Ashton Ridge Golf Course Wind Farm Project
Environmental Screening Report

Grand Valley Wind Farms Inc.
3042 Concession 3 Adjala
Hockley Valley, RR1
Palgrave, Ontario
L0N 1P0

March 1, 2007

Prepared by
Environmental Business Consultants
for
Grand Valley Wind Farms Inc.

Preface

Environmental Business Consultants ("EBC") has prepared this Environmental Screening Report ("ESR") for the Ashton Ridge Golf Course Wind Farm Project. The report is consistent with the Ontario Ministry of the Environment's ("MOE") Guide to Environmental Assessment Requirements for Electricity Projects (March 2001) as mandated under Ontario Regulation 116/01, the Electricity Projects Regulation.

In completing the screening Environmental Assessment ("EA") for the Project, EBC has responded to the provisions of the environmental screening requirements stipulated by the Province of Ontario. The checklist below identifies the report requirements as stipulated in the Ontario Ministry of the Environment's (MOE) *Guide to Environmental Assessment Requirements for Electricity Projects* (March 2001).

Screening EA Requirements for the MOE

Requirement	**Section**
Background information including description of project	1, 2, & 3
Map of project location	1 & 2
Description of local environmental conditions	4
Description of other required approvals and permits	1
Completed screening criteria checklist	Appendix I
Information, analysis and discussion of mitigation and impact measurement measures for any potential negative effects	6
Commitments to mitigation, impact management, monitoring and/or further consultation	5 & 6
Information on public and agency consultation	1 & 7
Description of how environmental effects or issues may be addressed through other required approvals	1 & 6
A review of the overall environmental advantages and disadvantages of the project	6 & 9
A summary of all mitigation, impact management and monitoring commitments	6, 7 & Appendix I

TABLE OF CONTENTS

List of Figures

List of Tables

1.0 PROJECT SUMMARY

This report documents the assessment of the environmental effects of the proposed construction and operation of twelve (12) wind turbines and a transmission line at Ashton Ridge, Grand Valley, Ontario. The assessment was conducted to address the requirements of the Ontario *Environmental Assessment Act* (*EAA*). The Table in the preface describes the information required for a screening report under the Guide to Environmental Assessment Requirements for Electricity Projects (MOE, 2001).

1.1 Project Proponent

The project proponent is Grand Valley Wind Farms Inc. Contact information is as follows:

J.C. Pennie, Chairman
Grand Valley Wind Farms Inc.
3042 Concession Road 3 Adjala
RR 1, Hockley Valley
Palgrave, Ontario L0N 1P0
Canada

Bus: (905) 729-0060
Bus Fax: (905) 729-0054
E-mail: jcpennie@windrush-energy.com
Website: www.windrush-energy.com

1.2 Title of Project

The title of the project is *Ashton Ridge Golf Course Wind Farm Project ("the Project").*

1.3 Project Location

The Project is located on Part of the Lots 29 - 32, Concessions 7 & 8, East Luther Grand Valley Township, Dufferin County, Province of Ontario. The wind farm is located at

Ashton Ridge Golf Course and surrounding private property to the south and west. A centered landmark is the meteorological tower located at UTM 17 5 84020 E and 48 77409 N (base elevation 290m). A series of maps showing the location of the site can be in the following pages in and Appendix A. Specifically, the maps and figures include the following:

- Figure 1: Map of Area
- Figure 2: Project Location
- Figure 3: Simulated View of Project Area with Wind Turbines
- Figure 4: Aquatic Features, Roads, & Transmission Lines
- Figure 5: TerrestrialFeatures, Roads & Transmission Lines

Insert Figure 1

Insert Figure 2

Insert Figure 3

Insert Figure 4

Insert Figure 5

1.4 Estimated Capacity of the Wind Farm

Windrush Energy believes that the Township of East Luther Grand Valley have proven potential for electricity generated by wind. This site will consist of 12 wind turbines manufactured by VESTAS or equivalent with an expected capacity of 20 MW.

Specifications on the VESTAS V82 wind turbine can be found in Appendix K.

1.5 Construction Schedule

The construction schedule and key milestones in the development of the Project can be found in the Table below.

Table 1: Construction Schedule

Schedule	Date
Zoning By-law Amendments	Spring 2005
Official public meetings at Township offices and "kitchen table" meetings with neighbours	Spring 2005
Initiate preliminary engineering	Summer 2005
Begin gathering background information for environmental studies	Summer 2005
Post Notice of Commencement	Fall 2006
Complete provincial and federal environmental assessment processes	Winter 2006
Submit ESR Statement of Completion	Winter 2007
Obtain other project approvals	Spring 2007
Initiate construction	Summer 2007
Complete construction activities	Fall 2007
Start of commercial operations	Fall 2007

1.6 Government Agencies Involved in the Environmental Screening Review

The Project is subject to provincial assessment requirements. Consequently, multiple agencies were contacted as part of the Project works.

The Ontario Ministry of the Environment (MOE) as well as other government ministries and groups were contacted as part of the Screening Environmental Assessment. A notice of commencement concerning the project was sent to the following government Ministries, agencies, and groups:

- Ontario Native Affairs Secretariat
- Ontario Ministry of Natural Resources
- Ontario Ministry of Energy
- Ontario Ministry of Agriculture, Food and Rural Affairs
- Ontario Ministry of Municipal Affairs and Housing
- Ontario Ministry of Transportation
- Ministry of the Attorney General
- Ontario Government Mobile Communications Office
- Ontario Secretary for Aboriginal Affairs
- Environmental Commissioner of Ontario
- Niagara Escarpment Commission
- Grand River Conservation Authority
- Ontario Energy Board
- Upper Grand District School Board
- Natural Resources Canada
- Environment Canada
- Township of East Luther Grand Valley
- Land Stewardship Network of Dufferin South Simcoe
- Grand Valley & District Fire Department
- Grand Valley Agricultural Society
- Greater Dufferin Area Chamber of Commerce
- County of Dufferin
- Canadian Environmental Assessment Agency
- Fisheries and Oceans Canada
- Health Canada
- Federal Department of Indian and Northern Affairs

1.7 Other Regulatory Approvals

Federal Approvals and Authorizations

The principle federal approvals and authorizations that are required for the development and operation of the Project include input from Environment Canada and other federal agencies on the birds and fish habitat. In addition, the wind turbines will require lighting to address the requirements of the Canadian Aviation Regulations administered by Transport Canada. Finally, there are responsibilities by the proponent under the *Species at Risk Act* (*SARA*) and *Migratory Birds Convention Act* (*MBCA*).

Provincial Approvals and Authorizations

At the Provincial level, there are permits and approvals that will be required to facilitate the development of the Project. Their ultimate applicability will be determined based upon the Project's detailed design.

A Certificate of Approval (air and noise) under the *Environmental Protection Act* issued by the Ontario Ministry of the Environment and archaeological clearance from the Ministry of Culture are approvals that will be required.

Compliance with the Ontario Ministry of Transportation provincial highway traffic and road safety regulations will be required of heavy/oversize loads. A Transportation Permit may also be necessary.

A Generator's License issued by the Ontario Energy Board (OEB) for the generation of electrical power and sale to the grid will be required. Also, a Transmitter License from OEB is necessary for the transmission of electrical power to interconnect with provincial grid.

A Customer Impact Assessment will be required from Hydro One for the integration of project with Hydro One and effects to customers.

A System Impact Assessment will be required by the Independent Electricity System Operator (IESO) for integration of project with Hydro One's transmission and distribution system. Approval of Connection will be required by IESO for electrical interconnection with the IESO grid regulated network

Municipal Approvals and Authorizations

Municipal permits and approvals will also be required from the Township of East Luther-Grand Valley and/or the County of Dufferin such as a building permit.

The Township of East Luther Grand Valley has already passed a by-law allowing for the construction of wind turbines on the affected properties.

1.8 Project Importance, Disadvantages and Advantages

Project Importance

The need for new, renewable electricity generation capacity within the Province of Ontario is fully documented in the Independent Electricity System Operator's document entitled: *10-Year Outlook: An Assessment of the Adequacy of Generation and Transmission Facilities to Meet Future Electricity Needs in Ontario, From January 2005 to December 2014* (www.theimo.com/imoweb/monthsYears/monthsAhead.asp). This report outlines the significant challenges over the next ten years, concluding, "new transmission, supply, and demand side initiatives are urgently needed to address this gap (i.e. severe electricity shortfall) and secure Ontario's energy future".

In response to the predicted electricity shortfalls, and after reviewing various power generation alternatives, the Government of Ontario, through the Ministry of Energy (June 2004), released a Renewable Energy Request for Proposals (RFP-I). RFP-I contained provisions for the supply of approximately 300 MW of capacity from new, renewable generating facilities as soon as practical, but no later than December 31, 2007. In addition, the Ontario Government released an RFP on June 2004 for 2,500 MW of clean generation (including demand side management) and requested electricity generation proposals of at least 5 MW through a process other than burning coal or oil as a primary fuel.

In November 2005, the Ontario Ministry of Energy issued RFP-II for renewable energy for 1000 MW. In April 2006, The Ministry of Energy issued a Standard Offer Program (SOP) at a fixed price of 11.5 cents per KWH for projects up to a maximum of 10 MW per location.

This Project will provide up to two 10 MW projects of renewable electricity, as part of the SOP process and is considered a new renewable generating facility. On an annual basis, this amount of energy is sufficient to satisfy the electricity needs of approximately 4,000 average Ontario homes; helping the Government of Ontario to address the predicted electricity shortfalls.

Project Disadvantages

As required under the Environmental Screening Process, the ESR must review the overall environmental advantages and disadvantages of the Project. The disadvantages are highlighted in this section.

Just about every human activity has the ability to positively or negatively affect the environment; the same is true for electricity generation. Since the mid-twentieth century electricity has been an essential part of human life; electricity powers our appliances, office equipment, heats our homes, and assists in refining the fuels that power vehicles and machinery. Indeed, the use of electricity is something that many take for granted.

While it is true that in comparison to other forms of electricity generation, electricity generated from wind power is relatively benign, there are some real and perceived disadvantages, which include:

- a small amount of agricultural land is taken out of production over the Project's lifecycle;
- there is potential to kill a limited number of birds (<2 birds/turbine/year);
- new sources of sound have been added to the environment;
- there is potential for public safety issues related to ice throw and catastrophic

failure (i.e., collapse) of the structures;

- the viewscape will be changed for the Project's lifecycle;

- it has been claimed that property values will be adversely affected within the view shed (studies in Europe, the United States and Ontario now show that values actually increase);

- Electric and magnetic fields from the Project are perceived by some people to have adverse health effects.

Additional information on the real and perceived disadvantages of the Project is provided in Section 6. As appropriate, Section 6 and 7 also outline the protective and mitigative measures recommended to avoid, minimize, and/or offset any potentially adverse environmental effects.

Project Advantages

The advantages/benefits of the Project include the following:

- C*onstruction phase*. The construction phase of the project will have significant economic benefits to the local economy. The construction of 12 wind turbines will create several full and part-time employment positions. The construction phase will generate expenditures of several million dollars, including locally purchased goods and services.

- *Operation phase*. The operation phase will provide annual economic benefits: wind farm operations will require roughly one full time operation and maintenance position and several secondary jobs (e.g., snow removal and road work). It is anticipated that operations and maintenance costs for the Project will be approximately several tens of thousands of dollars annually.

- *Property tax revenues*. There will be an increase in property tax revenues for the Township. The development of the Project is expected to increase property tax revenues collected in East Luther-Grand Valley Township by several thousand dollars annually over the current property tax revenues with limited demand for

municipal services.

- *Secondary incomes will be created*. For those landowners with an executed land lease agreement, the added income from the wind farm will assist in offsetting existing financial challenges related to farming in the area.

- *Increased investment into renewable energy*. The community will be contributing to the growth and establishment of Ontario's growing wind power industry.

- *No material affect to property values*. Based upon the available literature there is no evidence supporting the claim that views of the wind farm will decrease property value in the area.

- *No emissions of green house gases:* every kilowatt hour of clean, emission-free wind energy produced is a kilowatt hour that does not require the burning of fossil fuel.

Benefits of Wind Energy

The numerous benefits of generating electricity from wind energy are well documented. Compared to other forms of electricity generation, wind energy offers the following benefits:

- "clean" and thus does not produce any air pollution;
- renewable, highly reliable, and efficient;
- evolving as an economical source of new large-scale electricity generation;
- associated with few environmental effects in comparison to thermal generation or nuclear generation of electricity;
- demonstrated increase in property values;
- increases farm income;
- increases local employment through construction and long-term maintenance;
- assists in reducing our contributions to global climate change; and
- part of an overall solution to Ontario's forecasted electricity needs.

1.9 KEY CONCLUSIONS OF ESR

This environmental screening report (ESR) has been completed to assist Grand Valley Wind Farms in fulfilling the various regulatory requirements as mandated by provincial government for the development of the Ashton Ridge Golf Course Wind Farm Project. Specifically, this ESR is consistent with the provisions of Ontario Regulation 116/01 for a Category B Project. An interdisciplinary team of impact assessment specialists, using best practice principles (e.g., quantitative and qualitative analytical techniques), completed this ESR.

Field and analytical studies have been carried out during the ESR to fulfill data gaps and assist in the determination of potential effects associated with construction, operation, and decommissioning of the Project. As a result, various protection and mitigation measures have been identified to manage potentially adverse environmental effects. A project follow-up and monitoring program will also be developed.

A stakeholder consultation and information disclosure program identified key issues of interest to the local community and various government agencies. Analysis of the interests identified through the program was undertaken and incorporated into the issues identified in the MOE's Environmental Screening Criteria Checklist. Based on the analysis, it was concluded that the Project is not likely to cause significant harmful environmental effects, taking into account the implementation of appropriate protection and mitigation measures.

Further, potentially significant adverse environmental effects have been avoided through careful site selection, following good environmental assessment and planning principles, and adherence to regulatory requirements. The Project is located in a rural, agricultural-based area where it will not interfere with the existing natural features and has been sited in such a way as to minimize effects to agricultural operations. All potentially net adverse effects that could not be avoided by siting or through regulation can be effectively mitigated using proven, industry accepted methods and technologies. No significant net adverse environmental effects are expected.

The overall conclusion of the ESR is that the Project can be constructed, operated, and decommissioned in such a manner as to minimize potentially adverse effects on the environment, whilst enhancing the positive effects both locally and provincially. In

particular, migratory bird deaths due to collision with the turbines are anticipated to be negligible given the absence of known migratory flight paths in the project area. Effects to breeding bird habitat have been minimized through siting initiatives and mitigation measures. Environmental noise levels at surrounding receptors are predicted to be within the applicable MOE noise criteria. Finally, published documentation has shown that there will be no negative effect on property values within the viewshed of the turbines.

Significant net positive environmental effects are expected to result from development of the Project. The Project benefits include the provision of up to 20 MW of clean renewable electricity, increased investment into renewable energy, increase municipal tax revenue with limited demand for municipal services, and no emission of green house gases. Economic benefits during the construction phase include increased local hiring and procurement of local goods and services. The operation phase should provide annual economic benefits including potential employment opportunities.

1.10 Author of ESR

As per good environmental assessment practices, this ESR has been prepared by an independent, interdisciplinary team of professionals led by Environmental Business Consultants (EBC). General contact information for the primary author of the ESR is as follows:

John Nicholson, M.Sc., P.Eng.
Environmental Business Consultants
33 Wanita Road
Mississauga, Ontario
L5G 1L3
Phone: 905-271-2845
Fax: 905-271-0843
e-mail: john.nicholson@ebccanada.com
Web: www.ebccanada.com

2. PROJECT DESCRIPTION

2.1. Presentation of Proponent

Grand Valley Wind Farms Inc. is an Ontario corporation with the mission to develop community-based, inland wind energy projects.

Grand Valley Wind Farms Inc. is a joint venture of Creststreet Capital and Windrush Energy. Creststreet is the first Canadian Income Trust formed to finance and operate wind farms. Windrush Energy Division of Land's End Corporation, Directors & Officers are: J.C.Pennie, Chairman & CEO; Brian G. Boake – Principal, The Boake Group; President, Adjala Power Corp; Barry Cracower – President, Marketing Alternatives Inc.; former President, Rexall Drug Stores; Michael Florence – President Sherfam Inc. (Appotex Group); Robert T. Gillespie – President, Gilvest Inc.; former Chairman & CEO, GE Canada; Todd Latham – President, WE Communications; Publisher ReNEW Magazine; Marilyn J. Field, M.S.M. - Corporate Secretary; President, DareArts Foundation Inc.

2.2. Background of Project

Virtually all regions of Canada contain good wind resources. Production from wind increases with the cube of the wind speed, therefore doubling the wind speed increases electricity generation by a factor of eight. It is important to find the best winds. Oceans and large lakes, wide open prairies and hill or mountain areas that act as a funnel often have good winds. High pressure, cold air has the greatest wind energy.

In a *Wind Info Sheet* jointly prepared by the Produced by the Ministry of Municipal Affairs and Housing, Provincial Planning and Environmental Services Branch and the Ministry of Energy, Energy Division (Queens Printer for Ontario, 2003), the benefits of wind energy include the following:

- A renewable energy source that does not create emissions or hazardous waste.
- Provides local employment in a potentially long-term industry. Wind energy produces more jobs than conventional energy generation.
- Offers the potential for Ontario communities to be leaders in developing an industrial cluster.

- Can increase municipal tax base.
- Create the potential for a second income for landowners/farmers through land rental/lease.
- Can co-exist with existing agricultural practices or support restoration of agricultural lands.

Wind turbines produce electricity from generators in much the same manner as other types of electricity generation plants in Ontario. Electricity is produced when wind propels the blades of wind turbines. A shaft rotates a dense coil of insulated wire between the poles of a powerful magnet in the generator, which creates an electrical current. A wind speed of 15 kilometers per hour is the minimum required for effective electrical generation. There is better potential for electricity generation in areas where there is a constant the wind.

The idea for the project was initiated several years ago. Grand Valley Wind Farms Inc. was formed to develop wind turbine farms in rural areas on a small scale (1 to 15 wind turbines).

The local municipal government has indicated its support of the Project. The mayor sent a letter to Windrush Energy offering his support (see Appendix H – Public Consultation). The Township of East-Luther Grand Valley is a "green municipality" and would like to be self-sufficient. On August 9th, 2005, the Township passed a bylaw (No. 2005-30) permitting wind turbines for the Ashton Ridge project pending approval of the new Official Plan which will permit wind energy projects. In support of the passing of the bylaw, one hundred percent of all adjoining property owners of the Ashton Ridge project gave their written support to the Township. This stems from the rural community and farming attitude of the residents.

The Province of Ontario supports wind energy projects. The project is pre-qualified for bidding on the Ontario Ministry of Energy RFP for 300 MW of Renewable Energy Supplies and a proposal has been submitted.

2.3. Purpose of Project

The purpose of the project is to generate 20 MW of electricity to meet the growing

demand for power in the province of Ontario. The lifespan of the project is 20 years.

The objectives of the project are to generate 20 MW of clean energy and replace 20 MW of electricity produced by coal-fired generating stations. This Project will also assist the local municipality in its vision of becoming a leader in sustainable development.

2.4. Summary of Project

The proposed wind turbine farm is located on Part of Lots 29 - 32, Concession 7 and 8, East Luther Grand Valley Township, Dufferin County. Presently, the land is zoned rural which allows the installation of wind turbines.

There will be 12 wind turbines with an overall capacity of up to 20 MW. The wind turbines consist of the supporting tower, tower foundation, rotor blades, and gearbox/electrical generator housing (the "nacelle"). The turbines procured for the Project are horizontal-axis turbines with three bladed upwind rotors, a rotor diameter of approximately 80 metres, and a hub height (i.e., centre height) of 80 metres.

Each tower will be 80 metres in height to the nacelle, while the length of each rotor blade will be 40 metres (total blade diameter of 80 metres including the rotor). The nacelle includes the gearbox and electric generator, as well as blade and turbine control equipment, wind speed and direction sensing equipment, and cooling equipment. Based upon the local wind regime, and technical specifications of the turbines, the blades are expected to rotate at an average speed of 10 to 15 revolutions per minute.

The tower will require the construction of a poured in place concrete foundation. The permanent/operational land base required for each turbine, excluding the access road, is approximately 0.4 acres (i.e., 0.25 acre excavation, 0.15 acre maintenance, clearing).

Connection to the grid will be by a by underground transmission lines on the properties to the existing wooden hydro poles lining the adjacent roads.

2.5. Location of Project

The Wind farm is situated within East Luther-Grand Valley Township, Dufferin County, Province of Ontario. The wind farm is located at Ashton Ridge Golf Course and private property to the west. A centered landmark is the meteorological tower located at UTM 17 5 84020 E and 48 77409 N (base elevation 290m).

A site plan and photos with project location, features and activities are found in Figures 1 through 5 and in Appendix A. They also show the geographical context of the site and the environmental features that could be affected by the project.

The nearest environmental and/or cultural site is the Niagara Escarpment, located more than 5 kilometers from the site. The nearest heritage site is the Grand River, immediately west of the project area.

First Nations reserves and lands currently used by aboriginal peoples are not within the proximity of the site. The nearest First Nation reserves are Georgina Island on Lake Simcoe, Chippewas of Saugeen on Lake Simcoe and Beausoleil (north of Barrie). All three reserves are over 50 kilometres from the site. The project area does, however, lie within the boundaries of the "Haldimand Tract" land claim.

2.6. Detailed Project Activities

The information below details the construction, operation and decommissioning phases and the timing and scheduling of each phase. The project components are described in detail including any permanent and temporary structures, associated infrastructures and associated construction work. The type of equipment used is listed for the location. The capacity and size of the various components is also provided.

2.6.1. Construction Phase

Prior to initiating construction, a number of surveys will be required including, but not limited to site survey, geotechnical survey and grid construction survey.

A determination was made on the number of water wells in the project area. According

to the Ontario Water Well Information System, there are 47 water wells within the project area (see Appendix J for a copy of the Ecolog ERIS report).

A preliminary geotechnical drilling investigation was undertaken at the site (see Appendix J for a copy of the report). The purpose of the investigation was to confirm subsurface conditions and the elevation of the groundwater table. The geotechnical investigation determined that subsurface material consisted of a combination of sandy silt and clayey silt. Very dense sandy silt was found below 9.0 m.

The preliminary investigation found that the groundwater table at 4.6 m, but concluded that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events. The foundations for the wind turbines are typically between 2 – 3 meters in depth. The need for dewatering may be necessary depending on the elevation of the water table at each wind turbine location. If the geotechnical investigation reveals a high water table at specific locations, a determination will be made on how the excavation will affect the water level in nearby water wells and if a Permit to Take Water is necessary.

A more complete geotechnical investigation will be conducted at each turbine location prior to excavation in order to determine the depth of various layers of subsurface material and the elevation of the groundwater table.

