

**Renewable Energy Systems Canada  
Inc.  
Talbot Wind Farm  
Environmental Review  
Report/Environmental Impact  
Statement**  
*Final Report – May 2009*

07-7382

*Submitted by*

**Dillon Consulting  
Limited**

## **Executive Summary**

Renewable Energy Systems Canada Inc. (RES Canada) proposes to construct and operate a 43 turbine (98.9 MW) wind farm on private land, located in the Municipality of Chatham-Kent near the community of Ridgetown. The proposed project is referred to as the Talbot Wind Farm (“the project”).

This project will assist Chatham-Kent in meeting its stated goals of having significant amounts of renewable energy established within its jurisdiction and support the provincial plan (the IPSP) to close existing coal-powered electricity generation by 2014, thus reducing some of the Province’s largest emission sources of greenhouse gases.

An Environmental Review Report/Environmental Impact Statement (ERR/EIS) has been completed to fulfill provincial and federal environmental assessment regulatory requirements. An interdisciplinary team of professionals prepared this report based on extensive field work and data collection activities including one year of bird survey work and extensive bat surveys. Natural heritage survey programs were guided by the input of provincial and federal government agencies.

Significant effects to the natural and social environment have been avoided through the careful siting of turbines and support facilities. The project is located on agricultural land. The turbines, access roads and ancillary facilities have been sited to minimize the impact to agricultural operations. The turbines are also well set back from residences to ensure that provincial noise criteria will be met. Mitigation measures have been developed to minimize effects on the environment (including the social and natural environment). RES Canada is committed to the development and implementation of environmental protection and management measures to guide the development and operation of the project.

Extensive opportunities for public input have been provided including project notices and public open houses. First Nations and Aboriginal communities have been notified and invited to participate throughout the Environmental Review process. Consultation activities with them are ongoing with respect to the Aboriginal Consultation Agreement entered into with the Crown. RES Canada intends to continue consultation activities with interested members of the public, interest groups, agencies, First Nations, and Aboriginal communities through all phases of the project.

The overall conclusion of this ERR/EIS is that this project can be constructed, operated and decommissioned without any significant impacts to the environment including the social and natural environment. Furthermore, there are significant net benefits of this project, including the generation of clean renewable energy, an increased municipal tax base for Chatham, and increased employment opportunities. The operation of the wind farm will also provide annual economic benefits through royalties to landowners and a continuing need for supplies and services from the Chatham-Kent rural economy.

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## 1. Project Summary

The proponent, Renewable Energy Systems Canada Inc. (RES Canada), is proposing to construct and operate a 43 turbine (98.9 MW) wind farm on private land located in the Municipality of Chatham-Kent. The proposed project is referred to as the Talbot Wind Farm (“the project”). In addition to the turbines, the project will require a new 230 kV transmission line (single circuit) to be constructed to connect the Talbot Wind Farm to the provincial grid system, approximately 10 kilometers away.

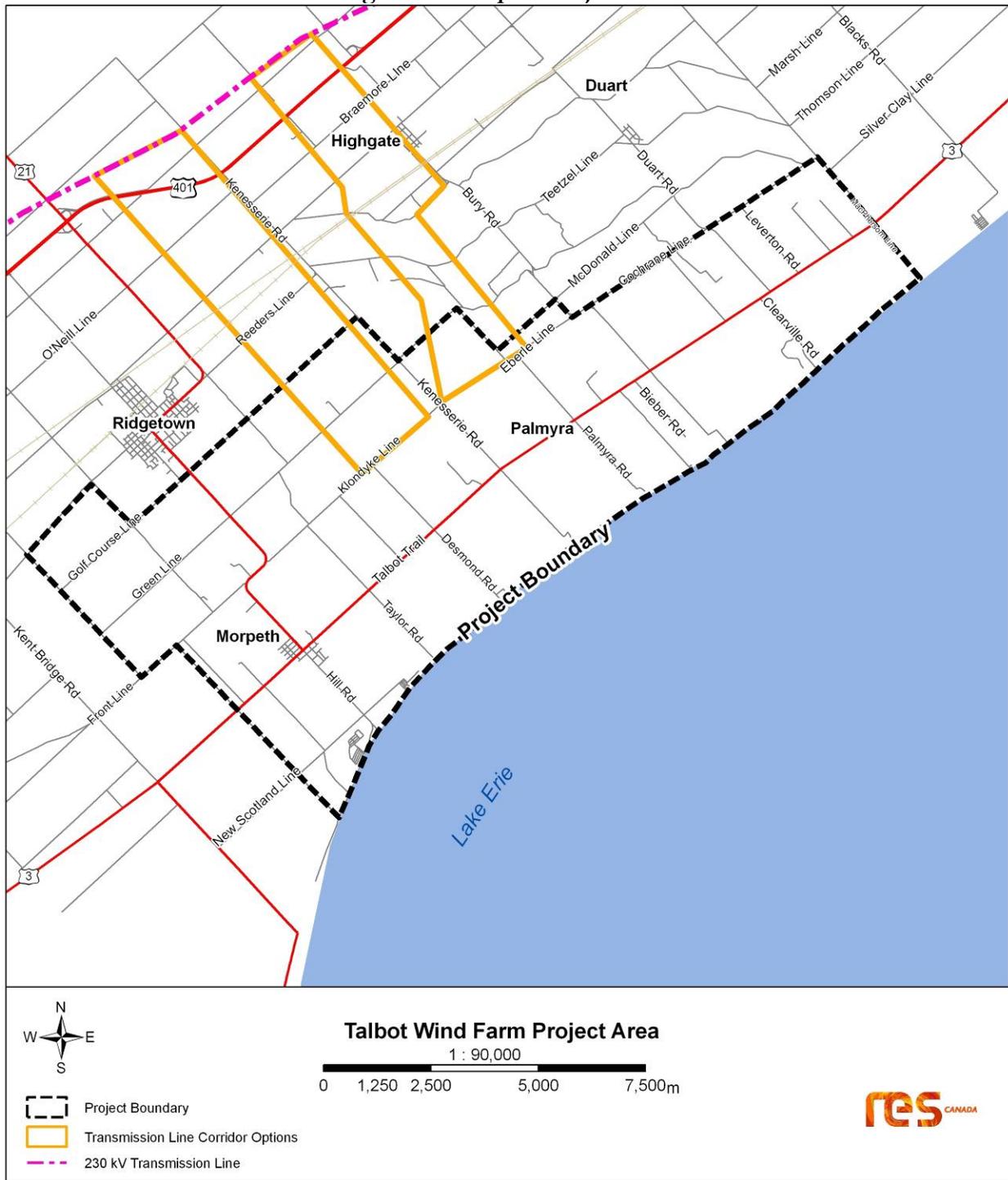
This Environmental Review Report (ERR) documents the results of the environmental review that was undertaken for the proposed project which includes the electrical transmission line.

The project will be located in the southern portion of East Kent in Chatham-Kent near the community of Ridgetown on the north shore of Lake Erie (see **Figure 1.1**). **Figure 1.2** presents a map of the project area. The project location is largely rural in nature with land under agricultural use.

**Figure 1.1: Project Area in Regional Context**



Figure 1.2: Map of Project Area



The project components include:

- 43 Siemens SWT-2.3-101 turbines with a pad mount transformer stepping up from 690V to 34.5Kv;
- The collector system will be buried (except in technically impossible or very difficult places such as water crossings and in the presence of rock) and will be single and double 34.5 kV circuits (to connect the wind turbines to the local electrical distribution system);
- A single circuit overhead pole 230 kV transmission line to connect to the provincial grid;
- Pad mounted transformers (located at or near the base of each tower);
- Substation to raise the voltage from 34.5 kV to 230 kV and a switch station;
- Turbine access roads; and
- Staging areas for assembly of wind turbines.

The manufacturer's specifications for the Siemens SWT-2.3-101 wind turbines are outlined in **Table 1.1**.

<b>Table 1.1: Wind Turbine Description – Siemens 2.3-101</b>	
Operating Data	Specification
<b>General</b>	
Rated Capacity	2300 kW
Cut-in wind speed (m/s)	4
Cut-out wind speed (m/s)	25
Rated wind speed (m/s)	12-13
<b>Rotor</b>	
Number of rotor blades	3
Rotor diameter (m)	101
Swept area (m <sup>2</sup> )	8000
Rotor speed (rpm)	6-16 rpm
<b>Tower</b>	
Hub height (m)	80
Power Control	Pitch regulation with variable speed

## **1.1 Applicable Government of Canada Approvals**

As RES Canada intends to apply for funding under the federal ecoENERGY for Renewable Power Program (ecoENERGY), the requirements of the *Canadian Environmental Assessment Act* (CEAA) will need to be met in the form of a CEAA Screening. As Natural Resources Canada (NRCan) administers the ecoENERGY program, they will act as the Responsible Authority under the CEAA.

Approvals under the *Canadian Fisheries Act* and the *Navigable Water Protection Act* are not expected not be required.

RES Canada has initiated the CEAA screening process through submission of a “Project Description” to NRCan as part of its ecoENERGY application.

## **1.2 Applicable Government of Ontario Approvals**

The Talbot Wind Farm project is subject to the *Ontario Environmental Assessment Act* (Ontario EA) as per the requirements of Regulation 116/01 (Electricity Projects). As described in the Ministry of the Environment March 2001 *Guide to Environmental Assessment Requirements for Electricity Projects*, for wind projects in excess of 2 MW (a Category B project), an Environmental Screening Process must be carried out.

An Environmental Screening process involves the consideration of a number of screening criteria as set out by the “EA Electricity Guide”. To be proactive and conservative, and to ensure all environmental issues are fully considered as part of the planning process, RES Canada has self-elevated the Talbot project from an Environmental Screening to an Environmental Review (ER). This report documents the results of the ER that was undertaken for the Talbot Wind Farm project.

## **1.3 Coordinated Approach to Federal and Provincial Approvals**

This Environmental Review (ER) has been undertaken recognizing the various federal, provincial and municipal approvals processes that apply to this project. The ERR has been prepared to be consistent with the MOE’s Environmental Assessment process (i.e. environmental screening) and federal CEAA requirements (including Natural Resources Canada’s requirements).

## **1.4 Project Proponent**

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## **1.5 Title of Project**

The name of the project is the Talbot Wind Farm. Throughout this ERR/EIS the terms “project” and “Talbot Wind Farm” are used interchangeably and include the transmission line component of the study.

## **1.6 Project Location**

The project is located in the municipality of Chatham-Kent. Chatham-Kent was formed in 1998 through the amalgamation of 23 municipalities. The study area is located in East Kent and is comprised of approximately 11,500 hectares of land. **Figure 1.1** illustrates the location of the project in southwestern Ontario.

## **1.7 Estimated Capacity of Wind Farm**

Through a total of forty-three (43) 2.3 MW Siemens turbines, the wind farm will have a nameplate capacity of 98.9 MW.

## **1.8 Construction Schedule**

It is anticipated that project construction would be initiated in 2009 with the project being commissioned in 2010.

Description of the construction, operation, and decommissioning phases of the project are provided in **Table 2.1**.

## **1.9 NRCan’s Involvement in the Project**

As RES Canada intends to apply for funding under the federal ecoENERGY for Renewable Power Program, the requirements of the *Canadian Environmental Assessment Act* (CEAA) will need to be met in the form of a CEAA Screening. As Natural Resources Canada (NRCan) administers the ecoENERGY program, it is the project proponent’s understanding that they will act as the Responsible Authority under the CEAA.

## **1.10 Federal and Provincial Agencies Involved in the Environmental Review**

The following agencies were contacted through this study:

### ***Federal Agencies***

- Natural Resources Canada (NRCan)
- Indian and Northern Affairs Canada (INAC)
- Canadian Environmental Assessment Agency (CEAA)
- Environment Canada (EC) / Canadian Wildlife Service (CWS)
- Department of Fisheries and Oceans (DFO)
- Transport Canada (TC)
- NAV Canada

### ***Provincial Agencies***

- Ministry of the Environment (MOE) – London Regional
- Ministry of Natural Resources (OMNR) – Aylmer District
- Ministry of Transportation Ontario (MTO) – Southwestern Region
- Ministry of Energy – Southwest Region
- Ministry of Culture – Southwest Region
- Ministry of Agriculture and Food (OMAF) – Agricultural Land Use Unit
- Ministry of Municipal Affairs (MMA) – Southwest Ontario
- Government of Ontario Public Safety Network (Communication Towers)

### ***Conservation Authorities***

- Lower Thames Valley Conservation Authority (LTVCA)

## **1.11 Key Conclusions of the ERR/EIS**

This ERR/EIS has been completed to fulfill part of the required provincial and federal regulatory requirements for the development of the Talbot Wind Farm. This ERR/EIS is consistent with the provisions of Ontario Regulation 116/01 for a Category B project and with the *Canadian Environmental Assessment Act* (to fulfill NRCan CEAA requirements). A team of interdisciplinary professionals completed this report using best practices. Field work and data collection was performed to assist in the determination of potential environmental effects, including effects on the social and natural environment. Key data collection activities include one year of bird survey work and extensive bat surveys. Mitigation measures have been developed to manage the potential environmental effects. RES has made a commitment to implement all mitigation plans referenced in this ERR.

Significant effects to the environment, including the social and natural environment, have been avoided through careful site selection and good planning and adherence to regulatory requirements. The project is located in a rural area on agricultural land where the wind farm will not interfere with the existing land uses.

**The overall conclusion of this ERR/EIS is that this project can be constructed, operated and decommissioned without any significant impacts to the environment, including the natural and social environment.**

Further, there are significant net benefits of this project including the generation of clean renewable energy, an increased municipal tax base for Chatham-Kent, and increased employment opportunities, particularly during the construction stage. The operation of the wind farm will also provide annual economic benefits through royalties to landowners and a continuing need for supplies and services in the Chatham-Kent rural economy.

## **1.12 ERR/EIS Study Team**

Dillon Consulting Limited has prepared this Environmental Review Report/ Environmental Impact Statement. In preparing this ERR/EIS; Dillon was supported by Valcoustics (Noise), Echo Tracks (Bats), Cultural Resource Management Group (Archaeology), and Ortech (Visual Simulations).

### **1.13 Report Structure**

**The report is structured as follows:**

Section 2.0 – Project Description  
Section 3.0 – Scope of Assessment  
Section 4.0 – Permits and Approvals  
Section 5.0 – Stakeholder Consultation  
Section 6.0 – Environmental Features Screening  
Section 7.0 – Wind Farm Effects Assessment and Mitigation  
Section 8.0 - Transmission Line Effects Assessment and Mitigation  
Section 9.0 – Project Follow-up Measures and Monitoring  
Section 10.0 – Conclusions  
Section 11.0 - References

There are also several appendices which contain further details regarding the studies that were conducted including:

Appendix A Turbine Site Coordinates  
Appendix B Public Consultation Materials  
Appendix C Communication Towers Consultation  
Appendix D Natural Heritage Report  
Appendix E Bird Study Report  
Appendix F Bat Study Report  
Appendix G Archaeology Report  
Appendix H Noise Analysis Report  
Appendix I Visual Assessment Report  
Appendix J Flicker Analysis Report

## **2. Project Description**

RES Canada is proposing to develop the Talbot Wind Farm. The project will form part of the provincial government's target of procuring 10% of all electrical generating capacity to be sourced from renewable sources by 2010 (2700 MW). This project will help Ontario meet its electricity needs while having no emissions of smog and greenhouse gases during its operation. The location of this project is based on the following factors:

- Strong Wind Resource - The shores of Lake Erie have a very good to excellent wind resource, averaging from 7.5 m/s to 9 m/s, (OMNR, 2005).
- Access to Electrical Grid - Transmission connection points, with available capacity, in close proximity to the study area.
- Landowner Support - There is general public support for wind power in the vicinity of the study area and for the project. This is in part due to RES' unique "zonal payment" approach, whereby it signs option agreements with all major landowners in the project area. Windfarm revenues are distributed to all landowners in the "windfarm zone", both to those with turbines as well as their neighbours who may not have turbines or windfarm infrastructure. This approach shares benefits and reduces community division.

### **2.1 Description of Project Components**

The major components of the Project are as follows:

- Up to 43 wind turbines;
- Pad mount 690 V / 34.5 kV step up transformers (located at or near the base of each turbine);
- Underground, 34.5 kV collection system to link the wind turbines to the substation (above ground will be used in places where underground is technically impossible or extremely difficult, such as for water crossings and in the presence of underlying rock);
- Substation (to step up the electric output from 34.5 kV to 230 kV);
- A 10.2 km, 230 kV transmission line;
- A switching station at the point of connection with the provincial grid;
- Turbine access roads;
- Two meteorological towers (one at the western end and one at the eastern end of the wind farm);
- Staging areas for assembly of wind turbines, only during construction; and
- Batch plant for the manufacture of concrete (only during construction and only if concrete cannot be sourced from a local supplier. While it is expected that concrete can be sourced locally, if not, the site for the facility would be identified in consultation with applicable agencies including Chatham-Kent and the MOE).

A key aspect of all project phases will be on the minimization of environmental effects. The turbines have been sited to maximize distances from residences and sensitive natural features. Access roads and electrical connection lines have been routed to minimize their length, avoid sensitive natural

features, follow lot lines as much as possible, avoid tiling and drainage systems when possible, and minimize tree cutting. The routing also involved input from the landowners themselves in order to minimize the impact on agricultural activities.

To minimize the potential for environmental effects during the construction phase, the contractors will be made well aware of the environmental management commitments that have been made by RES Canada. An Environmental Management Plan (EMP) will be developed and followed during construction. A RES Canada site manager/compliance inspector will monitor the project contractor's compliance with the EMP throughout the construction period.

### **Wind Turbines**

The project will consist of 43 wind turbines that will generate 98.9 MW of electrical power. The turbine layout took into consideration the following factors:

- Results from wind profile studies and anemometer data;
- Potential effect on the local residents (i.e. noise limits, visual effects);
- Site access;
- Existing land use;
- Environmental and socio-economic information (i.e. wildlife habitat, vegetation communities, location of historical resources);
- Results from the sound assessment;
- Public and agency input; and
- Interconnection economics.

The turbine setback requirements as specified in setback standards and as adopted by Chatham Kent Municipal Council, has been observed or surpassed in siting the turbines:

- From any residential or institutional zone – 600 m;
- From any industrial or commercial zone – 450 m (None identified in study area);
- From an off-site residential dwelling – 300 m to blade tip;
- From an on-site residential dwelling – 250 m to blade tip;
- Non-participating landowner lot line - 10 m from blade tip ;
- Participating landowner lot line – Zero;
- Local Roads – 10 m from blade tip;
- Provincial, arterial, collector road – 163 m (1.25 x turbine height);
- Provincially Significant Wetland (PSW) – 170.5 m (blade length plus 120 m);
- Woodlots greater than 2 ha – 150.5 m (blade length plus 100 m);
- Setback from Lake Erie (closest turbine to the lake is 460 m); and
- Gas/oil wells – 25 m.

In addition to the above, other setbacks observed included:

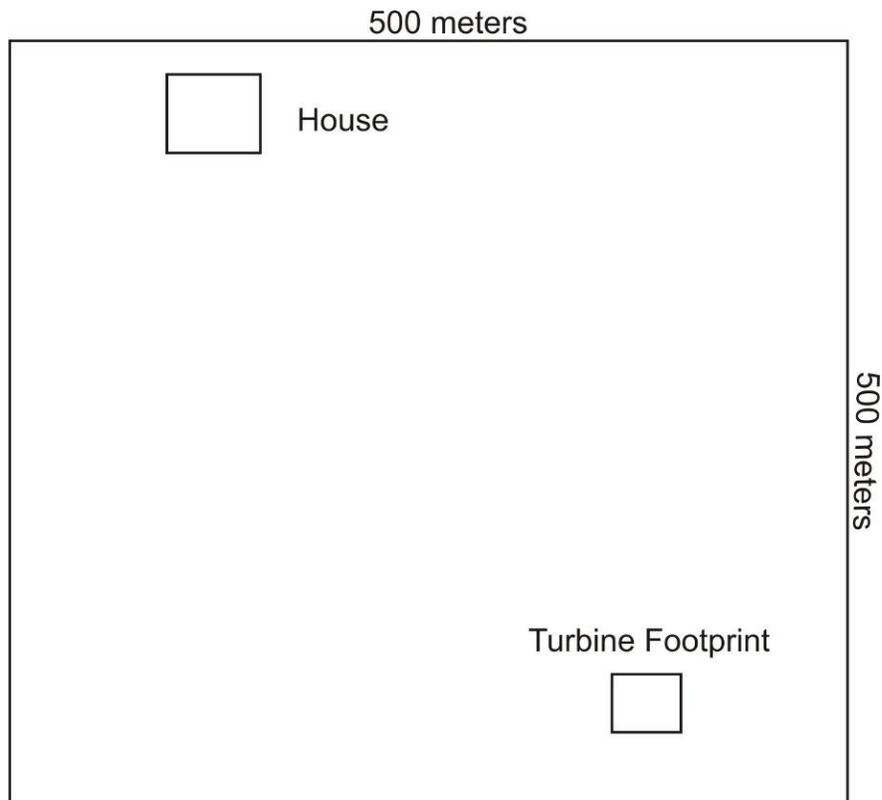
- Noise set back to meet MOE noise criteria (so that a MOE Certificate of Approval (Air) can be obtained); All residences within a 1.5 kilometer radius were identified in the report and for the purposes of completing the Noise Assessment for the proposed project;

- Avoidance and set backs of sensitive natural features/wildlife habitat as presented in **Section 7.6.2.1**; and
- Set backs from communication towers in the study area (Rogers cell tower and a Coast Guard Radio Communications tower).

Considering the above setback criteria, the closest residence to a turbine is 270 meters (participating landowner that is not inhabited) and with one exception, all residences are at least 500 m away from the turbines (the one exception is between 450 to 500 m away).

Each turbine and associated electrical equipment and access roads will take approximately one (1) acre (0.4 hectares) out of agricultural production after the construction year. **Figure 2.1** shows the impact of a turbine on a typical lot.

**Figure 2.1: Impact of a Wind Turbine on a 25 ha Lot**

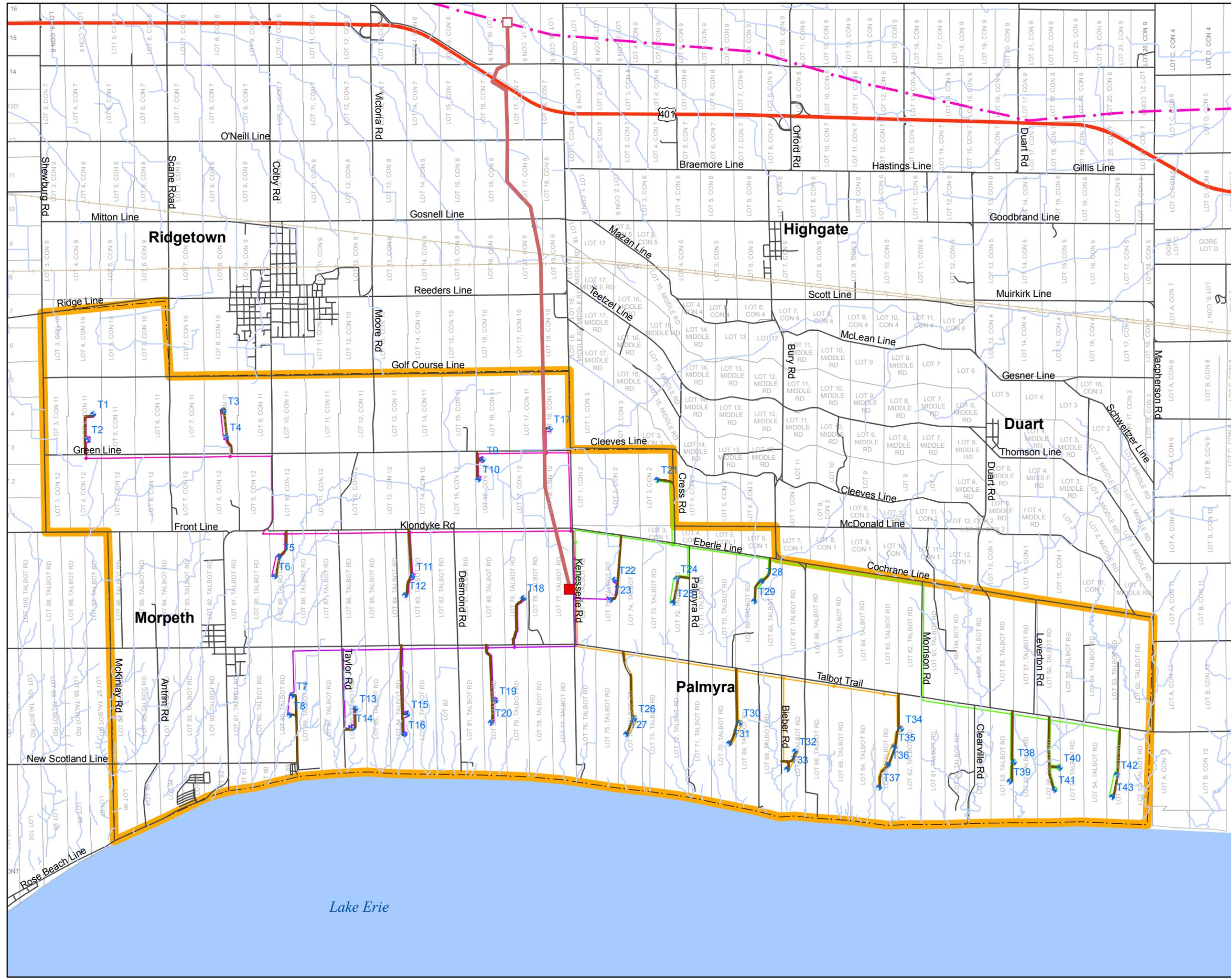


**Table A-1 in Appendix A** contains the coordinates of the wind turbines (UTM NAD 83, Zone 17N coordinate system). The wind farm has been designed to meet the above noted setback criteria. The final turbine locations may be subject to some refinement as a result of geotechnical and environmental considerations.

**Figure 2.2** presents the wind farm layout.

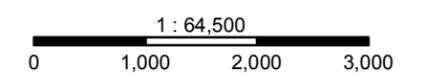
# Wind Farm Study

## Figure 2.2: Wind Farm Layout



**Legend**

- Turbines
- Transformer/Substation Location
- Access Roads
- Existing 230kV Transmission Line
- Proposed Project 230kV Transmission Line
- MV Circuit 1
- MV Circuit 2
- MV Circuit 3
- MV Circuit 4
- Railway
- Roads
- Highways
- Project Boundary
- Lots/Parcels
- Waterbody



### **Discussion on the Chatham-Kent Shoreline Setback**

The Chatham-Kent lakeshore setback standard was established through a council motion (July 21, 2008) and suggests a 1000 m from Lake Erie, although there are no specific guidelines to dictate an appropriate buffer along the lakeshore. Specific consultation with EC (including Canadian Wildlife Service-Lyle Friesen) was consulted to determine appropriate setbacks from the Lake Erie shoreline. During the consultation process with the Municipality, it was communicated to RES Canada that a 200m buffer was considered the minimum buffer for any turbine adjacent to the shoreline. Post-construction work completed for the Erie Shores wind farm suggests a setback of 250m from the shoreline (James 2008). In addition to the recommended buffers, a migration corridor was implemented, which avoids placing turbines in intervening spacing between shoreline forests. This was implemented based on discussions with Dave Martin and Ross James, which indicated that raptors often follow forest and other wooded features and other diurnal migrating species often island hop from shoreline forest to shoreline forest as they travel along the Lake Erie shoreline. Further, discussion with Tom Bolohan, President of Hawk Cliff Foundation indicated that some raptors may roost in forests and require an area to gain height during the earlier portions of the day.

Buffer recommendations in combination with the migration corridor result in 1 turbine being within 500m (being 460 m from the shoreline) and 9 additional turbines within 1km of the Lakeshore. It should be noted that the layout change from 69 to 43 turbines has further reduced the number of turbines less than 1000 m from the lake from 12 to 10 and has increased the distances overall with all but 3 being closer than 700 m from the shoreline. Based on all discussions during the Environmental Assessment process, the recommended lakeshore setback exceeds all suggested setbacks and incorporates other discussion points from multiple sources. Based on existing literature, which defines the potential risk to raptors, including post construction monitoring for the Erie Shores wind farm east of the subject site, there is nothing to suggest the current layout creates an increased risk to raptors or diurnal migrants than a layout that has every turbine further than 1km from the lakeshore.

To summarize, the following observations are made regarding the lakeshore setback issue:

- Talbot Trail is located a substantial distance (approximately 2 km) from Lake Erie within the Study Area. This distance and the lakeside woodlots have the effect of making the Lake not visible from Talbot Trail in the study area. Also there is no road running alongside the lake, which is significantly different from the areas to the west; especially, along the lakefront area within the Communities of Harwich, Raleigh, Tilbury East and Romney, where Talbot Trail is located relatively close to the Lake and there is an excellent view of it;
- The Study Area is sparsely populated with the majority of the dwellings in the area being located close to Talbot Trail. The balance of the area between Talbot Trail and the Lake is predominantly large narrow agricultural parcels. There are very few dwellings located near the Lake because of limited access;
- Due to the fact that Talbot Trail is located a substantial distance back from the Lake Erie, the view of the Lake is very limited while traveling along this corridor through this stretch of Chatham-Kent. Therefore, the presence of turbines in this area will not significantly impact a view of the Lake from Talbot Trail;

- It is understood that the Council recommended setback was based on consideration of the bird activities next to the shorelines of Chatham-Kent, particularly those adjacent to Rondeau Park and Lake St. Clair;
- Specific consultation with Environment Canada was conducted to determine appropriate setbacks from the Lake Erie shoreline for the Talbot Wind Farm. It was communicated to RES that a 200m buffer was considered the minimum buffer for any turbine adjacent to the shoreline. Post-construction work completed for the Erie Shores wind farm suggests a setback of 250m from the shoreline (James 2008);
- The proposed turbine layout for the Talbot Wind Farm exceeds the buffers recommended by Environment Canada as well as other experts in the field. The layout includes one turbine being located 460 m from the shoreline, one being 580 m, one being 660 m and the remaining seven being located greater than 700 m from the shoreline;
- Further, the placement of turbines in the intervening spaces between shoreline forests, which are important to some migratory birds, were avoided. This was implemented based on discussions with Dave Martin and Ross James, both whom indicating that raptors often follow the edges of forest and other wooded features. Other diurnal migrating species very often ‘island hop’ from shoreline forest to shoreline forest as they travel along the Lake Erie shoreline;
- Based on all the information and input received from applicable agencies and experts, the Talbot Wind Farm layout exceeds all suggested setbacks. On the basis of the existing ornithological literature including post construction monitoring for the Erie Shores wind farm located to the east of the subject site, there is no evidence to suggest the current layout would create an increased risk to raptors or diurnal migrants than a windfarm layout that has all turbines located greater than 1km from the shoreline; and
- If all turbines within 1000m of the Lake were to be relocated, more distant turbine locations would need to be used, which would reduce the density and efficiency of the overall windfarm by spreading it over a greater area for the same installed capacity (MW). This would also result in locations closer to Settlement Areas such as Ridgetown and Morpeth.

### **Access Roads**

Access roads are required in order to erect the turbines and for operations maintenance. The access roads to be constructed will be approximately 10 m wide with no ditches and be composed of a gravel base. Where turning is required the width of the road could be wider. If requested by the landowner, gates can be installed to restrict access. **Figure 2.2** illustrates the locations of the proposed turbine access roads. A total of 8 watercourses will need to be crossed by the turbine access roads as shown in **Figure 7.1 (Section 7)**. Further, lease agreements are firmly in place for all wind turbine sites and ancillary facilities.

The topsoil on the proposed roads will be stripped to remove 25 centimeters and is leveled to a 5% grade and either stockpiled for the landowner’s use or piled in mounds with cover crop planted on top, depending on landowner preference. The subsoil will then be removed and used to in-fill low areas on the same property. The depth of the road base will be sufficient to support the traffic loads

associated with the construction and operations of the wind farm. Based on the preliminary geotechnical report, the excavation for the roadbed is expected to be above the water table at all times.

During construction, concrete trucks, pick-up trucks, small cranes and transport trucks bringing turbine components to the site will use these access roads.

In some cases the turbine erection crane will travel cross-country to access the turbines sites. Any watercourse crossings by the crane will be accomplished through the construction, installation or widening of the road/culvert as per the municipal drain crossing requirements. The crossings would be approximately 10 m wide.

### **Electrical Connections/Substation**

Underground 34.5 kV electrical power collection lines will be installed from each turbine to the nearest road allowance. A trenching construction method will be used to install the underground lines (at a depth of 1.2m or greater) as it will allow for the easy identification and repair of landowner field drainage tile systems. As shown in **Figure 2.2** the electrical connection lines will run parallel to the turbine access roads connecting each turbine to the next. Once at a road allowance, the electrical power collection lines will include a combination of primarily underground 34.5 kV lines running within the municipal right-of-way to the site substation. This will be done in continued consultation with the local Public Works department. Some overhead lines may be considered in areas where Hydro One infrastructure already exists, such poles would be shared. In the event that burying cables is technically unfeasible, due to soil conditions or other constraints, overhead lines could be used. The total length of 34.5 kV feeder lines (below and above ground) that will be required will be just over 100 km, however some of this distance will be double-circuits buried in parallel in trenches.

The substation (to convert the power to 230 kV so that the wind farm can be tied into the provincial grid) will be located along Kenneserie Road between Klondike line and Talbot Trail and will include one transformer (HICO equivalent 3 Phase 60 Hz 33/44/55 MVA). The substation will be surrounded by a sound barrier wall (Quiet-Fence STC32- Heavy Wall). Including access roads, the station will occupy approximately 45 m by 80 m (3600m<sup>2</sup>) of land that is currently under cultivation. The substation has been included in the noise analysis of the wind farm and a Certificate of Approval will be obtained for the turbines and substation.

An office yard will be located adjacent to substation.

A typical layout for the substation is provided in **Figure 2.3**.

### **Transmission Line**

The transmission line to connect the wind farm to the provincial grid system, approximately 10.2 km away, is proposed to be a single pole line with alternating off-set arms and a single sky wire along the top.

The entire length of the transmission line is through private lands; RES Canada has secured easements with all the landowners owning the specific properties needed for the routing of the transmission line and related switching and substation. The general width of the right of way for the

easement would be 30 meters assuming that 25 meter poles are used and the spans between poles are about 90 meters. The line will be supported by steel, concrete or wood poles. **Figure 2.4** provides an illustration of the poles. Agricultural activity could continue within the easement.

The proposed route of for the transmission line is presented in **Figure 2.2**. Details regarding the process to select the preferred route for the transmission line are presented in **Section 8.0**.

Ontario Energy Board (OEB) approvals will be required for the proposed 230 kV transmission line. These approvals are: Leave to Construct the line (Section 92), Right of Entry (Section 98 for gathering survey and engineering data) and Authority to Expropriate (Section 99). If the expropriate option was required, this process is governed by the *Expropriations Act*. It is not expected that expropriation would be required for the transmission line.

### **Cement Batch Plant**

RES plans to obtain required concrete through established licensed suppliers in the area. If an existing local batch plant cannot supply the required cement, then a temporary project specific batch plant will be required during the construction period. If a new batch plant is needed, about 2 hectares of land would be required. The siting of the facility would be undertaken in consultation with Chatham-Kent and the MOE. All applicable requirements and permits for the siting and development of this plant would be obtained. Water requirements would exceed 50,000 litres/day, as such an MOE Permit to Take Water would be required for this facility.

Electrical power for the batch plant would be supplied through a diesel generator that will require a MOE Certificate of Approval to address noise and air concerns.

The wash water from the cement drums will be dealt with by one of the following, and approval for disposal of the wash water will be sought from the appropriate agency:

1. Build a containment system which separates the sediment/aggregate from the water.
2. Dry wash using stone in the drums to clean them.
3. Use a retarder on the inside of the drum, which prevents the concrete from adhering to the drum.

Wash water from the cleaning of drums will be disposed of in a sewage works designed for that purpose and approved under Section 53.1 of the Ontario *Water Resources Act* (or part 8 of the *Building Code Act*).

The land will be restored to its original state after the construction period.

### **Staging/Laydown Areas**

The crane pad used for construction will be approximately 50 meters wide by 30 meters deep and will be accessible from the access road with a slope of less than 1% or less in all directions. A 360 degree radius around the base of the turbine to a distance of 40 meters at a 5% grade is needed for the assembly and erection of the turbines. Given that all of the turbines are on cleared agricultural land, this should not be an issue. Turbine staging areas are located at each turbine site. **Figure 2.5** shows an example of the staging area for a turbine.

The land for the staging area will be restored to its original state after the construction period.

Figure 2.3: Substation Layout

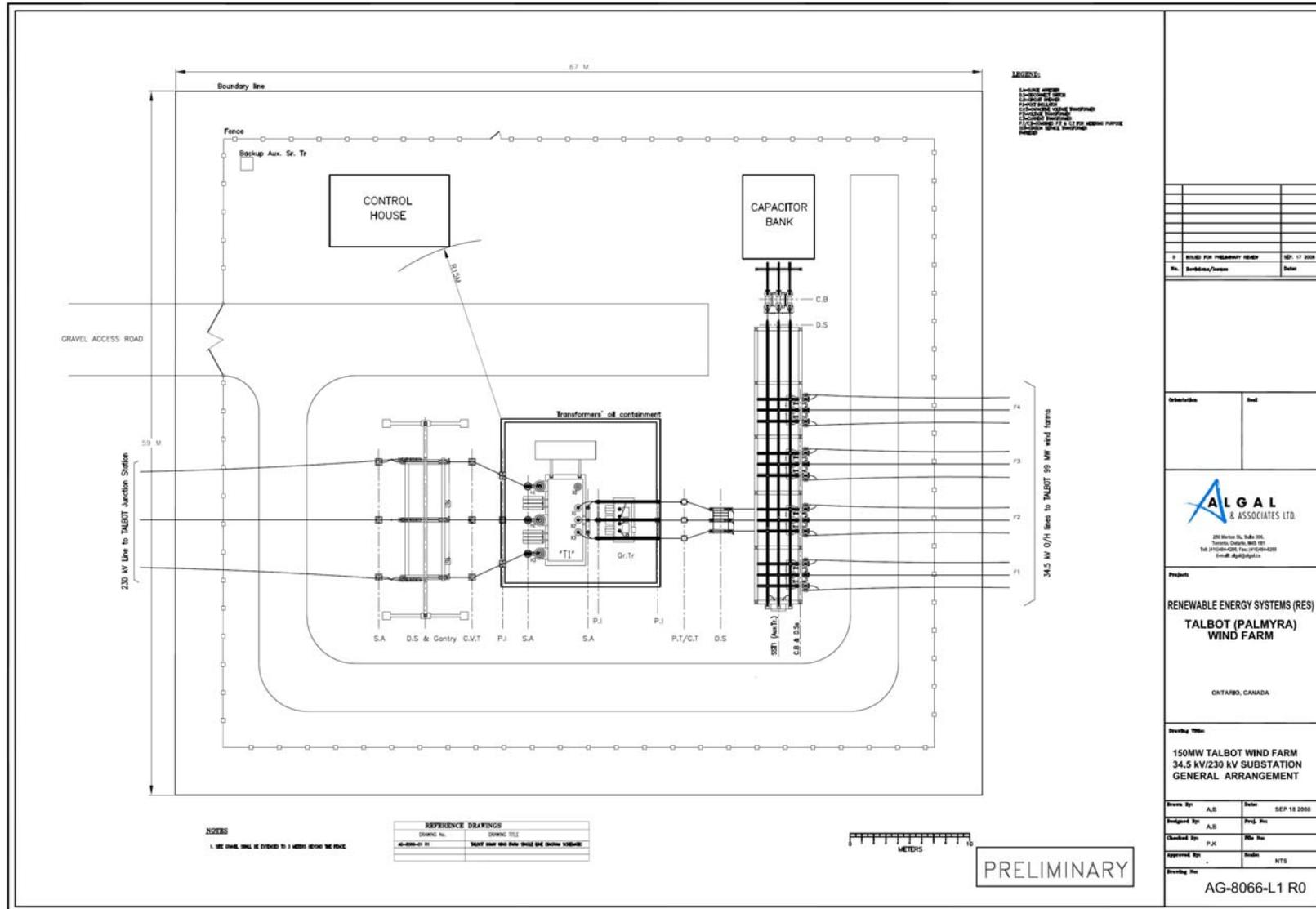
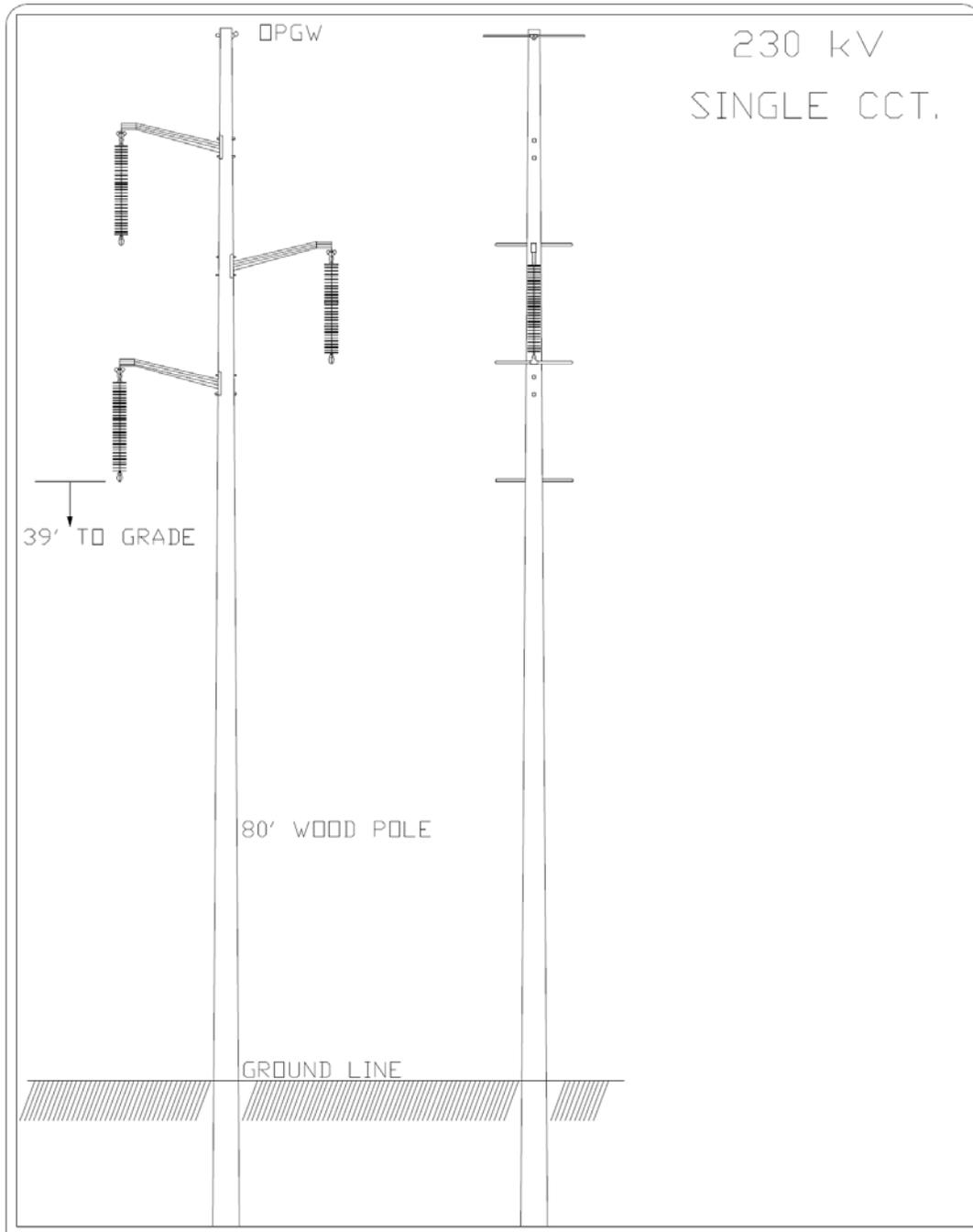
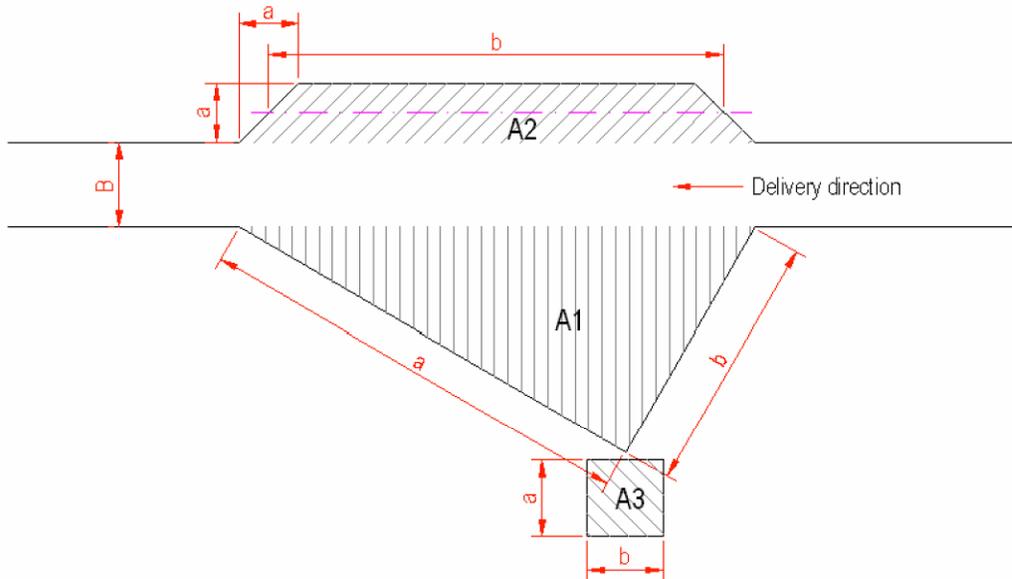


Figure 2.4 – Transmission Line Pole Drawing



 <p><b>DILLON</b> CONSULTING</p>	RES		230 kV SINGLE CCT.	
	Proj. Manager: Dan McKinnon	Drawn By: D.P./T.A.D.	Figure No.	Revision
	Scale: N.T.S.	Checked By: G.I.W.	SE2	
	Date Issued: March 11 2008	Project No: 07-7382		
Location: Chatham Kent	File Name: TalbotWindfarm.dwg			

Figure 2.5: Typical Turbine Laydown Area



Area	Description	Max fall (%)	Area (m <sup>2</sup> )	Dimension a x b (m)	Bearing Capacity kN/m <sup>2</sup>	Capacity Axel load	Maintenance
A1	Construction area	1	938	50 x 37,5	200	14 T	Permanent
A2	Lay down area	1	340	7 x 48,5	200	14 T	Temporary
A3	Assembly area	1	81	9 x 9	80	-	Temporary

## **2.2 Description of Project Activities**

The key project activity phases include: construction, operations and decommissioning of the wind farm and transmission line. **Table 2.1** provides a description of the key activities that will occur under each project phase. A key aspect of all project phases will be on the minimization of environmental and social effects. The turbines have been sited to maximize distances from sensitive receptors and away from woodlots and other natural features. Access roads and electrical connection lines have been routed to minimize their length, avoid sensitive natural features, follow lot lines as much as possible, and minimize tree removal. The routing also involved much input from landowners themselves.

### **2.2.1 Construction Phase**

The construction phase of any major project such as this has the potential for adverse effects on the environment. Key activities during the construction phase include: clearing, topsoil stripping, grading, access road development, trenching of underground distribution lines, watercourse crossing construction, foundation excavation, transportation, assembling and erecting of the turbines. Key activities during the construction of the transmission line include: surveying, clearing, and installation of the poles and stringing of the conductors.

An Environmental Protection and Management Plan will be developed and its implementation monitored by a RES Canada environmental inspector. The potential for effects on agricultural drains during the construction phase will be managed through a repair crew.

### **2.2.2 Operation and Maintenance Phase**

Once the project is operational, the wind turbines and transmission line will operate automatically. There is little maintenance required for the turbines and transmission line, aside from periodic servicing. Any wastes generated, including fluids and oils, will be recycled where possible and if not possible, will be disposed of at an approved facility. The turbines will be accessed primarily by light trucks. Larger trucks or cranes may be required for repairs from time to time. All access to the turbines and transmission line will be confined to access routes and landowners will be made aware of maintenance activities.

Waste fluids (oil, etc.) may be generated (in small quantities) by the operation of the turbines. These fluids may need to be removed on a periodic basis from the project site. The waste fluids will be disposed of through a licensed contractor in accordance with O.Reg. 347 of the *Environmental Protection Act*. A Generator Registration Report will be created for each waste generated from the project.

### **2.2.3 Decommissioning Phase**

The project is designed to have a life of at least 20 years. A decommissioning plan will be prepared in accordance with provincial legislation and guidelines that exist at the time of decommissioning. Decommissioning will involve the removal of the turbines and other associated infrastructure including the turbine foundations to below grade and the removal of electrical lines/facilities. Infrastructure that is left below grade will not affect future farming operations however underground cables will be removed if the project will not be repowered. Previously disturbed lands would be rehabilitated and returned to their previous state (either natural or farmland). The land lease that RES has signed with all targeted landowners provides the land owners with the right to require a

security deposit, amounting to the cost of removal of all infrastructures, 15 years after the beginning of operations.

The lease agreements negotiated with landowners provides for a decommissioning plan that requires RES to, within 12 months of the termination or expiration of the lease:

- Remove all fixtures and equipment to 3 feet below grade and replant, reseed; and
- Remove all roads only at the landowners request.

The agreement also allows the landowner to request that a removal security be placed after the 15<sup>th</sup> year of operation of the wind farm to insure funds are in place for the decommissioning phase of the project.

<b>Table 2.1 – Project Activities</b>	
<b>Physical Works/Activities</b>	<b>Description of Activity</b>
<b>Construction</b>	
Surveying & Geotechnical Investigations	The land survey activities are to include staking the boundaries of the construction areas, temporary workspace, access roads, distribution line routes, transmission line route, as well as marking the location of existing underground pipelines and cables. Areas to be avoided will be fenced and/or flagged and avoided. Geotechnical work will involve bore samples being taken in the proposed turbine locations.
Development of access roads	Depending on landowner requirements, topsoil will be stripped. Access roads will be approximately 10 m wide to accommodate the turbine erection cranes, maintenance vehicles and heavy equipment for larger repairs/replacements. In order to access the wind turbine sites, it will be necessary to construct access roads across various open drains. About 7 drains/watercourses will need to be crossed by the turbine access roads. Culverts, comprised of various diameters, are to be constructed across the various drains in order to accommodate vehicular access and construction traffic across the drain while maintaining unimpeded flow within the drain. All works being considered that implicate the various municipal drainage systems must be undertaken in accordance with the <i>Drainage Act</i> , by a Professional Engineer appointed by the Municipality. This process will include the involvement of the local Conservation Authority, being the Lower Thames River Conservation Authority.
Crane Path/ Temporary Access Roads	The turbine erection cranes will travel where possible along the main turbine access roads, although it will be necessary in some cases to cross agricultural lands with the erection cranes. Wherever possible scheduling will be completed with landowner input in order to insure that field crossing with erection cranes has minimal impact on agricultural land use.
Clearing	Bush and other vegetation will be cleared from the construction areas as required although as most of the project is within active agricultural land little bush clearing will be required. The clearing of small sections of hedgerow will be required for the 230 kV transmission line. Prior to any clearing activities, the Canadian Food Inspection Agency will be consulted on the presence of the Emerald Ash Borer and disposal requirements with the intent of reducing the spread of the insect.
Topsoil stripping and salvage	Graders, bulldozers, and backhoes will be used to strip and stockpile topsoil. Topsoil will be temporarily stored for replacement during clean up and reclamation. Topsoil removed from the permanent access roads will be feathered out on lands adjacent to the access roads. Hay bales will be used to prevent erosion and a silt fence put around the perimeter.
Grading	Following topsoil stripping and salvage, grading will be conducted on irregular ground surfaces to provide a safe and clean work surface. Grading will be done in such a manner so as to not alter drainage patterns in the area.

<b>Table 2.1 – Project Activities</b>	
<b>Physical Works/Activities</b>	<b>Description of Activity</b>
Trenching for Underground Collection Lines	<p>Underground 34.5 kV electrical lines will be installed from each turbine location to the nearest road allowance where they will connect with the collection lines that will extend along the road rights-of-way. Trenching will be used to install the lines. The method for crossing water courses will be confirmed with the LTVCA/Municipality.</p> <p>Typically, a wheel-like or elongated, bar-like mechanism on which teeth are situated is used to cut a narrow trench into which the cable is placed. This action is somewhat similar to the teeth of a chainsaw. Trenching equipment for underground cable is much smaller than that used for natural gas pipeline construction. The equipment is usually mounted on a bobcat or small backhoe. The spill pile from the trench cut is situated immediately adjacent to the trench, extending less than 1m to the side. A blade mounted on a backhoe or other small piece of equipment is subsequently used to push the spill pile back into place, and to smooth and pack the berm.</p> <p>Where the underground cable must be spliced (<i>e.g.</i>, at the end of a reel or to pass underneath another utility cable) a splice pit is likely required. These pits are roughly 1m deep, 1m wide, and up to 5 m long (but usually closer to 1 to 2 m long). At these locations, the topsoil will be stripped and salvaged in a pile immediately adjacent to the excavation, so that no mixing of the subsoil occurs. After the procedure is complete, subsoil is back-filled and smoothed over, and the topsoil replaced as the final procedure during reclamation.</p>
Electrical Lines Wood Pole Erecting	The 34.5 kV collection system will potentially be a hybrid of buried and overhead wood pole lines. Underground will be used unless it is technically impossible or very difficult to do so and existing overhead lines will be used where available.
Foundation excavation	The size of the excavation for the turbine tower will be approximately 2.5 meters to 3 meters deep and 36.5 meters wide. A tracked excavator will be used for excavation.
Pouring turbine foundation	Concrete will be poured into the forms continuously. The amount of concrete required will depend on soil characteristics. The plywood forms for the foundations typically are left in and the excavated area is back-filled and compressed such that only the tower base portion of the foundation is above ground.
Turbine Transportation	Each of the disassembled turbines and generators will be trucked to the site on a flat-deck trailer. It may be necessary to undertake some local road intersection improvements to allow the trucks to make turns. The nature of these improvements will be confirmed in consultation with the municipality.
Equipment lay-down	To create a safe and level work area for storing and assembling the wind turbine generators and towers, an area of 80 m in diameter may have to be stripped and leveled, depending on the local conditions. Each of the turbines and generators will be trucked on a flat-deck trailer to the site and assembled within this temporary construction area.
Tower, generator, and rotor assembly	The tower comes in four sections that are assembled at the turbine sites one section at a time. The nacelle, which houses the generator is lifted by a crane and attached to the top of the top tower section. The rotor blades are assembled on the ground and lifted as one piece and attached to the nacelle.

