GRAND RENEWABLE ENERGY PARK
NATURAL HERITAGE ASSESSMENT
AND ENVIRONMENTAL IMPACT STUDY

File No. 161010624/161010646
October 2011

Prepared for:

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Executive Summary

Samsung C&T (Samsung), Korea Power Electric Corporation (KEPCO) and Pattern Energy (Pattern) are proposing to develop, construct, and operate the Grand Renewable Energy Park (the "Project") in response to the Government of Ontario's initiative to promote the development of renewable electricity in the Province.

The Project is proposed within the County of Haldimand and is generally bounded by Townline Road to the north, Haldimand Road 20 to the west, the Grand River to the east and Lake Erie to the south. It consists of a 148.6 MW (nameplate capacity) wind project, a 100 MW (nameplate capacity) solar project located on privately owned and Ontario Realty Corporation (ORC) managed lands and a transmission line to convey electricity to the existing power grid. According to subsection 6(3) of O. Reg. 359/09, the wind component of the Project is classified as a Class 4 Wind Facility and the solar component of the Project is classified as a Class 3 Solar Facility.

The basic components of the Project include 67 wind turbines, approximately 425,000 photovoltaic (PV) solar panels installed on fixed ground-mounted racking structures organized into 100-1 MW solar modules, a collector sub-station, interconnect station and Operations and Maintenance building, temporary storage and staging areas, approximately 20 km of 230 kV transmission lines along Haldimand Road 20, approximately 82 km of new overhead 34.5 kV collector lines along public roads, approximately 48 km of new underground collector lines along turbine access roads, approximately 45 km of turbine access roads and 40 km of solar panel maintenance roads.

This Natural Heritage Assessment (NHA) and Environmental Impact Study (EIS) Report is intended to satisfy the requirements outlined within Ontario Regulation 359/09 (Sections 24 through 28, 37 and 38) and is to be submitted as a component of the Renewable Energy Approval (REA) application for the Project. The scope and content of this document were generated through consultation with the Ministry of Natural Resources, with specific information provided by a variety of provincial, conservation authority and municipal agencies, including members of the public.

The records review report, site investigation report, evaluation of significance report and Environmental Impact Study for significant features located in or within 120 m of the Project Location as required by O. Reg. 359/09 are included within this document. Background data were collected and reviewed to identify natural features located in, or within 120 m of the Project Location. The results of the records review search were used to determine whether the Project Location is in or within 120 m of a natural feature. These results were confirmed and supplemented through site investigations to confirm and refine the boundaries and characteristics of the natural features within the 120 m Zone of Investigation surrounding the Project Location.

Natural features present in and within 120 m of the Project Location requiring an evaluation of significance in accordance with s. 27 of O. Reg. 359/09 included several wetlands, woodlands, valleylands and candidate significant wildlife habitat in the area. James N. Allen Provincial Park is also located within 120 m of the Project.

Natural heritage information pertaining to the form and function of the natural features were analyzed in accordance with Provincial guidelines to determine the significance and sensitivity of existing ecological features and functions. Based on this evaluation, several provincially and locally significant wetlands, significant woodlands, significant valleylands and significant wildlife habitat were identified within 120 m of the Project Location. Information dealing with the presence of threatened or endangered species and habitat are subject to the *Endangered Species Act* and are beyond the scope of this NHA / EIS.

An EIS is provided for each significant natural feature that is found within 120 m of the Project Location. The EIS identifies and assesses any negative environmental effects and proposes mitigation measures to minimize and mitigate the potential negative impacts associated with the planning, design construction, and operation of the Projects.

Once the identified protective, mitigation and compensation measures are applied to the environmental features discussed above, the construction and operation of the Project is expected to have acceptable net negative effects on the significant features and functions identified through the Natural Heritage Assessment process. An environmental effects monitoring plan that includes a post-construction monitoring program will be developed to confirm the accuracy of predicted effects as well as to monitor the effects to other natural elements.

The following table summarizes the requirements of this report as specified under O. Reg. 359/09:

Natural Heritage Assessment and Environmental Impact Study Report Requirements (as per O. Reg. 359/09)

Requirements	Completed	Section Reference
24. (1) A person who proposes to engage in a renewable energy project shall conduct a natural heritage assessment, consisting of the following:		
1. A records review conducted in accordance with section 25.	√	Section 3.0
2. A site investigation conducted in accordance with section 26.	√	Section 4.0
3. Subject to subsection (3), an evaluation of the significance or provincial significance of each natural feature identified in the course of the records review and site investigation, conducted in accordance with section 27.	√	Wind – Section 5.2 Solar – Section 5.3 Transmission Line – Section 5.4
(2)…Identifying natural features and determining the boundaries of any natural features, a person mentioned in subsection (1) shall use applicable evaluation criteria or procedures established or	√	Section 5.1

Natural Heritage Assessment and Environmental Impact Study Report Requirements (as per O. Reg. 359/09)

Requirements	Completed	Section Reference
accepted by the Ministry of Natural Resources, as amended from time to time.		
25. (1) In conducting a records review mentioned in paragraph 1 of subsection 24 (1), a person who proposes to engage in a renewable energy project shall ensure that a search for and analysis of the records set out in Column 1 of the Table to this section are conducted in respect of the project location for the purpose of making the determinations set out opposite the records in Column 2 of the Table.	√	Sections 3.2.3 to 3.2.8
(3) The person mentioned in subsection (1) shall prepare a report setting out a summary of the records searched and the results of the analysis conducted under subsection (1).	√	Section 3.1.1 Sections 3.2.3 to 3.2.8
26. (1) For the purposes of conducting a site investigation, a person who proposes to engage in a renewable energy project shall ensure that an investigation of the air, land and water within 120 m of the project location is conducted, either by visiting the site or by an alternative investigation of the site, in order to determine:	√	Wind – Section 4.3 Solar – Section 4.4 Transmission Line – Section 4.5
a) whether the results of the analysis summarized in the report prepared under subsection 25 (3) are correct or require correction, and identifying any required corrections;	√	Table 4.3 (Appendix B)
(b) whether any additional natural features exist, other than those that were identified in the report prepared under subsection 25 (3);	√	Table 4.3 (Appendix B) Sections 3.2.3 to 3.2.8
(c) the boundaries, located within 120 m of the project location, of any natural feature that was identified in the records review or the site investigation; and	√	Figures 9, 10.1 to 12.6 (Appendix A)
(d) the distance from the project location to the boundaries determined under clause (c). O. Reg. 359/09, s. 26 (1).	√	Wind - Section 6.1 Solar – Section 6.2.2 Transmission Line - Section 6.3.2
(3) The person mentioned in subsection (1) shall prepare a report setting out the following with respect to the air, land and water in respect of which any site investigation was conducted:	√	Section 3.0
1. A summary of any corrections to the report prepared under subsection 25 (3) and the determinations made as a result of conducting the site investigation.	√	Table 4.3 (Appendix B)
2. Information relating to each natural feature identified in the records review and in the site investigation, including the type, attributes, composition and function of the feature	√	Table 4.6 (Appendix B)
3. A map showing, i. all boundaries mentioned in clause (1) (c), ii. the location and type of each natural feature identified in relation to the project location, and	√	Figures 10.1 to 12.6 (Appendix A)

Natural Heritage Assessment and Environmental Impact Study Report Requirements (as per O. Reg. 359/09)

Requirements	Completed	Section Reference
iii. all distances mentioned in clause (1) (d).		
4. A summary of methods used to make observations for the purposes of the site investigation.	√	Sections 4.1.1. to 4.1.6
5. The name and qualifications of the person conducting the site investigation.	√	Table 4.1 (Appendix B) Appendix I
6. If an investigation was conducted by visiting the site: i. The dates and times of the beginning and completion of the site investigation. ii. The duration of the site investigation. iii. The weather conditions during the site investigation. iv. Field notes kept by the person conducting the site investigation	√	Table 4.1 (Appendix B) Appendix E
27. (1) In conducting the evaluation of the significance or provincial significance of a natural feature for the purposes of paragraph 3 of subsection 24 (1), a person who proposes to engage in a renewable energy project shall consider any information available to the person relating to natural features, including, a) all information obtained during the records review conducted in accordance with section 25; b) all information obtained during any site investigation conducted in accordance with section 26; and c) all information received from the public, aboriginal communities, municipalities, local road boards and Local Services Boards until such time as the report mentioned in subsection 27 (4) has been prepared.	√	Wind – Section 5.2 Solar – Section 5.3 Transmission Lines – Section 5.4
(2) For the purposes of the evaluation under subsection (1), a person shall determine that a natural feature is significant if it is a woodland, a valleyland or a wildlife habitat, (a) that the Ministry of Natural Resources has identified as significant; or (b) that is considered to be significant when evaluated using evaluation criteria or procedures established or accepted by the Ministry of Natural Resources, as amended from time to time, for significant natural features.	√	Sections 5.1.2 Valleylands 5.1.4 Wildlife Habitat 5.1.5 Woodlands
(3) For the purposes of the evaluation under subsection (1), a person shall determine that a natural feature is provincially significant if it is a southern wetland, a northern wetland, a coastal wetland, an area of natural and scientific interest (earth science) or an area of natural and scientific interest (life science), (a) that the Ministry of Natural Resources has identified as provincially significant; or (b) that is considered to be provincially significant when evaluated using evaluation criteria or procedures established or accepted by the Ministry of Natural Resources, as amended from time to time, for provincially	√	Sections 5.1.1 Wetlands 5.1.3 ANSIs

Natural Heritage Assessment and Environmental Impact Study Report Requirements (as per O. Reg. 359/09)

Requirements	Completed	Section Reference
significant natural features.		
(4) The person mentioned in subsection (1) shall prepare a report that sets out the following: 1. For each natural feature shown on the map mentioned in paragraph 3 of subsection 26 (3), a determination of whether the natural feature is provincially significant, significant, not significant or not provincially significant. 2. A summary of the evaluation criteria or procedures used to make the determinations mentioned in paragraph 1. 3. The name and qualifications of any person who applied the evaluation criteria or procedures mentioned in paragraph 2. 4. The dates of the beginning and completion of the evaluation.	√	Wind – Section 5.2 Solar – Section 5.3 Transmission Lines – Section 5.4 Section 5.1 Section 5.6
37. No person shall construct, install or expand a renewable energy generation facility as part of a renewable energy project at a project location that is in any of the following locations: 1. A provincially significant southern wetland. 2. A provincially significant coastal wetland. 3. A provincial park or a conservation reserve, unless the construction, installation or expansion of the facility is not prohibited by or under the *Provincial Parks and Conservation Reserves Act, 2006*. O. Reg. 359/09, s. 37	√	Wind – Sections 6.1.3 to 6.1.49 Solar – Section 6.2.2 Transmission Lines – Section 6.3.2
38. (1) No person shall construct, install or expand a renewable energy generation facility as part of a renewable energy project at a project location that is in any of the following locations: 1. A provincially significant northern wetland or within 120 m of a provincially significant northern wetland. 2. Within 120 m of a provincially significant southern wetland. 3. Within 120 m of a provincially significant coastal wetland. 4. A provincially significant area of natural and scientific interest (earth science) or within 50 m of a provincially significant area of natural and scientific interest (earth science). 5. A provincially significant area of natural and scientific interest (life science) or within 120 m of a provincially significant area of natural and scientific interest (life science). 6. A significant valleyland or within 120 m of a significant valleyland. 7. A significant woodland or within 120 m of a significant woodland. 8. A significant wildlife habitat or within 120 m of a significant wildlife habitat.	√	Wind – Sections 6.1.3 to 6.1.49 Solar – Section 6.2.2 Transmission Lines – Section 6.3.2

Natural Heritage Assessment and Environmental Impact Study Report Requirements (as per O. Reg. 359/09)

Requirements	Completed	Section Reference
9. Within 120 m of a provincial park. 10. Within 120 m of a conservation reserve.		
(2) Subsection (1) does not apply if, as part of the application for the issue of a renewable energy approval in respect of the renewable energy project, the applicant submits, (a) an environmental impact study report prepared in accordance with any procedures established by the Ministry of Natural Resources, as amended from time to time, that, (i) identifies and assesses any negative environmental effects of the project on a natural feature, provincial park or conservation reserve referred to in paragraphs 1 to 10 of subsection (1),	√	Wind – Sections 6.1.2 to 6.1.49 Solar – Section 6.2.2 Transmission Lines – Section 6.3.2
(ii) identifies mitigation measures in respect of any negative environmental effects mentioned in subclause (i),	√	Wind – Sections 6.1.3 to 6.1.49 Solar – Section 6.2.2 Transmission Lines – Section 6.3.3
(iii) describes how the environmental effects monitoring plan set out in paragraph 4 of item 4 of Table 1 addresses any negative environmental effects mentioned in subclause (i), and	√	Section 6.4 EEMP under separate cover
(iv) describes how the construction plan report prepared in accordance with Table 1 addresses any negative environmental effects mentioned in subclause (i);	√	Table 6.2

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1.0 Overview

Samsung C&T (Samsung), Korea Power Electric Corporation (KEPCO), and Pattern Energy (Pattern) plan to build and operate the world's largest renewable energy cluster in Southern Ontario (Ontario Alternative Energy Cluster). Samsung has previously launched Korea's first solar energy project and built the world's largest skyscraper (Dubai). KEPCO is one of the world's top power utilities and develops low-carbon power generation and smart grid technologies. Pattern is an independent, fully integrated energy company that develops, constructs, owns and operates renewable energy and transmission assets in the United States, Canada and Latin America. Together, these companies will be involved in the development of the first phase of the Ontario Alternative Energy Cluster development.