Site preparation activities will include preparing a point of access to the site (i.e, temporary road), preparation of the site (e.g., placement of temporary snow fencing), and mobilization of construction equipment. An appropriate area of the site will be secured behind a silt fence during construction to prevent run-off of silt-laden stormwater.

Excavation will be required for the concrete foundations for the wind turbines. The foundations will be built and the cement poured in less than a week. This will require cement trucked in from off-site. A typical foundation is 4-m in diameter and 2 – 3 meters in depth. The foundation must cure for a month prior to erecting the turbine. Foundation holes will be excavated using an excavator. Excavated materials will be disposed of in accordance with the *Environmental Protection Act* and its regulations (i.e., General – Waste Regulation).

The wind turbine, including tower, will be brought on site by the supplier in sections on

flatbed trucks.

A large crane will be brought on site. It will lift and bolt tower sections into place. The nacelle, which contains the gear box, generator and yawing mechanism, will then be placed onto the top of the tower. The next step will be to assemble or partially assemble the rotor (i.e. the blades of the turbine) on the ground. It will then be lifted to the nacelle and bolted in place.

A small crane will be needed for the assembly of the rotors while a large crane will be needed to put it in place. It will take approximately 2 days to erect each turbine. The proposed turbines will be approximately 80 metres tall. The blade length will be approximately 40 metres and the diameter of each tower will be 7 metres.

A transformer, that will be approximately 1.5 cubic metres, will be sited within or proximal to each wind turbine base. Each transformer will have approximately a 20-year life span. The transformers from each of the twelve wind turbine towers will be connected to the power grid either along Concession Road 8-9, County Road 25, Concession Road 6-7, or Amaranth/East Luther Townline via an underground bus duct cabling arrangement.

The trench for the power cables will be dug using heavy equipment. The trench will be 1.5 metres below the surface to carry the bus duct and associated power cables. The power cables will then be placed in the trench and the trench filled. The power cables will be installed at the turbine and connected to the grid - adjacent hydro poles on the adjacent roads. Where possible, the conduit will be placed in the existing road allowance. This activity will take approximately 1 to 2 weeks.

Prior to the start up of the wind turbine, a series of checks and tests will be carried out. This will include both static and dynamic tests to make sure the turbine is working within appropriate limits. Grid interconnection and unit synchronization will be undertaken to confirm the turbine and unit performance. Physical adjustments may be needed such as changing the pitch of the blades. The schedule for this activity will be subject to site and weather conditions.

The site will be demobilized when the work is complete. Backfill will be placed over the base and the ground will be remedied with appropriate vegetation. Fencing will be

removed, and any access points to the site will be remediated. It is expected that these activities will take approximately one week. In some cases, these activities may be carried out concurrently to optimize scheduling of equipment.

Parking lots will not be required for this project. Construction workers will park their vehicles in the existing parking lot of the Ashton Ridge Golf Course.

The project schedule will be prepared prior to the initiating construction.

2.6.2. Operation Phase

The wind turbines will be operated in a manner consistent with International Electrotechnical Commission (IEC) standards. The activities described below will be required for the wind turbine operation:

A. ONGOING OPERATION

The wind turbine will be operational except under certain circumstances such as mechanical breakdown, extreme weather conditions or maintenance activities.

B. MAINTENANCE

Normal maintenance on the individual wind turbines occurs twice per year. It involves complete checks of structural soundness, changing of hydraulic and lubricating fluids, etc. For safety reasons, a two-person team will conduct the required maintenance. The expected maintenance time involved is approximately five days per turbine. Extraordinary maintenance occurs infrequently and typically involves the replacement of a major component, such as a gearbox, transformer, or blade. In the event of a major malfunction, a crane may be required to lift the affected component. The first year of operation is expected to have more maintenance time, as the systems are fine-tuned.

2.6.3. Decommissioning Phase

The expected lifetime for the project is 20 years. At the end of the expected life for the wind turbines, a decision will be made on whether to replace them. If it decided to

dismantle the turbines, decommissioning would involve the following activities:

- removal of the wind turbines, along with the mechanical and electrical equipment;
- collector line excavation and removal;
- removal of concrete foundation to a depth that does not interfere with agricultural operations;
- fill and grade the each turbine site with suitable engineered fill; and
- replace topsoil and seed area as required.

The major steps involved in decommissioning the project area are described below.

A. SITE PREPARATION

Site preparation activities will include preparing a point of access to the site (i.e. temporary road), preparation of the site (e.g. placement of temporary snow fencing) and the mobilization of construction equipment.

B. DISASSEMBLE AND REPLACE EXISTING TURBINES

A large crane will be brought on site. It will be used to disassemble towers' sections. The sections will be reused, recycled or disposed of in accordance with regulatory requirements. All parts of the turbines are reusable or recyclable except for the blades. Some of the parts (cabling, generator) will have high economic value. There are ongoing programs in Europe to develop blades that are recyclable.

C. TRANSPORTATION AND TRAFFIC

Heavy equipment will be brought on-site to the removal of the wind turbines. The equipment will include a crane for dismantling the turbines and towers.

D. SITE RECLAMATION

Restoration work will include filling all pit holes, trenches or other borings or excavations which will be covered with local soils sufficient for vegetative growth.

2.6.4 Future Phases of Project

Once the project is complete, no further expansion on the project lands is anticipated. No more than the proposed 12 wind turbines will be erected. In 20 years, the decision will be made on if the current wind turbines should be replaced with new ones.

2.7 Project Sensitivity Analysis

Environment Canada and the Canadian Wildlife Service (2006) provide information and recommendations in their Guidance Document on how to select and evaluate site suitability for potential wind power facilities, based on reducing risks to birds. Site sensitivity is ranked as low, medium, high, or very high. Refer to Section 6.3.5 in the Vegetation & Wildlife Environmental Report (NRSI 2007) for the full site sensitivity analysis.

Table 2: Site Sensitivity

Sensitivity	Determining Factor	Project Area
Very High	• The presence of a bird species listed as "at risk" by the SARA, COSEWIC or provincial/territorial threat ranking, or the presence of the residence(s) of individuals of that species if listed under the SARA, or of its critical habitat. To be of concern, either the bird or its residence or critical habitat must be considered to be potentially affected by the project. • Site contains, or is adjacent to, a large or important bird colony, such as herons, gulls, terns and seabirds. • Site contains significant staging or wintering area for waterfowl or shorebirds, or significant areas of bird concentrations. • Site is in, or is adjacent to, an area recognized as nationally important for birds (e.g., by being located in or adjacent to a • Area, National Park, Western Hemisphere Shorebird Reserve Network (WHSRN) site, or similar area specifically designated to protect birds). • Site contains large concentrations of raptors. • Site is on a known migration corridor.	• One SARA species of concern and five provincially rare (1 extremely rare; and 2 very rare to rare to uncommon) are known from the subject properties and/or study area. None of these species were observed by NRSI biologists during field studies. • Study area is located approximately 5km east of Luther Marsh (IBA) where nationally significant numbers of breeding Least Bittern occur. Black Tern and Great Egret are also known to nest here. Luther Marsh is also an important staging area for waterbirds and waterfowl. None of these species were observed by NRSI biologists during field surveys, nor were movements of these species between the study site and the marsh recorded.
High	• Site contains one or more landform factors that concentrate birds (e.g., islands, shoreline, ridge, peninsula or other landform that may funnel bird movement) or significantly increase the relative height of the turbines. • Project will disrupt large contiguous wetland or forest habitat that may be of importance to birds. • Site is located between habitats where large local bird movements occur, or is close to significant migration staging or wintering area for waterfowl or shorebirds. • Site contains, or is adjacent to, a small colony of colonial birds, such as herons, gulls, terns, or seabirds.	• Substantial east-west movements by waterfowl and some waterbirds were noted. Luther Marsh (IBA) occurs 5km west of the subject properties and Bowling Green Swamp (PSW) occurs approximately 1km northeast of the subject properties.

	• Site is subject to increased bird activity from the presence of a large heron, gull, tern or seabird colony located in the vicinity of the site. • Site is subject to increased bird activity from the presence of an area recognized as nationally important for birds (e.g., a National Wildlife Area, Migratory Bird Sanctuary, Important Bird Area, National Park, or similar area protected provincially or territorially because of its importance to birds). • Site contains species of high conservation concern (e.g., birds known to have aerial flight displays, PIF/CWS priority species, etc.).	
Medium	• Site is recognized as regionally or locally important to birds, or contains regionally significant habitat types.	
Low	• Site does not contain any of the elements listed above.	

Level of concern for the wind farm facility is inferred from the matrix in the Table below.

Table 3: Level of Concern Matrix

		Sensitivity			
		Very High	**High**	**Medium**	**Low**
Facility Size	**Very Large**	Very high	Very high	High	Medium
	Large	Very high	Very high	High	Medium
	Medium	Very high	High	Medium	low
	Small	Very high	High	Medium	low

As a precautionary measure, the Ashton Ridge Golf Course Wind Farm Project has been assigned a "high site" sensitivity. Although the site is approximately 5km from a nationally important bird area (Luther Marsh) and the presence of 1 SARA species and 5 provincially rare birds were reported form the vicinity of the study area, none of the nationally or provincially rare bird species were observed within the study area while conducting surveys. As a result, the site sensitivity measure was dropped to 'high' from 'very high'.

.

3. SCOPE OF THE ASSESSMENT

3.1. Provincial Project Characterization

Ontario Regulation 116/01 ("Regulation 116/01) sets out the Environmental Screening Process (ESP) as a proponent driven, self-assessment process. The proponent is responsible for determining if the project falls within the ESP and when to formally commence the process. The proponent is also responsible for determining the time required to adequately conduct the ESP and when to publicly release project documentation and/or solicit comments from stakeholders.

Under Ontario Regulation 116/01 ("Regulation 116/01"), new electricity projects are classified into one of three categories:

- Category A: projects that are expected to have minimal environmental effects and do not require approval under the EAA;

- Category B: projects that have environmental effects that can likely be mitigated, but require approval under the ESP of the EAA; and

- Category C: projects that have known significant environmental effects and require the preparation of an "individual environmental assessment" under the EAA.

There are two possible stages of environmental study required under the ESP, depending upon the potential adverse environmental effects of a project and/or stakeholder issues: "screening" and "environmental review". All projects subject to the ESP are required to go through the screening stage, which requires proponents to apply a series of screening criteria to identify the potential adverse environmental effects of the project. The more detailed stage, an environmental review, is required if potential concerns raised during the screening stage dictate a need for additional, detailed studies.

Based upon the MOE's categorization of electricity projects, wind turbines greater than or equal to 2 MW are classified as Category B Projects and thus subject to approval under the ESP of the EAA. This categorization, coupled with the results of the screening

criteria checklist has led the Project to be assessed as an environmental screening under Regulation 116/01.

3.2 Study Objectives

Working within the federal, provincial, and municipal approvals processes, and consistent with the MOE's environmental screening criteria checklist, the main objectives of this ESR are threefold:

1. To identify, define, and assess the potential effects of the Project on the environment;

2. Ensure environmental considerations are explicitly addressed and incorporated into the planning, design, and decision-making processes;

3. Considering objectives one and two, 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.

3.3 Methodology of Environmental Assessment

The environmental assessment methodology for the Project was developed to satisfy regulatory requirements of a screening level assessment under the Ontario *EAA*.

The methodology used in this report is designed to produce an environmental assessment document that:

- focuses on issues of greatest concern;
- addresses regulatory requirements;
- addresses issues raised by the public and other stakeholders; and
- integrates engineering design and mitigative and monitoring programs into a comprehensive environmental management planning process.

The environmental assessment screening methodology for this Project includes an evaluation of the potential effects, of each Project phase – construction, operation and

decommissioning – as well as malfunctions and accidents, with regard to the environmental components and socio-economic components. Project related effects are assessed within the context of project time (construction, operation and decommissioning) and location boundaries established for the assessment.

The scope of work for the environmental assessment involved the following:

- Document review of similar work that has been executed to date with respect to comparable projects undertaken in Canada and elsewhere;
- Correspondence, meetings and interviews with pertinent federal, provincial and municipal agencies, other parties and local interests who may have information or interests on the site or relevant to the development and operation of the proposed project;
- Compilation of all pertinent ecological and other relevant data with respect the site and its surroundings; and
- A series of field investigations.

Documentation Review

A review of existing information on wind turbines and their environmental effects was undertaken.

Only documentation that was part of the public process was included in this review. A list of supporting documentation is included at end of the report.

Document review included the following:

- relevant provincial and federal websites (e.g. Department of Natural Resources, Environment Canada);
- listed species and/or species at risk found within the Project area using existing regional information and/or site surveys;
- environmental databases supplied by the government; and
- environmental assessment documentation for similar projects.

Correspondence, Meetings and Interviews

Interviews were conducted with those associated with the project and with interested parties. The goals of the interviews were to (1) explore the effect of the project on the

environment; (2) seek suggestions for mitigation of any environmental impacts, and (3) gather input about the project. Interviews were conducted in an informal setting that allowed persons to raise points and explain issues that they considered important.

The following persons were interviewed as part of the environmental process:

- John Pennie, Grand Valley Wind Farms Inc.
- Municipal, Provincial and Federal government personnel
- Landowners and adjacent neighbours

Compilation of Existing Data

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 the ESR it was determined that existing information about the project area was insufficient for the purposes of the ESR. Thus, background data collection studies were completed to provide a description of:

- Meteorological conditions
- Breeding and migratory birds
- Raptors
- Amphibians
- Terrestrial flora and fauna
- Watercourses, drainage channels and fish habitat
- Geotechnical features
- Socio-economic issues
- Property values
- Water wells
- waste sites
- Historical and archaeological resources.

The field-based information, collected on the basis of best practicable science and industry accepted methodologies, is considered reliable and suitable for use within the ESR. 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.

Field Investigations

On-site field investigations were undertaken in 2005, 2006, and 2007. Further field surveys were conducted in NRSI biologists in 2005, 2006, and 2007. During these field surveys, the following tasks were conducted:

- Vegetation communities on the subject property and immediately adjacent lands were described;
- Aquatic habitat was studied and recorded;
- All species of vascular flora were recorded; and
- Breeding bird species were recorded, using two methods (i) bird species observed throughout the site were recorded along with breeding evidence using the Ontario Breeding Bird Atlas methodology (CWS 2001), (ii) point counts were done at four stations on-site following the standard Forest Bird Monitoring Protocol (CWS 1997). Four 100m radius plots were used which corresponded to four of the five locations being considered for wind turbines.

The timing of the field investigation did not allow for a complete inventory of plant species or wildlife on the subject lands. However, this was not seen as a limitation to the study since general characteristics of the vegetation communities could be observed and many species were present at the peak of their reproductive period.

A Stage I archaeological assessment was conducted within the project area in 2006.

A preliminary geotechnical investigation was conducted within the project area in 2006.

4.0 ENVIRONMENTAL CHARACTERISTICS

A description of the physical, social and economic environment has been undertaken in order to understand the Project's potential impacts and develop mitigation measures. Refer to NRSI's Environmental Report and Aquatic Habitat Characterization Report (February 2007) for a detailed description of the existing environmental features in the project area.

4.1 Geophysical Environment

4.1.1 Physiography and Topography

The twelve wind turbines are to be constructed on three parcels of land that make up the project area as follows:

- Two wind turbines will be located on farm land that lies south of Concession Road 6-7, west of Amaranth-East Luther Townline and east of County Road 25.
- Three wind turbines will be located on the Ashton Ridge Golf Course that lies north of Concession Road 6-7, west of Amaranth-East Luther Townline and east of County Road 25.
- Seven wind turbines will be located on farm land west of County Road 25, east of the Grand River, and South of Concession Road 9-9.

The project area that includes the three parcels of land where the wind turbines will be located consists of primarily agricultural fields or golf course lands with a few small wetlands and woodlots. The project area contains agricultural habitats interspersed with wetlands, woodlots and pine plantations.

Adjacent Land Use

Land adjacent to the Project area are zoned rural and are composed primarily of agricultural fields with a few small wetlands and woodlots.

Topography

The project area is characterized as having gently undulating till plains and is predominantly active agricultural fields and cultural meadows interspersed with small

woodlots and pine plantations. The project area contains some natural areas, such as small wetlands that are associated with watercourses and wet meadows.

Drainage of lands via small watercourses that traverse the study site occurs to the south and southwest towards the Grand River.

4.1.2 Soil Quality

The project area is comprised of a variety of loam and silt loam soils. Most of the project area carries a superficial deposit of silt, probably wind-blown. Refer to Table below for the dominant soil types found within the project area, their composition and drainage capabilities (Chapman and Putnam 1984).

Table 4: Dominant Soil Types within the Project Area

Soil Type	Soil Series	Parent Materials	Drainage
Silt Loam	Camilla	Silt loam material over outwash gravel	Imperfect
Silt Loam	Honeywood	Loess or alluvium over loam till	Good
Loam	Huron	Clay loam till	Good
Loam	Listowel	Loam and silt loam till	Imperfect
Loam	Perth	Clay loam till	Imperfect

A preliminary geotechnical investigation was undertaken within the project area to confirm subsurface conditions (see Appendix J). The investigation determined that that layers consisted of topsoil (400 mm), loose sandy silt mixed with topsoil to a depth to 1.1 m, compacted to loose sandy silt to silty fine sand to a depth of 3 m, overlying clayey silt to silt till. The clayey silt till from 3.0 to 6.0 m was very stiff, and the clayey silt to silt till from 6.0 to 9.0 m was in a hard state. Very dense sandy silt till was found below 9.0m, extending to the explored depth of 9.6 m in the borehole. The tills contain frequent cobbles. Boulders will be present in the tills.

4.1.3 Geology

The landscape in this area is smooth and level to smooth and moderately sloping. The minor topographic variation is associated with the Grand River Valley. Stoniness within

the area ranges from stone free to slightly stony (Chapman and Putnam 1984).

4.1.4 Seismicity

The Southern Ontario Seismic Network (SOSN) consists of 11 three component short period seismic stations located mainly in the Toronto-Hamilton-Niagara area of Ontario, Canada. The network is operated by the University of Western Ontario for Ontario Power Generation and has been in operation since 1991. Its purpose is to obtain information on the seismicity and seismic hazards of a region of Southern Ontario in which a number of nuclear power stations are located. Although the region covered by the network is not as active as other areas of Canada such as the St. Lawrence Valley, it has still experienced a number of small earthquakes in the past. Larger earthquakes have occurred in adjacent areas of New York State (Attica, 1929, M=5.7), Northern Ontario (Temiscaming 1935, M=6.2), Eastern Ontario (Cornwall, 1944, M=5.7), Leroy, Ohio (near Cleveland, 1986, M=5.0), Pennsylvania-Ohio border (1998, M=5.4), and Northern Ontario (70 km NE of North Bay, Jan. 1 2000, M=5.2).

Over the past 9 years the network has been in operation, more than 100 local earthquakes have been detected and more than half of these have been located in the western Lake Ontario area. The largest earthquake (M = 3.8) in western Lake Ontario region ocurred on Nov. 26, 1999 in Lake Ontario at a distance of 16 km SE from the town of Pickering.

4.1.5 Groundwater

The main bedrock aquifer in the project area is the fractured limestone of the Guelph-Amabel aquifer. Of the rainwater that infiltrates into the project area annually, it is estimated that 95% of this annual infiltration discharges to streams and rivers. The remaining 5% leaves the area and contributes to the regional groundwater flow. The main area where groundwater leaves the project area is in the Grand River watershed.

During the preliminary geotechnical investigation, the sandy soil above 3.0 m was found wet. The short-term (unstabilized) groundwater level observed in the borehole at the completion of drilling was at a depth of 4.6 m. It was determined that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

There are 47 water wells within the project area. Confirmation of this fact can be found in the Ecolog ERIS report found in Appendix

4.2 Aquatic Environment

4.2.1 Aquatic Habitats

A total of 7 watercourses traverse the study area including agricultural drains with linear and natural channels, and the main stem of the Grand River. The drains predominantly flow in a west-southwest direction toward the Grand River, which traverses the southwestern portion of the study area. The drains have both warm-water and cool/cold-water classifications according to the Class Authorization System for agricultural Drains in the Southern Ontario Region (DFO, 1999). Refer to Figure 1 in the Aquatic Habitat Characterization Report (NRSI 2007). Their names and classifications are as follows:

- James Tyner Award (warm-water)
- Brown Drainage Works (warm-water)
- Number 21 Drainage Works (cold/cool-water)
- Bruce Drainage Works (cold/cool-water)
- Gajtani Drainage Works (cold/cool-water)
- Pearce Drainage Works (cold/cool-water)
- Grand River (warm-water)

In addition, 7 isolated ponds have been identified within the study area. Refer to the Aquatic Habitat Characterization report by Natural Resource Solutions Inc. (2007) for a detailed description of the existing aquatic habitats.

All crossings for any watercourse or municipal drain will require a permit from the Grand River Conservation Authority (GRVA) and the require that the GRVA undertake a fisheries review on behalf of the Department of Fisheries and Oceans through the GRVA process.

4.2.2 Aquatic Fauna

A study was conducted by the GRCA in 1996 to assess the fish communities in the upper Grand River and its tributaries. The Grand River Fisheries Management Plan, published

in 1998 by the GRCA and the MNR, outlines management objectives for the fisheries resources in the upper Grand River and its tributaries. Refer to the Aquatic Habitat Characterization report by Natural Resource Solutions Inc. (2007) for a summary of the information in the above reports, site-specific fish sampling on two of the watercourses in the study area, and a detailed description of the existing aquatic habitats.

All species of fish that inhabit the project area, or have known potential to inhabit the study area, are common in Ontario. There are no rare species within the project area.

4.2.3 Aquatic Vegetation

The Great Lakes Forest Region's Huron-Ontario Section Forest Region (Rowe, 1972) characterizes most of the project area's vegetation, while aquatic flora is consistent with warm, cool, and cold watercourses.

The vegetation includes grasses and watercress, and the substrate in the channel is dominated by fine gravel and cobble. Cattails are abundant in locations in streams with stagnant flow. Refer to the Aquatic Habitat Characterization report by Natural Resource Solutions Inc. (2007) for more information on aquatic vegetation.

4.2.4 Surface Hydrology

To maintain the hydrology of the rivers and streams in the project area, careful consideration is needed maintain wetlands. The protection of wetlands is important to maintaining the hydrology of the stream in the project area, which in turn, helps maintain fish and wildlife habitat.

Refer to the Aquatic Habitat Characterization report by Natural Resource Solutions Inc. (2007) for more information on surface hydrology.

4.2.5 Surface Water Quality

The cold/cool-water habitats in the project area are an infrequent occurrence in the upper Grand River watershed, and so are important direct habitats in the study area. They are also the most sensitive to water quality impacts due to temperature increases and sedimentation. Refer to the Aquatic Habitat Characterization report by Natural Resource

Solutions Inc. (2007) for more information on surface water quality.