<b>Table 2.1 – Project Activities</b>	
<b>Physical Works/Activities</b>	<b>Description of Activity</b>
Spills Management	Hazardous materials such as oils, fuels and paints will be required. Fuel will be delivered to the site by tanker with temporary fuel storage at the project construction site. Although the quantity of materials to be used is of low volume, there is the potential for some spills during the construction period. Spills will be managed in accordance with provincial legislation and guidelines such as RES Canada’s Waste management plan.
Waste Management, clean-up and reclamation	Garbage and debris will be removed and disposed of at an approved location. Slash trees will be left to decompose among the remaining trees. All equipment and vehicles will be removed from the construction area. The temporary lay-down areas and disturbed areas around the foundation of each turbine and at the substation will be replaced with the stockpiled topsoil. The disturbed areas (including trenches/plough seams) will be re-seeded. High voltage signage will be installed at the substation and elsewhere, as necessary.  The proponent will prepare a Generator Waste Registration Report for each waste that will be generated on site as per O.Reg. 347 of the EPA. All waste fluids and oils will be removed from the site and recycled, where possible, or disposed of according to provincial guidelines.
Drainage System	There is a considerable amount of tile drainage in the study area (which could include older ceramic tiles and new PVC tiles). The movement of equipment in construction of access roads has the potential to impact these drains. All tile drainage systems damaged during construction will be repaired to their original working order. Meetings have and will continue to be held with landowners in advance of construction to identify drain locations and to determine the best crossing locations. The landowners will be held harmless to any associated costs and protected as such under their turbine easement with RES Canada.
Wind Farm Commissioning	Turbine commissioning can occur once the wind turbines have been fully installed and the electrical connections are completed. The commissioning involves testing and inspection of electrical, mechanical, and communications operability. A detailed set of operating instructions must be followed in order to connect with the local electrical system.
<b>Operations and Maintenance</b>	
Wind Turbine Operation	Operation activities will largely involve the remote monitoring of the facility. Monitoring of potential bird and bat effects from the operating wind farm will be undertaken. The program would involve area searches for bat and bird carcasses. The nature and duration of the monitoring program will be developed with the input of Environment Canada and the Ministry of Natural Resources.
Inspection, Maintenance and Repairs	Maintenance inspections will be required approximately every 3 months for routine servicing and lubricant replacement. Light 4x4 trucks, vehicles, and ATVs may be used to access the towers. Larger trucks and cranes may be required periodically for larger repairs, but this will not happen frequently. Scheduled maintenance on turbines will occur every quarter for the first year and will move to twice annually thereafter.

<b>Table 2.1 – Project Activities</b>	
<b>Physical Works/Activities</b>	<b>Description of Activity</b>
<b>Decommissioning and Abandonment</b>	
A decommissioning plan will be prepared in accordance with provincial legislation and guidelines that exist at the time of decommissioning.	
Rotor, generator and tower disassembly	The rotor, generator and towers would be disassembled using a crane and removed from the site for re-use, reconditioning or disposal using a flatbed truck.
Removal of access roads	All permanent access roads would be deep-ploughed, as appropriate and graded to restore terrain profiles, and seeded.
Removal of concrete foundation	Within 12 months of termination of lease, all above grade facilities will be removed to not less than 3 feet below grade, covered with subsoil to rebuild the grade. Topsoil would be replaced over the area to current depths of adjacent horizons and the area seeded and left for cultivation or grazing, depending on the land use at the time and the preference of the landowner.
Removal of electrical collection and transmission lines	The above ground collection and transmission lines and wood poles will be removed. Underground lines will be removed unless the project is repowered.
Waste Management	All waste material would be removed from the site and disposed at an appropriate facility (e.g. licensed landfill).  The proponent will prepare a Generator Waste Registration Report for each waste that will be generated on site as per O.Reg. 347 of the EPA. All waste fluids and oils will be removed from the site and recycled, where possible, or disposed of according to provincial guidelines

## **2.3 Economic Benefits of the Project**

In Canada, the impact of the wind energy related expenditures was last estimated to represent \$1.49 Billion of the nation's GDP (Insightrix, 2007). Of those expenditures almost 33% are from project developers, 27% are involved in consulting and 30 buy and sell wind energy (Insightrix, 2007). Project specific economic benefits are all positive as described below.

### **Construction Spending**

The construction of a 98.9 MW wind farm requires a capital spend of approximately \$250 million on turbine components, civil construction, electrical, crane and many additional specialist contractors. Approximately 25% of the overall capital spend is on "balance of plant" which are generally not specialist contractors and would include, for example local road, concrete, aggregate, and electrical contractors/suppliers. Opportunities to provide these services/supplies would likely be through competitive bid. In total, about \$75 million in contracting services would be available to local service providers in southern Ontario.

A portion of the direct local capital spend will be duplicated by support and contracting services to the wind farm project. Typically this could represent orders to fabrication shops, catering, hoteliers, electrical sub-suppliers, etc.

The construction of the wind farm would generate about 300 jobs at the peak of the construction period. The income generated through these jobs is expected to be about \$7.5 to 9 million.

### **Operation Spending**

The overall annual spending on wind farm operations and maintenance activities is estimated at \$7million. The wind farm will be operated and maintained from an operations and maintenance facility to be located in the vicinity of the wind farm. The facility will have stores for spare parts, and scheduled and unscheduled maintenance will be dispatched from this facility. Operations will directly employ between 8 and 10 people whose tasks will be to monitor and operate the wind farm. These long term employment opportunities will generate total annual incomes of about \$500,000.

Sub-contracts will be awarded to contractors for road maintenance, snow clearance, electrical maintenance, etc. The annual value of these sub-contracts is estimated at \$100,000.

A percentage of direct local operations spending will be duplicated by support and contracting services to the wind farm project. As with construction, this could represent orders to fabrication shops, catering, hoteliers, and electrical sub-suppliers.

### **Municipal Payments**

Based on current MPAC evaluations for turbines and typical mill rates, tax revenue from each turbine will be about \$5,000 per unit, regardless of the MW rating of the machine. With the Talbot Wind farm's current layout of 43 turbines, this represents an annual tax bill to the Municipality of approximately \$215,000.

### **Landowner and Community Payment**

Under a 98.9 MW layout with 2.3 MW turbines, an annual rent will be paid to landowners with a turbine on their property amounting to a total of approximately \$600,000 for the whole project. In

addition, RES will also be making payments to all landowners who have signed a lease option and are within the vicinity of the wind farm. This will amount to a total annual payment of approximately \$450,000. This revenue to landowners will largely be spent locally on improvements to farming and domestic infrastructure, as well as securing the viability of family farming.

RES will also be contributing to a community benefit payment of not less than \$800/turbine per annum (\$35,000/annum minimum). This fund is to be directed to community ecological or environmental causes in a program whose details shall be announced in 2009. Lease agreements are firmly in place for all wind turbine sites and ancillary facilities.

**Economic Summary**

In addition to the estimated \$250 million to be spent to construct the project, over an assumed 20 year life span of the facility, the project is expected to result in about \$26 million being paid to the local community and close to \$4.3 million being generated in taxes (all 2008 dollars not including inflation).

### **3. Scope of the Assessment**

The following describes the environmental components that were considered to meet both Ontario and federal environmental assessment requirements. This ERR/EIS has been structured according to the provincial process but all key components required to fulfill federal EA requirements have also been addressed. Sections pertinent to provincial authorities or federal authorities only have been labeled.

#### **3.1 Scope of Assessment**

The Ontario's *Environmental Assessment Act* and MOE's March 2001 *Guide to Environmental Assessment Requirements for Electricity Projects* (the "Guide"), defines "environment" as:

*air, land or water; plant and animal life, including man; the social, economic and cultural conditions that influence the life of man or a community; any building, structure, machine or other device or thing made by man; any solid, liquid, gas, odour, heat, vibration or radiation resulting directly or indirectly from the activities of man; or any part or combination of the foregoing and the interrelationships between any two or more of them.*

Further, the Guide states that:

*negative environmental effects include the negative effects that a project has, or could potentially have, directly or indirectly on the environment at any stage in the project life cycle. Negative environmental effects may include, but are not limited to, the harmful alteration, disruption, destruction, or loss of natural features, flora or fauna and their habitat, ecological functions, natural resources, air or water quality, and cultural or heritage resources. Negative environmental effects may also include the displacement, impairment, conflict or interference with existing land uses, approved land use plans, businesses or economic enterprises, recreational uses or activities, cultural pursuits, social conditions or economic structure*

The Guide also states that "net effects" are "negative environmental effects of a project and related activities that will remain after mitigation and impact management measures have been applied".

Section 16 of *CEAA* identifies the factors that need to be considered in the environmental assessment screening:

16(1) *Every screening...shall include a consideration of the following factors:*

- (a) the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;*
- (b) the significance of the effects referred to in paragraph (a);*
- (c) comments from the public that are received in accordance with this Act and the regulations;*
- (d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and*
- (e) any other matter relevant to the screening... such as the need for the project and alternatives to the project, that the responsible authority... may require to be considered.*

CEAA defines "environmental effect" as any change that the project may cause in the environment including any change to a listed wildlife species, its critical habitat or the residences of individuals in that species [per the *Species at Risk Act*]; the effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; or any change to the project that may be caused by the environment, whether any such change occurs within or outside Canada.

CEAA includes the following definition of "environment":

- (a) land, water and air, including all layers of the atmosphere;
- (b) all organic and inorganic matter and living organisms; and
- (c) the interacting natural systems that include components referred to in paragraphs (a) and (b).

The scope of the assessment for the Talbot Wind Farm project includes the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project, cumulative environmental effects that are likely to result from the project in combination with other approved projects or activities that have been or will be carried out and the effect of the environment on the project.

### **3.2 Scope of Factors**

This ER has considered the potential changes to the natural and social environment potentially caused by the project. The environmental factors considered in the ER included:

#### Biophysical Environment

- Physiography/Topography
- Surface Water Quality and Soil Erosion
- Geotechnical
- Fish and Fish Habitat
- Groundwater Quality
- Air Quality
- Birds
- Bats
- Wildlife and Wildlife Habitat
- Vulnerable, Threatened or Endangered Species

#### Related Effects on Socio-Economic Conditions (under CEAA, these effects should be directly linked to the project's environmental effects)

- Population and Existing Land Use
- Disposal of Waste Materials
- Environmental Noise
- Agricultural and Rural Resources
- Neighbourhood and Community Characteristics
- Traditional Land Use by Aboriginal Peoples

- Recreation and Tourism Areas
- Construction Related Traffic
- Public Health and Safety
- Effects on Communications
- Historical and Archaeological Resources
- Viewscape
- Accidents and Malfunctions

#### Effects of the Environment on the Project

- Climate Change
- Extreme weather events
- Earthquakes

In assessing the potential for cumulative effects, the assessment has considered other projects or activities that could combine with the potential effects of the project regardless of where these other projects/activities are located.

To determine the potential for environmental effects that could occur and the significance of those effects, the following questions were examined:

- What are the possible environmental effects of the project?
- Are the identified effects positive or negative?
- Can the predicted adverse effects be avoided or mitigated?
- After mitigation of adverse effects, are there residual effects?
- Taking into consideration any cumulative effects, what are the magnitude, geographic extent, duration and frequency of adverse residual effects or positive effects?
- Are the residual adverse effects reversible?
- Is the ecological setting of the undertaking sensitive?

The ER has considered both the potential direct net effects of the proposed project and the potential for cumulative effects from other existing and future activities and projects. Existing activities and projects have been addressed through the consideration of the existing environment. Cumulative effects with other future project/activities have been considered where there is some reasonable expectation for development and approvals have been obtained. There must also be some potential for effect overlap with the project in terms of time and space.

### **3.3 Study Objectives**

The following outlines the study objectives:

1. To ensure environmental considerations are addressed and incorporated into the planning, design, and decision-making processes.
2. To identify, define and assess the potential effects of the project on the environment including the natural and social environment. The environmental and social features identified in this document represent features that were known to occur or had a reasonable probability of occurrence within the study area and which could be affected by the project.

These environmental and social features that were selected for assessment are listed above in Section 3.2 and are further discussed in Section 7 and the technical appendices.

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

### **3.4 Methodology of Environmental Review/Environmental Impact Assessment**

During the preparation of this ERR/EIS the following primary and secondary data collection activities were undertaken to determine key baseline conditions in and around the study area.

- Review of mapping and air photos;
- Review of natural heritage data and studies for the area;
- Review of land use planning related documents and policies;
- 1 year, 4-season bird survey;
- Bat summer and fall surveys;
- Field visits to confirm presence of natural vegetation/wildlife habitat (ELC Mapping);
- Field visits to confirm location of noise receptors (largely residences);
- Archaeological investigations; and
- Discussions with landowners to confirm turbine placement.

### **3.5 Study Area**

While the study area for data collection (spatial boundary) was dependant on the environmental component, it largely included lands within the project area as shown previously in **Figure 1.2**.

### **3.6 Uncertainty and Data Gaps**

Identifying uncertainty and data gaps is important when evaluating the occurrence and significance of potentially adverse environmental effects and their probabilities. Having regard for potentially incomplete data sets the following supporting field studies were undertaken to complete the required datasets listed below:

- Natural Heritage Studies (Appendix D);
- Bird Surveys (winter, breeding bird, fall and spring migration) (Appendix E);
- Bat Surveys (Appendix F);
- Archaeological Resources (Appendix G);
- Sound Modeling (Appendix H);
- Visual Assessment (Appendix I); and
- Flicker Assessment (Appendix J).

#### **4. Permits and Approvals**

In addition to the EA requirements, other provincial environmental related approvals and permits that may be required for the Project include:

- Ontario MOE Certificate of Approval (air) under the *Environmental Protection Act*, for wind turbine and electrical sub-station effects (noise);
- Permits under the regulation “Development, Interference with Wetlands and Alterations to Shorelines and Watercourses” (“Generic Regulation”) through the Conservation Authority (which replaces Ontario Regulation 158 “Fill Construction and Alteration to Waterways” as of May 1, 2006);
- Ontario MOE Permit to Take Water under the *Environmental Protection Act*, should water be extracted for use in the temporary cement plant/concrete batch plant (if necessary) or for other purposes from a surface and or groundwater source in excess of 50,000 liters per day;
- Certificate of Approval (sewage) with respect to settling ponds as per Section 53 of the *Ontario Water Resources Act* (if required);
- Generator Registration under Ontario Regulation 347 for generation of subject waste;
- Ontario Ministry of Culture “clearance” under the *Heritage Act* regarding effects on cultural resources; and
- Ontario Energy Board – Leave to Construct for the Transmission Line.

This project will also require a number of other provincial level permits, which are not directly related to the environment such as a generator’s license from the Ontario Energy Board and agreements and/or approvals with the Independent Electricity System Operator (IESO) and Hydro One.

RES Canada has also consulted with the Government of Ontario Public Safety Network under the Ministry of Government Services and the owners of specific communication towers in the area, regarding the potential for effects on communication tower signals.

Zoning By-law amendments, site plan approval and building permits from the Municipality of Chatham-Kent will be required.

Federal permits and approvals that may be required include:

- Aeronautical Obstruction Clearance Permit from Transport Canada in response to potential turbine height hazards and navigation lighting; and
- Air Safety and Land Use Application from NAV Canada for navigational mapping requirements.

## **5. Public and Agency Consultation**

Public and agency consultation has been a cornerstone of this project with multiple information sharing and stakeholder feedback opportunities provided throughout the course of this study. The consultation program was initiated in July 2007 and will continue beyond the filing of the Notice of Completion. The following sections describe the key consultation activities that were undertaken. Comments received at these consultation events were considered in the completion of this environmental review. **Appendix B** provides the supporting documentation from the following consultation activities.

### **5.1 Project Notices**

The Environmental Assessment Notice of Commencement and Notice of First Public Information Centre for this project was issued in the Chatham Daily News and the Blenheim News-Tribune the weeks of June 24<sup>th</sup>, 2007 and July 1st 2007 (please see **Appendix B**). A Notice of the Second Public Information Centre, details of the Transmission Line Corridor study, and RES voluntary self-elevation from an ESR to an ERR was advertised the week of March 9<sup>th</sup>, 2007 and March 17<sup>th</sup>, 2007 in the Chatham Daily News and the Ridgeway Independent News. The Notice for the third Public Information Centre was published in the Ridgeway Independent on October 15 and 29, 2008, and in the Chatham Daily News and Chatham Citizen on October 17 and 24, 2008, respectively. On May 1, 2009, the ERR Notice of Completion and commencement of the 30 day ERR review period was published in the Chatham Daily News.

### **5.2 Public Notifications**

In July 2007, a Notice of Commencement and Notice of First Public Information Centre (PIC) was mailed out to all residents within the study area, and advertisements were placed in the Ridgeway Independent. The letters to residents gave a brief description of the project and who to contact for further information. The first PIC took place at the Morpeth Community Hall at the centre of the project site.

The second PIC was held on March 27<sup>th</sup>, 2008. Three weeks before the PIC, a letter and notice of Second Public Information Centre was mailed to all residents of the study area and all those who wished to be on the mailing list from PIC #1. One week before the second Public Information Centre all residents within the study area received a personal invitation to the PIC by unaddressed ad-mail. In addition, advertisements were placed in the Ridgeway Independent newspaper. The second PIC took place at the Scout Hut building in Ridgeway. See **Appendix B** for a copy of letters and invitations.

The third PIC was held on November 4, 2008. Letters and notices were mailed out to all landowners under wind farm and transmission leases. The letters contained background project information, PIC details, contact information and an indication of the availability of the ERR for review. The Notice for the third PIC was also published in the Ridgeway Independent, Chatham Daily News and the Chatham Citizen.

Other notifications/meetings conducted by RES included:

- January 4<sup>th</sup>, 2006 RES presented wind farm concept to open meeting. Palmyra Community Centre.
- March 26<sup>th</sup>, 2008 RES establishes and holds the first meeting of the ‘Talbot Wind Farm Advisory Group’ to present more detailed information to a diverse group of local citizenry. The group includes local landowners (with and without an interest in the project), the local ward councilor, members of environmental agencies, and wind farm opponents. Minutes of the meeting are included in **Appendix B**. A second meeting of the advisory group was held November 3<sup>rd</sup> and minutes are also included in **Appendix B**.
- May 4<sup>th</sup> 2008 RES presented a speech and presentation to the Ridgetown Kiwanis Club.
- July 9<sup>th</sup> 2008 RES presented a speech and presentation to the Chatham Rotary Club.
- March 31<sup>st</sup> 2009 RES held a ‘Breakfast with RES’ event where RES representatives were available to answer questions about the project in an informal environment. According to the restaurant owner, 319 meals were served at the event.

### **5.3 Interest/Community Groups Notification**

The Notice of Commencement and First Public Information Centre (July 2007) were sent to the following interest groups:

- Rural Lambton Stewardship Network
- Sydenham Field Naturalists
- Wallaceburg Advisory Team for a Cleaner Habitat
- Wallaceburg Ecumenical Social Justice Group
- Walpole Island Heritage Centre
- Ontario Federation of Agriculture
- Chatham Aeronauts
- Chatham-Kent Homebuilders Association
- Business Improvement Association
- Lambton-Kent District School Board
- St. Clair Catholic District School Board
- Chatham-Kent Health Alliance
- Chatham-Kent Lambton Administrative School Services
- Chatham-Kent Municipal Airport
- Buxton National Historic Site and Museum
- Ridgetown Independent News
- Friends of Rondeau Park (email correspondence)

None of the interest/community groups who received letters replied.

Communications with the Chatham Municipal Airport produced a list of registered and unregistered airports, heliports and airstrips in the Chatham area. There are three registered airports in the larger area: the Chatham Health Alliance, the Chatham Municipal Airport and the Highgate Airstrip in Muirkirk. All are outside of the project area boundaries and all were contacted and sent the Notice of Commencements with contact information if they required further information. Phone calls were

made to the 19 unregistered private airstrip owners in the larger area. Nine of these airstrips were sent more information by request while the 10 others were not interested due to the location of the proposed wind farm or could not be contacted as their phone numbers had been disconnected or the airstrip was no longer active.

Five private airstrips were identified in the vicinity of the project all of which are located to the north of the project boundary (see **Figure 7.4**). Dialogue with the airstrip owners is ongoing. Section 7.10 provides further discussion regarding this issue.

#### **5.4 Agency Notification and Consultation**

Prior to the issuing of the study Notice of Commencement, several meetings were held with the Municipality of Chatham-Kent regarding the project including:

- On December 7<sup>th</sup>, 2005, representatives of RES Canada met with Chatham-Kent Economic Development officer Ron Anderson and chief planner Gerry Murphy to discuss wind energy in the municipality.
- On April 27<sup>th</sup>, 2006, representatives of RES Canada met with the Chatham-Kent ‘Green Energy Committee’, which included several councilors, chief planner Gerry Murphy, and Economic Development officer Ron Anderson. RES presented the concept of wind power in Chatham-Kent and presented the areas in the municipality which it was targeting for a wind farm project.
- On June 11, 2007 representative of RES Canada and Dillon met with Ralph Pugliese, Director of Planning Services, Chatham-Kent, members of the ‘Green Energy Committee’ and Chatham-Kent ward councilors for the Talbot wind farm to introduce the project and the project team. The focus of this meeting was a discussion of planning approvals and the Chatham-Kent draft Zoning By-law for green energy. Since the local Official Plan had already been amended to permit another wind farm project in the municipality, only a zoning by-law amendment and site plan approval would be required for this project.

On July 6, 2007, agencies were provided with a Notice of Commencement and cover letter, as noted below, introducing the project and notifying recipients of the first Public Open House on July 21, 2007. The Notice of Commencement subsequently appeared in the Blenheim News-Tribune on July 11, 2007.

Federal, provincial and municipal agencies that received a copy of the Notice of Commencement in July 2007, and invitations to the public open houses, included:

##### ***Federal Agencies:***

- Canadian Environmental Assessment Agency
- Department of Indian and Northern Affairs
  - Environment and Natural Resources, Lands and Trust Services
  - Litigation Management and Resolution Branch
  - Comprehensive Claims Branch
- Environment Canada
- Transport Canada

- Health Canada
- CN Rail

***Provincial Agencies:***

- Ontario Secretariat for Aboriginal Affairs
- Ministry of the Attorney General
- Ministry of Agriculture, Food and Rural Affairs
- Ministry of Culture
- Ministry of Tourism and Recreation
- Ministry of Energy
- Ministry of the Environment, Southwest Region
- Ministry of Municipal Affairs and Housing
- Ministry of Natural Resources
- Ministry of Citizenship and Immigration
- iSERV Ontario
- Lower Thames Conservation Authority
- Hydro One Inc.
- Government Mobile Communications Office

***Municipal Agencies:***

- Municipality of Chatham Kent
  - Mayor
  - Councilor Ward 3
  - Chief Administrative Officer
  - Environmental Services
  - Economic Development Services
  - Land Ambulance Services
  - Fire Chief – Fire Services
  - Planning Services
  - Agricultural Coordinator
- Chatham Kent Airport
- Chatham Kent Polices Services
- Chatham & District Chamber of Commerce
- MPP, Chatham-Kent Essex
- Chatham-Kent Energy

A copy of the letter that was sent to the above Agencies is contained in **Appendix B**. Letters received by Agencies in response to the Notice of Commencement and Notices of Public Open Houses are also in **Appendix B**.

A summary of the responses received by Agencies to the Notice of Commencement is below. All letters are contained in **Appendix B**.

- An undated letter was received from Indian and Northern Affairs Canada to confirm that there are no comprehensive land claims in the Municipality of Chatham-Kent. The Comprehensive Claims Branch of INAC wanted to be removed from the project mailing list.
- A letter dated July 13, 2007 was received from the Ministry of Municipal Affairs and Housing. This letter described the current policy on land use planning matters in Ontario through the Provincial Policy Statement and the *Planning Act*.
- A letter was received by the Ministry of Culture; Southwest Archaeological Field Office dated July 16, 2007 identifying the need to perform a Stage 1 Archaeological Assessment and a Stage 2 Assessment to potential areas that may be impacted by the project.
- On July 17, 2007 a letter was received by the Canadian Environmental Assessment Agency. The letter described the federal environmental assessment process and the requirement of performing a federal EA under the *Canadian Environmental Assessment Act*.
- A letter dated July 18, 2007 was received by Indian and Northern Affairs Canada that provided information on identifying and notifying all potentially interested First Nation communities. Information was also presented on federal assessments under the *Canadian Environmental Assessment Act*.
- To obtain information on soil classifications quality and agricultural land classification, a data sharing agreement form, dated July 19, 2007, was received from Ontario Ministry of Agriculture, Food and Rural Affairs.
- A letter dated July 24, 2007, was received by CN Rail. The letter stated that CN Rail has no concerns or comments regarding the project and requested removal from the mailing list.
- Correspondence dated July 27, 2007, from the Lower Thames Conservation Authority was received requesting information on site access.
- Correspondence dated August 10, 2007, was received by Ontario Ministry of Natural Resources. The letter provided information on Areas of Natural and Scientific Information (ANSI), the recommended Clear Creek Forest Provincial Park, and specific sections of the report including Mammals, Herpetozoa, Species of Conservation Concern, Evaluation of Site Sensitivity, and Survey Methods, Schedule and Efforts.
- On September 2, 2007, a letter was received from Indian and Northern Affairs Canada – Specific Claims Branch, advising that claims on the area have been submitted by the following First Nations: Caldwell, Walpole Island, Oneida Nation of the Thames, Chippewas of the Thames First Nation, Munsee-Delaware Nation, and Chippewas of Kettle and Stony Point. In addition, the following First Nations are in the vicinity of the project area: Moravian of the Thames and Aamjiwnanng.
- A letter dated September 4, 2007 was received from Indian and Northern Affairs Canada – Litigation Management and Resolution Branch, advising that their inventory includes active litigation cases in the vicinity of the property including: Walpole Island First Nation, Bkjewanong Territory, Municipality of Chatham-Kent, and Caldwell First Nation.
- On September 10, 2007, correspondence was received by the Department of National Defense, Air Traffic Control and Air Defense Radars, indicating that there are no conflicts with any current radar installations.

- A letter dated September 12, 2007, was received by the Ontario Ministry of Aboriginal Affairs. The letter recommended First Nation contacts that might have an interest in the project either through proximity to the study area or through ancestral ties to the area. All First Nations that were recommended were added to the project circulation list.
- Letter dated April 18, 2008 from INAC notifying the proponent of the provincial Environmental Assessment notification process.
- Communication dated April 24, 2008 to the Canadian Food Inspection Agency (CFIA) providing information on the Emerald Ash Borer in relation to the project.
- Communication dated April 28, 2008 from the CFIA stating that they do not foresee any Emerald Ash Borer problems being created as a result of the project.
- July 14, 2008 letter from Transport Canada related to the Chatham Airport Zoning Regulations which restrict the height of buildings, structures and objects in the vicinity of the airport.

Additional agency meetings and discussions that were held included:

- On October 28<sup>th</sup>, 2007, representatives of RES Canada met with Chief Planner Ralph Pugliese and selected members of the ‘Green Energy Committee’ to present an update on the Talbot project.
- On February 5, 2008, representatives from RES Canada and Dillon met with Chatham-Kent Planning Staff (Green Energy Committee) to review the project status and confirm study expectations as they pertained to planning approvals.
- On March 10, 2008, agencies were provided with a letter notifying them of the second Public Information Centre on March 27, 2008.
- On March 20, 2008, representatives of Dillon Consulting and RES Canada attended a Wind Energy Process meeting with municipal representatives at the Chatham-Kent Civic Centre.
- On July 15, 2008, representatives of Dillon Consulting and RES Canada attended a Wind Energy Update meeting with municipal representatives at the Chatham-Kent Civic Centre.
- From February to April 2009, several discussions were held with representatives of Chatham-Kent regarding the project to the lead up of the release of this ERR.
- Correspondence (letters and discussions) was conducted throughout the study period with Environment Canada/CWS regarding the migratory bird survey program and with the Ontario MNR regarding bats and raptor surveys.

## **5.5 Communications Towers Consultation**

As per RABC, 2007 Communication Tower Consultation Guidelines, the following agencies were sent a Notice of Commencement and other project notices:

- Radio Advisory Board of Canada
- Canadian Wind Energy Association
- Industry Canada – Radio Communication Users
- Department of National Defence – Radio Communication Users
- Royal Canadian Mounted Police – Radio Spectrum Management Section
- Rogers Communications

- Environment Canada – Weather Radars
- NAV Canada – Civilian ATC Radars
- Department of National Defence – Military Air Defence and ATC Radars
- Canadian Coast Guard – Vessel Traffic System Radars
- Natural Resources Canada – Seismological Monitoring Arrays

Correspondence received to date includes:

- Correspondence, dated August 7, 2007, was received from Government Mobile Communication Services stating that the project (as long as it is confined to the area described) should pose no problems to the public safety communications system.
- Correspondence, dated August 21, 2007 was received from Spectrum Engineering at the Canadian Forces requesting the wind turbine layout once available. A draft layout was sent in February 2008 and the Canadian Forces responded stating they had no problems with the layout. A final layout was sent in August 2008. On August 25 and 28, 2008, Canada Forces indicated that the final layout does not pose any issues with radio communications and radar.
- Correspondence, dated August 30, 2007 was received from Mobile Communication Services of the Royal Canadian Mounted Police (RCMP) stating that from a radio communications perspective, The RCMP has no issue with the proposed Talbot wind farm. The closest RCMP radio tower is over 7 kilometers away.
- Correspondence, dated August 31, 2007 from Environment Canada, Meteorological Service of Canada, National Radar Program stating that it would be unlikely that the wind farm would impact their towers. They requested the final wind turbine layout. This will be sent to them.
- Correspondence, dated September 10, 2007 was received from the Department of National Defence, Air Traffic Control and Air Defence Radars, stating this Agency has no issues with the proposed location of the wind farm.
- On June 19, 2008, Rogers Wireless Partnership provided correspondence to RES expressing concern over a turbine located in proximity to a cellular tower south and adjacent to Ridgetown. Rogers requested that the turbine be moved to another portion of the property, increasing the distance from the cellular tower. RES commissioned a study to identify potential effects (see **Appendix B** for completed study). The study determined that there would be no adverse effects on the operation of the tower. RES has decided not to proceed with a turbine location on this property, and therefore has alleviated Rogers' concern.
- On August 26, 2008, the Coast Guard provided correspondence stating that they were satisfied with the results of the study commissioned by RES, “Canadian Coast Guard VHF Communication System Operation Analysis with Respect to the Talbot Wind Farm in Ontario, Canada”, and that they do not anticipate any problems with the proposed wind turbine installation. Please see **Appendix B** for the completed study and letter response.
- The Canadian Broadcasting Corporation (CBC), AChannel, CTV and Global Television were all contacted as these were the channels identified that could be affected by the wind farm due to interference to home antennas. Please see **Appendix B** for the consultation record with these TV stations.

All agencies contacted raised no issues with the proposed wind farm, except for Rogers Communications and the Canadian Coast Guard. Please see **Section 7.19** for details of the discussions and issue resolution with these two agencies. Please see **Appendix C** for the record of correspondence. The final project layout is being circulated to the above noted agencies to confirm that they have no issues with the project layout.

## **5.6 Public Information Centres**

### **5.6.1 First Public Information Centre**

On Saturday, July 21, 2007, the first public open house was held at the Morpeth Community Hall in Morpeth from 12pm to 4pm and included a number of display panels that provided information about the project (See **Appendix B** for the display panels). Letters were mailed to all landowners in the study area informing them of the first Public Information Centre the weeks July 9th, 2007. This Public Information Centre was also advertised in both the Chatham Daily News and the Ridgetown Independent the week of July 9, 2007 (See **Appendix B** for ad copies).

Representatives from RES Canada and Dillon were present to answer questions about the proposed project and provide additional information to the public. Project details and general wind power information was shared with the 49 attendees. The completed sign-in sheet is available in **Appendix B**. A summary of the comments and subsequent follow-up actions from the project team are included in **Appendix B**. The panels presented at the Information Centre can be viewed in **Appendix B**.

Based on the questionnaires returned from the Public Information Centre, 94% of attendees who filled out questionnaires were property owners in the project study area or adjacent to the study area. The most common concerns expressed through the open house by residents were:

- noise impacts;
- wildlife impacts;
- visual impacts;
- loss of property rights;
- decrease in property value;
- social impacts such as health and community cohesiveness;
- commitment to the project in years to come;
- impacts to birds;
- industrial applications in a rural setting;
- timing of the project; and
- location of the turbines.

When asked what the most important benefits to the project respondents stated:

- renewable energy is more environmentally friendly;
- decrease in nuclear energy as a result;
- no harmful explosions;
- increased income to local property owners/farmers; and
- more hydro (electricity) for southwestern Ontario.

Thirteen people filled out questionnaires at the first Public Information Centre. When asked if the questionnaire respondents were supportive of the project, 23% stated they were supportive; 23% states they were neutral, 46% stated they were not supportive; and 8% had no opinion at that time. See **Appendix B** for the questionnaires. Please note that only those respondent's questionnaires who agreed to be on the public record have been included.

### **5.6.2 Second Public Information Centre**

The second Public Information Centre was held at the Ridgetown Youth Centre in Ridgetown on March 27, 2008 from 4 to 8pm. Letters were mailed the week of March 3<sup>rd</sup>, 2008 to all landowners in the vicinity of the project study area informing them of the second open house, the inclusion of the Transmission Line in the EA and RES self-elevation from an ESR to an ERR. This Public Information Centre was also advertised in the Ridgetown Independent News and The Chatham Daily News the weeks of March 10<sup>th</sup> and March 17<sup>th</sup>, 2008. See **Appendix B** for copies of the ads.

Representatives from RES Canada, Dillon and Valcoustics were present to answer questions about the proposed project and provide additional information to the public. Project details and general wind power information was shared with the attendees. Seventy-one (71) people signed in. The sign-in sheets are available in **Appendix B**. A summary of the comments and subsequent follow-up actions from the project team are included in **Appendix B**. Details on the notification of this event are included in **Section 5.1** "Project Notices". The panels presented at the Information Centre can be viewed in **Appendix B**.

Based on the twenty-seven questionnaires returned from the Public Information Centre 74% of attendees who filled out questionnaires were property owners in the project study area or adjacent to the study area. The most common concerns expressed through the open house by residents were:

When asked what the most important benefits to the project respondents stated:

- Incomes source for farmers and municipality;
- Creates jobs and economic opportunities; and
- Less fossil fuel use and lower greenhouse gas emissions.

The most important issues to respondents are (in order of importance):

- Wildlife
- Visual
- Noise
- Construction

When asked if the questionnaire respondents were supportive of wind power development in Ontario, 65% stated they were supportive and 35% stated they were not supportive. Some respondents were supportive of wind power development in Ontario but not in Chatham-Kent. Some respondents wanted to see large setbacks, up to 1.5 kilometers from residences and 3 km for the Lake Erie shoreline. Another issue was residents who hosted the Transmission Line should be compensated at the same rate as those who host a turbine. See **Appendix B** for the completed questionnaires. Please note that only those respondent's questionnaires who agreed to be on the public record have been included.

### **5.6.3 Third Public Information Centre**

The third Public Information Centre was held at the Ridgetown Youth Centre in Ridgetown on November 4, 2008 from 4pm to 8pm. Letters were mailed the week of October 16, 2008 to all landowners in the vicinity of the project study area informing them of the availability of the ERR and the third open house. This Public Information Session was also advertised in the Ridgetown Independent News (October 15 and 29, 2008), the Chatham Daily News (October 17, 2008) and the Chatham Citizen (October 24, 2008).

Representatives from RES Canada and Dillon were present to answer questions about the proposed project and provide additional information to the public. Project details and progress, as well as general wind power information, was shared with the attendees. A total of thirty-three (33) people signed in. A copy of the sign-in sheets and information panels are available in **Appendix B**. A summary of the comments received by the project team are also provided in **Appendix B**.

Based on the eight questionnaires returned from the Public Information Centre, six attendees identified themselves as property owners in the project study area or adjacent to the study area. The most common concerns expressed at the Information Centre by residents were:

When asked what the most important benefits to the project respondents stated:

- increase in property tax assessment for municipality;
- job creation; and
- long-term electricity generation.

The most important issues to respondents are (in order of importance):

- visual;
- noise; and
- wildlife.

When the questionnaire respondents were asked if they were supportive of wind power development in Ontario, five stated they were, two respondents indicated they were not supportive and one did not know. One respondent wanted to ensure that any potential stray voltage issues would be addressed while another indicated that wind energy is not “green,” since it is backed by conventional power. Another respondent indicated that they do not want to live within an industrial park or near wind turbines. See **Appendix B** for the completed questionnaires. Please note that only those respondent’s questionnaires who agreed to be on the public record have been included.

## **5.7 Aboriginal Consultation**

### **5.7.1 Aboriginal Consultation**

Since the inception of the development of the Talbot wind farm, RES Canada (“RES”) has recognized that Aboriginal consultation is an integral part of the environmental review process.

As a first step in determining which Aboriginal communities to consult, a letter was sent on July 6, 2007, to the Ontario Ministry of Aboriginal Affairs (MAA) and to Indian and Northern Affairs Canada (INAC) describing the project and the study area. These letters are included in **Appendix B**.

In September of 2008, the MAA and INAC responded with a list of Aboriginal communities that should be included in the consultation process.

In addition to this, in early 2009, as required by the OPA's RES-III RFP process, RES submitted to the Ontario Ministry of Energy and Infrastructure (MEI) a required an "Aboriginal Consultation Information Request" letter. The MEI responded in a letter dated February 12, 2009, identifying the Aboriginal communities that it considers should be consulted.

Beyond the standard Ontario and Canadian EA and MEI requirements, RES has conducted its own research to identify potentially affected Aboriginal communities and has made efforts to communicate with each of them.

Based on direction from MAA, MOEI and INAC and through its own research, the following First Nations and representative organizations have been included in the consultation process:

- Bkejwannong Territory (Walpole Island First Nation)
- Moravian of the Thames First Nation (Delaware First Nation)
- Caldwell First Nation
- Six Nations of the Grand River Territory
- Munsee-Delaware Nation
- Chippewas of Kettle/Stony Point First Nation
- Chippewas of the Thames First Nation
- Chippewas of Sarnia First Nation
- Oneida First Nation of the Thames
- Association of Iroquois and Allied Indians

The following resources were used in developing and implementing RES' Aboriginal consultation process:

- Correspondence received from government agencies, including INAC (Specific Claims, Comprehensive Claims, Litigation), MAA, MOEI and websites of such agencies;
- Correspondence received from Aboriginal communities and organizations;
- Identified Aboriginal community and organizations websites (where available);
- INAC Specific Claims Public Information Summary Reports (to Sept. 2007);
- INAC Comprehensive Claims Information per INAC website (to Sept. 2007);

- Land titles search results;
- Available litigation proceedings for identified litigation; and
- Other selected publicly available information (media reports, internet searches, etc.).

### **5.7.2 Consultation Activity To Date**

For a summary of the consultation activity undertaken by RES to date please refer to the Consultation Summary (the Summary) found in **Appendix B**.

Communication with the identified Aboriginal communities was on-going throughout this Environmental Review. In order to undertake a successful consultation process, RES carried out the following activities:

- Keeping up-to-date on any community contact or governance changes within the Aboriginal communities. As the study took place over an extended period of time it was important to ensure that communication was taking place with the relevant community.
- Providing information on the regulatory and approval process. This was achieved by presenting panels on the EA process at the Public Information Centres meetings, including information in letters, and incorporating information into presentation materials.
- Making themselves available to any Aboriginal community that responded to information requests or accepted the invitation to hold an in-person meeting. RES was therefore able to meet with representatives from Six Nations of the Grand River and Moravian of the Thames. In addition, RES actively solicited other meetings with certain First Nations.
- Continuing to follow-up with Aboriginal communities through telephone calls, emails, faxes, and letters.
- Gathering and taking into account information provided by the Aboriginal communities regarding potential impacts on their interests in the formulation of mitigation, approval and operation plans.

Since the summer of 2007, RES has undertaken a sustained program of consultation activities with the Aboriginal communities listed to above. As noted, these activities are summarized more fully in Appendix B. Certain major milestones are mentioned below. These are not exhaustive of consultation activities to date. As shown in **Appendix B**, considerable other communications and certain meetings have also taken place.

On July 6, 2007, RES sent an introductory letter with the Notice of Study Commencement (NoC) to Aboriginal communities.

On April 23, 2008, RES sent a fax letter to Aboriginal communities notifying of its intent to develop the Project, with a Project area map and handout with general information on Project and contacts. The Supplier indicated that it would be pleased to meet with representatives of the First Nation to

discuss the Project and to receive any comments or questions. If a First Nation wished a meeting, it was invited to call RES to arrange same.

On July 29, 2008, RES sent to Aboriginal communities a follow-up letter to the fax letter of April 23, 2008. In the context of the environmental review process, RES proposed an individual meeting with each First Nation, at its request, in order to better understand the First Nation's interest, if any, in the Project area and to discuss the environmental review in greater detail. The meeting would also solicit information from the First Nation regarding the Project area, provide the First Nation with information on RES's study and findings to date, engage with the First Nation in a meaningful way, develop a good working relationship with First Nations and provide the First Nation with more information on wind energy and the EA process. The NoC and the draft wind turbine layout were enclosed for review.

On October 29, 2008, RES sent to Aboriginal communities a letter following up on the NoC and earlier letters proposing direct meetings to discuss the Project. The letter provided notice of the draft ERR and invited comments on it. RES offered to provide a hard copy of the draft ERR. Comments of First Nations would be considered, after which the final ERR would be prepared and released with the Notice of Completion. The final ERR would also be released for review and comment.

### ***Summary of Input Received from Aboriginal Communities***

The following section provides a synopsis of topics and themes that have emerged from those First Nations who have to date responded to RES' request for information.

#### Moravian of the Thames First Nation (Delaware First Nation)

First Nation Chief indicated, subject to verification with his Council, that he was not aware of any traditional use or archaeological interest in the Project area.

#### Caldwell First Nation

First Nation Chief indicated that Caldwell First Nation would have an interest in the Project area. First Nations councillor indicated that, he wasn't aware of any traditional use or archaeological interest in the Project area with the exception of possible hunting trails. He advised that Caldwell First Nation primarily used the Leamington-Pelee and Pointe Island area.

#### Six Nations of the Grand River

Six Nations advised RES by letter of its claim to certain rights under the 1701 Nanfan (or Fort Albany) Treaty and asserted that the Project area falls within treaty area. Six Nations state that the Project may impact their interests. They advised RES to communicate with Moraviantown First Nation, given its proximity to Project area, to address any concerns. Six Nations stated that they had no further comment at this time, but requested to be kept informed of new developments.

#### Walpole Island First Nation (Bkejwannong First Nation) (WIFN)

WIFN advised that it would send out an invitation for wind project proponents to attend a general public information session to discuss consultation in the WIFN traditional territory. They also

advised that the WIFN has developed a wind energy initiative and consultation protocols. The proposed general public information session was cancelled.

### ***Current Status of Consultation***

#### Moravian of the Thames First Nation (Delaware First Nation)

- RES is continuing consultation to determine possible traditional land use and archaeological interests in the Project area.
- RES has invited Moravian of the Thames First Nation to participate in the Phase II Archaeological study.
- RES will provide Moravian of the Thames with a copy of the final ERR for their review and comment.
- RES has offered capacity funding to complete this work.

#### Caldwell First Nation

- RES is continuing consultation to determine possible traditional land use and archaeological interests in the Project area.
- RES will invite Caldwell First Nation to participate in the Phase II Archaeological study.
- RES will provide Caldwell First Nation with a copy of the final ERR for their review and comment.
- RES has offered capacity funding to complete this work.

#### Six Nations of the Grand River

- RES is continuing consultation to determine possible traditional land use and potentially affected interests in the Project area.
- RES will invite Six Nations to participate in the Phase II Archaeological study.
- RES will provide Six Nations with a copy of the final ERR for their review and comment.
- RES has offered capacity funding to complete this work.

#### Walpole Island First Nation (Bkejwannong First Nation)

- RES is continuing consultation to determine possible traditional land use and potentially affected interests in the Project area.
- RES will invite WIFN to participate in the Phase II Archaeological study.

- RES will provide WIFN with a copy of the final ERR for their review and comment.
- RES has offered capacity funding to complete this work.

### **5.7.3 Future Consultation**

RES is committed to continuing to consult with Aboriginal communities who have asserted have potentially affected interests. In this regard, RES will comply with the requirements of the Aboriginal Consultation Agreement recently concluded with the Crown. These consultations will be carried out by, among other things, the following measures:

- Continuing to meet and engage the said Aboriginal communities to better understand their interests in the area, to address any material concerns and to keep them apprised of the Project's development.
- Assessing need and where appropriate provide capacity funding for Aboriginal communities to effectively participate in the consultation process.
- Continue attempts to determine potentially affected traditional land use and archaeological interests in the Project area. Where necessary, RES will formulate appropriate mitigation, approval and operation plans with affected Aboriginal communities.

## **5.8 Release of Environmental Review Report to Public and Agencies**

### **Voluntary Release of Draft ERR for Agency and Public Review**

In October of 2008, the draft ERR was voluntarily released prior to the filing of the Notice of Completion and the formal 30-day review period for agency (Environment Canada, Ontario Ministry of the Environment, Ministry of Natural Resources and the Municipality of Chatham-Kent) and public review. The availability of the report was advertised in the Ridgeway Independent News, the Chatham Daily News and the Chatham Citizen. Comments received are provided in **Appendix B**. The ERR was made available for public review at the following locations:

- Ridgeway Public Library; and
- Municipality of Chatham-Kent.

As of January 2009, comments received from the public on the draft ERR included:

- Ms. Monica Elm - Provided comments to MOE (November 7, 2008) See Appendix B for RES response;
- Mr. Earle Johnson – Chatham-Kent Wind Assessment Study (November 18 and 19, 2008);
- Mr. Terry Birch – General Public (November 21, 2008); and
- Mr. Earle Johnson - Provided a compiled listing of public comments on the project. (November 18 and 19, 2008).

Further, comments from the following agencies were received on the ERR included:

- Municipality of Chatham-Kent - Public Works, Drainage and Transportation (December 2, 2008, January 7, 2009);
- Heritage Chatham (December 2, 2008)
- Ontario MOE – Southwest Region (January 16, 2009);
- Municipality of Chatham-Kent, - Planning Services (March 7, 2009);
- Ministry of Natural Resources (March 20 and 24, 2009)
- Ontario MOE – Noise Unit (April 21, 2009)

Comments received were all considered in the preparation of this final ERR.

## **5.9 Public Release of Environmental Review Report**

### **Notice of Completion and Release of Final ERR**

An ERR Notice of Completion has been filed to inform the public, agencies and First Nations that the ER for the project has been completed. The Notice was published in the Chatham Daily News on May, 1 2009 and again on May 6, 2009 in the Ridgeway Independent. The NOC includes a map showing the location of the project, a summary of project background information, information on where the ERR can be obtained to review and contact information for the MOE and the project proponent. (See **Appendix B**)

Letters were also sent to residents in the project area advising them of the availability of the final ERR for review and comment.

## **5.10 Future Consultation Commitments**

RES Canada will continue its stakeholder consultation and communications through project construction and implementation phases. Planned stakeholder consultation and communications activities will include:

- Release of this final ERR for public review and comment;
- Fourth Public Information Centre (proposed for June 2009);
- The formation of a Community Benefit Fund;
- The appointment of an Operations Manager to receive project information and help address community concerns during all project stages;
- In lead up to and during construction: weekly ads in local newspapers and radio stations on project progress;
- Web site with updates on project progress;
- 1-800 number for messages during construction to relay messages to construction crew;
- The appointment of a construction community liaison officer who shall directly address issues raised by the community during the construction phase of the project;
- Project update bulletin or bulletins as required, mailed or hand delivered to keep area residents apprised of the progress of construction, dates and timing of any traffic disruptions connected with the project and any other matters that may affect or be of interest to area residents and other project stakeholders;
- Newspaper notices regarding traffic disruptions and construction timings of interest;

- Personal consultations as requested or if warranted;
- Meetings with the Municipality of Chatham-Kent regarding other required approvals and project implementation;
- Discussion with provincial government agencies as required;
- Ongoing consultation and meetings with project landowners;
- Talbot wind farm advisory group: already established and has held two meetings. The group is composed of eight members that includes: landowners with/without turbines, councilors, environmental groups, etc). To continue meeting on regular basis to discuss project issues and concerns prior to and during the project construction;
- Post-construction: Sponsor an article or insert periodically in Ridgetown paper on Talbot wind farm, wind energy and/or energy efficiency; and
- Post-construction: public forum to present post-construction studies' results.

## **6. Environmental Features Screening**

### **6.1 Environmental Screening**

As required by MOE regulation 116/01 and the “*MOE Guide to Environmental Assessment Requirements for Electricity Projects*”, a screening of environmental features was undertaken for the purposes of focusing on the most likely effects from the project. The MOE screening criteria as contained in Appendix C of the “*Electricity Project EA Guide*” was used as a basis for the screening and has been reproduced in **Table 6.1**. A “No” listing in the table indicates that the environmental feature will not be affected by the proposed project and is not considered further in the Environmental Review. A “Yes” listing indicates the possibility of the environmental feature being affected by the project. As in the *Electricity Project EA Guide*, mitigation or impact management measures are not to be considered in completing this table. Environmental features, which could be affected by the project, were then assessed in greater detail as described in this section of the report.