Stantec Consulting Ltd. ("Stantec") was retained by Samsung, Pattern and KEPCO (herein referred to as "SPK") to prepare a Natural Heritage Assessment (NHA) and Environmental Impact Study (EIS) for the proposed Grand Renewable Energy Park ("the Project"). This report has been prepared in accordance with *Ontario Regulation 359/09* issued under the *Environmental Protection Act* with guidance obtained from the Draft *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2010).

This report has been prepared for submission to the Ministry of Natural Resources (MNR) in advance of its submission as part of a Renewable Energy Approvals (REA) package to the Ministry of the Environment (MOE).

1.1 PROJECT OVERVIEW

The Project consists of a 148.6 MW (nameplate capacity) wind project, a 100 MW (nameplate capacity) solar project located on privately owned and Ontario Realty Corporation (ORC) managed lands and a transmission line to convey electricity to the existing power grid. Specifically, the Project will consist of the following:

- 67 wind turbines (65 with a nameplate capacity of 2.221 MW and 2 that have been re-rated to 2.126 MW);
- pad-mounted transformers near the base of each tower;
- construction pads and turnaround areas surrounding each wind turbine location (temporary during construction);
- approximately 425,000 photovoltaic (PV) solar panels installed on fixed ground-mounted racking structures organized into 100 1 MW solar modules;
- a 0.72 ha collector sub-station and associated stormwater collection system;
- a 4.5 ha Operations and Maintenance building and associated parking, storage and stormwater management areas;

- a 1.08 ha interconnect station;
- approximately 20 km of 230 kV transmission lines along Haldimand Road 20;
- approximately 82 km of new overhead 34.5 kV transmission lines along public roads;
- approximately 48 km of new underground transmission lines along turbine access roads; and
- approximately 45 km of turbine access roads and 40 km of solar panel maintenance roads.

According to subsection 6(3) of O. Reg. 359/09, the wind component of the Project is classified as a Class 4 Wind Facility and the solar component of the Project is classified as a Class 3 Solar Facility.

1.2 PROJECT LOCATION AND STUDY AREA

The Project is proposed within the County of Haldimand and is generally bounded by Townline Road to the north, Haldimand Road 20 to the west, the Grand River to the east and Lake Erie to the south. The area generally consists of flat, gently rolling farmland on the Haldimand clay plain with several woodlands, wetlands and watercourses traversing the area. Settlements within the general vicinity of the Project include Byng, Cayuga, Decewsville, Dunnville, Fisherville, Nelles Corners, Rainham Centre, Sandusk, Selkirk, South Cayuga and Sweets Corners. Several cottages and residential dwelling also occur along the north shore of Lake Ere, with the remainder of the area used for agricultural production. Selkirk Provincial Park and James N. Allan Provincial Park, as well as Taquanyah Conservation Area and Byng Conservation Area, are located in the general vicinity of the Project.

The “Project Location” refers to any land, structure or air space in, on or over which part of a renewable energy project is proposed. This includes structures such as turbines, solar panels, access roads and power lines, as well as any temporary work areas (constructible areas) which are required to be utilized during the construction of the Project (see **Figure 1, Appendix A**). These components have been divided into 3 separate areas that together comprise the Project Location, as follows:

- Wind Project Location: includes the wind turbines, access roads, collector lines and constructible area (temporary construction zone surrounding access roads and turbines);
- Solar Project Location: includes the solar panels, sub-station, collector lines, access roads, operation and maintenance building, stormwater management facility and other appurtenances within the Solar Lands; and
- Transmission Project Location: includes the transmission line, towers and all appurtenances from the collector sub-station to the existing transmission lines south of Hagersville.

"Constructible Areas" have been identified surrounding the various Project components, which include temporary work areas, laydown areas or areas within which some disturbance may occur during construction. No permanent structures are proposed within these areas, with the exception of the Project components noted above. Originally, these areas were used to provide some flexibility during the micro-siting of the Project components to ensure field investigations were completed within 120 m of the Project. However, these areas have been refined to identify the area within which construction activity is proposed (and conversely to limit encroachment into or immediately adjacent to specific natural features).

The "Study Area" used for the records review component of this NHA report generally includes all lands within 1km of the Project Location in order to identify natural features within, or partially within, 120 m of the Project (**Figure 1, Appendix A**).

For the purposes of verifying the accuracy of the records review and to identify any additional natural features, , a "Zone of Investigation" has been identified based on the requirements of Ontario Regulation 359/09 (O. Reg. 359/09) and the Draft *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, December 2010). The "Zone of Investigation" encompasses the Project Location plus an additional 120 m surrounding the Project Location (**Figure 1, Appendix A**) and is the area within which site-specific field investigations were completed to:

- verify whether the analysis of the project location undertaken through the records review is accurate, and make any necessary corrections to the determinations in the records review report;
- determine whether any additional natural features exist within 120 m of the project location, other than those identified in the records review report;
- determine the boundaries of any natural feature located within 120 m of the project location (identified through the records review report or during site investigation); and
- determine the distance from the project location to the boundaries of any natural features.

This ensures that any negative environmental effects that may result from construction and operation of the Project will be assessed within this report as per the requirements of O. Reg. 359/09.

2.0 Renewable Energy Approval Requirements

2.1 RENEWABLE ENERGY APPROVALS

Ontario Regulation 359/09 (as amended by O. Reg. 376/09 and O. Reg. 521/10) issued under the *Environmental Protection Act* outlines the application, approval, consultation and reporting requirements necessary to obtain approval of a renewable energy project, such as a wind, solar, thermal treatment or anaerobic digestion facility.

This NHA and EIS report is intended to satisfy sections 24 through 28, 37 and 38 of O. Reg. 359/09. It has been prepared through consultation with the Guelph and Aylmer District MNR with guidance provided from the Draft *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2010) for submission as a component of the REA application for this Project.

Pursuant to O. Reg. 359/09, an NHA is required for all renewable energy projects, which must include a records review (s. 25), site investigation (s. 26) and evaluation of significance (s. 27) for any natural features in, or within 120 m of, the Project Location. The results of the NHA must be consolidated into a report and submitted to MNR for confirmation (s. 28) in advance of submission of the REA application to the MOE.

The location, boundaries, characteristics and significance of the following natural features and areas must be determined in relation to the project location:

- life science and earth science areas of natural and scientific interest (ANSIs);
- wetlands, including coastal, northern and southern wetlands;
- valleylands;
- wildlife habitat;
- woodlands; or
- provincial parks and conservation reserves.

Any sand barrens, savannahs, tallgrass prairies or alvars must also be considered where a Project occurs within the Protected Countryside identified under the *Greenbelt Act* or within the Oak Ridges Moraine Conservation Plan Area identified under the *Oak Ridges Moraine Conservation Act*. However, this Project is not located within the Greenbelt or Oak Ridges Moraine and therefore consideration for these natural features is not required under O. Reg. 359/09.

The results of the NHA are intended to identify any significant natural features located within 120 m of the Project Location, for which the completion of an EIS is required in accordance with section 38 of O. Reg. 359/09. An EIS must be completed in accordance with MNR procedures

(as amended from time to time) and must identify and assess any negative environmental effects of the Project, identify appropriate mitigation measures and describe how the environmental effects monitoring plan and construction plan will address any negative environmental effects (O. Reg. 359/09, s. 38(2)(a)).

Prohibitions for the construction, installation or expansion of a renewable energy generation facility exist for provincially significant southern wetlands, provincially significant coastal wetlands, or a provincial park or conservation reserve (unless otherwise permitted under the Provincial Parks and Conservation Reserves Act, 2006) (O. Reg. 359/08, s. 37). Renewable energy generation facilities may be permitted within the following areas subject to the completion of an EIS:

- provincially significant northern wetland;
- provincially significant life science ANSI;
- significant valleyland;
- significant woodland;
- significant wildlife habitat;
- within 120 m of the above natural features, provincially significant southern wetland, provincially significant coastal wetland, provincial park or conservation reserve;
- provincially significant earth science area of natural and scientific interest (ANSI); or
- within 50 m of a provincially significant earth science ANSI (O. Reg. 359/09, s. (38(1)).

The NHA and EIS report is submitted to the MNR for review prior to the submission of a REA application to the MOE. Written confirmation from the MNR (s. 38(2)(b)), as well as any written comments received from the MNR (s. 38(2)(c)) based on their review, must be submitted along with the NHA and EIS to the MOE as part of the REA application.

Consideration for the identification and protection of endangered and threatened species protected under the *Endangered Species Act* is beyond the scope of this report. In consultation with the MNR, SPK and Stantec have been and will be reviewing the implications of this Act to the Project and, where appropriate, will be preparing any necessary Permit applications for submission to the MNR in conjunction with the submission of the REA application and supporting documents to the MOE.

2.2 GUIDANCE DOCUMENTS

During the preparation of this report, several guidance documents were referenced to ensure compliance with current standards and agency requirements. These documents include:

- Draft *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2010) (Draft posted to EBR on December 8, 2010)
- Draft *Bats and Bat Habitats Guideline for Renewable Energy Projects* (MNR, 2010)
- Draft *Birds and Bird Habitats Guideline for Renewable Energy Projects* (MNR, 2010)
- *Natural Heritage Reference Manual* (MNR, 2010)
- *Significant Wildlife Habitat Technical Guide* (MNR, 2000)
- Significant Wildlife Habitat Decision Support System (MNR, undated)
- *Ontario Wetland Evaluation System, Southern Manual* (MNR, 2002)

As well, although still in working draft form and not yet in effect, the Draft version of the *Significant Wildlife Habitat Ecoregion Criteria Schedules* (MNR, 2009) was consulted for information purposes.

2.3 OTHER APPLICABLE LEGISLATION

The REA process integrates provincial review of the environmental issues and concerns that were previously addressed through the local land use planning process (e.g. zoning or site planning), environmental assessment process and environmental approvals processes (e.g. Certificates of Approval, Permits to Take Water). Although amendments through the Green Energy Act have provided exemptions to several pieces of Provincial legislation (i.e. Planning Act, Environmental Protection Act), renewable energy facilities remain subject to various other environmental Acts and Regulations, including the following:

Federal

- *Fisheries Act* – requires prior Authorization for any Harmful Alteration, Disruption or Destruction (HADD) of fish habitat and prohibits release of a deleterious substance;
- *Migratory Bird Convention Act* – in addition to harvesting and hunting restrictions, this Act prohibits the disturbance of the nests of migratory birds except as authorized by regulation.
- *Species at Risk Act* (SARA) – prohibits killing or harming species at risk (or their residence), as listed under SARA schedules, that are either aquatic species or migratory birds protected under the *Migratory Bird Convention Act*.