4.2.6 Sediment Quality

For the purposes of the screening environmental assessment, it is assumed that the sediment quality within the existing watercourses should not be impacted by project activities.

Information provided by the Grand River Conservation Authority on watercourses within the project area indicates that the watercourses are classified as Type C drains. According to the Class Authorization System for Agricultural Drains in the Southern Ontario Region (DFO, 1999) the James Tynar Award Drain and the Brown Drainage Works are permanent warm water watercourses that contain baitfish species. No specific fish species data was available.

Refer to the Aquatic Habitat Characterization report by Natural Resource Solutions Inc. (2007) for more information on sediment quality.

4.3 Terrestrial Environment

4.3.1 Flora

Vegetation

The project area is primarily composed of agricultural fields, interspersed with some small woodlots and a few small wetland areas. Some early successional habitats such as cultural meadows and cultural thickets also exist. Numerous hedgerows occur between agricultural fields and are generally treed with shrubs. A total of 14 vegetation communities were identified in the project area by NRSI (2007). Refer to the Table below for a list of the vegetation communities that were identified.

Table 5: Vegetation Communities in the Project area

Community Series	ELC Code
Dry-Fresh White Cedar Mixed Forest	FOM4
Deciduous Forest	FOD
Dry -Fresh Maple Deciduous Forest	FOD5

Dry-Fresh Sugar Maple-White Ash Deciduous Forest	FOD5-8
Fresh-Moist Poplar Deciduous Forest	FOD8-1
Coniferous Plantation	CUP3
Cultural Thicket	CUT
Cultural Meadow	CUM
Mineral Cultural Meadow	CUM1
Dry-Moist Old Field Meadow	CUM1-1
Thicket Swamp	SWT
Mineral Deciduous Swamp	SWD4
Blue-joint Mineral Meadow Marsh	MAM2-1
Reed Canary Grass Mineral	MAM2-2
Agricultural Field	Ag

Deciduous forests are dominated by Sugar Maple, with a variety of associates, such as American Beech (*Fagus grandifolia*), White Birch (*Betula papyrifera*), other Maples, and Ashes. Coniferous forests are composed predominantly of White Cedar (*Thuja accidentalis*), but also include Tamarack (*Larix laricina*) White Spruce (*Picca glauca*), Black Spruce (*Picea mariana*), and White Pine (*Pinus strobur*).

According to the Natural Heritage Information Centre (NHIC) website (MNR 2005), there are no rare plant species known within the project area.

4.3.2 Fauna

Breeding Birds

During 2005, both spring and fall surveys were conducted by NRSI during periods of bird migration. Spring migration monitoring began in mid-April and lasted until early-June. A total of 2145 individuals, and 58 species were recorded during the spring 2005 migration monitoring study. A total of 2788 individuals were observed, and 38 species were identified during the fall migration monitoring.

Winter point counts captured typical use of the area by winter residents. A total of 77 species are known from the area based on the historical Christmas Bird Counts for Caledon (National Audubon Society 2006). The study conducted by NRSI for the ESR recorded 15 species from the project area during bird surveys in the winter of 2005/06.

Other Wildlife

Eagles, buteos, osprey, accipiters, and falcons are all "birds of prey", collectively known as raptors. Of the raptor species observed in the vicinity of the project area during site investigations, only the Rough-legged Hawk is provincially rare. Rough-legged Hawks were observed on three separate occasions foraging within the project area (NRSI, 2007).

Owls are nocturnal raptors, and as such are discussed separately. A total of 6 owl species are known from the project area. One Great-horned Owl was observed on a single occasion in the project area during NRSI field investigations (2007).

Throughout the study period, a total of 8 non-bat mammal species were recorded by biologists during investigations. None of the species observed are considered significant species, and all are classified as very common with secure populations in Ontario.

One deer yard is located in the vicinity of the project area. Because this deer yard occurs well outside the proposed development area and is surrounded by Provincially Significant Wetlands, there is little threat to the existing conditions.

During the 2005 monitoring period, a total of 93 passes were documented during the 6 nights of bat monitoring. The total monitoring period consisted of 645 minutes of observation. Bats tend to frequent forested areas and since the proposed site is mainly a wide-open golf course and farmers fields, the frequency of bat flights is lower than average at a measured rate of 8.65 passes per hour (NRSI 2007).

During field studies conducted by NRSI in 2005, all observations of reptiles and amphibians were recorded and compiled into a master list of herpetofauna known to exist within the project area. These surveys occurred in a wide range of habitats found within the Ashton Ridge Wind Farm project area. There are currently no records of any significant reptile or amphibian species reported within the project area. All of the species known to exist within the project area, either through observations or Ontario Herpetofaunal Summary Database, are species considered common to very common.

4.3.3 Endangered Species

Significant bird species are known from the project area in all seasons. No species at risk were encountered by NRSI biologists within the project area during the monitoring

periods. Habitats associated with species at risk were reviewed by NRSI biologists. Based on this review, adverse environmental effects from the proposed project on SAR species and their habitats in not likely (NRSI, 2007)

Eleven species known from the vicinity of the project area are provincially and/or nationally rare. A number of rare reptiles, and one rare amphibian, are known from the vicinity, but were not confirmed during the field surveys.

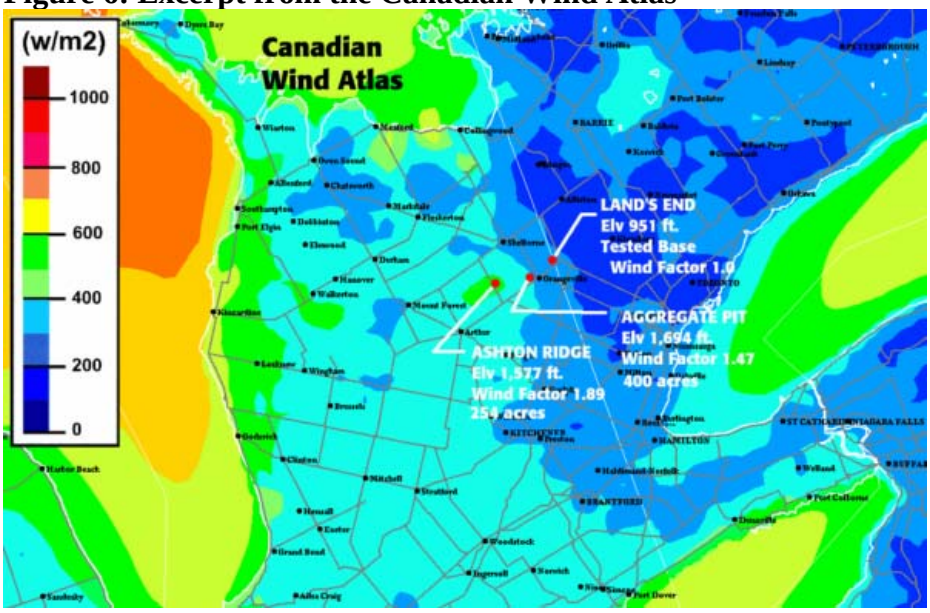
4.4 Atmospheric Environment

4.4.1 Climate

The climate at the site is typical of that in southern Ontario. Data on wind speeds and directions at the proposed site has been collected and is favourable for the placement of wind turbines. According to the Canadian Wind Atlas, published by Environment Canada (2006), the mean wind energy in the approximately 600 W/m^2. The predominant wind direction is from the west, off Lake Huron (see Figure below)

A meteorological tower has been collecting wind data on the site since 2005. Windrush Energy considers the data collected from the meteorological data to be propriety.

Figure 6: Excerpt from the Canadian Wind Atlas



4.4.2 Air Quality

The air quality at the proposed site is typical of that found in southern Ontario. The generation of electricity by the wind turbines will displace the release of carbon dioxide (CO_2), nitrogen oxides (NO_x) and sulphur dioxide (SO_2) into the environment through conventional means of electricity generation (i.e., coal).

4.5 Socio-Economic Conditions

A socio-economic was performed as part of the environmental assessment and can be found in Appendix C.

The area around the project area is a sparsely populated rural setting. The nearest village is 4 km to the south and is comprised of a retail service centre for local farms known as Grand Valley Village.

The area surrounding the project area is sparsely populated with few neighbours or businesses relying on roads and infrastructure.

The Town of Grand Valley is approximately 2-km south of the project area. The nearest major community, Orangeville, is over 15-km east of the project area.

According the MOE waste disposal site inventories, there are no waste disposal sites within 2-km of the project area. Various provincial and federal environmental databases were searched with respect to the project area. The results of the database search can be found in Appendix J (Ecolog Eris Report). According the findings in the database search, no significant environmental activities (i.e., fuel storage tanks, PCB storage, aggregate mining) occur within 2-km of the project area.

The existing noise level is consistent with that found in a rural setting.

The project area does not include any schools run by the Upper Grand District School Board. The roads that will be used to transport the concrete, turbines, and ancillary equipment will be the same roads that the School Board uses to bus students.

Currently, the safety issues related to the project area and surrounding lands can be characterized as that similar to any rural setting.

The visual landscape is that of a rural-agricultural setting.

4.5.1 Archaeological and Cultural Resources

Orangeville is the centre of social, economic and religious activities. There are limited social services in East Luther-Grand Valley Township and most of the services are found in the neighbouring towns of Orangeville and Shelburne. Hunting for food and recreation occurs on the surrounding properties.

A Stage I archaeological assessment of the subject property was performed and can be found in Appendix F. The Stage I archaeological assessment concluded that a Stage 2: Assessment should be conducted on all areas identified as having high archaeological potential. The report also recommended that the Ministry of Culture be notified and site work be suspended if deeply buried archaeological material is found during construction.

4.5.2 Heritage Sites, Archaeological Sites & Cultural Resources

With respect to heritage sites, the Grand River is classified as a Canadian Heritage River. Luther Marsh Conservation Area is over 3-km west and the Niagara Escarpment is further west.

Based on the historic research, environmental factors and known sites in the area, the subject properties, Part of Lots 29 to 32, Concession 7 & 8, East Luther Township has low archaeological potential for Euro-Canadian and variable archaeological potential for Native archaeological artifacts.

Of cultural significance in the area is the annual Grand Valley Fall Fair.

4.5.3 Recreation Areas Used for Traditional Purposes by Aboriginal Persons

The project area and surrounding lands are privately owned and are not considered

recreational areas for aboriginal persons. The project area is within the area known as the "Haldimand Tract" that is claimed by First Nations.

5. FEATURES SCREENING

The effects of constructing, operating, and maintaining a wind farm is well understood and can be typically mitigated through well known and accepted techniques and practices. For example, siting the Project outside of known migratory bird pathways, outside of forested and wetland areas, and away from residential (noise) receptors reduces the potential for adverse environmental effects. Further, the use of the wind as the primary fuel source negates concerns related to air quality effects and contributions of green house gases.

A screening of environmental features was undertaken consistent with Regulation 116/01, in order to focus the ESR on issues and effects relevant to the Project using the MOE Screening Criteria Checklist. The MOE's screening criteria, as presented in the *Guide to EA Requirements for Electricity Projects*, is intended to be applied to Project without considering the remedying effects of protection and mitigation measures.

A "No" listing in the table indicates environmental features that are not affected by construction, operation, and maintenance, while a "Yes" listing acknowledges the potential for negative effects prior to the application of mitigation measures. Environmental features identified with a "No" listing have subsequently been screened out from further analysis and discussion, while those identified with a "Yes" listing are discussed in detail.

The Screening Criteria Checklist can be found below and is also in Appendix I.

Table 6: Ontario MOE EA Screening Criteria, Ashton Ridge Golf Course Wind Farm Project, 2006

Criterion	Yes	No	Additional information
Will the Project …			
1. Surface and Ground Water			
1.1 have negative effects on surface water quality, quantities or flow?		✓	• No construction is proposed within surface water courses • The project does not involve the storage or consumption of surface water

			• The project will not require alteration of surface runoff patterns • Sediment and erosion control measures will be implemented prior to construction and maintained during the construction phase
1.2 have negative effects on ground water quality, quantity or movement?	✓		• It is possible that some dewatering activities may be required when installing the tower foundations • There is potential to effect adjacent natural features (i.e., wetlands and/or watercourses that may be dependent on groundwater) • There is potential to affect on wells in close proximity of the construction site in the event that a shallow water bearing formation is intercepted during construction Mitigation: • If construction of a wind turbine is within 100 m of a private well, the contractor will monitor, at the owners request, the quality and quantity of the water in the wells during the course of construction • If construction of a wind turbine is within 100 m of a wetland or watercourse, the water depth and/or flow will be measured to determine if there is an impact, and if so, the dewatering rate will be reduced to minimize impact.
1.3 cause significant sedimentation, soil erosion or shoreline or riverbank erosion on or off site?		✓	• No shoreline works will be undertaken as part of the Project.
1.4 cause potential negative effects on surface or ground water from accidental spills or releases to the environment?	✓		• Materials such as fuel and lubricating oils associated with turbine construction, maintenance and operation and could be spilled. • These materials are contained within equipment or the turbine itself and will not be stored elsewhere on the sites. • Large quantities of these materials are not contained within the turbine or on-site and do not represent a significant potential negative effect on the surface or groundwater in the event of accidental spills. Mitigation: • Standard containment facilities and emergency response materials will be onsite as required (i.e., during construction). • Landowners and local first responders will receive information on materials that could be accidentally spilled or released.
2. Land			
2.1 have negative effects on residential, commercial or institutional land uses within 500 metres of the site?	✓		• Lands for the access roads, electrical lines, turbines, electrical transformer station, and maintenance/control building will be required for the lease period (i.e., 20 years with renewal options) • During the lease period these lands will be removed from their present land-use • Wind turbines are setback over 400 m from any

			residence Mitigation: • The landowners will be financially compensated and will receive free electrical power. The income received from leasing lands for wind turbines is designed to exceed the income from farming. • Adjacent landowners receive free electricity for the duration for the project.
2.2 be inconsistent with the Provincial Policy Statement, provincial land use or resource management plans?		✓	• No effects on provincial land-use or resource management plans are anticipated
2.3 be inconsistent with municipal land use policies, plans and zoning by-laws?		✓	• The Project will conform with the Township's draft Official Plan for wind power and with the zoning by-law • Development is compatible with the area's surrounding rural and agricultural land uses
2.4 use hazard lands or unstable lands subject to erosion?		✓	• There are no hazard lands within the project sites • Land is generally stable, there is limited topographic relief, and hence limited erosion potential
2.5 have potential negative effects related to the remediation of contaminated land?		✓	• Field work conducted to-date do not indicate environmental concern associated with contaminated lands/sites • The history of the area is rural and agricultural, therefore with very little potential for contaminated sites being present.
3. Air and Noise			
3.1 have negative effects on air quality due to emissions of nitrogen dioxide, sulphur dioxide, suspended particulates, or other pollutants?	✓		• Equipment and vehicles will emit exhaust during the construction period of the project. The effects will be brief and localized and will, in the long-term, be offset by the generation of clean electricity from the wind farm • There are no air emissions generated from the operation of the wind farm Mitigation: • Watering of site to suppress dust if dry conditions exist. • Contractor responsible for ensuring construction equipment meets MOE and MTO emission requirements
3.2 cause negative effects from the emission of greenhouse gases (CO_2, methane)?	✓		• Emissions of carbon dioxide or methane will be generated by construction/maintenance equipment. The effects will be offset by generation of clean electricity from the wind farm
3.3 cause negative effects from the emission of dust or odour?	✓		• Dust will be generated during construction but will occur for only a short in duration and be limited to the lands surrounding the work areas. Mitigation: • Water of gravel/dirt roads will suppress dust
3.4 cause negative effects from the emission of noise?	✓		• Noise will be emitted from the wind turbines and can effect sensitive receptors

			• An acoustic assessment was performed to ensure the wind turbines are set back far enough from residences (over 400 m) to meet MOE compliance requirements.
4. Natural Environment			
4.1 cause negative effects on rare, threatened or endangered species of flora or fauna or their habitat?	✓		• The Ministry of Natural Resources has identified historical sitings of VTE species within the general area of study for the turbine • Area habitats may support such species and disruption/alteration of the habitat could cause negative effects
4.2 cause negative effects on protected natural areas such as ANSIs, ESAs or other significant natural areas?		✓	• There are no ANSIs, ESAs, conservation areas, or parks (i.e., National or Provincial) within the project area for the turbine construction
4.3 cause negative effects on wetlands?		✓	• There are no provincially and non-provincially significant wetlands identified within the study area
4.4 have negative effects on wildlife habitat, populations, corridors or movement?	✓		• The installation of the wind turbines may have potential to affect wildlife habitat. • There will be limited clearing of habitat associated with the Project. Mitigation: • Pre-construction and post-construction (3-year) bird study will be conducted to confirm minimal impact on birds
4.5 have negative effects on fish or their habitat, spawning, movement or environmental conditions (e.g., water temperature, turbidity, etc.)?		✓	• No in-water works are proposed. • No shoreline works are proposed. • Sediment and erosion control program will be put in place prior to construction • If dewatering is need for the construction of the foundations, MOE and GRCA will be consulted and presented with plan
4.6 have negative effects on migratory birds, including effects on their habitat or staging areas?	✓		• There is potential to affect migratory birds due to collision with the turbine tower and/or blades • Each turbine will have a 20-m diameter footprint Mitigation: • Studies have been conducted to ensure that the wind turbines are not located in an area where there are rare and endangered species of birds. • Pre-construction bird counts and area searches in the Spring of 2007 followed by 3-years of post-construction bird and bat mortality monitoring
4.7 have negative effects on locally important or valued ecosystems or vegetation?		✓	• Each turbine will be located on lands already cleared for rural and agricultural land-uses which means that there should be no negative effect on valued ecosystems or vegetation
5. Resources			
5.1 result in inefficient (below 40%) use of a non-renewable resource (efficiency is defined as the ratio of output energy to input energy, where output		✓	• The electricity created by the Project is generated from wind – a renewable resource

energy includes electricity produced plus useful heat captured)?			
5.2 have negative effects on the use of Canada Land Inventory Class 1-3, specialty crop or locally significant agricultural lands?	✓		• Some of the wind turbines will occupy areas of agricultural land (20-m diameter footprint for each) • The operation of the wind turbines will not negatively affect the use of adjoining prime agricultural lands, field crop production, or livestock pasturing, all of which can occur in close proximity to the wind turbines • The wind turbines and roads will only take up 5% of the project area
5.3 have negative effects on existing agricultural production?	✓		• Agricultural production on the lands occupied by the wind turbines will be discontinued over the Project life. • To mitigate the loss of income from farming the lands, landowners will be financially compensated for the allowing the turbines on their property Mitigation: • The footprint of each wind turbine is 20-m in diameter
5.4 have negative effects on the availability of mineral, aggregate or petroleum resources?		✓	• There are no known petroleum resources within the study area • There are no designated mineral or aggregate resources within the lands proposed for the Project
5.5 have negative effects on the availability of forest resources?		✓	• Construction of the wind turbines will not affect any merchantable forest resources
5.6 have negative effects on game and fishery resources, including negative effects caused by creating access to previously inaccessible areas?		✓	• The area is largely cleared for agriculture and there are no areas that could be deemed inaccessible • The will be no construction within 200 metres of the Grand River • Sediment and erosion control measures will be in place during construction and maintenance activities (if necessary)
6. Socio-economic			
6.1 have negative effects on neighbourhood or community character?		✓	The present rural / agricultural character of the community will remain.
6.2 have negative effects on local businesses, institutions or public facilities?		✓	• Area businesses will benefit financially from construction activities and fulfilling operational supplies • Temporary construction jobs and full-time maintenance jobs will be created. • There is no retail or commercial businesses within the study area other than the golf course.
6.3 have negative effects on recreation, cottaging or tourism?		✓	• The Project is sited on rural / agricultural land • There are no known cottage areas within the study area • It is not anticipated that golf course attendance will drop as a result of the presence of wind turbines,

6.4 have negative effects related to increases in the demands on community services and infrastructure?		✓	• One or two personnel will be required to maintain the wind farm, therefore there will be only a nominal demand on/for public services (e.g., housing, hospitals, and schools) • The Project will not be physically connected to community services or infrastructure and hence no increases for these services is required (e.g., no new demand for potable water or wastewater connections)
6.5 have negative effects on the economic base of a municipality or community?		✓	• Each land owner will be financially compensated for the wind turbines located on their property. • Additional resources will be added to the economic base (e.g., through annual taxation) without creating the demand for additional municipal services • Efforts will be made to utilize local goods and services will be procured during construction, operation and maintenance, and decommissioning of the Project – creating a positive economic effect
6.6 have negative effects on local employment and labour supply?		✓	• To the extent possible, local persons will be employed during the construction phase and to provide operational supplies – creating a positive effect for local labour and employment
6.7 have negative effects related to traffic?	✓		• The transport of equipment and supplies during the construction phase will result in additional (temporary) road use and traffic to the Project sites carrying excess loads and large tower components • Numerous trucks trips will be required for equipment transportation during Project construction • During operation supplies will be intermittently delivered to the Project as required Mitigation: • Local residents will be made aware of the possible traffic disruptions during construction through the use of road signage • Local school board will be notified of road closures if construction occurs during school year
6.8 cause public concerns related to public health and safety?	✓		• Potential exists for accidents and malfunctions and thus there may be general public safety concerns with the new infrastructure. Mitigation: • Discussions on health and safety issues are part of the public consultation process during the EA. • There is a minimum separation distance more than 400 m between wind turbines and any residence.
7. Heritage and Culture			
7.1 have negative effects on heritage buildings, structures or sites, archaeological resources, or cultural heritage landscapes?		✓	• Lands affected by the Project have been identified as having a low potential for archaeological resources • No known heritage buildings, structures, or sites, nor any cultural heritage landscapes have been identified within the Project sites

			Mitigation: • Stage II archaeological assessment is planned and First Nations will attend
7.2 have negative effects on scenic or aesthetically pleasing landscapes or views?	✓		• With a hub height of 80 metres, the wind turbines could be seen from some distance and thus alter landscapes and views • There is nothing that can be done to alter the appearance of the wind turbines. Mitigation: • Leaseholders financially compensated to partially to account for perceived deterioration in view • Adjacent landowners to receive free electrical power to partially account in perceived deterioration in view • Twelve turbines spread over three separate parcels to break-up view and prevent "industrial wind farm" perception
8. Aboriginal			
8.1 cause negative effects on First Nations or other Aboriginal communities?		✓	• There are no known First Nations or Aboriginal communities within the study area • The nearest First Nation settlement is over 10-km away • Project area falls within the "Haldimand Tract" land claim of First Nations. Mitigation: • Consultations held with First Nations to receive their concerns with the project • First Nations to attend the Stage II archaeological assessment • First Nations contractors will be involved in construction activities
9. Other			
9.1 result in the creation of waste materials requiring disposal?	✓		• Construction wastes, such as excavated soils, equipment packaging and wrappings, and scraps, will be produced • The Project will generate waste associated with turbine construction, maintenance and operation Mitigation: • Waste material will either be recycled or disposed at local landfills
9.2 cause any other negative environmental effects not covered by the criteria outlined above?	✓		• Potential accidents and malfunctions including seismicity, third party damage and aeronautical obstruction could occur. Mitigation: • Regular maintenance of wind turbines will occur in accordance with the manufacturer's requirements. • The Grand Valley Public School will be offered educational materials on the advantages,

			disadvantages and dangers of wind turbines. • The wind turbines will be lit at night in accordance with federal aviation regulations.