<b>Table 6.1 – Provincial Screening Checklist</b>			
Criterion: Will the project.....	Yes	No	Additional Information
<b>1. Surface and Ground Water</b>			
1.1 have negative effects on surface water quality, quantities or flow?	X		<ul style="list-style-type: none"> <li>▪ Potential for effects on water quality (sediments) and flow obstruction from the construction of access roads and the need to cross one watercourse.</li> <li>▪ No surface water will be required for the project.</li> <li>▪ See Section 7.2 for effects assessment/mitigation.</li> </ul>
1.2 have negative effects on ground water quality, quantity or movement?	X		<ul style="list-style-type: none"> <li>▪ The potential for dewatering during turbine foundation construction could affect groundwater levels.</li> <li>▪ See Section 7.4 for effects assessment/mitigation.</li> </ul>
1.3 cause significant sedimentation, soil erosion or shoreline or riverbank erosion on or off site?	X		<ul style="list-style-type: none"> <li>▪ In-water works for access roads and electrical lines could increase erosion/sedimentation rates in watercourses. It is expected that these effects can be mitigated.</li> <li>▪ See Section 7.2 for effects assessment and mitigation measures.</li> </ul>
1.4 cause potential negative effects on surface or ground water from accidental spills or releases to the environment?	X		<ul style="list-style-type: none"> <li>▪ Fuels and lubricants will be required during all project phases. As with any infrastructure project, there is the potential for spills of these materials. The quantities of these materials to be used are not large. Some temporary storage at the project construction office is likely.</li> <li>▪ See Sections 7.2 and 7.4 for effects assessment/mitigation</li> </ul>
<b>2. Land</b>			
2.1 have negative effects on residential, commercial or institutional land uses within 500- metres of the site?	X		<ul style="list-style-type: none"> <li>▪ Lands will be required for the turbines, access roads, electrical cables, and laydown areas. All affected lands are on private land under lease agreement with the landowner.</li> <li>▪ Some disruption to land use in the surrounding area is anticipated during all project phases.</li> <li>▪ See Section 7.10 for effects assessment/mitigation</li> </ul>
2.2 be inconsistent with the Provincial Policy Statement, provincial land use or resource management plans?	X		<ul style="list-style-type: none"> <li>▪ The project has regard to the Provincial Policy Statement</li> </ul>
2.3 be inconsistent with municipal land use policies, plans and zoning by-laws?	X		<ul style="list-style-type: none"> <li>▪ The project will be subject to zoning and site plan control.</li> </ul>
2.4 use hazard lands or unstable lands subject		X	<ul style="list-style-type: none"> <li>▪ The turbines are located outside of hazard lands (i.e. flood plain).</li> </ul>

<b>Table 6.1 – Provincial Screening Checklist</b>			
Criterion: Will the project.....	Yes	No	Additional Information
to erosion?			
2.5 have potential negative effects related to the remediation of contaminated land?		X	<ul style="list-style-type: none"> <li>▪ As lands required for the project are rural and under agricultural use it is very unlikely that the lands are contaminated and require remediation.</li> </ul>
<b>3. Air and Noise</b>			
3.1 have negative effects on air quality due to emissions of nitrogen dioxide, sulphur dioxide, suspended particulates, or other pollutants?	X		<ul style="list-style-type: none"> <li>▪ The operation of the wind farm will not result in air emissions.</li> <li>▪ During the construction period, air emissions from construction machinery will occur.</li> <li>▪ Movement of construction equipment and excavation activities could increase TSP levels in a localized area.</li> <li>▪ Increased road traffic from the construction workforce could increase air emissions in the study area.</li> <li>▪ See Section 7.5 for effects assessment/mitigation.</li> </ul>
3.2 cause negative effects from the emission of greenhouse gases (CO <sub>2</sub> , methane)?		X	<ul style="list-style-type: none"> <li>▪ The construction machinery will emit greenhouse gases. These will be minor and temporary effects.</li> <li>▪ The operation of the wind turbines will not result in the release of greenhouse gases.</li> <li>▪ See Section 7.5 for effects assessment/mitigation.</li> </ul>
3.3 cause negative effects from the emission of dust or odour?	X		<ul style="list-style-type: none"> <li>▪ During the construction period there is the potential for increased dust levels.</li> <li>▪ No odours are expected during operations.</li> <li>▪ See all of Section 7 for effects assessment/mitigation.</li> </ul>
3.4 cause negative effects from the emission of noise?	X		<ul style="list-style-type: none"> <li>▪ The operation of the construction equipment will result in noise increases in a localized area.</li> <li>▪ The operation of the turbines will result in noise. The turbines have been sited to meet applicable MOE noise standards.</li> <li>▪ Increased road traffic from the construction workforce could increase road traffic noise levels in area.</li> <li>▪ See Section 7.12 and 7.17 for effects assessment/mitigation.</li> </ul>
<b>4. Natural Environment</b>			
4.1 cause negative effects on rare, threatened or endangered species of flora or fauna or	X		<ul style="list-style-type: none"> <li>▪ Based on available records and fieldwork, the operation of the wind farm</li> </ul>

<b>Table 6.1 – Provincial Screening Checklist</b>			
<b>Criterion: Will the project.....</b>	<b>Yes</b>	<b>No</b>	<b>Additional Information</b>
their habitat?			<ul style="list-style-type: none"> <li>has the potential to cause negative effects to bald eagles.</li> <li>▪ The construction and installation of project components has the potential to encounter and cause negative effects to eastern fox snakes and their habitat.</li> <li>▪ See Section 7.9 for effects assessment.</li> </ul>
4.2 cause negative effects on protected natural areas such as ANSIs, ESAs or other significant natural areas?		<b>X</b>	<ul style="list-style-type: none"> <li>▪ The turbines have been well set back from natural areas including the Clear Creek Life Science ANSI and Elgin and Kent County Shoreline Life Science ANSI. Turbine#10, 11 and 12 are in proximity but outside of the Morpeth Ravine Life Science ANSI.</li> <li>▪ See Section 7.8 and 7.9 for effects assessment/mitigation.</li> </ul>
4.3 cause negative effects on wetlands?		<b>X</b>	<ul style="list-style-type: none"> <li>▪ There are no wetlands in the study area</li> </ul>
4.4 have negative effects on wildlife habitat, populations, corridors or movement?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ The construction and installation of project components has the potential to result in effects to wildlife.</li> <li>▪ Most of the infrastructure is located on previously cleared agricultural lands. Little to no natural habitat lands will be affected.</li> <li>▪ See Section 7.8 for effects assessment/mitigation.</li> </ul>
4.5 have negative effects on fish or their habitat, spawning, movement or environmental conditions (e.g. water temperature, turbidity, etc.)?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ It will be necessary to cross about 7 drains/watercourses with the access roads/electrical cables and 9 drains with the transmission line – this could result in affects to fish and fish habitat.</li> <li>▪ Crossings will be designed to minimize effects on aquatic habitat</li> <li>▪ The LTVCA is being consulted with regards to this issue.</li> <li>▪ See Section 7.3 for effects assessment/mitigation.</li> </ul>
4.6 have negative effects on migratory birds, including effects on their habitat or staging areas?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ The operation of the wind farm has the potential to result in effects on migratory birds through collisions and habitat alteration. The scale and significance of these effects has been assessed in this EA.</li> <li>▪ See Section 7.6 for effects assessment/mitigation.</li> </ul>
4.7 have negative effects on locally important or valued ecosystems or vegetation?”	<b>X</b>		<ul style="list-style-type: none"> <li>▪ The turbines are not located in woodlots.</li> <li>▪ Some minimal natural vegetation could be cleared for the access roads and transmission line (hedgerows).</li> <li>▪ See Section 7.8 for effects assessment/mitigation.</li> </ul>

<b>Table 6.1 – Provincial Screening Checklist</b>			
Criterion: Will the project.....	Yes	No	Additional Information
<b>5. Resources</b>			
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 energy includes electricity produced plus useful heat captures)?		X	<ul style="list-style-type: none"> <li>▪ Wind will be used to generate the electricity.</li> </ul>
5.2 have negative effects on the use of Canada Land Inventory Class 1-3, specialty crop or locally significant agricultural lands?	X		<ul style="list-style-type: none"> <li>▪ Most of the project components are located on high capability agricultural land.</li> <li>▪ See Section 7.13 for effects assessment/mitigation.</li> </ul>
5.3 have negative effects on existing agricultural production?	X		<ul style="list-style-type: none"> <li>▪ Agricultural land to be used for the turbines and access roads will be taken out of production.</li> <li>▪ See Section 7.13 for effects assessment/mitigation.</li> </ul>
5.4 have negative effects on the availability of mineral, aggregate or petroleum resources?	X		<ul style="list-style-type: none"> <li>▪ There is the potential for some aggregate resources in the project area.</li> <li>▪ The project should not result in effects to these resources. Discussions with land owners will occur to ensure that these effects do not occur.</li> </ul>
5.5 have negative effects on the availability of forest resources?		X	<ul style="list-style-type: none"> <li>▪ No areas that support merchantable forests will be affected by the project.</li> </ul>
5.6 have negative effects on game and fishery resources, including negative effects caused by creating access to previously inaccessible areas?	X		<ul style="list-style-type: none"> <li>▪ Although most of the land to be affected is under agricultural production, the land could support some game species such as deer.</li> <li>▪ Seventeen watercourses are to be crossed, some of which may provide fish habitat.</li> <li>▪ None of the affected lands can be considered as inaccessible.</li> <li>▪ See Section 7.3 and 7.8 for effects assessment/mitigation.</li> </ul>
<b>6. Socio-Economic</b>			
6.1 have negative effects on neighbourhood or community character?	X		<ul style="list-style-type: none"> <li>▪ The project has the potential to affect community character through the installation 43 wind turbines in an area that is largely rural/farming in character.</li> <li>▪ There will be visual effects in the study area.</li> <li>▪ See Section 7.21 for effects assessment/mitigation.</li> </ul>

<b>Table 6.1 – Provincial Screening Checklist</b>			
<b>Criterion: Will the project.....</b>	<b>Yes</b>	<b>No</b>	<b>Additional Information</b>
6.2 have negative effects on local businesses, institutions or public facilities?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ The development of the wind project will result in economic benefits in the area through employment creation and through the required services and supplies.</li> <li>▪ Agriculture is the dominant economic activity in the study area. The wind farm will not significantly affect agricultural activity in the study area.</li> <li>▪ See Section 7.10 and 7.13 for effects assessment and mitigation measures.</li> </ul>
6.3 have negative effects on recreation, cottaging or tourism?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ The closest turbine to the Lake Erie shoreline is 460 m away.</li> <li>▪ Project could be visible from the shoreline areas.</li> <li>▪ See Section 7.16 for effects assessment/mitigation.</li> </ul>
6.4 have negative effects related to increases in the demands on community services and infrastructure?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ Potential (although low) for demand on emergency service in the event of an accidental event.</li> <li>▪ RES to provide funding for appropriate training to local emergency services.</li> </ul>
6.5 have negative effects on the economic base of a municipality or community?		<b>X</b>	<ul style="list-style-type: none"> <li>▪ There will be no negative effects on the areas economy. The project will result in positive economic impacts through taxes that will be paid to the municipality and job creation. Supplies and services will be obtained in the local area as much as possible.</li> </ul>
6.6 have negative effects on local employment and labour supply?		<b>X</b>	<ul style="list-style-type: none"> <li>▪ It expected that the project will result in positive effects through the creation of employment opportunities.</li> </ul>
6.7 have negative effects related to traffic?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ The turbines and other related supplies will be transported to the study area by truck. This could create some short term road congestion during the construction period. A moving permit will be required to transport turbine components to site.</li> <li>▪ Access road construction and delivery of foundation concrete could deteriorate Municipal roads. RES intends to undertake a pre-construction and post-construction road condition survey. Upon completing construction, roads will be returned to their initial state.</li> <li>▪ See Section 7.17 for effects assessment/mitigation.</li> </ul>
6.8 cause public concerns related to public health and safety?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ There exists the potential for public safety issues during the construction and operation period.</li> <li>▪ As this is a green energy project, it will offset electrical production from</li> </ul>

<b>Table 6.1 – Provincial Screening Checklist</b>			
Criterion: Will the project.....	Yes	No	Additional Information
			<p>other generation sources that could have public health implications.</p> <ul style="list-style-type: none"> <li>▪ See Section 7.18 for effects assessment/mitigation.</li> <li>▪ Project Health and safety concerns have been responded to – local residents are generally supportive of the project</li> </ul>
<b>7. Heritage and Culture</b>			
7.1 have negative effects on heritage buildings, structures or sites, archaeological resources, or cultural heritage landscapes?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ The project has the potential to affect archaeological resources.</li> <li>▪ See Section 7.20 for effects assessment/mitigation.</li> </ul>
7.2 have negative effects on scenic or aesthetically pleasing landscapes or views?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ The wind farm will be visible throughout the study area. This will change the landscape of the area. There also exist the potential for flicker effects.</li> <li>▪ See Section 7.21 for effects assessment/mitigation.</li> </ul>
<b>8. Aboriginal</b>			
8.1 cause negative effects on First Nations or other Aboriginal communities?		<b>X</b>	<ul style="list-style-type: none"> <li>▪ The conclusions of this review are that this Project is expected to result in no significant adverse effects on First Nation and Aboriginal communities.</li> <li>▪ Consultations with First Nation and Aboriginal communities are ongoing with respect to the Aboriginal Consultation Agreement entered into with the Crown.</li> </ul>
<b>9. Other</b>			
9.1 result in the creation of waste materials requiring disposal?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ The project will result in the creation of some solid waste materials such as packaging and other constructed related materials and used lubricants.</li> <li>▪ See Section 7.11 for effects assessment/mitigation.</li> </ul>
9.2 cause any other negative environmental effects not covered by the criteria outlined above?	<b>X</b>		<ul style="list-style-type: none"> <li>▪ Effects to navigable waterways.</li> <li>▪ Effects to air navigation.</li> <li>▪ See all of Section 7 for effects assessment/mitigation.</li> </ul>

## 7. Effects Assessment and Mitigation

The construction, operation and maintenance of the Talbot Wind Farm have the potential to affect the local natural and socio-economic environments. This section examines the interactions between the project activities and the natural and social features that they could potentially affect.

The *Guide to Environmental Assessment Requirements for Electricity Projects* and the *Environmental Impact Statement Guidelines for Screening of Inland Wind Farms under the Canadian Environmental Assessment Act* both require that for each project specific issue identified through the environmental screening checklist (**Table 6.1**) the following analysis be completed:

1. **Existing Environment** - describes the potentially affected environmental feature.
2. **Potential Effects** – describes the potential effects, both positive and negative, to the environmental features that may occur as a result of the Project.
3. **Mitigation Measures** – Recommends specific mitigative measures that will be implemented to minimize any potential negative effect of the Project on environmental features.
4. **Net Effects and Significance** – Describes the residual effects after mitigation measures have been applied. Determines the significance of the net effects. The criteria for assessing the level of significance of net effects after mitigation measures have been applied are illustrated in **Table 7.1**, as described in the *Environmental Impact Statement Guidelines for Screening of Inland Wind Farms Under the Canadian Environmental Assessment Act*.

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

The following section describe the potential for projects effects considering the results of the screening that was undertaken as previously documented in **Table 6.1**. For each component of the environment that was considered, we describe existing conditions, potential effects, propose mitigation and then describe the net effect/effect significance. While the study area recognized in the effects assessment varied by environmental component, for the most part the study area included the lands within the project area boundary.

## **Natural Environment**

### **7.1 Physiography/Topography**

#### **7.1.1 Existing Environment**

The proposed study area is located on the Blenheim Moraine (Dillon, 2004). The general surficial geology consists of till deposits, lacustrine deposits and sandy/course deposits. Bedrock geology consists of the Kettle Point Formation (shale). Typically, bedrock is located more than 30 meters below the surface (Dillon, 2004).

The soil deposits, which exist as narrow strips extending east to west, are consistent with the topography of the land within the study area, as the land drains south to Lake Erie. Generally, the topography consists as a gentle slope ranging from 0.5-1.0 % in a southerly direction toward the lake, with the land draining through sub-surface drains, dredged ditches and lake gullies. However, a small section in the northwest corner of the study area drains north to the Thames River.

#### **7.1.2 Potential Effects**

There exists the potential for some slight alterations to topography as a result of grading required for the construction of the permanent access roads. No potential effects are anticipated during the operation of the wind farm.

#### **7.1.3 Mitigation Measures**

In constructing the access roads, the extent of grading will be minimized as much as possible so as to not substantially affect drainage patterns in the area. No mitigation measures are required as there are no anticipated effects during the operation of the wind farm.

#### **7.1.4 Net Effects and Significance**

The slight changes to topography due to grading are not considered to be significant.

### **7.2 Surface Water Quality and Soil Erosion**

*This section refers to items 1.1, 1.3, 1.4 and 2.4 of the MOE's environmental screening checklist" will the projects:*

- *Have negative effects on surface water quantity, quantities or flow?*
- *Cause significant sedimentation, soil erosion or shoreline or riverbank erosion on or off-site?*
- *Cause potential negative effects on surface or ground water from accidental spills or releases into the environment?*
- *Use hazard lands or unstable lands subject to erosion?*

#### **7.2.1 Existing Environment**

Commencing in the southern part at Lake Erie and extending to the northern boundary (near Ridgetown) soils within the study area are classified as Brookston Clay, Fox Gravelly Loam, Miami Clay Loam and Conover Clay Loam soils. The southeast corner of the study area consists of Brookston Sandy Loam.

Brookston Clay and Conover Clay Loam possess greater organic matter and poorer natural drainage when compared to the Miami Clay and the Fox Gravelly Loam. The Brookston Sandy Loam is an imperfectly drained soil underline with clay and is low in organic content. There exists a relatively small portion of the study area in the northwest corner (consisting of Brookston Clay) that drains north to the Thames River (Ontario Soil Survey No. 3).

The surface water is conveyed from the northern extent of the study area to the gullies and Lake Erie via existing creeks, streams and agricultural drainage ditches. Due to the existing gradient of the downstream portion of these gullies, soil erosion is a common occurrence at these features.

## **7.2.2 Potential Effects**

It will be necessary to cross about 14 drains and potentially 1 natural watercourse with turbine access roads/electrical connections and transmission line. The access road crossings will require the placement of culverts to allow water flow. **Figure 7.1** shows the drain crossing locations.

The following lists the names of the drains to be crossed (drain crossing numbers correspond to **Figure 7.1**):

### **Transmission Line Crossings**

- Drain Crossing 1 - Butler Drain, Community of Howard
- Drain Crossing 2 - East Branch of Spring Creek Drain, Community of Howard
- Drain Crossing 3 - Spring Creek Drain, Community of Howard
- Drain Crossing 4 - Stover Drain, Community of Howard
- Drain Crossing 5 - Janosek Coatsworth Drain (south side of Golf Course Line) between Lot 17 & 18, Concession 11, Community of Howard
- Drain Crossing 6 - McTaggart Drain, Community of Howard
- Drain Crossing 7 - South Marsh Tile Drain (south side of Green Line), Community of Howard
- Drain Crossing 8 - South Branch of South Marsh Drain, Community of Howard
- Drain Crossing 9 - South Branch of South Marsh Drain

### **Turbine Access Roads Crossings**

- Drain Crossing 6 - As above
- Drain Crossing 10 - South Marsh Drain, Community of Howard
- Drain Crossing 11 - Strycio Drain No. 1 in Lot 4, Conc. 11, Community of Howard
- Drain Crossing 13 - Drain within Lot 86, Talbot Rd
- Drain Crossing 12 - Ashton Drain, Community of Howard
- Drain Crossing 14 - West branch of the Greenway Drain
- Watercourse Crossing A- Branch of Leverton Creek (Lot 56, Talbot Rd)

In most cases, culverts of approximately 13 to 15 m in width will be required to accommodate the crossing of the watercourses/drains by the access roads. In some cases to accommodate a wider turning radius for the cranes, culverts of 20 to 30 m wide may be required. In order to access the various wind turbine sites, it will be necessary to construct access roads across various open drains. These watercourses are considered municipal drains, having been constructed and maintained in accordance with the *Drainage Act*. Access culverts, comprised of various diameters, are to be constructed across these various drains in order to accommodate vehicular access and construction traffic across the drain while maintaining unimpeded flow within the drain. All works being

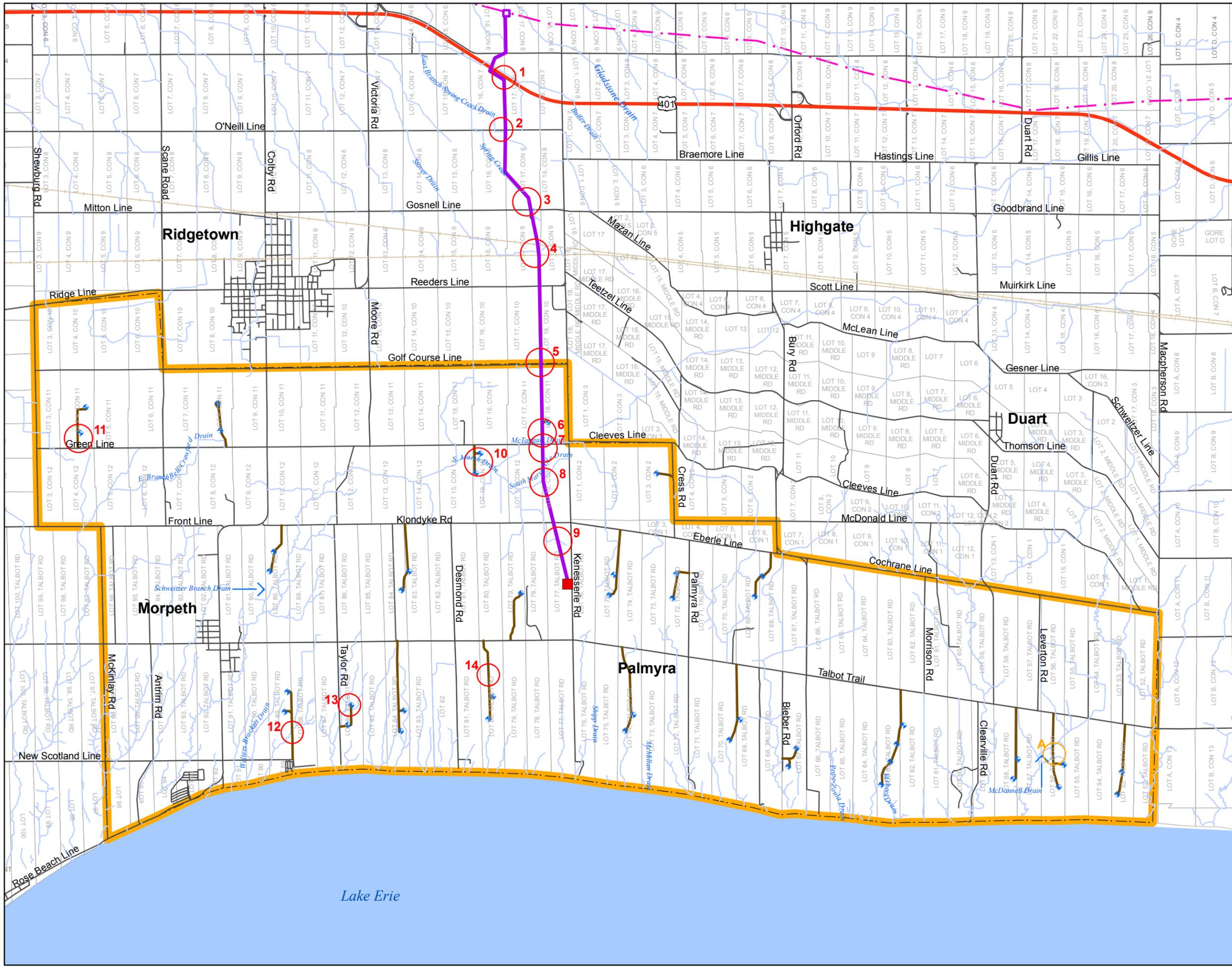
considered that implicate the various municipal drainage systems must be undertaken in accordance with the *Drainage Act*, by a Professional Engineer appointed by the Municipality. This process will include the involvement of the local Conservation Authority, being the Lower Thames River Conservation Authority.

It is expected that no navigable waterways will be traversed, although an official determination by Transport Canada will be sought during the detailed engineering stage of the project.

The potential effects and mitigation measures are further discussed under the next Section, Section 7.3 Fisheries Habitat.

# Wind Farm Study

Figure 7.1: Drain Crossings



- Legend**
- Turbines
  - Transformer/Substation Location
  - Access Roads
  - Existing 230kV Transmission Line
  - Proposed Project 230kV Transmission Line
  - Railway
  - Roads
  - Highways
  - Drain Crossings
  - Natural Watercourse Crossing (existing crossing to be widened)
  - Project Boundary
  - Lots/Parcels
  - Waterbody



1 : 63,000  
 0 1,000 2,000 3,000

### **7.2.3 Mitigation Measures**

Where there is the potential for effects to watercourses including drains from the construction of the turbines and watercourse crossings, the following will be taken into consideration:

- the Ontario MOE Stormwater Management Planning and Design Manual (2003);
- the Ontario Provincial Standards and Specifications (OPSS 182, 518 & 577);
- the Ontario MOE Stormwater Pollution Prevention Handbook (Part I); and the Part II – Pollution Prevention and Flow Reduction Measures Fact Sheets; the Ontario MNR Guidelines on Erosion Control for Urban Construction Sites (1989); and
- the MNR Technical Guidelines- Erosion and Sediment Control (1989).

To provide source controls and minimize adverse impacts, the following drainage mitigation will be incorporated into the environmental protection plan (EPP) that the project constructor will be requested to comply with:

- Minimize disturbance of existing vegetation outside ditching and grassed slopes where regrading is required;
- Minimize time exposure of un-vegetated soils;
- Maximize length of overland flow through to points where stormwater leaves the site;
- Complete an erosion assessment on all new and existing ditches to determine the need for additional erosion protection;
- Top of bank barriers (e.g. silt fencing) are to be put in place for any construction activity that is in proximity to watercourses;
- Where ditch regrading is required, where appropriate, utilize flat bottom ditches in lieu of ‘V’ ditches to reduce velocities and erosion potential, promote peak flow attenuation and provide short-term storm water storage;
- Use of in-line erosion control measures such as erosion blanket, rip rap, straw bale, rock flow checks and vegetated buffers, thereby mitigating high flow velocities and excessive erosion/sedimentation;
- Stream banks are to be stabilized and restored to their pre-construction condition immediately following construction activity. This is particularly important in erosion prone areas such as steep sloped stream banks;
- The watercourse crossing is to be assessed in advance and the most appropriate mitigative measures determined. Alternative watercourse crossing locations should be considered if the proposed crossing location appears to be particularly sensitive to erosion;
- Any stockpiled materials are to be stored and stabilized away from watercourses;
- Ensure all materials placed within the flood line are clean and free of silt and clay size particles. All materials must meet applicable regulations governing placement of fill in water bodies;
- Ensure that all materials and equipment used for the purpose of site preparation and the completion of any work is operated and stored in a manner that prevents any deleterious substance from entering the water;
- Refuelling and handling of potential hazardous substances are to be done away from watercourses;

- Sediment and erosion control measures are to be left in place until all disturbed areas have been stabilized;
- The sediment control plan be designed and implemented to mitigate impacts associated with construction of the project - to prevent suspended sediment, mud, debris, fill, rock dust, etc. from entering downstream watercourses. Areas disturbed by work must be minimized. Silt fences/curtains, sediment traps, check dams must be installed as appropriate;
- Measures are to be in place to minimize mud tracking by construction vehicles, and to ensure timely cleanup of any tracked mud, dirt and debris along local roads and areas outside of the immediate work area where the above sediment controls would not be in place;
- Work is to be suspended if excessive flows of sediment discharges occur, and, any appropriate action should be immediately taken to reduce sediment loading;
- If it is necessary to de-water foundation excavations, prior to its discharge to a watercourse, the water is to be discharged to a settling pond, filter bag, or vegetated buffer strip of adequate size, to filter out suspended sediment (this activity would require a Certificate of Approval under the OWRA from MOE. In addition, should dewatering activities exceed a rate of 50,000 litres per day, a PTTW would be required as well); and,
- Temporary mitigation measures are to be installed prior to commencement of any site clearing, grubbing, excavation, filling or grading works and maintained on regular basis, prior to and after runoff events. Any accumulated materials are to be cleaned out during maintenance and prior to their removal. All disturbed areas on land to be restored to natural conditions should be re-vegetated as soon as conditions allow preventing erosion and restoring habitat functions. Land based measures must not be removed until vegetation has been re-established to a sufficient degree (or surface soils stabilized using other measures) so as to provide adequate erosion protection to disturbed work areas.

There are no anticipated effects during the operations phase of the wind farm.

#### **7.2.4 Significance of Net Effects**

It is expected that the proposed mitigation measures will be effective in minimizing adverse effects on surface water features. Most of the effects will occur during a 6-month construction window and thus will be relatively short term. As a result, none to minor effects are expected.

Net effects are expected to be of low magnitude and temporary in nature. The affected watercourses are not considered to be sensitive. As a result, the net effects are not considered to be significant.

### 7.3 Fisheries Habitat

*This section refers to items 4.5 and 5.6 of the MOE’s environmental screening checklist: will the project:*

- *Have negative effects on fish or their habitat, spawning, movement or environmental conditions (e.g. Water temperature, turbidity, etc)?*
- *Have negative effects on game and fishery resources, including negative effects caused by creating access to previously inaccessible areas?*

#### 7.3.1 Existing Environment

As part of the process to gather background information for the aquatic resources assessment, the Lower Thames Valley Conservation Authority (LTVCA) (Valerie Towsley – Resource Technician) and the Ontario Ministry of Natural Resources (OMNR) – Chatham Office (Holly Simpson – Area Biologist and Ron Gould – SAR Technician) were contacted. As well, to characterize the existing watercourses field visits were conducted on March 7th and August 19, 2008.

Watercourses within the study area drain generally in a southerly or southwesterly direction to Lake Erie, the majority of them having direct connectivity to the Lake. LTVCA (Valerie Towsley, Personal Communication, 2008) provided draft drain classifications for drains within the study area. These classifications are utilized for Fisheries and Oceans Canada (DFO) Class Authorizations for drain maintenance activities. It should be noted that the classifications are draft and could be subject to change as additional fisheries information becomes available.

Fish habitat conditions, including draft drain classifications, for watercourses/drains in the study area are provided in the Fisheries Report contained in **Appendix D**. Some preliminary field work was conducted on the basis of an earlier project layout. Additional field work may be required to support *Fisheries Act* applications (if required). The drains/watercourses that may be adversely affected by the proposed works are shown in **Figure 7.1**.

Generally speaking, the types of existing watercourses are diverse in nature, ranging from tiled drains, agricultural drains, grassy swales, natural intermittent creeks, to natural permanent creeks with defined channels. According to the LTVCA, all of the creeks and drains within the Project Boundary are Class E, F, and C or hybrids of two or more classes. Most of the watercourses south of Talbot Road are channelized drains directly containing warm water fish communities. Conversely, the majority of the watercourses north of Talbot Road are either Class C and/or F with a number of tiled field drains conveying overland surface flows. Most of them have either direct or indirect habitat potential due to their drain classifications and known hydraulic connection to fish bearing waters.

Drains in the area exhibited many features typical of agricultural drains, such as being straightened with uniform channel width and depth and lined with vegetation within a narrow valley corridor. Many of the drains are exposed with extremely steep banks, which has led to significant bank deterioration and erosion, impacts to already-limited riparian vegetation/cover and poorly defined low-flow channels along some reaches. Judging from by the observed flows during field investigations and the significant floodplain erosion lines seen throughout Morpeth and Clear Creek and their associated tributaries, many of these streams appear to be a “flashy” in nature, meaning that water levels are highly variable and sensitive to rainfall events and/or spring freshet.

Despite the above limitations, most of the non-tiled watercourses (natural and altered) within the study area are considered to function as direct warm water fish habitat. Although many of the natural reaches exhibit typical cool/cold water habitat types, their relatively short lengths and agricultural surroundings with many supporting field drains and tiles, likely have contributed to their current warm water classification. Nevertheless, the natural reaches combined with the proximity to Lake Erie explain the periodic occurrence of a few cool water species not typically found in warm water systems.

### **7.3.2 Potential Effects**

The risks to fish and fish habitat associated with isolated open cut stream crossings to install a culvert include the potential for direct damage to substrates, release of excessive sediments, loss of riparian habitat, stranding of fish in dewatered areas, impingement/entrainment of fish at pump intakes, and disruption of essential fish movement patterns. Similarly, dry open-cut stream crossings pose a risk to fish and fish habitat due to potential harmful alteration of substrates, loss of riparian habitat, and release of excessive sediment once stream flows resume. Potential negative effects of the project are related to culvert crossings for access road construction.

There are no known Species at Risk associated with the watercourse crossing within the study area.

Negative impacts of the proposed project and potential permit/approval requirements largely depend on the final site plan and its orientation to nearby creek/drain systems. Any potential impacts on fish habitat (e.g. culverts for access roads, underground transmission lines, removal of riparian vegetation etc.) should be mitigated. When a harmful alteration, disruption or destruction (HADD) of fish habitat cannot be avoided, an Authorization under the Federal *Fisheries Act* will be required from Fisheries and Oceans Canada (DFO) and fish habitat compensation measures may need to be implemented. LTVCA has a Level 2 agreement with DFO, meaning that the Authority conducts the initial assessment of the project to identify any impacts on fish habitat, and can also determine how the proponent can mitigate any impacts. Permanent watercourse crossings where fish habitat is present would be referred to DFO for review to determine if an Authorization is required. Any fish habitat compensation plans that may need to be prepared would be developed in consultation with DFO.

### **7.3.3 Mitigation Measures**

The majority of road crossings over small creeks and/or drains are handled by installing an appropriately-sized culvert by open cutting creek/drain beds to properly install at an acceptable elevation to ensure proper fluvial function and fish passage. Standard mitigation measures to address typical negative impacts resulting from construction activities of these kinds are presented in **Table 7.2** below. As well, the following measures should be implemented:

- The OMNR in-water construction-timing window should be implemented for the summer months when work can be completed in the dry or when resident fish communities in permanent systems have completed their annual reproductive activities.
- Compensation measures, where required, should involve riparian plantings, bank stabilization through bioengineering, or the construction of in-stream fish habitat features

and/or the removal of blockages/barriers (this is a possibility along the shoreline at the mouths of some tributaries).

**Table 7.2 – Fisheries Potential Impacts, Mitigation Measures and Net Effects**

Potential Impact	Appropriate Mitigation/Restoration	Net Effects (if any) / Rationale
<b>Erosion and sedimentation/silt release</b> (due to bank disturbance, loss of root systems, rutting, and compaction of stream substrates)	<ul style="list-style-type: none"> <li>- install sufficient silt fencing, rock/straw bail check dams, erosion blankets to control exposed surfaces</li> <li>- work during dry/frozen conditions or create dry conditions (i.e., dam and pump)</li> <li>- cross watercourses at straight sections where banks are more stable</li> </ul>	<p><b>NO Net Negative Effect</b></p> <ul style="list-style-type: none"> <li>- mitigation measures will catch the majority of release</li> <li>- majority of these drains are already degraded due to runoff from the surrounding fields</li> </ul>
<b>Site dewatering &amp; fish stranding</b> (due to cofferdam installation to create dry work conditions)	<ul style="list-style-type: none"> <li>- install filter bags/sediment basins/ splash pads to capture and filter sediment-laden water prior to reentry</li> <li>- capture and relocate stranded fish prior to dewatering any enclosures</li> </ul>	<p><b>NO Net Negative Effect</b></p> <ul style="list-style-type: none"> <li>- mitigation measures will filter the discharge</li> <li>- relocated fish will be well downstream of the work area</li> </ul>
<b>Disturbance to or removal of existing vegetation and banks</b> (due to site access for heavy equipment)	<ul style="list-style-type: none"> <li>- use existing trails, cut-lines, roads to avoid/minimize unnecessary removal and keep within the utility ROW</li> <li>- replant and/or reseed disturbed areas as required using native species</li> <li>- reshape bank to original or better shape</li> </ul>	<p><b>LOW Net Negative Effect</b></p> <ul style="list-style-type: none"> <li>- limited riparian vegetation is expected to be removed per site</li> <li>- exposed areas will be restored and revegetated ASAP</li> </ul>
<b>Disturbance (compaction) to or removal of existing substrates</b> (due to crossing of heavy equipment and culvert footprints)	<ul style="list-style-type: none"> <li>- operate machinery only in channel area proposed to be disturbed (e.g., footprint of the culvert)</li> <li>- similar or improved substrate will be installed throughout the new culvert</li> </ul>	<p><b>LOW Net Negative Effect</b></p> <ul style="list-style-type: none"> <li>- some native substrate will be removed within the footprint of the new culvert</li> <li>- disturbed substrate will be replaced with same or better</li> </ul>
<b>Disruption to sensitive life stages</b> (due to untimely in-water work)	<ul style="list-style-type: none"> <li>- adhere to the appropriate MNR In-water Construction Timing Window (i.e., late summer to early spring only)</li> </ul>	<p><b>NO Net Negative Effect</b></p> <ul style="list-style-type: none"> <li>- avoids spawning, incubation, and rearing times</li> </ul>
<b>Introduction of deleterious substances</b> (due to heavy equipment on-site and in-water)	<ul style="list-style-type: none"> <li>- ensure that machinery used is clean and free of fluid leaks</li> <li>- refuel and store fuel far back from the watercourse and keep a spill kit ready on-site</li> </ul>	<p><b>NO Net Negative Effect</b></p> <ul style="list-style-type: none"> <li>- standard measures will prevent petroleum products from entering the watercourse</li> </ul>
<b>Impingement of fish at pump</b>	<ul style="list-style-type: none"> <li>- prevent fish from gaining access</li> </ul>	<p><b>NO Net Negative Effect</b></p>

Potential Impact	Appropriate Mitigation/Restoration	Net Effects (if any) / Rationale
intakes (due to cofferdam dewatering or dam and pumping – if methods utilized)	to pump intakes by using screens and temporary gravel berms etc.	- standard measures will protect fish
<b>Disruption of migratory movements</b> (due to cofferdam or dam and pumping construction methods)	- work in a manner that minimizes time in the channel - work outside of migratory times	<b>NO Net Negative Effect</b> - disruption is temporary and to occur within the approved In-water Construction Timing Window

As seen in the above table, few net effects will remain after appropriate mitigation measures have been implemented. These effects are considered minor and can generally be compensated through the implementation of basic restoration activities to replace what was lost (e.g., riparian plantings, reseeded, substrate enhancement/replacement etc.).

For reference, please refer to DFO’s Operation Statements for “Overhead Line Construction” and “Isolated or Dry Open-Cut Stream Crossings” (**Appendix D**) for more detailed information on environmental mitigation and protection appropriate to these types of watercourse crossing. Provided the listed conditions in the Operational Statements are met, review and approval by DFO is not likely required.

The majority of crossing locations have been identified to be of low sensitivity due to the current state of existing habitat (e.g., dry, altered channels with little to no buffer/riparian protection). As such, implementation of the mitigation measures listed in **Table 7.2** and in **Appendix D** would likely prevent the occurrence of HADD at these particular crossings.

### 7.3.4 Significance of Net Effects

As the watercourses to be crossed by access roads are considered to be of low or moderate sensitivity and with the implementation of mitigation measures as outlined in **Table 7.2** and the measures outlined in DFOs Operational Statements, the resulting net environmental effects are not considered to be significant. As such, the proposed works are considered to be of low risk overall with no HADDs to fish habitat expected.

Any new crossings of drains would also have to be approved by the Municipality under the *Drainage Act*, the LTVCA under the *Conservation Authorities Act*, DFO under the *Fisheries Act* (if required), and possibly Transport Canada (TC) under the *Navigable Waters Protection Act* (if deemed navigable).

## 7.4 Groundwater Quality

*This section refers to items 12 and 1.4 of the MOE’s environmental screening checklist: will the project:*

- *have negative effects on ground water quality, quantity of movement?*
- *Cause potential negative effects on surface or groundwater from accidental spills or releases to the environment?*

#### **7.4.1 Existing Environment**

The groundwater flow characteristics reflect that of the surface topography. Therefore, throughout the study area, the principle shallow groundwater flow direction is away from the topographic ridge (Blenheim Moraine), as described above (Dillon, 2004).

The water table depth is relatively close to the surface for the majority of study area, with the exception of area south of Talbot Road. At this location the water table coincides with the decrease in elevation to the lake below (Dillon, 2004). Throughout much of the region (Municipality of Chatham-Kent), there is a contact aquifer (at or near bedrock). This contact aquifer surfaces within the study area outlined above, as there are some discontinuous surficial sand deposits of a variable thickness (Dillon, 2004).

#### **7.4.2 Potential Effects**

As the project will result in the creation of very limited impervious areas (turbine base), the project will not alter infiltration rates and thus affect groundwater recharge. There is the possibility that dewatering may be required when excavating and constructing the turbine bases. As the depth of the excavation is to a depth of 3 meters below ground (MBG) it is unlikely the excavation would encounter the bedrock aquifer. As the amount of dewatering potentially required during excavation is relatively minor, substantial effects to ground water supplies is not expected. There are no turbines in close proximity to existing wells.

Groundwater supplies could also be affected by spills of hazardous material such as fuel and oils. There may be temporary fuel storage at the project construction office. Given the volume of materials to be used is relatively small; the potential for these types of effects is minimal. No potential effects are anticipated during the operation of the wind farm.

If a project specific cement batch plant is required for the project, there would be a need to extract ground water. As it is expected that more than 50,000 litres/day would be needed, it would be necessary to obtain a MOE C of A.

#### **7.4.3 Mitigation Measures**

A relatively low volume of water would be extracted during turbine base construction, from dewatering and extracted for water use; therefore no mitigation measures are required.

Fuels and oils will be managed per provincial requirements. In the event of a spill of hazardous materials, clean-up procedures will be undertaken as per provincial protocols and legislation as governed by the *Environmental Protection Act* and the *Ontario Water Resources Act*.

The extraction of groundwater for a potential cement batch plant would be undertaken under the requirements of a MOE C of A.

#### **7.4.4 Significance of Net Effects**

Groundwater supplies will not be adversely affected by the project. No significant effects are expected.

## **7.5 Air Quality**

*This section refers to items 3.1, 3.2 and 3.3 of the MOE’s environmental screening checklist: will the project:*

- *Have negative effects on air quality due to emissions of nitrogen oxide, sulphur dioxide, suspended particulates, or other pollutants?*
- *Cause negative effects from the emission of greenhouse gases?*
- *Cause negatives effects from the emission of dust or odour?*

### **7.5.1 Existing Environment**

The project area is located within the Chatham Flats. Then mean temperature of the area tends to be higher than the Ontario average and due to the areas proximity to Lake Erie and Lake St. Clair, received a relatively higher amount of precipitation.

In 2005, the highest one-hour ozone concentration (116 ppb) was recorded at Chatham. The higher numbers of one-hour ozone exceedances are recorded mainly on the north shores of Lake Erie and are generally attributed to the long-range transport of pollutants into Ontario from the United States (Government of Ontario, 2005). Particulate Matter concentration (PM 2.5) in Chatham is in line with the Ontario average. Chatham experienced 9 days of PM 2.5 concentrations above the 30micrograms/m<sup>3</sup>.

The air quality index for the Chatham station was recorded as being “very good” 28% (35%) of the time, “good” 53% (52%) of the time, “moderate” 16.5% (12%) of the time and “poor” 1.6% (1.1%) of the time.<sup>1</sup>

### **7.5.2 Potential Effects**

Project related air quality effects would largely occur during the construction phase. This would include emissions from construction equipment and increased dust levels during soil excavation and from road traffic. As the construction areas are generally well removed from receptors, air quality related effects are expected to be minimal and would be temporary.

As electricity is to be generated through wind, during the operations period there will be no negative effects on air quality due to odour or emissions of nitrogen dioxide, sulphur dioxide, suspended particulates or other pollutants, including greenhouse gases.

### **7.5.3 Mitigation Measures**

During the construction period, the contractor will implement standard practices to minimize air emissions including:

- Use new or well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles, engine covers;
- Motorized equipment should meet design specifications for emission controls and conform to provincial Drive Clean standards where appropriate;
- Comply with operating specifications for heavy equipment and machinery;

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<sup>1</sup> Ontario average in brackets.

- Minimize operation and idling of gas-powered equipment and vehicles, in particular, during smog advisories – this is to be strictly monitored;
- Minimize vehicular traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material;
- Minimize mud tracking by construction vehicles along access routes and areas outside of the immediate work site, and ensure timely cleanup of any tracked mud, dirt and debris.
- Avoid excavation and other construction activities with potential to release airborne particulates during windy and prolonged dry periods;
- Stabilize stockpiled excavated soils in areas that are upwind of sensitive receptors;
- Cover or otherwise contain loose construction materials that have potential to release airborne particulates during transport, installation or removal;
- Use of Spray water and environmentally friendly dust suppressants applied at an environmentally acceptable rate may be used to minimize the release of dust from gravel, paved areas and exposed soils only where necessary on problem areas; and
- Restore disturbed areas as soon as possible to minimize the duration of soil exposure.

#### **7.5.4 Significance of Net Effects**

Given the large separation distances from receptors, air related effects during the construction period would be minimal and not dissimilar to many agricultural activities in the area. Effects would also be temporary.

The operation of the wind farm will result in a net benefit to air quality by offsetting the need to produce electricity from other sources such as fossil fuel generators that emit greenhouse gases.

Construction related air quality effects would be of short duration and low in magnitude. They are therefore not considered to be significant. During the long-term operations periods, the project will contribute to improved air quality in the Province by offsetting other forms of electricity production.

#### **7.6 Birds**

*This section refers to item 4.6 of the MOE's environmental screening checklist: will the project:*

- *Have negative effects on migratory birds, including effects on their habitat or staging areas?*

##### **7.6.1 Existing Environment**

Please refer to **Appendix E** for the complete Bird Report.

Thirty one surveys were conducted between February 16, 2007 and January 10, 2008 for the purpose of documenting bird usage of the study area during all seasons. The specific target species or groups of these surveys and the methods used were the result of issues identified during a background information review, local knowledge of the area and formal consultation with agencies.

Several sources, including: Natural Heritage Information Centre database; Breeding Bird Atlas (<http://www.birdsontario.org/atlas/atlasmain.html>); Important Bird Areas

(<http://www.ibacanada.ca>); federal *Species at Risk Act* (SARA) Public Registry ([http://www.sararegistry.gc.ca/default\\_e.cfm](http://www.sararegistry.gc.ca/default_e.cfm)); and provincial Species at Risk (SAR) (<http://www.mnr.gov.on.ca/MNR/speciesatrisk/status.html>) formed the basis of the background review. The Ontario Ministry of Natural Resources Ontario Digital Geospatial Information was used to obtain aerial photos (1995-1999) and mapping of habitat in or immediately adjacent to the study area.

Consultation with OMNR Aylmer and Chatham District Office staff, including: Daraleigh Irving (Aylmer District Planner); Holly Simpson (Chatham District Biologist); and Ron Gould (Aylmer/Chatham District Species at Risk Biologist) was completed as part of the background review. Rob Read (Environmental Assessment Officer, Environment Canada) was also consulted during in the earlier stages of the project with respect to the existing natural environment under EC's mandate (i.e. *Migratory Bird Convention Act*, 1994 (MBCA) and Species at Risk).

Methods to be used during this study were communicated to EC and the OMNR (Dillon Consulting April 2007) and formed part of the pre-consultation for this project.

#### *7.6.1.1 Determination Level of Concern Category*

During the initial stages of the project the study area was best described as having a very high site sensitivity designation based on Table 1 in *Wind Turbines and Birds: A Guidance Document for Environmental Assessments* (Environment Canada March 2007b). This designation occurs as a result of the:

- Presence of Species at Risk (e.g. Bald Eagle and Acadian Flycatcher);
- Presence of some BCR 13 priority species;
- Fall raptor migration corridor along the north shore of Lake Erie;
- Presence of the Greater Rondeau IBA, Clear Creek IBA and Southwest Elgin Forest Complex IBA;
- Study area surrounds Clear Creek Forest Natural Reserve and is adjacent to Rondeau Provincial Park, both managed by Ontario Parks;
- Adjacent area recognized as a staging area for pelagic species of waterfowl during spring, fall and early winter; and
- Potential presence of tundra swan and shorebird staging areas in study area during spring.

The proposed size of the wind farm is considered “large”, about 40-50 turbines. This in conjunction with the site sensitivity score of very high puts this project in Level of Concern Category 4.

#### *7.6.1.2 Spring Migration*

The primary focus of spring surveys were Tundra Swans, shorebirds (e.g. American Golden-Plover, Black-bellied Plover and Ruddy Turnstone) and waterfowl (e.g. red-breasted mergansers). These target species or guilds were identified through background research and consultation with EC (Environment Canada March 13 2007). Survey methods used were adapted from Environment Canada 2007a.

### *7.6.1.3 Breeding Birds*

From background information sources and discussions with local experts it was known that there was potential for Species at Risk and Bird Conservation Region 13 birds to breed in the study area. Breeding bird surveys were undertaken to qualify their presence and location in the study area. Survey methods used were adapted from Environment Canada 2007a.

### *7.6.1.4 Fall Migration - Diurnal Migration and Staging Areas*

The north shore of Lake Erie is known as a key fall migration route for diurnal migrants. Of primary interest are raptors going through the area during the fall season. Survey methods used were adapted from Environment Canada 2007a.

### *7.6.1.5 Winter Residents*

Consultation or background information did not identify any specific species or guilds that required specific observation during the winter season. Rather winter surveys were carried out for the purpose of providing a complete assessment of all seasons and to qualify any concentration of raptors and/or waterfowl, which have been of concern in other areas for various regions.

Overall, a total of 272,150 individual birds were observed during surveys, which were made up of 173 species. High numbers were observed for a select few groups including: waterfowl (45,389 [16.7%]), comprised primarily of pelagic species observed during spring and winter; waterbirds (29,597 [10.9%]), primarily a result of high numbers of Ring-billed Gulls in the fall; and landbirds (190,837 [70.1%]), primarily made up of blackbirds (144,978) observed during the fall.

## **7.6.2 Potential Effects**

### *7.6.2.1 Overview*

#### **General Assessment of Risk**

Studies undertaken around the world indicate that, with few exceptions, very low numbers of bird fatalities occur at wind energy facilities (Kingsley and Whittam, 2005, Erickson et al. 2001, Gill et al. 1996, Langston and Pullan, 2002). Furthermore, there is no evidence that any large-scale kills are occurring at night similar to those commonly reported at tall buildings and tall communications towers (Anderson et al. 1999). Wind turbine related mortality has been far less than that reported for many other sources of human-caused avian mortality (Erickson et al., 2001).

While avian mortality has been of primary concern in North America at operating wind farms, it has not proven to have had significant impact on any bird populations (Kerlinger, 2001). Average mortality rate was estimated at 1.83 birds/turbine/year outside California (Erickson et al., 2001). A more recent estimate of average mortality placed it at 2.3 birds/turbine/year outside California, and this increase was largely due to a single site in Tennessee (NWCC 2004). Mortality rates in agricultural sites may be below one bird/turbine/year (NWCC 2004, Koford et al., 2004, Johnson et al., 2003a). According to James (2008), a mortality rate between 2.0 and 2.5 birds/turbine/year was estimated for the Erie Shores wind farm, which is located approximately 75km east of the proposed site.

It is not possible to accurately predict potential mortality through pre-construction surveys of numbers of birds present in an area (Thelander and Rugge, 2001, Gill et al., 1996). Behavioural

studies demonstrate that the reason collision fatalities are rare at wind turbines is a result of the fact that birds apparently see the turbines, recognize them as obstacles, change flight direction when they encounter them and fly around the turbines (EchoTracks 2005, Kerlinger, 2003). Birds have excellent vision with very quick motor control and spend much of their life avoiding obstacles at close range in the habitat they fly through. Birds can readily detect slowly rotating turbine blades, and tend to avoid operating turbines, but easily fly close to and among turbines when not operating (Nelson and Curry, 1995). Radar observations have shown that birds will generally be able to detect and avoid a wind turbine (Pederson and Poulsen 1991, EchoTracks Inc. 2005).

### **Summary of Avian Collisions with Human-made Structures**

It has been estimated that from 100 million to well over 1 billion birds are killed annually in the United States due to collisions with human-made structures, including vehicles, buildings and windows, powerlines, communication towers, and wind turbines. Although wind energy is generally considered environmentally friendly it has been associated with the deaths of birds colliding with turbines and other wind plant structures, especially in California. It is commonly recognized that seasonal concentrations of birds, geographic and weather conditions can potentially increase the risk of avian mortality with respect to wind power structures. In order to put the issue of avian mortality associated with windpower into perspective with other sources of avian collision mortality across the U.S, Erickson et al. (2001) reviewed several sources of avian mortality. Reviewed reports indicated that the following estimated annual avian collision mortality in the United States:

- Vehicles: 60 million - 80 million;
- Buildings and Windows: 98 million - 980 million;
- Powerlines: tens of thousands - 174 million;
- Communication Towers: 4 million - 50 million; and
- Wind Generation Facilities: 10,000 - 40,000.

The large differences in total mortality from these sources are strongly related to the differences in the number (or miles) of structures in each category. There are approximately 4 million miles of road, 4.5 million commercial buildings and 93.5 million houses, 500,000 miles of bulk transmission lines (and an unknown number of miles of distribution lines), 80,000 communication towers and 15,000 commercial wind turbines (by end of 2001) in the U.S. Even if wind plants were quite numerous (e.g., 1 million turbines), they would likely cause no more than a few percent of all collision deaths related to human structures (Erickson et al., 2001).

Where communication towers are greater than 150m in height, some large numbers of dead birds have been found. Studies at communications towers across the United States, including northern states at similar latitudes to southern Ontario, indicate that towers less than about 135 m have not been involved in mass mortality events (Kerlinger, 2000, Kemper 1996, Ugoretz, 2001). The taller the structure the greater the number of birds likely to be killed (Manville, 2001). The wind turbines to be used in this project are shorter than 135 m.

Literature which examines the impacts of wind turbines on the bird community identifies three main (and often interactive) factors that contribute to avian mortality at a particular site. These three factors include weather conditions, the density of birds in an area and landscape features funneling birds through the area (e.g. raptors). Literature also suggests that appropriate sighting of wind

turbines is the best way to reduce bird interactions with wind turbine infrastructure. Density of birds and landscape/habitat features of the study area have been reported above.

### **Weather Conditions**

At many sites, nocturnal migrant collisions tend to occur during episodes of poor weather with low visibility. Although most examples appear to be isolated incidences, weather conditions should be kept in mind if a site is being proposed in an area that has a large number of poor visibility days (<200 m) during the spring and fall, and has other confounding factors (e.g. large numbers of nocturnal migrants and landform features such as ridges present).

Inclement weather can increase the risk of bird collision with wind farm structures. (Winkelman, 1995, Strickland et al., 2001, Johnson et al., 2002). Even then mortality has been only a tiny fraction of passing birds (Crockford, 1992, Winkelman, 1985, 1995, Pearson, 1992). For example, clouds have an influence on the altitude of migrants by forcing higher flying migrants to lower altitudes, which increases the density of migrants near the ground and increases the probability of collisions with tall obstacles. A cloud ceiling that drops to near or below the height of the turbines will affect high altitude migration, inducing migrants to move at or below treetop level (Robbins 2002 in Environment Canada 2007c). Drizzle and fog impair visibility and also cause birds to fly at lower altitudes, to follow topographical clues. Combined with lighting that may attract migrating birds, migrants may collide with turbines or they may circle the structure until exhausted, falling to the ground where they are at risk of dying due to exposure or predation. If there are a high proportion of fog days during migration at the project site, there may be an increased risk of collision. Even in bad weather there has never been a mass kill of birds at a wind turbine. The largest recorded mortality event in North America was 14 birds at 2 turbines following a severe thunderstorm (Johnson et al., 2002).

General weather conditions in the area along the North shore of Lake Erie was obtained from Meteorological Service of Canada for a weather station located east of the City of London, 42 km inland from the Lake Erie shoreline which describes visibility/low cloud bases (<200m visibility). Data from the London A weather station represents hourly measurements of weather conditions recorded between 1953 and 1982. **Appendix G** shows the London A stations average hourly cloud ceilings and/or visibility by month. This information demonstrates that low cloud bases <30m and/or visibility <0.5km occurred on average 1.1% of the time between 1953 and 1982. This average appears to be consistent through all hours of the day/night and fairly consistent through the seasons. A slight exception to this is during May, June and July when the average drops to 0.5%.

An average of 1.2% of all observations equates to approximately 2887 hours of low cloud bases <30m and/or visibility <0.5km over 30 years, 96 hours in a given year or 8 hours during a particular month. It is recognized that this data may underestimate the number of low cloud base and or low visibility events on the Lakeshore. At Hawk Cliff, one of the main raptor migration areas along the north shore of Lake Erie, low visibility events during September, October and November are infrequent events (Tom Bolohan-Hawk Cliff President, pers. com.). Hawk Cliff weather data from 2002 to 2005 show two hours of visibility at 200m and 8 hours at 500m. The Hawk Cliff data set also includes 23 events of 0km visibility. However, it would appear that these 0 km visibility records represent unrecorded visibility readings because large amounts of raptors were still being recorded (Hawk Cliff Foundation ‘unpublished data’). Therefore, low cloud bases or visibility are infrequent and of short duration and do not present a major concern along the north shore of Lake Erie.

### *7.6.2.2 Siting Constraints Recognized*

Based on the background information, discussions with EC, CWS, OMNR, Ontario Parks and other individuals familiar with wind farms, as detailed in the Section 3 and information collected during field work, several constraints specific to the protection of birds were voluntarily proposed and adopted by RES. These self-imposed buffers are more restrictive than others commonly found for any wind farm that we are aware of in Ontario and follow or exceed agency guidance that was provided. **Figure 7.2** illustrates the constraints/buffers that were developed as part of the turbine siting process. Constraints developed for the protection of bird species include:

- 180 m Interior Forest Buffer
- 180 m Red-headed Woodpecker Buffer
- 200 m Acadian Flycatcher Critical Habitat Buffer
- 250 m Clear Creek Property Boundary Buffer
- 200 m Lake Erie Shoreline Buffer
- 1 km Bald Eagles Nest and Associated Forest Buffer
- Bald Eagle Lake Access Area
- Migration Corridor

Further, while not specifically a set back that was recognized or determined out of a perceived need to reduce impacts, **Figure 7.2** illustrates a 6 km distance between the edge of Rondeau Bay to the nearest turbine.

These are discussed in detail in **Section 7.6.3** Mitigation Measures.

