderness area.

*Using Table 5-2, the level of impact after protection and mitigation measures have been employed is rated as "minimal" (i.e. the resource should return to baseline levels).

5.3 Site Sensitivity

To determine the Site Sensitivity, the Table on page 8 of the Proponent's Guide to Wind Power Projects by NSE was consulted. The combination of site size (Small) and the potential site sensitivity (Low) resulted in the Project Category being Category 1.

5.4 Summary of Valued Ecological Components, and Significance of Impacts

Table 5.4 provides a summary of the potential effects, mitigation measures, net effects, and the significance of those net effects for all Project specific issues. For clarity, this summary is broken down to identify the effects during Project Construction, Project Operation and Decommissioning.

The residual environmental effect of all the above potential issues is rated as "Low" or "Minimal" and it has been determined that no significant effects are predicted due to proper mitigation methods and work habits.

Table 5.4: Summary of VECs and Significance of Net Effects

Section	Valued Ecological Components (VECs)	Significance of Net Effect
5.2.1	Flora/ Botany	Minimal
5.2.2	Surface, groundwater quality and fish habitat	Minimal
5.2.3	Species at Risk, Wildlife, and their habitats	Low
5.2.4	Avian species, including migratory birds	Low
5.2.5	Existing land use	Minimal
5.2.6	Air quality	Minimal
5.2.7	Environmental noise	Low
5.2.8	Bats	Low
5.2.9	Visual landscape	Low
5.2.10	Public health and safety	Minimal
5.2.11	Heritage sites, archaeological sites and other cultural resources	Minimal
5.2.12	Waste disposal	Low
5.2.13	Neighbourhood and community characteristics	Low
5.2.14	Climatic fluctuations and extreme events	Low
5.2.15	Soils, terrain and vegetation	Minimal
5.2.16	Construction related traffic	Minimal
5.2.17	Aboriginal interests	Minimal
5.2.18	Eigg Mountain Wilderness Area	Minimal

SECTION 6.0 – EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Specifically, this section assesses the potential of climatic fluctuations in the study area as well as the potential effects that extreme weather and natural events may have on the Project. These issues are also addressed in Section 5.2.14 Climate Fluctuations and Extreme Events.

The climate of the area is predominately controlled by South West winds in the summer and North West during winter. The weather patterns, alternate from warm humid air from the Gulf of Mexico to cold dry air from the Arctic. Global computer climate modelling indicates an increase in the variability of the weather patterns with increases in more extreme events (i.e. more frequent low and high temperature events). Overall an increase in average annual temperatures is projected with an increase in precipitation amounts (Climate Change Science Program et al, 2004). The increase in extreme conditions is likely to be accompanied by increases in wind speeds. The turbines have a cut out speed (i.e. shut off) of 25 m/s.

Extreme events include rain, hail, ice storms, fire, tornadoes, earthquakes, and lightning strikes. The following events have been considered and are included within the various Project design components:

- Rain – surficial drainage patterns will remain intact and continue to convey rain water;
- Hail – the turbine blades, nacelle, and tower are constructed of materials to withstand damage from the impact of hail;
- Ice storms/freezing rain – the turbines are designed to automatically shut down when there is any significant ice load on the blades;
- Tornadoes – the blades will stop moving at wind speeds greater than 25 m/s, even though they are designed to withstand the forces of a Level 2 tornado (i.e., 200 km/hr), and the foundation design will resist similar forces;
- Earthquakes – structures are designed to meet the earthquake loads;
- Lightning – the turbines and substation will be equipped with lightning protection systems designed to accept the electrical charge and transfer it to the ground; the systems may be equipped with lightning strike sensor to determine the number of strikes and whether it is necessary to send out an inspector prior to the turbine being placed back in service.

SECTION 7.0 – EFFECTS OF THE PROJECT ON THE ENVIRONMENT

Maryvale Wind LP is responding to a Provincial and Federal strategy to provide approximately 20% renewable power to the Provincial grid by 2013. RMS energy Ltd. was successful in its bid to Nova Scotia Power Inc. and has been awarded a 6MW contract to produce wind generated electrical power for 25 years. Since that time RMSenergy has partnered with Darthmisia to create Maryvale Wind LP.