Based upon the screening and input from public discussions, the following issues have been identified that require further analysis and discussion:

- residential, commercial, institutional, and farm land-use
- surface water and groundwater
- air and noise
- wildlife and VTE species
- migratory birds
- magnetism
- Infrasound
- neighbourhood and community characteristics
- public health and safety
- traffic
- historical and archaeological resources
- aesthetics/viewscape

6. ASSESSMENT OF ENVIRONMENTAL IMPACTS, MITIGATION REQUIREMENTS AND RESIDUAL EFFECTS

For each project-specific issue identified through the environmental features screening checklist, the following analysis was completed:

1. *Existing Environment* – describes the potentially affected environmental feature;
2. *Potential Effects* – identifies potential effects, both positive and negative, to environmental features that may occur as a result of the Project;
3. *Mitigative Measures* – recommends specific protective and/or mitigative measures that will be implemented to minimize any potential negative effects of the Project upon environmental features;
4. *Residual Effects* – describes the effects remaining after mitigation measures have been applied; and
5. *Significance of Residual Effects* – determines the significance of residual effects. The criteria for assessing the level of significance of residual effects after mitigation measures have been applied are shown in Table 7. This table has been replicated from the federal WPPI Guide, although it generally encompasses the provincial MOE's criteria for determining significance as well. These criteria include: value of the resource affected; magnitude of the effect; geographic extent of the effect; duration and frequency of the effect; irreversibility of the effect; and ecological/social context.

Table 7: Level of Significance after Mitigation Measures

Level	Potential
High	Potential effect could threaten sustainability of the resource and should be considered a management concern. Research, monitoring, and/or recovery initiatives should be considered.
Medium	Potential effect could result in a decline in resource to lower-than-baseline, but stable levels in the project area after project closure and into the foreseeable future. Regional management actions such as research, monitoring, and/or recovery initiatives may be required.
Low	Potential effect may result in a slight decline in resource in project area

	during the life of the project. Research, monitoring, and/or recovery initiatives may be required.
Minimal	Potential effect may result in a slight decline in resource in project area during construction phase, but the resource should return to baseline levels.

The expected residual effects and their significance to environmental features are based upon the assumption that all mitigative activities are fully implemented during relevant stages of project construction, operation, and maintenance. Issues raised by stakeholders during the consultation program have also been included below when they differ from those issues identified in the environmental features screening process.

Section 4 identified the existing environmental features surrounding the project while the following describes the potential effect and mitigation measures. Any effect which cannot be mitigated will result in residual effects, which are also discussed below. Appropriate monitoring programs are recommended.

With respect to the potential impact of the wind farm on migrating birds, this section describes specifically in the context of the following:

1) Disruption of bird nests are governed by the *Migratory Birds Convention Act*. This *Act* prohibits the disruption of birds and their nests
2) The potential for collisions of birds with turbines and transmission lines

6.1. Project Construction Activities – Environmental Effects

The following sections describe the environmental impacts of the proposed construction, of up to twelve wind turbines at the site. Table 10 in section 6.7 summarizes the potential environmental impacts, mitigation measures and residual environmental effects of the project.

With respect to aquatic habitat, the Aquatic Habitat Characterization report by Natural Resource Solutions Inc. (2007) (see Appendix B) specifies buffers of 15m for the warm-water habitats (James Tyner Award, and Brown Drainage Works), and 30m buffers for

the cold-water habitats (Number 21 Drainage Works, Bruce Drainage Works, Gajtani Drainage Works, and Pearce Drainage Works). These buffers apply to each side of the watercourses, measured from the tops of the banks. The 15m buffer also applies to the isolated ponds in the study area. The NRSI aquatic report also indicates that construction activities within 100m of the main stem of the Grand River will trigger additional study.

The vegetation communities found within the study area are summarized in Section 5.3 of the Terrestrial and Wildlife Environmental Report (NRSI 2007). Vegetation communities were mapped and described during the 2005 and 2007 field surveys with the aid of air photographs from the Ministry of Natural Resources (NRSI 2007). The biological area of study is primarily agricultural lands interspersed with cultural meadows, coniferous and deciduous forests and swamp/marsh ecosites. Vegetation communities are shown in Figure 5 of this report and in Figure 2 of the Terrestrial and Wildlife Environmental Report (NRSI 2007).

6.1.1. Surveying and Siting Operations

Site preparation consists of a number of surveys, such as geotechnical assessment. During the geotechnical investigation, a drill rig would be brought to selected sites to confirm the geophysical characteristics of the soils and depth to bedrock. The drill rig will make use of existing roads whenever possible.

The following potential effects on wildlife and habitats are anticipated during this activity:

- Potential noise impacts from equipment

6.1.2. Land Clearing

There are minor environmental impacts expected from the land clearing at the subject property. The amount of clearing is minimal and will not significantly affect habitat. Existing vegetation will be removed from a small area at the construction site, and at the access points to the site. Such removal as may be necessary is not considered to be significant since the species involved are common plants, and disturbance is temporary. The disturbed sites can be re-vegetated quickly.

There will minimal impact on wildlife from land clearing. Very few, if any, animals will

be incapable of moving away from the site in order to avoid construction activities. Construction is limited in extent and time, and is expected to have very little direct effect on any species at the time.

The closest distance between the centre of a turbine location and a cold-water aquatic habitat is approximately 300m. No land clearing for the turbine sites will occur within the 30m buffers. Therefore, standard erosion and sediment control measures will mitigate potential impacts to cold-water aquatic habitats.

Turbine 11 is approximately 40m from the centre of the James Tyner Award drain, East Branch, major tributary system (as described in the Aquatic Habitat Characterization report by NRSI). At this point in the drainage system, there is an area of ponded water that extends approximately 20m from the centreline of the watercourse toward the proposed turbine site. As a result, construction activities will encroach to the intermittently wetted edge of this watercourse. Although the in situ fish habitat is of limited value, this section of the James Tyner Award drain is considered direct fish habitat due to its role of connecting 2 permanent ponds located further upstream to the larger system downstream of the turbine site. For this site, it is most important to maintain flow conveyance and fish passage. Site-specific erosion and sediment control measures will be required to ensure that channel form is maintained and water quality is protected. Should there be impact to flow conveyance, fish passage, or in situ habitat, approval will be required under the federal Fisheries Act. This legislation is administered by the Grand River Conservation Authority (GRCA) for the Grand River Watershed.

The next-closest turbine site to a warm-water watercourse is Turbine 10, which is approximately 240m from the James Tyner Award Drain, East Branch, major tributary system. Therefore, standard erosion and sediment control measures will mitigate potential impacts to warm-water watercourses from the remaining turbine sites.

The turbine closest to an isolated pond is Turbine 11. It is approximately 60m from the centre of the turbine site to Pond A. Standard erosion and sediment control measures will mitigate potential impacts.

Turbine 4 is the closest turbine to the main stem of the upper Grand River and will be approximately 300m away from the river. Construction activities will not occur within 100m of the river. Therefore, standard erosion and sediment control measures will

mitigate potential impacts to the main stem of the Grand River.

In all activities where vegetation clearing will occur, the disruption of bird nests is a consideration. The disruption of bird nests is only an issue for a relatively short period of time; within the nesting period of the birds in the area and the potential time overlap with the various construction activities. Even though much of the study area is dominated with agricultural fields, the nesting period of birds should be considered.

The following potential effects on vegetation are anticipated during this activity:

- Clearing of agricultural crop land and some hedgerows to allow for access of the vehicles required to conduct the work.

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 weekly and immediately following rainfall events 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.

6.1.3. Road Construction/Modifications

Minor environmental impacts expected from the road construction and modifications at the subject property. There are currently temporary roads at the site, but they will need to be re-enforced with gravel. The environmental impact of road construction will be minimal and restricted to the project area.

The amount of clearing is minimal and will not significantly affect habitat. Existing vegetation will be removed from a small area at the construction site, and at the access to the site. Such removal as may be necessary is not considered to be significant since the species involved are common plants, and disturbance is temporary. The disturbed sites can be re-vegetated quickly.

The noise impacts associated with road construction will be limited and temporary. It can be expected that the most intense noise will occur during site preparation, assembly of the turbine towers, and the mounting of the turbine nacelle. During this period a variety of light and heavy-duty construction vehicles would be operated within and through the project area.

The following is a list of construction vehicles/machines/activities that will be used in construction:

- bulldozer
- backhoe
- large crane
- small crane
- dump truck
- ready-mix concrete truck
- flat-bed truck

Noise impacts to local residents will be equivalent to noise levels associated with common road construction. Construction activities related to the project should be no greater than several months.

The effects on residents, wildlife and habitat, associated with the construction of the roads will include:

- Potential noise and dust impacts from equipment, traffic etc
- The vehicles used for this work have the potential to result in spills of fuel, oil, hydraulic fluids or other deleterious substances.

To control dust, roads will be watered down. To minimize the impact of noise during construction, reasonable construction hours (i.e., 8 am until 6 pm) will be employed. Vehicle speeds on gravel/dirt roads will be limited to 30 km/hour or less.

No access roads will be constructed over a cold-water aquatic habitat, or within their 30m buffers.

One access road to be constructed will cross the James Tyner Award drain, East Branch, major tributary system (as described in the Aquatic Habitat Characterization report by

NRSI). This road will provide access to Turbine 11. Although the in situ fish habitat is of limited value, this section of the James Tyner Award drain is considered direct fish habitat due to its role in connecting 2 permanent ponds, located further upstream, to the larger system downstream of the turbine site. For the design of this crossing structure, it is most important to maintain flow conveyance and fish passage. In addition, site-specific erosion and sediment control measures will be required to ensure that channel form is maintained and water quality is protected. This crossing structure has potential to affect flow conveyance, fish passage, and in situ habitat. Therefore, approval will be required under the federal Fisheries Act administered by the GRCA for the Grand River Watershed.

No other warm-water watercourses will be subject to construction of access roads or modifications to access roads

The access road to be constructed for access to Turbines 10 and 11 will encroach within 15m of Ponds A, D, and E as described in the Aquatic Habitat Characterization report by NRSI. These ponds have potential to function as direct fish habitat. Therefore, the 15m buffer recommended in the NRSI report should be respected and site-specific erosion and sediment control measures should be employed. Encroachment within the 15m buffer may require permitting under the federal Fisheries Act administered by the GRCA. Access roads will not encroach upon any of the other ponds.

No access roads or modifications to access roads will be constructed over the main stem of the Grand River, or within 100 metres of the river.

The disruption of bird nests is only an issue for a relatively short period of time; within the nesting period of the birds in the area and the potential time overlap with the various construction activities. Even though much of the study area is dominated with agricultural fields, the nesting period of birds should be considered.

6.1.4. Delivery of Equipment

This activity includes all transportation related to the project, such as turbine components, heavy machinery and concrete.

The turbine components will be shipped from the manufacturing companies to the study

area via ground transportation using public highways and internal roads. Convoys transporting machinery and the turbine components will arrive to the study area via County Road 25.

The roads to be used for the transport of the turbines will also be used for the transport of concrete and cranes. The roads will be constructed to withstand all equipment to be used for construction and subsequent maintenance. Limited effects on wildlife are expected due to the transportation of the turbines including:

- Potential noise impacts from vehicles.
- Fugitive dust emissions from traffic on gravel roads.
- Potential disruption to wildlife populations and movements due to traffic.
- Clearing of cropland or hedgerows from the right-of-way for the length of the primary road.

The project area does not include any schools run by the Upper Grand District School Board. As such, our typical concerns regarding noise mitigation, setbacks and visual interference are not applicable. However, there is potential disturbance due to road closings necessary to construct turbines and connecting power lines. If road closures are necessary to transport oversized loads; they could interfere with the busing of students. Every effort will be made to for the construction to take place during the summer months of July and August when there is no school. If in the event construction occurs during the school season, the school board will be notified in advance of road closures and they will be timed when the school buses are not running.

Local residents will also be notified by phone, personal communication, or advanced road signage prior to delivery of equipment so alternative transportation routes can be taken.

Limited effects on vegetation are expected due to the transportation of the turbines including dust generated from construction activity and associated traffic. Dust generation can be controlled by wetting gravel roads.

6.1.5. Temporary Storage Facilities

If the project demands temporary storage facilities, the size of the facilities, as well as their placement, will be such that there would be minimal environmental impact.

Emergency spill kits will be maintained in the project area, in the event that any spills of hazardous material occur. In the event of an accidental spill of fuel, hydraulic fluid or other deleterious substance, a thorough clean-up of the effected area will occur. If Potential spills will be minimized by ensuring that proper industry regulations are followed. Re-fuelling of construction equipment will only take place at crane pads or designated areas.

6.1.6. Foundation Construction

The construction of the foundation will have minimal environmental impact. Existing vegetation will be removed from a small area at the construction site (15-m diameter area), and at the access to the site. Such removal as may be necessary is not considered to be significant since the species involved are common plants, and disturbance is temporary. The disturbed sites can be re-vegetated quickly.

Effects on wildlife and habitat, associated with the preparation of the turbine foundations include would involve the temporary disturbance of habitat and the noise associated with heavy equipment. The effects are considered to be temporary.

The excavation for the wind turbine foundations may require dewatering. A preliminary geotechnical investigation (see Appendix J) revealed that the water table in the project area can vary depending on the season. A water table elevation of 4.6 m below grade was encountered during the preliminary geotechnical investigation. The excavation for the foundations of the wind turbines is typically 2 – 3 meters.

There are 47 water wells with the project area and any dewatering at the wind turbine locations has the potential to affect their water level. A geotechnical investigation will be conducted at each wind turbine location to determine, amongst other things, the elevation of the water table. If the water table is at an elevation that will require dewatering during the excavation of a foundation, a plan will be implement that includes the control, treatment (if necessary), and disposal of water produced during dewatering operations.

There are natural features (wetlands and watercourses) adjacent some of the proposed wind turbine locations. Turbine site 11 is very near the Rigney-Brown Drainage Works and the Pearce Drainage Works. If dewatering is required for foundation construction at turbine site 11, the water quality, depth and flow in the two adjacent drainage works will

be monitored by an aquatic biologist. The dewatering rate will be adjusted to mitigate the temporary impact caused.

The use of ready-mix concrete trucks will result in noise impacts slightly exceeding typical noise pressures. Construction of each foundation, however, will take only one week.

The Aquatic Habitat Characterization report by Natural Resource Solutions Inc. (2007) specifies buffers of 15m for the warm-water habitats (James Tyner Award, and Brown Drainage Works), and 30m buffers for the cold-water habitats (Number 21 Drainage Works, Bruce Drainage Works, Gajtani Drainage Works, and Pearce Drainage Works). These buffers apply to each side of the watercourses, measured from the tops of the banks. The 15m buffer also applies to the isolated ponds in the study area. The proposed locations of the turbines provide the buffer distance recommended by NRSI.

The NRSI aquatic report also indicates that construction activities within 100m of the main stem of the Grand River will trigger additional study. The nearest proposed wind turbine location to the Grand River (Location #4) is over 250 metres away.

6.1.7. Tower and Turbine Assembly and Installation

The tower and turbine assembly and installation will have minimal environmental impact. Existing vegetation will be trampled in a small area around each wind turbine location. The trampled vegetation is not considered significant since the species involved are common plants, and the disturbance is temporary.

Vegetation associated with the small wetland pockets near Turbines 10 and 11 has the potential to be impacted during the duration of the project but these areas are anticipated to be avoided.

Upon completion of construction and installation for each turbine, each site as well as the rotor assembly area and the edges along the access road will be restored. These areas will be backfilled with salvaged subsoil and covered with topsoil and salvaged organic material. To avoid erosion, any areas cleared during the construction phase will be remedied with appropriate vegetation.

As the lands at the base of the turbines and along the transmission lines will be maintained as agricultural fields or roadways, it is not anticipated that foraging bird species (e.g. raptors) will be further attracted to these areas.

The effects on aquatic habitat associated with site reclamation include:

- Potential disruption to aquatic populations and aquatic habitat due to erosion and sedimentation.
- Positive effect due to the rehabilitation of the site towards a more pre-development condition.

6.1.8. Interconnection from Turbines to Transmission Lines

Each wind turbine will have its own step-up transformer at its base. Their will be no substation. A trench will be constructed from each wind turbine to the existing electrical lines along Concession Road 8-9, County Road 25, Concession Road 6-7, and Amaranth-East Luther Town Line. As the electrical network is anticipated to follow the access road, additional vegetation clearing is not expected on the right-of-way. Any existing vegetation that is removed is not considered to be significant since the species involved are common plants, and disturbance is temporary. The disturbed sites can be re-vegetated quickly.

The effects on the wildlife and habitat, associated with the preparation of the electrical network include potential noise impacts from equipment and disruption of wildlife populations and movements due to traffic. The disturbances are considered minimal.

Interconnection transmission lines will be constructed at least 300m from any cold-water habitats in the study area.

One interconnection transmission line will cross the James Tyner Award drain, East Branch, major tributary system (as described in the Aquatic Habitat Characterization report by NRSI). The crossing will occur in conjunction with the access road crossing. Impacts are not expected provided the transmission line is constructed using overhead wires and the mitigation measures for the access road and turbine site incorporate installation of the poles. Alternatively, the transmission line can be placed within the road bed. Underground installation involving instream works will require permitting

under the federal Fisheries Act administered by the GRCA.

Interconnection transmission lines are not expected to impact any isolated ponds provided tower construction and trenching activities are kept outside the 15m buffers, and standard erosion and sediment control measures are employed.

No interconnection transmission lines are proposed to cross the main stem of the Grand River. One transmission line will be constructed along County Road 25, approximately 100m from the main stem of the Grand River. Because it will be constructed within an existing roadway, disturbance to the landscape will be minimal and no impact is expected.

6.1.9. Substation Construction

No substation is planned for the project area. Each wind turbine will have a step-up transformer to 30 kV and the lines will be contacted to the roads that cross and border the project area.

6.1.10. Transmission Line to Power Line

The existing transmission lines will be utilized that exist along Concession Road 8-9, County Road 25, Concession Road 6-7, or Amaranth/East Luther Townline. Wildlife and vegetative disturbances will be minor and temporary.

The transmission line leaving the site will cross the Pearce Drainage Works, which is a cold-water aquatic habitat. No impact is expected provided the transmission line is constructed using overhead wires, and installation of poles occurs outside the 30m buffer. Installation of poles within the 30m buffer will require review by the GRCA for compliance with the federal Fisheries Act. Underground installation involving instream works will require permitting under the federal Fisheries Act through the GRCA.

6.1.11. Fencing/Gates

If fencing and gates are to be constructed, they will have minimal impact on the environment. Disturbance will also occur during temporary placement of fencing, and where construction equipment is used near the site. Such removal as may be necessary is

not considered to be significant since the species involved are common plants, and disturbance is temporary. The disturbed sites can be re-vegetated quickly.

6.1.12. Parking Lots

There will be no parking lots constructed and hence there will be no impact on the environment from this non-activity. The construction workers will park in the existing parking lot at the Ashton Ridge Golf Course.

6.2. Operational Activities – Environmental Effects

6.2.1. Wind Turbine Operation

6.2.1.1. Land Use and Property Values

There will be minimal environmental impacts on land use as a result of the wind turbines. Lands previously used for farming will continue to be available for farming practices following the construction of the wind turbines. The land occupied by the wind turbines and roads will be less than 5 percent of the project area.

One concern expressed by opponents of wind farms is that the real estate values in the vicinity will plummet. A property value study was commissioned to determine the relationship between wind farm development and market prices. The study, performed by the real estate appraisal firm of Blake, Matlock and Marshal Ltd., was specifically focused on the Townships of Melancthon, East Luther Grand Valley and the County of Dufferin, covering the period from January 2002 to September 2006, both before and after the construction of the Melancthon wind farm in the summer of 2005. The study can be found in Appendix F.

The intention of the property value study was to determine if the development of the recent wind farm in the Melancthon area has had any impact on the growth of property values when compared to East Luther Grand Valley where wind farm development has not been implemented. The study also documented the average prices found in Dufferin County which includes the said townships within its boundary.

The study performed by of Blake, Matlock and Marshal Ltd. found that the Township of

Melancthon has demonstrated consistent patterns of growth on most accounts despite being the topic of wind farm development and similar growth to Dufferin County as a whole which included communities absent of any wind farm. The study also found that the Township of Melancthon has demonstrated superior growth (38% during the study period) to the Township of East Luther Grand Valley (29% during the same period) which is devoid of wind farm development and produced inferior growth to Dufferin County statistics. The study concluded that the economics and environmental circumstances surrounding the large scale wind farm did not diminish the property value but rather nourished property values by its presence.

A major study conducted for the U.S. government in ten states determined that in 9 out of 10 states when comparing the view shed of wind farms over 10 MW and a control community in the same state, real estate values rose faster in the areas surrounding the wind farms. In the 10th instance, there was no appreciable difference between the control community and the wind farm community. The report, the Renewable Energy Policy Project (REPP), was issued in May 2003.

6.2.1.2. Visual Impacts

There will be visual impacts from the wind turbines. The turbines are set back from major roads and in be a rural setting will be visible to local residents and motorists.

From ground to highest blade peak, the wind turbines at the site will be 138 metres tall. In accordance with Canadian aviation regulations, objects taller than 91 metres require some form of lighting under Transport Canada's Canadian Aviation Regulations. In accordance with the Regulation, each wind turbine will have a flashing red beacon mounted on the tower.

Visual issues and concerns are subjective, and very largely a matter of individual taste. Clearly, some people dislike the visual appearance of wind turbines. Equally, some people like the visual appearance of wind turbines, citing the modern sculptural lines of a pro-environmental mechanism in a pastoral rural setting, and siting the educational value of the presence of a clearly identifiable energy alternative structure adjacent to areas such as farm land.

The pro-environment view is that small-scale windmill projects such as this one are

essential to satisfy the call for alternative energy sources by the public and balance environmental impacts. Under this view, locating windmills in rural areas that a close to urban centres, at gateways to urban parks and especially at gateways to natural heritage areas is a major benefit and goal.