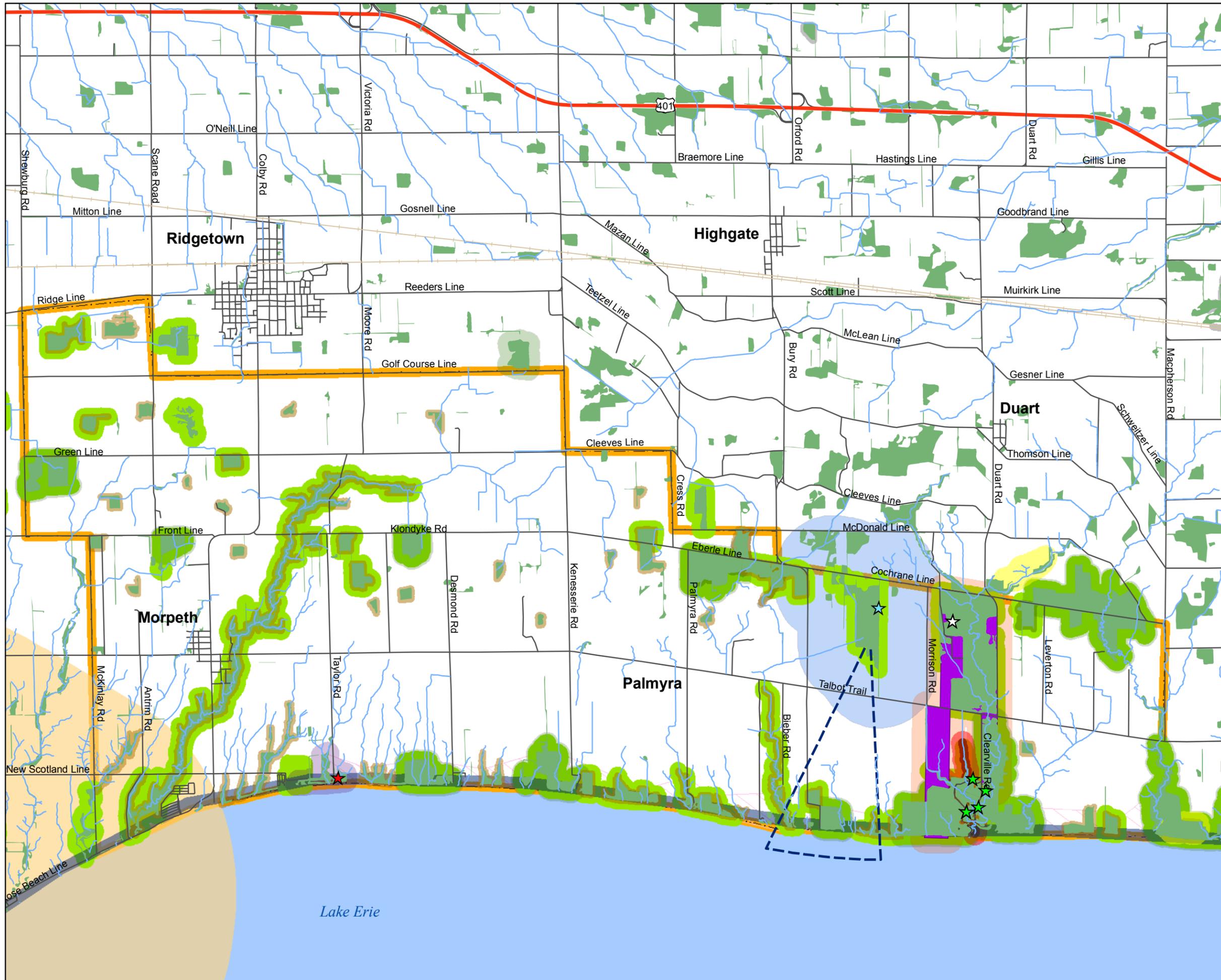
### *7.6.2.3 Operational Effects*

Operational effects primarily focus on two distinct factors including:

- Direct Mortality from collisions with turbines or power lines; and
- Displacement as a result of turbine infrastructure. Displacement can include displacement from breeding territories, staging areas and other changes in migratory behaviour.

# Wind Farm Study

## Figure 7.2: Environmental Constraints



### Legend

- Bald Eagle
- Acadian Flycatcher
- Red Headed Woodpecker
- White Eyed Vireo
- Railway
- Roads
- Highways
- River/Streams
- Project Boundary
- Clear Creek Nature Forest Reserve
- Acadian Flycatcher Habitat

### Environmental Constraints

- 50m Other Wetland Setback
- 50m Wooded Valley and Forest
- 150.5m Significant Woodlot Setback
- 170.5m Provincially Significant Wetlands Setback
- 180m Red Headed Woodpecker Setback
- 180m Interior Forest Setback
- 200m Acadian Flycatcher Setback
- 200m Shoreline Setback
- 250m Clear Creek Nature Reserve Setback
- 1km Bald Eagle Habitat
- 6km Rondeau Bay Distance
- LTVCA Regulated Area
- Bald Eagle Lake Access
- Migration Corridor



1 : 63,000  
 0 1,000 2,000 3,000

The evaluation of birds which appear to be at greatest risk of either mortality or disturbance in the RES Talbot project area is based on:

- Literature related to direct mortality and displacement;
- High numbers observed;
- Behavioural attributes; and
- Presence of a well define major migratory route;

The effects assessment of species/groups is largely discussed below as an aggregate (e.g. Shorebirds, Waterfowl, Waterbirds and Raptors). Some species or groups of birds may not be specifically mentioned however, they have been considered. Potential impacts to those not mentioned are comparatively at a low level of risk.

### **Shorebirds**

#### *Mortality*

Little information is available on potential impact to shorebirds in North America, as most wind turbine sites have not been close to habitats where large numbers are expected. In Minnesota, where 73 turbines were erected, shorebirds were considered at high risk during the spring and fall because of high numbers in the area. None were found dead in 2 years of monitoring (Strickland et al., 2000). One Killdeer was found dead after two additional years of searches at a 91 turbine site (Johnson et al., 2002). Post-construction surveys completed at Erie Shores over the 2006 and 2007 migration seasons (Spring and Fall) did not find any turbine related shorebird kills after 18 weeks of surveys (James, 2007).

#### *Displacement*

At the Blyth Harbour wind site in the UK, Purple Sandpipers (*Calidris maritima*) overwinter in globally significant numbers (Lowther, 2000). Despite this, the sandpipers did not seem disturbed by either the construction process or the operation of wind turbines (Lowther, 2000). Studies in the Netherlands (Dirksen et al. 1997) and Denmark (Pedersen and Poulsen, 1991) examined the effect of turbines placed near important staging areas for many species of shorebirds, and found that the birds readily avoided the turbines and were at low risk of collision. Some studies have shown that shorebirds avoid turbines up to 500m away (Winkelman, 1995), while others have shown no significant effect of turbines on shorebird distribution (Thomas 1999).

#### *Anticipated Effect*

Black-bellied Plovers, Ruddy Turnstone and Dunlin stage in fields during their spring migration, typically in the 100s to 1000s of individuals in areas where they concentrate. Fieldwork completed for this project observed extremely low numbers of shorebirds in the area through all seasons. Based on these results and relative to other areas of southwestern Ontario, along the Lake Erie shoreline west of Rondeau Bay, the study area did not function as a concentration area in 2007.

Post-construction surveys (Erie Shores 2006 and 2007) did not find any turbine related shorebird kills after 18 weeks of surveys (James 2007).

Studies in the Netherlands (Dirksen et al. 1997) and Denmark (Pedersen and Poulsen 1991) found that the shorebirds readily avoided the turbines and were at low risk of collision.

Study area did not function as a concentration area in 2007. No significant net effect anticipated.

## **Waterfowl and Waterbirds**

### *Mortality*

Waterfowl appear to be among the least susceptible birds to collision with wind turbines, despite considerable numbers in areas studied. In some cases, sea ducks are believed to learn to avoid turbines, resulting in fewer collisions over time (Percival, 2001). In terms of dabbling ducks, sites reporting the most fatalities are those with year-round waterfowl use, with waterfowl making up to 10% or more of the total number of fatalities. However, numbers of fatalities are still very small, especially in relation to the number of ducks that use the areas (Erickson et al., 2002). Based on a recent study completed for the Erie Shores wind farm (James, 2008), which is located along the north shore of Lake Erie east and west of Port Burwell in a similar geographic and bird community setting, no waterfowl mortality occurred over a two year post-construction period.

In Minnesota, Canada Geese and Mallard (with Greater White-fronted Goose and Snow Goose) were considered at high risk because of numbers flying through the site at rotor height during spring and fall, prior to construction. Following the erection of 73 turbines and the completion of two years of post-construction monitoring only one dead duck was found (Osborne et al., 1998). After four years of searches, no geese, and three ducks were found (Johnson et al. 2002).

In the Montezuma Hills, California, 600 turbines were erected in a pass between two wildlife sanctuaries where thousands of waterfowl moved between two wetlands. In two years of post construction surveys, no waterfowl were found dead. More than 15,000 observations of waterfowl flying through the pass indicated waterfowl avoided flying near the turbines and avoided collision (Howell and Noone, 1992, Gipe, 1995).

In several European studies involving large numbers of wintering and migrating diving ducks, it was clear that waterfowl clearly avoided flying near turbines and that mortality was low (Guillemette, et al., 1998, Lowther, 2000, Winkelman, 1985, Dirksen et al., 1997, Musters et al., 1996).

In Iowa, an 89-turbine facility was located between three Wildlife Management Areas which attracted waterfowl species including up to 40,000 Canada Geese and 20,000 ducks each year. No fatalities were recorded during a year of post-construction searches at 26 turbines (Koford et al., 2004).

At a 16 turbine facility in Oregon in wheat fields and grasslands Canada Geese were abundant with nearly 5000 birds observed flying through the area prior to construction. Only 2 individuals were killed in the year following construction, apparently in conditions of poor visibility (Johnson et al., 2003a).

In an Oregon/Washington project Canada Geese were one of the four most common species reported on avian surveys and during incidental observations. One fatality was recorded in 2.5 years of searches at this 273-turbine facility. There was also only one Mallard fatality in 2.5 years, although they were not nearly as numerous in the area as geese (Erickson et al., 2004).

At the turbine located in Pickering, varying numbers of Canada Geese flew past within 100 m of the turbine daily for most of the year with no fatalities (James, 2003). Likewise Mallards, although much less common, flew past the turbine and landed in a small marsh close to the tower and even nested there below the extent of the turning blades and suffered no mortality (James, 2003). Canada Geese regularly flew within 100 m of the Exhibition Place wind turbine much of the year and no mortality was recorded (James and Coady, 2004).

At the Nysted off-shore wind farm in Denmark a mortality rate of 1.4 collision/year/turbine was estimated for Common Eiders based on a validated predictive model (Desholm, 2006). The wind farm consists of 69, 2.3 MW turbines with a hub height of 69m and blade length of 41m.

Gulls have often been identified as being especially vulnerable to mortality due to wind turbines because they often fly within the height of the turbine blade sphere (Airola, 1987). Despite their perceived vulnerability, very low numbers of gulls have been reported to collide with turbines, except at three sites in Belgium (Everaert, 2003).

In Minnesota, at a wind farm near a lake, Ring-billed Gulls and Franklin's Gulls were identified as being at high risk during the fall and spring because of the high numbers flying through the area. None were found dead after two years of searches. However, one Herring Gull was documented as a casualty (Strickland et al., 2000).

In the Altamont Pass, California, California Gulls and Ring-billed Gulls were identified as some of the most common species flying through the area. Searches around 685 turbines for 11 months found only one fatality (Thelander and Rugge, 2001).

A nine turbine site at Blythe Harbour in Britain where a large population of wintering gulls occurred was documented to have very few collisions all birds combined (one bird/turbine/year, including gulls (Lowther, 2000).

At Pickering, Ring-billed gulls flew past the turbine daily, and foraged and loafed on nearby grassy areas, without suffering any mortality. Herring and Great Black-backed Gulls were also regular users of the lakeshore within 100 m and suffered no mortality (James, 2003).

At the Exhibition Place turbine, Ring-billed Gulls flew around the turbine within 100 m almost daily over several months without incident (James and Coady, 2004).

#### Displacement

Disturbance effects have been of greater concern than mortality in European studies and are probably of greater importance to waterfowl than potential mortality (Kingsley and Whittam, 2005). Desholm (2006) demonstrated that there is indeed an avoidance effect for at least Common Eiders. It was also noted a reduction in flight height and adoption of a straight line flight path were behavioural changes which reduced exposure to turbines blades and towers. However, much of

these European studies have been directed toward diving ducks, and there appears to be very species-specific reactions to wind turbines, with even closely related species showing different effects (Kingsley and Whittam, 2005).

Swans are potentially sensitive to disturbance, being the largest and least able to take off and land quickly. Not a great deal of information is available specific to Tundra Swans. In Denmark, Bewick's Swan (closely related to Tundra Swan) apparently avoid fields where turbines have been placed (S. Petrie, pers. com., 2008). Waterfowl often avoid flying much closer than 100 m to operating turbines. In the Yukon, where hundreds of Tundra and Trumpeter Swans flew past the turbine there, none came within 200 m of it, although they were not deterred from flying past on their normal flights.

Other waterfowl appear to be less likely to be displaced. In Washington/Oregon, with 454 turbines, with 47 m rotors, spaced only 70 or 105 m apart, in strings 800 m apart, avian use surveys showed a slight increase in waterfowl two years after construction (Erickson et al. 2004). In Minnesota, with 73 turbines with 33 m rotor diameter, spaced 91 – 183 m apart, in 10 strings, Mallards were the second most common bird seen in avian surveys (Osborne et al., 1998). In Iowa, with 86 turbines located between three Wildlife Management Areas, observations found 270 flocks of geese foraging in the wind farm area in fields with and without turbines (Koford et al, 2004), although the proportion in the two types of field was not given.

At Pickering Canada Geese regularly flew within 100 m of the turbine and walked to the base of the turbine when foraging, on numerous occasions (James, 2003). They also regularly flew in the gap between the turbine and other buildings as close on the other side. Canada Geese also regularly flew within 100 m of the Exhibition Place wind turbine, although ground conditions were not conducive to foraging close (James and Coady, 2004). Mallards regularly approached the Pickering turbine, flying within 50 m of the blades to a small marsh below the blade tips. One pair nested below the blades in this wetland (James, 2003). In Minnesota, a Mallard nested within 31 m of a turbine base (Osborne et al., 1998).

In European studies Winkelman (1992) listed Mallard as sensitive to disturbance however; this may have resulted from much closer turbine spacing. Studies at several coastal wind farms indicated that flights of waterfowl flocks were the same in areas with and without wind turbines. The waterfowl were well aware of and readily avoided the turbines (Dirksen et al., 1997).

Gulls apparently habituate to the presence of turbines very rapidly (Winkelman, 1985, 1992, James, 2003, James and Coady, 2004). Although they fly amongst wind turbines almost constantly, they rarely collide with them (Kerlinger, 2001).

#### Anticipated Effect

In the Talbot study area pelagic species were found in high numbers during the spring, including Red-breasted Mergansers. However, they were clearly associated with the Lake Erie environment and there were very few occurrences of these species inland. Similarly, dabbling species were often observed in the Rondeau Bay area or just off shore around the Clear Creek area. Two open wetland areas associated with Duart Rolling Sandland ANSI on the northwest boundary of the study area did support small numbers of dabblers through spring. Limited interaction between dabbling species and turbines is anticipated based on existing literature, low numbers observed inland and the maintenance of good access to the open water habitats known to occur in the study area.

During the spring Rondeau Bay is known to function as a stopover site for up to approximately 4% of the North America's Tundra Swans population (Bird Life International 2007a). The study team has traveled along Hwy 3 in March on many occasions over the past 20 years and has only observed small flocks (i.e. dozens to hundreds, not thousands) associated with the study area. While dozens to hundreds of swans can be expected in fields in the study area most springs, it appears that this area is not a traditional stopover for larger numbers.

The location of inland concentrations of Tundra Swans in the study area was variable from survey to survey. With exception to areas adjacent to Clear Creek that were utilized more consistently, Tundra Swans use of fields in the study area appear irregular but closely tied to corn crops. This finding is consistent with published research on Tundra Swan feeding preferences during spring migration in the Great Lakes Region (Petrie *et al.* 2002). It also suggests that feeding areas would likely change from year to year depending on where preferred waste grain is available. Based on existing literature it is likely that Tundra Swans will be locally displaced from areas immediately around turbines. RES intends to leave a minimum of 2.5 to 3 rotor diameter between turbines in the same row and 7 rotor diameters between turbine rows. This space between turbines should allow for this species to fly through the study area similar to that observed by James (2008). Turbines are not expected to deter the use of fields in areas without turbines.

Gulls were observed in the study area and/or along the lake environment in high numbers during the fall and at a much reduced level during the spring. Despite large numbers of gulls present in fields near turbines in the study area they are considered to be at low risk of collision.

Double-crested Cormorant are unlikely to suffer any mortality in the study area as few were observed over the study area and those that were observed flew well above turbine height. In Minnesota, they were identified as being at high risk because of the numbers observed flying through the area from the nearby lake where they congregated spring and autumn. However, none were found dead after 4 years of searches (Strickland et al., 2000, Johnson et al., 2002). At Blyth Harbour in Britain, where a large number of Great Cormorants were present, they were observed to avoid flying close to turbines and no mortality was indicated (Lowther, 2000).

Waterfowl appear to be among the least susceptible birds to collision with wind turbines

Desholm (2006) demonstrated there is an avoidance effect and behavioural changes which reduced exposure to turbines blades and towers.

No waterfowl mortality occurred over a two year post-construction period for the Erie Shores wind farm (James 2008).

Swans are potentially sensitive to disturbance. In Denmark, Bewick's Swan apparently avoid fields where turbines have been placed (S. Petrie, pers. com. 2008).

For species such as Tundra Swan the significance of net effect is considered low.

## **Landbirds**

### *Mortality*

It is recognized that nocturnal migrants typically fly in broad fronts through southern Ontario. As a result many areas can experience a high proportion of individuals at anyone time during spring or fall migration. Several radar studies and ceilometer studies at seven sites in New York, Vermont, Maine and North Dakota, at similar latitudes to this project, found that migration traffic rates detected would suggest that mortality rates would be less than 1/1000th of 1 % of populations of common species that would likely be involved in spring migration (Kerlinger, 2003). Studies at Sandusky, Ohio, indicated a passage rate of nocturnal birds at 5380 birds/mile of front/hour during peak migration. In four migration seasons, only one dead bird was found (Rogers et al., 1997). Radar studies in Minnesota indicated that approximately 3.5 million birds migrated over the 354-turbine wind farm each year. From 4 years of searches (1996 – 1999), adjusted for predator removal and observer ability, the fatality rate estimate for migrant passerines was about 1.5 birds/turbine/year (Johnson et al., 2002). Studies completed as part of this project suggest a passage rate (flight density) of approximately 59% the density (#/km/hr) of other published data for wind farm sites in the Great Lakes area. At Talbot plots, an average of  $180 \pm 51$  (95% CI) night migrants (bird and bat) were recorded per kilometer per hour (see bat monitoring technical appendix for details).

Most nocturnal migrants also fly at elevations too high to encounter the largest turbines (Parslow, 1969, Able 1999, Richardson, 2000). Birds apparently climb quickly once they set out, reaching as high as 2000 m within 10 minutes (Parslow, 1969). Radar studies operating at St. Catharines found that most birds are above 350 m with some above 1100 m (Black 1998, 2000). In the fall of 2004 Natural Resource Solutions Inc. conducted a radar monitoring study for the purpose of documenting the general height of nocturnal migrants (birds and/or bats) flying over the Kingsbridge Wind Power Project (Natural Resource Solutions Inc. 2004), which is located along the shore of Lake Huron, near Goderich. Monitoring was conducted on September 28, October 19, and November 2, 2004 for a total of eight hours each night. Radar observations showed that the average height was well above turbine sphere height. However the average of targets that flew at turbine sphere height was 18.6%. Studies completed for this project suggests that approximately 24% of the total population of flying birds and bats at night is within the blade sphere height (see bat monitoring technical appendix for details).

Migrant songbirds have always been considered at highest risk among birds, as they constitute the majority of collision victims. In North America songbirds comprise about 78 % of all fatalities (Erickson et al. 2001). However, only in conditions where nocturnal migrating birds are suddenly overtaken by poor weather conditions is higher than normal mortality likely to be experienced, and even in such situations only a tiny fraction of passing birds are involved (Crockford 1992, Winkelman, 1985, 1995, Pearson 1992). The timing and location of poor weather is unpredictable and cannot be used as a determinant of turbine placement in inland locations (Hanowski and Hawrot 2000, Evans, 2000). Even in poor weather, there has never been a mass kill of birds at a wind turbine. The largest recorded mortality event in North America was 14 birds, seven at each of two turbines, following a severe thunderstorm (Johnson et al., 2002).

### *Displacement*

The greatest threat to songbirds is habitat loss and destruction. Very little detailed information is available regarding the effects of wind energy developments on landbirds, with the exception of grassland species. It has been shown that turbines may displace many (but not all) grassland species. Leddy et al. (1999) found a linear relationship between breeding bird density (males/100ha) and distance from turbines (0-180 m). Densities decreased by more than 50% within the increments measured (180-80 m, 80-40 m and 40-0 m). Species richness also appears to be impacted in areas closer than 180 m. It remains unknown if nesting grassland birds will become habituated to turbines and return to areas from where they were previously displaced. It should also be noted that not all grassland species are displaced by turbines. At the Ponnequin Wind Energy Facility in Colorado, grassland songbirds like Horned Larks forage directly beneath turbines and Western Meadowlarks (*Sturnella neglecta*) were also found to forage directly beneath turbines at Altamont in California (Curry and Kerlinger cited in Kerlinger, 2003b).

#### Anticipated Effect

Based on weather information it is understood that poor weather conditions (>200m visibility) occurs infrequently along the north shore of Lake Erie. Further, nights of high rates of passage are clear nights with excellent flight conditions. Calm nights or tail winds are favoured conditions where birds tend to traveling well above turbine height. The potential for landbird species collision to occur as a result of this development are considered low and in the region of well documented averages.

Among the breeding birds present in the area, Priority Landbird Species for BCR 13, especially Open Country Birds (grassland birds), are of primary management concern due to population decline being experienced throughout the North American continent (McCracken, 2005). A small amount of grassland birds were observed in the study area during breeding bird surveys. However, suitable nesting habitat appears limited in the study area based on roadside surveys of major habitat types. The placement of turbines has generally avoided areas where grassland birds were observed. Disturbance impacts to grassland birds in the project area are anticipated to be minimal. Interaction between BCR 13 Open Country habitat birds is a possibility at seven turbines. Species recorded in the general vicinity (500m of similar major habitat) around the seven turbines are as follows:

- Turbine 2 – approximately 450m from Point Count 3 – Vesper Sparrow (1). Hayfield habitat occurs to the immediate south east of this turbine location.
- Turbine 4 – approximately 350m from Point Count 4 - Bobolinks (4), Eastern Meadowlark (3) and Savannah Sparrow (10). Higher quality hay fields occur 100m northwest of this point count and then becomes well used pasture;
- Turbine 21 – approximately 350m from Point Count 12 – American Kestrel (1) and Vesper Sparrow (2). This area is tilled agriculture;
- Turbine 17 – approximately 500m away from Point Count 29 – Bobolink (10) and Savannah Sparrow (1). This area is hayfield/alfalfa; and
- Turbines 32 & 33 – approximately 300m from Point Count 16. BCR 13 open country birds observed include Field Sparrow (2), Vesper Sparrow (1), Bank Swallow (63).
- Turbine 28 – Approximately 500m from Point Count 15 – Bank Swallow (4), Vesper Sparrow (1).

The impact of turbines on forest nesting birds has only been examined once in North America, during a short-term study at Searsburg, Vermont (Kerlinger, 2003b). It was found that disturbance

to most birds was low, with several species nesting in the forest within 20-30m of the turbines. A few species were, however, found to avoid the clearing where the turbines were located and some appeared to move further into the forest, most notably Swainson's Thrush. It is unclear whether this movement was related to avoidance of the turbines or of the clearing (Kerlinger, 2003b).

As noted above, it appears that zone of influence where forest birds are affected by turbines is much reduced in comparison to grassland birds. Despite this, a precautionary buffer of 180 m buffer around forest with notable portions of interior space (> 100 m from the forest edge) was implemented for the Talbot Wind Project. Smaller forests with no interior space have been provided a 50 m buffer. As a result of these setbacks forest nesting birds are not considered to at risk of displacement.

Elevated numbers of Bank Swallows were observed in the areas adjacent to the Lake Erie shoreline. The shoreline setback and placement of turbines in agricultural fields will reduce interactions with this species to the ability possible. Based on collision rates documented for other landbird species in similar habitat and topography along Lake Erie (James January 2008) impacts to Banks Swallows is anticipated to be minimal.

Two Acadian Flycatchers (presumably migrants) were observed on the May 24 visit at wooded ravines that had suitable breeding habitat. Neither was found on three subsequent visits in June despite deliberate searches. Intensive searches on June 22 at the known breeding habitat in the Camp Catarauqui wooded ravine did not find any birds. The Clearville Creek ravine has suitable habitat for up to four pairs. Birds were present in the mid 1980s and the late 1990s and bred successfully, but there are also periods when no birds are present. From time to time when there are influxes of birds from the core of their breeding range to the south, sites with suitable habitat are recolonized. The Clear Creek Habitat has been provided a 200m from the centre of the ravine area identified as core habitat (Dave Martin pers. com.). The property boundary Clear Creek Forest Provincial Park has also been buffered 250m, which results in an effective buffer of 450m from Acadian Flycatcher habitat. No impact is anticipated on the suitability of Acadian Flycatcher habitat.

The north shore of Lake Erie is well known as a major concentration area of many diurnal migrating species such as blue jays and blackbirds. Our observations also noted extremely high numbers of blackbirds flying along the Lakeshore environment, primarily during the fall. Based on recent post construction work completed for the Erie Shores wind farm it was reasoned that the mortality rate was 2.0 to 2.5 native birds/turbine/year (James, 2008). The majority of turbine-related mortality was passerine birds, accounting for 79.7 % of species recorded over 2 years (James, 2008). Nocturnal migrants made up about half the passerines at 48.9 % (James, 2008), which suggests diurnal migrants made up the remaining 30.8%. Based on this information the potential impact to landbirds is considered low despite the large concentrations of some groups observed (i.e. blackbirds).

Migrant landbirds have been considered at highest risk among birds. The largest recorded mortality event in North America was for wind turbines was 14 birds, seven at each of two turbines, following a severe thunderstorm (Johnson et al. 2002).

With exception to two turbines, breeding Priority Landbird Species for BCR 13 have been avoided.

Elevated numbers of Bank Swallows were observed in the areas adjacent to the Lake Erie shoreline. The lake setback will reduce interactions with the elevated numbers observed.

Two Acadian Flycatchers were observed in the study area. Suitable habitat has been provided an effective buffer of 450m. No impact is anticipated on the suitability of Acadian Flycatcher habitat.

The north shore of Lake Erie is a major flyway for diurnal migrating landbirds. A mortality rate was 2.0 to 2.5 native birds/turbine/year (James 2008) is documented for the Erie Shores project. Landbirds made up 79.7 % of collisions recorded over 2 years (James 2008).

The significance of net effects to landbirds is considered medium.

## **Raptors**

### **Mortality**

Hawks, eagles, and falcons have been a major concern for wind farm developments in North America. However, they have experienced problems primarily at older facilities in California, and largely in one location, where there are several factors contributing to the problem (Arnett et al. 2007). In 1989, the California Energy Commission issued a report that reviewed data on bird collisions with wind turbines in this state between 1984 and 1988 (California Energy Commission 1989). Observations and mortality searches were conducted for six seasons examining a sample of approximately 16% of the 7000 turbines at Altamont. Of the 183 dead birds found during this study, 119 (65%) were raptors, the majority of which were Red-tailed Hawks (*Buteo jamaicensis*), American Kestrels (*Falco sparverius*), and Golden Eagles (*Aquila chrysaetos*). Approximately 55% of all raptor deaths were attributed to turbine collision, 8% to electrocution, 11% to wire collision, and 26% could not be determined (Orloff and Flannery, 1992).

Differences in fatalities between Californian sites appear to be related to raptor density as well as turbine type and spacing (Arnett et al., 2007). For Altamont, which has the highest fatalities, there is a high prey base of small mammals in the uncultivated grasslands to attract large numbers to the area. The raptor mortality has been associated with the clustering of prey near the turbines, the perching of birds on the turbines, where other perches are unavailable, and the foraging of birds living among the turbines for long periods (Nelson and Curry, 1995). Several turbine factors were proposed as posing the greatest risk to raptors such as, end-row turbines, turbines within 500m of a canyon and turbines with a lattice-type tower (Orloff and Flannery, 1992). High raptor mortality in the Altamont Pass area continues to be seen. Between 1998 and 2000, 256 dead birds were found, 139 (54.3%) of which were raptors (Erickson et al., 2002, Hunt, 2002).

Another wind energy site that has had significant raptor mortality is in Tarifa, Spain. This site is on the edge of the Strait of Gibraltar and forms a “bottleneck” that concentrates bird migration in the Mediterranean basin. Soaring birds are generally of greatest concern, since at least 30,000 individual raptors and huge numbers of storks pass through the area in the autumn. Many collisions with the turbines have been recorded, including those of 14 protected species. A total of 106 individuals were estimated to have been killed over the span of one year (Marti and Barrios, 1995). A subsequent study over 14 months including 2 autumn migration periods recorded over 72 000 birds during 1000 hours of observation. But, only 2 bird carcasses were found, including one Griffon Vulture (*Gyps fulvus* – of 45 000 seen) and one Short-toed Eagle (*Circaetus gallicus* – of 2500 seen). This indicates that death rates can vary year to year and from area to area (Janss, 2000). Studies in both California and southern Spain clearly indicate that there is a disproportionately high mortality at a relatively few turbines on ridges (Barrios and Rodriguez, 2004, Hoover and Morrison, 2005).

There have been very few raptor fatalities reported at wind sites other than Altamont and Tarifa. It is recognized that a major contributor to raptor fatalities at these two facilities was the use of lattice towers, appropriate for perching, the close spacing of turbines (50 m from each other) and fast rpm of the small blade. In the U.S. outside of California, raptors comprise only 2.7% of turbine-related deaths (Erickson et al. 2001, Kerlinger, 2001). A comparison of the different mortality rates between older and newer facilities in the United States completed by Arnett et al. (2007) is in agreement with this finding three of the four older sites reported higher fatality rates than at all newer, larger turbine sites.

Results from 14 avian fatality studies at newer sites, where surveys were conducted using a systematic process for a minimum of one year and appropriate correction factors were incorporated into the estimates, indicate that combined mean fatality rate for these sites are 0.03 raptors per turbine and 0.04 per megawatt (Arnett et al., 2007). Landscapes vary from mountains, plateaus, and ridges, to areas of low relief, but aside from size of rotor-swept area, all of these facilities had new generation turbines with lower rotational speeds (~15-27 rpm, tips exceeding 280km/hr) and primarily underground transmission lines. These results are in-line with a study (James 2008) completed for the Erie Shores site, located along the north shore of Lake Erie, which has a similar landscape and habitat matrix to the subject site.

Based on 2 years of post-construction observations for the Erie Shores wind farm near Port Burwell, Ontario no elevated mortality occurred with respect to raptors, despite the presence of large numbers in the fall and turbines near the shoreline. Five raptors including 1 Turkey Vulture were found over the 2 years of post-construction monitoring. These five raptors represent approximately 8.5% of all bird fatalities. Based on the correction factors applied a mortality rate of about 0.04 raptors/turbine/year, including residents and the thousands of migrants in the wind farm each year was estimated (James, 2008). In addition, approximately 15,000 raptors move along the north shores of Lake Ontario in autumn, none were found dead at either the Pickering or the Exhibition Place turbines, both within 100 m of the lakeshore.

Bald Eagles are observed to be comparatively low risk of collision with wind turbines. The variety of raptor foraging behaviour appears to affect the rates of mortality. Red-tailed Hawks and American Kestrels are active hunters. Concentrating on hunting rather than paying attention to where they are flying, when among turbines, may make them more susceptible to collision. Species such as ravens, vultures and Bald Eagles that may be largely scavengers, do not often hunt among turbines and appear to suffer less mortality (Orloff, 1992). In a Wyoming study around 69 turbines,

Bald Eagles were considered 5th highest species at risk in winter. Yet none were found dead there in three years of searches (Young et al., 2003). Turkey Vultures are at far higher population levels in California than in Ontario and rarely collided with turbines (Kerlinger, 2001).

#### Displacement

There is little information on how raptor species react behaviorally to turbines but do appear to be among the least likely birds to be displaced by wind turbines. In Washington/Oregon, nesting of raptor species was slightly higher after construction; new nest sites were discovered in the wind facility area after construction; and avian use surveys showed only a slight decrease in raptor numbers after construction (Erickson et al., 2004). In California, raptors were considered less likely to display evasive avoidance behaviour in relation to wind turbines than any other group (McCrary et al., 1986). In the Altamont Pass, observations of behaviour indicated that the distribution of raptors in areas of many turbines was similar to areas where there were no turbines (Orloff and Flannery, 1992). In Minnesota, 80 % and 74.8 % seen in two successive years flew 31 m or more from turbines, and 5 % and 14 % flew within 16 m. The group of birds most likely to migrate near the turbine in the Yukon was raptors (Mossop, 1998).

Based on anecdotal information reported by James (2008) it would appear that raptors continue to use the landscape and habitat similar to the way they did prior to turbine development and easily avoid collisions during migration.

#### Anticipated Effects

The study area does contain a ridge feature, located along the Lake Erie shoreline, which provides appropriate migrating conditions for diurnal migrants. The north shore of Lake Erie is well known as a major concentration area of many diurnal migrating species such as blue jays, blackbirds and migrating raptors in the fall. Outside of California, existing post-construction monitoring studies suggest that the collision rates of raptors are small (0.03 raptors/turbine/year). The proposed RES Talbot Wind Farm experiences a very similar raptor migration during the fall. At this site the fatality of raptors was reported to be 0.04 raptors/turbine/year. Based on the best information available and recognizing the importance of the north shore of Lake Erie as a major migration route for fall raptors, evidence suggests that the risk to this group is low and not a threat to their populations.

Observations during winter suggest a reasonable population of winter raptors in the area, which are at the upper range of their typical density per km documented for southern Ontario. The conditions that apply in the California situation during winter do not apply to this project. Turbines will be placed in cultivated fields with presumably a much reduced mammalian prey base, with many alternative perches available besides turbine structures. Available evidence suggests that there is little risk to wintering raptors as a result of turbine development.

A 1km buffer has been provided around the outside boundary the woodlot that has been used by Bald Eagles for nesting in successive years. This buffer is anticipated to protect breeding habitat from disturbance. The implementation of this buffer was also recommended by the MNR during consultation (Ron Gould – Species at Risk Biologist).

James (2008) recommended that turbines not be placed between a nest and the Lakeshore as a result of post-construction work from Erie Shores (James 2008). Turbines adjacent to this area they should be reduced and placed perpendicular to the shoreline so that an unimpeded path to the Lake

remains. The recommended access to the Lake represents the point of least distance between the nest location and the lakeshore and measures approximately 1.65km between the closest turbines.

The north shore of Lake Erie is a major flyway for fall migrating raptors.

Wintering raptors are in upper range of their typical density per km documented for southern Ontario.

Studies at newer sites where tubular towers are used indicate a mean fatality rate of 0.03 raptors per turbine and 0.04 per megawatt (Arnett et al., 2007). (James 2008) found a similar fatality rate for the Erie Shores site.

The minimum 200 m Lake Erie shoreline setback recommended during consultation with Environment Canada was surpassed for this project as an additional migration corridor setback was implemented to keep turbines out of the intervening spaces between shoreline forests. This resulted in an effective buffer of 460 m or more from the shoreline.

A 1km buffer has been provided around the outside boundary the woodlot where Bald Eagles have nested in the past. This buffer was discussed with and recommended by the MNR during consultation (Ron Gould – Species at Risk Biologist).

A lake access areas with an aperture of 1.65km has been provided for breeding Bald Eagles to access the Lake Erie environment unimpeded.

The best evidence available suggests that the potential significance of net effects on raptors is low and not a threat to their populations.

#### *7.6.2.4 Project Construction*

Construction activities for each turbine are expected to take place in farm fields (apart from roadside transmission line work) and will involve only a very small part of any field (1-1.5 acres). Effort has been taken to avoid natural features and therefore minimize any impact to the environment. In some instances disturbance may occur at watercourse/drain crossings as a result of access roads and result in some localized disturbance. Potential effects that could occur during construction may include:

- Disruption of nests; and
- Potential temporary displacement of breeding birds during construction in the immediate vicinity of a turbine or watercourse crossing; and
- Site specific protection of species at risk habitat.

The *Migratory Bird Act* prohibits the destruction of birds, their nest or young.

It is recommended that construction occur outside of the core breeding period for birds in the area, where possible - May 1 to July 23 in open areas and May 9 to July 23 in forested areas (Environment Canada pers. com). If construction does take place during the core breeding season, it is recommended that a qualified biologist conduct nest searches in areas to be cleared (watercourse crossing) and identify nest, which require protection until young have fledged. Based on this nest

search an appropriate buffer should be provided for each nest based on an initial determination by the biologist on site. Follow up with EC should be completed to confirm appropriate mitigation measures.

### **7.6.3 Mitigation Measures**

The potential for effects on birds has largely been addressed through turbine placement. Mitigation measures implemented include the following:

- 180m Interior Forest Buffer – Where interior forests exist the potential for species sensitive to development was presumed. No literature could be found to suggest an appropriate buffer to protect bird species in a forested environment. Therefore, the buffer size was developed based on literature for other habitats (e.g. grassland, Leddy et al. 1999) and in consultation with EC. This size of buffer was generally applied to other important areas in the absence of literature or other specific circumstances.
- 180m Red-headed Woodpecker Buffer – a pair is known to nest in a forest patch immediately to the west of Taylor Road and the Lake Erie shoreline. This buffer was developed based on literature for other habitats (e.g. grassland, Leddy et al. 1999).
- 200m Acadian Flycatcher Critical Habitat Buffer - This was generally applied from the centre line of the stream in the areas identified as critical habitat (Dave Martin, Acadian Flycatcher Species at Risk Team pers. com.). Again, in the absence of literature directing a specific buffer size for forests, the buffer was developed based on literature for other habitats (e.g. grassland, Leddy et al. 1999) and in consultation with EC.
- 250m Clear Creek Property Boundary Buffer – An additional buffer was provided for the entire Clear Creek area in recognition of its importance to the area. This buffer in combination with the 200m buffer of Acadian Flycatcher habitat creates an effective buffer of 450m from this species critical habitat. This 250m buffer was discussed with Brian Huis of Ontario Parks.
- 200m Lake Erie Shoreline Buffer – There are no specific guidelines to dictate what an appropriate buffer along the lakeshore is. Specific consultation with EC (including Canadian Wildlife Service-Lyle Friesen) was consulted to determine appropriate setbacks from the Lake Erie shoreline. It was communicated to Dillon that a 200m buffer was considered the minimum buffer for any turbine adjacent to the shoreline. Post-construction work completed for the Erie Shores wind farm suggests a setback of 250m from the shoreline (James 2008). In addition to the recommended buffers, a migration corridor was implemented, which avoids placing turbines in intervening spacing between shoreline forests. This was implemented based on discussions with Dave Martin and Ross James, which indicated that raptors often follow forest and other wooded features and other diurnal migrating species often island hop from shoreline forests to shoreline forest as they travel along the Lake Erie shoreline. Further, discussion with Tom Bolohan, President of Hawk Cliff Foundation indicated that some raptors may roost in forests and require an area to gain height during the earlier portions of the day.

Buffer recommendations in combination with the migration corridor result in 1 turbines being within 500m and 9 additional turbines within 1km of the Lakeshore. The closest turbine is approximately 460m from the shoreline. Based on all discussions during the ER process, the recommended lakeshore setback surpasses all suggested setbacks. Based on existing literature, which defines the potential risk to raptors, including post construction monitoring for the Erie Shores wind farm east of the subject site, there is nothing to suggest the current layout creates an increased risk to raptors or diurnal migrants than a layout that has every turbine further than 1km from the lakeshore.

- 1km Bald Eagles Nest and Associated Forest Buffer – This buffer is based on discussions with the Ministry of Natural Resources (Ron Gould – Species at Risk Biologist) and recommendations made by James, 2008. The buffer was recommended based on nesting location and disturbance behaviour observations made at the Erie Shores wind farm.
- 6km Rondeau Bay Separation Distance – This distance is based on siting constraints other than those required to reduce impacts to bird species staging in Rondeau Bay and is larger than one that would be implemented solely on that basis. It is highlighted in recognition of the importance of Rondeau Bay as a staging area, to demonstrate that the proximity of turbines to the Bay were considered in our evaluation of potential impacts and that sufficient protection has been provided to protect the area.
- Bald Eagle Lake Access Area – James (2008) recommended as a result of post-construction work from Erie Shores that turbines not be placed between a nest and the Lakeshore (James 2008). The need for a fan-shaped lake access area was discussed with the MNR (Ron Gould – Species at Risk Biologist) and it was recommended that this be implemented. Where turbines occurred in areas adjacent to the access area they should be minimized and placed perpendicular to the Lakeshore.
- Migration Corridor – it was understood that many species, especially raptors and other diurnal migrants had a tendency to follow shoreline forest areas and in some cases hop from forest patch to forest patch. Therefore, it was generally recommended that the intervening spaces between shoreline forests be avoided to the extent possible. As a result, the closest turbine for this project is 460m from the shoreline and successfully avoids intervening spaces of shoreline forests.

#### **7.6.4 Significance of Net Effects**

The wind farm is situated along the north shore of Lake Erie, which is recognized as a major migration route for diurnal migrants in the fall. It is also recognized that pelagic duck species do stage in the Lake Erie environment, respectively. Some species at risk were noted through background studies and fieldwork. Mitigation measures have been implemented that protects the immediate lakeshore migration pathway and critical habitat for species at risk. At seven turbine locations, a couple of open country priority bird species may be displaced from local breeding habitat. Other species or groups which were identified as potential concern either did not occur in the study area in high numbers or had alternative foraging areas in the immediate environment to alleviate any local displacement. Based on existing literature for both mortality and displacement effects the proposed wind farm poses a well defined low risk to birds and bird habitat and does not suggest any negative population effects.

## **7.7 Bats**

Please refer to **Appendix F** for the complete Bat Report.

### **7.7.1 Existing Environment**

Extensive bat surveys were conducted in the study as per input and recommendations received from the Ontario MNR. In their review of the draft ERR, the MNR indicated general satisfaction with the bat survey work and did not request additional pre-construction bat survey work be conducted.

Comparison of the survey results with other sites in southern Ontario with similar land use and topography that were sampled using the same radar-acoustic technology, and within the same season and year, suggests that Talbot has a similar concentration of night migrant birds or bats.

The nightly pattern of bird and bat flight activity from radar and acoustic data peaked 10 August to 7 September and 16-26 September. Radar and acoustic data were collected simultaneously from sunset to sunrise. Bat activity peaked approximately one hour after dusk and decreased gradually until dawn. Nocturnal bird activity peaked again just before sunrise.

An average of 76% of the total flights of bats and birds through the proposed development area was outside the sweep area of the blades, leaving an average of 24% of airborne animals potentially exposed to a collision. Thirty-two percent of the animals are bats. Winds from the south which appose the southward direction of migration tended to increase the proportion exposed. Based on pre and post-installation sampling at other sites, this exposure is expected to be reduced by an increase in flight height and avoidance after the installation of turbines.

The study results for nocturnal bird migrants suggest that the risk to these species would be associated with a moderate mortality based on comparable studies in New York State. The site of highest activity in the study area was Site E2. Habitats of highest activity were residential buildings, woodlots and riparian corridors (attractants) as determined by both radar and acoustics. A setback of 100 m from these features is recommended for ten percent of the planned locations of turbines.

While the proposed wind power project area itself carries a moderate risk to the flying population, some flight concentrations, generally associated with attractants, were identified. Turbines should be placed to avoid locations areas where feeding attractants such as lights and rivers/riparian or roosts like woodlots and buildings are present. Flight corridors between attractants should also be avoided.

The pre-construction results should be compared to post-construction results for a measure of collision-avoidance behaviour and disturbance response.

Environment Canada and OMNR identify the presence of Great Lakes shore and IBAs as a consideration when assessing the risk of a site to birds and bats. The survey plots were selected to be varying distances from the shore and protected natural areas (e.g., provincially significant wetlands and the southwest Elgin Forest Complex). Plot E4 was situated to monitor flights between Clear Creek and Southwest IBAs.

It has been hypothesized that reduced visibility could increase the collision risk to night migrants (EC 2005). To test for this, meteorological data (i.e., wind speed, wind direction, temperature and

barometric pressure) from an on-site meteorological tower were correlated with heights and activity patterns of night migrants (birds and bats).

### **7.7.2 Potential Effects**

The following provides a summary of key observations and interpretations of data collected during the fall 2007 Bat and Nocturnal Migrant Bird investigation at the Talbot Wind Project site. See **Figure 2 in Appendix F** for locations of the sample sites.

- EchoTrack recorded 454,114 individual flights of night migrants during 22 nights of sampling from sunset to sunrise using radar-acoustic technology. Sampling was completed for four evaluation plots (E1, E2, E3 and E4). Bats comprised 22% of the overall night migrant population sampled by radar.
- The observed overall flight density (birds and bats) was comparable to studies in agricultural plateau topography in the Great Lakes region (New York).
- Habitats most associated with concentrations of bats were residential, woodlot and riparian corridors. Based on this study, a setback of 100 m would be sufficient to mitigate for potential collisions.
- The mobile acoustic results suggest Talbot has moderate bat activity compared to other proposed wind farm sites in southern Ontario. The average bat activity determined by acoustics at Talbot was  $0.31 \pm 0.41$  passes per minute versus  $0.22 \pm 0.20$  for other sites in southern Ontario. Talbot activity is also within the range of radar-determined activity for wind development sites in New York (an average passage rate of  $180 \pm 51$  (range of 4-1867) at Talbot versus  $304 \pm 88$  (9-1671) for New York).
- Plot E1 had the highest diversity of bat species and Plot E4 the least.
- Eight species of bats are potentially present in the study area. Seven of these were recorded. All species are considered secure in Ontario, with the exception of the Eastern small-footed bat which is designated as 'may be at risk' by the Ontario Ministry of Natural Resources. Six individuals were observed.
- Nocturnal bat flights in the study area peaked in activity 1.0 hour after sunset, tapering towards dawn.
- The peak in nocturnal bird flights was 30 minutes after sunset and 45 minutes before sunrise.
- Night migrant radar-determined activity (birds and bats) was greatest at E2, then E3 and E4. E1 was had the lowest overall (bird and bat) activity level and the lowest bat activity level of all plots sampled.
- Bat calling activity as determined by acoustic analysis, was greatest at E2 and E3, followed by E4 and E1.
- An average of 24% of the total population (all night migrants) was observed flying through the area proposed for turbines at blade sweep height. This proportion is higher than the average recorded by radar observations in similar landscapes in New York State, but of a lower observed migration activity. This proportion is expected to be reduced once the

turbines are operational due to increased flying heights, reduced flying speeds and changes in flying direction. The lowest proportion of those at risk was observed at E2.

- 32% of the total number of bats was recorded flying at heights within the blade sweep volume. Plot E4 had the highest proportion (37%), followed by plot E2 (35%), plot E1 (31%) and E3 (27%).
- The average flying height of all animals at plot E1 is 207 m; plot E2 = 203 m, plot E3 = 315 m; plot C = 206 m. All average flying heights for both birds and bats was above the proposed blade sweep volume for all plots.
- Based on the relatively lower flying height of bats, wooded areas in the vicinity of plots E4 and residential buildings at E3 and E2 likely provide some diurnal roosting habitat.
- The riparian habitat along the river in plot E1 was associated with increased activity for birds and bats, suggesting the use of this habitat for diurnal roosting.
- No evidence of hibernacula was found on Talbot. No swarming events were observed.
- Winds apposing the direction of migration had a tendency to decrease activity and increase the proportion of airborne wildlife in the blade sweep volume although not significantly. Other weather parameters, such as temperature and barometric pressure did not appear to affect flight behaviour.
- Some potential attractants associated with flight concentrations were identified in the project area. These include lights, residential buildings, woodlots and riparian corridors.

Based on consideration of the above information, EchoTrack characterizes the Talbot Wind Project as posing a moderate risk to bats and nocturnal migrant birds. The average acoustic activity is higher than other sites monitoring by EchoTrack in fall 2007 in southern Ontario, but the average radar activity is within the range of other sites recorded in similar topography and habitat at sites in New York. There were no acoustic recordings at the New York studies to enable a comparison. This pre-construction baseline information should be compared to post-construction data to determine collision avoidance behaviour and disturbance response.

An average of 76% of flights through the proposed development area was outside the blade sweep area, leaving an average of 24% of airborne animals potentially exposed to a collision. Most of the population migrating through the site continue their migration without coming into range of the blades to land or feed. This exposure is expected to be further reduced by over-flight and avoidance after the installation of turbines (Millikin in press).

Due to the lower flying height by bats, they are more at risk to a collision than birds; this agrees with the literature (EC 2005; OMNR 2007). Plots E2 and E4 have lower flight heights and a higher proportion of bats at risk but E4, as determined through radar analysis, has the lowest bird and bat activity, thus reducing the collision risk. Bat calling activity, as determined through acoustic analysis, was highest at E2 and lowest at E1.

The locations of flights with higher collision risk can provide guidance on the siting of individual turbines. The turbines are equally distributed between shore and plateau topography (45 shore and 44 plateau). Most turbines (90% (80/89)) are located in crop habitat that requires no setback

(**Appendix E** - Fig. 19 and Table 3). Turbines located near woodlot, riparian or residential habitat (10%) should be setback 100 m from those features (**Appendix E** - Table 3).

The rare Eastern long-eared bat was not recorded in a location planned for turbines.

### **7.7.3 Mitigation Measures**

In addition to the 1 year of pre-construction bat monitoring conducted by EchoTracks, the draft MNR bat guideline document indicates that at least two years of post-construction monitoring will be required from May through September. RES Canada will enter into discussions with the Ontario MNR regarding the need for post-construction mortality monitoring for this project.

The study results suggest that the risk to night migrant birds and bats is moderate and the site of highest activity is E2. Ninety percent of the proposed turbine layout is in crop habitat with low estimated collision risk. A remaining 10% of the turbines are proposed near woodlot, riparian or residential habitat. For these 10%, the data suggest a setback of 100 m from those features would reduce the collision risk. RES has respected this setback and conformed to it in developing its wind turbine layout.

While the area of Talbot that will receive wind turbines carries a moderate risk to the flying population, some flight concentrations, generally associated with attractants, were identified. Turbines will be placed to minimize and/or avoid the use of locations where feeding attractants such as lights and standing water or roosts like trees, woodlots, some hedgerows and buildings are present. At the plot level, flight corridors between woodlots and buildings, buildings and hedgerows will be avoided to the extent practical.

The pre-construction results will be compared to post-construction results for a measure of collision-avoidance behaviour and disturbance response.

### **7.7.4 Significance of Net Effects**

While the proposed wind power project area itself carries a moderate risk to the flying population, some flight concentrations, generally associated with attractants, were identified. As turbines will be placed to avoid locations areas where feeding attractants such as lights and rivers/riparian or roosts like woodlots and buildings are present and flight corridors between attractants will also be avoided no major impacts are expected. With these mitigation measures in place, impacts on bats are not expected to be significant. RES will undertake post construction monitoring will confirm impacts. The post construction avian monitoring program will be developed in consultation with the Ontario MNR. Further wind farm operational changes may be required depending on the results of the monitoring.

## **7.8 Wildlife and Wildlife Habitat**

*This section refers to item 4.2, 4.4, 4.7 and 5.6 of the MOE's environmental screening checklist: will the project:*

- *Cause negative effects on protected natural areas such as ANSIs, ESAs or other significant natural areas?*
- *Have negative effects on wildlife habitat, populations, corridors or movement?*
- *Have negative effects on locally important or valued ecosystems or vegetation?*

- ***Have negative effects on game and fishery resources, including negative effects caused by creating access to previously inaccessible areas?***

## **7.8.1 Existing Environment**

### *7.8.1.1 Approach to Data Collection*

Several sources, including: Natural Heritage Information Centre database; Atlas of Mammals of Ontario (Dobbyn 1994); Ontario Herpetofauna Atlas (Oldham and Weller 2000); Breeding Bird Atlas (<http://www.birdsontario.org/atlas/atlasmain.html>); Important Bird Areas (<http://www.ibacanada.ca>); federal *Species at Risk Act* (SARA) Public Registry ([http://www.sararegistry.gc.ca/default\\_e.cfm](http://www.sararegistry.gc.ca/default_e.cfm)); and provincial Species at Risk (SAR) (<http://www.mnr.gov.on.ca/MNR/speciesatrisk/status.html>) formed the basis of the background review. The Ontario Ministry of Natural Resources Ontario Digital Geospatial Information was used to obtain aerial photos (1995-1999) and mapping of natural features in or immediately adjacent to the study area.

Aerial photographs (1995-1999) were initially used to determine major habitat types (Environment Canada 2007a) in the study area. The description of major habitat types contained here in is based on observations completed during seasonal field surveys during 2007, which covered the entire study area.

Consultation with Ontario Ministry of Natural Resources (OMNR) Aylmer and Chatham District Office staff, including: Daraleigh Irving (Aylmer District Planner); Holly Simpson (Chatham District Biologist); and Ron Gould (Aylmer/Chatham District Species at Risk Biologist) was completed as part of the background review. Rob Read (Environmental Assessment Officer, Environment Canada) was also consulted during in the earlier stages of the project with respect to the existing natural environment under Environment Canada's mandate (i.e. *Migratory Bird Convention Act*, 1994 (MBCA) and Species at Risk).

Further consultation took place with the MNR (Ron Gould – Species at Risk Biologist), EC (Lyle Friesen - Biologist), Ontario Parks (Brian Huis - Parks Planning Specialist), Dave Martin (Consulting Biologist), Dr. Ross James (Consulting Biologist) Dr. Rhonda Millikin (EchoTracks Inc.) and the Nature Conservancy of Canada (Dan Kraus - Conservation Science Manager) between December 3 and 14, 2007. This consultation was focused on setting appropriate buffers for a variety of natural features and species at risk in the study area. During the last week of February and the first week of March 2008 these individuals were contacted again to provide input into the draft turbine layout that had been prepared.

No specific wildlife issues (outside of species at risk and birds) were identified during discussions with agencies. As a result, the evaluation focused on protecting valuable wildlife habitat in the study area as generally outlined in the Ministry of Natural Resources' Significant Wildlife Habitat Technical Guide (MNR 2000). In addition, the potential for effects on wildlife and wildlife habitat has largely been addressed through turbine placement and buffers implemented.

### *7.8.1.2 Results Summary*

Several natural features were identified in the study area including:

- Clear Creek Forest Nature Reserve;
- Clear Creek – Regionally Significant - Life Science Area of Natural and Scientific Interest;
- Morpeth Ravine – Regionally Significant - Life Science Area of Natural and Scientific Interest;
- Elgin and Kent Shoreline – Provincially Significant – Life Science Area of Natural and Scientific Interest;
- Duart Rolling Sandlands – Regionally Significant Life Science Area of Natural and Environmental Interest;
- Wayne Smith’s Woodlot-Wetland – Provincially Significant Wetland;
- Highgate Wetlands – Locally Significant Wetland;
- New Glasgow Woodlot/Wetland – Provincially Significant Wetland; and
- Morpeth Creek – Other Significance – Life Science Site.

These areas are described in **Appendix D**. Further, Table 3 of Appendix D provides a listing of wildlife species that are expected to live in the project area.

The study area is primarily comprised of tilled agricultural crops including beans and corn with some winter wheat. Forest in the area are made up of both upland, lowland (swamp) and forest ravine components and represents the second most abundant habitat type in the study area. Hedgerows are rather sparse overall, especially on the roads south of Highway 3 and the middle portions of the study area. Natural vegetation along drains is also sparse. Grassland and grassland type habitat in the form of pastures, old fields and hay/alfalfa are almost entirely absent from the study area. There are a few small areas of pasture that are used for cattle and other livestock and are of various qualities. Even fewer areas of old field occur. What does occur is small and isolated. Although hay and alfalfa fields were observed in the study area they too are limited in size and occurrence.

The Lake Erie shoreline has steep bluffs for most of the 30 km’s of shoreline in the study area.