Provincial

Pursuant to O. Reg. 15/10 issued under the *Green Energy Act*, renewable energy facilities remain subject to various provincial Acts and Regulations, including:

- *Endangered Species Act* - protects species at risk, as identified through regulation, and their habitats by prohibiting anyone from killing, harming or harassing protected species, as well as prohibiting any damage or destruction to their habitat.
- *Public Lands Act* – requires prior issuance of a Permit to construct a water crossing (e.g. bridge, culvert and causeway) on public land, except where constructed under the authority of the Crown Forest Sustainability Act.
- *Fish and Wildlife Conservation Act* - prohibits the destruction of nests or eggs of birds (beyond those protected under the MBCA) and the destruction of beaver dams or dens of black bear and furbearing mammals (except dens of foxes or skunks) and prohibits the interference with a black bear in its den.
- *Conservation Authorities Act* – requires prior issuance of a Permit for any development within a regulated area, interference with a wetland or alteration to a river, creek, stream or watercourse pursuant to the *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation*. For renewable energy projects, as amended in 2009, such permission is based on the control of pollution, flooding, erosion or dynamic beaches but not the 'conservation of land' (s. 28(13.1)).

Municipal

- *Ontario Building Code*

The implications of these Acts were considered during the preparation of the Project layout and design. Additional documentation will be submitted to the appropriate agencies to address any legislative requirements of the above Acts outside of the REA process.

3.0 Records Review

This records review report was prepared in accordance with Section 25 of O. Reg. 359/09 with guidance provided from the Draft *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2010). The intent of this section is to identify, verify and document any natural features present at or within 120 m of the proposed Project Location.

3.1 METHODS

3.1.1 Background Data Collection

A variety of background documents and sources of information made available through agency staff and on-line resources were reviewed during the preparation of this report, including the following data sources:

Agency Records, Reports and Mapping

- MNR Wetland Evaluation Records (various);
- MNR ANSI Reports (various);
- MNR Deer Wintering Activity Data and associated mapping (MNR Niagara, 2000);
- MNR AMIS database (bat hibernacula locations);
- Grand River Conservation Authority GIS data layers and regulatory mapping (2010);
- Long Point Region Conservation Authority GIS data layers and regulatory mapping (2010);
- *Grand River Watershed Characterization Report* (Draft, 2008);
- *Long Point Region Watershed Characterization Report* (Draft, 2008); and
- *Haldimand County Official Plan* (2006) and associated Schedules and Appendices

On-line Resources

- Land Information Ontario (LIO) digital mapping of natural features (MNR, 2010);
- Natural Heritage Information Centre (NHIC) database search for Natural Areas and Species records (Accessed June 2010);
- Ontario Parks website (2010);

- Renewable *Energy Atlas* (2010) Bat hibernacula mapping;
- Important Bird Areas database (Bird Studies Canada and BirdLife International, undated);
- Audubon Society Christmas Bird Count database; and
- Ontbirds Archives (various years).

Other Reports and Studies

- *Natural Areas Inventory of the Regional Municipality of Haldimand-Norfolk, Volume 2: Annotated Checklists* (Norfolk Field Naturalists, 1987);
- Various wildlife atlases (birds, mammals, herpetofauna); and
- *Samsung C&T Corporation, 2009/2010 Bird Baseline Monitoring Program and Results, Grand Renewable Energy Park* (Hatch, 2010) (Appendix C).

A complete list of information received and cited during the preparation of this NHA and EIS report is provided in **Section 8** (References Cited) of this report.

3.1.2 Agency Consultation

An important component of the records review also involved specific consultation and meetings with the various provincial, municipal and conservation authority staff to obtain relevant background information and to clarify agency expectations with respect to REA guidelines and documentation requirements. Specific consultation with agency staff included:

(a) requests for existing background information pertaining to natural features mapping, inventories or other available information from the MNR (Guelph, Aylmer, Niagara), MOE, Grand River Conservation Authority (GRCA), Long Point Region Conservation Authority (LPRCA) and Haldimand County;

(b) several meetings with MNR staff to introduce the Project, review the REA process, exchange natural heritage feature mapping for the Study Area and discuss the proposed field work program and results (May 6, July 23, September 9, September 15, and December 15, 2010);

(c) several meetings with MNR staff to review and discuss their comments based on a review of initial Natural Heritage Assessment and Environmental Impact Study (March 7, March 15, April 20 and June 21, 2011)

(d) project progress update meetings with MEI, MOE and MNR staff (various dates);

(e) correspondence with Frank Brunton, an Aggregate & Industrial Minerals Geologist with the Sedimentary Geoscience Branch of the Ontario Ministry of Northern Development and

Mines, to determine the potential for karst-like or cave-like habitat features within the Study Area (September 23, 2010);

(f) meeting with the GRCA and LPRCA staff to discuss the proposed project layout, components, design and information requirements (October 26, 2010); and

(g) other general correspondence between Stantec and various agencies (phone calls, emails) to exchange information, confirm the site investigations program and clarify / address data any gaps.

A summary of consultation activities and agency staff consulted during the preparation of this report is provided in the **Consultation Report** (under separate cover).

3.1.3 Public Consultation

Information regarding natural heritage features and wildlife received from the public at a Public Open House, held on July 8, 2010 in Cayuga, was considered in the records review. In addition, the Norfolk Field Naturalists (Diane Salter, October 22, 2010) were contacted to request Natural Heritage Inventory data for this area.

3.2 RESULTS

Based on a review of the above information sources, and through consultation with agency staff, several natural features have been identified within the Study Area. A description of each natural feature is provided in this section of the report and the location of each natural feature is identified on **Figure 2 (Appendix A)**.

As noted above, this information was used to identify natural features within the Study Area, to determine those natural features that occur in or within 120 m the Project Location (50 m if the feature is an Earth Science ANSI).

3.2.1 Physiography

3.2.1.1 Soils

The Study Area is situated in the Haldimand Clay Plain Physiographic Region. This physiographic region has an area of 1,350 sq. miles (3,500 km^2). Although it was all submerged in glacial Lake Warren, the till is not all buried by stratified clay (Chapman & Putnam 1984). The outstanding characteristics of the soils of this region are that the soils are heavy in texture and have poor drainage. It must be mentioned that the soil drainage in this region is not uniform. For example, areas of better-drained soils are dotted with wet depressions of irregular size and shape. This mottled pattern is easily seen from aerial photography.

The majority of the soils in the vicinity of the Study Area are mapped as imperfectly drained Haldimand soils (Presant & Acton, 1984). This is the imperfectly drained member of the

Smithville soil catena. Typically, the surface soil texture is silty clay grading into heavy clay with depth. The other members of the soil catena, the moderately well drained Smithville soil and the poorly drained Lincoln soils were also mapped within the Study Area. Members of the Brantford soil catena (Brantford, Beverly and Toledo soils) were also mapped within the Study Area. These soils are similar to the soils of the Smithville soil catena except that they do not contain a heavy clay textured horizon within the soil profile.

Most of the Canada Land Inventory (CLI) Agricultural Capability for the Study Area is CLI class 3 (OMAFRA & AgCanada, 2009). The main two soil limitations to agricultural productivity are excess water (W) and undesirable soil structure and/or low permeability (D). The two minor soil limitations identified within the Study Area are adverse topography (T) and bedrock within 100 cm of soil surface (R). As stated above, most of the soils within the Study Area were mapped as the imperfectly drained Haldimand soils. These soils have been mapped as having a heavy clay soil horizon identified within the 100 cm soil profile.

3.2.1.2 Geology

The Ontario Ministry of Northern Development and Mines indicated that Haldimand County and the surrounding area has potential to have karst features, and possible presence of sinkholes, caves and dissolution of joint systems in the Late Silurian Bertie formation (pers. comm.., F. Brunton, September 23, 2010). This formation tends to be found south of the Grand River (OGS, 1985). There is also the potential to have karst-like feature in the Middle Devonian Dundee formation. This formation is located in the vicinity of Nanticoke. The locations of karst-like features have been identified in **Figure 3 (Appendix A)**.

Other locations for potential caves or cave-like features would be located at the various quarries and abandoned mines also along the Grand River (**Figure 3, Appendix A**).

3.2.2 Watershed Conditions

The Study Area is located with the jurisdictions of the Grand River Conservation Authority (GRCA) and Long Point Region Conservation Authority (LPRCA) (**Figure 2, Appendix A**). Approximately half of the Study Area drains generally eastward to the Grand River via several drainage features, including watercourses, swales, grassed waterways and agricultural drainage. The remainder of the Study Area drains to the south and southwest via several direct tributaries of Lake Erie.

The Grand River watershed, which includes the area drained by the Grand River and its major tributaries, including the Speed River, Eramosa River, Nith River and Conestogo River, drains an area of approximately 6800 km^2 (GRCA, 2006). It is the largest direct drainage basin to Lake Erie on the Canadian side of the border, comprising approximately 10% of the catchment of Lake Erie (GRCA, 2004). Land use within the watershed is primarily rural and agricultural (79%), with rapidly expanding urban areas covering 3% and natural areas covering 18%

(GRCA, 2006). Local tributaries of the Grand River within the Study Area include Holmes Creek, Sulphur Creek, Mill Creek, the Mazi Drain and several unnamed tributaries.

The Long Point Region watershed includes an area of approximately 2,900 km^2 that is drained by 12 major creek systems that are direct tributaries of Lake Erie. The largest tributaries are Big Creek and Otter Creek. While the majority of the watershed is developed as farmland, woodlands occupy approximately 20% of the watershed (Lake Erie Source Protection Region Technical Team, 2008). The most notable natural feature within the LPRCA watershed is the Long Point sand spit that extends into Lake Erie, which is a Biosphere Reserve and Ramsar recognized wetland. Local tributaries of Lake Erie within the Study Area include Wardell's Creek, Evans Creek, tributaries of Stoney Creek and several unnamed tributaries.

3.2.3 Areas of Natural and Scientific Interest

ANSIs are defined as areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education (MNR, 2010). ANSIs are identified on the basis of scientific surveys of the province's ecodistricts and represent important natural features that are not found in provincial parks and conservation reserves. The MNR is responsible for identifying and evaluating the significance of ANSIs across the Province.

The two types of ANSIs include (a) Life Science and (b) Earth Science ANSIs (MNR, 2010), which can be evaluated as being provincially, regionally or locally significant. Life science ANSIs are significant representative segments of Ontario's biodiversity and natural landscapes, including specific types of forests, valleys, prairies, savannahs, alvars and wetlands, their native plants and animals, and their supporting environments (MNR, 2010). Earth science ANSIs are geological in nature, consist of some of the most significant representative examples of the bedrock, fossils and landforms in Ontario, and include examples of ongoing geological processes (MNR, 2010).

3.2.3.1 Life Science ANSIs

Based on the information obtained from the MNR, through the NHIC, LIO mapping and agency correspondence, two Life Science ANSIs were identified within the Study Area, as identified on **Figure 2 (Appendix A)**:

1. Oriskany Sandstone and Woodlands Provincially Significant Life Science ANSI – The Oriskany sandstone area is an isolated sandstone and limestone rockland plain located in the western portion of the Haldimand clay plain. It has a thin layer of soil and very little relief, except for a low escarpment along its north eastern side and sandhills in its southern portion (MNR, 1989). The plant communities of the ANSI are derived from the well-drained site conditions and previous land uses. Significant elements of the ANSI include the unique geological formation and its brachiopod fossil community, the unique oak-hickory forest

association supported by the dry, acid substrate, approximately 30 plant species that are rare in Ontario (MNR, 1989).

The vegetation of the Oriskany Sandstone and Woodlands ANSI includes a variety of dry and mesic upland and wet lowland deciduous forests, a large pond and wetland complex, and successional barrens, meadows and thickets (MNR, 1989). Concentrations of prairie plant species are present. This ANSI is located north of Highway 3, east of Haldimand Road 20.

2. Dunnville Grand River Alluvial Marshes Provincially Significant Life Science ANSI – This area represents a 5 km expanse of the lower Grand River that includes a broad series of natural features associated with the inundated, still water riparian environment resulting from the backwater effect created upstream of the Dunnville dam. The general landform of the area is a series of broad alluvial islands and floodplains separated by natural basins and the major channel of the Grand River. This area presents the best complement of still water riparian landforms and community patterns recorded in the lower Grand River Valley. Although the environment is not strictly natural due to the impacts of the Dunnville dam, it does present a diversity and development of riparian wetland community patterns. (MNR, undated). This ANSI is located in the northeast portion of the Study Area along the Grand River.