Several studies have been carried out to evaluate the experiences of people who live near wind turbines. Generally, residents have responded quite favourably to local wind turbines, especially if they provided their homes with some electricity. One study surveys the attitudes of people living near the 24 wind turbine Cemmaes Wind farm in Wales both immediately after construction (Phase 1) and one year later (Phase 2). When asked the question "broadly speaking, are you for or against the Cammaes Wind farm?", the majority of respondents (86%) were in favour in both Phase 1 and Phase 2 of the survey; 12% Phase 1 and 11% Phase 2 were "neither for nor against"; 1% in both Phase 1 and Phase 2 "didn't know"; and 1% in Phase 1 and 2% in Phase 2 were "against" the wind farm. Hence, both immediately after construction and one year later, very few local people surveyed (1%, 2%) felt negative about the wind farm.

With respect to the visual impact of the Cemmaes Wind farm, visual appearance was the potential effect most commented on before the wind farm had been constructed. Most comments were either neutral or positive. A few people (4%) had more serious reservations as to the potential negative visual impact but said they were "pleasantly surprised" by what they saw after they were built (Phase 1). Of the respondents who could see the wind turbines from their house, 75% made favourable statements about the wind farm.

The study summary states, "Being able to see wind turbines did not bother the majority of people and led in some cases to respondents expressing increased interest and even pride in the machines". The most common word (62%) chosen by study respondents to describe the look of the turbines was "interesting".

A Taff Ely residents' survey, based on 336 face-to-face interviews carried out in homes near the Taff Ely wind farm, indicates that only 4% of the respondents opposed the development once it was in operation and 71% of residents couldn't identify any drawbacks to the wind farm. When asked if they thought the wind farm fit into the scenery, many residents thought it made the scenery more interesting.

Hence, once the wind farm had been constructed and was in operation, the majority of local residents were either neutral or supportive of it. This is despite the "extreme opposition to the wind farm" expressed when it was first proposed. The local Mayor, Kate Rees and local Councilor, Mr. Scovie, recall there was a lot of controversy about the wind farm. Councilor Scovie stated he could not remember anybody who was for the wind farm when it was first proposed.

In response to a question regarding what Cemmaes windfarm respondents had heard about other local residents' experiences of wind farms, noise problems were most frequently recounted. Hence, respondents surveyed at the Cemmaes windfarm tended to believe that other people's experiences of wind farms were that they are noisy. When asked if the Cemmaes wind farm is noisy, 1% strongly agreed and 1% agreed at Phase 1 of the study and 2% strongly agreed and 14% agreed at Phase 2. Of the 14% who agreed that the wind farm is noisy, the majority did not live within earshot of the windfarm. Hence, 98% of the respondents at Phase 1 and 84% at Phase 2 felt that either the wind farm was not noisy or that they did not know, despite noise being originally identified as a common concern to communities living near wind farms.

A before and after study of opinion in Cornwall and Devon of the Delabole wind farm states that attitudes of residents living in the area of the wind farm changed significantly in the period between the two surveys, becoming more favourable towards the use of wind energy (e.g. 90% of those who changed their minds did so in favour of wind energy). The response to the question, "In general do you approve or disapprove of wind power?" was 84% approve (40.1% approve strongly, 44.5% approve) 11.4% were not sure and 4% disapprove (3.3% disapprove, 0.7% disapprove strongly).

Research regarding public attitudes towards the three wind farms in Wales based on a sample of 208 local residents indicates an overwhelming support for wind power in Wales and the three local wind farms upon which the research was centered. Respondents had become more positive towards wind power following construction of their local wind farm and, even where the turbines could be heard inside or outside of respondents' homes, this did not necessarily turn them against the wind farm. Indeed, 70% were in favour of expansion (some subject to conditions), 22% against, 8% no opinion.

It is well recognized in the literature pertaining to the sociological impacts of wind farms

that these concerns, while apparent in advance of the actual installation of the turbines, are significantly reduced once the turbines are installed and in operation.

The above data suggests that while there may be concerns about the potential for the wind turbines to be intrusive, this is not going to a significant environmental effect around any of the proposed sites.

In the case of the Project, leases agreements and free electrical power to lease holders and neighbours will provide financial compensation for perceived negative visual impacts.

6.2.1.3. Noise Impacts

An environmental acoustic assessment was performed on the project area to assess the acoustic impact of the proposed wind farm against the acoustic criteria of the Ontario Ministry of the Environment. The Acoustic Assessment report can be found in the Appendix D.

The sound power data for the wind turbine generators was obtained from the supplier of the wind turbines. The data was used in a computer model to predict the sound level impact at the closest residential receptors, as a function of wind speed. The results of the modelling demonstrate compliance with the MOE guidelines when all twelve wind turbines are operating over their entire speed range.

A noise study and data obtained from the manufacture indicates that the wind turbines will have minimal noise impact. An analysis was performed by HGC engineering. The turbines are situated such the sound level at residences in the area is below the level regulated by the Province.

6.2.1.4. Wildlife Disturbance

The operation of the wind turbines will have minimal disturbance on wildlife. There will be minimal environmental effects expected on the aquatic environment since there will be minimal potential for negative interactions between wind turbine components and the aquatic environment.

A primary concern with the operation of wind turbines is the potential for adverse effects

on wildlife. This is particularly true in connection with avian mortality. However, studies of wind turbines at many sites from across North America and Europe have indicated that avian mortality is not significant to bird populations. On sites with a small number of turbines, there is often no recorded mortality. Even at larger sites the mortality is usually less than one bird killed per turbine per year. The maximum rate at any wind farm site in North America was 1.9 birds per year per turbine. In Europe, most mortality rates were also below the maximum recorded in North America.

The usual low rate of mortality is particularly relevant in light of the fact that studies to date have almost entirely dealt with variable speed turbines. The variable speed turbine is a more serious threat as there is a correlation between the speed of rotation and the number of birds killed (Orloff and Flannery 1995). A fixed speed rotation of only 28-RPM, such as the turbines being proposed, should have an even lower mortality. Up to 80% of birds can fly through the rapidly rotating blades of variable speed turbines and remain unharmed (Winkelman 1992b). Birds have much more time to evade the blades of a fixed speed turbine.

Most birds flying during daylight have excellent vision, and can easily see and avoid obstacles, even slowly moving ones. In good weather, even in coastal areas, the chance of a strike in daylight is virtually zero (Crockford 1992, Winkelman 1985). The birds most likely to suffer mortality are small nocturnal migrants, flying in poorer light and in large numbers. However, even these birds are largely flying too high (Able 1999), but when low can usually still see and avoid structures in good weather conditions. Only in poor flying conditions of fog and rain are they more susceptible to strikes at tall structures (Winkelman 1995). The timing and location of such weather conditions is not predictable. Some collisions may occur regardless of where turbines are placed (Hanowski and Hawrot, in press).

Even in poor flying conditions there has never been a mass kill of nocturnal migrants such as are commonly associated with tall buildings or communication towers (Gipe 1995, Winkelman 1992a). In poor flying conditions the vast majority of birds can fly unharmed through slowly rotating turbine blades (Winkelman 1995).

Avian mortality is far higher at other structures. Tall communications towers in Canada were estimated to be killing more than 1,000 birds each per year (Weir 1976). A relatively few tall buildings in Toronto are estimated to be killing more than 10,000 birds

per year (FLAP), the taller ones each killing hundreds (Evans Ogden 1996). Even low buildings, such as houses, are estimated to be killing from 100 million to 1 billion birds across North America with each house killing between 1 and 10 birds (Klem 1989, Dunn 1993). Bird mortality, even at its highest rate in Europe, was considered to kill no more birds per kilometer of turbines than per kilometer of highway, or per kilometer of power transmission lines (Winkelman 1995). House cats, which many households have, are estimated to be killing as many as 140 million birds a year in Canada (http://www3.sympatico.ca/samgreen/webcats.html).

Every structure that is erected has the potential to kill some birds; however, the above figures clearly indicate that every average house, directly or indirectly, is killing more birds per year than any average wind turbine. In fact, the average house is probably killing far more birds.

Even in European situations that have recorded the highest avian mortality rates ever, studies have repeatedly considered that avian mortality was not significant to bird populations, and that disturbance effects were a larger issue (Winkelman 1995, Crockford 1992). This is an important consideration since most European wind turbines have been place in coastal areas, even in harbours on breakwalls. Thousands of birds can fly close to turbines with no problems (e.g. Mossop 1998, Howell and Noone 1992, Still et al. 1994, Lowther in press).

Avian mortality is not anticipated to be serious with the proposed placement of turbines at the project area. Unless turbines are placed directly in a confined flight corridor for birds, which will not be case, mortality will be low. There are no structures around the project area that will confine birds, or direct them toward the turbines. Collisions with wind turbines are statistically rare events (Curry 1994).

A number of studies in North America and Europe, have indicated that there is generally little or no effect to birds nesting close to and right below operating turbines (Bureau of Reclamation 1984, Howell and Noone 1994, Kerlinger, in press, Percival 1998, Karlsson 1983, Meek 1993, Vauk 1990, Winkelman 1992d). Where breeding birds were disturbed at a site, it was a result of extensive disturbance to the surroundings, or the continued presence of people and vehicles (Leddy et al. 1999, Percival 1999), not the turbines themselves. The placement of turbines in a rural setting such as at the subject property will not have any effect on breeding bird colonies

Birds will nest right below operating turbines (Percival 1998). Several studies in Europe have indicated that the most serious affect in their situation was disturbance to resting or staging birds (Benner 1993, Crockford 1992, Winkelman 1994). Avoidance reactions have been considered important in European situations where wind farms were placed in estuaries in coastal areas where large numbers of staging waterfowl and shorebirds traditionally gather to feed on tidal mudflats. For flying birds, avoidance reactions have been observed in some species as far as 800 metres away, but most respond only at much closer distances, and many show no avoidance response at all. The response is variable, even within species, and may vary with time of day. Avoidance would mean birds could not take advantage of foraging areas near turbines. But, even where birds avoided turbines at some distance in flight, they were not disturbed when they did land, and would often swim or walk much closer to feed (Percival 1998, Winkelman 1985).

Such disturbance effects are not going to be of concern at the proposed site. Towers will not be located in areas providing rich food sources, and are not located close enough to feeding sites to cause any appreciable loss of foraging opportunities. Avoidance of towers by flying birds reduces the risk of collisions.

Siting guidelines have been established in various places in Europe and North America. Unless turbines are placed in a microhabitat where large numbers of birds are confined by topography or structures, avian mortality is going to be rare. The proposed site does not exhibit characteristics likely to enhance avian mortality. The tubular type of turbine to be used, with no guy wires or overhead transmission lines (far more deadly as they are much less visible – Bevanger 1994) is the safest design, and a fixed slow speed of blade rotation that make them easily visible, are the least likely to cause mortality to flying animals.

The minimum red or strobe lights needed to meet Transport Canada regulations will also have minimal impact to nocturnal migrants (Evans Ogden 1996).

No additional precautions are needed to mitigate against bird strikes. A pre-construction point count and area bird search study will be conducted in the spring of 2007 and three years of post-construction bird studies will be performed to confirm that the wind turbines are not impacting bird populations.

There is no evidence that terrestrial mammals, reptiles or amphibians are likely to be affected at all by wind turbines. Small mammals have been reported living in close proximity to operating turbines (Orloff 1992).

Bats are at some risk as with other flying animals. However, they have excellent navigation skills and generally mortality seems to be less than that of birds (Howell and DiDonato 1991, Strickland et al. 1998). They are at low risk at the project area.

Butterflies, dragonflies and other flying insects are likely to be at very low risk of collision with wind turbines, certainly at much lower risk than they experience on highways. What studies there are have indicated negligible effects to insects (Gipe 1995).

The Natural Environmental Resources Report, including a bird and bat study, prepared as part of the Environmental Assessment can be found in Appendix B.

6.2.1.5 Safety Issues

Questions of safety arise in respect to those who maintain and operate wind turbine equipment as well as the members of the general public who come into the vicinity of the equipment. Safety issues potentially arise if anyone is in the vicinity of a wind turbine when ice falls off, which may under rare conditions, accumulate on the tower or the blades and subsequently slide or be thrown off by the rotating blades.

Icing is the predominant safety concern expressed by the public with respect to wind turbines. Since there have been no recorded incidents of injury by ice from an operating wind turbine, this aspect of safety has received little regulatory attention in the world-wide wind energy community.

Ice may accumulate under conditions of freezing rain, sleet or melting snow. Operators of the Tacke turbine installation at Kincardine, on the Bruce Peninsula, report a frequency of three such icing events every year. Ice accumulation events should be similar at the subject site.

Safety issues can be addressed either by operational avoidance or set-back criteria.

Wind turbines have wind sensors mounted on their nacelles. When wind is not detected, the windmill ceases operation. Such a sensor will almost always commonly "ice-up" before any rotating blades become coated with ice. With the sensors "iced-up", the blades will stop rotating – eliminating the risk of ice being thrown any great distance. The wind turbines that will be used for the Ashton Ridge Golf Course Wind Farm will equipped with cold weather packages, including icing sensors.

The three-year old TREC turbine on Lakeshore Blvd. in the City of Toronto is immediately adjacent to the Liberty Grand banquet centre, approximately 100-feet from Lakeshore Blvd., and approximately 500-feet from Lake Ontario. Lakeshore Blvd. has a traffic flow 1,000 vehicles/lane/hour in rush hour. There is a considerable amount of moist, cold air at that site that would normally cause icing. The local authorities have not reported any damage from falling ice since the wind turbine was commissioned.

Once stopped, the blades can restart either automatically or by manual control only, depending on equipment specifications.

Colin Morgan of Garrad Hassan and Partners presented a paper (Morgan et. al., 1999) sponsored by the Non-Nuclear Energy Programme of the European Commission, DGXII, and the UK Department of Trade and Industry which assesses the safety risks arising from wind turbine icing. They present recommendations on the mitigation of icing risk including:

- The use of warning signs alerting anyone in the area of risk.
- . Awareness of operational staff of the conditions likely to lead to ice accretion on the turbine, the risk of ice falling from the rotor, and other areas of risk.

For proposed turbines, the following measures will be put in place before the operation of each turbine:

1. The turbine control system will be programmed to recognize icing through feedback from various conditions. Each turbine has a built-in measurement and control system that receives input on rotor blade balance (which is constantly monitored), vibration, wind speed, temperature, wind direction, and determines if icing conditions exist.
2. As soon as an icing condition is recognized, the control system will perform a safe shutdown of the turbine. The operator will also be able to initiate this shutdown either on site or remotely.
3. The turbine will remain shut down until an operator travels to the site to inspect the

condition of the turbine blades. When the operator deems that a re-start is safe, he/she will post the area with signs advising that the turbine is about to be re-started and the public should stay behind the signs until the signs are removed. The operator will determine if any members of the public are within the signed area and if not, re-start the turbine and remove the signs.

In addition, the following safety measures will be in place to prevent injury from falling ice:

1. The area will be posted with signs that inform the public of the potential danger from falling ice should icing conditions exist.
2. The turbine operator will be trained to be aware of the conditions likely to lead to ice accretion on the turbine, of the risk of ice falling from the rotor, and of the areas of risk. Safety concerns regarding structural stability and ability of a wind turbine to withstand wind forces will be addressed as part of each operator's required technical training.

Table 8: Vesta V82 Climate and Site Conditions

Climate and Site Conditions regarding structural design		
Survival wind speed = 59.5 m/s = 214 kilometres per hour = 130 miles per hour		
	50 Hz – IEC IIb	**60 Hz – IEC IIb**
Design life time	20 years	20 years
A-factor	9.59 m/s	9.59 m/s
Form factor, c	2.0	2.0
Annual average wind speed	8.5 m/s	8.5 m/s
Wind shear	0.20	0.20
Extreme wind speed	42.5 m/s (10 min. average)	42.5 m/s (10 min. average)
Survival wind speed	59.5 m/s (3 sec. average)	59.5 m/s (3 sec. average)
Automatic stop limit	20 m/s (10 min. average)	20 m/s (10 min average)
Automatic stop limit	24 m/s (1 min. average)	24 m/s (1 min. average)
Automatic stop limit	32 m/s (1 sec. average)	32 m/s (1 sec. average)
Re-cut in	18 m/s (10 min. average)	18 m/s (10 min. average)
Characteristic turbulence intensity acc. To IEC 61400-1 (15 m/s)	16% (including wind farm turbulence)	16% (including wind farm turbulence)
Air density	1.225 kg/m^3	1.225 kg/m^3
Maximum in-flow angle	8 degrees	8 degrees

6.2.1.6 Magnetism

Magnetic fields (MF) occur where any electric conductor exists with an electrical current flowing through it. All alternating currents generate magnetic fields. Power lines are highly visible sources of magnetic fields, but any electrical device is capable of producing them. Canadians are exposed to these fields to varying extents throughout their lives.

There are four potential sources of magnetic fields associated with proposed operation. These are:

- The grid interconnection power line;
- The wind turbine generators;
- The electrical transformer at the base of each wind turbine; and
- The underground collector network cabling.

It is anticipated that the interconnection with the existing grid will be made above ground and be no different from any other power line used within the network. The MF levels are comparable to typical household appliance, i.e. negligible.

The electrical generator windings are close together and surrounded by conductive metal so that the magnetic fields around the wind turbine from the generator is effectively zero.

The wind turbines will sit on solid steel enclosed towers in which all electrical equipment will be located, except for the windmill transformer. Access to the tower is only through a solid steel door that will be locked when not in use. The magnetic field from the wind turbine transformer is negligible 10 feet from the transformer and tower.

The collector network which connects the wind turbine generators will operate at typical distribution voltage of 600 V and is buried below ground level. Because of the closeness of the phase conductors within the cables magnetic fields are balanced out to effectively zero.

A field survey and report associated with the health effects of magnetic fields generated by wind turbines can be found in Appendix E.

6.2.1.7 Infrasound

Recently, there have been concerns expressed about the emissions of infrasound at wind farms. Specifically, infrasound was reported as an issue at the Pubnico Point Wind Farm in Nova Scotia. A study conducted prepared by HGC Engineering for the Canadian federal Department of Natural Resources at the Pubnico Point Wind Farm concluded that the infrasound emitted from the wind turbines was below internationally accepted human perception limits. The nearest receptor at the Pubnico Wind Farm is 330 metres.

HGC Engineering conducted the acoustic assessment at the project area. The nearest residence to a wind turbine for the project area is over 400 metres (the minimum setback from the centre of each residential dwelling is 450 – allowing for the footprint of a residence and property use around the residence). Based on the findings from the Pubnico Point Wind Farm study, the distance will be far enough such that the infrasound will be well below internationally accepted human perception limits (90 dBA for sound frequencies of less than 20 Hz).

6.2.2. Maintenance Activities

Normal maintenance on the individual wind turbines occurs twice per year. It involves complete checks of structural soundness, changing of hydraulic and lubricating fluids, etc. Any waste products (e.g. oil) will be disposed of in accordance with Ontario's General – Waste Management Regulation (Reg. 347).

Sensory disturbance of game resources may occur during maintenance activities as result of increased on-site human activities. However, a certain level of sensory disturbance to game and wildlife resources in the study area has already resulted from ongoing agricultural and recreational activities. Considering the periodic nature of maintenance activities, it is likely that resident wildlife will adapt once the wildlife realize there is no threat. Consequently, no significant negative impacts are anticipated to wildlife and their habitats.

In order to limit the impact to aquatic habitats, sediment and erosion control measures must be implemented during the maintenance activities.

6.3. Decommissioning and Abandonment Plans – Environmental Effects

As with construction, there are no significant environmental effects expected from the decommissioning of the wind turbines. In addition, decommissioning activities are limited in extent and time.

The removal of the turbines, ancillary equipment, and collector lines is expected to have minimal environmental impacts. Some vegetation surrounding the turbines may be disturbed in the area immediately surrounding the turbines. Removal of the vegetation will not be significant since the species involved are common plants, and disturbance is temporary. The disturbed sites can be re-vegetated quickly.

The foundations will be decommissioned in-place and marked. A decision will be made at the time of decommissioning if the top portion of the foundations is to be removed, covered with topsoil, and re-vegetated.

During the decommissioning phase Grand Valley Wind Farms Inc. will adhere to all applicable clean-up regulations and guidelines that are in effect at the time of decommissioning.

Any cleared and/or grassed areas not associated with agricultural fields will be prepared to allow for the establishment of surrounding indigenous tree and herbaceous species.
Residual effects associated with the remediation of the study area include:

- Potential sound and dust impacts from equipment
- Potential disruption to wildlife populations and movements due to traffic

In order to limit the impact to aquatic habitats, sediment and erosion control measures must be implemented during the decommissioning phase of the project.

In all activities where vegetation clearing will occur, the disruption of bird nests is a consideration. This potential effect is not anticipated to be a major consideration during decommissioning. Little vegetation is to be removed from the project area.

The potential for collisions of birds with the turbines will not be a consideration as the turbines are removed during this phase.

6.4. Accidents and Malfunctions

Possible accidents and malfunctions associated with the project include catastrophic failure of the wind turbines or spills.

The wind turbines are designed and have control systems to prevent failure. If this should occur, the environmental impact would be minimal. The rural setting and setback distances from residences would minimize the risk of injury to people. Metal debris could be removed and any spilled liquids remediated.

Spills of fuel, hydraulic fluids or other deleterious substances could occur during the construction phase or during maintenance activities. Potential spills will be minimized by ensuring that proper industry regulations are followed. Re-fuelling of construction equipment will only take place at designated areas. No hazardous materials will be stored on-site. Emergency spill kits will be maintained in the study area, in the event that any spills of hazardous material occur.

An emergency and environmental protection plan will be part of the operation and maintenance manual for the wind turbines. Construction and maintenance staff will be trained on spill procedures and spill kits will be available during construction and maintenance activities.

6.5. Effects of the Environment on the Project

6.5.1. Climate Fluctuations

The climate of the area is predominately controlled by west to east trending weather patterns, alternating from warm humid air from the Gulf of Mexico to cold dry air from the Arctic. These patterns shift south in the winter and north in the summer. Global climate change modeling predicts 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 wind

turbines are designed to shut off at wind speeds in excess of 25 m/s.

6.5.2. Extreme Events

Extreme events include rain, hail, ice storms, fire, tornadoes, earthquakes, and lightening 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 be able 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 – Each wind turbine as a control system that stops the blades from moving at wind speeds greater than 25 metres per second, 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 – The structures will be designed to meet the earthquake loads as stipulated in the Ontario Building Code.
- Lightning – The turbines 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.

Following an extreme event, a thorough inspection of the structures will be undertaken to ensure their integrity was not compromised and that they are safe to operate. Any necessary repairs will occur or the structure will be dismantled if it is found to be beyond repair.

6.6. Cumulative Effects

This cumulative effects section describes the potential cumulative effects of the proposed Project in combination with the existing environment and the effects of other certain and reasonably foreseeable actions and projects.

Pest practice principles are applied in the design, construction and operation of the wind farm to avoid, minimize, and limit Project-specific effects. As such, the potentially adverse effects on environmental systems from the Project have been minimized.

The objective of examining cumulative effects is to identify and assess collective effects that are considered significant at the regional level. The residual effects of the project are considered in conjunction with the residual effects of other unrelated actions and projects.