## **7.8.2 Potential Effects**

### *7.8.2.1 Siting Constraints Recognized*

Based on background information, discussions with agencies and information collected during field work, several constraints specific to the protection of wildlife and wildlife habitat in the study area were proposed and implemented by RES. **Figure 7.2** provides a summary of all constraints/buffers that were developed as part of the turbine siting process. Constraints developed for the protection of the terrestrial environment include:

- 50 m Other Wetland Buffer
- 120 m Provincially Significant Wetland Buffer
- 50 m Wooded Valley and Other Forest Buffer
- 180 m Interior Forest Buffer
- 180 m Red-headed Woodpecker Buffer
- 200 m Acadian Flycatcher Critical Habitat Buffer

- 250 m Clear Creek Property Boundary Buffer
- 200 m Lake Erie Shoreline Buffer
- 1 km Bald Eagles Nest and Associated Forest Buffer
- Lower Thames Valley Conservation Authority Regulated Areas
- Bald Eagle Lake Access Area
- Migration Corridor

#### *7.8.2.2 Designated Natural Heritage Features*

Several natural heritage features have been identified in the study area (see **Figure 7.2**). The importance of these areas for maintaining wildlife habitat and biodiversity in the study was identified during the initial stages of the project. With exception to one access road and electrical collector line no clearing of vegetation is expected. In fact specific mitigation measures (buffers) were implemented during the siting of turbines to avoid impacts to designated natural features. See Mitigation Measures section below for a detailed account of buffers implemented.

The single crossing of Duart Rolling Sandlands ANSI follows an existing farm lane with an overhead three phase 4.8/8kV line. Some minimal upgrading of the laneway will be required to facilitate the access road.

With exception to the single crossing of Duart Rolling Sandlands, no impact to wildlife or wildlife habitat associated with designated natural heritage features in the study area is anticipated. No rare vegetation or species have been identified in the ANSI Duart Rolling Sandlands according to MNR (August 10, 2007) and NHIC database. The limited expansion of the existing farmland crossing Duart Rolling Sandlands is anticipated to have a minimal impact on wildlife habitat and no impact on wildlife.

#### *7.8.2.3 Seasonal Concentration Areas*

Several seasonal concentration areas have been identified in the study area. Many of these pertain specifically to birds and have been discussed in detail in the **Appendix D** of the ERR. Based on consultation with the MNR and existing mapping, it is understood that deer wintering areas do exist in the area (see **Figure 1 in Appendix D**) and there is potential for reptile (snake) hibernacula to occur in the area.

Deer wintering habitat has been avoided. No impact is anticipated to the local population.

Habitat generally associated with eastern fox snake has been avoided, including areas associated with Morpeth Ravine and connecting hedgerows. Therefore, no impact to this species is anticipated, provided appropriate mitigation measures are implemented (see below for recommended mitigation).

#### *7.8.2.4 Specialized Habitats*

Potential or confirmed specialized habitats recognized in the study area include:

- Habitat for area-sensitive bird species
- Acadian Flycatcher habitat
- Open Country habitat (e.g. old-field, alfalfa/hay, pasture)

- Amphibian woodland breeding ponds
- Turtle nesting habitat
- Cliffs
- Seeps and springs

These features are contained within identified natural features, typically of provincial or regional significance (**Figure 1 in Appendix D**). These features have been avoided and buffers applied to further protect species that may be associated with these habitats. No impact is anticipated.

#### *7.8.2.5 Animal Movement Corridors*

Many corridors consist of naturally vegetated areas, often forested land that run through more developed and open landscapes and connect natural areas within and beyond municipalities. Other potentially significant corridors include forested river valleys, shrubby riparian vegetation along smaller watercourses such as creeks, and undeveloped lake shorelines. Many wildlife species move freely through agricultural land to reach natural areas.

Based on initial assessment of the study area the majority of corridor function occurs along forested ravine areas. There are large distances between natural features in the study area.

The corridor function provided by agricultural areas and connecting hedgerows is not expected to be impacted by the development of a wind farm. However, some species at risk, which may rely on diffuse or ill-defined corridors for their survival, are known to occur in the study area (i.e. eastern fox snake). Provided mitigation measures are developed and implemented in consultation with the MNR, no impact is anticipated (see below for recommended mitigation).

### **7.8.3 Mitigation Measures**

The potential for effects on wildlife and wildlife habitat has largely been addressed through turbine placement. Mitigation measures to be implemented include recognizing buffers as previously described in Section 7.6.3.

In addition, the following recommendations are being proposed:

- In the area where the farm lane is to be expanded to accommodate the electrical collector line, detailed vegetation work should be completed prior to construction to ensure no rare vegetation occurs in or immediately adjacent to the construction footprint. If any provincial or national rare species are found, consultation with the appropriate agency should be conducted and additional site specific mitigation measures implemented.
- It is recommended that the MNR be consulted prior to construction to develop a species at risk corridor and seasonal construction window management plan to proactively manage potential interactions between construction and species at risk known to the area. The general scope of this mitigation measures will be to identify seasonal corridor routes (as specifically as possible) that may overlap proposed road access routes and identify any construction timing windows which may increase potential interactions with species at risk in the area.

#### 7.8.4 Significance of Net Effects

The risk to wildlife and wildlife habitat in the area is low, provided mitigation measures are implemented.

#### 7.9 Threatened, Rare or Endangered Species

*This section refers to items 4.1 of the MOE's screening checklist: will the project:*

- *Cause negative effects on rare, threatened or endangered species of flora or fauna or their habitat?*

##### 7.9.1 Existing Environment

According to the NHIC database no rare vegetation communities occur in or immediately adjacent to the study area.

##### 7.9.2 Vulnerable Threatened or Endangered Species

The Natural Heritage Information Centre (NHIC) database identifies a number of rare species within or adjacent to the study area. All of these species range from vulnerable (S3) to critically imperiled (S1) in the province of Ontario and some are listed under the *Species at Risk Act (SARA)* and/or *Endangered Species Act (ESA)*. Rare species confirmed to be of management concern through consultation with Ron Gould (MNR Species at Risk Biologist) are provided in **Appendix D (Sub-Appendix I)**. Many of these species are a result of road kills and suggest that these species are using appropriate habitat in the area. The majority of plants and many fauna exist within study area natural features that will be avoided and buffered.

Fieldwork documented some rare bird species using the study area during a variety of seasons including:

- Bald Eagle, Rusty Blackbird sightings during the winter of 2007 and 2008;
- Acadian Flycatcher, Bald Eagle, Peregrine Falcon, Red-headed Woodpecker and Rusty Blackbird observed during spring 2007; and
- Red-shouldered Hawk, Bald Eagle, Peregrine Flacon, Red-headed Woodpecker, Golden Eagle in the fall of 2007.

Although breeding evidence was not confirmed for Acadian Flycatcher, Bald Eagle and Red-headed Woodpecker in the study area, Breeding Bird Atlas and/or agency reports suggest that these species currently are or regularly do nest in the area.

According to the OMNR (Holly Simpson and Ron Gould, personal email correspondence), no known aquatic species at risk (i.e., fish or mussels) occur anywhere inside of the current Project Boundary, including the fish listed in the tables above.

Finally, the eastern foxsnake can likely be found within the project boundary, usually near water, preferring marshes, woodland edges and hedgerows.

### **7.9.3 Potential Effects**

Based on consultation and fieldwork, species at risk habitat has been avoided through the avoidance of natural features and buffers implemented during the siting of turbines. The potential for impact to these species are low, provided appropriate mitigation measures are implemented.

The risk to species at risk observed flying through the area during migration are also thought to be low based on literature. No impact to these species is anticipated.

*Eastern Fox Snake*, which are located within the project boundary, are usually found near water, preferring marshes and woodland areas. However, they are often seen in grassy habitat and along municipal drains and roadside ditches while hunting. Culvert installation within municipal drains to access some turbines will require disturbance of stream and streambank vegetation, which is potential fox snake habitat. Mitigation of construction impacts is required and discussed under “Mitigation” below. No other potential short or long term effects to this species are anticipated.

### **7.9.4 Mitigation Measures**

Species requiring specific management efforts include:

- Bald Eagle;
- Acadian Flycatcher;
- Red-headed Woodpecker; and
- Eastern Fox Snake.

Specific mitigation for Bald Eagle, Acadian Flycatcher and Red-headed Woodpecker has been discussed in Section 6.1.6 of **Appendix D**.

#### ***Eastern Fox Snake***

Eastern Fox Snake utilize municipal drains as movement corridors. Culvert installation within these municipal drains may disturb habitat as per the *Endangered Species Act* (2007), the Ontario Ministry of Natural Resources should be involved with approval of the works.

To limit disruption to Eastern Fox Snake habitat, culvert installation work should occur between June and mid-September when temperatures are sufficiently warm allowing them to readily escape any disturbance activity. Culvert installation could also take place following fall freeze-up when snakes are in their hibernacula. Culvert locations need to be reviewed by the MNR to confirm that there is no site-specific information, such as hibernaculum locations, that would affect winter construction. Culvert installation timing should also correspond with fisheries considerations. Any adjustments to the culvert installation window could be considered under consultation with MNR, particularly related to ambient temperatures, snake mobility and additional mitigation measures such as conducting field investigations immediately prior to construction activity.

In addition, the MNR will be consulted prior to construction to develop a species at risk corridor and seasonal construction window management plan to proactively manage potential interactions between construction and species at risk known to the area. The general scope of these mitigation measures will be to identify seasonal corridor routes (as specifically as possible) that may overlap

proposed road access routes and identify any construction timing windows which may increase potential interactions with species at risk in the area.

### **7.9.5 Significance of Net Effects**

Low probability of risk to resident species provided mitigation is implemented. The majority of migrants will pass along the lakeshore where a buffer has been provided to protect the main concentration of diurnal migrants.

## **Social Environment**

### **7.10 Economics, Land Use, and Resources**

*This section refers to items 5.4, 6.2, 6.4, 6.5 and 6.6 of the MOE's screening checklist: will the project:*

- *Be consistent with municipal land use policies, plans and zoning by-laws?*
- *Have negative effects on local businesses, institutions or public facilities?*
- *Have negative effects related to increases in demand on community services or infrastructure?*
- *Have negative effects on the economic base or a municipality of community?*
- *Have negative effects on local employment and labour supply?*
- *Have negative effects on the availability of mineral, aggregate or petroleum resources?*

#### **7.10.1 Existing Conditions**

The following provides a description of existing land use and economic activity in Chatham-Kent and the study area. Agricultural, which is a key aspect of the area's economic base, is described separately in Section 7.13. Existing aggregate and petroleum resource conditions are also addressed below.

## **Population and Land Use**

**Figure 7.3** illustrates major land use features in the study area.

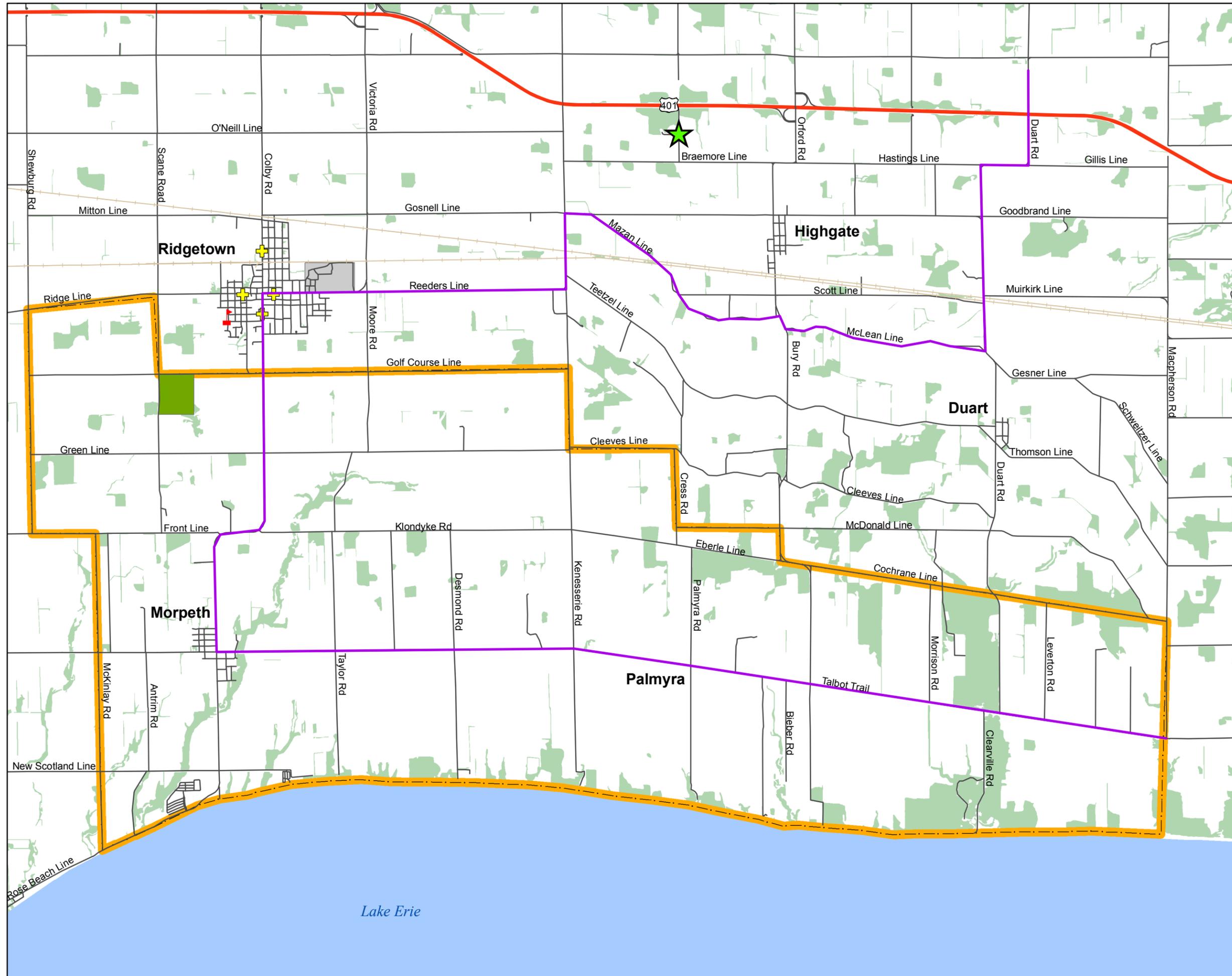
There are no significant built-up areas in the proposed project area. Land use in the study area is primarily agricultural as designated in the Chatham-Kent Official Plan (Land Use Schedule fA-3 Community of Howard). Lands in the study area are largely zoned as Agricultural Area, which permits uses such as agricultural and agriculturally related uses, sustainable forestry uses, conservation, home based business, retail stands for the sale of agricultural products produced on the same farm unit, bed and breakfast establishments and farm related commercial and industrial uses. The area has a minimum tree cover (5-10%) with the remaining lands being used for agriculture (largely tilled crops), rural residential, highways, and municipal roads. Within Chatham-Kent as a whole, population has largely remained unchanged from 2001–2006 although it is becoming older, that includes reductions in the key labour market age ranges.

The Talbot Wind Farm Study Area is primarily located in an agricultural area. Both the Provincial Policy Statement and the Chatham-Kent Official Plan prohibit new vacant residential lot creation in

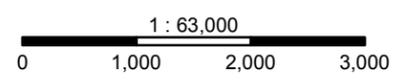
agricultural areas; therefore, any future development activity would be limited to individual farm dwellings; agricultural buildings and small-scale agricultural related industrial/commercial type uses. The Hamlet of Morpeth and the small Settlement of Palmyra are located within the Study Boundaries, both of which are described below in more detail. The Settlement Area boundaries of both Morpeth and Palmyra have been established by the Official Plan. In order to be consistent with the PPS and in conformity with the Official Plan, new development is to be limited to minor infilling within the established boundaries. Development is also constrained because of the absence and capability of providing full municipal services to either of these Settlement Areas. The closest proposed turbines are in excess of 1000 meters of both these Settlement Area boundaries.

# Wind Farm Study

## Figure 7.3: Land Use



- Legend**
- Waste Transfer Facility
  - Church
  - School
  - Residence
  - Proposed Trans Canada Trail
  - Project Boundary
  - Railway
  - Roads
  - Highways
  - Ridgetown Golf and Country Club
  - University of Guelph (Ridgetown Campus)
  - Woodlots
  - Waterbody



Palmyra is a small rural farming community. There are approximately thirty homes in the 5 km radius from the community centre and eight homes within the rural community itself. Population in the community has been declining over the years. The old school house has been converted into a historic community hall. Most residents from Palmyra travel to either Ridgetown or Highgate for groceries, banking, mail services, church, and other such needs.

Morpeth is also a small rural community with a population of approximately 300 – 400 people. In years passed, the community had two churches, stores, restaurants, and inns. Like Palmyra, the population and commerce began declining when transportation infrastructure was developed north of the community. Today the community has a gas station, small variety shop, antique store, body shop, and a very active community hall (Personal Communication, Kay Quinton, Resident, 2008).

With a population of 3,464, Ridgetown is the largest community in proximity to the study area. Located 1.5 km north of the study area, it is considered a smaller Primary Urban Centre within the Municipality (Chatham-Kent Official Plan). As noted above, Ridgetown functions as a service and commerce centre for outlying communities.

Communications with Chatham Municipal Airport identified 22 airports, heliports and airstrips in the surrounding communities. Of these three are registered: the Chatham Health Alliance heliport, the Chatham Municipal Airport and a private airstrip in Highgate. The Chatham Health Alliance heliport and the Chatham Municipal Airport are 22.4 km and 18.4 km away from the study area, respectively. The heliport and the Municipal airport were made aware of the project although no further consultation was necessary based on the distance between them and the study area.

Five private airstrips were identified to north of the project area. (see **Figure 7.4**). The closest to the project include an airstrip (identified as #1 on **Figure 7.4**) that is located 1.6 km from Site T-17 and one airstrip (identified as #5) is 2.3 km from Site T-17. Contact with these airstrip owners has been made and discussions are ongoing. In discussing the project with the owner of airstrip #5, it was indicated that the approaches to the airstrip are largely from the east and west. As such, the turbines would not be in-line with these approaches.

### **Economic Base**

The main industries in Chatham-Kent are agriculture and other resource based industries, manufacturing and construction industries, and health and education. Manufacturing remains CK's largest industry, representing 23% of the labour force which is well above the provincial average. The municipality faces many of the same economic challenges in other small and mid-size municipalities in Ontario hit hard over the last decade by factors such as migration of population to larger urban centres, decline in manufacturing as a result of overseas competition and the higher Canadian dollar<sup>2</sup>.

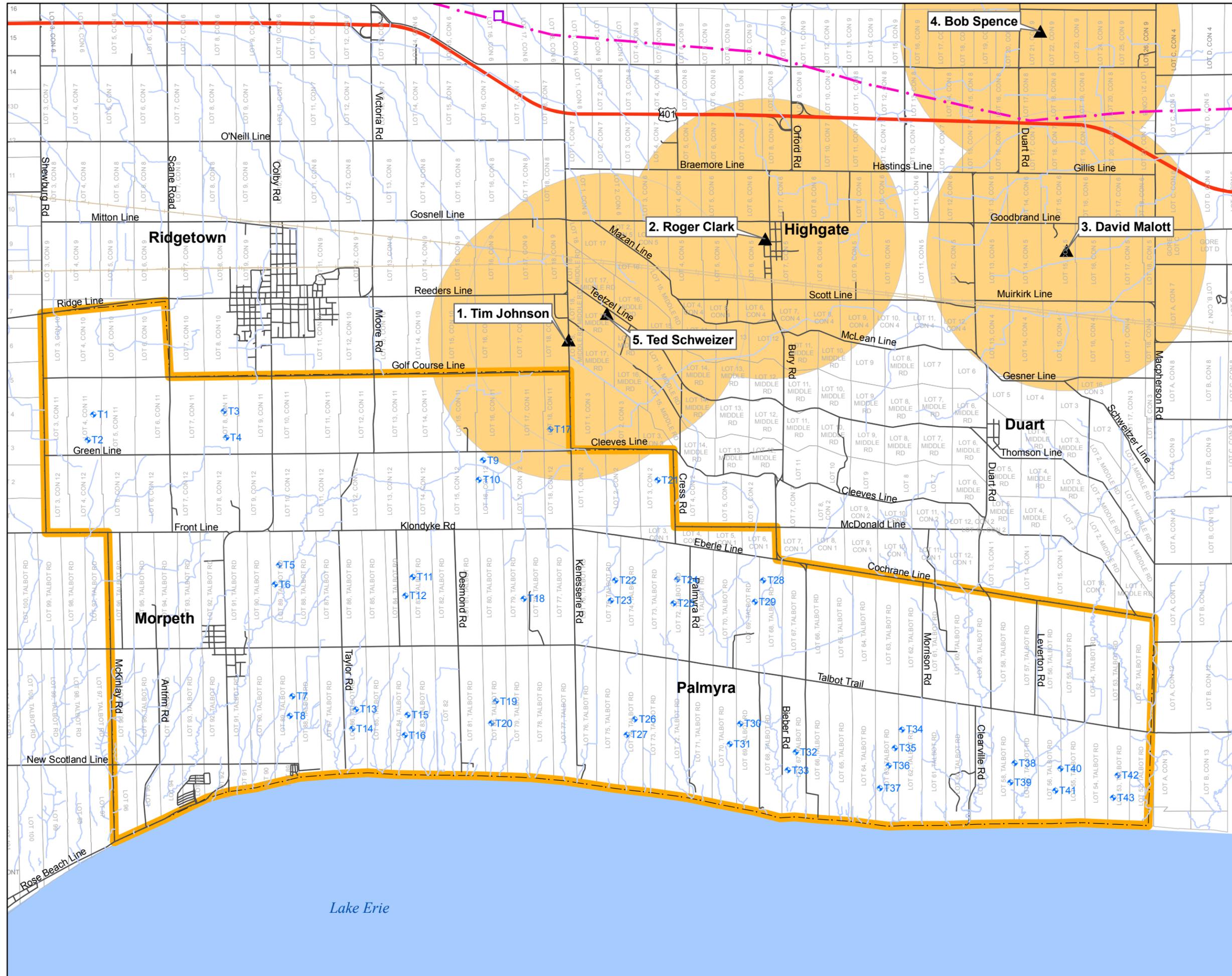
Within the study area, the main economic driver is agriculture although there does exist some manufacturing in the Ridgetown area that provides a local source of employment, these industries include: Thyssen-Krupp, KSR International, Waltron Trailers, Trak Tool Machines, and Challenger Pallet in Ridgetown. Those who do not farm or work in the locale, commute to other areas such as Chatham, Windsor, and London.

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<sup>2</sup> December 2007 *Cultural Plan for Chatham-Kent*

# Wind Farm Study

## Figure 7.4: Private Airstrip Locations



### Legend

- Turbines
- Private Airstrips
- Existing 230kV Transmission Line
- Railway
- Roads
- Highways
- Project Boundary
- Lots/Parcels
- Waterbody
- 2.5km Airstrip Setback



1 : 64,500  
 0 1,000 2,000 3,000

In 1977, through a partnership with the Ontario Ministry of Agriculture and Food, the University of Guelph took over the research farm and established a campus in Ridgetown. This partnership has provided for better resources and new research into Ontario's agriculture and rural sector at the University of Guelph, Ridgetown Campus (University of Guelph, 2008). About 500 students attend the campus which employs approximately 110 year-round staff, 15 seasonal contract staff, and 75 summer students. Significant investments have been made recently to the campus, including upgrades to infrastructure and the additional of several new facilities.

One of the six Lake Erie on-shore gas processing plants is located at Morpeth. The gas wells are serviced by vessels that operate out of the harbours at Erieau and Wheatley (Chatham-Kent Official Plan 2005).

Finally, due to the study area's proximity to Rondeau Provincial Park, tourism also contributes to the area's economic base through the provision of services being offered to visitors of the Park.

The Municipality is looking to diversify and increase their economic base. In 2005, Council adopted the Second Edition of the Chatham-Kent Community Strategic Plan tag lined, "Working Together...To Achieve The Visions". This document includes a 20-year Community Vision and six broad strategic areas to guide the Municipality and the Community. The Plan states that the Municipality wishes to "encourage the continuing growth of a diversified and sustainable economic base"...and a desired outcome is to "build upon (their) strong agricultural base by attracting complementary businesses and industries". This is to be achieved by "fostering partnerships among all industrial sectors". Renewable or "next generation energy" has been identified in Chatham-Kent's Economic Development and Tourism Strategy 2008-2011 as a potential growth area for economic development. According to Councils "Strategic Direction and Goals: 2007-2010", Chatham-Kent, "will support sustainable growth in business and industry with an emphasis on next generation energy, environmental industries and related technologies", with a goal of attracting "\$3B in sustainable investment in new and existing next generation energy, environmental industries and related technologies" (Municipality of Chatham-Kent, 2007a).

### **Aggregate and Petroleum Resources**

The Chatham-Kent Area is home to several aggregate operations, including licensed areas under the *Aggregate Resources Act*. The proposed wind farm avoids these licensed areas. However, some turbine sites are within or adjacent to areas designated as a secondary resource with the Chatham-Kent Official Plan. The secondary resource areas support two licensed pits near Morpeth and may be able to support other licensed operations.

These aggregate resource areas are identified on Schedule 11 of the CK OP. The area in question just north of Morpeth has been delineated as a Medium Aggregate Potential area. Wind turbines are permitted uses within any land designation area. Section 2.5.2.1 of the Chatham-Kent Official Plan states that:

*"Wind farms comprising one or more large wind turbines, where electrical wind energy is sold to the electrical grid, are permitted in any designation subject to the policies of this Plan."*

In addition, active and plugged petroleum wells in addition to active oil and gas pools also occur within the study area. If any of these wells are identified in close proximity to the turbine sites, adequate set backs would be maintained.

## **7.10.2 Potential Effects**

### *7.10.2.1 Population and Land Use*

As noted earlier, the new Council Adopted Chatham-Kent Official Plan designates the majority of the project area as "Agricultural Area" as identified on Land Use Schedules A2 & A3 to the Plan. The new Official Plan, adopted by Council in January of 2005, is awaiting formal approval from the Ministry of Municipal Affairs and Housing. Section 5 of the Plan sets of policies related to Wind Energy Resources. Specifically the Plan states:

*It will be the objective of Chatham-Kent to:*

*2.5.1.1 Encourage the development of wind energy systems for electricity production, as a source of renewable energy for the economic and environmental benefit of Chatham-Kent and the Province of Ontario.*

*It will be the policy of Chatham-Kent that:*

*2.5.2.1 Wind farms comprising one or more large wind turbines, where electrical wind energy is sold to the electrical grid, are permitted in any designation subject to the policies of this Plan.*

*2.5.2.2 Wind farms will require an amendment to the Zoning By-law. It is intended that many of the safety, noise and visual impacts will be contained on the site of the wind farm.*

The Official Plan in effect is still that of the former Township of Howard, which was prepared in an era before wind turbines were contemplated in rural areas throughout Ontario. Since the Plan does not contemplate wind turbines as a use, they are not permitted under any designation in the Howard Official Plan; therefore, necessitating the need for an Official Plan Amendment to the Howard Official Plan. Conversely, the former Township of Orford never had an Official Plan, so there are technically no land use policies in place.

At the time of writing, the new Chatham-Kent Official Plan adopted by Council in January 2005, was formally approved by Minister of Municipal Affairs and Housing on December 24, 2008; however, there were a few appeals and the matter is still before the Ontario Municipal Board. The new Chatham-Kent Official Plan does establish wind farms as a permitted use in any designation and provides policies to guide their development and provides an endorsement of Council's position on wind energy. It should be noted that none of the aforementioned appeals of the Official Plan were related to its wind energy policies. Furthermore, since the Plan was adopted in 2005, there have been two specific wind projects approved by Council that have introduced additional policy direction, namely the Kruger Port Alma Wind Project, in the Communities of Romney, Raleigh and Tilbury East and the Gengrowth Wind Projects, which entailed four separate smaller RESOP projects in the Communities of Dover, Harwich, Howard and Tilbury East.

The subject sites are currently zoned "A2, Agriculture Zone 2" in the former Township of Howard Zoning By-Law and "A, Rural" in the former Township of Orford Zoning By-law, neither of which

permits wind turbines as a use. Therefore, a Zoning By-law Amendment has been requested to site-specifically rezone the properties that are proposed to have turbines and/or ancillary uses located on them to permit those uses. In designing their layout, RES has been using the setbacks outlined in the Draft Chatham-Kent Zoning By-law; the enhanced setback standards that were adopted by Council on July 21, 2008, as well as additional setbacks based on other feedback and good planning principles.

The Municipality's approach has been to require a site-specific zoning for each of the properties within the project area that are intended to have a turbine or accessory uses located on them. In previous applications for wind projects in Chatham-Kent, the Municipality has added a suffix symbol (WF) to the underlying agricultural zone. The (WF) symbol introduces general provisions that permit "wind farms and accessory uses" with specific setback requirements for the siting of wind turbines on the specific properties in question. It is anticipated that the same approach will be used in this case. In addition, each property containing a turbine or accessory use will be subject to site plan control under Section 41 of the *Planning Act*. A Site Plan Agreement between the proponent and the Municipality will be required for each property that is to host a wind turbine.

The development of the wind farm will result in the removal of existing land uses, which is largely agricultural land. The development of wind turbines could have an effect on planned and proposed land uses in the study area by potentially reducing the land development opportunities in the vicinity of the turbines. There is no by-law at the time of this report to prevent a new home from being built in close proximity to a turbine.

It is also important to recognize that all turbines are to be located on land designated in the Chatham-Kent Official Plan as "Agricultural Area" and are currently used for agricultural purposes. Being a very rural area, the development activity in the area over the past number of years has been very limited. Any development has been agriculture-related. The new 2005 Provincial Policy Statement and the new Chatham-Kent Official Plan are both geared to protect prime agricultural areas. New growth is intended to be directed to defined settlement areas, such as the Communities of Ridgetown and Highgate. The Municipalities Agricultural Consent policies also restrict rural residential lot severances to existing residences that are surplus to a farm operation as a result of consolidation. No new vacant rural residential lot creation is permitted in the "Agricultural Area" designation. As well, the turbines are largely all located near the middle to the back of the properties well away from roads. Lands near roads are expected to be most attractive for development.

Given the above, it is unlikely that the lands in the vicinity of the turbines (i.e. within 450 m) would be developed, as such; the project is expected to have minimal impact on development activity in the study area.

As well, as with most wind farms, some concern has been expressed regarding the potential for negative impacts on property values. A few studies have been completed regarding this issue including:

- Economic Impacts of Wind Power in Kittitas County, October 2002;
- Impacts of Windmill Visibility on Property Values in Madison County, New York, April 2006 (summary); and
- Wind Farms and Property Prices (overview of various countries by AUSWEA (Australia).

Each of these documents carries the same message which we quote from the Madison County study summary sheet – “no measurable effects of windmill visibility on property values....This evidence holds even when concentrating on homes within a mile (of turbines) or on those that sold immediately following announcement (of the wind farm...)”.

A more recent and local property value study was conducted in the vicinity of the operating wind farm in Melancthon Township, Ontario<sup>3</sup>. This study compared house resale prices and growth rates of Melancthon Township (which has a windfarm) to the neighbouring Township of East Luther Grand Valley. Based on this study, it would appear that the windfarm did not have an effect on neither resale prices nor growth rates.

Given the results of past studies, and the large separation distances between the turbines and residences in the area, there is no reason to expect that the Talbot Wind Farm would adversely affect property values in the area.

#### *7.10.2.2 Economic*

The following addresses the potential for economic impacts from the Talbot Wind Farm as organized on the basis of the applicable screening criteria.

- ***Have negative effects on local businesses, institutions or public facilities?***

Business activity in the study area is largely agricultural based including services to support it. No businesses, institutions or public facilities were identified that would be adversely affected by the project. Rather, the payment that the farm industry will receive through lease payments will help to support this industry as further noted below.

- ***Have negative effects related to increases in demand on community services or infrastructure?***

The project will not result in increase demand on community services or infrastructure. The turbines require no municipal servicing connections. A central office for the wind farm would likely be located in an existing community where servicing is readily available. Municipal roads used during the construction period would be repaired if damaged and return to existing if not better condition. RES will provide funding to applicable emergency service providers such as the fire department for required training.

- ***Have negative effects on the economic base or a municipality of community?***

The effects of the project on the area’s economic base are all positive as described below:

#### *Construction Spending*

The construction of a 98.9 MW wind farm requires a capital spend of approximately \$250 million on turbine components, civil construction, electrical, crane and many additional specialist contractors.

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<sup>3</sup> Property Value Study, The Relationship of WindMill Development and Market Prices, Township of Melancthon, Township of East Luther Grand Valley and County of Dufferin, September 2006.

Approximately 25% of the overall capital spend is on “balance of plant” which are generally not specialist contractors and would include for example local road, concrete, aggregate, and electrical contractors/suppliers. Opportunities to provide these services/supplies would likely be through competitive bid. In total, about \$75 million in contracting services would be available to local service providers in southern Ontario.

A portion of the direct local capital spend will be duplicated by support and contracting services to the wind farm project. Typically this could represent orders to fabrication shops, catering, hoteliers, electrical sub-suppliers, etc.

The construction of the wind farm would generate about 300 jobs at the peak of the construction period. The income generated through these jobs is expected to be about \$7.5 to 9 million.

#### *Operation Spending*

The overall annual spending on wind farm operations and maintenance activities is estimated at \$7million. The wind farm will be operated and maintained from an operations and maintenance facility to be located in the vicinity of the wind farm. The facility will have stores for spare parts, and scheduled and unscheduled maintenance will be dispatched from this facility. Operations will directly employ between 8 and 10 people whose tasks will be to monitor and operate the wind farm. These long term employment opportunities will generate total annual incomes of about \$500,000.

Sub-contracts will be awarded to contractors for road maintenance, snow clearance, electrical maintenance, etc. The annual value of these sub-contracts is estimated at \$100,000.

A percentage of direct local operations spending will be duplicated by support and contracting services to the wind farm project. Typically this could represent orders to fabrication shops, catering, hoteliers, electrical sub-suppliers.

#### *Municipal Payments*

Based on current MPAC evaluations for turbines and typical mill rates, tax revenue from each turbine will be about \$5,000 per unit, regardless of the MW rating of the machine. With the Talbot Wind farm’s current layout of 43 turbines, this represents an annual tax bill to the Municipality of approximately \$215,000.

#### *Landowner and Community Payment*

Under a 98.9 MW layout with 2.3 MW turbines, an annual rent will be paid to landowners with a turbine on their property amounting to a total of approximately \$600,000 for the whole project. In addition, RES will also be making payments to all landowners who have signed a lease option and are within the vicinity of the wind farm. This will amount to a total annual payment of approximately \$450,000. This revenue to landowners will largely be spent locally on improvements to farming and domestic infrastructure, as well as securing the viability of family farming.

RES will also be contributing to a community benefit payment of not less than \$800/turbine per annum (\$35,000/annum minimum). This fund is to be directed to ecological or environmental causes.

*Economic Summary*

In addition to the \$250 million to be spent to construct the project, over an assumed 20 year life span of the facility, the project is expected to result in about \$26 million being paid to the local community and close to \$4.3 million being generated in taxes (all 2008 dollars not including inflation).

- ***Have negative effects on local employment and labour supply?***

During the construction period, workers will be required; much of this employment will be sourced through the overall project contractor. It is expected that the labour supply will be drawn from throughout Southern Ontario. No negative effects are anticipated on the local labour supply.

*7.10.2.3 Aggregate and Petroleum Resources*

The following addresses the potential for impacts to aggregate and oil and gas resources from the Talbot Wind Farm as organized on the basis of the applicable screening criteria (section 5.4, Table 6.1).

Aggregate operations exist in the study. The proposed turbine areas successfully avoid these areas. Construction of the turbines has the potential to impact secondary resources areas, specifically the two licensed pits north of Morpeth should appropriate setbacks not be applied.

In addition, and during the construction phase of the project, abandoned petroleum wells may be discovered. The proposed project may impact the development of the resource should appropriate setbacks not be applied.

### **7.10.3 Mitigation Measures**

As described above, the project is not expected to result in negative land use or economic effects. As such, no specific mitigation measures are required.

### **Aggregate and Petroleum Resources**

Prior to project construction, a detailed inventory of aggregate resources will be developed. Should there be a potential for one of these resource areas be impacted, detailed consultation will be undertaken with the Municipality of Chatham-Kent and the resource owner to determine the proposed impact and appropriate setbacks for the turbines and associated infrastructure from the resource.

Abandoned petroleum wells may be discovered prior to or during construction activities. Should one be located, the Petroleum Resources Centre in London will be contacted (519-873-4634) immediately. In addition, if the well located is noted to have a significant potential for impact due to construction or operation (should it be determined that drilling may, at a certain point, be re-started), a setback of 50 meters will be instituted as per Section 3.1.1 of the *Oil, Gas, and Salt Resources of Ontario Operating Standards* to accommodate access to the wells from drilling rigs and other equipment.

### **7.10.4 Significance of Net Effects**

Given the predominate agricultural designation of the lands in the study area; the wind farm is unlikely to result in adverse effects on planned land use. Due to expected low magnitude of effect on planned land use, the effects are not expected to be significant.

The project is expected to result in substantial positive economic effects during both construction and operation periods through project capital expenditures and employment opportunities that are generated.

With appropriate mitigation measures applied, no adverse effects on aggregate or petroleum resources is anticipated.

## **7.11 Disposal of Waste Materials**

*This section refers to item 9.1 of the MOE environmental screening checklist: will the project:*

- *Cause negative effects of waste materials requiring disposal?*

### **7.11.1 Existing Environment**

The Ministry of the Environment has an interest for all development projects that are located within 500 meters of an active or closed landfill site, through Section 46 of the *Environmental protection Act* and the MOE Guideline D-4. The MOE's Guideline, D-4, Land Use On or Near Landfills and Dumps (1994) describes acceptable and unacceptable land use controls for lands within 30 meters, 500 meters and beyond 500 meters of a fill area. There is one closed landfill facility on Scane Road, north of Klondyke Line. This facility was a class A4 facility, meaning when the document was

published the landfill had been closed for approximately 10 years and was a rural facility accepting municipal and domestic wastes only. This landfill was closed in March 1980.

In the 1991 MOE Waste Disposal Site Inventory lists an active landfill, which is located at 20908 Heatherington Road. Other waste disposal sites in the general vicinity of the study area are the Blenheim Landfill located at 20277 Base Road and the Ridge Landfill located at 20262 Erieau Road. None of these landfills are close enough to the study area for the wind farm to have any impact on them. In communications with the Municipality with Chatham Kent the Heatherington Road waste site is now a waste transfer station. The municipality does not know when the landfill stopped accepting municipal waste. This site is further discussed in Section 8 Effects Assessment of the Transmission Line.

The Ridge Landfill is the main active waste disposal site for Chatham-Kent and is located in Blenheim, approximately 25 kilometers west of the study area. This landfill receives domestic and commercial waste from Chatham-Kent as well as the Greater Toronto Area. General construction wastes will be transported to this landfill for disposal.

All turbines and ancillary facilities are to be located on land currently used for agricultural production. Given the historical and present land uses, the potential for encountering contaminated materials and soils is minimal. Furthermore, no turbine or ancillary facility is planned within 3 kilometers of an active or closed landfill.

### **7.11.2 Potential Effects**

The construction process will generate waste material most of which will be solid, non-hazardous materials such as packaging, excess lumber, used equipment, office wastes and other such material.

During the construction phase a temporary on-site waste storage should not create any adverse environmental effects taken that mitigation measures are implemented (see below). Although, it is possible that the disposal of some wastes will have an incremental effect on groundwater, surface water and soils, as is the case with all solid wastes. All wastes generated at the wind farm site will be transported to the Ridge Landfill. The Ridge Landfill is MOE certified and therefore, legally compliant with Ministry regulations for waste disposal. No potential effects are foreseen.

As there are no active or closed landfill facilities within 500 meters of the study area, therefore no potential effects on any closed or active landfills are foreseen.

During the operation phase of the wind farm oils and other fluids are typically used to maintain the turbines and ancillary equipment. O.Reg 347 of the *Environmental Protection Act* requires that proponents submit a generator waste registration report for each waste generated at the facility. RES Canada will submit such reports before the construction period.

### **7.11.3 Mitigation Measures**

During construction the Contractor will implement a site-specific waste collection and disposal management plan and system. Waste collection best practices could include:

- Systematic collection of on-site waste in weather protected bins;

- Labeling and proper storage of liquid wastes in a secure area to ensure containment of the material in the event of a spill. If any spills do occur, which could produce an environmental effect, it will be reported to MOE's Spills Action Centre;
- Routine training and periodic updates for staff on spills management protocol and procedures;
- Appropriate spill kits will be provided on-site during construction;
- Prohibition of dumping or burying wastes within the project site;
- Should contaminated soil be encountered (unlikely as area is used for agricultural production) during the course of excavations the contaminated material will be disposed of in accordance with the current provincial legislation, such as Ontario regulation 461/05;
- Disposal of non-hazardous waste at a registered disposal facility;
- Hazardous wastes such as lubricants will be collected, contained, and then transported to an off-site facility that collects hazardous waste; and,
- Implementation of an on-going waste management program that encourages reducing, reusing and recycling materials.

During the operation phase, where oils and lubricants will be used to maintain turbines and ancillary equipment will be collected and where possible recycled. These spent oils and lubricants will be transported off site by a licensed transporting company and recycled or disposed of according to provincial regulations. RES Canada will submit a Generator's Registration Report for each waste generated by the wind farm and its ancillary facilities, according to O.Reg 347 of the *Environmental Protection Act*.

#### **7.11.4 Significance of Net Effects**

During construction the temporary on-site storage of waste should not create any adverse effect provided that the mitigation measures are implemented. Like all waste however, it is possible that waste disposal could have an incremental effect on soil, groundwater and surface water at the waste disposal site. It is assumed that the registered landfill facilities are legally compliant.

As a result of responsible waste management practices, no significant net effects are anticipated.

#### **7.12 Environmental Noise**

Please refer to **Appendix H** for the complete Noise Report.

*This section refers to item 3.4 of the MOE's environmental screening checklist: Will the project:*

- *cause negative effects from the emission of noise?*

### **7.12.1 Existing Environment**

The main sources of ambient noise that currently exist in the study area are:

- Vehicular traffic on Hwy 3 (Talbot Trail);
- Local vehicular traffic on concession roads;
- Natural sounds; and
- Occasional sounds due to agricultural practices.

The Ministry of the Environment (MOE) designated points of reception into three classes. Class 1 is an environment typical of a major population centre. Class 2 is an environment similar to Class 1 in the daytime, with low ambient sound levels in the evening and nighttime, defined by natural sounds and infrequent human activity. Class 3 refers to rural areas and/or small communities with a population of less than 1000 and an environment dominated by natural sounds and little or no road traffic.

To be conservative all receptors in the noise study area have been treated as if in a Class 3 area for purposes of the noise assessment, notwithstanding that some receptors may actually be Class 2. This approach triggers the most stringent of noise criteria for use in the noise assessment.

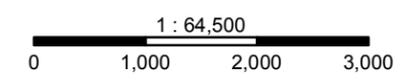
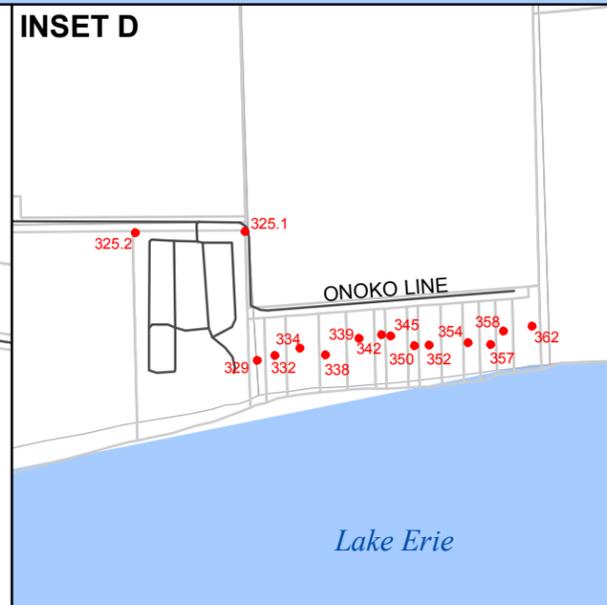
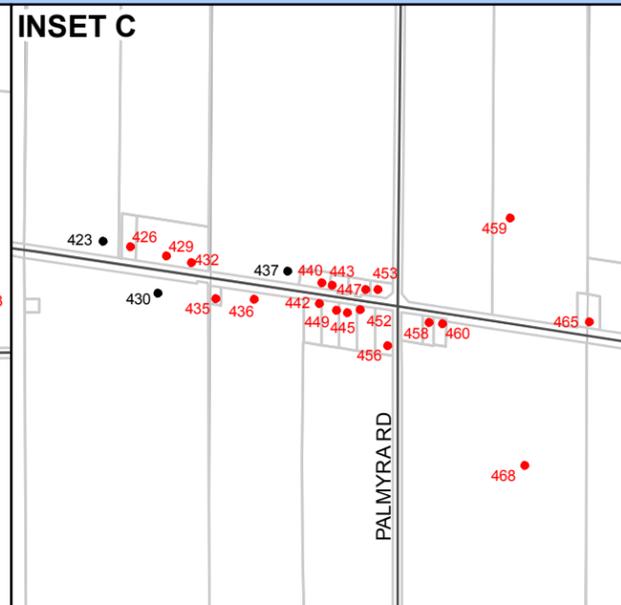
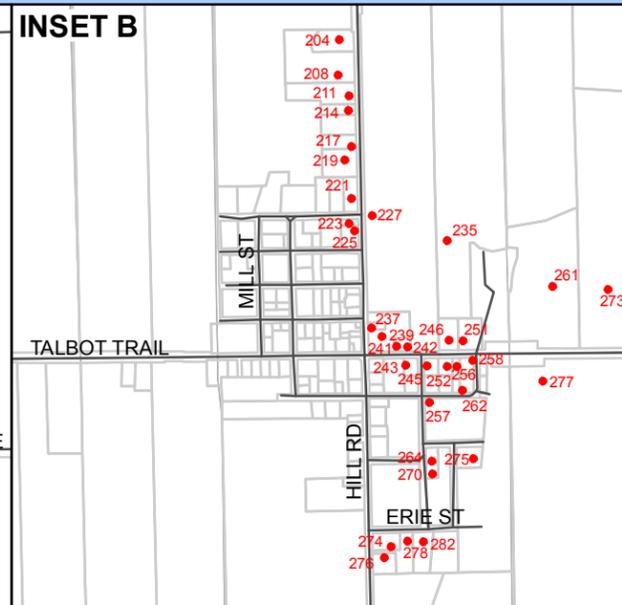
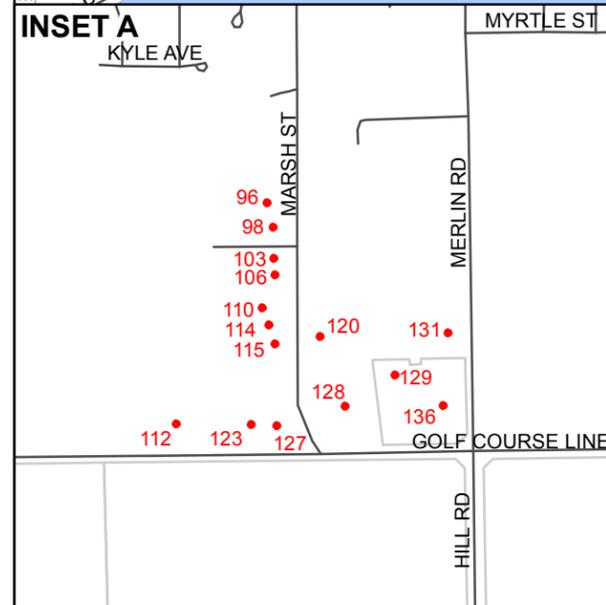
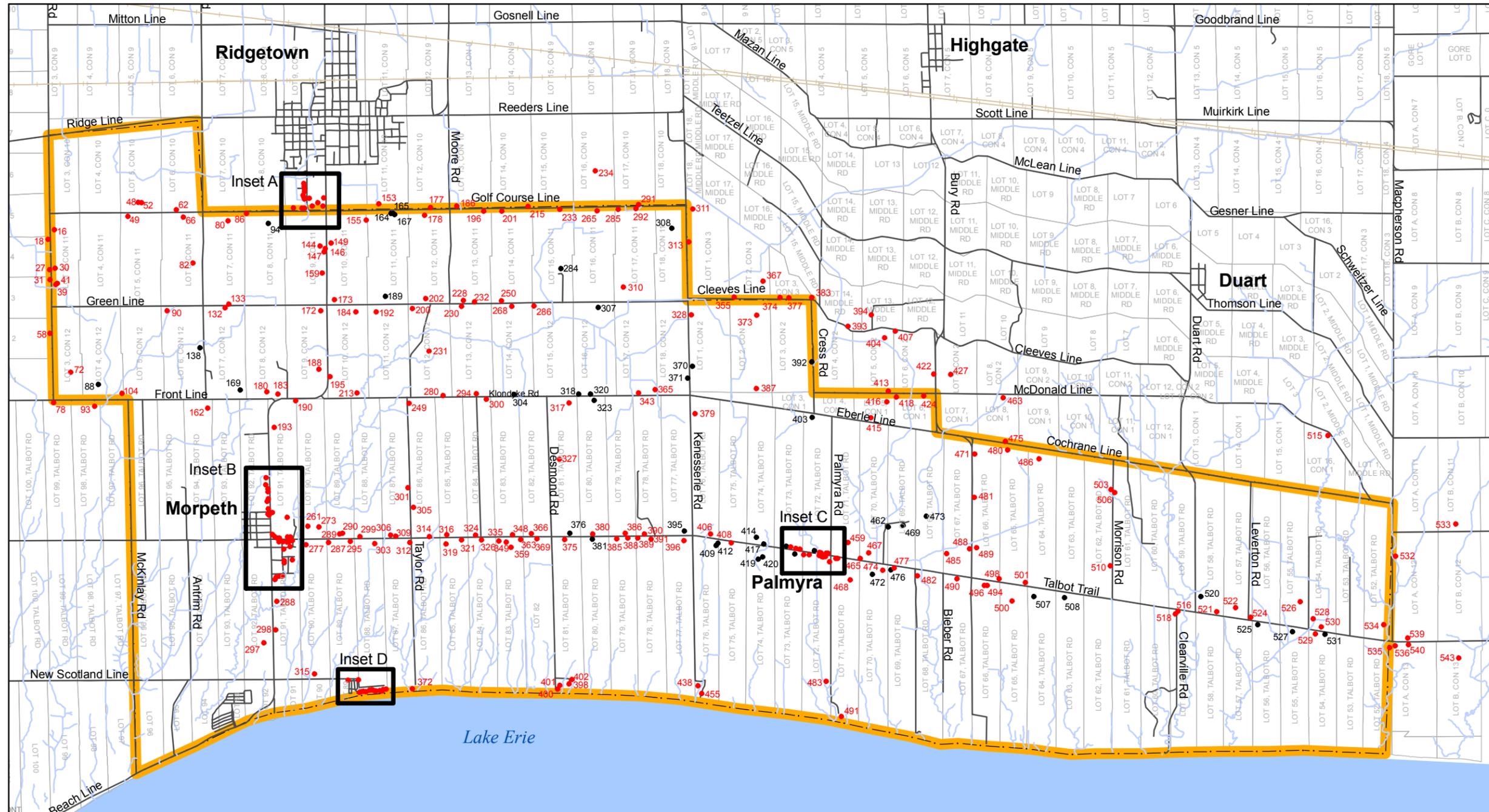
The MOE requires that wind projects obtain a Certificate of Approval (Air) in accordance with Section 9 of the *Environmental Protection Act*. The Certificate of Approval ensures that appropriate noise impact assessments are conducted on the proposed facility and that the project is in compliance with the MOE noise guideline criteria. The objective of the MOE noise criteria is to minimize changes to the existing environment. RES has followed the MOE noise guidelines as part of the wind farm design criteria and will pursue this approval process when the EA report is submitted.

**Figure 7.5** shows the receptor locations considered.

# Wind Farm Study

## Figure 7.5: Receptor Locations

- Legend**
- 450 Non Participating Residence/Receptor
  - 368 Participating Residence/Receptor
  - Railway
  - Roads
  - Highways
  - Project Boundary
  - Lots/Parcels
  - Waterbody



### **7.12.2 Potential Effects**

During construction of the wind farm noise will be generated by the operation of heavy equipment and vehicular traffic. The audible noise at receptors beyond the construction site is expected to be minor and temporary.

During the operation phase of the wind farm noise will be generated from the mechanical and aerodynamic noise emitted from the turbines and the transformer station (see **Figure 2.1** for location). The potential noise emissions were determined by comparing the noise levels for various wind speeds as per the MOE's *Interpretation for Applying MOE NPC Technical Publications to Wind Turbine Generators, 2004*.

Noise levels were modeled by a specialized noise consultant using the MOE endorsed CadnaA V3.7 3-D acoustic model. Hourly sound exposures were determined for the receptors at different wind speeds (4 to 12 m/s). The noise modeling undertaken recognized recent guidance from the MOE including:

- Acoustically “soft” ground (sound absorbing) assumed between each receptor and all turbines (an attenuation factor of 0.7 was assumed); and
- All receptors are assumed to be downwind of all turbines, simultaneously.

Analysis of noise levels shows that the noise impact from the operating phase of the wind farm would not exceed the most restrictive nighttime noise limits that apply for an area with a Class 3 (Rural) acoustic designation. As the turbines have been sited to comply with MOE noise restrictions (40 dB level) there is no need to apply mitigation measures. The exception is with respect to the transformer station which will require 5.5 m high sound barrier wall (see **Appendix H**).

**Figure 7.6** shows the hourly sound exposure levels with the noise contours for the worst case scenario. The most stringent MOE noise guidelines are predicted to be met at all non project participating receptor. The results of the noise modeling work are contained in **Appendix H**.

### **7.12.3 Mitigation Measures**

As noise levels will be higher during the construction phase due to the use of heavy equipment traveling to and from the site and working on the site all engines associated with construction equipment will be equipped with mufflers and/or silencers to comply with MOE guidelines and regulations. Noise levels arising from equipment will also be compliant with sound levels established by the MOE.

Construction activities that create excessive noise will be restricted to daylight hours and adhere to local noise by-laws. If activities that create excessive noise levels must be performed outside of regular working hours adjacent residents will be notified in advance.