7.1 Project Advantages

The Project will provide the following advantages to the local community and the Province of Nova Scotia:

- Renewable, highly reliable, and efficient source of electrical energy
- Clean energy, no air pollution which in time will improve the habitat for all mentioned VECs in this EA, resulting in a net environmental improvement as opposed to a negative impact
- Reduced acid rain which will directly benefit the health of plants, fish, birds and people, and which will directly benefit our health
- Zero greenhouse gas emissions which will contribute to our provincial and national climate change goals
- Reduced emissions of airborne particulates
- Employment opportunities during construction
- Permanent employment opportunities: The operation of the Project will result in the creation of some permanent maintenance and management jobs with RMSenergy's Maintenance and Overhaul facility on Dalhousie Mountain
- Personal Income: Landowner royalties will provide income for those who own the land. This will also enhance their quality of life and maintain ownership of their land through improved land use. For some landowners, this land use will lead to better forest management practices and preservation
- Improved Municipal tax base: Municipal governments depend on local tax revenues. Enhanced land values will increase the municipal tax base. There is evidence indicating that the Project will increase property values due to the property income potential, road improvements and power lines

7.2 Project Disadvantages

See attached Appendices for individual environmental assessment studies which were carried out to reduce and mitigate the project disadvantages mentioned above.

- There may be potential negative impacts on birds and bats; however, these impacts are not likely to affect regional bird and bat populations or sensitive species.

- New sources of sound are added to the environment.

- There is a potential public safety issue related to ice throw; however, the sites are on private lands where public access is restricted. The potential receptors are much further away from the turbines than any ice could ever be thrown.

- The landscape view will be changed for the Project's lifespan (This is a subjective issue which can be seen as a positive change).

7.3 Summary of Conclusions

The examination of current field data indicates that the proposed Project will have no significant negative effects on the environment once protective and mitigative measures are applied. Effects of the wind turbines on surrounding lands are expected to be minimal. The Project will be mainly sited on previously cleared lands, and thus have minimal effects on forest habitats. Effects of the wind turbines on fauna are also expected to be minimal. It is anticipated that avian mortality due to collision with turbines will be low and will not affect the survival of any species. Modeling of turbine noise at critical receptors demonstrates the voluntary night time rating of 45 dB will not be exceeded at any residence, based on a worst case scenario, it is expected the results will be less again than the study indicated.

The presence of wind turbines will change the visual landscape of the Project area. Thus, it is likely that some animal species, especially bats and birds, will avoid the turbine areas. It is also important to mention that significant net positive effects are expected to result from the development of the Maryvale Wind Project.

Some of these benefits are:

- The production of 6 MW of clean renewable electricity

- Fewer emissions of greenhouse gases

- Direct local construction jobs and supplies

- Municipal and Provincial taxes paid yearly

- Fire tax levy for the local Fire Hall

- The creation of permanent technical jobs for the life time of the project (30-40 years).

7.4 Project Objectives and Justification

The objective of this project is to provide electrical power generation using a renewable resource and offset fossil fuel power generation. A small scale wind farm in Antigonish County would compliment the existing coal generated power by sharing the load and resources (fuel) currently supplying electricity to the county. This Project is needed to supply additional power to the local grid and offset some of the annual increase in demand by Nova Scotians.

Maryvale Wind LP requests approval for the proposed Maryvale Wind Project. The following conditions will be met or completed:

(1) Implementation of all the mitigation measures described in this document;

(2) Completion of a Post-construction Bird Monitoring Study;

(3) Completion of a Post-construction Mainland Moose Monitoring Program.

(4) Completion of regularly scheduled (and after extreme rainfall events) visual inspection of roads, ditching and tributaries.

SECTION 8.0 – PROJECT FOLLOW-UP MEASURES AND MONITORING

This section describes the program of follow-up measures and monitoring that will be undertaken by the Proponent in relation to the Maryvale Wind Project. Maryvale Wind LP intends to honour all commitments made in this Environmental Assessment, and will conform to all applicable Provincial and Federal Laws and Regulations.

8.1 Monitoring Plan Structure

8.1.1 Goals

The main goals of the follow-up monitoring plan for the proposed Project are to:

- Monitor the efficacy of the proposed protection and mitigation measures;
- Assess potential impacts on avian species;
- Verify compliance of the Project with applicable Municipal, Provincial, and Federal standards and guidelines.

8.1.2 Objectives

Specifically, the objectives of the monitoring plan will be:

- To minimize the effects on the flora, fauna, and natural habitats
- To conform with all environmental quality standards set by Municipal, Provincial and Federal laws and regulations

8.2 Environmental Management Systems

Various plans, programs, and procedures will be established by the Proponent to guide all stages of construction, operation, and decommissioning and to minimize the effects of the proposed Project on the environment as stipulated in Section 6.0.

8.2.1 Management Structures

As previously mentioned, the Proponent is committed to constructing, operating, and decommissioning the proposed Project in an environmentally responsible manner in compliance with all Provincial and Federal relevant laws and regulations. Among other things, this implies that Maryvale Wind LP and all construction contractors and sub-contractors involved in this Project will have appropriately skilled personnel to conduct the environmental responsibilities as defined in this EA. Furthermore, all contractors, subcontractors, and other associates of the proposed Project will respect the guiding principles of the monitoring program as well as all relevant Municipal, Provincial, and Federal Laws and Regulations. The intentions of the Proponent with respect to the overall environmental performance of the Project will be communicated to all of its employees and the construction contractors. In the eventuality that changes are required to address unforeseen or unexpected conditions or situations

regarding any phase of the Project, Maryvale Wind LP and the construction contractor will be responsible for ensuring environmental and safety issues are addressed.