6.6.1. Past, Present & Future Projects at the Site

The cumulative effects of past (agriculture), present (non-farming agriculture) and future (wind turbine site) are minimal.

Other projects in the area (i.e., farming) combined with the wind turbines will have a minimal environmental impact.

6.6.2. Interaction between Projects and Description of Cumulative Effects

The proposed wind turbine project is south of the Melancthon wind farm. The cumulative effect of the project with other undertakings in the future will be minimal due to the nature of the project, the rural setting and the zoning restrictions of the township.

The Table below provides a summary of cumulative effects of various project activities on ecosystem components.

Table 9: Summary of Cumulative Effects

Valued Ecosystem Component	Description of Project Activity	Other Activities	Assessment of Cumulative Effects	Level of Cumulative Effect
Bird habitat	Project construction	Farming	• Farming activity has already affected bird habitat • Mitigation measures will be put in place (e.g., project construction will occur outside bird-nesting times and will avoid nesting areas where possible) • Pre-construction and post-construction (3-years) bird study planned	Low

			• No cumulative increase in the destruction of bird habitat is anticipated	
Bird population	Presence of turbines	Silos Other farm buildings Hydro lines	• Collision hazard for birds is expected to increase in proportion to the number of turbines added. Turbines will not be clustered in one location • Mitigation measures include siting turbines away from migratory bird corridors • Little cumulative increase in bird collisions is anticipated • Pre-construction and post-construction bird studies to be conducted	Low
Noise level	Noise from turbine	Farming operation Road Traffic	• Sound produced by turbines will be added to the noise produced by farming activities • Sound from turbines dissipates rapidly and turbines are set away from residences, therefore no cumulative increase in ambient sound levels is anticipated • Setback distance of at over 400 m from any residence	low
Property Value	Presence of Turbines		A study conducted in Dufferin County, before and after the construction of the Melancthon wind farm, indicated property values rising faster than surrounding communities. Studies undertaken in the U.S. conclude that the presence of wind turbines enhances property values (Sterziner et. al., 2003)	low
Aesthetics	Presence of turbines	Silos and Other tall structures	• Turbine visibility from nearby roads and residences is limited • Turbine installation will contribute to a limited cumulative effect on the visual landscape	low

6.7. Summary of Potential Environmental Impacts, Mitigation Measures and Residual Effects.

Environmental Impacts

The construction phase of the project will take several months. During this time, only half of the time spent will involve the effects that are typically associated with construction. The environmental effects that have been predicted through this environmental assessment are not only limited in time, they are also limited spatially. They can be characterized as temporary increases in noise levels, some dust created from excavation activities and the movement of a few additional trucks, beyond what is already experienced on the roads leading to these sites. Given the short-term frame, the minor nature of the effects and the spatially limited range of these environmental effects, cumulative effects with other developments are not expected.

Mitigation Measures

To address potential effects to wildlife and habitat during the construction, operation and decommissioning phases of this project, a range of mitigation measures are available. Most of these mitigation measures are specific to minimizing effects to vegetation.

The following are descriptions of the mitigation measures that are specific to wildlife. These measures will be used widely to address potential effects from a range of project activities.

Habitat Loss

Numerous mitigative measures are presented in Section above regarding vegetation impacts. These measures are anticipated to address potential effects to wildlife habitats.

Noise

Construction activity, site access, traffic, etc will produce noise but wildlife typically adjusts to the anticipated noise levels. Turbines produce minimal noise and wildlife typically adjusts to the anticipated noise levels. No additional mitigation is proposed for these effects.

Traffic

Travel speeds of construction and maintenance vehicles will be restricted to minimize potential impacts on wildlife. Where required, sight-line considerations will be used to maximize reaction time for vehicle drivers and wildlife to minimize collisions.

Migratory Birds

As a majority of the study area is comprised of agricultural fields, vegetation clearing will be kept to a minimum. To reduce the disruption of bird nesting areas, the tming of work, or at least timing of clearing, will occur outside the bird nesting period (May – June). If work must occur within nesting period, prior to any site clearing a trained biologist will inspect the proposed work area of nesting birds.

To assist in the re-vegetation of bird nesting areas following construction, native species will be used to re-establish vegetative cover around any wetland areas impacted as soon as feasible.

To minimize bird collisions with utility poles (if any are needed), single wooden pole structures will be used ensure that power lines are on same level and minimize the potential for collisions. Also, pole heights will not extend far above the canopy of adjacent forest communities, decreasing the potential for collisions with migrants.

To minimize the bird collisions with the wind turbines, the proposed turbines utilize modern design principles that minimize rotor speed, avoid use of guy wires and lattice-type towers that minimize potential collisions. Also, micro-siting considerations have been used to avoid high risk locations and minimize collision potential. Finally, the lighting of the towers will be minimized to that required for safety.

Residual Effects – Site Preparation and Construction

Habitat Loss

Much of the project area is comprised of agricultural lands and will remain as such throughout the duration of the project. Very little habitat loss is anticipated. The size of the cleared openings will generally be restricted to minimal road width and turbine construction areas.

Traffic volume is anticipated to have a minimal impact on local wildlife populations.

Habitat Fragmentation

The proposed project activities will lead to very little habitat fragmentation as the study area is dominated by existing agricultural lands. It is expected that any impacts will be short in duration and very local in proximity to the study area.

Wildlife movements

The residual effect on wildlife movements during the proposed project activity is anticipated to be negligible. Impacts to wildlife will be short in duration and very local in proximity to the study area.

Loss of Forest Interior

With the current turbine layout, the proposed wind farm will not contribute to the loss of forest interior.

Traffic

As discussed above, traffic will be restricted in terms of volume and daylight access. The residual effects on the local wildlife populations from traffic volume are anticipated to have minimal impacts.

Migratory Birds

The potential for impact on nesting migrant bird species is only an issue during the nesting period. Based on the assessment that the extent of vegetation clearing will be minimal compared to the remaining habitats, loss of productivity is not anticipated. Once agricultural lands are cleared, the *Migratory Birds Convention Act* is unlikely to apply as they would not likely provide much habitat for nesting.

Mortality of birds due to collisions with turbines and transmission lines during construction is anticipated to be very low.

Residual Effects - Operation

Habitat Loss

Habitat loss will be negligible as much of the study area is comprised of agricultural fields. It is anticipated that any habitat loss will have a minimal residual effect on the local wildlife. Areas below the turbines will be maintained as agriculture, providing very little wildlife habitat.

Noise

As noted above, site access traffic, etc will produce noise but wildlife typically habituate to the anticipated noise level. Local residence will also be affected by the nois. For the most part, these impacts will be short in duration and very local in proximity to the study area. The turbines will produce a very low level of noise that wildlife will habituate to (as demonstrated at numerous wind power facilities in North America). It is predicted that residual impacts to wildlife from noise will be negligible. The noise impacts on residence will be of short duration.

Traffic

As discussed above, traffic will be restricted in terms of volume and daylight access and will be very low during the Operation phase. The residual effect on the local wildlife

populations from the traffic volume is anticipated to be negligible.

Road closures, if necessary, will only be of short duration.

Birds

This disruption of bird nests from operations is not anticipated to be a major consideration. Operating the wind turbines does not result in vegetation removal. The residual impact will be negligible.

Mortality of birds due to collisions with turbines and transmission lines is anticipated to be very low. The incidence of bird mortality resulting from interaction with the transmission lines is anticipated to be very low, but may last the duration of operation.

Bats

A total of 12 turbines will be operational within the project area. Overall, a low incidence of bat collisions with turbines is anticipated.

Residual Effects - Decommissioning

Habitat Loss

During the Decommissioning phase (20 years) it is expected that very little non-agricultural vegetation will be disturbed as a result of vehicle and equipment access. This

Noise

As noted above, construction, and site access traffic, etc will produce noise but wildlife typically habituate to the anticipated noise levels. For the most part, these impacts will be short in duration and very local in proximity to the study area. It is predicted that residual impacts to wildlife from noise will be negligible.

Traffic

As discussed above, traffic will be restricted in terms of volume and daylight access. The residual effect on the local wildlife populations from the traffic volume is anticipated to be negligible.

Site Remediation

Although the project will not fully be restored to its pre-construction state, the re-

establishment of any affected wetland vegetative cover will result in a more positive impact on vegetation in the area than if it was left as bare ground.

Migratory Birds

The potential for impact on nesting migrant bird species is only an issue during the nesting period. Based on the assessment that the extent of vegetation clearing will occur on agricultural lands, loss of productivity is not anticipated.

The potential for collisions with the turbines transmission lines and turbines will be reduced to zero, as these structures are removed from the project area.

Restoration of any disrupted lands near the wetlands and elsewhere in the study area will occur during the decommissioning phase. No negative impacts on birds are anticipated.

Table 10: Summary of Environmental Impacts, Mitigation Measures, & Residual Environmental Effects

Project Activities	Env. Components Subject to Impacts	Impacts – Short Description	Mitigation Measures	Residual Env. Effects	Level of Residual Impact
Construction Activities					
Surveying & Siting Operations	Wildlife	• Noise from equipment	• None	None	Minimal
Land clearing	Habitat,vegetation, wildlife	•	• No land clearing 100-m from Grand River or 30-m from cold-water aquatic habitat • Erosion controls in place	Loss of habitat Loss of vegetation	minimal
Road Construction	Wildlife, habitat, vegetation, residents, watercourses,	• Noise • Loss of habitat & vegetation • Erosion • dust	• no access roads within 30-m of watercourses • Erosion controls in place • No roads within 100-m of Grand River • Roads will be watered down • Vehicle speed will be less than 30 km/hr • Reasonable construction hours	• Loss of habitat & vegetation • Noise and dust impacts for only a short period of time	Minimal
Delivery of Equipment	Local Residents, vegetation, wildlife	• Road closures and/or traffic delays • Noise • Dust	• Notify School Board so buses can be re-routed • Notify local residents so alternative routes can be taken	Some impact but only for a short period of time	Minimal
Temporary Storage facilities	Vegetation, habitat, watercourses	• Footprint of facilities • Spills of stored materials	• Facilities will be built on agricultural land and away from watercourses and nesting areas • Spill kits will be stored in	Some impact but only for a short period of time	Minimal

			facilities		
Foundation Construction	Groundwater, surface water, vegetation, wildlife, habitat, residents	• Reduced groundwater levels • Reduced flow in nearby streams • Loss of vegetation • Wildlife disturbed • Noise and dust	• Monitoring on nearby watercourses and water wells if dewatering necessary • Sediment and erosion control measures • Watering of roads	Impact on residents and wildlife temporary	Low
Tower and Turbine Assembly	Vegetation	• Vegetation trampled	• Turbines located on lands that are predominantly agricultural • Apply topsoil and re-vegetate trampled lands as necessary • Erosion control measures	Loss of vegetation and habitat	minimal
Interconnection	Residents, vegetation, habitat, wildlife, watercourses	• Noise & dust • Loss of vegetation • Disturbance to wildlife • Loss of habitat	• Watering of roads • Construction during reasonable hours • Digging along existing roads • No lines will cross streams/drains or be within 100 m of Grand River		minimal
		•	•		
		•	•		
Operation Activities					
Land Use	Land Use (Farming) & Property Values	Reduction of land for agriculture ; Perception that property value of land is reduced due the presence of wind turbines	• Land occupied by equipment will be less than 5 percent of site • Agricultural activities are possible near turbines; • Landowners are financially compensated for use of land for wind turbines, offsetting lost agricultural revenues • free electricity to neighbours	None anticipated	minimal
Land Use	Visual Impacts	Concerns that wind turbines take away from rural setting	• Lease agreements to land holders free electrical power to neighbours provides financial compensation for perceived negative visual impacts • The presence of 12 turbines scattered over three parcels of land reduces the overall visual image of an “industrial” wind farm	Some persons may still find them visually displeasing	Low
Operation	Noise	Noise from rotating blades	• Acoustic modeling has been done such that the sound level at the points of reception are within government regulations • Setback distances of 450 metres from every resident	None	Minimal
Wildlife disturbance	Birds & Bats	Bird & Bat Collisions	• Siting of turbines away from migratory bird corridors and in area of low topographic relief, away from potential nesting areas with low diversity and natural vegetation • Monitoring of bird/bat fatalities	Pre-construction point and area bird monitoring and 3-year post construction	Low

			using mortality surveys • Turbines have a tubular structure which will deter birds from landing or perching on them	monitoring of birds	
Land Use	Terrain & vegetation	Reduction of land for agriculture	•	None anticipated	Minimal
Operation	Safety Issues	Possible injury from falling ice, blade failure, or tower collapse	• Control system prevent ice build-up, shuts turbine down in strong winds • Regular preventative maintenance by trained operators • Signage will warn of possible falling ice during the winter • Turbines are in rural area and setback from residences is 450 m • Tower designed to withstand 130 mile/hour wind	None anticipated	Minimal
Operation	Magnetism	Health effects from magnetic fields	• Magnetic fields around turbines are effectively zero • Transmission lines from turbines to main roads are buried	None anticipated	Minimal
Operation	Infrasound	Health effects from infrasound	• Wind turbines are more than 400 m from residences •	None anticipated	Minimal
Maintenance	Watercourses, vegetation, wildlife	Spills	• Sediment and soil erosion controls • Spills kits available during maintenance	None anticipated	Minimal
Decommissioning					
Turbine Removal	Terrain & vegetation, Residents, watercourses, wildlife	Noise and dust from vehicles	• Water down roads • 30 km/hr limit on traffic • soil and erosion controls • Underground structures left but marked	None anticipated	Minimal
Accidents and Malfunctions					
Accident or malfunction	Watercourse, residents, wildlife	Spill or catastrophic failure of wind turbine	• Design and control system reduce probability of malfunction • Rural setting and setback distances reduce probability of injury in the event of catastrophic failure • Spill kits on-site during construction, maintenance, and decommissioning • Sediment and erosion control measures as mentioned above	None anticipated	minimal
Effects of the Environment on the Project					
	Climate fluctuations	Increase in extreme weather events	• Design and control systems prevent damage to wind turbines	None anticipated	minimal
	Extreme Events	Damage to Turbines	• Design and control systems prevent damage to wind turbines • Damage checks by staff following extreme events	None anticipated	minimal

7. FOLLOW-UP MEASURES AND MONITORING

This section details the overall package of follow-up measures and monitoring that Grand Valley Wind Farms Inc. will carry out in relation to the project. The package has been designed to ensure the continued compliance of the project with the environmental requirements set out in this document and applicable legislation.

7.1 MONITORING PLAN STRUCTURE

7.1.1 Methodology

Fundamental to quantification of the significance of residual effects and the success of protection and mitigation measures is the need for monitoring. The monitoring plan for the project has been designed to:

- monitor the effectiveness of the proposed protection and mitigation measures;
- verify compliance of the project with applicable municipal, provincial, and federal standards and guidelines; and
- optimize environmental management with the goal of continual improvement.

Environmental monitoring by NRSI, which started with the collection of primary background data as part of this ESR study, will continue with appropriate follow-up activities during the construction and operation phases of the project. Monitoring will provide data on key environmental, health, and safety aspects as well as the effectiveness of management measures implemented as part of this project. The monitoring procedures noted herein, directly link to the potential effects, protection, and mitigation measures discussed in section 6.

7.1.2 Goals and Objectives

Following are the goals of the monitoring plan:

- Minimize conflicts with communities within the project's area of influence
- Minimize conflicts in the communities affected by the execution of the works according to legal terms and to the proponent's policies;

- Reduce the probability of accidents and malfunctions; and
- avoid levies or sanctions from the corresponding authorities for negligent environmental performance.

The monitoring plan is designed to achieve the following objectives:

- reduce the environmental effects associated with construction works on agricultural lands;
- reduce the environmental effects on natural habitats, flora, and fauna;
- establish measures that increase occupational safety to safeguard the physical and psychological integrity of people linked to these activities;
- minimize complaints from the community in terms of effects identified during the development of infrastructure and/or refurbishment activities; and
- comply with all applicable environmental statutes and regulations.

7.1.3 Guiding Principles

The following principles were used to guide the preparation of the monitoring plan:

- focus upon environmental, health, and safety risk prevention
- conformance with relevant standards, codes, and practices were considered in the application of safe technologies
- all activities will be performed in a safe and effective manner by trained personnel
- all equipment will be maintained in good operating condition for protection of property,
- conservation of the environment, and protection of worker health and safety
- all necessary precautions to control, remove, or otherwise correct any health and safety hazards will be implemented
- construction and operation of the Project will meet relevant municipal, provincial, and federal standards that collectively ensure sufficient technical levels of safety.

The monitoring plan will include the preparation of construction, operation and maintenance, and decommissioning protocols.

7.2 Monitoring Plan

In this section of the report, the needs and requirements of the monitoring program are described. Wherever impacts to migratory birds, vegetation, aquatic habitat, and wetland communities have been identified, follow-up monitoring is recommended. Monitoring includes the construction period and a suitable time frame during the operation phase, and decommissioning.

Migratory Birds

The monitoring protocols for migratory birds are discussed below.

Pre-Construction

- Establish baseline of bird use in the study area for use in subsequent mortality monitoring. The baseline of bird use will be obtained from existing data and through a point count and area survey in June 2007. The point count/area survey protocol that will be observed is as follows:
    1. Point counts will be performed at least twice in the breeding season (preferably both surveys in June but ending no later than the first week of July), separated by 7-10 days to detect earlier and later-breeding species.
    2. Surveys will be conducted in the early morning during the breeding season.
    3. Record the weather conditions (temperature, wind speed, cloud cover, precipitation), date, and time of day.
    4. Point counts will be of 10-minute duration.
    5. At each point count station, the birds should be identified as to species and individual abundance.
    6. The surveyors will estimate the distance to the birds using a scale of 0-50 m, 50-100 m, and >100m.
    7. Area searches (which are not constrained by time or by point count station boundaries) will be employed, unless the surveyors believe that all of the birds that might reasonably have occurred in the study area were likely detected during the point counts. The area search in the project area will be within 500 m from the proposed turbine locations.

Construction

- Identify and delineate work zone prior to undertaking work, and regularly inspect

the extent of the work to ensure that the spatial extent of the work is minimized.

- If work must occur within nesting period, prior to any site clearing a trained biologist is to inspect the proposed work area of nesting birds.
- Monitor mortality of birds associated with transmission lines.

Operation

- Monitor bird mortality associated with turbines
- If work must occur within the nesting period, prior to any site clearing a trained biologist is to inspect the proposed work area of nesting birds
- Identify and delineate work zone prior to undertaking work and regularly inspect the extent of the work to ensure that the spatial extent of the work is minimized

Decommissioning

- If work must occur within the nesting period, prior to any site clearing a trained biologist is to inspect the proposed work area of nesting birds
- Identify and delineate work zone prior to undertaking work, and regularly inspect the extent of the work to ensure that the spatial extent of the work is minimized

Mortality Monitoring

As part of the detailed design phase of this project, a detailed monitoring plan for detecting mortality of birds and bats associated with both the transmission line and turbines will be developed in conjunction with the Ministry of Natural Resources and Canadian Wildlife Service. At a minimum the monitoring program will consist of:

Monitoring of bird flight patterns and variations as a result of season and weather, etc. will focus on the following:

- The potential for direct impacts of the construction of the turbines, access roads and associated structures on bird habitats (especially rare species).
- The potential of bird – turbine interactions from:
    1. Activity patterns of breeding birds and resident summer birds that may bring the birds into conflict with the turbines
    2. Flights of daytime migrants during a range of weather conditions (including inclement weather)
    3. Daytime bird flight behaviour of migrant birds between 9am and 3pm

Monitoring of birds at transmission lines and turbine sites will occur using systematic

carcass searches and scavenger trials.

Bats

Pre-Construction

- Establish baseline of bat use of the study area, for use in subsequent mortality monitoring (see below)

Construction

- Identify and delineate work zone prior to undertaking work, and regularly inspect the extent of the work to ensure that the spatial extent of the work is minimized
- Monitor mortality of bats associated with transmission lines

Operation

- Monitor bat mortality associated with turbines

Mortality Monitoring

As part of the detailed design phase of this project, a detailed monitoring plan for detecting mortality of bats associated with turbines will be developed in conjunction with the MNR. At a minimum the monitoring program will consist of:

Monitoring of bat flight patterns and variations due to season, weather, etc. will focus on the following:

- The potential for direct impacts of the construction of the turbines, access roads and associated structures on bat habitats (especially rare species).
- The potential of bat – turbine interactions from:
    1. Activity patterns of migrating bats and resident summer bats that may bring the bats into conflict with the turbines
    2. Abundance of bats and flight behaviour of migrant bat between sunset and sunrise

The monitoring of bats at the turbine sites will consist of systematic carcass searches and scavenger trials.

Wildlife and Habitat

No additional monitoring of wildlife and habitats is recommended.

Surface Water and Groundwater

All sediment and erosion control measures will be inspected weekly. Additionally, the effectiveness of the control measures will be inspected during and immediately following rainfall events.

8. PUBLIC CONSULTATION

Stakeholder consultation and information disclosure activities are typically undertaken to provide project stakeholders with an opportunity to participate in the planning and development of a proposed project. The activities carried out by a proponent provide a two way communication process to involve interested stakeholders in the planning, implementation and monitoring of an undertaking. The purpose of public consultation in the Environmental Screening Process is to allow the proponent to identify and address public concerns and issues and to provide the public with an opportunity to receive information about and make meaningful input into the project review and development. Windrush Energy has developed and is in the process of implementing a consultation program that provides appropriate opportunities and forums for the public to participate in the planning and approvals for the Grand Valley Wind Turbine Project.

8.1 Defining the Terms

8.1.1 Stakeholder Consultation

Stakeholder consultation is a tool for initiating and managing communications among the project proponent, stakeholders, and other affected persons/groups. It provides an avenue for the reviewing agencies and the project proponent to improve their decision-making capabilities, while fostering an environment of understanding by actively involving organizations, groups, and individuals directly affected by or involved in the project.

8.1.2 Information Disclosure

Effective consultation is driven in part by adequate and appropriate disclosure of information to stakeholders. Disclosure of information is critical if stakeholders are to have meaningful input and participation in the decision-making process. Exchange of information also allows stakeholders to better understand the trade-offs between the Project's advantages and disadvantages.

8.2 Methodology

When developing a methodology for stakeholder consultation and information disclosure it is important to understand the extent to which stakeholders may be interested in the project based upon their perceptions and concerns. Another objective is to develop a representative understanding of the stakeholders' views about the area in which they live, community characteristics, and environmental resources that are important to them.

Since many of the issues addressed within the ESR are of public relevance, or are matters that would benefit from public review and comment, a framework that facilitates stakeholder participation is important. Such a framework must also contain mechanisms to monitor consultation and disclosure activities on a continuous basis during construction and as required during operational activities.

Building upon the phased approach to consultation and disclosure, as well as the methodological considerations above, the following subsections outline the various methods and techniques used to facilitate meaningful consultation and disclosure with the Project stakeholders.