Although these natural features occur within the Study Area, there are no Life Science ANSIs located within 120 m of the Project Location (**Figure 2, Appendix A)**.

3.2.3.2 Earth Science ANSIs

Based on the information obtained from the MNR, through the NHIC, LIO mapping and agency correspondence, one Earth Science ANSI was identified within the Study Area, as identified on **Figure 2, Appendix A**:

1. Oriskany Sandstone Provincially Significant Earth Science ANSI – The ANSI contains the only exposures of the Devonian Oriskany Formation in Canada. This sandstone was deposited in an Early Devonian near shore environment rich in fossil remains. Unconformities exist between this formation and both the Bertie and Bois Blanc Formations which are also present. (MNR, undated). This ANSI is located north of Highway 3, east of Haldimand Road 20.

Although this natural feature occurs within the Study Area, there are no Earth Science ANSIs located within 120 m of the Project Location (**Figure 2, Appendix A)**.

3.2.4 Wetlands

Based on the records review, a number of evaluated and unevaluated wetlands occur within the Study Area. Any provincially or locally significant wetlands within the Study Area have been identified through LIO mapping, NHIC and wetland evaluations records received from the MNR. Of note, some evaluation records are dated and utilized an older version of the Ontario Wetland Evaluation System (OWES). Nonetheless, these records are considered current pending updates of the evaluations proposed by the MNR in 2011 (pers. comm., Ann Yagi, MNR, 2010).

Other wetlands, including those evaluated by the MNR, have been identified by the GRCA and LPRCA as part of their regulatory mapping. Some of these wetlands have also been recognized within the *Haldimand County Official Plan*. Each wetland identified by the MNR, Biodiversity Explorer, GRCA, LPRCA and *Haldimand County Official Plan* mapping is presented on **Figure 2 (Appendix A)**.

According to Ducks Unlimited (2010), approximately 1.7% of the former Township of Haldimand and 7.4% of the former Township of Dunnville consist of wetland cover (as of 2002).

3.2.4.1 Provincially Significant Wetlands

Six wetlands have been evaluated by the MNR in accordance with the OWES and are considered Provincially Significant Wetlands (PSWs) within the Study Area:

1. Dry Lake Provincially Significant Wetland – This single (35.3 ha) wetland is comprised of 68% marsh and 32% swamp. It is reported to contain habitat for Bullfrogs and Snapping Turtles and supports fish spawning (Brown Bullhead). This wetland is a local waterfowl staging and production area and is known to provide breeding and feeding habitat for Black Tern (Special Concern) and Pied-billed Grebe. The marsh is contained by a dam structure built by Ducks Unlimited. (MNR, 1984). This PSW is located north of Highway 3, east of Dry Lake Road.

2. Dunnville Marshes Provincially Significant Wetland – This 1,600 ha wetland complex located 5 km upstream of the Grand River's outflow into Lake Erie is comprised of 5 individual wetlands dominated by marsh (96%) and deciduous swamp (4%). It is reported to support nesting colonial waterbirds, and regionally significant staging habitat for waterfowl and fish spawning/rearing. (MNR, undated). This PSW is located downstream of the Dunnville dam, along the eastern boundary of the Study Area, and includes the riparian wetlands along either side of the Grand River extending to Lake Erie.

3. Fradenburg Tract Provincially Significant Wetland – This wetland complex is comprised of 12 individual wetlands dominated by swamp (99%) and marsh totaling 18.3 ha in size. It provides habitat for Bullfrogs, breeding habitat for Black Tern (SC) and feeding habitat for Great Blue Heron. Sora and Common Moorhen, both regionally significant birds, have been

observed here. (MNR, 1986). This PSW is located in the central portion of the Study Area south of Meadows Road and east of Sutor Road.

4. Grand River Marshes (Cayuga-Dunnville Dam) Provincially Significant Wetland – This wetland complex is comprised of 10 individual wetlands dominated by marsh (67%) and deciduous swamp (32%). It is reported to support nesting colonial waterbirds, and locally significant winter cover for wildlife including deer (MNR, undated). This PSW is located along side of the Grand River extending from just south of Cayuga to the marshes upstream of the Dunnville Dam, along the north central portion of the Study Area.

5. James N. Allen Park Woodlot-Wetland Provincially Significant Wetland – This coastal wetland complex is made up of 5 individual wetlands, composed of 2 wetland types (65% swamp and 35% marsh). It is reported to support nesting colonial waterbirds and active feeding areas for Great Blue Heron, and locally significant winter cover for wildlife and fish spawning and rearing. This PSW is located along the north shore of Lake Erie south of Kings Row, east of Haldimand Road 49 in the southeast corner of the Study Area.

6. Wardell's Creek Mouth (LET2) Provincially Significant Wetland – This riverine wetland (8.97 ha) is composed of marsh (92%) and swamp (8%). It occurs at the mouth of Wardell's Creek and is considered a coastal wetland. It is reported to contain habitat for Bullfrogs, Snapping Turtles and fish. The habitat within this marsh is identified as supporting nesting for colonial waterbirds, waterfowl staging/moulting, waterfowl breeding and a migratory stopover area. It also provides habitat for a regionally significant plant species (Large Starwort). This PSW is located along Wardell's Creek east of Brookers Road, extending from Rainham Road to its confluence with Lake Erie within the south central portion of the Study Area.

Although these natural features occur within the Study Area, only portions of the Dunnville Marshes PSW, Fradenburg Tract PSW and Grand River Marshes (Cayuga-Dunnville Dam) PSW are located within 120 m of the Project location (**Figure 2, Appendix A)**.

3.2.4.2 Locally Significant Wetlands

In addition, five wetlands have been evaluated by MNR in accordance with the OWES and are considered Locally Significant Wetlands (LSWs):

1. Byng Creek Locally Significant Wetland – This single (3.7 ha) riverine wetland is comprised of swamp (82%) and marsh (18%). Trees and shrubs along the shoreline provide erosion control along Byng Creek. Great Blue Heron and Green Heron are known to occur within this wetland. (MNR, 1989). This LSW includes wetlands along Byng Creek and is located east of Aikens Road and north of Rainham Road within the east portion of the Study Area.

2. Evans Creek (LET3) Locally Significant Wetland – This wetland complex is comprised of 2 individual wetlands dominated by marsh (91%) and deciduous swamp (32%). One wetland

community occurs at the mouth of Evans Creek and is considered a coastal wetland. It is reported to contain habitat for Bullfrogs, Snapping Turtles and fish, as well as habitat for nesting colonial waterbirds, waterfowl staging / moulting, and migratory stopover. (MNR, 2005). This LSW is located along Evans Creek west of Haldimand Road 50, extending from Rainham Road to its confluence with Lake Erie within the south central portion of the Study Area.

3. STC1 Locally Significant Wetland – This single (7.1 ha) palustrine wetland is comprised entirely of swamp communities. Notable functions of this feature include habitat for common furbearers, water quality improvements, flood attenuation and groundwater recharge. (MNR, 2001). This LSW is located west of Haldimand Road 53, between Concession 8W-1 and Concession 9W-1 along the western limit of the Study Area.

4. STC2 Locally Significant Wetland – This wetland complex is comprised of 3 individual wetlands dominated by swamp (84%) and marsh (16%) totaling 7.1 ha in size. Notable functions of this feature include habitat for common furbearers, water quality improvements, flood attenuation and groundwater recharge. (MNR, 2001). This LSW is located west of Haldimand Road 20, between Concession 9W-1 and Concession 10W-1 along the western limit of the Study Area.

5. Taquanyah Conservation Area Locally Significant Wetland – This single (65.3 ha) wetland is comprised of marsh (89%) and swamp (11%) and is associated with the Taquanyah Conservation Area owned and operated by the GRCA. This lacustrine wetland is associated with Mill Creek, although the dam structure that previously controlled levels within the Taquanyah reservoir has been removed. It is known to support fish habitat, Bullfrogs and Snapping Turtles, an Eastern Bluebird colony and provides an active feeding area for Black Tern. This area was the subject of a restoration project undertaken by the GRCA to remove the dam control structure on Mill Creek and to naturalize the floodplain flats. This LSW is located south of Townline Road, east and west of Decewsville Road along the northern limit of the Study Area.

Although these natural features occur within the Study Area, only the Evans Creek LSW is located within 120 m of the Project location (**Figure 2, Appendix A)**.

3.2.4.3 Other Unevaluated Wetlands

In addition to the above wetlands, several unevaluated (unnamed) wetlands as identified by the GRCA and LPRCA occur within the Study Area. Some of these wetlands are identified on Schedule E of the *Haldimand County Official Plan* (2006) and applicable Regulatory mapping provided by the GRCA and LPRCA. These unevaluated wetlands are identified on **Figure 2 (Appendix A)**, including several that occur within 120 m of the Project Location.

3.2.4.4 Coastal Wetlands

Coastal wetlands are defined as wetlands that are located:

(a) on Lake Ontario, Lake Erie, Lake Huron, Lake Superior or Lake St. Clair,

(b) on the St. Mary's, St. Clair, Detroit, Niagara or St. Lawrence River, or

(c) on a tributary to any water body mentioned in clause (a) or (b) and, either in whole or in part, downstream of a line located 2 km upstream of the 1:100 year floodline (wave run-up included) of the water body. (O. Reg. 359/09)

Based on this definition, the Grand River Marshes PSW, James N. Allen Park Woodlot-Wetland PSW, Wardell's Creek Mouth PSW and Evans Creek LSW would be considered coastal wetlands. Only the Grand River Marshes PSW and Evans Creek LSW are located within 120 m of the Project Location (**Figure 2, Appendix A)**. Several of the unevaluated wetlands identified by the GRCA and LPRCA along the Lake Erie shoreline, lower reaches of the Grand River and various minor tributaries to Lake Erie would also be considered coastal wetlands. These wetlands are identified on **Figure 2 (Appendix A)**.

3.2.5 Valleylands

Valleylands are natural areas that occur in a valley or other landform depression that has water flowing through or standing for some period of the year (MNR, 2010). Significant valleylands are valleylands that are ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system (MNR, 2010). The significance of valleylands should be assessed within the context of the overall watershed (MNR, 2010).

The identification and evaluation of significant valleylands based on the recommended criteria from MNR (i.e. surface and groundwater functions, landform prominence, ecological features and functions) is the responsibility of planning authorities (municipalities) (MNR, 2010). Significant valleylands have not been identified in the Haldimand County OP, but are to be identified as part of a Natural Environment Study (Greenlands Study) proposed to be completed by the County (Haldimand County, 2006). Once identified, any significant valleylands will be mapped as an overlay on Schedule E of the Haldimand County OP.

In the absence of municipally identified valleylands, the GRCA and LPRCA have identified riverine hazards (floodplains, steep and erosion susceptible slopes), which can be used to help (although imperfectly) identify the presence of valleylands. The floodplains and steep / valley slopes associated with the various tributaries of the Grand River and Lake Erie are identified on **Figure 2 (Appendix A)**, several of which occur within 120 m of the Project Location.

3.2.6 Wildlife Habitat

Wildlife habitat is defined as an area where plants, animals and other organisms live, including areas where species concentrate at a vulnerable point in their life cycle and that are important to migratory and non-migratory species (O. Reg. 359/09; MNR, 2010). These are grouped into four categories (i.e. seasonal concentration areas, rare vegetation communities or specialized habitats, movement corridors and habitats of species of conservation concern).

A compilation of background information on known wildlife use of the Study Area was undertaken. Using this information, a preliminary assessment was conducted to identify wildlife habitat features that may be present in or within 120 m of the Project Location to determine whether the area contains confirmed significant wildlife habitat (SWH) or involves a trigger for candidate SWH.

The Study Area is situated along Lake Erie and the Grand River, and is located within the Haldimand clay plain. Land use is primarily agricultural, although soil characteristics have a heavy texture and poor drainage (Presant and Acton, 1984), yielding a varied landscape of active agriculture, hay, pasture and fallow lands, with small to large blocks of woodland often characterized by treed wetland. Numerous watercourses traverse the Study Area, flowing toward Lake Erie or the Grand River. There are no designated Important Bird Areas, National Wildlife Areas or Provincial Wildlife Areas identified within the Study Area.