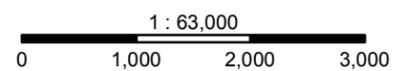
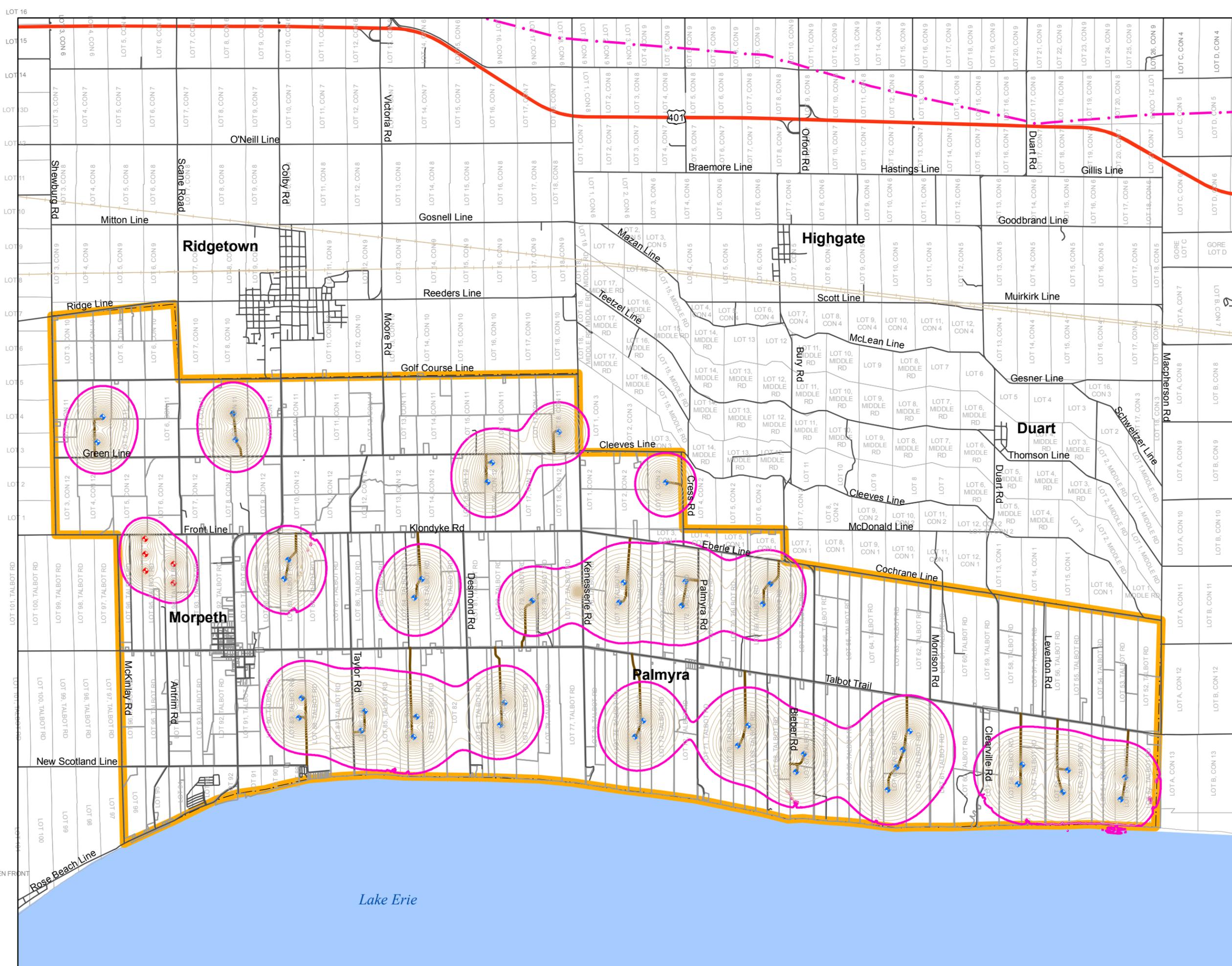
During operations the wind farm, when modeled according to MOE ISO 9613-2 standard and Siemens noise level data, the environmental noise produced by the wind farm was found to not exceed the levels that apply for areas that have an acoustic designation of Class 3. The MOE's most stringent noise guidelines are predicted to be met at all receptors based on the current wind turbine layout. No additional noise mitigation measures are warranted for the turbines.

# Wind Farm Study

## Figure 7.6: Noise Levels Contours

### Legend

- RES Turbines
- Front Line Turbines
- Existing 230kV Transmission Line
- Access Roads
- 40 dBA Noise Contour
- dBA Noise Contours
- Railway
- Roads
- Highways
- Project Boundary
- Lots/Parcels
- Waterbody



Map Created By: SFG  
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 2009\Mapping\ERR Figure 7.7 Noise  
 Level Contours

A sound wall of about 5.5 m will need to be installed around the transformer station.

#### **7.12.4 Significance of Net Effects**

With appropriate mitigation the net effects of noise levels during construction should be minimal. During operations ambient noise levels will be slightly increased, but will be within MOE Noise Guidelines (i.e. below 40 dB). The wind farm has been designed so the significance of the net effects is minimal.

#### **7.13 Agricultural and Rural Resources**

*This section refers to item 2.3, 5.2, and 5.3 of the MOE environmental screening checklist. The checklist covers the following questions: will the project:*

- *Be consistent with municipal land use policies, plans and zoning by-laws?*
- *Have negative effects on the use of Canada Land Inventory Class 1-3, specialty crop or locally significant agricultural land?*
- *Have negative effects on existing agricultural production?*

##### **7.13.1 Existing Environment**

The wind farm is consistent with municipal land use policy. Wind farms are a good complement to agricultural operations. The municipal council is supportive of generating electricity from wind in Chatham-Kent. The municipality has a draft green energy by-law and all draft setbacks were adhered to.(with the exception of the 1000m for Lake Erie set back) A zoning by-law amendment will be required in order to construct the wind farm.

All the wind turbines and most of the support facilities are located on privately owned actively farmed land. Agriculture has played a predominant role in Chatham-Kent since the late 1800's and continues to be the main source of income and employment in the study area. Lands within the study area are identified as CLI Class 2 (i.e., soils with moderate limitations that restrict the range of crops or require special conservation practices). Subclass W encompasses the entire study area meaning the area frequently characterized by excess water.

Land in this area is considered to be prime agriculture land. Approximately 550,000 of the 600,000 acres in Chatham-Kent are under cultivation making agriculture the primary economic driver in the area. The average farm size has grown from 149 acres to 235 acres which is approximately twice the growth rate experienced in other areas of Ontario. In addition, land under cultivation has remained steady in this region, unlike the rest of Ontario which has been reduced by approximately 15% since the 1970s.

Eighty-five percent of farm types in the Chatham-Kent region produce oilseed, grain, vegetables, and other cash crops as their principle products. Specific crops to the study area region are winter wheat, soybean, and corn. Although livestock farming has been on a general decline, hog production is increasing in the eastern portion of Chatham-Kent (Chatham-Kent Official Plan, 2005).

The predominant soil type is Brookston clay loam. Poor drainage is a characteristic of this soil type and therefore, drainage tiles are required. A small gravel ridge traverses the south side of the Highway #3, none of which has been mined for aggregate.

Soybeans, corn and wheat are the three dominant crops and make up approximately 10% of the provincial yield (Municipality of Chatham-Kent, 2007b). Chatham-Kent actively farms a variety of other produce such as tomatoes, sugar beet for ethanol production, peas as well as a range of other fruits and vegetables. In the study area the predominant crops are wheat, soybean and corn. Pig, beef cattle, and dairy cattle farms operate in the area (Personal Communication, R. Geluk, 2008).

Chatham Kent is one municipality where the Soybean Cyst Nematode (SCN) is present. The SCN is a highly destructive pest that thrives on soybeans and other types of beans. Significant crops can be lost even before the pest is recognized. Rotating crops, with wheat, oats or corn, can significantly reduce the presence of the SCN as they are non-host crops. The Emerald Ash Borer (EAB) is an insect that is highly destructive and kills ash trees. Chatham-Kent is one of the three regulated areas in Ontario that are infested with the EAB. The regulation of this area allows for regulated materials to be moved within the regulated area, but restrict the movement of regulated materials out of the area without written permission from the Canadian Food Inspection Agency (CFIA). Regulated materials include: wood chips, wood or bark, wood packaging and dunnage, lumber, logs, nursery stock, trees, all species of firewood.

The Ontario Agri-Foods Policy Institute says farming at one time was very profitable in Ontario. When adjusted to 2002 dollars, over the 15 years from 1971 to 1986 Ontario farmers netted about \$1.1 billion per year from operations, not including the \$300 million received annually in direct government subsidy. But since this time, farm incomes have been dropping; the Institute states that the average rate of Ontario farm income has been declining by an average of \$50 million per year in 2002 dollars, including government payments (Ebb, 2008). Discussions with local landowners suggest that farmer's are indeed not profiting as they once did in this area. The area is suffering somewhat of a financial hardship even with government subsidy. The additional incomes generated from the electricity produced by the wind turbines are a much needed secondary source of income for many farmers.

### **7.13.2 Potential Effects**

#### *Construction Debris*

During construction there is the possibility of affecting adjacent agricultural fields, which may create a temporary inconvenience to site-specific cropping patterns as well as the potential for soil mixing from topsoil conservation practices. During the construction phase additional land in excess of the final wind farm footprint will be needed to accommodate project construction and assembly of the wind turbines. In addition, the operation of heavy construction equipment in the fields could damage existing tile drains.

There is also the potential for construction debris to blow onto other fields or if incorporated into the soil could lead to damaged equipment or reduced efficiency when cultivating or harvesting. In addition, the movement of construction machinery, particularly the erection cranes, could result in some crop damage beyond the areas to be removed from agricultural production.

### Soil Compaction

As much of the study area is situated on imperfectly drained soils (clay), compaction can be problematic when heavy equipment travels over the same soil repeatedly. Soil compaction could result from the movement of the turbine across fields. Soil compaction can lead to a variety of problems including decreased pore space, reduced aeration and infiltration and increased erosion and siltation of drainage ditches.

As it is expected that the majority of the wind turbine sites are situated on agricultural land that has had some form of drainage improvement, damage to drainage tile is likely. This will likely be through the construction of access roads and the movement of construction equipment across the fields. Damage to drainage tile can result in delays in planting and harvesting, to death of permanent crops such as hay or pasture. The damage to drains can include: cracking or crushing (especially in older clay tile installations), misalignment, deformation, or breakage. Damage to auxiliary structures such as junction boxes, surface water inlets, sand traps, outlets, and rodent barriers can also influence the efficiency of drainage tile systems (Irwin 1986, as cited in Dillon, 2006).

As the equipment used at each turbine site including cranes, bulldozers, and other large earth-moving equipment will be heavier than conventional farming equipment, there is a distinct possibility that the weight of this equipment plus the dead load of soil on top of existing tile systems will exceed the minimum strength of the tile. Damage is expected during the construction of access roads, turbine bases, and the transportation of the construction cranes from one site to another.

### SCN Transfer

There also exists the possibility of SCN transfer from one field to another by the movement of construction equipment. If a field becomes infested there is the possibility of soybean crop loss. If a field is found to have SCN, mitigation measures will be taken to prevent transfer to non-infested fields. RES Canada will also ensure that regulated materials are not moved out of the study area as per the regulation placed on the Municipality of Chatham-Kent and Subsection 15(3) of the *Plant Protection Act*, to prevent the spread of the Emerald Ash Borer. The Ontario Ministry of Food, Agriculture and Rural Affairs has been contacted regarding this project and has reviewed RES plan to contain the SCN, if encountered. Please see **Appendix B** for consultation record.

### Loss of Agricultural Land

The only permanent effect of the project on agriculture is a small loss of agricultural land for the turbines and access roads (about 1 acre per turbine). Field farming techniques may have to be adjusted in order to accommodate the wind farm facilities. In addition, agricultural land will be temporarily disturbed during the construction phase of the project. However, the land will be returned to its previous state once construction is completed. It is not expected that the turbines would result in any real effects to agricultural activity.

### **7.13.3 Mitigation Measures**

Construction activity will be limited to designated construction areas. Travel to and from construction areas will be made via access roads whenever possible. Following the completion of construction the temporary construction areas will be graded and the topsoil replaced. The area will be left as close to pre-construction conditions as possible. Agricultural lands where artificial tile drainage may be affected will include proper re-alignment of the existing tile drainage system. A

licensed agricultural tile drainage contractor will carry out any re-alignment or repairs, if the system is damaged during construction.

The wind turbines, access roads and ancillary facilities have all been sited in a way that minimizes disturbance to existing agricultural operations. RES Canada has made an effort to avoid or minimize field fragmentation, disruptions to agricultural drains and tile drainage and placing access roads and ancillary facilities adjacent to lot lines and making use of existing roads.

There are no anticipated effects to agricultural and rural resources during the operations phase.

#### **7.13.4 Significance of Net Effects**

There will be minor disturbance to agricultural activities during the construction phase. However, this is temporary and construction areas will be rehabilitated and restored to agricultural use. The land that hosts the turbines, access roads and ancillary facilities will be taken out of agricultural use for the life of the project. There may also be some requirement of the landowner to adjust cropping and harvesting techniques to accommodate the wind turbines, access roads and ancillary facilities.

### **7.14 Neighbourhood and Community Characteristics**

*This section refers to item 6.1 of the MOE environmental screening checklist: will the project:*

- *Have negative effects on neighbourhood or community characteristics?*

#### **7.14.1 Existing Environment**

The study area is situated in almost exclusively agricultural and rural residential land uses. As described in **Section 7.10** the communities of Morpeth and Palmyra are located within the study area. Morpeth has a population of 300-400 residents and Palmyra has approximately 100 residents. Both communities are rural farming communities. All turbines have been setback appropriately, based on the Municipality of Chatham-Kent's draft green energy by-law's setbacks.

#### **7.14.2 Potential Effects**

Residents may experience a temporary disruption during project construction associated with short-term effects associated with noise, dust and additional traffic volumes. Although these effects are common to any large-scale construction project, they do have the ability to temporarily affect the character of the neighbourhood during the construction of the project.

The presence of wind turbines will alter the current agriculture and rural nature of the study area. The visual impact of wind turbines is subjective as some view them as a positive or negative influence on the viewscape. The alteration of the viewscape is further discussed in **Section 7.21**.

#### **7.14.3 Mitigation Measures**

Dust from the construction areas will be controlled through environmentally friendly suppressants. Environmental noise will be reduced through standard operating practices. RES Canada will have a designated representative to maintain community relations throughout the construction phase of the project who will be available to address concerns expressed by local citizens and stakeholders.

#### **7.14.4 Significance of Net Effects**

During the construction phase there will be an increase in activity in the study area. Construction activities will also produce a temporary nuisance in the form of increased dust from construction activities and increased noise levels from machinery. Changes to the character of the area will result from the turbines being visible through much of the area.

#### **7.15 Traditional Land Use by Aboriginal Peoples**

*This section refers to item 8.1 of the MOE environmental screening checklist: will the project:*

- *Cause negative effects on First Nations or other Aboriginal communities?*

##### **7.15.1 Existing Environment**

According to INAC – Comprehensive Claims Branch, there are no comprehensive claims in the Municipality of Chatham-Kent. In addition, there are no First Nation reserves within the project area as the affected lands are all privately owned and are primarily used for agricultural purposes.

In a letter received September 4, 2008 from the Specific Claims Branch, INAC advised that specific claims have been submitted by the following First Nations: Caldwell, Walpole Island First Nation (Bkejwannong First Nation), Oneida Nation of the Thames, Chippewas of the Thames, Munsee-Delaware Nation, Chippewas of Kettle and Stony Point. In addition, INAC advised that the Moravian of the Thames and the Aamjiwnaang First Nations are in the general vicinity of the project area. In a letter dated September 12, 2007, MAA noted that the project could be of interest to the Caldwell First Nation, Walpole Island First Nation (Bkejwannong First Nation), and Moravian of the Thames First Nation.

In respect of the First Nations that have been included in the Aboriginal consultation process (see above in **Section 5.7.1**), no significant adverse impacts on any potential traditional land use arising from the Project have been identified.

##### **7.15.2 Aboriginal Input to Date on Traditional Land Use and Archaeological Interest**

Since the Aboriginal consultation process began (see **Section 5.7** and **Appendix B**) four First Nations have responded to RES' requests for information on potentially affected interests. These are:

- Moravian of the Thames First Nation
- Caldwell First Nation
- Six Nations of the Grand River (Six Nations)
- Walpole Island First Nation

These four First Nations are also those whose traditional areas or asserted claims lie within the closest proximity to the project area.

The Six Nations have indicated that although the project area falls within the 1701 Treaty of Fort Albany the project area lies outside their specific land interest. They have stated that they do not have further comments on the environmental review but asked to be kept informed.

Both the Moravian of the Thames and Caldwell First Nations have stated they did not believe they have had any traditional land use or archaeological interests in the project area.

The Moravian of the Thames First Nation indicated that, after the War of 1812, it had been given some 50,000 acres that were bounded by Kennesserie Road to the west and extended from north of the 401 to about 1 km from the shore of Lake Erie to the south with the eastern boundary was in the county of Elgin. The First Nation currently occupies 3,000 acres of that land, all outside the project area.

WIFN has advised that the project area is of interest to them. No information regarding traditional use and archaeological interests has been received by RES beyond what is noted above in **Section 5.7.2**.

The above four First Nations have been offered the opportunity to participate in the Stage II Archaeological Assessment.

### **7.15.3 On-going Aboriginal Consultation**

RES is committed to continuing to solicit and obtain input from Aboriginal communities regarding traditional land use and archaeological interest in the project area. As noted in **Section 5.7**, RES has offered capacity funding for Moravian of the Thames First Nation, Caldwell First Nation, Six Nations and Walpole Island First Nation to participate in the Stage II Archaeological study to be undertaken and the ERR review. All other identified Aboriginal communities will be given notice of the study and final ERR review and if appropriate will be provided with the opportunity to comment.

### **7.15.4 Potential Effects**

As noted, the project area lies entirely in privately owned land that is primarily used for agricultural purposes. Nevertheless, it is understood that Caldwell First Nation, Moravian of the Thames First Nation, Six Nations of the Grand River, and Walpole Island First Nation have asserted potentially affected interests in the Project area. Based on the consultation undertaken to date, these interests are related to the potential for adverse effects from the project on lands within traditional harvesting areas (hunting, trapping and other activities related to wildlife), and possibly on areas of archaeological significance.

The Phase II Archaeological study will assist in identifying any potential archaeological effects. Natural features effects are addressed in subsequent sections of this ERR.

Regarding effects on the natural environment as they may affect the interests of the identified First Nations, this ERR has included extensive natural feature surveys and studies. With the exception of the watercourse crossings, the project will not result in any destruction of natural habitat as it is located within active agricultural land.

The conclusions of this ER are that this project is expected to result in minimal effects on natural features and wildlife such that no significant adverse effects on Aboriginal communities will result from the project.

#### **7.15.5 Mitigation Measures**

Based on the results of the Phase II Archaeological study and in consultation with any affected Aboriginal communities, RES will formulate appropriate mitigation, approval and operation plans with affected Aboriginal communities.

Natural features mitigation measures are described in **Sections 7.7 to 7.9** of this ERR.

#### **7.15.6 Significance of Net Effects**

At this time, it is not anticipated there will be any significant adverse effects on Aboriginal communities arising from the Project.

### **7.16 Recreation and Tourism Areas**

*This section refers to item 6.3 of the MOE environmental screening checklist: will the project:*

- *Have negative effects on recreation, cottaging or tourism?*

#### **7.16.1 Existing Environment**

Rondeau Provincial Park is located on the shore of Lake Erie, east of the project boundary. Access to the park is either from access roads off of Highway 401 or Highway #3, which is approximately 2 kilometers from Morpeth. Rondeau is the second oldest provincial park in Ontario. The Rondeau Peninsula is a 3254-hectare natural environment park that extends almost 8 kilometers out into Lake Erie and forms a protective bay. The Rondeau Bay and Peninsula attract migrating birds throughout the spring and fall.

The shore of Lake Erie is a major tourism area with much activity in the summer months. There are many cottages and summer homes along the coast. The Municipality of Chatham-Kent owns and operates a beach at Terrace Park that is accessed through Morpeth. A Boy Scout Camp and a recreation campground are also located at the lakeshore south of Clearville.

Two cairns are erected in the study area. The first, located near Palmyra is for Canadian poet, Archibald Lampman. The second is near Clearville Road where the original township of Orford was settled. The historical Trinity Anglican Church and graveyard (housing Mr. Lampman's cairn) are also located between Palmyra and Morpeth.

#### **7.16.2 Potential Effects**

As the wind farm is well removed from major recreation features such as Rondeau Provincial Park (closest turbine is >6 km away), effects to recreation/tourism are unlikely. The wind turbines will be visible along the Talbot Trail which visitors to the area are likely to drive along. Discussions regarding the visual effects of the project are contained in **Section 7.21**.

The closest turbine is about 460 meters away from the Lake Erie shoreline. There are some homes/cottages along the shoreline in the south-west corner of the study area. Turbines #13-15 (that are 1 km from these residences) are expected to be visible from these cottages/homes (although the view would be opposite from the water).

As wind farms are relatively new in Ontario this project may have the potential to attract visitors. Citizens in the vicinity of the Port Burwell windfarm established an interpretation centre for the project, which attracts numerous visitors over the summer visitor months. Windfarm murals also decorate municipal amenities on the public beach and the mayor of the community of Bayham has spoken publicly on the positive economic benefits of the Port Burwell project on her community.

The Talbot project would therefore likely have a positive impact on the Municipality of Chatham-Kent on increased spending in their jurisdiction. One resident described the wind turbines as “majestic” (Personal Communications, Mrs. Carson, Resident, 2008). Conversely, others claim the project could dissuade tourists such as birders from coming to the area.

### **7.16.3 Mitigation Measures**

The wind turbines will be neutrally coloured (white towers) with a minimal use of logos to ensure they blend into the area as much as possible.

No other mitigation measures are required for the construction phase of the project.

### **7.16.4 Significance of Net Effects**

The net effects could either be a minor increase or decrease in use of the area for recreational activities, depending on how individual visitors perceive the presence of wind turbines. The effects are not expected to be significant.

## **7.17 Construction Related Traffic**

*This section refers to item 6.7 of the MOE environmental screening checklist: will the project:*

- *Have negative effects related to traffic?*

### **7.17.1 Existing Environment**

The major thoroughfares in the area are Highway 3 (Talbot Trail) which traverses the study area. Highway #401 runs in perpendicular direction northwest. There are various secondary roads that link communities together within the area and a series of tertiary concession roads throughout. These concession roads, which are mostly gravel surfaces, were built along the concession lines indicated by early surveys and do not always, follow a grid pattern.

### **7.17.2 Potential Effects**

During the construction phase truck traffic will increase in order to deliver turbine parts and accessories to the study area and to remove excess materials and waste. There will also be an increase in regular vehicular traffic as construction workers drive to the construction site. The increase in truck traffic will be noticeably reduced after all turbine components are on site. This increase in vehicular and truck traffic may result in short-term localized disturbance to traffic

patterns, produce abnormal wear and tear on existing roadways, and have the potential to create truck safety hazards. The need to cross Highway 401 with the transmission line could also create temporary traffic delays.

During normal operations there will be no noticeable difference in either vehicular or truck traffic as a result of the wind farm.

### **7.17.3 Mitigation Measures**

There will be instances where excess loads will require special traffic planning. Widening turning radius and road widths may also be required. As appropriate, these permits will be obtained from municipal and provincial agencies. In addition, detailed road use requirements and support need be communicated and discussed with the Municipality of Chatham-Kent prior to construction.

The use of local roads by construction equipment has the potential to affect the road/bed condition. The roads will be returned to their pre-construction condition based on a pre-construction survey. The roads will be monitored after heavy rain events during the construction period and road repairs will be made if necessary.

Once in operation project related traffic will be limited to maintenance staff. No mitigation measures are required.

### **7.17.4 Significance of Net Effects**

During the construction stage there is the possibility of having a short-term effect on traffic. With appropriate mitigation measures, especially during the transportation of the turbine parts to the study area, the net effects are expected to be minimal.

## **7.18 Public Health and Safety**

***This section refers to item 6.8 of the MOE environmental screening checklist: will the project:***

- ***Cause public concerns related to public health and safety?***

In July, 2008 the Municipality of Chatham-Kent, Health and Family Services, Public Health unit released an Information report to the mayor and Members of Council regarding the health impacts of wind turbines. The objective of the report was to address the health and safety issues of wind turbines identified within current Canadian, American, European and Australian literature. The report included key correspondence with health officials from Ontario, Nova Scotia, and Prince Edward Island. The comprehensive report presents findings and recommendations from impact assessments, research studies, and opinions of individuals and organizations for and against wind.

The report enabled the Chatham-Kent Board of Health to make an evidence-based decision regarding the known health impacts of wind turbines.

The paper concluded that, “ In summary, as long as the Ministry of the Environment Guidelines for location criteria of wind farms are followed, it is my opinion that there will be negligible adverse health impacts on Chatham-Kent citizens. Although opposition to wind farms on aesthetic grounds

is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence”.

### **7.18.1 Existing Environment**

Wind farms generally present no danger to public safety and health. They do not emit any atmospheric pollutants or greenhouse gases. Although some perceive wind turbines to present a risk to public health and safety most commonly from shadow flicker and ice throw from turbine blades.

### **7.18.2 Potential Effects**

The increased risk to public health and safety during wind farm construction is mostly related to an increase in truck traffic in the study area and unauthorized access of the public to the construction site.

There are general safety and health concerns associated with wind turbine operation. The most common concerns include: shadow flicker, icefall and throw, electro-magnetic fields and collapse of the turbine tower.

#### Shadow Flicker

Shadow flicker is caused as rotating turbine blades disrupt the sun’s rays as they are cast on incident surfaces. When the incident surfaces affected are windows at nearby houses, shadow flicker becomes a problem that must be minimized through effective planning and design.

Wind turbines located nearby to residences can cast a flickering shadow on the windows which have been generally described as annoying. There are rare cases in which flickers above 2.5-3 HZ can trigger epileptic seizures in those prone to the condition. Although the Siemens 2.3 MW turbine rotates too slowly (between 0.3 and 0.8 Hz) to trigger serious health effects, it is considered an annoyance if experienced on a regular basis.

There are no established regulations defining acceptable levels of shadow flicker at residences located near wind turbines in Canada or North America. However, a commonly-adopted industry guideline is to allow no more than 30 hours of flicker at any individual receptor. Internet sources often quote that the “German Standard” of 30 hrs/year was implemented by a judge in a German court case, but specific details are vague<sup>4</sup>. A 1999 German report<sup>5</sup> on the visual aspects of wind turbines in the state of Schleswig-Holstein, which were subsequently adopted by most federal states in Germany for their licensing procedures, recommended that “the maximum permissible time that a shadow can be cast at an emission point was 30 hours annually or 30 minutes per day, respectively, based on the astronomical possible maximum period”. These limits however, were only to apply in times when the residence was occupied. The 30 hr/yr limit is also consistent with *Enbridge Wind Farm OMB Decision* hearing report, where Bruce County recommended that “no more than 30 hours per year be accepted when the modelling of shadow flicker is being undertaken”.

Shadow Flicker was modeled for the project and the results are presented in **Appendix J**. The shadow flicker analysis has shown that, while most residents within the wind farm boundaries could experience some form of occasional shadow flicker, most are well under the “German standard” of

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<sup>4</sup> As quoted in Danish Wind Industry Ass. Guided tour, online at: <http://www.windpower.org/en/tour/env/shadow/index.htm>

<sup>5</sup> As referenced in Hau, E. 2006. Wind Turbines: Fundamentals, Technologies, Application, Economics. Springer. 786 pp.

30 hours a year. According to the modeling, two receptors could experience more than 30 hours of shadow flicker per year (assuming cloud cover). These include receptor #94 (30 hrs/yr) and receptor #307 (65 hrs/yr). Both of these receptors are project participants.

Further, the flicker analysis has shown that there are 20 receptors that could experience more than 30 minutes of shadow flicker on at least one day of the year. The Flicker Assessment Report (**Appendix J**) includes a map (Figure 1) that highlights these receptors. While the analysis is an overestimation of the likely effect, RES will monitor potential flicker effects and will implement mitigation as is required and appropriate, including taking into account concerns expressed by affected receptors. This may include the installation of vegetative (trees) screening.

If additional real-world assumptions are considered (such as vegetation, angle and pitch of the blades and instances when the turbines are not turning), it is highly likely that all of the modeled receptors would experience much less than suggested by the model.

#### Ice Fall and Throw

During icing events it is possible for ice to fall or be thrown from turbine blades. Any ice that is accumulated may be shed from the turbine both due to gravity and the mechanical force of the blades. An increase in temperature or solar radiation may cause sheets or fragments of ice to loosen and fall, making the area directly under the turbine subject to the greatest risk. Rotating turbine blades may propel ice fragments up to several hundred meters for the turbine location. The turbine blades will be equipped with sensors that would shut the turbines down should ice build-up be detected.

#### Electro-Magnetic Fields

Humans are exposed to a wide variety of electro-magnetic fields, whose sources range from transmission lines to fridge magnets. Transmission line facilities that are installed to transmit power from power generating facilities emit EMF at extremely low frequencies. This low frequency is unable to break molecular bonds and is considered to be non-ionizing. In comparison, x-rays have sufficiency energy to cause ionization. The human health impacts of EMF have been widely studied. In Canada, the Federal-Provincial Territorial Radiation Protection Committee was established to advance the development and harmonization of practices and standards for radiation protection. This Committee has concluded that research to date had not identified any biophysical mechanisms that link the initiation or promotion of cancer to power frequency field properties (Health Canada, 2004).

#### Infra Sound

Infrasound or low frequency noise emissions were characteristics of some of the earlier models of wind turbines. This was attributed to early designs in which the turbine blades are downwind of the main tower. This phenomenon does not occur with modern upwind turbine technology (MOE, 2005). Infrasound has been studied extensively for current wind turbine technologies (JCAA, June 2006; HGC, 2006; Defra, 2003). The evidence is that the current turbine technologies do not present any problems or adverse impact related to the generation of infrasound (MOE, 2005).

At present, there are a significant number of wind turbines in operation in Ontario, including in proximity to residences; with no adverse impact from infrasound.

A study performed by HCG (2006) conclude, "All in all, based on Canadian and international studies, infrasound generated by wind turbines should not be considered a concern to the health of nearby residences...At the closest distances at which residences are typically located near large wind turbines, approximately 300 meters, the infrasonic levels are low enough to not be of concern. In any event, the discussion of whether or not infrasound poses a health risk at low levels is somewhat academic since, in the absence of wind turbines, comparable infrasonic levels are present in the natural environment."

All wind turbines are greater than 400 meters away from any residence, so there should clearly be no issue. In addition, the MOE noise standard meets the range of the Health Canada guidelines of 40 dB(A) to residences.

#### Turbine Collapse

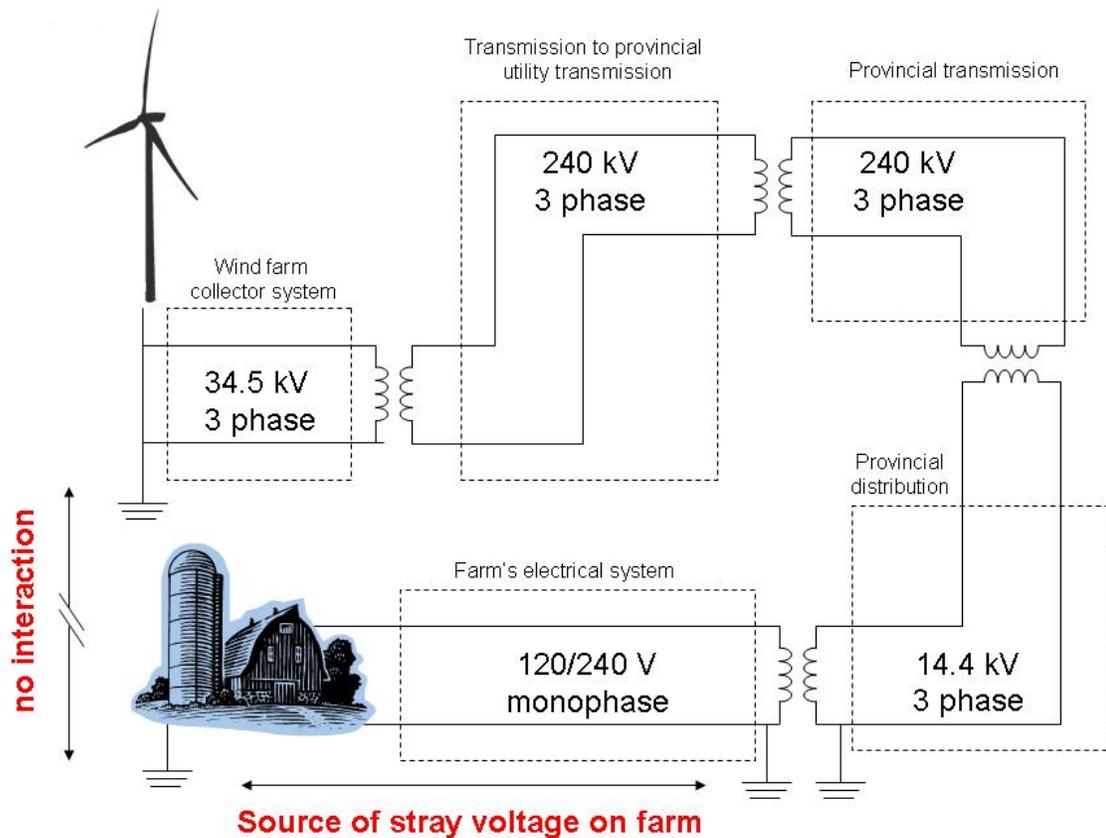
Although it is highly unlikely there always is the probability that any tall structure could collapse. There is also a very slight probability that a blade could become detached from the nacelle under extreme conditions. Should these events occur there is the potential for damage to the area directly under the turbine and to the collapse zone surrounding the turbine. As this area is privately owned farm land, in the remote chance that such an event were to occur, effects are highly unlikely.

#### Stray Voltage

Stray voltage is a potential by-product of the electrical distribution system as distribution lines are grounded to the earth. Stray voltage occurs when two separate objects, that can be simultaneously touched by a person or an animal, are at different electrical potentials. The result of this difference in voltage can range from a minor "zap" to the uncommon but potentially severe electric shock. However, stray voltage is only known to cause nuisance problems when there is poor wiring between the local distribution grid and areas used by people and animals, or if electrical systems are poorly grounded. An official definition for stray voltage is provided by the Institute of Electrical and Electronics Engineers (IEEE Canada):

*"A voltage resulting from the normal delivery and/or use of electricity (usually smaller than 10 volts) that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals. Stray voltage is caused by primary and/or secondary return current, and power system induced currents, as these currents flow through the impedance of the intended return pathway, its parallel conductive pathways, and conductive loops in close proximity to the power system. Stray voltage is not related to power system faults, and is generally not considered hazardous."*

In relation to the study area, stray voltage is known to be a concern for farmers. On a farm, stray voltage is usually caused by improper grounding, faulty wiring, defective equipment or from telephone lines. The impact has mainly been observed in dairy cattle (which are known to be sensitive to 'tingle voltage'), where it is known to have caused behavioral, health, and problems with the production of milk. The diagram below illustrates the sources of stray voltage on farms.



*Typical Transmission and Distribution System*

### 7.18.3 Mitigation Measures

Implementing good transportation planning and safety measures during construction will minimize the potential for any traffic accidents and safety concerns. Safety concerns relating to construction traffic are addressed in **Section 7.17**. No additional mitigation measures will be taken.

Public safety is incorporated into the project design. Land access during construction will be controlled through signs and restricted to authorized personnel only. The Construction Contractor will employ site safety practices during this phase.

#### Shadow Flicker

The wind farm has been designed to ensure a minimal amount of shadow flicker to nearby receptors. Shadow flicker can also be minimized by planting trees with landowner consent. Only three receptors were identified through the modeling to result in more than 30 hours of flicker per year. One receptor is an abandoned house so no mitigation is warranted. The need for additional mitigation will be discussed with these residents. RES commits to adding screening or making building modifications at the landowners request to address flicker effects for the residences that exceed the 30 hr/year level.

### Ice fall and Throw

Modern wind turbines have sensors that detect an imbalance in the rotor system and cause the turbine to stop rotating its blades and powers off until the imbalance is corrected. Since each wind turbine will be constructed on privately owned land that is generally publicly inaccessible the threat posed from ice throw and fall is greatly diminished. Turbines have all been sited with appropriate setbacks from roads, residences and lot lines to alleviate this risk. Furthermore, icefall and throw occur in the winter when agricultural fields are not in use. Therefore there should not be very much activity on or in the vicinity of turbines during the winter months.

Signs on all access roads leading to the wind turbines will post signs warning people of the winter risk of ice fall and ice throw.

### Turbine Collapse

Although highly unlikely there always is the possibility of critical failure. The wind turbines will be constructed to code and every possible measure will be taken to ensure good construction and engineering practices are observed. Turbines have all been sited with appropriate setbacks from roads and residences to alleviate this risk

### Stray Voltage

Stray voltage is usually caused by improper grounding, faulty wiring, defective equipment on the farm. In addition, the OEB has contracted several studies to evaluate the issue of stray voltage and has found no cause and effect relationship between wind turbines and stray voltage. There is no anticipated impact from stray voltage to rural landowners as a result of the project. As such, no mitigation measures are necessary.

## **7.18.4 Significance of Net Effects**

When all mitigation measures are put into practice any effects to public health and safety are expected to be limited to levels well below those that could cause significant net negative effects. All the above health impacts were taken into consideration during the effects assessment.

## **7.19 Communication Facilities**

### **7.19.1 Telecommunications Interference**

Wind turbines can cause interference to telecommunications systems. The interference can be caused as a result of the turbine being in the line-of-sight between a receiver and the signal source (RABC, 2007). Frequency modulated (FM) signals are much more immune to this phenomena and only become impaired in very close proximity to wind turbines. Amplitude modulated (AM) signals are more susceptible to interference in the following three ways:

1. Signal Blockage –the radio signal can be blocked as a result of the turbine being directly between the signal source and the receiver.
2. Static Ghosting – the broadcast signal is reflected off the tower of the wind turbine and results in the signal being delayed to the receiver.
3. Pulsing – the receiver picks up an interference signal, in addition to the direct signal, as a result of the signal reflecting off of the turbine blades. This results in periodic variations in the television picture quality.

As per the RABC, 2007 guidelines RES consulted with the following communications agencies:

- Radio Advisory Board of Canada
- Canadian Wind Energy Association
- Industry Canada – Radio Communication Users
- Department of National Defence – Radio Communication Users
- Royal Canadian Mounted Police – Radio Spectrum Management Section
- Environment Canada – Weather Radars
- NAV Canada – Civilian ATC Radars
- Department of National Defence – Military Air Defence and ATC Radars
- Canadian Coast Guard – Vessel Traffic System Radars
- Natural Resources Canada – Seismological Monitoring Arrays

In addition to the above agencies, RES also consulted with Rogers Communications, as there is a Rogers Cellular tower within the study area.

All agencies, with the exception of Rogers and the Coast Guard had no issues with the wind farm location or layout. Further consultation was required with Rogers and the Coast Guard due to their concerns over the wind farm interfering with their communications towers.

Comsearch, an American company specializing in Communications studies was retained and completed a separate study for Rogers and the Coast Guard. Rogers' concern was based on the proximity of wind Turbine #11 to their communications tower. Comsearch's study conclusion stated there would be no net effects to the Rogers Cellular tower due to the wind farm. See **Appendix B** for the completed study. Rogers requested that the turbine be moved on the property. RES has removed the turbine from the project.

The concern of the Coast Guard was not in the proximity of the wind turbines to their tower (all turbines were set back well over 1000 meters, but the density of turbines in the study area. Comsearch completed a study and the report's conclusion stated that there would be no net effects to the Coast Guard tower due to the wind farm. Please see **Appendix B** for the completed study. Coast Guard provided correspondence on August 26, 2008 indicating that their concerns had been addressed.

RES intends to send the final layout to the above noted agencies to confirm that there are no concerns regarding their communication facilities.

Regarding the potential for effects to rural internet service, Dillon received correspondence from Chatham Internet Access who indicated that based on their own tests; wind turbines are unlikely to affect internet signal strength. Further, it is noted that RES has had discussions with a company wanting to use its towers to mount repeaters for internet service, which potentially would increase reception quality in the area.

### **7.19.2 Impacts to High Definition TV**

High definition receivers greatly reduce or even eliminate static interference created by wind turbines through their built-in ghost canceling circuits. Interference problems only occur when a wind

turbine is positioned directly between the signal source (television station) and the point of reception (RABC, 2007). Consultation with the Ontario Government Mobile Service has confirmed the wind farm will not cause any impacts to high definition TV.

## **7.20 Historical and Archaeological Resources**

*This section refers to item 7.1 of the MOE's environmental screening checklist: will the project:*

- *Have negative effects on heritage buildings, structures or sites, archaeological resources, or cultural heritage landscapes?*

### **7.20.1 Existing Environment**

The Talbot Wind Farm study area is located on the northern shore of Lake Erie within the Municipality of Chatham-Kent. The site extends along the Erie shore for approximately 20 kilometers from just west of Morpeth through to the Elgin County boundary in the east. At its widest point, west of Morpeth, the wind farm area extends approximately 9 kilometers north of the lakeshore. At the eastern end of the study area, it narrows to less than 4 kilometers. The northern edge of the wind farm study area lies atop a gentle ridge formed by the Blenheim Moraine (Chapman and Putnam 1984: 44). The study area generally slopes down from the southern edge of the ridge to the Lake Erie shoreline. The rolling topography of the ridge is replaced by flat clay plain adjacent to the lakeshore. While the majority of the study area drains into Lake Erie, small portions of the study area overlying the ridge (immediately west of Ridgetown and north of Palmyra) actually drain northward into the Thames River.

The study area is a collage of soil types ranging from sand to loam mixed with differing amounts of clay. Looping through the centre of the study area is a relict beach line formed by Glacial Lake Warren (Chapman and Putnam 1984: 64). The relict beach line consists of variations of sandy loam, loamy sand and sand. The light sandy soils and the sand deposits in particular would have been prime areas for Pre-contact and historic Native settlement.

First Nation and early Euro-Canadian archaeological resources, either formally registered or referenced anecdotally, tend to be found in proximity to water bodies such as the Lake Erie shoreline, Morpeth Creek, Clear Creek or the smaller inland watercourses that drained the study area. Despite late eighteenth century Loyalist settlement along the Thames River, it was not until the early nineteenth century that significant Euro-Canadian settlement moved into the interior of Howard Township, including the study area. Of particular note is the important role played by the Talbot Trail in opening up early nineteenth century settlement throughout the southern portions of Howard and Orford Townships that fall within the study area.

In the late fall of 2007, a Stage 1 archaeological resource assessment was undertaken as part of the site evaluation process. On December 3<sup>rd</sup> and 4<sup>th</sup>, Cultural Resource Management (CRM) Group Limited initiated a Stage 1 background study of the RES Wind Farm study area to inventory known archaeological resources and identify areas of archaeological sensitivity. The background study will be followed by a Stage 2 field assessment. While the full results of this assessment are contained in **Appendix F**, the following paragraphs summarize the methodology and results of the archaeological assessment.

A Stage 1 archaeological background study, as required by the Ontario Ministry of Culture (OMC), is intended to identify archaeological resource potential within a specific geographical area and form the basis for subsequent stages of archaeological assessment, testing and mitigation. In general terms, the background study consists of the following: review of the OMC archaeological site data base; consultation with researchers and others familiar with the archaeology of the study area; archaeological potential modeling based on archival research and geographical review; and, site reconnaissance.

The identification of archaeologically sensitive areas is based on an evaluation of various environmental and cultural characteristics, which were conducive to human settlement during the Pre-contact Native periods and/or the historic Euro-Canadian period. Environmental factors such as proximity to water for both drinking and transportation have played a crucial role in the identification of Native sites and early Euro-Canadian sites. Current air photos, topographical maps and soil maps were reviewed to identify areas of increased archaeological potential. Historic maps and land abstracts were also reviewed in conjunction with local histories to identify areas of early Euro-Canadian settlement. These environmental and cultural factors were combined to identify areas of moderate to high archaeological potential which then required further investigation under the terms of a Stage 2: Archaeological Assessment.

During the background study, CRM Group visited the proposed wind farm site to gain a basic orientation to the study areas. During the site visit, general field conditions including vegetation were noted, as well as any obvious areas of disturbance (soil stripping, quarrying, etc) within the overall study area. More specific site evaluation was not possible since the proposed turbine sites had not been identified at the time of the field reconnaissance.

On the basis of the specific environmental and cultural factors examined during the Stage 1: Background Assessment, the Talbot Wind Farm study area is considered to exhibit a mix of moderate to high archaeological potential for Pre-contact Native, historic Native and early Euro-Canadian settlement. Given the potential for encountering Native and/or Euro-Canadian archaeological resources at any of the proposed turbine sites, it is recommended that archaeological assessment (Stage 2) be conducted at each of the proposed turbine sites, as well as ancillary facilities such as access roads, lay-down yards, transmission lines, etc., in advance of any ground disturbance.

OMC's guidelines for archaeological consulting stipulate that Stage 2: Assessment should, whenever possible, be based the visual examination of ploughed ground. The guidelines specify the walking of transects at between 5 meter and 10-meter intervals depending upon the perceived degree of potential within the study area. Shovel testing is to be limited to wooded, wet or landscaped areas that cannot be ploughed. Variance from this policy is generally only allowable after discussion with the Ministry and then only under exceptional circumstances.

In light of these requirements, it is recommended that all sites, as well as associated ancillary facilities, be ploughed and allowed to weather prior to conducting the assessment. Please note that all ploughing should be conducted within the standards of normal agricultural ploughing (no chisel ploughing or deep ploughing) so as not to disturb archaeological resources buried below the current plough zone.

### **7.20.2 Potential Effects**

A Stage 1 archaeological background study of the Talbot Wind Farm study area identified the area as exhibiting a mix of moderate to high archaeological potential for encountering Pre-contact Native, historic Native and early Euro-Canadian settlement. This means that it is quite likely that construction activities could impact as yet unidentified archaeological resources. Given this potential for impact during construction at any of the proposed turbine sites, it is recommended that archaeological assessment (Stage 2) be conducted at each of the proposed turbine sites, as well as ancillary facilities such as access roads, lay-down yards, transmission lines, etc, in advance of any ground disturbance.

The archaeological assessment would be used as a means to refine the specific placement of turbines and ancillary facilities, and thus avoid cultural resource impacts.

As in most of Southern Ontario, there is also the potential to uncover unmarked burial areas. However, a Stage 2 Archaeology Assessment would also serve to reduce the risk of such an encounter.

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

### **7.20.3 Mitigation Measures**

In accordance with the procedures recommended by the Ministry of Culture Guidelines (1993), a Stage 2 assessment will be conducted on each property with a turbine or ancillary facility. If any significant historical or archaeological feature is found, the resource will be avoided or Stage 3 testing and Stage 4 mitigation will be initiated to document and/or remove the resource. During the assessment process, protective and mitigative measure will be designed to the satisfaction of the Ministry of Culture.

In the event that human remains are found, all work will stop immediately, the Ministry of Culture and the Registrar of the Cemeteries Regulation Unit of the Ontario Ministry of Consumer and Commercial Relations will be notified, as well as the appropriate police and local medical officer of health.

No mitigation measures are required for the Operation phase of the wind farm due to the identification that no additional effects are expected.

### **7.20.4 Significance of Net Effects**

By following the Ministry of Culture procedures in the completion of a Stage 2: Archaeological Assessment, any archaeological resources located within the impact footprint associated with each of the turbine sites should be identified, tested and mitigated prior to construction. Consequently, it is suggested that the net effect on Ontario's archaeological heritage will be mitigated through avoidance or recovery and documentation of the resources in compliance with OMC guidelines.

## 7.21 Viewscape

*This section refers to item 7.2 of the MOE’s environmental screening checklist: will the project:*

- *Have negative effects on scenic or aesthetically pleasing landscapes or views?*

### 7.21.1 Existing Environment

The visual landscape of the study area can be described as being rural/agriculture in character. The landscape is typical of many parts of Southern Ontario and is not considered to be unique. The terrain is extremely flat with a network of concession roads with residences and farms scattered throughout. Most of the natural vegetation in the area has been removed for agriculture. The details of residences, woodlots, and their proximity to the lake and electrical lines in relation to the turbine locations can be seen in **Figure 7.4**.

### 7.21.2 Potential Effects

There are no regulations or even policies regarding wind turbine layout in Ontario although some municipalities have begun to stipulate the requirements for visual assessment. Chatham-Kent has no such policies. Viewsapes and the impact of wind farms on viewsapes is a very subjective issue. Some may enjoy or not be concerned with the views of the turbines while others may be concerned. It is noted that a public opinion survey of residents in several southwestern Ontario municipalities (600 people) was undertaken by Stakeholder Strategies Inc in 2006 (see Appendix B). About 10% of those surveyed were located in proximity to either an existing or proposed wind farm. The survey indicated that there is very strong support for wind turbines and only 14% of the respondents indicated that they didn’t want to live near a wind turbine. Of those in proximity of a built/planned wind farm, 89%/77% respectively indicated that they “support” wind farms in their local community. Visual effects were not identified as a major concern.

A set of photomontages have been prepared from nine locations throughout the study area that simulate the to-scale appearance of the wind farm and are presented in **Appendix I**. The number and extent of turbines visible varies by location and the distance of the viewpoint to the turbine. In some cases only a portion of the turbine will be visible (e.g. blade tip) while in others most of the turbine will be visible. The high visibility of the wind farm is due to the generally flat topography in the study area and the lack of vegetation. The extent of the views depends on several variables including the distance of the turbine from the viewing locations, the amount and height of vegetation (or other screening such as buildings) in the foreground and weather conditions. The turbines will be visible from locations several kilometres away. The turbines will be most visible during good weather blue-sky days and less visible when skies are grey and when the weather is poor (e.g. rain, snow, fog).

The extent to which the wind farm will result in a perceived change in the visual character of the area is highly subjective and can somewhat depend on one’s viewpoint regarding wind energy (supporters tend to like the look of turbines while those opposed to wind energy don’t). The Talbot project study area is agricultural in nature and not considered unique either within southern Ontario or Chatham-Kent. The area (particularly south of the Talbot Trail) tends to be less developed than other parts of CK and there is very little recreation development along the Lake Erie shoreline within the study area. The area has no designated or recognized viewsapes.

Regarding the potential for visual effects to have an effect on tourism in the area, the Talbot Trail (Hwy 3) does pass through the study area. The route however, is not a designated tourism route and there are few amenities along it. The largest tourism features in the area is Rondeau Provincial Park. Rondeau Provincial Park is accessed via Regional Rd 17 from Hwy 401 or via Kent Bridge Rd that is to the west of Rd 17. It is noted that in the development of a cultural/tourism plan for CK (*Culture, Economy and Community; A Cultural Plan for Chatham Kent 2007*), that solicited input from the community, the Talbot Trail was not mentioned as a potential opportunity area for tourism. It was not identified as a potential “cultural drive route” in CK.

There will be some visibility of the turbines off of Rd 17 (e.g. to the east of Morpeth) which could be used to access Rondeau Park by visitors. The visibility of the turbines along the access roads to Rondeau Park is not expected to affect the likelihood of people visiting the Park. The closest turbine to the Park is approaching 7 km away from the Park entrance. The wind farm is not expected to affect the enjoyment of the Park by visitors or their likelihood to visit the Park. There have been numerous studies regarding the potential effect of wind farm on tourism, particularly in the U.K. In Canada, the most comprehensive study undertaken to date regarding the opinions of residents and visitors regarding wind turbines is a study that was undertaken by the Tourism Research Centre at the University of Prince Edward Island (*Wind Energy Report: View of Residents of PEI and Visitors to PEI, September 2008*). The report was based on responses from 1,676 respondents including both residents and visitors to PEI. The results of the survey indicated that there was strong support for wind turbines in PEI by both residents and visitors (which is important considering the economic importance of tourism to PEI). The results also indicated that respondents strongly agreed that there should be more wind farms on PEI. As well, the results indicated that while respondents do not feel that “a wind farm adds to the attractiveness of the area”, they also think that wind farms do not “ruin the view in the areas they area based”.

As well, a study regarding the impact of wind farms on tourism was prepared for the Scottish Government (*The Economic Impacts of Wind Farms on Scottish Tourism, March 2008*). Scottish tourism depends heavily on the landscape, thus concerns regarding the visual impacts of wind turbines are understandable. Interviews were conducted with 380 tourists in areas where there would have been a high likelihood that the respondent would have seen a wind farm. Some findings from the study include:

- In general, 75% of people felt that wind farms had a positive or neutral impact on the landscape;
- 68% were positive about the statement “A well sited wind farm does not ruin the landscape” while 12% were neutral;
- 48% indicated that they like to see wind farms while 12% were neutral;
- Respondents who had seen a wind farm were more supportive than those that had not;
- Only a very small group of visitors changed there intentions about re-visiting Scotland because of wind farms.

### **7.21.3 Mitigation Measures**

During construction, activities will be confined to the workspace which will limit the potential disruptions to the viewscape. Collector system lines will be placed underground in the municipal road allowances, and RES will also use existing electrical poles wherever possible.

All the turbines are of the same model and will all be neutrally coloured.

The turbines have been arranged in clean lines that are perpendicular to the road network and have not been scattered throughout.

To soften the look of the erected wind turbines they will be painted white/light grey and made out of rolled steel (not latticed tower turbines). The nacelle and blades will also be painted similarly. White and light grey were selected based on the generally understood notion that this colouring blends with the environment in comparison to other colour schemes.

#### **7.21.4 Significance of Net Effects**

During the construction phase visual effects are expected to be minimal and temporary. The installation of the wind turbines will alter the existing viewscape of the area for the lifetime of the project. The turbines have been sited to minimize visual effects through the placement of them in rows with the turbine rows being spaced widely apart. As the aesthetic effects of wind turbines is subjective and varies from person to person, it is difficult to make a definitive statement regarding the significance of the effect. The project area is not considered to be unique from a landscape/visual perspective and contains landscapes that are typical for southern Ontario. Appropriate tower colouring and navigation lighting will combine to reduce the extent of this effect.

#### **7.22 Accidents and Malfunctions**

CEAA requires that the potential for environmental effects as a result of accidents and malfunctions be considered.

The primary protective measures for accidents and malfunctions are in the safe design, construction, operations and maintenance and decommissioning of the turbine and ancillary facilities. The appropriate training and education of all employees can also minimize accidents and malfunctions. RES will ensure that all landowners with a land lease agreement are aware of the procedures to follow in the event of an emergency. All local municipal emergency agencies will be contacted to ensure they are aware of the exact locations of the wind turbines. Response to malfunctions or accidents, which could result as a result of the operation of the wind turbines, will be addressed in RES's Emergency Response Plan.

#### **Third Party Damage**

The wind turbines will be located away from roads a minimum of 50 m and from homes a minimum of 250 meters. The separation distance from non-participating residences is in excess of 500m. The possibility does exist for accidental collision of farm equipment with the turbine towers as all turbines are sited in agricultural fields. Although possible such an event is considered to be rare and it would be unlikely that even if farm equipment collided into a turbine tower there would be any damage due to the integrity and strength of the tower itself and the fact that there is a supporting foundation as well as a surrounding gravel pad.