8.3. Consultation and Disclosure Activities

Consultation and disclosure have been key components of the project planning and development activities. These activities were accomplished through direct mailings, newspaper ads, phone calls and kitchen table meetings. Additional communications about the Project were conveyed through direct stakeholder contacts, as well as a project website, project specific e-mail, and written correspondence. A summary of stakeholder consultation and information disclosure activities and copies of newsletters and newspaper notices is provided in Appendix H.

8.3.1 Stakeholder Engagement

Using the various communication tools identified above, stakeholders were engaged to participate in the development of the planning process and ESR through the following means:

- Letters of invitation sent to adjoining neighbours to attend a "kitchen table meeting" in the winter of 2005.
- During 2005, a series of individual and group meetings and negotiations with land owners were held to secure lease arrangements for the use of their properties for the wind farm. During the meetings, discussions were held about any concerns they may have about the project.
- During 2005, a series of individual and group meetings were held with adjacent land owners to address their concerns about the project and to negotiate an arrangement whereby they would receive compensation in the form of free electricity.
- During 2005 and 2006, a series of meetings were held with the local council with respect to land use and zoning on the properties. Some of the meetings were held during council meetings and were open to the public.
- Public notices that contained the name of the proponent, a brief description of the project, maps showing the key project location, statements that the project was subject to Regulation 116/01, and contact names, addresses, e-mail, fax, and telephone numbers was issued in the local newspaper.
- Personal phone calls made to adjoining neighbours to discuss the project and invite to the kitchen table meeting.

Government agencies, adjoining neighbours and the local community were notified and included in the consultation.

A notice of commencement concerning the project was sent to the following government Ministries, agencies, and groups:

- Ontario Native Affairs Secretariat
- Ontario Ministry of Natural Resources
- Ontario Ministry of Energy
- Ontario Ministry of the Environment
- Ontario Ministry of Agriculture, Food and Rural Affairs
- Ontario Ministry of Municipal Affairs and Housing
- Ontario Ministry of Transportation
- Ministry of the Attorney General
- Ontario Government Mobile Communications Office
- Ontario Secretary for Aboriginal Affairs
- Environmental Commissioner of Ontario

- Niagara Escarpment Commission
- Grand River Conservation Authority
- Ontario Energy Board
- Upper Grand District School Board
- Natural Resources Canada
- Environment Canada
- Township of East Luther Grand Valley
- Land Stewardship Network of Dufferin South Simcoe
- Grand Valley & District Fire Department
- Grand Valley Agricultural Society
- Greater Dufferin Area Chamber of Commerce
- County of Dufferin
- Canadian Environmental Assessment Agency
- Fisheries and Oceans Canada
- Health Canada
- Federal Department of Indian and Northern Affairs

8.3.2 Kitchen Table Meeting

In 2005, the first formal meeting was held by Grand Valley Wind Farms Inc. for the land owners of the leased properties. The meeting was held at the Grand Valley library. Invitations to Kitchen Table meeting were sent to adjoining neighbours and personal phone calls were made.

The meeting was conducted in order to introduce the project to the immediate community and ensure early consultation and feedback. All of the owners of leased properties attended the meeting. A good discussion regarding the project took place where the proponent was able to hear the thoughts of the neighbours on the proposed project. No major concerns were identified.

8.4 Public Consultation Activities

8.4.1. Notice of Commencement

A formal Notice of Commencement was published in a local newspaper, the Grand

Valley Vidette, on November 16, 2006. A Notice of Commencement was published at the beginning of an Environmental Screening to satisfy the Ontario *Environmental Assessment Act* (*EAA*) requirements for Electricity Projects. The notice formally announces the project being subject to an Environmental Screening Process under the Ontario *Environmental Assessment Act* and that the project was commencing a review under this process. The Notice of Commencement, in addition to being published, was also mailed to the adjacent neighbours and government agencies. For a list of government agencies involved in the process and their correspondence, please see Appendix H.

8.4.2. Public and Agency Review of Draft ESR

Prior to a formal submission of the EA Screening Report, a draft was circulated to appropriate government agencies and key stakeholders for comment. This consultative period ensured that all comments and concerns from the government agencies and interested parties can be identified and addressed prior to a formal submission under the *EAA*. Written comments on the Draft Environmental Screening Report were requested in order to ensure that all outstanding concerns are addressed.

A number of government agencies responded to the draft ESR. A summary of the public and agency concerns is found in the Table below. A discussion on how the concerns were addressed is also included in the Table.

Table 11: Public and Agency Concerns

Agency/Concern	How Concern was Addressed
Ontario Ministry of the Environment – West Central Region	
Further detail on the type and capacity of the wind turbines should be included	Technical information on VESTA V-82 added to ESR and Appendix J
A preliminary geotechnical report and pre-consultation with the Regional Office of the MOE may be necessary to determine the need for a Permit to Take Water	Preliminary geotechnical report preformed, water wells in the project area were located and the impact (see Appendix J), mitigation, and residual effects from dewatering were addressed (see section 4.1.5 and 6.1.6).
Investigation on the possibility of waste sites in the area	Database search made on if waste sites (active or closed) were within 2.5-km of project area (see s. 4.5 and Appendix J)
Further description of the aquatic environment	Information from NRSI Aquatic Habitat Characterization Report (2007) added to section 4.2 and in s. 6.
Include data on wind speeds and directions	Information added from Canadian Wind Atlas (see

	section 4.4.1). Data collected from meteorological tower at the site is considered proprietary
Add screening Criteria Checklist to main body of ESR	Screening Criteria Checklist moved to Section 5 and also in Appendix I
Tower & Turbine Assembly and Installation and vegetation removal	S. 6.1.7 re-written to clarify the potential impacts associated with tower and turbine assembly and installation
Explanation of structural stability to withstand extreme winds	S. 6.2.1.5 Manufacturer specifications included in a Table indicating survival wind speeds.
Clarification on removal of concrete foundation during site decommissioning	S. 6.3.4 re-written to clarify the plan on decommissioning the concrete foundations
Clarification on inspections following extreme weather events	s. 6.5.2 re-written to specify the procedures for tower inspection, repair or disassembly following an extreme weather event
Clarification of text in summary chart in s. 6.7 with discussion on impacts and mitigation measures discussed in the preceding sections of the report	Full review of s. 6 conducted and revisions made to demonstrate that 5-step analysis described in s. 6 was conducted for each impact
Monitoring commitments absent from s. 7	Monitoring plan added to s. 7
Summary of public and agency concerns to be included in final version of ESR along with how they have been addressed	Table added to s. 8 summarizing public & agency concerns and how they have been addressed.
More details on consultation with First Nations	Details on discussions with First Nations, a summary of their concerns, and a plan to address their concerns can be found in Section 9. Correspondence from First Nations can be found in Appendix H
Summary and Conclusions is missing reference to the potential impacts to surface and groundwater	Potential impacts added to s. 10
Report does not discuss the location of specific turbines and their impacts on nearby surface water features	Discussion added on specific turbines that are very close to water bodies (see s. 6.1.2 and s. 6.1.3) along with potential impacts and mitigation measures.
Ontario Ministry of the Environment – Acoustic Assessment	
1. Provide land-use zoning plan of the area surrounding the proposed facility	Copy of plan obtained from Township and included in Acoustic Assessment Report
2. Separation distances between some POR and the closest wind turbine are less than the 400 m stated in the report	Surveyor confirmed locations of all residence and mapped a 450 m exclusion zone around each one. The minimum setback from the centre of each residential dwelling is 450 – allowing for 50-m to be considered the footprint of a residence and property use around the residence
3. Identify POR with corresponding ID designations and coordinates	ID designations added to correspond with coordinates listed in tables and noise impact results shown on site plan drawings in Acoustic Assessment Report
4. Confirm height of towers and specifically hub height above grade of all wind turbine generators	Height of towers confirmed to be 80-m for all wind turbine generators.
5. Confirm the noise emission levels corresponding to wind speed data at the 10-m reference height	Noise emission levels confirmed at the 10-m reference height
6. Table A3 of Acoustic Assessment Report must indicate correct separation distances between each POR and closest turbine location	Table A3 modified to show UTM coordinates
7. Show the parameters and assumptions included in the noise impact assessment calculations	Parameters and assumptions added in Acoustic Assessment Report
8. Report should indicate adherence to the limits for noise and vibration if blasting operations are to be	No blasting operations are contemplated in excavating the foundations. The preliminary

conducted	geotechnical investigation did not find subsurface material that could not be excavated using an excacvator or similar earth removal equipment.
Grand Valley Conservation Authority	
1. Greater map details on turbine locations and associated infrastructure overlaid onto resource mapping	Mapping performed and included in NRSI reports
2. Greater detail on aquatic resources in fish habitat	Studies conducted by NRSI (2007) and key findings included in the main report (see s. 4.2)
3. Information on sediment quality	Studies conducted by NRSI (2007) included in s.4.2.6
4. Clarification on watercourse crossings and potential effects	Mapping clarifies that no watercourse crossings proposed. Potential impacts, mitigation measures, and residual effects discussed in s. 6.1
5. Information on potential effect of groundwater quality on watercourses and wetlands	Information added to s.4.1.5 and to s. 6.1.6
6. Further analysis of the wooded area (FOD8)	Further study conducted by NRSI (2007) in included in Vegetation & Wildlife Environment Report
7. further analysis of the wetland areas near some of the turbines	Further study conducted by NRSI (2007) and included in Aquatic Habitat Characterization Report
8. Consideration of direct and indirect impacts on wetlands	Information on impacts, mitigation measures and residual effects on wetlands included in s. 6
9. Assessment of impact on wetlands as a result of locating wind turbines adjacent to them	Information added to s. 6 with respect to potential impacts on wetlands resulting from nearby wind turbines
Environment Canada	
Make reference to the NRSI studies and reports in the main report	References to NRSI studies made in main report
Include NRSI site sensitivity matrix in main report	Sensitivity matrix added to main report
Clarify follow-up measures and monitoring especially with respect to avian fauna and wildlife	Clarifications made to main report
Clarification on additional breeding bird studies	NRSI report (February 2007) address issues related to breeding birds and pre/post construction monitoring addresses recommendations on breeding bird point counts and area counts.
Reference to supporting document in the EIS	Reference made to NRSI reports (February 2007) including impacts on aquatic environment, flora, fauna, and endangered species.
County of Dufferin	
No comments on the draft ESR other than noting County policies related to excess load permit requirements, entrance requirements, issuance of emergency numbers, and possible road occupancy	Applicable permits and requirements will be obtained prior to construction
Grand Valley Agricultural Society	
In favour of project – no concerns	Keep Grand Valley Agricultural Society informed on the progress of the project
Township of East Luther – Grand Valley	
In support of the project	Keep Township informed on the progress of the project
Upper Grand District School Board	
Wants advance notice the construction schedule, including proposed road closures so bus operators can make necessary rout adjustments. Would prefer that construction occur in the summer months	Every effort will be made to construct the turbines in the summer months. If it is not possible, the School Board will be notified.

Niagara Escarpment Commission	
Property is located outside Niagara Escarpment Plan. Concerned about large-scale wind projects in areas adjacent to the NEP because of their potential negative impacts on landscape character and natural scenery of lands within the NEP	With 12 wind turbines, the project is considered a "medium-scale" undertaking that balances agricultural practices with renewable wind generation. The presence of the 12 wind turbines is considered to have a minimal impact on the landscape character and natural scenery of lands within the NEP.
Frank Entwisle, Windwatch Conservation	
E-mailed a "bump-up" request directly to the MOE shortly after the Notice of Commencement was published and attending the open house. He was concerned that proper procedures were not being followed with respect to the publication of the Notice of Commencement and its content. There was also confusion expressed with respect to the number of wind turbines at the site. Finally, Mr. Entwisle expressed concern about the ability of the public to address their concerns about the project	A letter response was sent to Mr. Entwisle clarifying any misunderstandings on the size of the project (i.e., number of wind turbines), timing for public input, and willingness to further discuss his concerns. Mr. Entwisle phoned the CEO of Windrush Energy on February 28, 2007 and informed him that he was no longer interested in the project and did not consider his e-mail to the MOE as a bump-up request.

8.4.3. Open House

An Open House was held on November 27th, 2006. An invitation for this open house was published in local newspapers, mailed to lease holders and the adjacent neighbours as well as sent to appropriate government agencies. The open house included a discussion of any and all concerns by various stakeholders. Subject matter experts attended the open house and answered questions related to the proposed project. The intention of the open house was ensure that all relevant concerns related to the environmental assessment were discussed and that an effort was made to resolve any issues.

8.4.4. Notice of Completion of Screening Report and Public Review

Following the review of the draft screening report by government agencies and other interested parties, a Notice of Completion was published in the *Grand Valley Star Vidette* – a local newspaper and sent to leaseholders, neighbours, government agencies and persons that expressed an interest in the project. The Screening Report will be made available for public and agency review for a period of 30 calendar days. The report will be available at the Grand Valley Public library. The Notice of Completion stated that if any the remaining outstanding environmental concerns about the project exist, they should be raised with the proponent. If these concerns still remain unresolved, the Notice of Completion identifies an appropriate course of action.

The Public Consultation Plan outlined above provided several opportunities for resolving concerns with respect to the project. The proponent was available to hear all comments, concerns, and commits in an open and consultative way. The ESR, technical reports and other supporting information were made available on the Windrush Energy web site (www.windrush-energy.com) and in the Grand Valley Public Library. The ESR and requested technical reports were sent to various government departments and agencies that requested them.

Information related to the public consultation process can be found in Appendix H.

9. FIRST NATION CONSULTATION

Consultations with First Nations and Aboriginal communities in the context of the project were held to determine the following:

- Claims or interests by Aboriginal groups and First Nations.
- If there are interests, what would be the potential impacts on the First Nations and Aboriginal communities? (e.g., culture, environment, trapping routes).
- What agreement could be reached to mitigate the impacts and address their concerns?

Identification of First Nations with Potential Interest in the Project

Consideration of First Nations and other Aboriginal communities located in the vicinity or the project has been given. Although there are no First Nation communities situated in the vicinity of the project (the nearest community is over 30-km away), there are land claims to property that the project is situated on.

The project is located on properties leased by Grand Valley Wind Farms Inc.(the project owner) from numerous private landowners. The properties are located in part of the land referred to as the "Haldimand Tract." In 1784, land that lay six miles on each side of the Grand River from Lake Erie to the river's source was granted to some of the people of the Six Nations Iroquois Confederacy. The property is within six miles of the Grand River. The Government of Canada contends that the north end of the Haldimand Tract (which includes the location of the Windrush Energy projects) was not granted due to the Simcoe Patent. Grand Valley Wind Farms Inc., is not a Nation and is not in a position to comment on, or negotiate, land claims, therefore is proceeding with discussions based on proposed business arrangements with Six Nations and other constituents' interests.

Currently, Windrush Energy (the project developer) has undertaken discussions with Six Nations and Aboriginal Groups that have a potential interest in the Haldimand Tract. The First Nations and Aboriginal communities that have potential interest in the Haldimand Tract include the following:

1) Six Nations Confederacy Council (Land claim and archaeological interests)
2) Six Nations Band Council (Land claim and archaeological interests)
3) Saugeen First Nation No. 29 (Archaeological interests)

4) Huron Wendat (Archaeological interests)
5) Wahta Mohawks (Archaeological interests)

Feedback from Indian and Northern Affairs (INAC) with respect to land claims on the subject property can be found in the Stakeholder Appendix. INAC indicated that there currently is litigation entitled *Six Nations of the Grand River Band of Indians v. Attorney General for Canada and Her Majesty the Queen in Right of Ontario* that may affect the proposed Project.

Consultation with First Nations and Aboriginal Communities

Windrush Energy has retained Paul Chaput, a Métis and leader in the Restorative Justice movement within the Aboriginal community and Paul Frits, LLB, a Mohawk attorney who has a background in financing business projects with Toronto law firms and the investment community. Both are responsible for working with Windrush Energy to satisfy interests and reach an agreement with Six Nations by employing certain Six Nations contractors to work on the projects and granting to Windrush Energy by way of 21 year leases, with an option to renew, air-rights at the project sites.

An initial meeting at the Six Nations Confederacy Council ("SNCC") was held on February 3, 2007. The SNCC agreed in principal with the concept of wind energy for the generation of power and was open to discussions through a Joint Committee to be formed to discuss the proposal for leasing air-rights to Windrush Energy. Further meetings are contemplated including outstanding appointments with the Six Nations Land & Resource Department in March 2007 with Chief David General and elected band Council representatives.

Windrush Energy contracted Archaeological Services Inc. (ASI) to determine the impact of the Project on the Huron Wendat. ASI concluded the following:

> "Due to the location of the project relative to the historic homelands of the peoples who made up the Huron Confederacy in Ontario up to the mid-seventeenth century A.D., it is unlikely that any First Nation archaeological sites that may be located within the project area will prove to have been occupied by the direct ancestors of the Huron-Wendat people today. It is therefore not

anticipated that the project will present any significant concerns to the Huron-Wendat in terms of their cultural heritage legacy. "

At present, Windrush is in discussions with the legal counsel for the Huron Wendat, David Donnelly of Gilbert's LLP, and has obtained a letter confirming that they do not have any direct interest in the Project but are interested in being consulted on the findings from a Stage II Archaeological Assessment.

Initial discussions between representatives of Windrush Energy and Saugeen Nation have been held. The initial view of Chief Randall Kahgee is that the project area is not part of the Saugeen watershed. Discussions will continue with the David McLaren of Nawash First Nation with whom Saugeen Nation has a collaborative relationship. David McLaren is the joint Environmental Office Coordinator for both first nations.

Windrush Energy recently placed a full-page advertisement in Turtle Island News, the largest First Nations newspaper in Canada. The purpose of the advertisement is to communicate with the aboriginal community and make them aware of the company's web site. A copy of the advertisement can be found in Appendix H.

The Chairman of Windrush Energy, J.C. Pennie, in consultation with First Nations is participating in educating other wind energy developers on how to partner with First Nation communities by presenting a workshop session at the Canada Forum on the *Renewable Energy Projects with First Nations, Industry and Government Partnerships*. The event will be held April 16 – 17, 2007 in Toronto.

Grand Valley Wind Farms Inc. has signed a Memorandum of Understanding ("MOU") with a Six Nations contractor, Dan Elliott Construction, to undertake foundation excavation and backfill, service road construction and electrical conduit trenching work. A final contract between Grand Valley Wind Farms Inc. and Dan Elliott Construction is subject to the terms and conditions specified in the MOU.

Effects of the Project on First Nations and Aboriginal Communities

In preliminary discussions with the First Nations communities, the utilization of the wind to produce electricity was viewed as a positive environmental activity. However, the

ownership of the wind was voiced as a concern. To address the concern, Windrush Energy is in discussions to lease the air-rights at the project sites. Prior to the construction, Grand Valley Wind Farms Inc. intends to negotiate in good faith a lease agreement with Six Nations who have ongoing claims in the area.

Archaeological interests were expressed by all five First Nation groups identified. The Stage I Archaeological Assessment has already been performed and a Stage II Archaeological Assessment will be performed during excavation work. Representatives from the Six Nations Six Nations Confederacy Council and the Huron-Wendat Nation will be invited to observe the Stage II Archaeological Assessment and the findings will be shared with the other Aboriginal and First Nations groups.

10. SUMMARY AND CONCLUSIONS

The Environmental Screening Report is consistent with the requirements of Ontario Regulation 116/01 as documented in the EA Guide.

A comprehensive Stakeholder Consultation and Information Disclosure Program were developed to identify the key issues of interest to the local community. Based on the support of the Township of East Luther – Grand Valley, lease holders, and neighbours, the immediate community is satisfied that any negative environmental impacts from the project can be mitigated.

This ESR document demonstrates the commitment that Grand Valley Wind Farms Inc. has to the best practices it intends to employ and defines the means by which the Project addresses the stakeholder interests expressed.

Based upon a detailed and thorough analyses of the interests identified through the Stakeholder Consultation and Information Disclosure Program, and those identified by the project team through the MOE's Environmental Screening Process, the following features were identified as potentially being affected by the project prior to the implementation of protection and mitigation measures:

- sedimentation and soil erosion;
- agriculture resources and practices;
- surface and groundwater;
- wildlife, VTE species, and habitats;
- migratory birds;
- neighbourhood and community characteristics;
- residential, institutional, or commercial land-use;
- environmental noise;
- public health and safety;
- historical and archaeological resources;
- aesthetics / viewscape;
- accidents and malfunctions; and
- effects of the environment on the project.

Once protective and mitigative measures are applied, the project is expected to have few

net negative effects on the environment. The potential for cumulative environmental effects is also generally considered minimal to low.

Significant adverse net environmental effects have been avoided through careful site selection. The project is located in a rural area and thus has a minimal effect on the natural features, while minimizing effects on agriculture lands and operations.

All potentially adverse residual effects that could not be avoided by siting can be effectively mitigated using well-known and proven methods and technologies. For example:

- Avian mortality due to collision with the turbines is anticipated to be negligible given the absence of known migratory flight paths in the project area. Effects to breeding bird habitat have been minimized through the mitigation.
- Environmental noise levels at surrounding receptors are predicted to be within the applicable environmental noise criteria.
- The study commissioned by the proponent has shown that there will be no negative effect on property values of lands within the viewshed of the wind farm.

Significant net positive effects are expected to result from development of the Project. In particular, the Project benefits include:

- The project will provide up to 20 MW of clean renewable electricity.
- No emissions of green house gases and every kilowatt hour of clean, emission-free wind energy produced is a kilowatt hour that does not require the burning of non-renewable fuel sources.
- Construction activities will create construction jobs in the area.
- Operation activities will create up to employment opportunities for local residents.
- The investment into renewable energy in the area will secure electrical power requirements for the local area and contribute to the Ontario government's goal of eliminating the reliance on coal-fired generating stations.
- Increases real estate values.
- Increases local employment.
- Increases farm income.
- Municipal taxes paid by Grand Valley Wind Farm Inc. will increase the local property tax base.

In conclusion, the project is not likely to cause important environmental effects, taking into account the implementation of appropriate mitigation measures. Further, the Project will positively contribute economic resources to the community, while not contributing green house gases.

11. LIST OF SUPPORTING DOCUMENTS

Agriculture and Agri-Food Canada. 2004. Soil Survey of Dufferin County. CanSIS. Online: http://sis.agr.gc.ca/cansis/publications/on/on38/

Arnett, E.B. (technical editor). 2005. Relationships Between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Fatality Search Protocols, Patterns of Fatality, and Behavioral Interactions with Wind Turbines. A final report submitted to the Bats and Wind Energy Cooperative. Bat Conservation International. Austin, Texas.

Askins, R.A. 2002. Restoring North America's Birds 2nd Edition, Lessons from Landscape Ecology. Yale University, London. pp. 1-25.