As part of the initial data collection program for this Project, bird surveys were undertaken by Hatch in 2009 and 2010 to document bird usage (spring and fall migration, summer breeding, over-wintering raptors) within the Study Area (Hatch, 2010). The results of these surveys have been incorporated into the records review sections below.

A total of 135 species of birds were observed throughout four seasons of observation within the Study Area by Hatch (2010, **Appendix C**). The majority are ranked S5 (secure - common, widespread and abundant in Ontario) or S4 (apparently secure - uncommon but not rare in Ontario) in the season in which they were observed; the exceptions were Caspian Tern (S3), observed in spring, summer and fall, and Red-headed Woodpecker (S3, federally threatened and provincial species of special concern), observed in the breeding season, and Carolina Wren (S3S4), observed in the fall.

Caspian Tern was recorded during lakeshore point counts as > 100 m distant from the lakeshore, or flyovers, presumably foraging along the shoreline and not related to any habitats within the Zone of Investigation. The Red-headed Woodpecker, reported as foraging near a homestead “right along the shoreline of Lake Erie” (Hatch, 2010; **Appendix C**), was observed at Hatch’s point LA11, located more than 2km east of the nearest part of the Project Location.

3.2.6.1 Seasonal Concentration Areas

Seasonal concentration areas are those sites where large numbers of a species gather together at one time of the year, or where several species congregate. The *Significant Wildlife Habitat Technical Guide* (MNR, 2000) identifies 14 potential types of seasonal concentration areas.

The 14 types of seasonal concentrations are:

1. winter deer yards;
2. moose late winter habitat;
3. colonial bird nesting sites;
4. waterfowl stopover and staging areas;
5. waterfowl nesting sites;
6. shorebird migratory stopover areas;
7. landbird migratory stopover areas;
8. raptor winter feeding and roosting areas;
9. Wild Turkey winter range;
10. Turkey Vulture summer roosting areas;
11. reptile hibernacula;
12. bat hibernacula;
13. Bullfrog concentration areas; and
14. migratory butterfly stopover areas.

The Project Location is situated in southern Ontario along the north shore of Lake Erie, a portion of which occurs less than 5 km from the shoreline. A review of background information to assess the potential for seasonal concentration areas associated with this region of Ontario (Ecoregion 7E) to be supported in the Study Area is provided below.

Winter Deer Yards

Deer yards are areas of key winter habitat for white-tailed deer. They usually consist of a coniferous forest, which provides shelter from snow and wind, adjacent to an area of deciduous forest or other foraging habitat (MNR, 2000). MNR has identified the majority of woodlands within the Study Area as deer yards (**Figure 2, Appendix A**). MNR survey data from 2000 of the woodlands within the former Townships of North Cayuga, South Cayuga, Dunnville and Oneida (management unit 90A) suggests winter deer densities ranged from 0.05 to 0.16 white-tailed deer per hectare (overall average of 0.08 per ha), with an overall estimated population of 227 deer in these three areas (data provided by MNR in 2010). The presence of suitable habitat for winter deer yards will be confirmed during site investigations (Section 4.0).

Colonial Bird Nesting Sites

Colonial bird nesting sites can be located in swamps and along large bodies of water for herons, islands for gulls and cliffs, banks and artificial structures for swallows (MNR, 2000).

A review of the MNR's wetland data records indicate the presence of nesting colonial waterbirds at Dunnville Marshes, Grand River Marshes, James N. Allen Park Woodlot-Wetland, Wardell's Creek Mouth PSWs, as well as Evans Creek and Taquanyah Conservation Area LSWs. Only the Dunnville Marshes PSW, Grand River Marshes PSW and Evans Creek LSW are located within 120 m of the Project Location (**Figure 2, Appendix A)**. The presence of suitable habitat for colonial bird nesting sites will be confirmed during site investigations (Section 4.0).

Waterfowl Stopover and Staging Areas

Migrating waterfowl congregate within larger wetlands, especially those adjacent to large bodies of water, and relatively undisturbed shorelines with vegetation (MNR, 2000). Feeding ponds, such as beaver ponds and small lakes, and large night roosting ponds are used to replenish energy reserves, as resting areas and for cover from predators and adverse weather conditions (MNR, 2000). Night-time roosts are often thick willow thicket swamps or wetlands with a mix of marsh and swamp (Index 37).

Christmas Bird Counts are conducted annually between December 14 and January 5 by volunteers at thousands of North American and international locations. Species and numbers of birds are tallied within a 24 km diameter circle. There are two Count circles located within the Study Area, centered on Dunnville and Fisherville (National Audubon Society, 2010). Together the two Count circles encompass virtually the entire Study Area and the offshore areas in Lake Erie, with only a small portion of lakeshore excluded west of the foot of Haldimand Road 50. More than half of each Count circle is located outside the Study Area.

Of the last 20 years, data for the Dunnville Count circle, which includes the mouth of the Grand River as well as the Lake Erie shoreline to its intersection with Haldimand Road 50, is only available for the three-year period between 1998 and 2000. Notable features include thousands of overwintering waterfowl, including mergansers, scaup, other waterfowl and gulls. Common Merganser was the single most abundant species.

A review of the MNR's wetland data records indicates the presence of waterfowl stopover and staging areas at Dry Lake, Dunnville Marshes and Wardell's Creek Mouth PSWs, as well as Evans Creek LSW. GRCA (2004) also reports that the Grand River and Dunnville marshes are significant stopover areas for migratory birds. Only the Dunnville Marshes PSW, Grand River Marshes PSW and Evans Creek LSW are located within 120 m of the Project Location (**Figure 2, Appendix A**). Field surveys completed in the Study Area by Hatch also confirmed use of the offshore waters in Lake Erie and the Grand River by concentrations of waterfowl and gulls (Hatch 2010, Appendix C).

The presence of habitat suitable for waterfowl stopover and staging areas will be confirmed during site investigations (Section 4.0).

Waterfowl Nesting Habitat

Relatively large, undisturbed upland areas with an abundance of ponds and wetlands can serve as significant sites for waterfowl nesting. Clusters of marshes and swamps; areas with grass, shrub or pastureland adjacent to wetlands; poorly drained landscapes that contain a number of beaver ponds or flooded locations can also provide important nesting habitat (MNR, 2000). No evidence of nesting waterfowl was noted during Hatch's spring and summer field studies in 2009 (Hatch, 2010, **Appendix C**). The presence of habitat suitable to support waterfowl nesting will be confirmed during site investigations (Section 4.0).

Shorebird Migratory Stopover Areas

Relatively undisturbed shorelines along the Great Lakes that produce abundant food (clams, insects, snails and worms) are used by shorebirds during migration (MNR, 2000). Sandy and muddy habitats are essential (Ross et. al, 2003).

During vista surveys and area searches on four visits conducted by Hatch during the spring migration season, few species of migratory shorebirds were recorded within the Study Area, and those recorded were present in very small numbers in the fields along Meadows Road or along Lakeshore Road (Attachments C and D of Hatch, 2010, **Appendix C**). The Lake Erie shoreline was not identified as supporting concentrations of shorebirds (**Appendix C**).

The Lake Erie shoreline that is found within the Study Area is an exposed energetic environment and shoreline habitat is composed of rocky shoreline. It does not contain mudflats or open areas of soft substrate that would be suitable for foraging. The shoreline type found within the Study Area does not have the potential to support significant concentrations of shorebirds during migration and candidate significant wildlife habitat for shorebird stopover areas is considered absent from in or within 120 m of the Project Location.

Landbird Migratory Stopover Areas

Open water shorelines along Lake Erie provide natural migratory routes and staging areas for migrating songbirds (MNR, 2000). Migratory passerines are known to use forested landscapes along Lake Erie as stopover sites during spring and fall migration (Ewert et al., 2006). Areas that provide a diversity of habitat types ranging from open grasslands to large (i.e. >10ha) woodlands within 5 km of the Lake Erie shoreline are generally considered potential candidate significant wildlife habitat for migrating landbird stopover areas (SWHTG, 2000; MNR correspondence, March 1, 2011).

Landbirds tend to concentrate at tips of peninsulas and on islands in Lake Erie, congregating in significant numbers at known significant stopover sites, including Point Pelee and Long Point, during migration. These unique features, such as Long Point and Point Pelee are not found in the Study Area.

No known historic migratory landbird stopover areas occur within the Study Area. However, Selkirk Provincial Park and Rock Point Provincial Park, which occur west and east of the Study Area respectively, are known migratory bird stopover areas and have permanent bird banding stations to record use. As a result of their spring and fall migratory bird field studies, Hatch concluded that while many species were recorded across the Study Area, results were consistent of a passive migration of birds moving across a broad front rather than a concentrated bird migration corridor (**Appendix C**).

Several large woodlands (i.e. greater than 10 ha) with a diversity of habitat (i.e. multiple ELC community classes; adjacent grassland habitats) are present within 5 km of the Lake Erie shoreline within the Study Area (**Figure 2.2, Appendix A**). Further assessment of these features will be undertaken during site investigations (Section 4.0).

Raptor Winter Feeding and Roosting Areas

Hay fields, pastures and open meadows that support large and productive small mammal populations can provide critical winter roosting areas (MNR, 2000). Good roosting habitat consists of large fields (usually >20 ha) so that they are not disturbed and provide adequate cover and appropriately-coloured vegetation to camouflage the birds (Index 10). The best roosting sites are typically found in relatively mature mixed or coniferous woodlands that abut windswept fields, with scattered trees and fence posts providing perches for hunting (MNR, 2000).

During the Christmas Bird Counts, 2 to 4 wintering Bald Eagles were noted each year within the two Count circles located within the Study Area (Dunnville and Fisherville), as well as several dozen Red-tailed Hawks and Rough-legged Hawks. Wintering Short-eared Owls and Northern Harriers were present in smaller numbers (National Audubon Society, 2010).

Winter area searches conducted by Hatch (**Appendix C**) during the period between December 2009 and February 2010 found that raptors were generally uncommon within the Study Area, with no areas of particular concentration. No Short-eared Owls or Bald Eagles, but three Northern Harriers were observed (Hatch, **Appendix C**). Red-tailed Hawks and Rough-legged Hawks were present but dispersed across the Study Area. Calculations of winter raptor density, based on Hatch's field data, yield densities of 0.245 to 0.275 raptors per km.

The Fisherville area is well-known for unusually high numbers of wintering raptors. Environment Canada (EC) has identified it as the second most important site in southern Ontario in terms of wintering raptor density (Environment Canada, 2007). EC compiled the results of recent winter bird surveys from 17 sites in southern Ontario and concluded that only a few sites across

southern Ontario provide the necessary conditions to support high numbers of wintering raptors. Amherst Island supported the highest number of raptors (3.14 raptors/kilometre) followed by Fisherville (2.14 raptors/kilometre) and then Wolfe Island (1.4 raptors/kilometre). The remainder of the sites supported raptor densities that were an order of magnitude less than these three sites (Environment Canada, 2007). The Fisherville Christmas Bird Count results illustrate this function, with the last 20 years yielding records of as many as 15 Bald Eagles annually (highs in 2004 and 2008), and abundant Red-tailed Hawks, Rough-legged Hawks, Short-eared Owls and Northern Harriers.

A birding guide published for the Fisherville area (Miles, 1996) maps locations of Short-eared Owls sightings between 1989 and December 1995 (**Figure 2.2, Appendix A**). Several locations fall within the Study Area along Haldimand Road 20 and the solar lands, however, since that time the area of importance to wintering raptors appears to have shifted to the north and west. The Ontbirds ListServ archives were reviewed for the winters (December – March) from 2007- 2010 for reports of wintering raptors or owls in the Haldimand, Cayuga, Hagersville and Fisherville areas. There were few reports of Short-eared Owls during this period near Fisherville, with a report of 4 Short-eared Owls (Ontbirds Archives, February 24, 2008, *Bald Eagles, Owls – Fisherville to LaSalle Park*) and 2 Short-eared Owls (Ontbirds Archives, February 21, 2008, *Cayuga to Long Point – Swans, Owls and Woodpeckers, etc.*). In the same period, there was a sighting of 4 Short-eared Owls reported east of Hagersville (north of the study area; Ontbirds Archives January 5, 2010 *Haldimand – Short-eared Owls – Pipits – Horned Larks and Longspurs*) and of a concentration of at least 12 Rough-legged Hawks south of Hagersville (north of the study area; Ontbirds Archives February 23, 2008, *Hagersville – Rough Legs holding area*).