#### **Aeronautical Obstruction**

Industrial sized wind turbines do pose a risk to low flying aircraft as they reach typically over 120 meters in height from base to blade tip. The turbines will adhere to marking and lighting requirements of the Aerodrome Safety Branch of Transport Canada which has to be determined.

Lighting and marking of turbines has yet to be finalized with Transport Canada. The Chatham-Kent airport and Transport Canada have been contacted and the wind farm is outside the Airport's zoning regulation area.

As previously described in **Section 5.3**, contact was made with the three registered airports in the larger area (Chatham Health Alliance, Chatham Municipal Airport and Highgate Airstrip in Muirkirk) as well with local airstrip owners. Effects to the registered airports are not expected due to the large separation distances previously identified in this ERR. While there are 2 private airstrips located within 2.5 km of a proposed turbine site, through discussions with the airstrip owner it is expected that concerns can be addressed and any effects avoided.

### **7.22.1 Potential Effects**

During the construction period there is potential public safety issues associated with the movement of heavy equipment and other construction activities. There also exists the potential for spills of hazardous materials such as fuel, lubricants and hydraulic fluids. The project constructor will be required to construct the project in as safe a manner as possible. All standard construction safety procedures will be followed including appropriate signage and public restrictions from work site areas. Construction equipment using public roads will obey speed limits. Construction personnel will receive safety training. A health and safety plan will be developed for the wind farm.

Regarding the operations period, the wind farm project is located in a rural area with a relatively low population density. Lands are privately owned and no public thoroughfares are near the facilities. Turbines are set back a minimum of 50 m from local roads and 150 m from major roads. Property line and road setback distances have been observed as per municipal planning requirements. Few people would come in close proximity to the turbines on a regular basis.

Regarding public safety during operations, the website of a public advocacy group suggests that there have been 49 fatalities related to wind turbines since the 1970s, of which 35 were wind industry worker related.<sup>6</sup> Of the reported 14 public fatalities, the reasons for the fatalities varied and included: turbine transport related (majority), aircraft related and parachutist. Other anecdotal information indicates that a further 19 human injury accidents have been documented. Again, most are worker related. Five have involved members of the public including one incident involving ice throw and another involving falling turbine parts.

Given that there are over 100,000 operating wind turbines in the world, public injury incidents are very low.

Concerns have been expressed in past regarding the potential for ice throw from the blades. The turbine blades have built in sensors to detect ice accumulation. In the rare instances when this might occur the turbine would shut down until the ice melts/falls off. If an ice event is observed or anticipated, measures in the ERP would instruct operators to shut down some or all the windfarm.

An Emergency Response Plan (ERP) will be prepared for the project prior to the initiation of the construction period. The ERP will be submitted for review and comments to the Municipality of Chatham-Kent. The ERP will be used in the event of an emergency and will contain contact

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<sup>6</sup> [www.cloud.org.uk/pages/cloudAccidentData.htm](http://www.cloud.org.uk/pages/cloudAccidentData.htm)

information for regulators, landowners, and other stakeholders. Equipment required to respond to an emergency will be outlined in the ERP. All appropriate regulators will be notified should the emergency include any potential impact to the health and safety of local residents or the environment.

The Municipality of Chatham-Kent have been and will continue to be consulted on the development of the ERP. RES Canada will also work with the local fire department(s) and emergency response units to ensure that they are aware of the unique requirements of wind farms and potential associated accidents/events that they may need to respond to.

A Spills Response Plan (SRP) will also be developed which will address the requirements of the Ontario *Environmental Protection Act*. The SRP will address spill containment; spill reporting and spill clean-up procedures. Also to be included as part of this plan is the training activities for the construction work force that will be implemented to minimize the likelihood of spills.

RES Canada values the safety of its employees and the public, and will implement a Health and Safety plan during construction and operation phases of the project.

The wind farm will be operated in a manner that meets all applicable codes and practices. Sensors and detectors on the turbines will confirm that they are operating properly. Access doors at the base of the turbines will be kept locked. Gates may be placed at the access road entrances at the request of landowners. Turbines will be lit according to Transportation Canada guidelines.

The project has been designed and will be constructed, operated and decommissioned using applicable standards and industry best practices. Equipment will be inspected regularly and maintained to prevent any potential health or safety issues.

Accidents and malfunctions with short-term impacts may occur. More serious impacts are considered to be highly unlikely.

The likelihood of accidents/malfunctions associated with the Wind farm is considered to be low. The potential risks associated with accidents and malfunctions are also considered to be low.

### **7.23 Effects of the Environment on the Project**

This section assesses the potential of climatic fluctuations and the potential effects of extreme weather and natural events that could have an effect on the project.

#### **Climatic Fluctuations**

Global climate models indicate an increase in global average temperatures with an increase in precipitation amounts. It is expected that the severity and frequency of extreme weather events will also increase as a result of global warming.

An increase in average wind speeds may be expected as a result of an extreme weather event. Modern wind turbines have the ability to pitch their blades, turn out of the wind and automatically shut down at wind speeds of 25 m/s or greater to preserve the structural integrity of the turbine.

Similarly, during an extreme freezing rain or ice storm a sensor on the turbine registers the ice loading on the blades and the turbine automatically stop turning.

### **Extreme Events**

**Table 7.3** lists the probable extreme events that have the potential to affect the Talbot Wind Farm. The likely effects and mitigation measures that are planned to address these events are also listed.

<b>Table 7.3: Extreme Events</b>		
<b>Event</b>	<b>Effect</b>	<b>Mitigation Measure</b>
Heavy Rain/Flooding	Surficial drainage to remain intact and continue to convey water	None Required.
Hail	Damage to turbine blades	Turbine blades are constructed to withstand hail impact.
Heavy Snow	No effect anticipated	None Required
Ice Storms/Freezing Rain	Icing on turbine blades resulting in the potential of ice fall or throw	Turbine automatically powers down when it senses an imbalance in blades due to ice loading.
High Winds/Tornado	No effect anticipated	Turbine blades designed to stop moving at wind speeds greater than 25 m/s. Turbine and foundation structures are designed to withstand a Level 2 tornado (200 km/h winds).
Lighting	Potential for fire in the nacelle	Lighting receptors installed along blades and surge protection in electrical components.
Earthquake	Not located on an active fault area. No effects anticipated	Structure will be designed to meet the earthquake loads as per the Ontario Building Code.

## **7.24 Summary of Potential Effects and Mitigation Measures**

**Table 7.4** below provides a summary of the mitigation measures for the project specified issues identified.

<b>Table 7.4: Summary of Mitigation Measures</b>	
<b>Feature</b>	<b>Mitigation Measures</b>
Physiography/Topography	<ul style="list-style-type: none"> <li>● Grading will be minimized as to not affect drainage patterns</li> </ul>
Surface Water Quality and Soil Erosion	<ul style="list-style-type: none"> <li>● Minimize disturbance of existing vegetation outside ditching and grassed slopes where regrading is required.</li> <li>● Minimize time exposure of un-vegetated soils.</li> <li>● Maximize length of overland flow through to points where stormwater leaves the site.</li> <li>● Complete an erosion assessment on all new and existing ditches to determine the need for additional erosion protection.</li> <li>● Top of bank barriers (e.g. silt fencing) are to be put in place for any construction activity that is in proximity to watercourses.</li> </ul>

<b>Table 7.4: Summary of Mitigation Measures</b>	
<b>Feature</b>	<b>Mitigation Measures</b>
	<ul style="list-style-type: none"> <li>• Where ditch regrading is required, where appropriate, utilize flat bottom ditches in lieu of ‘V’ ditches to reduce velocities and erosion potential, promote peak flow attenuation and provide short-term storm water storage.</li> <li>• Use of in-line erosion control measures such as erosion blanket, rip rap, straw bale, rock flow checks and vegetated buffers, thereby mitigating high flow velocities and excessive erosion/sedimentation.</li> <li>• Stream banks are to be stabilized and restored to their pre-construction condition immediately following construction activity. This is particularly important in erosion prone areas such as steep sloped stream banks.</li> <li>• The watercourse crossings re to be assessed in advance and the most appropriate mitigative measures determined. Alternative watercourse crossing locations should be considered it the proposed crossing location appears to be particularly sensitive to erosion.</li> <li>• Any stockpiled materials are to be stored and stabilized away from watercourses.</li> <li>• Ensure all materials placed within the flood line are clean and free of silt and clay size particles. All materials must meet applicable regulations governing placement of fill in water bodies.</li> <li>• Ensure that all materials and equipment used for the purpose of site preparation and the completion of any work is operated and stored in a manner that prevents any deleterious substance from entering the water.</li> <li>• Refuelling and handling of potential hazardous substances are to be done away from watercourses.</li> <li>• Sediment and erosion control measures are to be left in place until all disturbed areas have been stabilized.</li> <li>• The sediment control plan be designed and implemented to mitigate impacts associated with construction of the project - to prevent suspended sediment, mud, debris, fill, rock dust, etc. from entering downstream watercourses. Areas disturbed by work must be minimized. Silt fences/curtains, sediment traps, check dams must be installed as appropriate.</li> <li>• Measures are to be in place to minimize mud tracking by construction vehicles, and to ensure timely cleanup of any tracked mud, dirt and debris along local roads and areas outside of the immediate work area where the above sediment controls would not be in place.</li> <li>• Work is to be suspended if excessive flows of sediment discharges occur, and, any appropriate action should be immediately taken to reduce sediment loading.</li> <li>• If it is necessary to de-water foundation excavations, prior to its discharge to a watercourse, the water is to be discharged to a settling pond, filter bag, or vegetated buffer strip of adequate size, to filter out suspended sediment.</li> <li>• Temporary mitigation measures are to be installed prior to commencement of any site clearing, grubbing, excavation, filling or grading works and maintained on regular basis, prior to and after</li> </ul>

<b>Table 7.4: Summary of Mitigation Measures</b>	
<b>Feature</b>	<b>Mitigation Measures</b>
	<p>runoff events. Any accumulated materials are to be cleaned out during maintenance and prior to their removal. All disturbed areas on land to be restored to natural conditions should be re-vegetated as soon as conditions allow preventing erosion, and restoring habitat functions. Land based measures must not be removed until vegetation has been re-established to a sufficient degree (or surface soils stabilized using other measures) so as to provide adequate erosion protection to disturbed work areas.</p> <ul style="list-style-type: none"> <li>• Timbers spaced to allow water flow and then covered with mats will be used for wet water crossings.</li> <li>• There are no anticipated effects during the operations phase of the wind</li> </ul>
Fisheries Habitat	<ul style="list-style-type: none"> <li>• All accesses can be constructed while the ditch is dry.</li> <li>• Adequate sediment and erosion control during construction along with revegetation of disturbed areas will be necessary to avoid any potential effects of construction to downstream habitat.</li> <li>• Sediment and erosion control systems should not be removed until the site is suitably stabilized.</li> <li>• Culverts should be embedded in the substrate to ensure there is no loss of habitat through the culvert section. The culvert will eventually silt in to match upstream and downstream grades as this area is extremely flat. In an open water course setting culverts will provide refuge in low flow and cover from predators for any limited fish population.</li> </ul>
Groundwater Quality	<ul style="list-style-type: none"> <li>• Given the relatively low volume of water that would be extracted during turbine base construction from dewatering and extracted for water use, no mitigation measures are required.</li> <li>• Fuels and oils will be managed per provincial requirements.</li> <li>• In the event of a spill of hazardous materials, clean-up procedures will be undertaken as per provincial protocols and legislations as governed by the <i>Environmental Protection Act</i> and the <i>Ontario Water Resources Act</i>.</li> </ul>

<b>Table 7.4: Summary of Mitigation Measures</b>	
<b>Feature</b>	<b>Mitigation Measures</b>
Air Quality	<ul style="list-style-type: none"> <li>• Use new or well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles, engine covers.</li> <li>• Motorized equipment should meet design specifications for emission controls and conform to provincial Drive Clean standards where appropriate.</li> <li>• Comply with operating specifications for heavy equipment and machinery.</li> <li>• Minimize operation and idling of gas-powered equipment and vehicles, in particular, during smog advisories – this is to be strictly monitored.</li> <li>• Minimize vehicular traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material.</li> <li>• Minimize mud tracking by construction vehicles along access routes and areas outside of the immediate work site, and ensure timely cleanup of any tracked mud, dirt and debris.</li> <li>• Avoid excavation and other construction activities with potential to release airborne particulates during windy and prolonged dry periods.</li> <li>• Stabilize stockpiled excavated soils in areas that are upwind of sensitive receptors</li> <li>• Cover or otherwise contain loose construction materials that have potential to release airborne particulates during transport, installation or removal.</li> <li>• Spray water to minimize the release of dust from gravel, paved areas and exposed soils. Use chemical dust suppressants only where necessary on problem areas.</li> <li>• Restore disturbed areas as soon as possible to minimize the duration of soil exposure.</li> </ul>
Birds	<ul style="list-style-type: none"> <li>• Mono-tubular towers, blade design and navigational lighting standards have all contributed to much lower bird mortalities.</li> <li>• Turbine placement and wind farm design are the key critical mitigating measures to minimize risk.</li> <li>• To avoid potential effects, turbines have been well set back from important habitat areas and the Lake Erie shoreline.</li> <li>• Inter-turbine spacing of more than 400 meters apart, and &gt;1.0 km between turbine rows, provide plenty of room for birds to move within the study area.</li> </ul>
Bats	<ul style="list-style-type: none"> <li>• Avoid treed habitats during the construction phase whenever possible.</li> <li>• Minimize the need for lighting towers and the use of strobe lighting.</li> <li>• Dismantle turbines at the end of the project life.</li> <li>• RES will enter into discussions with the Ontario MNR regarding the need for post construction mortality monitoring for this project.</li> </ul>
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> <li>• None required.</li> </ul>

<b>Table 7.4: Summary of Mitigation Measures</b>	
<b>Feature</b>	<b>Mitigation Measures</b>
Threatened, Rare or Endangered Species	<ul style="list-style-type: none"> <li>• For the resident Bald Eagle, proposed turbines are located more than 1 km from the woodlot which supports the nest. As well, the turbines are placed such that Bald Eagle movement between the woodlot and the lake is minimally disrupted.</li> <li>• Migrant bird activity is low for the area relative to near the lakeshore. Appropriate turbine siting has mitigated most of other potential impacts.</li> </ul>
Population and Existing Land Use	<ul style="list-style-type: none"> <li>• No mitigation measures specific to effects on existing or future land use are proposed.</li> </ul>
Disposal of Waste Materials	<ul style="list-style-type: none"> <li>• Systematic collection of waste on-site in weather protected bins.</li> <li>• Labeling and proper storage of liquid wastes in a secure area that will ensure containment of the material in the event of a spill. If any spills do occur, which could produce an environmental effect; it will be reported to MOE's Spills Action Centre.</li> <li>• Appropriate spill kits will be provided on-site during construction.</li> <li>• Prohibition of dumping or burying wastes within the project site.</li> <li>• Should contaminated soil be encountered (unlikely as area is used for agricultural production) during the course of excavations the contaminated material will be disposed of in accordance with the current provincial legislation, such as Ontario regulation 461/05.</li> <li>• Disposal of non-hazardous waste at a registered disposal facility.</li> <li>• Implementation of an on-going waste management program consisting of reduction, reuse and recycling of materials.</li> <li>• RES will complete a Registration of Generators Report for each waste material.</li> </ul>
Environmental Noise	<ul style="list-style-type: none"> <li>• As noise levels will be higher during the construction phase due to the use of heavy equipment traveling to and from the site and working on the site all engines associated with construction equipment will be equipped with mufflers and/or silencers to comply with MOE guidelines and regulations. Noise levels arising from equipment will also be compliant with sound levels established by the MOE.</li> <li>• Construction activities that create excessive noise will be restricted to daylight hours and adhere to local noise by-laws. If activities that create excessive noise levels must be performed outside of regular working hours adjacent residents will be notified in advance.</li> <li>• During operations the wind farm, when modeled according to MOE ISO 9613-2 standard and Siemens noise level data, the environmental noise produced by the wind farm was found to not exceed the levels that apply for areas that have an acoustic designation of Class 3. The MOE's most stringent noise guidelines are predicted to be met at all receptors based on the current wind turbine layout. No additional noise mitigation measures are warranted.</li> </ul>
Agricultural and Rural Resources	<ul style="list-style-type: none"> <li>• The wind turbines, access roads and ancillary facilities have all been sited in a way that minimizes disturbance to existing agricultural operations. RES has made an effort to avoid or minimize field fragmentation, disruptions to agricultural drains and tile drainage and placing access roads and ancillary facilities adjacent to lot lines and use</li> </ul>

Table 7.4: Summary of Mitigation Measures	
Feature	Mitigation Measures
	<p>of existing roads where they exist.</p> <ul style="list-style-type: none"> <li>• Construction activity will be limited to designated construction areas.</li> <li>• Travel to and from construction areas will be made via access roads whenever possible.</li> <li>• Following the completion of construction the temporary construction areas will be graded and the topsoil replaced. The area will be left as close to pre-construction conditions as possible.</li> <li>• Agricultural lands with artificial tile drainage that may be affected will include proper re-alignment of the existing tile drainage system. A licensed agricultural tile drainage contractor will carry out any re-alignment or repairs, if the system is damaged during construction.</li> <li>• There are no anticipated effects to agricultural and rural resources during the operations phase.</li> </ul>
Neighbourhood and Community Characteristics	<ul style="list-style-type: none"> <li>• Dust from the construction areas will be controlled through suppressants.</li> <li>• Environmental noise will be reduced through standard operating practices.</li> <li>• An operations manager from RES will be available during all phases of the project to address concerns expressed by stakeholders.</li> </ul>
Traditional Land Use by Aboriginal Peoples	<ul style="list-style-type: none"> <li>• The need for mitigation to address the potential concerns of the Bkejwannong Territory (Walpole Island) First Nation is still being addressed.</li> </ul>
Recreation and Tourism Areas	<ul style="list-style-type: none"> <li>• No mitigation measures are required for the construction phase of the project.</li> <li>• The wind turbines will be neutrally coloured (white towers) with a minimal use of logos to ensure they blend into the area as much as possible.</li> </ul>
Construction Related Traffic	<ul style="list-style-type: none"> <li>• There will be instances where excess loads will require special traffic planning.</li> <li>• Widening turning radius and road widths may also be required.</li> <li>• As appropriate these permits will be obtained from municipal and provincial agencies.</li> <li>• Once in operation project related traffic will be limited to maintenance staff. Therefore no mitigation measures are required.</li> </ul>
Public Health and Safety	<ul style="list-style-type: none"> <li>• Implementing good transportation planning and safety measures during construction will minimize the potential for any traffic accidents and safety concerns. Safety concerns relating to construction traffic are addressed in Section 7.17. No additional mitigation measures will be taken.</li> <li>• Public safety is incorporated into the project design. Land access during construction will be controlled through signs and restricted to authorized personnel only. The Construction Contractor will employ site safety practices during this phase.</li> </ul> <p><b>Shadow Flicker</b>                      The wind farm has been designed to ensure a minimal amount of shadow flicker to nearby receptors.</p>

<b>Table 7.4: Summary of Mitigation Measures</b>	
<b>Feature</b>	<b>Mitigation Measures</b>
	<p><b><i>Ice fall and Throw</i></b></p> <ul style="list-style-type: none"> <li>• Modern wind turbines have sensors that detect an imbalance in the rotor system and cause the turbine to stop rotating its blades and powers off until the imbalance is corrected.</li> <li>• Since each wind turbine will be constructed on privately owned land that is generally publicly inaccessible the threat posed from ice throw and fall is greatly diminished.</li> <li>• Turbines have all been sited with appropriate setbacks from roads, residences and lot lines to minimize this risk.</li> <li>• Furthermore, icefall and throw occur in the winter when agricultural fields are not in use. Therefore there should not be very much activity on or in the vicinity of turbines during the winter months.</li> <li>• Signs on all access roads leading to the wind turbines will post signs warning people of the winter risk of ice fall and ice throw.</li> </ul> <p><b><i>Turbine Collapse</i></b></p> <ul style="list-style-type: none"> <li>• Although highly unlikely there always is the possibility of critical failure. The wind turbines will be constructed to code and every possible measure will be taken to ensure good construction and engineering practices are observed.</li> </ul>
Communications	<p><b><i>Impacts to Telecommunications</i></b></p> <p>In order to ensure the wind farm would not negatively affect any radio communication systems the following agencies were contacted.</p> <ul style="list-style-type: none"> <li>• Industry Canada, Radio Communication Users</li> <li>• Department of National Defence, Military Air Defence and ATC Radars</li> <li>• Royal Canadian Mounted Police</li> <li>• Environment Canada, Weather Radars</li> <li>• NAV Canada, Civilian ATC Radars</li> <li>• Canadian Coast Guard – Vessel Traffic System Radars</li> <li>• Rogers Telecom</li> </ul> <p>Initial concerns expressed by Rogers Telecom and the Canadian Coast Guard have been resolved.</p>
Historical and Archaeological Resources	<ul style="list-style-type: none"> <li>• If archaeological resources are encountered during the Phase 2 archaeological assessment of any turbines the resource will either be avoided or subjected to a further level of archaeological investigation (Stage 3: Testing). If the resource is significant, protective and mitigative measure will be designed to the satisfaction of the Ministry of Culture.</li> <li>• In the event that human remains are found all work will stop immediately, the Ministry of Culture will be contacted and the Registrar of the Cemeteries Regulation Unit of the Ontario Ministry of Consumer and Commercial Relations notified, as well as the appropriate police and local medical officer of health.</li> <li>• No mitigation measures are required for the Operation phase of the</li> </ul>

<b>Table 7.4: Summary of Mitigation Measures</b>	
<b>Feature</b>	<b>Mitigation Measures</b>
	wind farm due to the conclusion that no additional effects are expected.
Viewscape	<ul style="list-style-type: none"> <li>• During the construction phase there will be large transport vehicles and construction cranes on-site to erect the turbines which have the potential to temporarily affect the local viewscape.</li> <li>• During the operations phase the wind turbines will alter the current visual landscape. The diameter of the tower base is 4 metres, the hub height is 80 metres and each blade is almost 40 metres long. These tall structures will be visible for some distance in the surrounding area. Visibility will vary from receptor to receptor based on:               <ul style="list-style-type: none"> <li>○ The observers position</li> <li>○ Topography</li> <li>○ Atmospheric conditions</li> <li>○ Turbine marking</li> </ul> </li> <li>• Individual perceptions of the wind farm are subjective. RES has prepared a set of photomontages that simulate the to-scale appearance of the wind farm and attempted to harmonize the windfarm into the landscape by arranging the turbine rows in straight lines parallel to concession roads.</li> </ul>

## **7.25 Cumulative Effects**

CEAA requires that the potential for cumulative effects to be considered as part of a CEAA screening assessment. Cumulative effects are defined as effects from the project that could combine with the effects of other possible future projects and activities. Only those future projects and activities that are considered as “certain” or “reasonably foreseeable” are to be considered in the cumulative effects assessment. In assessing the potential for cumulative effects from this project, the CEA Agency’s guidance materials, such as the *Practitioner’s Guide: Cumulative Effects Assessment Guide* was considered. Ultimately what a CEA considers is the potential for multiple similar effects occurring over the same geographic area and possibly time period, that individually may have insignificant effects but when combined could potentially amount to a significant adverse effect. For an effect to be considered cumulative, the following was deemed necessary:

- There must be a measurable environmental effect of the project being proposed;
- Any environmental effect must be demonstrated to interact cumulatively with the environmental effects from other projects or activities; and
- It must be known that the other projects or activities have been, or will be, carried out and are not hypothetical.

In undertaking the assessment of project effects as previously described in this section, it was understood that the existing conditions of the various environmental components considered reflect past and ongoing activities that are occurring within or outside of the study area. As such, the CEA was focused on the potential for cumulative effects from planned future projects or activities.

The CEA addressed the following questions:

- What residual effects of the project are likely?
- What other planned activities or projects are expected to occur in the study area?
- Is there a potential for cumulative effects to result and if yes, what is the significance of these potential cumulative effects?
- What measures should be put in place to address the potential for these cumulative effects?

## **7.26 Potential Adverse Environmental Effects from the Project**

Based on the assessment of direct effects of the project on the various environmental components that were considered in this EA, the following adverse potential effects are likely.

### *Construction*

- Disturbance to wildlife during the construction phase;
- The removal of agricultural land from production;
- Short-term erosion/sedimentation from water crossings and potential for loss of fish habitat;
- Some minimal disturbance effects to residents in the form of dust and noise from equipment operation; and
- Traffic delays from the transport of project components to the study area and the movement of equipment within the study area.

*Operation*

- Change in the visual landscape of the area;
- Increase in noise levels although noise levels will be within MOE criteria; and
- Potential for birds and bats to collide with the wind turbines.

## **7.27 Other Future Projects/Activities**

The study area is designed for agricultural use and as such, the area is sparsely developed. In contacting the Municipality of Chatham-Kent planning department, no other planned developments within the study area were identified.

Within Chatham-Kent, RES Canada is aware of about 11 SOP scale wind projects and two other utility scale wind projects that were awarded contracts under the Ontario Power Authority's RES III process. These include:

### Utility Scale Projects

1. Kruger Energy, Port Alma Wind Farm
2. Invenergy Raleigh Wind Farm

### SOP Projects

3. genGrowth, Front Line Wind Farm, 10MW
4. genGrowth, Swanton Line Wind Farm, 10MW
5. genGrowth Marsh Line Wind Farm, 10 MW
6. genGrowth Bisnett Line Wind Farm, 10MW
7. Invenergy, Dover Wind Farm North Phase, 10.5 MW
8. Invenergy Raleigh Wind Farm East Phase 4.5 MW
9. Wind Prospect, Merlin Wind Farm, 10 MW
10. Wind Prospect, Doyle Wind Farm, 10 MW
11. Wind Prospect, Harwich Wind Farm, 10MW
12. Wind Prospect Horton Line Wind Farm, 10MW
13. Wind Prospect, Flat Creek Wind Farm, 10 MW

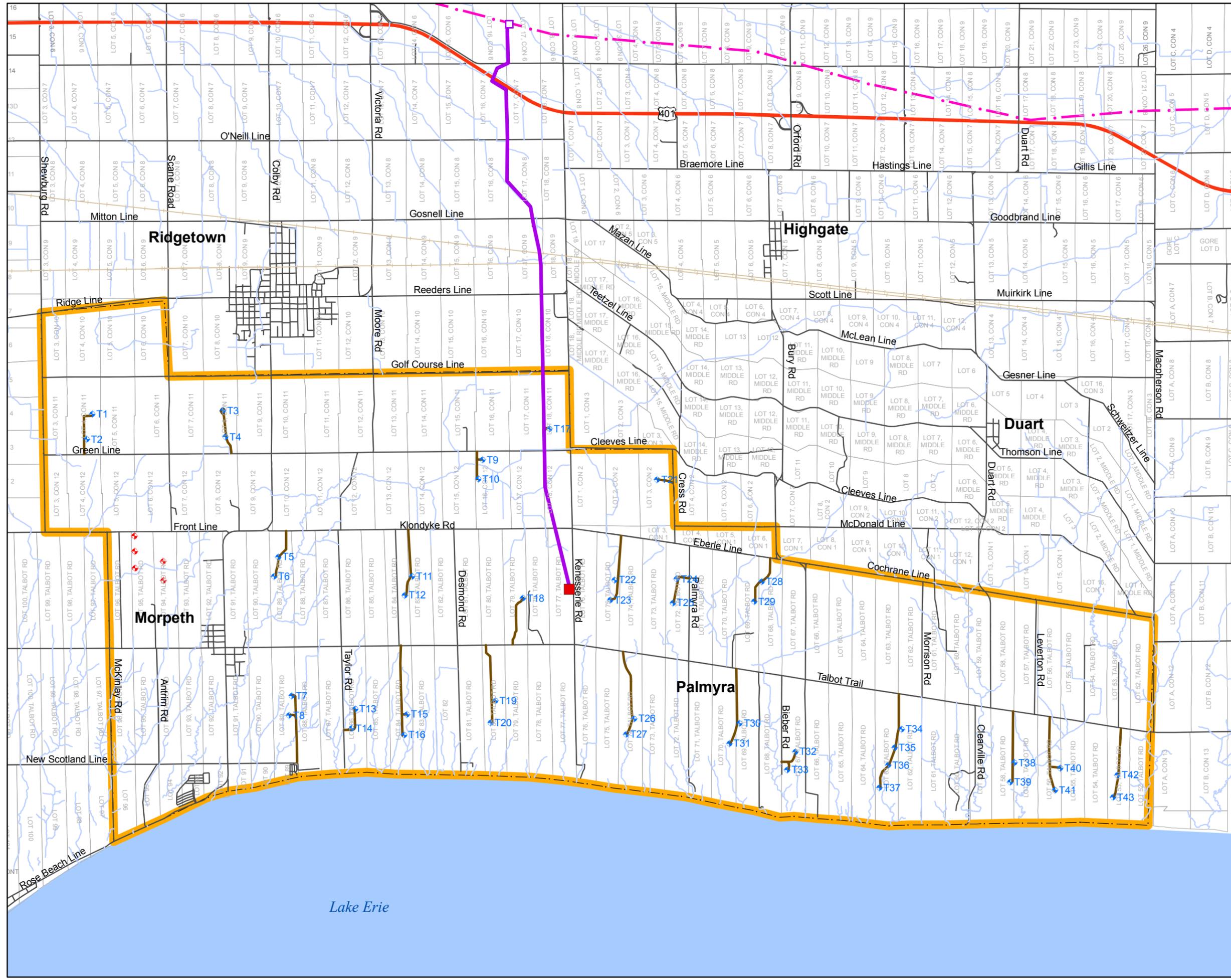
The only other wind farm in proximity to the Talbot Wind Farm is the Gengrowth Front Line project which is located just to the east of the community of Morpeth. (See **Figure 7.7**) The Front Line project has completed its EA process and has planning approval. These turbines are a minimum of 1.9 km away from the planned RES turbines, although we note that as the MOE C of A had not been issued for the Front Line Project at the time of this ERR release, this distance could be subject to change. At this distance, the RES turbines are very unlikely to have any impact on their performance of the Gengrowth turbines.

## **7.28 Potential Cumulative Effects**

Future activities that are expected to occur in the study area during both construction and operation periods include farming activities. The cultivation of farm fields could generate noise and dust that could combine with similar effects in constructing the wind farm. Agricultural activities are however, considered to be part of baseline conditions. The potential for cumulative noise effects from the Gengrowth Front Line wind farm project has been considered.

# Wind Farm Study

## Figure 7.7: Front Line Turbines in Relation to the Project



**Legend**

- RES Turbines
- Front Line Turbines
- Transformer/Substation Location
- Proposed Project 230kV Transmission Line
- Existing 230kV Transmission Line
- Access Roads
- Railway
- Roads
- Highways
- Project Boundary
- Lots/Parcels
- Waterbody



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## **7.29 Mitigation Measures to Address Cumulative Effects**

During the construction period there is the potential for dust and noise effects from the wind farm construction activities to combine with similar effects from agricultural operations. Given the large separation distances of the turbines from residences, the potential for these combined effects is considered to be low. The potential for these effects will be monitored based on complaints received from residents during the construction period. In the event that complaints are received, they will be investigated and correction action taken if warranted.

Once operational, there is the potential for noise effects from both wind projects to act cumulatively. The potential for this was addressed in the noise analysis work and three of the RES wind turbine sites were removed to address the potential cumulative noise effect. As well, the Front Line Project turbines are close to the RES turbines north-west of Morpeth and would result in more turbines being visible in the area.

## **7.30 Summary of Potential Effects and Mitigation**

Potential effects of the project are summarized as follows:

### **7.30.1 Construction Effects**

- Some minimal disturbance effects to residents in the form of dust and noise from equipment operation;
- Traffic delays from the transport of project components to the study area and the movement of equipment within the study area;
- Disturbance to wildlife during the construction period;
- Short term erosion/sedimentation effects from water crossings and potential for loss of fish habitat;
- The removal of agricultural land from production; and
- The loss of some natural vegetation/wildlife habitat.

### **7.30.2 Operation Effects**

- Change in visual landscape of the area, which effect has been partially mitigated and is highly perception subjective;
- Increased in noise levels in the area which will be within MOE criteria; and
- Potential for a small number of birds to collide with the wide turbines.

The assessment has concluded that with the implemented mitigation measures, none of the adverse environmental effects are to be considered as significant. Project monitoring (See **Section 8**) will be undertaken to confirm the effects assessment and respond appropriately if necessary.

The previous **Table 7.2** provides a summary of key mitigation recommendations to be implemented. RES will also prepare and Environmental Protection Plan in advance of construction initiation that will provide guidance to the Contractor in constructing the project.

## **8. Effects Assessment of the Transmission Line**

The Talbot Wind Farm will require the construction of an approximately 10.2 kilometer 230 kV transmission line. This line will connect the project to the existing Hydro One identified as lines W44LC and W45LC 230kV which run north of the wind farm roughly parallel to Highway 401. The wind farm's new transmission line would be supported by single poles and be located within a 30 m right-of-way.

This section describes the process followed to select the transmission line route and the existing environmental conditions, potential effects from the transmission line, mitigation measures and net effects/significance. Information that is specific to the transmission line is presented here. Where existing conditions information is similar to that of the wind farm study area, the reader is directed to the appropriate previous section.

### **8.1 Route Selection Process**

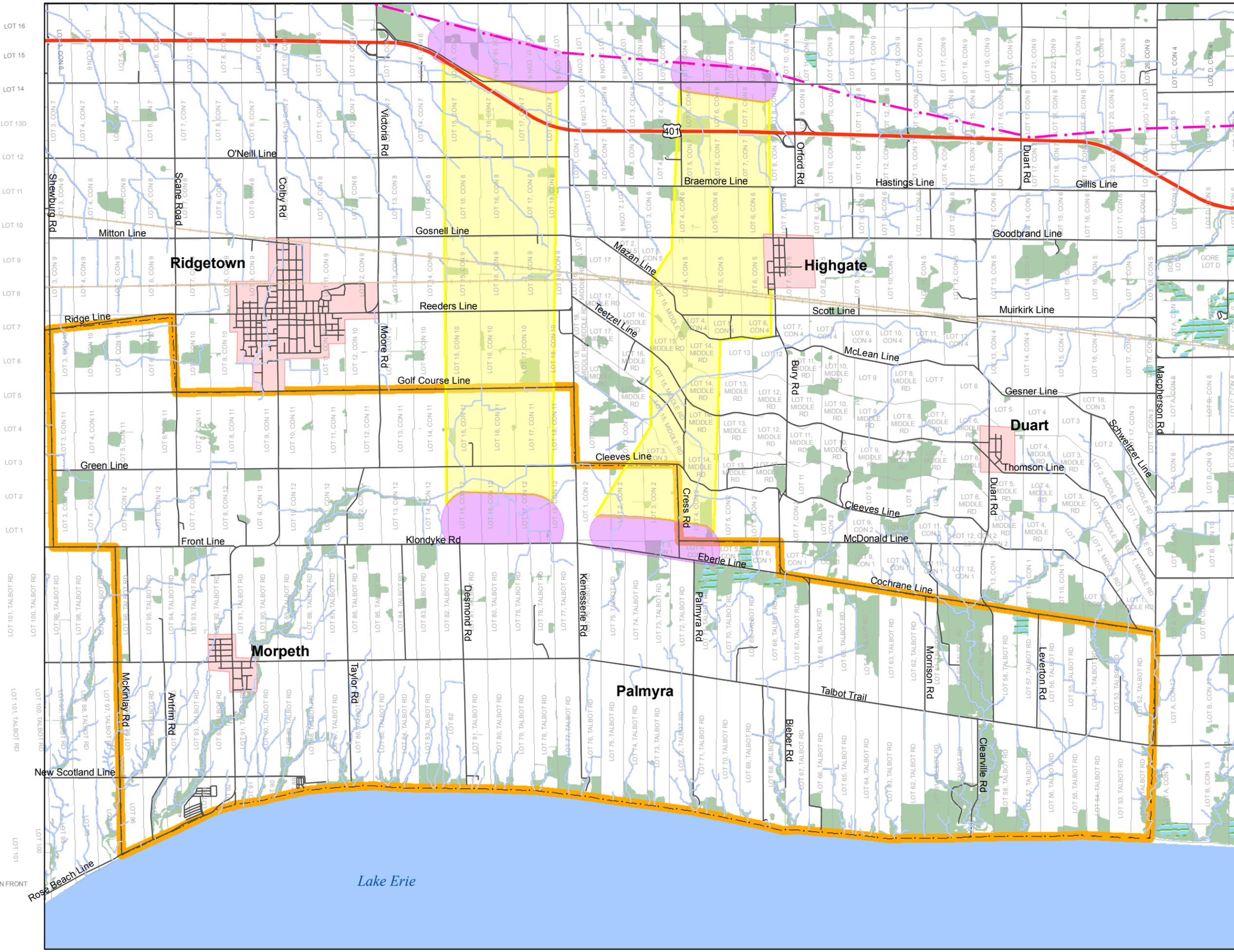
Several routing options were considered to connect the wind farm to the existing Hydro One 230 kV transmission lines to the north of the project site. Two options for connection to the Hydro One grid were initially proposed. The first option involves running four 34.5 kV circuits from the wind farm to the 230 kV line, while the second option would involve a single 230 kV circuit running north to the existing 230 kV line. After evaluating these two options, the four 34.5 kV lines were rejected given that this option would require running four circuits (12 conductors, in all) along one road allowance. It was expected that this would not be well received by residents in the area. The second option (single 230 kV line) was therefore taken forward for further analysis.

The transmission line routes and sites for the transformer station needed to be considered in an integrated manner. A two-step process was followed to identify possible routes for the transmission line and sites for the transformer station. Broad routing corridors were first established and then within these corridors, more detailed routes and sites (for the transformer station) were established. Environmental and land use constraint areas were identified and siting guidelines (e.g. following existing severances and hedgerows and maximizing alignments that parallel the lot line fabric) were used to select the corridors. Two routing corridors were identified (See **Figure 8.1**).

Field work was then undertaken to locate alternative routes within the two corridors and the station sites. This work focused on verification of residences and woodlots in the study area and checking for any technical constraints that would effect the location of the facilities, such as access roads, drainage infrastructure and terrain, communications towers and power infrastructure. The results of this work identified three potential routes in the west corridor and two routes in the east corridor (See **Figure 8.2**). After further evaluation of the routes, a preferred route was selected within each corridor.

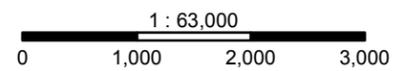
# Wind Farm Study

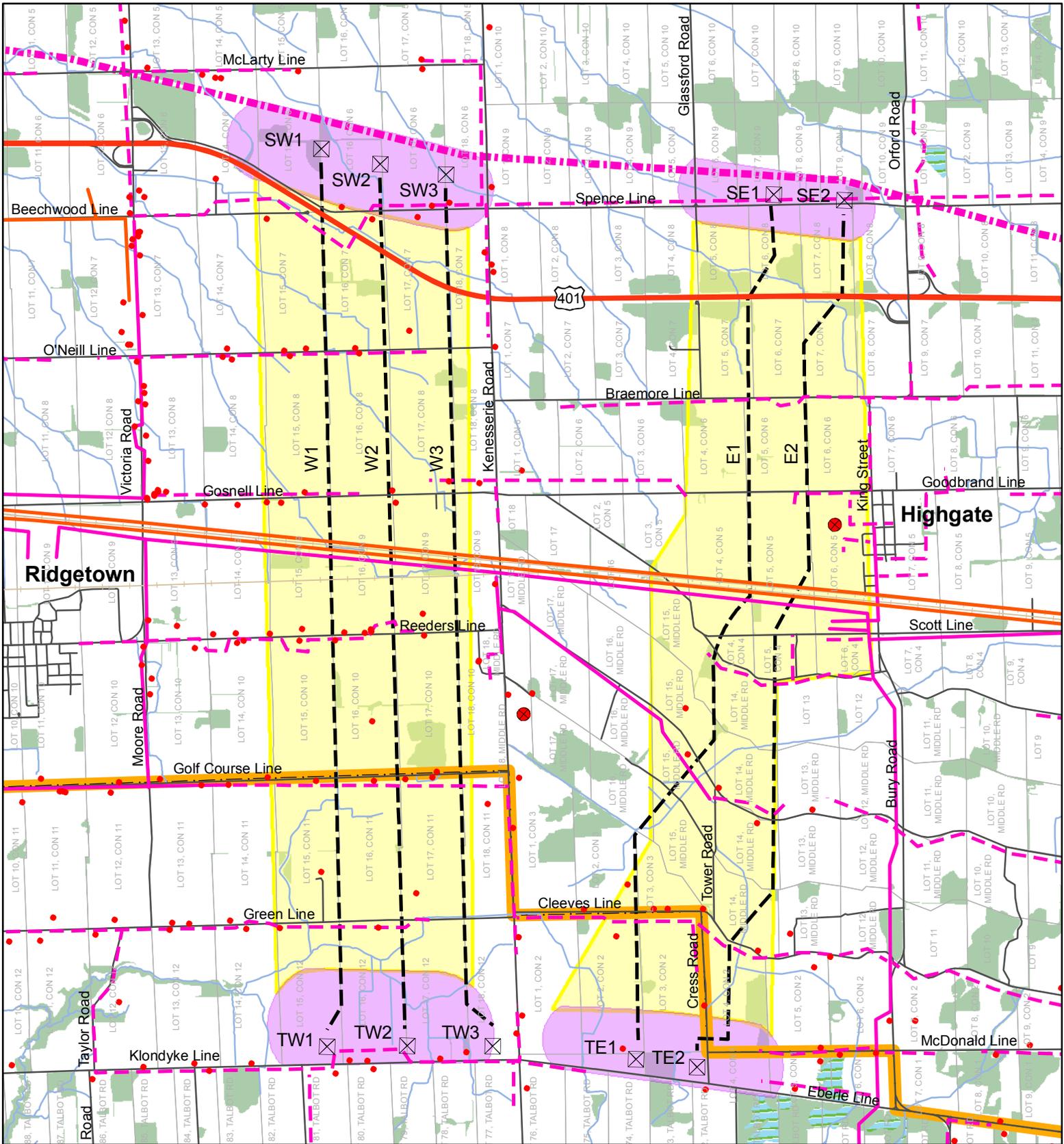
## Figure 8.1: Transmission Line Routing Corridors



**Legend**

- Existing 230kV Transmission Line
- Railway
- Roads
- Highways
- Urban Boundary
- Potential Substation Zone
- Transmission Line Corridors
- Project Boundary
- Lots/Parcels
- Waterbody





**RES CANADA Vind Farm Study**

**Figure 8.2: Alternative Transmission Line Routes and Existing Conditions**

**Legend**

- |                   |                                     |                             |          |
|-------------------|-------------------------------------|-----------------------------|----------|
| • Residence       | — Roads                             | ▭ Project Boundary          | Wetlands |
| ⊗ Airstrips       | — 3Ø Primary (8.32/4.8kV)           | ▭ Potential Substation Zone |          |
| ⊠ Substation Site | — 1Ø Primary                        | ▭ Potential HV Line Zone    |          |
| — Line Route      | — 3Ø Primary (27.6/16kV)            | ▭ Lots                      |          |
| — Rivers/Streams  | — 1Ø Primary                        | ▭ Woodlots                  |          |
| — Railway         | — Existing 230kV Transmission Lines |                             |          |

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Map Created By: SFG  
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 Date Modified: April 29, 2009  
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The preferred east and west routes were then evaluated based on the following criteria:

- Respecting lot lines and property fabric
- Cost and length;
- Environmental impacts;
- Proximity to homes;
- Communication towers; and
- Airstrips.

Based on cost and technical considerations, and minimization of impacts on residences and agricultural operations, the west route was identified as the preferred route. RES then met with the landowners that the route passes through to confirm whether they would be willing to provide an easement for the transmission line. Some further adjustments were made to the route and a preferred route was selected (see **Figure 8.3**). The potential effects of this route were then assessed and are described in the next section.

## **8.2 Transmission Line Effects Assessment**

**Figure 8.3** presents the preferred transmission line route.

### **Natural Environment**

#### **8.2.1 Physiography/Topography**

##### *8.2.1.1 Existing Environment*

Please refer to Section 7.1.

##### *8.2.1.2 Potential Effects*

It is not expected that there would be significant changes to the topography of the area as a result of the construction of the transmission line.

##### *8.2.1.3 Mitigation Measures*

No specific mitigation measures are required.

##### *8.2.1.4 Net Effects and Significance*

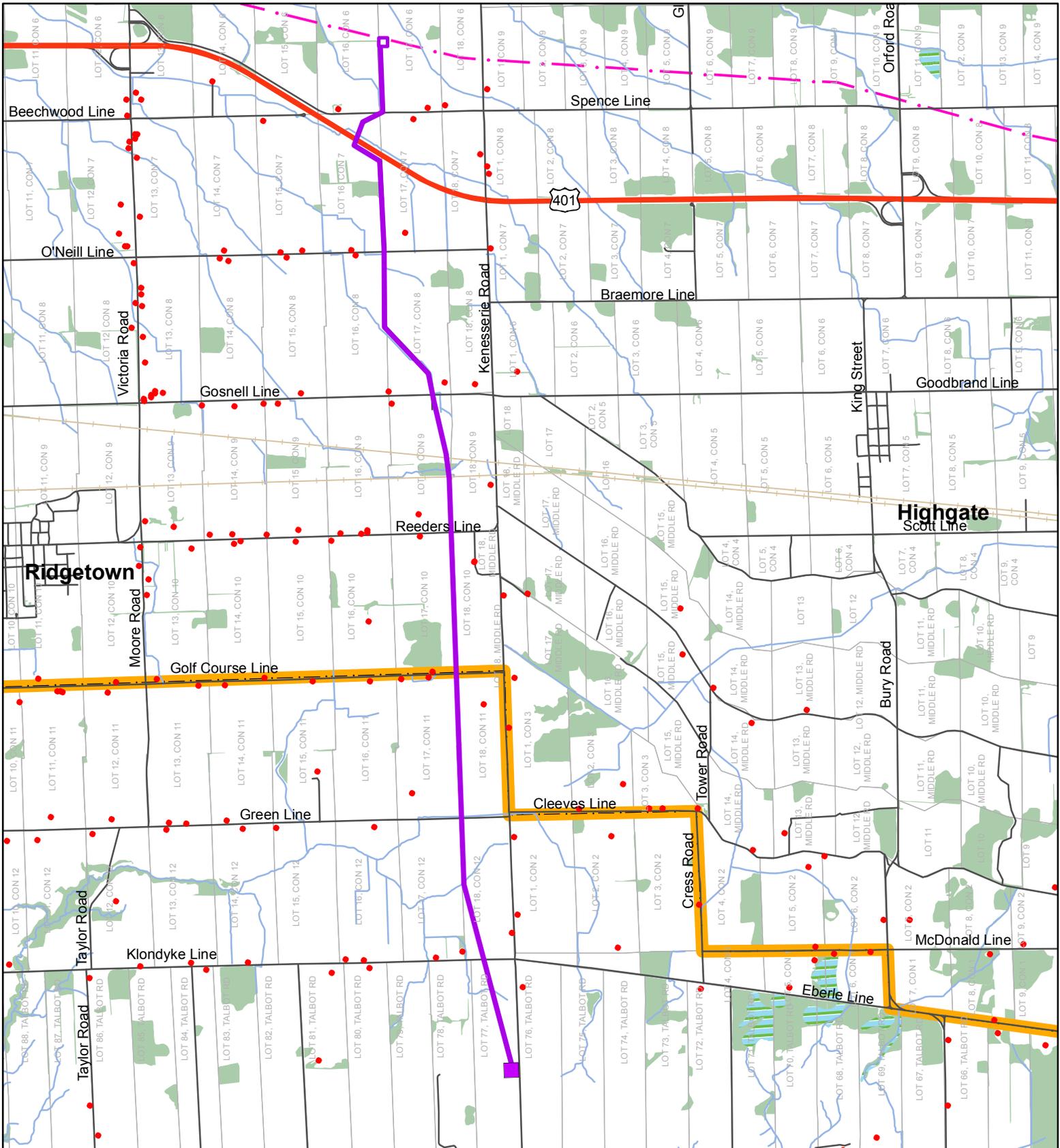
The slight changes to topography due to grading are not considered to be significant.

#### **8.2.2 Surface Water Quality and Soil Erosion**

##### *8.2.2.1 Existing Environment*

Please refer to **Section 7.2** for a general description of the study area.

It will be necessary to cross nine drains with the transmission line. The drains to be crossed are shown previously in **Figure 7.1** and were previously listed in Section 7.2.2.

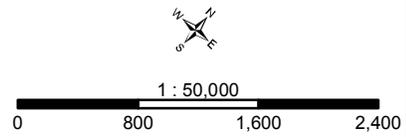


**res CANADA Wind Farm Study**

**Figure 8.3: Preferred Transmission Line Route**

**Legend**

- Residence
- Transformer/Substation Location
- - - Existing 230kV Transmission Line
- Proposed Project 230kV Transmission Line
- Rivers/Streams
- Railway
- Roads
- Project Boundary
- Lots
- Woodlots
- Wetlands



#### *8.2.2.2 Potential Effects*

The transmission line will span over the drains. There would be no alteration to the drains or requirement for in-water works. There is the potential for erosion effects from construction activity in the vicinity of the drains. These temporary disturbances may include downstream sediment transport and bed and bank disturbance. Although not anticipated, if a drain crossing were required, selection of the appropriate final crossing technique of any drains (if required at all) will be determined in conjunction with DFO, LTVCA, and Municipality of Chatham-Kent (due to the involvement of Municipal drains, under the *Drainage Act*).

#### *8.2.2.3 Mitigation Measures*

Please refer to **Section 7.2.3** for mitigation measures.

#### *8.2.2.4 Significance of Net Effects*

It is expected that the proposed mitigation measures will be effective in minimizing adverse effects on surface water features. Most of the effects will occur during a 6-month construction window and thus will be relatively short term. As a result, none to minor effects are expected.

Net effects are expected to be of low magnitude and temporary in nature. The affected watercourses are not considered to be sensitive. As a result, the net effects are not considered to be significant.

### **8.2.3 Fisheries Habitat**

#### *8.2.3.1 Existing Environment*

The transmission line will cross approximately 9 drains as previously shown in **Figure 7.1**. **Table 8.1** lists the various crossings and their characteristics.

#### *8.2.3.2 Potential Effects*

Negative impacts of the proposed project and potential permit/approval requirements largely depend on the final site plan and its orientation to nearby creek/drain systems. It is expected that effects to these drains will be minimal as the transmission line will pass overhead of them and there should be direct physical effects on them and any fish habitat that they may contain. There does exist the potential for some erosion/sedimentation effects due to construction in the vicinity of the drains. Any potential impacts on fish habitat (e.g. culverts to cross drains, removal of riparian vegetation etc.) should be mitigated. When a harmful alteration, disruption or destruction (HADD) of fish habitat cannot be avoided, an Authorization under the Federal *Fisheries Act* will be required from Fisheries and Oceans Canada (DFO) and fish habitat compensation measures may need to be implemented. LTVCA has a Level 2 agreement with DFO, meaning that the Authority conducts the initial assessment of the project to identify any impacts on fish habitat, and can also determine how the proponent can mitigate any impacts. Permanent watercourse crossings where fish habitat is present would be referred to DFO for review to determine if an Authorization is required. Any fish habitat compensation plans that may need to be prepared would be developed in consultation with DFO.

Table 8.1: Description of Drain Crossings

Water-course Crossing #	Flow (Aug 19 <sup>th</sup> 2008)	Substrate Type	Vegetation	Fish Observed during Field Work (species)	Drain Type (LTVCA, 2008)	Sensitivity	Rationale for Sensitivity Ranking / Comments
<b>TRANSMISSION LINE CROSSINGS</b>							
1	- active flow present	- sand small gravel	- extensive terrestrial vegetation along banks, little instream vegetation	None	C	Moderate	- natural watercourse - appears to be direct habitat - good overhanging bank cover present
2	- active flow present	- muck, silt, organic debris	- terrestrial grasses in channel	None	F	Low	- appears intermittent - cattle degradation - extensive erosion
3	- active flow present (looks like seepage)	- silt, sand	- abundant watercress observed in channel - steep and deep banks well vegetated with a mix of herbaceous plants & riparian trees and shrubs	None	F	Moderate	- conditions appear to be Type A rather than Type F - channelized drain with poor connectivity to downstream - abundance of watercress may indicate groundwater upwelling contributing to baseflow

<b>Water-course Crossing #</b>	<b>Flow (Aug 19<sup>th</sup> 2008)</b>	<b>Substrate Type</b>	<b>Vegetation</b>	<b>Fish Observed during Field Work (species)</b>	<b>Drain Type (LTVCA, 2008)</b>	<b>Sensitivity</b>	<b>Rationale for Sensitivity Ranking / Comments</b>
4	- no active flow (small, isolated pools from recent rain)	- clay, silt, muck	- abundant terrestrial grasses throughout channel (choked) - banks well vegetated with a mix of herbaceous plants & riparian trees and shrubs	None (lack of water)	C	Low	- appears Type F drain based on lack of flow - no refuge pools observed to be capable of sustained baitfish - poor connectivity to downstream reaches
5	- Not Observed at time of field work						
6	- no active flow observed	- clay, silt, muck	- banks densely vegetated with terrestrial grasses only (roadside ditch)	None (lack of water)	C	Low	- conditions appear to be Type F rather than Type C (dry) - poor connectivity to downstream reaches - no functional low-flow refuge habitat present (e.g., pools)
7	- Not observed at time of field work						
8	- no active flow observed (isolated pockets of water)	- clay, silt, muck	- banks densely vegetated with herbaceous plants and riparian shrubs	None (lack of water)	C	Low	- conditions appear to be Type F rather than Type C (dry) - poor connectivity to downstream reaches - no functional low-flow refuge habitat present (e.g., pools)
9	- Not observed at time of field work						

### *8.2.3.3 Mitigation Measures*

Mitigation measures during construction activities involving watercourse crossings should include steps to protect onsite and downstream aquatic resources from the effects of erosion and sedimentation. In addition to standard environmental protection measures (e.g., minimize footprint, sediment and erosion control, culvert selection and sizing, etc), the OMNR in-water construction-timing window would also likely be set for the summer months when work can be completed in the dry or when resident fish communities in permanent systems have completed their annual reproductive activities. The poles to support the electrical conductors will be spaced such that all watercourses are spanned by the transmission lines and no tower foundations placed within a watercourse. Compensation measures, where required, may involve riparian plantings, bank stabilization through bioengineering, or the construction of in-stream fish habitat features and/or the removal of blockages/barriers (this is a possibility along the shoreline at the mouths of some tributaries).

### *8.2.3.4 Significance of Net Effects*

As the transmission line is unlikely to directly affect the watercourses and due to the general lack of sensitive watercourses (e.g., cool/coldwater – Class B and D) and the absence of rare aquatic species, the application of recommended mitigation measures should alleviate any potential impacts, leaving no significant net effects on aquatic resources.

## **8.2.4 Groundwater Quality**

### *8.2.4.1 Existing Environment*

Please refer to **Section 7.4.1**.