Barrios, L. and A. Rodriguez. 2004. Behavioural and Environmental Correlates of Soaring-Bird Mortality at On-shore Wind Turbines. Journal of Applied Ecology. 41 (1): 72-81.

Bat Conservation International. 2004. Bats and Wind Energy: Key Findings. www.batcon.org.wind.findings.html. Accessed on July 20, 2005.

BLM (Bureau of Land Management) and DOI (US Department of the Interior). 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. Washington, D.C.

Cadman, M.D., P.F.J. Eagles, and F.M. Helleiner. 1987. Atlas of the Breeding Birds of Ontario. Federation of Ontario Naturalists and Long Point Observatory. University of Waterloo Press, Waterloo, Ontario.

Chapman, L.J. and D.F. Putnam. 1984. The Physiography of Southern Ontario: Third Edition. Toronto: Ontario Ministry of Natural Resources (Ontario Geological Survey. Special volume 2).

Cheskey, E.D. and W.G. Wilson. 2001. Luther Marsh Important Bird Area Conservation Plan.

Clemson University Radar Ornithology Laboratory. 2005. Website tutorial. Online: http://virtual.clemson.edu/groups/birdrad/index.htm

Colson and Associates. 1995. Avian Interaction with Wind Energy Facilities: a summer. Prepared for the American Wind Energy Association, Washington, D.C

Cooper, J. 2004. Monitoring Plan for Potential Wildlife Impacts Associated with Knob Hill Wind Farm. Prepared by Manning, Cooper and Associates for Sea Breeze Energy Inc.

Couturier, A. 1999. Conservation Priorities for the Birds of Southern Ontario. Unpublished Bird Studies Canada Report.

Curry, R. C., and P. Kerlinger. 2000. Avian mitigation plan: Kenetech model wind turbines, Altamont Pass WRA, California. In Proceedings of National Avian-Wind Power Planning Meeting III, San Diego, California, May 1998, prepared for the Avian Subcommittee of the National Wind Coordinating Committee by LGL Ltd., King City, Ontario. 18–27.

De Lucas, M. F. Guyonne. A. E. Janss and Ferrer, M. 2003. The Effects of Wind Farm on Birds in a Migration Point: the Strait of Gibraltar: Kluwer Academic, Netherlands

De Lucas, M., G.F.E. Janns, M. Ferrer. 2003. The effects of a wind farm on birds in a migration point: the Strait of Gibraltar. Biodiversity and Conservation, 13(2): 395-407.
Dillon Consulting Ltd. 2000. Wind Turbine Environmental Assessment: Draft Screening Document. Prepared for TREC and Toronto Hydro.

DFO. 1999. Class Authorization System for Agricultural Drains in the Southern Ontario Region.

Dirksen, S. Winden.V.D. and Spaans, A. L. 1998. Nocturnal Collision Risks of Birds with Wind Turbines in Tidal and semi-offshore areas. In: Ratto C.F and Solari G. (eds), Wind Energy and Landscape. Balkema, Rotterdam, The Netherlands.

Dobbyn, J. 2004. Atlas of the Mammals of Ontario.

Dunne, P., D. Sibley, and C. Sutton. 1988. Hawks in flight. Houghton Mifflin, Boston, Massachusetts, USA.

Environment Canada, 2005. Climate Weather Archives. Retrieved on May 5, 2005. Online from: http://www.climate.weatheroffice.ec.gc.ca/climateData/canada_e.html

Environment Canada, 2005. Wind Turbines and Birds A Guidance Document for Environmental Assessment. Prepared for Environment Canada by Bird Studies Canada.

Environment Canada Species at Risk, 2004. Species Status Listings. Last updated: December 7, 2004. Online:
http://www.sis.ec.gc.ca/ec_species/ec_species_e.phtml

Environment Canada. 2004. The Green Lane. Online:
http://www.weatheroffice.ec.gc.ca/canada_e.html

Environment Canada Species at Risk, 2004. Species Status Listings – Short-eared Owl. Last updated: November 10, 2004. Online:
http://www.speciesatrisk.gc.ca/search/speciesDetails_e.cfm?SpeciesID=60. January 3, 2006.

Erickson, W.P. 2004. Bird Fatality and Risk at New Generation Wind Projects. Proceedings of the Wind Energy and Birds/Bats Workshop: Understanding and Resolving Bird and Bat Impacts. Washington, D.C May 18- 19, 2004. Prepared by RESOLVE., Inc. Washington, D.C

Erickson, W., J. Jefferey, D. Young, K. Bay, R. Good, K. Sernka, and K. Kronner. 2003. Wildlife Baseline Study for the Kittitas Valley Wind Project: Summary of Results from 2002 Wildlife Surveys. Report prepared for Zilkha Renewable Energy.

Erickson, W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments. West, Inc.

Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, K. J. Sernka and R.E.

Good. 2001. Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States. Western EcoSystems Technology Inc. National Wind Coordinating Committee.

Erickson, W.P., G.D. Johnson, M.D. Strickland, K. Kronner, and P.S. Becker. 1999. Baseline Avian Use and Behavior at the CARES Wind Plant Site, Klickitat County, Washington, Final Report. Western Ecosystems Technology, Inc. Cheyenne, Wyoming.

Gauthreaux, Jr, S.A. 1995. Suggested Practices for Monitoring Bird Populations, Movements and Mortality in Wind Resource Areas. 1994 National Avian-Wind Power Planning Meeting Proceedings.

Gauthreaux, S.A., Jr. 1980a. The Influence of Global Dimaological Factors on the Evolution of Bird Migratory Pathways. In S.A. Gauthreaux, Jr. and G. Zink, conveners, Symposium on patterns of bird migration and the geographical, meteorological, and climatological aspects. XVII International Ornithological Congress, Berlin, 1980

Gauthreaux, S.A. and C.G. Belser. 2003. Bird Movements on Doppler Weather Surveillance Radar. Birding 35 (6): 616-628.

Gerson, H. 1984. Habitat Management Guidelines for Bats of Ontario. Ontario Ministry of Natural Resources. 41 p.

GRCA & MNR. 1998. Grand River Fisheries Management Plan. Avaliable at MNR Guelph district office, or GRCA office in Cambridge, Ontario. September 1998.

GRCA. 1996. Upper Grand River Aquatic Study; Preliminary Report for the 1996 Field Monitoring Program (Draft). Compiled by Lori Richardson.

Higgins, K. F., R.G Osborn, C.D. Dieter, and R.E Usgard. 1996. Monitoring of Seasonal bird Activity and Mortality at the Buffalo Wind Resource Area, Minnesota, 1994-1995. Completion Report. Submitted to Keneteach Windpower. On file, Wildlife and Fisheries Sciences Department, South Dakota State University.

Hoover, S.L, and Morrison M.L. 2005. Behaviour of Red-tailed Hawks in a Wind Turbine Development, California State University: Sacramento, C.A

Hoover, S. L. 2000. The Response of Red-tailed Hawk and Golden Eagles to Topographical Features, Weather, and Abundance of Dominant Prey Species at the Altamont Pass Wind resource Area, California, California State University, Sacramento, California

Hötker, H., K-M. Thomsen, and H. Klöster. 2004. Auswirkungen Regenerativer Energiegewinnung auf die Biologische Vielfalt am Beispiel der Vögel und der Fledermäuse – Fakten, Wissenslücken, Anforderungen an die Forschung, Ornithologische Kriterien zum Ausbau von Regenerativen Energiegewinnungsformen. Gefördert vom Bundesamt für Naturschutz; Förd. Nr. Z1.3-684 11-5/03.

Howe, R.W. and R. Atwater. 1999. The Potential Effects of Wind Power Facilities on Resident and Migratory Birds in Eastern Wisconsin. Richter Museum of Natural History Species Research Report No. 5. Prepared for the Wisconsin Department of Natural Resources, Bureau of Integrated Science Services.

Howell, J. A. 1997. Avian Mortality at Rotor Swept Area Equivalents, Altamont Pass and Montezuma Hills, California. Transactions of the Western Section of the Wildlife Society 33:24-29.

IBA: 2005. Important Bird Areas of Canada. http://www.ibacanada.com/. December 2005.

IBA Canada. 2004. Luther Marsh, Grand Valley, Ontario – IBA Site Summary. Online: http://www.bsc-eoc.org/iba/site.jsp?siteID=ON059

James, R.D. 2003. Bird Observations at the Pickering Wind Turbine. Ontario Birds 21 (2): 84-97.

James, R.D. and G. Coady. 2004. Bird Monitoring at Toronto's Exhibition Place Wind Turbine. Ontario Birds 22 (2): 79-88.

Janes, W.S. 1985. Habitat Selection in Raptorial Birds. Academic Press: London, United kingdom

Johnson, G.D., M.K. Perlik, W.P. Erickson, and M.D. Strickland. 2004. Bat activity, composition, and collision mortality at a large wind plant in Minnesota. Wildlife Society Bulletin 2004, 32(4): 1278-1288.

Johnson G. D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd and S.A. Sarappo. 2002. Collision Mortality of Local and Migrant Birds at a Large Scale Wind-Power Development on Buffalo Ridge, Minnesota. Wildlife Society Bulletin 30 (3): 879-887.

Johnson, G.D. 2000. Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-Year Study. Minnesota.

Keeley, B., S. Ugoretz, and D. Stickland. 1999. Bat Ecology and Wind Turbine Considerations. Avian Interations with Utility Structures Conference Presentation. Charleston, South Carolina.

Keppie, D. M. and R. M. Whiting, Jr. 1994. American Woodcock (Scolopax minor). In The Birds of North America, No. 100 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Kerlinger, P. 1995. How Birds Migrate. Stackpole, Mechanicsburg, PA. 53-68 pp.

Kerlinger, LLC. and Curry. 2002. Consultants to the Wind Power Industry on Birds and other Wildlife Issues. Online: http://www.currykerlinger.com/default.htm

Kingsley, A. and B. Whittam. 2001. Potential Impacts of Wind Turbines on Birds at North Cape, Prince Edward Island. Prepared for the Prince Edward Island Energy Corporation by Bird Studies Canada.

Kingsley, A. and Whittam B. 2003. Shades of Green – A Bird's Eye View of Wind Energy. Prepared for Environment Canada/Canadian Wildlife Service by Bird Studies Canada. Online: www.ibacanada.com/pdf/BWCsp03.pdf

Kingsley, A. and B. Whittam. 2003. Wind Turbines and Birds: A Guidance Document for Environmental Assessment - Phase II Report. Prepared for Environmental Canada by Bird Studies Canada.

Kingsley, A. and B. Whittam (Bird Studies Canada). 2005. Wind Turbines and Birds: A Background Review for Environmental Assessment. Prepared for Environment Canada.

Kunz, T.H. 2004. Wind Power: Bats and Wind Turbines. Wind Energy and Birds/Bats: Understanding and Resolving Bird and Bat Impacts. Proceedings of a workshop in Washington, D.C., May 17-18, 2004.

Langston, R.H.W. and J.D. Pullan. 2004. Effects of Wind Farms on Birds. Nature and Environment, No. 139. Council of Europe Publishing, Strasbourg, FR.

Larsen, J.K. and J. Madsen. 2000. Effects of Wind Turbines and Other Physical Elements on Field Utilization by Pink-footed Geese (Anser brachyrhynchus): A Landscape Perspective. Landscape Ecology 15: 755-764.

Leddy, K., K.F. Higgins, and D.E. Naugle. 1999. Effects of Wind Turbines on Upland Nesting Birds in Conservation Reserve Program Grassland. Wilson Bulletin 111: 100-104.

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and its Application. Ontario Ministry of Natural Resources, Southcentral Science Station, Science Development and Transfer Branch. SCSS Field Guide FG-02/.

Lincoln, F. C., Peterson, S. R. and Zimmerman J. L. 1998. Migration of birds. U.S. Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. Circular
16. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/migratio/migration.htm

Mabee, T.J., B.A. Cooper, J.H. Plissner. 2004. A Radar Study of Nocturnal Bird Migration at the Proposed Mount Storm Wind Power Development, West Virginia, Fall 2003. Report prepared for Western Ecosystems Technology Inc. and NedPower US LLC

Massachusetts Audubon Society. 2005. Grassland Birds – Grassland Conservation Program. Online: www.massaudubon.org/Birds_&_Beyond/grassland/index.php

McLaren, L. (Upper Credit Field Naturalists). 2005. Personal Communication with Katharina Walton, Natural Resource Solutions Inc. Email dated September 7, 2005.

Meek, E.R., J.B. Ribbands, W.G. Christer, P.R. Davy, and I. Higginson. 1993. The Effects of Aero-generators on Moorland Bird Populations in the Orkney Islands, Scotland. Bird Study 40:140-143. In Dillon Consulting Ltd. 2000. Wind Turbine Environmental Assessment – Draft Screening Document. Prepared for WindShare and Toronto Hydro Energy Services Inc.

Milko, R., L. Dickson, R. Elliot, and G. Donaldson. 2003. Canadian Wildlife Service. Wings Over Water: Canada's Waterbird Conservation Plan. Cat. no. CW66-219/2003 ISBN 0-662-67101-5.

Ministry of Natural Resources. 2005. Dufferin County. Fact sheets: areas of natural and scientific interest.

Ministry of Natural Resources. 2000. Significant Wildlife Habitat: Technical Guide. OMNR, October 2000.

Morrison, M. 1998. Avian risk and fatality protocol. National Renewable Energy Laboratory, Golden, CO.

Mossop, D.H. 1998. Five Years of Monitoring Bird Strike Potential at a Mountain-top Wind Turbine, Yukon Territory. PWGSC Contract No. 234403-9569/01-SQ. CANMET Energy Tech. Centre, Energy Tech. Br., Energy Sector, Dept. Nat. Res. Canada, Ottawa. In Dillon Consulting Ltd. 2000. Wind Turbine Environmental Assessment – Draft Screening Document. Prepared for WindShare and Toronto Hydro Energy Services Inc.

Mueller, H. 2005. Wilson's Snipe (Gallinago delicata). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Wilsons_Snipe/.

National Audubon Society. 2006. The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc [Accessed January 4, 2006].

Natural Heritage Information Centre, Ontario Ministry of Natural Resources, 2005, <http://nhic.mnr.gov.on.ca/MNR/nhic/queries/geographic.cfm

Natural Resource Solutions Inc. 2005a. Characterization of Biological Resources. Superior Wind Prince Power Project.

Natural Resource Solutions Inc. 2005b. Overview of Biological Features – Birds. Kingsbridge Wind Power Project.

Natural Resource Solutions Inc. 2005c. Summary of 2005 Bird Investigations Grand Valley Wind Power Project-September 2005

Natural Resource Solutions Inc. 2006a. Blue Highlands Wind Energy Project. Environmental Report.

Natural Resource Solutions Inc. 2006b. Results of Fall 2005 Bird and Bat Monitoring. Brookfield Power Wind. Superior Wind Prince Power Project.

Natural Resource Solutions Inc. 2006c. Grand Valley Wind Energy Project Aquatic Habitat Characterization-March 2006

Natural Resource Solutions Inc. 2007. Ashton Ridge Golf Course Wind Farm Project Aquatic Habitat Characterization. Prepared for Grand Valley Wind Farms Inc. February 2007.

National Weather Center for the Atmospheric Research. 2005. NEXRAD Weather Data. Online: http://www.rap.ucar.edu/weather/radar/

O'Harra, D. 2005. Shorebirds: Winging Between Hemispheres. Prepared for the U.S. Fish and Wildlife Service. Online: http://www.fws.gov/migratorybirds/shrbird/shrbird.html

Oldham, M.J. and W.F. Weller. 2000. Ontario Herpetofaunal Atlas. Natural Heritage Information Centre, Ontario Ministry of Natural Resources. http://www.mnr.gov.on.ca/MNR/nhic/herps/ohs.html (updated 15-01-2001).

Ontario Breeding Bird Atlas. 2001. Guide for Participants. Atlas Management Board, Federation of Ontario Naturalists, Don Mills.

Ontario Breeding Bird Atlas. 2000-2005. Species list for Square 17NJ56. www.birdsontario.org/atlas/printablesumm.jsp

Ontario Ministry of Natural Resources. 2005. Natural Heritage Information Centre. http://nhic.mnr.gov.on.ca/MNR/nhic/species.cfm

Ontario Partners in Flight. 2005. Ontario Landbird Conservation Plan: Lower Great Lakes/St. Lawrence Plain (North American Bird Conservation Region 13), Priorities, Objectives and Recommended Actions. Draft April 2005. Environment Canada and Ministry of Natural Resources.

Orloff, S. 1992. Tehachapi Wind Resource Area Avian Collision Baseline Study. Work performed by BioSytems Analysis, Inc. Tiburon, C.A Sacramento, CA: California Energy Commission

Orloff, S. and A. Flannery. 1992. Wind Turbine Effect on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County WRAs. Prep. By BioSystems Analysis, Inc., Tuburon, CA, for Calif. Energy Comm., Sacramento, CA.

Osborn, R.G., C.D. Dieter, K.F. Higgins, and R.E. Usgaard. 1998. Bird Flight Characteristics Near Wind Turbines in Minnesota. The American Midland Naturalist. 139 (1): p. 29-38.

Percival, S.M. 2001. Assessment of the Effects of Offshore Wind Farms on Birds. Report ETSU W/13/00565/REP, DTI/Pub URN 01/1434. In A. Kingsley and B. Whittam (Bird Studies Canada). 2005. Wind Turbines and Birds: A Background Review for Environmental Assessment. Prepared for Environment Canada.

Percival, S.M. 1999. Birds and Wind Turbines: Managing Potential Planning Issues. In J.K. Larsen and J. Madsen. 2000. Effects of Wind Turbines and Other Physical Elements on Field Utilization by Pink-footed Geese (Anser brachyrhynchus): A Landscape Perspective. Landscape Ecology 15: 755-764.

Petterson, L. 2004. The properties of sound and bat detectors. Pp. 9-12, In: Bat Echolocation Research: Tools, techniques and Analysis(R.M. Brigham, E.K.V. Kalko, G. Jones, S. Parsons, and H.J.G.A. Limpens, eds.). Bat Conservation International, Austin, Texas.

Read, R. (Environment Canada). 2005. Personal Communication with B. Woodman, Natural Resource Solutions Inc. Email dated December 5, 2005.

Reynolds, D.S. 2004. Draft Study Proposal for Bat Activity Monitoring Survey: Laurel Hill Wind Project Lycoming County, Pennsylvania. Prepared for Catamount Energy Corporation in Rutland Vermont.

Richardson, W.J. 1990. Bird Migration and Wind Turbines: Migration Timing, Flight Behaviour and Collision Risk. LGL Ltd., environmental research associates. 132-138 pp.

Sagrillo, M. 2003. Wind Turbines and Birds – Putting the Situation in Perspective in Wisconsin. Focus on Energy. Online: www.focusonenergy.com

Sargent, M.S and Carter, K.S., ed. 1999. Managing Michigan Wildlife: A Landowners Guide. Michigan United Conservation Clubs, East Lansing, MI. 297pp.

Skagen, S.K. and Knopf. 1994. Migrating Shorebirds and Habitat Dynamics at a Prairie Wetland Complex. Wilson Bulletin 106 (1): 91-105. In O'Harra. 2005. Shorebirds: Winging Between Hemispheres. Prepared for the U.S. Fish and Wildlife Service. Online: http://www.fws.gov/migratorybirds/shrbird/shrbird.html

Smith, G. D., and J.R. Murphy. Breeding ecology of raptors in the eastern great basin of Utah. Scientific Bulletin Biological Service 18: Brigham Young University, Provo, Utah, USA.

Stantec Consulting Ltd. 2005. Fall Migration and Bats Report: Melancthon Grey Wind Project. Prepared for Canadian Hydro Developers Inc.

Stantec Consulting Ltd. 2005. Spring Migration Report: Melancthon Grey Wind

Project. Prepared for Canadian Hydro Developers Inc.

Strickland, M.D., G.D. Johnson, and W.P. Erickson. 1998. Avian use, flight behaviour and mortality on the Buffalo Ridge. Minnesota Wind Resource Area. In Dillon Consulting Ltd. 2000. Wind Turbine Environmental Assessment – Draft Screening Document. Prepared for WindShare and Toronto Hydro Energy Services Inc.

The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/; DEC 2005.

Thelander, C.G., K.S. Smallwood, and L. Rugge. 2003. Bird Risk Behaviors and Fatalities a the Altamont Pass Wind Resource Area. Prepared for the United States Department of Energy, National Renewable Energy Laboratory by BioResource Consultants.

Township of Wellington North. 2005. Luther Marsh Conservation Area . http://www.wellington-north.com/dept-page.php?a=1&d=20&p=66&sp=66. Accessed on 15-12-05.

Tulp, I., H. Schekkerman, J.K. Larsen, J. van der Winden, R.J.W. van de Haterd, P. van Horssen, S. Dirksen, and A.L. Spaans. 1999. Nocturnal Flight Activity of Sea Ducks Near the Windfarm Tunø Knob in the Kattegat. Bureau Waardenburg bv.

United States Fish and Wildlife Service – Department of the Interior. 2003. Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines.

University of California, 1998. A Population Study of Golden Eagles in the Altamont Pass Wind Resource Area: Population Trend Analysis 1994-1997. NREL/SR-500-26092. Work performed by Predatory Bird Research Group, Long Marine Laboratory, Santa Cruz, CA. Golden, CO: National Renewable Energy Laboratory.

University of Wyoming, College of Engineering, Department of Atmospheric Science. 2005. Weather website. Online: http://weather.uwyo.edu/upperair/sounding.html

Walcott, C. 1995. Titling at Windmills. Living Bird (summer 1995).

Winkelman, J.E. 1989. [Birds at a Windpark Near Urk: Bird Collision Victims and Disturbance of Wintering Ducks, Geese, and Swans.] Rijksinstituut voor Natuurbeheer, Arnhem. RIN-Rappoet 89/15.

Young, Jr., D.P., D. Strickland, W.P. Erickson, and K.J. Bay (West Inc., Concord College, ABR Inc.). 2004. Baseline Avian Studies Mount Storm Wind Power Project Project, Grant County, West Virginia. Prepared for NedPower Mount Storm, LLC.

12. SIGNATURE OF SCREENING EA AUTHORS

Environmental Assessment conducted by:

Grand Valley Wind Farms Inc.

Proponent

March 1, 2007_____

Date

Per:_____

Signature J.C.Pennie, President

Environmental Business Consultants

Consultant

March 1, 2007_____

Date

_____

Signature John Nicholson

13. Appendices

Appendix A - Site Plan and Photos
Appendix B - Natural Environmental Resources Report
Appendix C – Socio-Economic Report
Appendix D – Acoustic Assessment Report
Appendix E – Magnetic Field Survey
Appendix F - Stage 1 Archaeological Assessment
Appendix G – Property Value Assessment
Appendix H - Public Consultation Documents
Appendix I - EA Screening Checklist (Ontario Regulation 116/01)
Appendix J - Turbine Specifications and Geotech Drilling Report