Trip reports for Ontario Field Ornithologists' annual February outing to the Fisherville area, 2001-2009, are available online (http://www.ofo.ca/fieldtrips/longpointarea.php). These reports indicate that the most reliable concentrations of Short-eared Owls in recent years are found in the "Raptor Preserve", located northwest of Fisherville, several kilometers from the Study Area. Between 0 and 9 Short-eared Owls were observed there during each annual outing, along with "several" Red-tailed Hawks and Rough-legged Hawks. The trip reports also record Short-eared Owls behind the Cayuga Speedway (4 in 2006 and 10-12 in 2002).

Most of the Study Area provides suitable habitat for winter raptors; open fields including hay, pasture and meadows with scattered, abutting woodlands for roosting sites. The open agricultural setting is likely to provide habitat for small mammal prey and potential perch sites, such as fence posts, are common. In addition, snow accumulation in this region is generally low, allowing for easier prey detections and hunting. Overall, the entire Zone of Investigation has been considered candidate significant habitat for winter raptor feeding and roosting (**Figure 2.2)**. The suitability of open habitats and wooded areas to support raptor winter feeding and roosting will be assessed during the site investigation (Section 4.0).

Wild Turkey Wintering Areas

Dense older coniferous or mixed forest stands on valley slopes that contain a good proportion of conifers or oaks provide habitat for wintering wild turkeys. The presence of groundwater seeps in forests also enhances habitat for turkeys (MNR, 2000).

Results of the Fisherville Christmas Bird Count indicate that Wild Turkey is an increasingly abundant species in the vicinity of the Study Area during the winter, with more than 100 individuals recorded over 5 of the last 7 years, and a high of 463 Wild Turkeys in 2008 (National Audubon Society, 2010).

The presence of habitat suitable for wild turkey winter habitat will be confirmed during site investigations (Section 4.0).

Turkey Vulture Summer Roosting Areas

Cliff ledges and large dead trees can serve as turkey vulture summer roosting areas. They are typically located in undisturbed areas and often near water (MNR, 2000). While cliff ledges are not present within the Study Area there is the potential for the Study Area to contain large dead trees. No evidence of Turkey Vulture summer roosts was noted during Hatch's spring and summer field studies in 2009 (Hatch, 2010, **Appendix C**). The presence of habitat suitable for Turkey Vulture summer roosting areas will be confirmed during site investigations (Section 4.0).

Reptile Hibernacula

Hibernacula may include animal burrows, rock crevices or other areas below the frost line, often in association with water to prevent desiccation (MNR, 2000). Frequently, hibernacula can be found among talus or karst areas.

The Study Area falls within the ranges of common species of snakes and turtles (Oldham and Weller, 2000), as well as some snake and turtle species at risk (MNR, pers. comm., 2010). Some species of snake or turtle overwinter in large concentrations in hibernacula. There is the potential for reptile hibernacula to be found within the Study Area. The only record of reptile hibernacula within the Study Area is a known snake-denning site north of the Dry Lake PSW within the Oriskany Sandstone Woodlands Life Science ANSI (MNR, 1989), which is located more than 1 km from the Project Location. The presence of habitat suitable to support snake hibernacula will be confirmed during site investigations (Section 4.0).

Bat Hibernacula and Maternity Roosts

The *Renewable Energy Atlas* (2010) does not identify known bat hibernacula within the vicinity of the Study Area. However, consultation with the MNR indicated the presence of a potential hibernaculum in the north-central portion of the Study Area. The potential hibernaculum has not been mapped due to the sensitivity of this information.

Consultation with the Ontario Ministry of Northern Development and Mines (MNDM) indicated that Haldimand County and the surrounding area has potential to support bat hibernaculum features within the various quarries and abandoned mines along the Grand River karst features, and possible presence of sinkholes, caves and dissolution of joint systems (**Section 3.2.1**; **Figure 3, Appendix A**).

Depending on the species, maternity roosts for bats can include tree foliage, tree cavities and crevices under loose bark, or buildings. There are no known maternity roosts in the Study Area; however, the presence of habitat suitable to support bat hibernacula or maternity roosts will be confirmed during site investigations (Section 4.0).

Bullfrog Concentration Areas

A review of the MNR's wetland data records indicates the presence of habitat for Bullfrogs at Dry Lake, Fradenburg Tract, and Wardell's Creek Mouth PSWs, as well as Evans Creek and Taquanyah LSWs. Only the Fradenburg Tract PSW and Evans Creek LSW are located within 120 m of the Project Location; none of these wetlands are in the Project Location (**Figure 2.2, Appendix A)**. The presence of habitat suitable to support Bullfrog concentration areas will be confirmed during site investigations (Section 4.0).

Migratory Butterfly Stopover Areas

During fall migration, some species of butterflies (i.e. Monarchs) stop to feed, rest or wait for inclement weather to pass before attempting to cross Lake Erie (MNR, 2000). Fields and other open areas with varied habitat types within 5 km of the Lake Erie shoreline are considered most significant (MNR, 2000). Large woodlands and open fields (>20 ha) within this area may provide resting areas for Monarchs and some other butterfly species (MNR correspondence, March 1, 2011 Comments) (**Figure 2.2, Appendix A**).

If there are onshore winds, Monarchs will tend to move along the north shore of the Great Lakes until they come to a peninsula where they congregate in staging areas until winds become favourable (Calvert, 2001). Point Pelee and Long Point, located southwest of the Study Area, are known as two of the most important staging areas for Monarchs (C. Taylor, pers. comm., 2006). Monarchs can be observed throughout southern Ontario along shoreline areas during migration; however these areas do not host the significant thousands that regularly occur at the main staging areas. There are no known butterfly stopover areas in the Study Area; however, the presence of habitat suitable to support migratory butterfly stopover areas will be confirmed during site investigations (Section 4.0).

Summary

Seasonal concentration features or habitat features potentially considered candidate significant wildlife habitat that are either known to occur (or that may potentially occur) in or within 120 m of the Project Location include:

- winter deer yards (MNR mapping and field investigations);
- colonial bird nesting sites (PSW records);
- waterfowl stopover and staging areas (PSW records);
- waterfowl nesting habitat (air photo interpretation);
- landbird migratory stopover areas (air photo interpretation, MNR correspondence);
- raptor winter feeding and roosting areas (air photo interpretation, historic records);
- Wild Turkey wintering areas (Christmas Bird Count results);
- Turkey Vulture summer roosting areas (air photo interpretation);
- reptile hibernacula (MNR information);
- bat hibernacula and maternity roosts (MNR and MNDM information);
- Bullfrog concentration areas (PSW records); and
- migratory butterfly stopover areas (MNR information and air photo interpretation).

3.2.6.2 Animal Movement Corridors

Animal movement corridors are elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another (MNR, 2000). Migration corridors are areas that are traditionally used by wildlife to move to one habitat from another in response to different seasonal habitat requirements. In southern Ontario, corridors usually consist of naturally vegetated areas that run through more developed and open landscapes.

Within a primarily agricultural setting, wildlife species move freely between natural areas (MNR, 2000). Potential significant corridors include naturally vegetated links between the largest natural areas within a municipality, the largest and oldest forest stands in a planning area, the largest and most diverse wetlands, relatively steep and undeveloped river valleys or riparian areas along lakes, rivers and streams, the most probable linkages between winter deer yards and amphibian breeding ponds, unopened road and rail allowances or utility corridors, and hedgerows, windbreaks and old fields that connect natural features (MNR, 2000). Significant

corridors generally will be wider, without roads and structurally and compositionally diverse. Though fence and hedgerows may be considered animal movement corridors, they should not be considered significant unless they provide the only corridor in the planning area (MNR, 2000).

Through an interpretation of aerial photographs of the natural features within the landscape of the Study Area, several potential animal movement corridors have been identified that connect various natural features (**Figure 9, Appendix A**). As noted in the *Significant Wildlife Habitat Technical Guide* (MNR, 2000), it is seldom possible to observe wildlife species using corridors. As such, field investigations to monitor animal movements are not anticipated to yield significant observations.

Criteria for confirming bat migration corridors and bat movement corridors are not currently defined in the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) meaning that the evaluation and confirmation of significant wildlife habitat is not possible for these categories (MNR, March 2010). Similarly, criteria for confirming raptor migration corridors are not currently defined in the *Significant Wildlife Habitat Technical Guide* (MNR, 2000). As a result, it is not possible to identify candidate significant wildlife habitat for this group of species during migration.

Within the Haldimand Clay Plain region, the Grand River corridor is well developed with extensive marshes, floodplain meadows, oak savannahs, woodlands, and willow lined riverbanks, between the roads that parallel the river (GRCA, 2004). This watershed-scale feature provides a natural linkage from Lake Erie to the northern part of the Grand River watershed that allows for the movement of wildlife.

A Natural Environment Study (Greenlands Study) has been proposed within the *Haldimand County Official Plan* (Policy 2.A.6) in order to identify natural environment areas and movement corridors. However, this study has not yet been initiated (Pers. Comm., Mike Evers, January 6, 2010). No animal movement corridors have been identified in LIO (2009) within the Study Area.

Fence and hedgerows are not considered significant movement corridors in the Study Area because they do not provide the sole corridor for animal movement (MNR, 2000). With the exception of the Grand River, there are no known animal movement corridors within the Study Area.

3.2.6.3 Rare or Specialized Habitats

Rare or specialized habitats are two separate components. Rare habitats are those with vegetation communities that are considered rare in the province. SRANKS are rarity rankings applied to species at the “state”, or in Canada at the provincial level, and are part of a system developed under the auspices of the Nature Conservancy (Arlington, VA). Generally, community types with SRANKS of S1 to S3 (i.e., extremely rare to rare – uncommon in Ontario), as defined by the Natural Heritage Information Centre (NHIC), could qualify. It is assumed that these

habitats are at risk and that they are also likely to support additional wildlife species that are considered significant.

Specialized habitats are microhabitats that are critical to some wildlife species. The *Significant Wildlife Habitat Technical Guide* (MNR, 2000) identifies the following potential specialized habitats:

- Sites supporting area-sensitive species;
- forest stands providing a diversity of habitats;
- old-growth or mature forest stands;
- seeps and springs;
- woodlands supporting amphibian breeding ponds;
- special woodland feeding habitat;
- sites supporting nesting raptors;
- turtle nesting habitat;
- special moose habitats – aquatic feeding areas, calving sites and mineral licks;
- mink, otter, marten, and fisher feeding / denning sites;
- highly diverse sites; and
- cliffs and caves.

Rare Vegetation Communities

A search of the NHIC database identified one historical record of a rare vegetation community potentially located within the Study Area. This community, a Graminoid Coastal Meadow Marsh (MAM4-1), is listed as G2? (inexact numeric range listed as very rare; between 5 and 20 occurrences) and provincially as S2 (imperiled; 20 or fewer populations) and was associated with James N. Allen Provincial Park. The shoreline of this Provincial Park, which is where this coastal community is likely to occur, occurs outside of the Study Area. However, the potential remains for this type of coastal community to occur along the Lake Erie shoreline within the Study Area.

In addition, a total of 11 rare vegetation community types known to occur within the Haldimand-Norfolk area are identified within Appendix M of the *Significant Wildlife Habitat Technical Guide*

(MNR, 2000) (**Table 3.1, Appendix B**). The presence of these rare vegetation communities, or others, will be confirmed during site investigations (Section 4.0).

Sites Supporting Area Sensitive Species

Large forest stands (>30 ha) comprised of a mainly closed canopy of large trees and a variety of vegetation layers tend to support a greater diversity of species because of the broader range of habitats they provide, including interior forest habitat (MNR, 2000). The minimum forest habitat for area-sensitive species is at least 100 m from any edge habitat (MNR, 2000). Several woodlands occur within the Study Area that satisfy these criteria (see **Figure 2.2, Appendix A**). The presence of suitable habitat and/or use of these features by area-sensitive species will be confirmed during site investigations (Section 4.0).

For area-sensitive grassland bird species, large undisturbed grassland areas provide habitat that is more likely to be buffered from disturbance, more likely to increase the distance of nesting habitat to woody edges, and provide more opportunities for nesting (MNR, 2000).