### *8.2.4.2 Potential Effects*

As the project will result in the creation of very limited impervious areas (transmission line pole base), the project will not alter infiltration rates and thus affect groundwater recharge.

Groundwater supplies could also be affected by spills of hazardous material such as fuel and oils. There may be temporary fuel storage at the project construction office. Given the volume of materials to be used is relatively small; the potential for these types of effects is minimal. No potential effects are anticipated during the operation of the wind farm.

### *8.2.4.3 Mitigation Measures*

Fuels and oils will be managed per provincial requirements. In the event of a spill of hazardous materials, clean-up procedures will be undertaken as per provincial protocols and legislation as governed by the *Environmental Protection Act* and the *Ontario Water Resources Act*.

### *8.2.4.4 Significance of Net Effects*

Groundwater supplies will not be adversely affected by the project. No significant effects to groundwater supplies are anticipated.

## **8.2.5 Air Quality**

### *8.2.5.1 Existing Environment*

Please refer to **Section 7.5.1**.

### *8.2.5.2 Potential Effects*

Project related air quality effects would largely occur during the construction phase. This would include emissions from construction equipment and increased dust levels during soil excavation and from road traffic. As the construction areas are generally well removed from receptors, air quality related effects are expected to be minimal and would be temporary.

### *8.2.5.3 Mitigation Measures*

During the construction period, the contractor will implement standard practices to minimize air emissions all of which are previously described in **Section 7.5.2**.

### *8.2.5.4 Significance of Net Effect*

Given the large separation distances from receptors, (a minimum of about 250 m for participating landowners) air related effects during the construction period would be minimal and not dissimilar to many agricultural activities in the area. Effects would also be temporary.

Construction related air quality effects would be of short duration and low in magnitude. They are therefore not considered to be significant. During the long-term operations periods, the project will contribute to improved air quality in the Province by offsetting other forms of electricity production.

## **8.2.6 Birds**

### *8.2.6.1 Existing Environment*

Please refer to **Section 7.6** for a detailed description of birds in the study area.

### *8.2.6.2 Potential Effects*

Manville (2000) estimates that there are tens of thousands of bird fatalities a year due to collisions with overhead wires. Many studies have examined the problem of birds colliding with power lines and other overhead wires but very few quantify the problem. Several groups of birds appear to be the most susceptible to collision with wires, most notably waterfowl, shorebirds and raptors (Stout and Cornwell 1976, Curtis 1977, Anderson 1978, Enderson and Kirven, 1979, NUS Corporation 1979, Olsen and Olsen 1980, Moorehead and Epstein 1985, Faanes 1987). As an example, Faanes (1987) searched 6 miles (9.6 km) of powerlines in North Dakota in the spring and fall of 1977 and 1978. Based on a total of 633 dead birds found, he estimated that 200 avian fatalities per mile per year (125 birds/km/year) were occurring. The applicability of these numbers to this site are not known as mortality estimates vary dramatically from study to study. In addition, the majority of studies completed to date is done in instances where there is a perceived or known problem and tend to involve larger power lines (e.g. 230 kV or larger lines).

The transmission line being proposed for this wind farm is pole to pole stringing of a single circuit consisting of three wires and one lighting wire. The distribution and transmission lines in adjacent areas typically consist of 27.6 kV multi-circuit poles with six to ten wires. From studies completed, the numbers of waterfowl and shorebirds using the study area are very small in comparison to habitats in the areas surrounding the study area and are not considered to be at additional risk. For species such as raptors that do occur in high numbers during the fall the addition of 10km of additional transmission line in a landscape that has 100s of km of hydro lines, the additional risk is considered relatively minimal.

#### *8.2.6.3 Mitigation Measures*

It is recommended that all vegetation clearing is completed outside of the main breeding window for bird species covered under the *Migratory Bird Convention Act*, 1994. The main bird breeding window in this area is typically considered to be May 1 to July 23 for open areas and May 9 to July 23 for forested areas (personal communication, April White - Environmental Assessment Officer, Environment Canada).

No mitigation is recommended. However monitoring of the number of collisions of birds along a representative patch of the transmission line is recommended given the areas known raptor migration corridor.

#### *8.2.6.4 Significance of Net Effects*

Impacts to nesting birds will be avoided by conducting constructing activities outside of the nesting season.

The 10 km line will contribute to some amount of bird deaths. As this will be a single circuit line, effects are expected to be less than the research suggests. Relative to the vast amount of transmission lines in southern Ontario, the significance of this effect is considered low.

### **8.2.7 Bats**

#### *8.2.7.1 Existing Environment*

Please refer to **Section 7.7.1**.

#### *8.2.7.2 Potential Effects*

The construction of the transmission line is not expected to result in any effects on bats.

#### *8.2.7.3 Mitigation Measures*

None required.

#### *8.2.7.4 Significance of Net Effects*

No effects.

### **8.2.8 Vegetation, Wildlife and Wildlife Habitat**

#### *8.2.8.1 Existing Environment*

The study area is comprised of a mixture of natural vegetation communities and agricultural fields. Detailed field surveys of vegetation resources identified the presence of 6 distinct ELC communities, 1 inclusion, and a number of hedgerows within the study area. According to the Natural Heritage Information Centre, vegetation units surveyed in the study area are considered secure in the province of Ontario (S5) with the exception of the Buttonbush Mineral Thicket Swamp inclusion which is considered vulnerable (S3) in the province of Ontario. For a couple of naturally occurring vegetation classifications, no provincial status was available. From our experience, these un-rated vegetation units are common in Ontario.

In total, 122 flora species were identified within the study area during the spring of 2008 (see **Table 8.3**). Of these 122 species, only 8% are listed as exotic or non-native species. Descriptions of each of the ELC communities observed within the study area are included in **Table 8.2** and are presented in **Figure 8.4**.

Table 8.2 –Descriptions of ELC Communities

ELC Code	Classification	Soils/Hydrology	Vegetation	Comments
FOD2-4	Dry-Fresh Oak – Hardwood Deciduous Forest	This well (3) drained site is characterized by a silty very fine sand substrate. No mottle or gley were found throughout the soil profile. The soil moisture regime for this site is 2 (Fresh).	This community is dominated by red oak ( <i>Quercus rubra</i> ) and ironwood ( <i>Ostrya virginiana</i> ). Additional canopy and sub-canopy species include sugar maple ( <i>Acer saccharum</i> ), red ash ( <i>Fraxinus pennsylvanica</i> ), American beech ( <i>Fagus grandifolia</i> ), and bitternut hickory ( <i>Carya cordiformis</i> ). The understory is dense with sugar maple and red ash seedlings. The ground layer is characterized by Virginia creeper ( <i>Parthenocissus inserta</i> ), enchanter’s nightshade ( <i>Circaea lutetiana</i> ssp. <i>canadensis</i> ), and starry false Solomon’s seal ( <i>Maianthemum stellatum</i> ).	A number of standing snags and fallen logs within this community may provide habitat for a variety of wildlife species. Incidental wildlife sightings include a number of wood frogs, white-tailed deer, grey squirrel, and giant swallowtail butterfly.
SWD6-2	Silver Maple Organic Deciduous Swamp	This very poor (7) drained site is characterized by over 120 meters of organic soils. The water table was encountered at 20 cm below the surface. The soil moisture regime for this site is 8 (wet). Evidence suggests that this community contains standing water at certain times of the year.	This community is dominated almost exclusively by silver maple ( <i>Acer saccharinum</i> ) with occurrences of white elm ( <i>Ulmus americana</i> ) and bur oak ( <i>Quercus macrocarpa</i> ). Both the understory and the ground layer are very sparse with spicebush ( <i>Lindera benzoin</i> ), buttonbush ( <i>Cephalanthus occidentalis</i> ), false nettle ( <i>Boehmeria cylindrica</i> ), and bulblet bladder fern ( <i>Cystopteris bulbifera</i> ).	This community contains a Buttonbush Thicket Swamp (SWT2-4) inclusion. This inclusion occurs along the western edge of the silver maple swamp community where canopy cover is absent. This small inclusion is not large enough to be its own community and is considered rare (S3) by NHIC.
FOD6-5	Fresh-Moist Sugar Maple - Hardwood Deciduous Forest (southern woodlot)	This imperfectly (5) drained site is characterized by a very fine sandy loam substrate. Mottles were encountered at 40 cm	This forest is co-dominated by black cherry ( <i>Prunus serotina</i> ) and sugar maple with red ash and black walnut ( <i>Juglans nigra</i> ) as associates. The understory is fairly sparse with European buckthorn	A small intermittent creek runs through the center of this community. A number of standing snags and fallen logs within this community may provide habitat for

ELC Code	Classification	Soils/Hydrology	Vegetation	Comments
		resulting in a soil moisture regime of 4 (Moderately Moist) for this site.	( <i>Rhamnus cathartica</i> ) and black cherry saplings. The ground layer is characterized by herb Robert ( <i>Geranium robertianum</i> ), enchanter's nightshade, and garlic mustard ( <i>Alliaria petiolaris</i> ).	a variety of wildlife species. Incidental wildlife sightings include song sparrow, indigo bunting, grey catbird, and American toad.
SWT2-2	Willow Mineral Thicket Swamp	This imperfectly (5) drained site is characterized by a very fine sandy loam substrate. Mottles were encountered at 28 cm resulting in a soil moisture regime of 6 (Very Moist) for this site.	This community is dominated by a variety of willow species including woolley-headed willow ( <i>Salix eriocephala</i> ), pussy willow ( <i>Salix discolor</i> ), and slender willow ( <i>Salix petiolaris</i> ). Trembling aspen ( <i>Populus tremuloides</i> ) occurs in few locations within this community. Where shrub cover is sparse the site is dense with common reed ( <i>Phragmites australis</i> ). Slender stinging nettle ( <i>Urtica dioica ssp. gracilis</i> ) and Canada goldenrod ( <i>Solidago canadensis</i> ) are common along the edges.	This community consists of a narrow band of vegetation which follows the creek for a distance. Incidental wildlife sightings within this community include leopard frog, gray catbird, and barn swallow.
FOD6-1	Fresh-Moist Sugar Maple Lowland Ash Deciduous Forest	No soil pit was dug at this location.	This community is dominated by maples mainly sugar maple ( <i>Acer saccharum ssp. saccharum</i> ) with red maple ( <i>Acer rubrum</i> ) and red ash ( <i>Fraxinus pennsylvanica</i> ) also being abundant. The shrub layer is dominated by sweet brier ( <i>Rosa rubiginosa</i> ) with abundant prickly ash ( <i>Zanthoxylum americanum</i> ). Kentucky blue grass ( <i>Poa pratense</i> ) is dominant in the ground layer with common dandelion ( <i>Taraxacum officinale</i> ), garlic mustard ( <i>Alliaria petiolata</i> ) and common plantain ( <i>Plantago major</i> ) also abundant.	This community consists of a small woodlot beside a pasture and has been heavily impacted in the shrub and ground layers by cattle grazing. Alien species are dominant in these layers.
SWD3-1	Red Maple Mineral	No soil pit was dug at this	This community is dominated by red	This is a small woodlot separated

ELC Code	Classification	Soils/Hydrology	Vegetation	Comments
	Deciduous Swamp	location.	maple with some silver maple and red ash. Prickly ash ( <i>Zanthoxylum americanum</i> ) and riverbank grape ( <i>Vitis riparia</i> ) were present in the shrub layer. Side flowering aster ( <i>Aster lateriflorus</i> var. <i>lateriflorus</i> ), zig-zag goldenrod ( <i>Solidago flexicaulis</i> ) and Virginia creeper ( <i>Parthenocissus inserta</i> ) are abundant in the ground layer.	from the FOD6-1 woodlot by hedgerows. It is fenced off from cattle and as a result has a thicker herb layer on the ground and is less dominated by invasive species.
H	Hedgerow	No soil pit was dug at this location.	A number of hedgerows occur throughout the study area. Hedgerow along the road and property lines tends to be dominated by planted coniferous species such as eastern white cedar ( <i>Thuja occidentalis</i> ) and white spruce ( <i>Picea glauca</i> ). Hedgerows which follow watercourses and drainage ditches tend to be more natural and include species such as white elm, black walnut, staghorn sumac ( <i>Rhus typhina</i> ), Manitoba maple ( <i>Acer negundo</i> ), and basswood ( <i>Tilia americana</i> ).	Hedgerows occur throughout the study area.

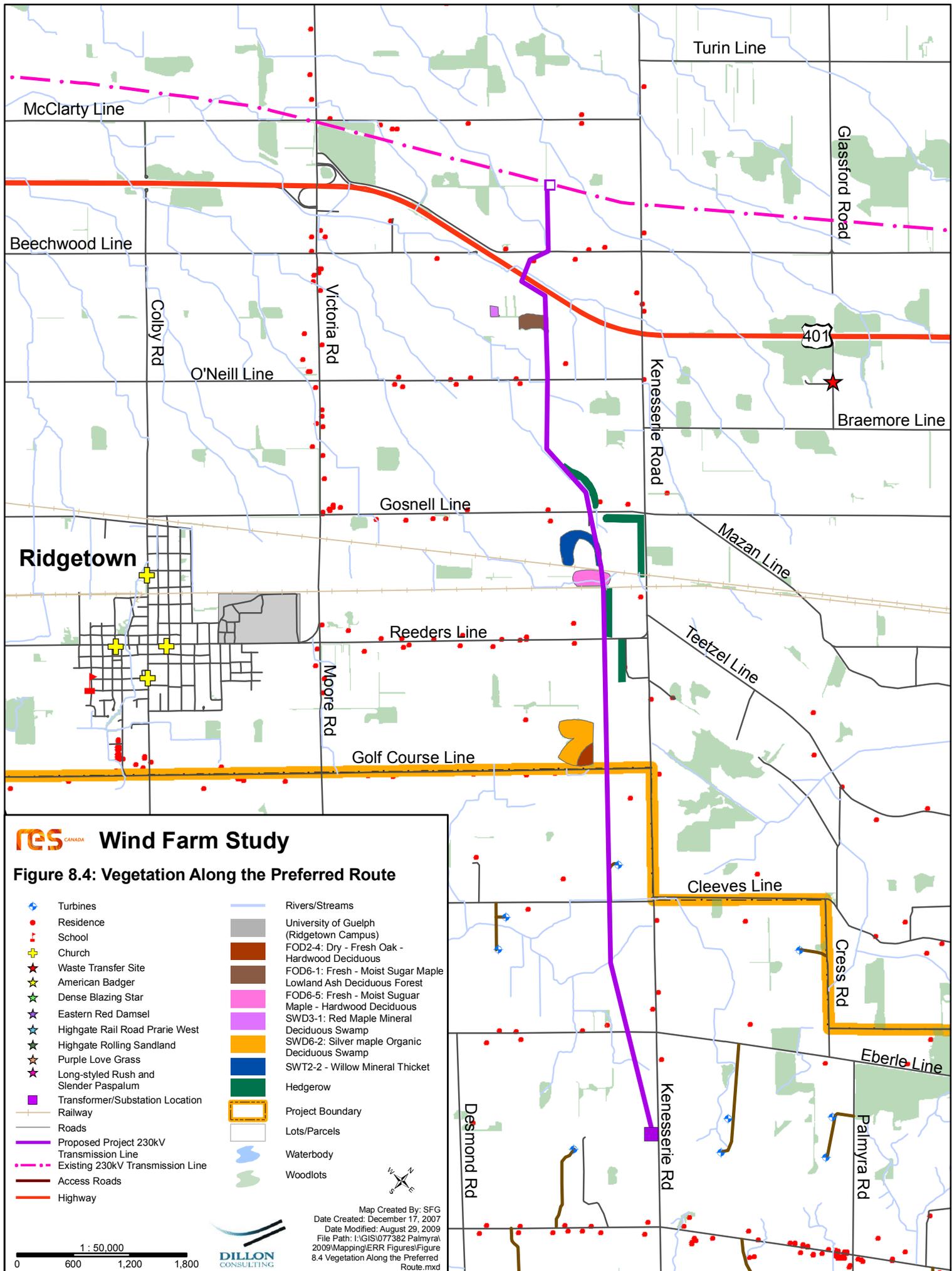
Table 8.3: Summer 2008 Plant List for the Transmission Line Route

Scientific Name	Common Names	Coefficient Conservation	Coefficient Wetness	SRank	Native/ Introduced
<i>Acer negundo</i>	Manitoba maple	0	-2	S5	N
<i>Acer rubrum</i>	Red Maple	4	0	S5	N
<i>Acer saccharinum</i>	Silver Maple	5	-3	S5	N
<i>Acer saccharum</i> ssp. <i>saccharum</i>	Sugar Maple	4	3	S5	N
<i>Acer X freemanii</i>	Freeman's Maple			S5	N
<i>Actaea pachypoda</i>	White Baneberry	6	5	S5	N
<i>Agrimonia gryposepala</i>	Tall Agrimony	2	2	S5	N
<i>Alliaria petiolata</i>	Garlic Mustard	0	0	SE5	I
<i>Ambrosia artemisiifolia</i>	Common Ragweed	0	3	S5	N
<i>Ambrosia trifida</i>	Giant Ragweed	0	-1	S5	N
<i>Arctium minus</i> ssp. <i>minus</i>	Common Burdock	0	5	SE5	I
<i>Arisaema triphyllum</i> ssp. <i>triphyllum</i>	Jack-in-the-pulpit	5	-2	S5	N
<i>Asclepias syriaca</i>	Common Milkweed	0	5	S5	N
<i>Aster lateriflorus</i> var. <i>lateriflorus</i>	Side flowering Aster	3	-2	S5	N
<i>Aster novae-angliae</i>	New England Aster	2	-3	S5	N
<i>Athyrium filix-femina</i> var. <i>angustum</i>	Northern Lady Fern	4	0	S5	N
<i>Berberis thunbergii</i>	Japanese Barberry	0	4	SE5	I
<i>Berberis vulgaris</i>	Common Barberry	0	3	SE5	I
<i>Betula alleghaniensis</i>	Yellow Birch	6	0	S5	N
<i>Betula papyrifera</i>	White Birch	2	2	S5	N
<i>Bidens frondosa</i>	Devil's Beggar-ticks	3	-3	S5	N
<i>Boehmeria cylindrica</i>	False Nettle	4	-5	S5	N
<i>Carex crinita</i>	Fringed Sedge	6	-4	S5	N
<i>Carex gracillima</i>	Graceful Sedge	4	3	S5	N
<i>Carex intumescens</i>	Bladder Sedge	6	-4	S5	N
<i>Carex rosea</i>	Stellate Sedge	5	5	S5	N
<i>Carex</i> sp	Sedge Species				N
<i>Carpinus caroliniana</i>	Blue beech	6	0	S5	N
<i>Carya cordiformis</i>	Bitternut Hickory	6	0	S5	N
<i>Carya ovata</i>	Shagbark Hickory	6	3	S5	N
<i>Cephalanthus occidentalis</i>	Buttonbush	7	-5	S5	N
<i>Cicuta maculata</i>	Spotted Water-hemlock	6	-5	S5	N
<i>Circaea lutetiana</i> ssp. <i>Canadensis</i>	Canada Enchanter's Nightshade	3	3	S5	N
<i>Cornus stolonifera</i>	Red-osier Dogwood	2	-3	S5	N
<i>Cyperus esculentus</i>	Field Nut Sedge	1	-3	S5	N
<i>Cystopteris bulbifera</i>	Bulblet Bladder Fern	5	-2	S5	N

Scientific Name	Common Names	Coefficient Conservation	Coefficient Wetness	SRank	Native/ Introduced
<i>Cystopteris fragilis</i>	Brittle Fern	7	3	S5	N
<i>Daucus carota</i>	Wild Carrot	0	5	SE5	I
<i>Dryopteris carthusiana</i>	Spinulose Wood Fern	5	-2	S5	N
<i>Dryopteris cristata</i>	Crested Wood Fern	7	-5	S5	N
<i>Echinocystis lobata</i>	Wild Cucumber	3	-2	S5	N
<i>Epipactis helleborine</i>	Helleborine	0	5	SE5	I
<i>Erigeron annuus</i>	Daisy fleabane	0	1	S5	N
<i>Eupatorium maculatum</i> ssp. <i>maculatum</i>	Spotted Joe-pye-weed	3	-5	S5	N
<i>Fagus grandifolia</i>	American Beech	6	3	S5	N
<i>Fraxinus pennsylvanica</i>	Red Ash	3	-3	S5	N
<i>Galium triflorum</i>	Fragrant Bedstraw	4	2	S5	N
<i>Geranium maculatum</i>	Spotted Crane's-bill	6	3	S5	N
<i>Geranium robertianum</i>	Herb Robert	0	5	SE5	I
<i>Geum</i> sp	Avens Species				N
<i>Glyceria striata</i>	Fowl Manna Grass	3	-5	S5	N
<i>Hamamelis virginiana</i>	Witch Hazel	6	3	S5	N
<i>Hesperis matronalis</i>	Dame's Rocket	0	5	SE5	I
<i>Impatiens capensis</i>	Spotted Touch-me-not	4	-3	S5	N
<i>Juglans nigra</i>	Black Walnut	5	3	S4	N
<i>Juniperus virginiana</i>	Eastern Red Cedar	4	3	S5	N
<i>Lactuca biennis</i>	Tall Blue Lettuce	6	0	S5	N
<i>Lactuca serriola</i>	Prickly Lettuce	0	0	SE5	I
<i>Laportea canadensis</i>	Wood Nettle	6	-3	S5	N
<i>Leersia oryzoides</i>	Rice Cut Grass	3	-5	S5	N
<i>Lindera benzoin</i>	Spicebush	6	-2	S5	N
<i>Liriodendron tulipifera</i>	Tulip tree	8	2	S4	N
<i>Lobelia siphilitica</i>	Great Blue Lobelia	6	-4	S5	N
<i>Lonicera tatarica</i>	Tartarian Honeysuckle	0	3	SE5	I
<i>Lysimachia nummularia</i>	Moneywort	0	-4	SE5	I
<i>Maianthemum canadense</i>	Canada Mayflower	5	0	S5	N
<i>Maianthemum racemosum</i> ssp. <i>racemosum</i>	False Solomon's Seal	4	3	S5	N
<i>Maianthemum stellatum</i>	Starry False Solomon's Seal	6	1	S5	N
<i>Malus pumila</i>	Common Apple	0	5	SE5	I
<i>Mitchella repens</i>	Partridge Berry	6	2	S5	N
<i>Morus alba</i>	White Mulberry	0	0	SE5	I
<i>Nepeta cataria</i>	Catnip	0	1	SE5	I
<i>Oenothera biennis</i>	Common Evening-primrose	0	3	S5	N

Scientific Name	Common Names	Coefficient Conservation	Coefficient Wetness	SRank	Native/ Introduced
<i>Onoclea sensibilis</i>	Sensitive Fern	4	-3	S5	N
<i>Osmunda regalis</i> var. <i>spectabilis</i>	Royal Fern	7	-5	S5	N
<i>Ostrya virginiana</i>	Hop Hornbeam	4	4	S5	N
<i>Oxalis stricta</i>	Upright Yellow Wood-sorrel	0	3	S5	N
<i>Parthenocissus inserta</i>	Thicket Creeper	3	3	S5	N
<i>Phalaris arundinacea</i>	Reed Canary Grass	0	-4	S5	N
<i>Phragmites australis</i>	Common Reed	0	-4	S5	N
<i>Phytolacca americana</i>	Pokeweed	3	1	S4	N
<i>Podophyllum peltatum</i>	Mayapple	5	3	S5	N
<i>Populus grandidentata</i>	Large-tooth Aspen	5	3	S5	N
<i>Populus tremuloides</i>	Trembling Aspen	2	0	S5	N
<i>Prunus serotina</i>	Black Cherry	3	3	S5	N
<i>Potentilla recta</i>	Rough-fruited cinquefoil	0	5	SE5	I
<i>Prunus avium</i>	Mazard cherry	0	5	SE4	I
<i>Prunus pensylvanica</i>	Pin Cherry	3	4	S5	N
<i>Prunus serotina</i>	Black Cherry	3	3	S5	N
<i>Quercus macrocarpa</i>	Bur Oak	5	1	S5	N
<i>Quercus rubra</i>	Red Oak	6	3	S5	N
<i>Rhus radicans</i> ssp. <i>negundo</i>	Climbing Poison-ivy	5	-1	S5	N
<i>Rhus radicans</i> ssp. <i>rydbergii</i>	Western Poison-ivy	0	0	S5	N
<i>Rhus typhina</i>	Staghorn Sumac	1	5	S5	N
<i>Ribes cynosbati</i>	Prickly Gooseberry	4	5	S5	N
<i>Rosa rubiginosa</i>	Sweet Brier	0	5	SE4	I
<i>Rubus allegheniensis</i>	Common Blackberry	2	2	S5	N
<i>Rubus idaeus</i> ssp. <i>melanolasius</i>	Wild Red Raspberry	0	-2	S5	N
<i>Rumex crispus</i>	Curly Dock	0	-1	SE5	I
<i>Salix discolor</i>	Pussy Willow	3	-3	S5	N
<i>Salix eriocephala</i>	Woolly-headed Willow	4	-3	S5	N
<i>Salix exigua</i>	Sandbar Willow	3	-5	S5	N
<i>Salix petiolaris</i>	Slender Willow	3	-4	S5	N
<i>Sambucus canadensis</i>	Common Elderberry	5	-2	S5	N
<i>Sambucus racemosa</i> ssp. <i>pubens</i>	Red-berried Elderberry	5	2	S5	N
<i>Sassafras albidum</i>	Sassafras	6	3	S4	N
<i>Scirpus atrovirens</i>	Black Bulrush	3	-5	S5	N
<i>Smilax herbacea</i>	Herbaceous Carrion Flower	5	0	S4	N

Scientific Name	Common Names	Coefficient Conservation	Coefficient Wetness	SRank	Native/ Introduced
<i>Smilax lasioneura</i>	Hairy-nerved Carrion Flower	5	5	S4	N
<i>Solidago caesia</i>	Blue-stem Goldenrod	5	3	S5	N
<i>Solidago canadensis</i> var. <i>canadensis</i>	Canada Goldenrod	1	3	S5	N
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	6	3	S5	N
<i>Spiraea alba</i>	Meadowsweet	3	-4	S5	N
<i>Thelypteris palustris</i> var. <i>pubescens</i>	Marsh Fern	5	-4	S5	N
<i>Tilia americana</i>	Basswood	4	3	S5	N
<i>Trillium erectum</i>	Red Trillium	6	1	S5	N
<i>Trillium grandiflorum</i>	White Trillium	5	5	S5	N
<i>Ulmus americana</i>	White Elm	3	-2	S5	N
<i>Urtica dioica</i> ssp. <i>gracilis</i>	Slender Stinging Nettle	2	-1	S5	N
<i>Viburnum acerifolium</i>	Maple-leaved Viburnum	6	5	S5	N
<i>Viola</i> sp	Violet Species				N
<i>Vitis riparia</i>	Riverbank Grape	0	-2	S5	N
<i>Zanthoxylum americanum</i>	Prickly-ash	3	5	S5	N



There are a number of high quality plant species within the study area. In total, 22% of the species encountered have a coefficient of conservatism of 6 or greater. A coefficient of conservatism (CC) ranges from 0 to 10 and represent an estimated probability that a plant is likely to occur in a landscape relatively unaltered from what is believed to be a pre-settlement condition. For example, a CC of 0 is given to plants such as Manitoba maple (*Acer negundo*), that have demonstrated little fidelity to any remnant natural community, i.e. may be found almost anywhere. Similarly, a CC of 10 is applied to plants like shrubby cinquefoil (*Potentilla fruticosa*) that are almost always restricted to a pre-settlement remnant, i.e. a high quality natural area. Introduced plants were not part of the pre-settlement flora, so no CC value is applied to these. Notable species within the study area include tulip tree (*Liriodendron tulipifera*), buttonbush (*Cephalanthus occidentalis*), sassafras (*Sassafras albidum*), and royal fern (*Osmunda regalis var. spectabilis*).

According to the NHIC database one rare vegetation community (Moist Fresh Tallgrass Prairie) occurs approximately 1 km east the proposed transmission line right of way. This rare vegetation habitat coincides with the High Gate Railroad Prairie West. As well as having a significant tract of *Shizachyrium scoparium*, species such as *Aristida oligantha*, *Eragrostis spectabilis*, *Asclepias sullivantii*, *Eupatorium altissimum* and *Liatris spicata* are also found.

All native vegetation species observed within the study area are considered secure (S5) or apparently secure (S4) in the province of Ontario. None of the species encountered within the study area are listed under the federal *Species at Risk Act* or the provincial *Endangered Species Act*. Further, no evidence of the historical species identified through the NHIC database search were observed within the proposed transmission corridor during a site visit complete on August 13, 2008.

Mitigation measures implemented for the protection and minimization of potential for effects to sensitive species such as the fox snake would be the same as outlined for the turbine access roads as previously described in **Section 7.9.4**.

**Coefficient of Conservatism:** Numeric value between 0 and 10 which indicates the degree of faithfulness a plant displays to a specific habitat or set of environmental conditions.

**Coefficient Wetness:** Lower negative numbers imply greater correlation with wetland conditions whereas higher positive numbers imply greater correlation with upland conditions.

**SRank:** Provincial ranks used by the Natural Heritage Information Centre to set protection priorities for rare species and natural communities. [S1 – Critically imperiled in Ontario; S2 – Imperiled in Ontario; S3 – Vulnerable in Ontario; S4 – Apparently secure in Ontario; S5 – Secure in Ontario; SE – Exotic].

#### *8.2.8.2 Potential Effects*

The potential effect of the proposed transmission line on protected natural areas is not anticipated due to the distance separating them from the construction site. A small wetland (Willow Mineral Thicket Swamp) occurs west of the proposed transmission line and is unlikely to be impacted.

Vegetation clearing will be limited to a small portion of hedgerow vegetation and the eastern edge of a Fresh Moist Sugar Maple Deciduous Forest that are not considered significant in the Municipality of Chatham Kent.

#### *8.2.8.3 Mitigation Measures*

No mitigation measures specific to the protection of the natural areas is required. For the protection of wetland features, appropriate sediment erosion control measures should be implemented prior to any clearing of other construction activities begin.

#### *8.2.8.4 Significance of Net Effects*

The risk to wildlife and wildlife habitat in the area is low, provided mitigation measures are implemented.

Net effects of vegetation removal are anticipated to be limited to the initial removal of two small, isolated and common vegetation units. The establishment of other low lying thicket and herbaceous material will reduce long-term effects of vegetation removal. The vegetation being removed is not significant and the function of the surrounding habitat will not be impaired by the proposed works. The significance of the proposed vegetation removal is anticipated to be low.

### **8.2.9 Threatened, Rare or Endangered Species**

#### *8.2.9.1 Existing Environment*

According to the Natural Heritage Information Centre (NHIC) database one International Biological Program site and one Environmentally Sensitive Area occur at least 1 km east the proposed transmission line right of way. The Ministry of Natural Resource Chatham area office was contacted for detailed mapping of each feature. No mapping was available.

#### High Gate Rolling Sandland

This 5.7 ha site is a part of the International Biological Program. The topography is rolling moist sand plain with a small intermediate aged deciduous woodlot located here. The vegetation is dominated by Sugar maple, which forms 70% of the canopy but also includes basswood, American beech, bitternut hickory, red maple, white oak, black cherry, tulip tree, shagbark hickory, red oak, black walnut, hop hornbeam, red ash and silver maple, along with various shrubs and herbs. This site is considered to have good diversity considering its size and homogenous substrate.

#### High Gate Railroad Prairie West

This 1 ha site is a prairie remnant that occurs along a set of dual railroad tracks that traverse the Dutton Prairie/Dunwich Swamp area. The best examples of prairie habitat lie between the tracks, particularly at a point 2.5 km west of County Road 20 at Highgate, where the tracks are spread apart by approximately 50m and prairie habitat stretches for 400m. Seven grass species that are Tallgrass prairie indicators are found here including one of the densest and most extensive tracts of *Schizachyrium scoparium* in Kent. Other plant species found include dogwoods, willows, poplar and staghorn sumac.

According to the Natural Heritage Information Centre (NHIC), all native vegetation species observed within the study area are considered secure (S5) or apparently secure (S4) in the province of Ontario. None of the species encountered within the study area are listed under the federal *Species at Risk Act* or the provincial *Endangered Species Act*.

The Natural Heritage Information Centre (NHIC) database identifies four rare plant species within or adjacent to the proposed transmission line right of way study area. All of these species range

from vulnerable (S3) to imperiled (S2) in the province of Ontario. Some of these species are listed under the *Species at Risk Act (SARA)* and/or *Endangered Species Act (ESA)*. A list of known species is summarized below and their approximate location can be found in **Appendix D**.

- Long-styled rush (*Juncus longistylis*) (S3)
- Slender paspalum (*Paspalum setaceum*) (S2)
- Purple love grass (*Eragrostis spectabilis*) (S2)
- Dense blazing star (*Liatris spicata*) SRank – (S2) (THR – *SARA* and *ESA*)

No evidence of these species was observed within the proposed transmission corridor during a site visit complete on August 13, 2008.

The Atlas of the Mammals of Ontario and the Natural Heritage Information Centre database identifies one rare mammal species potentially occurring within the general vicinity of the proposed transmission line right of way (American badger (*Taxidea taxus*) (S2) (END - *SARA* and *ESA*). This species was not observed during field work.

As well, the Natural Heritage Information Centre database includes one species of invertebrate tracked by the NHIC present within or immediately adjacent to the study area (Eastern red damsel (*Amphiagrion saucium*) (S3)). This species was not observed during field work.

#### *8.2.9.2 Potential Effects*

Plants - All of the rare plant species found in the vicinity of the planned transmission line right of way are located at a sufficient distance from the planned right of way to be effectively buffered and are not anticipated to be affected by construction activities or by the presence of the transmission line.

Mammals – The two records for American badger found on the NHIC database are from 1978 and 1985. The corridor function provided by agricultural areas and connecting hedgerows is not expected to be impacted by the development of transmission corridor. However, American badgers are mobile and have some minimal potential to use lands associated with the transmission line as a foraging area.

Invertebrates – The eastern red damsel was recorded in the year 2000 close to the planned transmission line right of way. However, it is unlikely that this species will be affected by the transmission line construction and operation provided appropriate fish habitat protection is implemented.

#### *8.2.9.3 Mitigation Measures*

With exception to American badger, no mitigation measures are required as there are no anticipated effects to rare species during construction and operation of the transmission line.

As a precautionary measure, the MNR recommend that as part of the environmental impact mitigation for the development, a badger monitoring and response plan be developed and implemented during vegetation removal and grading phases of the project. MNR will provide technical advice and information materials for the development and implementation of the monitoring and response plan.”

#### *8.2.9.4 Significance of Net Effect*

The net effect of the transmission line on rare species is anticipated to be isolated to one species and limited to during construction only. Provided appropriate mitigation measures are implemented the significance of net effects is considered to be low.

### **Social Environment**

#### **8.2.10 Economics and Land Use**

##### *8.2.10.1 Existing Conditions*

Please see **Section 7.10.1.**

##### *8.2.10.2 Potential Effects*

The construction of the transmission line is not expected to result in any negative land use or economic effects. It will contribute to economic benefits through capital expenditures, employment during construction and through lease payments to landowners. These effects have been previously described in Section 7.10.

##### *8.2.10.3 Mitigation Measures*

As described above, the project is not expected to result in negative land use or economic effects. As such, no specific mitigation measures are required.

##### *8.2.10.4 Significance of Net Effects*

Given the predominate agricultural designation of the lands in the study area; the wind farm is unlikely to result in adverse effects on planned land use. Due to expected low magnitude of effect on planned land use, the effects are not expected to be significant.

#### **8.2.11 Disposal of Waste Materials**

##### *8.2.11.1 Existing Environment*

Please refer to **Section 7.11.1.**

##### *8.2.11.2 Potential Effects*

Please refer to **Section 7.11.2.**

##### *8.2.11.3 Mitigation Measures*

Please refer to **Section 7.11.3.**

##### *8.2.11.4 Significance of Net Effects*

Please refer to **Section 7.11.4.**

#### **8.2.12 Environmental Noise**

##### *8.2.12.1 Existing Environment*

Please refer to **Section 7.12.1.**

#### *8.2.12.2 Potential Effects*

There will be no noise from the transmission line. Noise associated with the transformer station was conducted as part of the noise analysis for the wind turbines as previously described in **Section 7.12.2**.

#### *8.2.12.3 Mitigation Measures*

None required for the line.

#### *8.2.12.4 Significance of Net Effects*

None required.

### **8.2.13 Agricultural and Rural Resources**

#### *8.2.13.1 Existing Environment*

Please refer to **Section 7.13.1**.

#### *8.2.13.2 Potential Effects*

There will be a temporary loss of agricultural land during the construction phase. The amount of land to be permanently removed from the transmission line will be very minimal as single poles will be used. As well, the transmission line has been routed along the edge of property to minimize disruption to agricultural operations as much as possible. It will also be possible to farm within the transmission line corridor if suitable soils exist.

#### *8.2.13.3 Mitigation Measures*

The majority of the transmission line route will be located on lot lines. Once construction is complete fields will be available for active farming in the transmission line right of way. Due to landowner preference and negotiations the entire transmission line route was not able to be situated on lot lines.

#### *8.2.13.4 Significance of Net Effects*

No net effects anticipated.

### **8.2.14 Neighbourhood and Community Characteristics**

#### *8.2.14.1 Existing Environment*

The transmission line passes through rural agricultural land that is very similar in nature to the wind farm area. The closest community to the line is Ridgetown which is about 3 km to the west. There does exist some residences in the vicinity of the transmission line corridor (see **Figure 8.3**). The closest residences (about 10) are about 200 m from the line.

#### *8.2.14.2 Potential Effects*

The only effect anticipated is the visual impact created by the transmission line. As the transmission line will be supported by conventional poles, it will blend in to the surrounding environment more so than if steel lattice style structures were used.

The only effect anticipated is the visual impact created by the transmission line. As the transmission line will be supported by conventional poles, it will blend in to the surrounding environment more so than if steel lattice style structures were used.

#### *8.2.14.3 Mitigation Measures*

None.

#### *8.2.14.4 Significance of Net Effects*

None.

### **8.2.15 Traditional Land Use by Aboriginal Peoples**

Please refer to **Section 7.15**.

### **8.2.16 Recreation and Tourism Areas**

Please refer to **Section 7.16**. No specific recreation or tourism facilities were identified in the vicinity of the transmission line route. As such, effects of this nature are not expected.

### **8.2.17 Construction Related Traffic**

Please refer to **Section 7.17**.

### **8.2.18 Public Health and Safety**

The transmission line is generally well removed from residences thereby no effects are anticipated.

### **8.2.19 Historical and Archaeological Resources**

#### *8.2.19.1 Existing Environment*

The proposed Talbot Wind Farm transmission line extends north from the north-central area of the Talbot Wind Farm (Lot 18, Con 12 of Howard Township) to connect with an existing Hydro 1 transmission line approximately 1500 metres north of Highway 401 (Lot 1, Con 9 of Orford Township) within the Municipality of Chatham-Kent. The 9.5 kilometre alignment overlies a prominent ridge formed by the Blenheim Moraine (Chapman and Putnam 1984: 44). The southern portion of the transmission line lies on the south-facing side of the ridge which drains into Lake Erie, while the northern half slopes and drains northwest toward the Thames River.

The proposed transmission line transects a series of soil types ranging from sand to loam with clay evident only in isolated pockets. Near its midpoint, the proposed line crosses over a bluff representing the upper Warren shoreline, a relict beach line formed by Glacial Lake Warren (Chapman and Putnam 1984: 64-65). The relict shoreline consists of variations of fine sandy loam, sandy loam and loamy fine sand. The light sandy soils and the sand deposits in particular would have been prime areas for Precontact and historic Native settlement.

First Nation and early Euro-Canadian archaeological resources, either formally registered or referenced anecdotally, tend to be found in proximity to water bodies such as the Lake Erie shoreline, Morpeth Creek, Clear Creek or the smaller inland watercourses that drained the study

area. Despite late eighteenth century Loyalist settlement along the Thames River, it was not until the early nineteenth century that significant Euro-Canadian settlement moved into the interior of Howard and Orford townships, including the proposed transmission line alignment. Of particular note is the important role played by the Talbot Trail in opening up early nineteenth century settlement throughout the southern portions of Howard and Orford Townships which fall within the wind farm study area but well south of the proposed transmission line.

In the summer of 2008, a Stage 1 archaeological resource assessment was undertaken as part of the alignment evaluation process. On July 29<sup>th</sup>, Cultural Resource Management (CRM) Group Limited initiated a Stage 1 background study of the proposed RES Talbot Wind Farm transmission line to inventory known archaeological resources and identify areas of archaeological sensitivity. The background study will be followed by a Stage 2 field assessment. While the full results of the wind farm and transmission line Stage 1 assessment are contained in Appendix G, the following paragraphs summarize the methodology and results of the archaeological assessment.

A Stage 1 archaeological background study, as required by the Ontario Ministry of Culture (OMC), is intended to identify archaeological resource potential within a specific geographical area and form the basis for subsequent stages of archaeological assessment, testing and mitigation. In general terms, the background study consists of the following: review of the OMC archaeological site data base; consultation with researchers and others familiar with the archaeology of the study area; archaeological potential modelling based on archival research and geographical review; and, site reconnaissance.

The identification of archaeologically sensitive areas is based on an evaluation of various environmental and cultural characteristics which were conducive to human settlement during the Precontact Native periods and/or the historic Euro-Canadian period. Environmental factors such as proximity to water for both drinking and transportation have played a crucial role in the identification of Native sites and early Euro-Canadian sites. Current air photos, topographical maps and soil maps were reviewed to identify areas of increased archaeological potential. Historic maps and land abstracts were also reviewed in conjunction with local histories to identify areas of early Euro-Canadian settlement. These environmental and cultural factors were combined to identify areas of moderate to high archaeological potential which then required further investigation under the terms of a Stage 2: Archaeological Assessment.

During the background study, CRM Group visited the proposed Talbot Wind Farm transmission line to gain a basic orientation to the study areas. During the site visit, general field conditions including vegetation were noted, as well as any obvious areas of disturbance (soil stripping, quarrying, etc) within the overall study area.

On the basis of the specific environmental and cultural factors examined during the Stage 1: Background Assessment, the proposed transmission line is considered to exhibit a mix of moderate to high archaeological potential for Precontact Native, historic Native and early Euro-Canadian settlement. Given the potential for encountering Native and/or Euro-Canadian archaeological resources within the proposed transmission line alignment, it is recommended that archaeological assessment (Stage 2) be conducted at each of the proposed tower sites, as well as ancillary facilities such as access roads, lay-down yards, etc, in advance of any ground disturbance.

OMC's guidelines for archaeological consulting stipulate that Stage 2: Assessment should, whenever possible, be based the visual examination of ploughed ground. The guidelines specify the walking of transects at between 5 metre and 10 metre intervals depending upon the perceived degree of potential within the study area. Shovel testing is to be limited to wooded, wet or landscaped areas which cannot be ploughed. Variance from this policy is generally only allowable after discussion with the Ministry and then only under exceptional circumstances.

In light of these requirements, it is recommended that all tower sites, as well as associated ancillary facilities, be ploughed and allowed to weather prior to conducting the assessment. Please note that all ploughing should be conducted within the standards of normal agricultural ploughing (no chisel ploughing or deep ploughing) so as not to disturb archaeological resources buried below the current plough zone.

#### *8.2.19.2 Potential Effects*

##### Construction

A Stage 1 archaeological background study of the Talbot Wind Farm transmission line alignment identified the area as exhibiting a mix of moderate to high archaeological potential for encountering Precontact Native, historic Native and early Euro-Canadian settlement. This means that it is quite likely that construction activities could impact as yet unidentified archaeological resources. Given this potential for impact during construction at any of the proposed tower sites, it is recommended that archaeological assessment (Stage 2) be conducted at each of the proposed tower sites, as well as ancillary facilities such as access roads, lay-down yards, etc, in advance of any ground disturbance.

The archaeological assessment would be used as a means to refine the specific placement of towers and ancillary facilities, and thus avoid cultural resource impacts.

As in most of Southern Ontario, there is also the potential to uncover unmarked burial areas. However, a Stage 2 Archaeology Assessment would also serve to reduce the risk of such an encounter.

##### Operation

Once the towers are constructed and the access roads and ancillary facilities are installed, no additional effects on historical or archaeological resources are expected.

#### *8.2.19.3 Mitigation Measures*

##### Construction

In accordance with the procedures recommended by the Ministry of Culture Guidelines (1993), a Stage 2 assessment will be conducted at each tower site or ancillary facility. If any significant historical or archaeological feature is found, the resource will be avoided or Stage 3 testing and Stage 4 mitigation will be initiated to document and/or remove the resource. During the assessment process, protective and mitigative measure will be designed to the satisfaction of the Ministry of Culture.

In the event that human remains are found, all work will stop immediately, the Ministry of Culture and the Registrar of the Cemeteries Regulation Unit of the Ontario Ministry of Consumer and Commercial Relations will be notified, as well as the appropriate police and local medical officer of health.

## Operation

No mitigation measures are required for the Operation phase of the transmission line due to the identification that no additional effects are expected.

### *8.2.19.4 Significance of Net Effects*

By following the Ministry of Culture procedures in the completion of a Stage 2: Archaeological Assessment, any archaeological resources located within the impact footprint associated with each of the towers should be identified, tested and mitigated prior to construction. Consequently, it is suggested that the net effect on Ontario's archaeological heritage will be mitigated through avoidance or recovery and documentation of the resources in compliance with OMC guidelines.

## **8.2.20 Viewscape**

### *8.2.20.1 Existing Environment*

When considering viewsapes, two factors are generally considered: the existing landscape unit, which is a combination of land use and physiography, and receptors (residences within viewing distance of the transmission towers and lines and at road crossings). The current landscape is rural in character. Construction of the 230 kV circuit will require clearing of a minimal amount of vegetation for the right of way and placement of the poles, which may affect viewsapes. Several rural residences dot the landscape in proximity to the proposed transmission line.

Heading north from the sub-station, the proposed transmission -line will cross the following roads:

- Klondyke Line
- Green Line
- Golf Course Line
- Reeders Line
- Gosnell Line
- O'Neill Line
- Highway 401
- Beechwood Line

The transmission line, poles, and cleared/maintained right of way will visible to some residences in the area as well at roads crossings.

### *8.2.20.2 Potential Effects*

Visual effects are associated with clearing of vegetation and the contrast of the transmission poles against the existing landscape. Incompatible vegetation will be removed from the right of way during construction of the T-Line and vegetation within the right of way will be maintained throughout the life of the project. Towers will be visible by local residents and along road crossings by travelers, altering some views of the rural landscape.

### *8.2.20.3 Mitigation*

The transmission line route will generally follow lot lines while avoiding woodlots. This will place the line at a typical distance of several hundred metres from most public roads and reduce visibility. Vegetation to be removed is limited to three sections of hedgerows. Road allowances will also be

utilized for the east/west diversions from the predominantly north/south orientation of the line. Compatible vegetation will be left in the right of way when possible and revegetation of cleared areas will reduce visual effects of vegetation loss. Pole towers will be used to reduce the contrast with the existing rural landscape, and landscaping may be used to reduce the visual effect of the towers and lines on local residents.

#### *8.2.20.4 Significance of Net Effects*

Transmission lines supported by wood poles are a common site in rural areas in Ontario. By routing the line generally away from residences and for the most part off of existing road right-of-ways, the visual impact of the line will be greatly limited. The line will be most visible along the sections that cross the various lines.

### **8.2.21 Accidents and Malfunctions**

During the construction period there is potential public safety issues associated with the movement of heavy equipment and other construction activities. There also exists the potential for spills of hazardous materials such as fuel, lubricants and hydraulic fluids. The project constructor will be required to construct the project in as safe a manner as possible. All standard construction safety procedures will be followed including appropriate signage and public restrictions from work site areas. Construction equipment using public roads will obey speed limits. Construction personnel will receive safety training. A health and safety plan will be developed for the wind farm.

An Emergency Response Plan (ERP) will be prepared for the project prior to the initiation of the construction period. The ERP will be submitted for review and comments to the Municipality of Chatham-Kent. The ERP will be used in the event of an emergency and will contain contact information for regulators, landowners, and other stakeholders. Equipment required to respond to an emergency will be outlined in the ERP. All appropriate regulators will be notified should the emergency include any potential impact to the health and safety of local residents or the environment.

The Municipality of Chatham-Kent have been and will continue to be consulted on the development of the ERP. RES Canada will also work with the local fire department(s) and emergency response units to ensure that they are aware of the unique requirements of transmission lines and potential associated accidents/events that they may need to respond to.

A Spills Response Plan (SRP) will also be developed which will address the requirements of the Ontario *Environmental Protection Act*. The SRP will address spill containment; spill reporting and spill clean-up procedures. Also to be included as part of this plan is the training activities for the construction work force that will be implemented to minimize the likelihood of spills.

RES Canada values the safety of the employees and the public, and will implement a Health and Safety plan during construction and operation phases of the project.

Regarding the operations period, the transmission line is to be located in a rural area with a relatively low population density. Lands are privately owned and no public thoroughfares are near the facilities. Property line and road setback distances have been observed as per municipal planning

requirements. It is expected that few people would come in close proximity to the transmission line. In any event there is very little risk to public safety from operating a transmission line.

Accidents and malfunctions with short-term impacts may occur. More serious impacts are considered to be highly unlikely.

## **9. Project Follow-Up Measures and Monitoring**

### **9.1 Construction Monitoring**

#### **9.1.1 Terrestrial Habitat/Wildlife**

Terrestrial habitat/wildlife in the area could be affected through disturbance effects from the operation of heavy equipment in the area. As the study area is actively farmed, it is expected that many species have become adapted to the operation of heavy machinery. Nevertheless, RES Canada will take reasonable measures to ensure that construction equipment is kept in good working condition and that excessive noise and air emissions from machinery is avoided.

Accidental spills could also affect habitat. RES will be required to ensure that should a spill of a hazardous material occur (e.g. fuel), that the spill would be quickly responded to as per the requirements of the Spills Contingency Plan.

Any replanted and reclaimed areas will be inspected one year after their planting to ensure that they are established.

#### **9.1.2 Aquatic Habitat/Surface Water**

It is expected that monitoring activities relating to aquatic habitat will be confirmed through the ongoing permitting process with the LTVCA and DFO. The monitoring of aquatic habitat will occur at different levels. During construction, RES will ensure that the watercourse is crossed in an appropriate manner and that committed mitigation measures (e.g. erosion/sediment control) are being implemented and are effective. Some water quality sampling may be undertaken to ensure the effectiveness of the implemented measures. Weather conditions will be monitored to ensure that watercourses are being crossed at appropriate times so as to avoid in-water works during high flow events as much as feasible.

Site rehabilitation measures such as vegetation plantings in the riparian zone and fish habitat compensation measures (if required) will be monitored to ensure that they have been implemented correctly and inspected after the following year spring melt period. Corrective action will be taken should the rehab works not be effective.

All culverts will also be inspected on a frequent basis during construction to ensure that they are conveying water flow and not resulting in upstream flooding (either through blockage from debris or because of their under sizing).

#### **9.1.3 Agricultural Land**

Potential effects on agricultural soil as a result of the project include: soil compaction, increased stoniness soil subsidence after trench refilling and soil erosion. The movement of construction equipment such as the erection cranes has the potential to compact soils in agricultural fields. Soil compaction will be monitored and where necessary it will be decompacted. Trench areas will be monitored for excessive stoniness and soil subsidence. Stones may need to be removed and additional soil added to some sections of the refilled trench.

Finally, areas that have had topsoil removed and then replaced will be inspected to ensure that topsoil/sub soil layer mixing has not occurred. Through sampling, if soil mixing has occurred, appropriate measures will be put in place to correct this.

The movement of construction equipment through the study area and construction of access roads has the potential to impact tile drains. Many of the farm properties that have been leased for the project have been tile drained. Prior to construction activities, meetings will be held with landowners for the purpose of identifying the location of tile drains. These areas will be flagged. Where damage has occurred, or suspected to have occurred as a result of construction activity, drains will be repaired by RES Canada. The repair of the drains will be monitored to ensure that land is draining properly.

#### **9.1.4 Construction Disturbance Effects**

During the construction period, there is the potential for disturbance effects such as a noise and dust. It is expected that standard construction practices will minimize these effects as much as feasible. RES Canada will advertise in the community a contact number should residents wish to voice a complaint regarding the construction process and/or to obtain more information. RES Canada will respond to these calls and address the problem.

#### **9.1.5 Roads**

The use of local roads by the construction equipment has the potential to affect the road bed/condition. The roads will be returned to their preconstruction condition. The roads will be monitored after heavy rain events during the construction period and road repairs made if required. This will include new access points and roadside drain crossings.

### **9.2 Operations Monitoring**

RES Canada will consult with Environment Canada/CWS and the Ontario MNR regarding the scope of the post construction avian (bird and bat) mortality monitoring. A post construction monitoring plan will be prepared and submitted for their review and comments. The monitoring would be undertaken after various low (good) and high-risk (poor) weather conditions have occurred in the area (i.e. clear sky or low fog). Turbines will be sampled as soon as is reasonable after a target weather condition has passed through the area. This sampling of target weather conditions will be conducted on a seasonal basis in an attempt to model any difference in mortality rate during a particular weather event.

### **9.3 Community Liaison and Follow-up**

RES Canada will provide information releases to the community if new issues arise or if the community has specific concerns. Company representative contact information will be available to the public to address concerns and questions during operations. Stakeholder consultation and communications activities going forward will include:

- Project update bulletin or bulletins as required, mailed or hand-delivered to keep area residents apprised of the progress of construction, dates and timings of any traffic disruptions connected with the project and any other matters that may affect or be of interest to area residents and other project stakeholders;
- Creation of a Community Benefit Fund, whereby landowners and community member will have input into funding priorities;
- Newspaper notices regarding traffic disruptions and construction timings of interest;
- Personal consultations as requested or if warranted by project activity;
- Meetings with municipal and other local and provincial government authorities;
- RES proposes to hold another community public information centre to present the final proposed transmission line route; and
- Ongoing consultations and meetings with project landowners.

## **10. Conclusion**

The federal and provincial governments, as does the Municipality of Chatham-Kent, support the development of wind power in Ontario as it is a necessary contributor towards the Province's plan (the IPSP) to close existing coal-powered electricity generation by 2014, thus reducing some of the province's largest emission sources of greenhouse gases. Wind energy is also recognized at the federal level a source of carbon dioxide offsets which industry will use in federal carbon 'cap and trade' program. Finally, wind energy is a contributor towards Canadian energy security and an independence from imported fuel sources such as gas and bulk electricity imports from the United States.

Every reasonable step has been taken to ensure this project adheres to all federal, provincial and municipal regulatory requirements. Based on the Environmental Review that was undertaken, the Talbot Wind Farm, including the mitigation commitments, will not likely cause significant effects on the environment, including the natural and social environment. Furthermore, the project will positively contribute to the economy of the host rural community, while not contributing greenhouse gases into the environment.

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