8.3 Programs, Plans and Procedures

8.3.1 Environmental Protection Plan and Environmental Management Plan

Draft copies of the Environmental Protection Plan and Environmental Management Plan are provided in Appendices D-1 and D-2 respectively. These documents include a series of plans and procedures covering all critical construction and environmental management tasks.

8.3.2 Operation and Maintenance Program

The Proponent will develop an operations and maintenance program to be applied during pre-operational mobilization. The program will be based on existing procedures developed for wind turbine facilities constructed by Canadian companies. Specifically, the program will cover predictive and/or preventive maintenance, routine maintenance, annual overhauling, inspection of equipment and components, procurement of spare parts, and a schedule for regular inspections of the turbines and ancillary facilities (access roads).

8.3.3 Environmental Procedures

The Proponent will be responsible for implementing all approved environmental procedures during the operations phase of the Project. The environmental procedures will address different issues including:

- Establishing specific dates and times for environmental inspections of turbines, monitoring programs, and emergency notifications
- Spills and releases procedures
- Solid waste management procedures
- Hazardous waste management procedures
- Storage management procedures

8.3.4 Avian Species Monitoring

The Project is considered a Category 1 site based on the criteria provided in the Proponent's Guide to Wind Power Projects. The following conditions are the basis for this evaluation:

- Wind farm size: Small (1-10 turbines)
- Site Sensitivity: Medium (Site is recognized as regionally or locally important to birds, or contains provincially significant habitat types).

A two-year post-construction bird and bat monitoring program will be developed in consultation with the Canadian Wildlife Service (CWS) and will follow the Recommended Protocols for Monitoring Impacts

of Wind Turbines on Birds (CWS April, 2007). The monitoring program will reflect the most current guidance on post-construction monitoring at wind farms, and will include provisions for the development of mitigation measures as a result of any unanticipated adverse environmental effects.

The post-construction monitoring program will include standardized carcass searches, scavenger removal trials, and searcher efficiency trials. All appropriate permits will be applied for and all regulatory guidelines will be complied with during the program. The recommended frequency, coverage and data tabulation methods will comply with the Protocols for such surveys. The survey information will be provided to the Department of Natural Resources and the local office of CWS.

8.3.5 Noise

A noise monitoring program may be implemented upon commissioning to ensure the predictions made for the noise study found in this document are accurate. There are no receptors any closer than 1450m from any turbine location. Turbine noise at 1500m is practically inaudible and can be expected to fall within the natural level of background sound.

8.3.6 Mainland Moose

The Recovery Plan for Moose (*Alces alces americana*) in Mainland Nova Scotia, was published in March, 2007. The biologist hired for this EA (Bob Bancroft) serves on the Recovery Team. The overall goal of the recovery plan is to maintain the population of mainland moose in Nova Scotia within their current range.

Objectives of the recovery plan include “a rigorous long term monitoring program to provide reliable data on the distribution and demographics of moose on mainland Nova Scotia.”

The Pictou-Antigonish Highland moose population is a significant component of the endangered provincial mainland population. This proposed wind farm is sited along a western edge of the highland area that is considered active moose habitat. The moose population was last subject to a general winter monitoring survey in1995. Beyond reported sightings, little is known of its present status. The proposed small turbine footprints along this western boundary are primarily leased sites located on private land.

In meetings between Mark Pulsifer, Regional Biologist for DNR in Antigonish County, and Project Biologist, Bob Bancroft the results of the Moose PGI Survey (Appendix B-4) were shared. Mr. Pulsifer indicated that although there was absolutely no sign of moose found during the survey, it does not rule out the possibility that moose may use the area.

The Thermal Habitat Cover for Moose, as seen in Figure 4.2 shows that the most recently updated woodlands database shows there is no softwood cover (as defined earlier) being removed in the construction of this Project.

Maryvale Wind LP will conduct Moose PGI surveys annually over the next two years and continue to consult with DNR throughout the process.

8.3.7 Soil Erosion

On a bi-monthly basis after construction has been completed, and after extreme precipitation events occur, a visual survey along all roads, access routes and turbine pads will be undertaken to ensure the long-term erosion control measures have been effective. Excavation, straw bales and seeding measures will be carried out to maintain the roads, ditches and crane pads to a standard required to allow daily use in a safe and clean manner.

8.3.8 Occupational Health and Safety Procedures

The Proponent and all its contractors and sub-contractors will undertake all the measures necessary to ensure employee health and safety is maintained throughout their employment term. In addition, training programs will be developed to ensure that personnel receive appropriate training in relation to operation and maintenance programs, environmental, health and safety procedures.