MNR identifies grasslands greater than 30ha as candidate significant wildlife habitat for area sensitive breeding birds (MNR, 2000). Several large grassland areas exist within the Study Area, however many are actively farmed fields or pastures and are not considered to constitute candidate significant wildlife habitat (Pers. Comm., MNR staff, 2011). The presence of habitat suitable to support area-sensitive grassland breeding birds will be confirmed during site investigations (Section 4.0).

Appendix C and G of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) contain a list of area-sensitive wildlife. A review of the results of the *Ontario Herpetofaunal Atlas* (Oldham and Weller, 2000) and the *Atlas of the Breeding Birds of Ontario* (2007) indicates the presence of several area-sensitive species of wildlife in the vicinity of the Study Area, including marsh species such as Bullfrog and American Bittern, forest species such as Least Flycatcher, Scarlet Tanager and Ovenbird, and grassland species such as Savannah Sparrow and Grasshopper Sparrow. Grey wolf, lynx and fisher are also considered area sensitive species (MNR, 2000), although they are not known to occur in the Study Area (Dobbyn, 1994).

Old Growth or Mature Forest Stands

Old growth forests are characterized by having a large proportion of trees in older age classes, many of them over 120 to 140 years old (MNR, 2000). These forest stands are rare throughout Ontario, particularly in southern Ontario, largely due to past logging practices. The extensive deforestation for agriculture and urban development with the Deciduous Forest Region has reduced forest cover in some areas of southwestern Ontario to less than five per cent of the landbase (MNR, 2003). The presence of these sites will be confirmed during site investigations (Section 4.0).

Seeps and Springs

Seepage areas and springs provide habitat for numerous uncommon species and may support a high diversity of plant species (MNR, 2000). In winter, these areas provide foraging opportunities for Wild Turkey and white-tailed deer (MNR, 2000). Those that occur within forested areas where the canopy maintains cool, shaded conditions are most important (MNR, 2000). There are no known seeps or springs within the Study Area. The presence of these sites will be confirmed during site investigations (Section 4.0).

Woodlands Supporting Amphibian Breeding Ponds

The *Ontario Herpetofaunal Summary* (Oldham and Weller, 2000) indicates the Study Area falls within the range of a number of common amphibian (frog and salamander) species. Closed-canopy woodlands with rather dense undergrowth that maintains a damp environment are preferred for frogs, toads and salamanders (MNR, 2000). Woodlands and wetlands are present within the Study Area and have the potential to support amphibian woodland breeding ponds. There are no known amphibian woodland breeding ponds within the Study Area; however, the potential exists for amphibian breeding to occur within the various woodlands within the Study Area. The presence of suitable woodland habitat to support amphibian breeding will be confirmed during site investigations (Section 4.0).

Sites Supporting Specialized Nesting Raptors

The *Significant Wildlife Habitat Technical Guide* indicates that some raptors require somewhat specialized habitats. Under the criteria and guidelines outlined in Appendix Q (MNR, 2000) and Index #22 of the SWHTDSS critical habitat features that would support specialized Bald Eagle and Osprey nesting habitat are provided. It is noted that waterbodies with fish populations and trees with good visibility and flight lines that would comprise wildlife habitat for Osprey nesting habitat.

The Lake Erie shoreline is the predominant area for breeding Bald Eagles in southwestern Ontario (Cadman et al., 2007). Consultation with the MNR and the public indicated the potential presence of nesting Bald Eagles in the Study Area, although the nearest confirmed nest location is located more than 2 km east of the nearest Project component (a turbine location). Review of the results of the *Atlas of the Breeding Birds of Ontario* (2007) also revealed the potential presence of Osprey, another indicator of specialized raptor nesting habitat (MNR, 2000), as well as forest-nesting raptors such as Sharp-shinned Hawk and Cooper's Hawk. There are no known raptor nests within the Study Area, although the potential exists for such features to occur within the Study Area. The presence of specialized raptor nesting sites will be confirmed during site investigations (Section 4.0).

Turtle Nesting Habitat

The *Ontario Herpetofaunal Summary* (Oldham and Weller, 2000) indicates the Study Area falls within the range of a number of common turtle species. Preferred turtle nesting habitat occurs in open, sunny areas close to water, away from roads and is usually on relatively soft substrate (sand, fine gravel) that allows turtles to easily dig their nests (MNR, 2000).

Soils within the Study Area are primarily silty clay loam till, with some lacustrine silty clay and tight, clay-based soils (Presant, E.W and Acton, C.J. 1984), which are not generally conducive to turtle nesting. However, small pockets of sand or gravel may be present. There are no known turtle nesting sites within the Study Area. The presence of suitable habitat to support turtle nesting will be confirmed during site investigations (Section 4.0).

Summary

The review of background information found no evidence of forests providing a high diversity of habitats, special woodland feeding habitat, special moose habitat, mink, otter, marten and fisher denning sites, areas of high diversity or cliffs or caves in or within 120 m of the Project Location. In summary, specialized habitat features for which a trigger for candidate significant wildlife habitat was considered to occur in or within 120 m of the Project Location, requiring further site investigation, include:

- sites supporting woodland and grassland area-sensitive breeding bird species;
- old growth or mature forest stands;
- seeps and springs;
- woodlands supporting amphibian breeding ponds;
- sites supporting nesting raptors; and
- turtle nesting habitat.

The records review did not identify known locations of any other type of significant wildlife habitat in the form of specialized habitats.

3.2.6.4 Species of Conservation Concern

Species of conservation concern include four types of species: those that are rare, those whose populations are significantly declining, those that have been identified as being at risk from certain common activities, and those with relatively large populations in Ontario compared to the remainder of the globe (MNR, 2000).

Rare species are considered at five levels: globally rare, nationally rare (with designations by COSEWIC), provincially rare, regionally rare (at the Site Region level), and locally rare (in the municipality or Site District). This is also the order of priority that should be assigned to the importance of maintaining species. Some species have been identified as being susceptible to certain practices, and their presence may result in an area being designated significant wildlife habitat. Examples include species vulnerable to habitat loss and species such as woodland raptors that may be vulnerable to forest management or human disturbance. The final group of species of conservation concern includes species that have a high proportion of their global population in Ontario. Although they may be common in Ontario, they are found in low numbers in other jurisdictions.

Primary and secondary source data were used to determine potential wildlife use of the Study Area. Inventories of wildlife were compiled from available literature and resources including the *Atlas of the Mammals of Ontario* (Dobbyn, 1994), the *Ontario Herpetofaunal Summary* (Oldham and Weller, 2000) and the *Ontario Breeding Bird Atlas* (Cadman et al., 2007). The following is a summary of those findings:

Rare Species

Rare species potentially occurring in the study area include those identified through a search of the NHIC database with SRANKS of S1 to S3 (i.e. critically imperilled to vulnerable), as well as those provided by the MNR as species of special concern**.** A total of 32 plant, 3 odonate and butterfly, 5 amphibian and reptile, 6 bird and 3 mammal species were identified by the NHIC as potentially occurring within the study area. A summary of these species, as well as the habitat characteristics that support these species, is provided in **Table 3.2 (Appendix B)**.

Two species of special concern were observed in the Study Area during field investigations conducted by Hatch. These were not found in or within 120 m of the Wind Project Location. Bald Eagles, designated as a provincial species of special concern were observed passing over the Study Area during spring and fall migration and were not associated with any specific habitats. Red-headed Woodpecker, designated as a provincial species of special concern was observed more than 2 km west of the Wind Project Location (Appendix C).

Within the context of O. Reg. 359/09, endangered and threatened species are addressed as part of MNR's *Approval and Permitting Requirements Document for Renewable Energy Projects* (APRD) requirements (September 2009). Information required to comply with the requirements of this document will be submitted as part of the APRD Report (under separate cover). Where this information indicates that approvals or permits are required, these will be addressed separately through the applicable statute and corresponding permit and approval process.

Declining Species

Ontario Partners in Flight (PIF) indicate that moderate to high relative densities of avian species associated with grassland and shrubland / successional habitats are found along the north shore of Lake Erie, between Niagara and Long Point (Ontario PIF, 2006). The decline of grassland birds has been identified as a conservation concern (Cadman et al., 2007) and areas containing healthy populations of species belonging to these guilds would be considered for designation of significant wildlife habitat.

As discussed in Section 3.2.6.3, grasslands that could support populations of declining grassland breeding bird species are found within 120 m of the Project Location.

The *Ontario Breeding Bird Atlas* (Cadman et al., 2007) results indicate that grassland species designated by PIF as conservation priorities (i.e. Bobolink, Eastern Meadowlark and Vesper Sparrow) were recorded in the 10x10km squares that overlap with the Study Area.

As well, PIF priority forest and shrub / successional species are found within the range of the Study Area (Cadman et al., 2007). As discussed in Section 3.2.6.3, woodlands that could support declining woodland breeding bird species are found within 120 m of the Project Location. The presence of candidate significant wildlife habitat for declining grassland and woodland breeding bird species will be assessed through the site investigations.

3.2.6.5 Wildlife Habitat Summary

On the basis of the background information gathered, the following triggers for identifying candidate significant wildlife habitat are found within the Study Area, and have the potential to occur in or within 120 m of the Project Location:

1. Seasonal concentration areas, including:
    - winter deer yards (MNR mapping);
    - colonial bird nesting sites (PSW records);
    - waterfowl stopover and staging areas (PSW records);
    - waterfowl nesting habitat;
    - landbird migratory stopover areas (MNR correspondence);
    - raptor winter feeding and roosting areas (records review);
    - Wild Turkey wintering areas (Christmas Bird Count results);
    - Turkey Vulture summer roosting areas;

- reptile hibernacula (MNR information);
- bat hibernacula and maternity roosts (MNR information);
- Bullfrog concentration areas (PSW records); and
- migratory butterfly stopover areas (MNR information and air photos).

2. Animal movement corridors
3. Rare vegetation and specialized habitats, including:
   - sites supporting area-sensitive species;
   - old growth or mature forest stands;
   - seeps and springs;
   - woodlands supporting amphibian breeding ponds;
   - sites supporting nesting raptors; and
   - turtle nesting habitat.
4. Habitat for species of special concern, including:
   - Rare species (MNR, wetland evaluations) and
   - Declining Species (PIF priority grassland, shrubland and forest breeding bird species (wildlife atlases)).

3.2.7 Woodlands

As amended through O. Reg. 521/10, and in accordance with the transition policy for applying the definition of woodland as outlined in s. 63(1) of O. Reg. 359/09, a “woodland” is defined as a treed area, woodlot or forested area, other than a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees, that is located south and east of the Canadian Shield. For the purpose of this report, and corresponding REA submission, we have elected to apply this definition to the identification of woodlands within the Study Area.

MNR’s LIO mapping (2010), as well as aerial photograph interpretation, indicate that the Study Area contains a large number of woodlands of varying sizes, with several large, mature woodlands arrayed along the rear of large agricultural properties. Some woodland features are associated with watercourses or wetlands, while others occur in isolation. Woodlands as mapped by the MNR are shown on **Figure 2 (Appendix A)**.

Woodlands have not been identified in the *Haldimand County Official Plan*, but are proposed to be identified as part of a Natural Environment Study (Greenlands Study) proposed to be completed by the County (Haldimand County, 2006). Once identified, any significant woodlands will be mapped as an overlay on Schedule E of the Haldimand County OP.

Haldimand County is estimated to contain 17.12% forest cover (GRCA, 2004). The Study Area is located in the Niagara section of the Deciduous Forest Region (Rowe, 1972), commonly referred to as the Carolinian Forest region. The extreme southern tip of Ontario represents the maximum northern limit of the Carolinian Forest. Forests in this region are generally dominated by broadleaved trees including sugar maple, American beech, basswood, red maple, red oak, white oak, and bur oak, butternut, bitternut hickory, rock elm, silver maple and blue beech. Species such as black cherry, black walnut, sycamore, swamp white oak, and shagbark hickory are also occasionally present. Species considered rare to the province, such as pignut hickory, tulip-tree, chinquapin oak, pin oak, black oak, black gum, blue ash, cucumber-tree, paw paw, Kentucky coffee-tree, red mulberry and sassafras are sporadically present. Needle-leaved trees, such as hemlock, white pine, tamarack, eastern white cedar, eastern red cedar and black spruce, may be found in isolated patches where soil conditions are favourable.

3.2.8 Provincial Parks and Conservation Reserves

According to the Ontario Parks website, there is only one Provincial Park within the Study Area, as follows:

1. James N. Allen Provincial Park – This “non-operating” park is a 117 ha park located on the north shore of Lake Erie, about seven kilometers southwest of Dunnville, with access via King's Row. There are no visitor facilities and it consists of 1 km of pebble beach, 100 m of fine sand beach and approximately 60 hectares is forest and wetlands. James N. Allen Provincial Park is intended to protect natural and scenic areas for scientific, educational and recreational use, with this park specifically identified as a good spot for swimming, boating, walking and bird-watching (Ontario Parks, 2003). A portion of the James N. Allen Park Woodlot-Wetland PSW occurs within the southern portion of the Park, which includes a mix of swamp and marsh that supports nesting colonial waterbirds, active feeding areas for Great Blue Heron, and locally significant winter cover for wildlife and fish spawning and rearing.

A proposed collector line located along the north side of Kings Row is located within 120 m of James N. Allen Provincial Park.

No Conservation Reserves occur within the Study Area.

For information purposes, 2 Conservation Areas owned and operated by the GRCA are located within the Study Area, including:

1. Taquanyah Conservation Area – This 137 ha conservation area is located along Mill Creek and provides habitat for various rare and unique species, including Virginia Mallow, Spinulose Wood Fern, Bald Eagles, Ospreys, and Northern Harriers (Carolinian Canada Coalition, 2009). It offers fishing, hiking and bird watching opportunities. Following removal of the dam structure, this site is currently being rehabilitated to restore the area to a more natural state. A GRCA Nature Centre on the property served the local community for more than 30 years before it closed in 1996 (Carolinian Canada Coalition, 2009).

2. Byng Island Conservation Area – This 190 ha conservation area located on the lower stretch of the Grand River encompasses Carolinian forest, reforested farmland, and open space. It features one of Canada's largest fish ladders, allowing lake fish to migrate past the Dunnville Dam to prime spawning and nursery habitats upstream. It also provides an opportunity for outdoor swimming and camping (GRCA, 2010).

Neither of these Conservation Areas is located in or within 120 m of the Project Location.

The boundaries of James N. Allen Provincial Park and the two Conservation Areas are shown on **Figure 2 (Appendix A)**.

3.3 SUMMARY

The results of the records review completed within the Study Area for this Project indicate that the following natural features, as defined within O. Reg. 359/09, occur within 120 m of the Project Location:

- Wetlands, including 3 PSWs, 1 LSW and several unevaluated wetlands;
- Valleylands associated with tributaries of the Grand River and Lake Erie;
- Woodlands;
- Potential candidate significant wildlife habitat, including:
  a) Seasonal concentration areas, including:
    - winter deer yards (MNR mapping);
    - colonial bird nesting sites (PSW records);
    - waterfowl stopover and staging areas (PSW records);
    - waterfowl nesting habitat;
    - landbird migratory stopover areas (MNR correspondence);

- raptor winter feeding and roosting areas (records review);
- Wild Turkey wintering areas (Christmas Bird Count results);
- Turkey Vulture summer roosting areas;
- reptile hibernacula (MNR information);
- bat hibernacula and maternity roosts (MNR information);
- Bullfrog concentration areas (PSW records); and
- migratory butterfly stopover areas (MNR information and air photos).

b) Animal movement corridors

c) Rare vegetation and specialized habitats, including:

- sites supporting area-sensitive species;
- old growth or mature forest stands;
- seeps and springs;
- woodlands supporting amphibian breeding ponds;
- sites supporting nesting raptors; and
- turtle nesting habitat.

d) Habitat for species of special concern, including:

- Rare species (MNR, wetland evaluations); and
- Declining species (PIF priority grassland, shrubland and forest breeding bird species (wildlife atlases)); and

- James N. Allen Provincial Park.

There are no ANSIs or Conservation Reserves within 120 m of the Project Location.

Site investigations are required to confirm the presence, characteristics and boundaries of the natural features identified during the records review, as well as to determine whether any additional natural features exist in, or within 120 m of, the Project Location.

4.0 Site Investigation

This site investigation report was prepared in accordance with Section 26 of O. Reg. 359/09 with guidance provided from the Draft *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2010). The intent of this section is to confirm the presence and boundaries of natural features at or within 120 m of the Project Location, including those features identified within the records review report and any additional natural features identified during the site investigations.

Data collected during the records review concerning natural features, species occurrences and triggers for significant wildlife habitat were used to guide the scope and direction of site investigations.

4.1 METHODS

To confirm, refine and supplement the existing background information obtained during the records review, as described in Section 3, site investigations were undertaken to confirm and refine the boundaries and characteristics (i.e. type, attributes, composition and function) of the natural features within the Zone of Investigation surrounding the Project Location, including each proposed turbine, solar panel, access road, transmission line, collector line and associated constructible area. This included confirming the presence and refining the boundaries of any natural features identified during the records review, as well as any additional natural features not previously identified.

MNR was consulted on the Proposed Site Investigation Work Program for the Grand Renewable Energy Park (Stantec, July 23, 2010). MNR provided comments on the proposed work program in writing on August 19 and September 10, 2010 and by phone on September 9 and 15, 2010. Field investigations were completed in accordance with this work program.

Field studies to determine bird and bat use within the Study Area were conducted by Hatch between March 2009 and February 2010 (**Appendices C** and **D**), under now-outdated guidance documents (MNR, 2007a; 2007b). Subsequent to the introduction of REA and supporting guidance documents, supplementary field studies were conducted by Stantec between June and December 2010 within the Zone of Investigation surrounding all project components.

The limit of the 120 m Zone of Investigation, within which the site investigations and alternative site investigations were conducted, is identified on **Figure 1** (**Appendix A**). **Table 4.1** (**Appendix B**) provides a summary of the dates, times, duration, purpose, weather conditions and field personnel for each 2010 site investigation. Field notes from each site visit are provided in **Appendix E**. Curricula vitae for field staff are provided in **Appendix I**.

4.1.1 Alternative Site Investigations

In accordance with section 26(3)(7) of O. Reg. 359/09, as amended through O. Reg. 521/10, alternative site investigations were conducted where it was not reasonable to conduct site specific investigations. Site investigations were completed within the Zone of Investigation surrounding the wind infrastructure (turbine locations, access roads and crane pads, excluding collector lines), solar components and some of the transmission line components for all participating landowners and where access permission was available. However, where permission was not available to access adjacent properties, or where it was not deemed reasonable to complete a site investigation for other reasons, an alternative site investigation was completed. The areas where site investigations and alternative site investigations were completed are identified on **Figure L-1**.

Elexico was retained by Samsung to acquire land leases and other permissions in support of the Project. Samsung was also in contact with area landowners to request and secure access permission for this Project. Site investigations were only completed on lands where access was granted by the landowner.

Site investigations were completed by physically accessing all properties within the Zone of Investigation where permission to do so was provided. However, any properties where access was not obtained were investigated through an alternative site investigation method. In all such cases, these methods included a combination of aerial photograph interpretation and visual observations in the field from the nearest property line, fence line or municipal right of way. Observations of vegetation, species, communities, wildlife, wildlife habitat features and structures were recorded.

The following situations necessitated the need for an alternative site investigation within the Zone of Investigation because it was not reasonable to physically access these properties:

a) Collector and transmission lines: Due to the large number of non-participating landowners along the 20 km transmission line and 82 km of collector lines (approximately 700 properties), it was not deemed reasonable to contact each landowner to request and obtain access to their property.

   Since the proposed collector lines and transmission lines are restricted to the already-disturbed, existing road right-of-ways, roadside surveys were considered a sufficient level of effort to supplement air photo interpretation, confirm the records review information, identify additional natural features and describe existing conditions to an appropriate level necessary to assess significance and potential impacts of the transmission and collector lines.

   In some cases, access was made available to lands within 120 m of the collector / transmission lines. The following situations necessitated the need or provided the

opportunity to complete site investigations to specific properties along the transmission line and collector lines to investigate specific features, with landowner consent:

- Upper Quarry Earth Science Site (site specific survey on December 21, 2010);
- Collector and Transmission Lines on participating properties;
- Access permission granted by the MNR for James N. Allen Provincial Park (site survey on April 23, 2011)

b) Access permission specifically denied by landowner: Access to several properties within the Zone of Investigation was specifically denied by landowners. These situations were identified prior to undertaking the field investigations through private conversations between the Project Team and landowner. In these cases, property line or fence line surveys were completed (as described in the following sections). The identity of these landowners and their contact information is not for public dissemination.

c) Other non-participating landowners: In some cases, adjacent properties did not contain natural features that would necessitate the need for physically visiting the property to complete a site investigation. These cases included properties that did not contain a natural feature, such as residential properties or agricultural fields. Through an interpretation of aerial photographs and observations from the nearest property (fence) line, site characteristics and conditions were recorded to an appropriate level of detail to complete the NHA/EIS. Therefore, it was not deemed reasonable (or necessary) to access these properties.

The following sections provide details of the survey methods employed during the various site investigations.

4.1.2 Vegetation Community Assessment and Vascular Plant Surveys

Field investigations to identify vegetation communities and vascular plants within 120 m of the Project Location were conducted for the final project layout from September to December, 2010. Additional supplemental surveys were undertaken with MNR on March 15, 2011 (Feature 66 and 68) and by Stantec to accommodate changes to the Project layout in April, 2011. Survey dates, times and field personnel are summarized in **Table 4.1** (**Appendix B**).

Vegetation communities were first identified through an interpretation of aerial photographs taken in 2009 (Terrapoint, 2011) and a review of existing natural features mapping, as described in Section 3 (**Figures 2.1, 2.2** and **9**). The Zone of Investigation surrounding the wind infrastructure (turbine locations, access roads and crane pads, excluding collector lines), solar components and some of the transmission line components was traversed on foot and physically inventoried, where access permission was available. The results of these vegetation surveys are present on **Figures 6.1 to 8.6** (**Appendix A**).

Alternative site investigations were carried out from roadside locations or property lines (fences) (where access was not available) for the wind project components, transmission line components and their associated 120 m Zone of Investigation. Aerial photograph interpretation was supplemented through a visual inspection from the nearest vantage point from the municipal right of way or adjacent property line (fence) to identify natural features and species composition, to confirm natural feature boundaries and to identify wildlife and wildlife habitat structures or features, the results of which were recorded on appropriate field forms (**Appendix E**).

Agricultural fields were categorized visually by standing along property boundaries, typically hedgerows, or from roadsides during driving surveys. Natural features were assessed by standing at the appropriate boundary and, using binoculars, identifying the relative abundance of as many species as possible. The level of classification possible was dependent on visibility.

During all investigations, vegetation communities were described to community series based on the Ecological Land Classification for Southern Ontario (Lee et al., 1998). Colloquial and scientific nomenclature of plant species generally follows Newmaster et al. (1998). Plant species were considered rare if designated provincially as S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable), or locally rare in Haldimand County by Oldham (1993). Species having a high coefficient of conservatism (9 or 10) as designated by Oldham et al. (1995) were also considered species of note.

Due to the timing of some of the site investigations, a complete list of plant species was not attainable (i.e. December surveys). However, confirmation of ELC communities was possible based on the presence of canopy, sub-canopy and understorey vegetation.

No spring vegetation surveys were conducted for this Project, based on the Site Investigation Work Program for the Grand Renewable Energy Park (Stantec, July 23, 2010), as amended and approved through consultation with MNR. Early season surveys were not deemed necessary where Project components are proposed outside of naturally vegetated areas, as discussed with MNR. Spring ephemeral plants, specifically rare vegetation species identified in **Table 3.2**, are not likely present within managed agricultural fields, cultural plantations or along the edges of natural features due to the sensitive of these species to disturbance and human activities.

All project components are located outside of vegetation communities associated with natural features with one exception: Feature 42a (CUP3-12A*) (**Figure I-11**, **Appendix I**). This is a young cultural plantation that is composed primarily of white pine and Norway spruce. Cultural meadow species (such as asters and goldenrods) dominated the ground layer. Some wet pockets of reed-canary grass and scirpus were also identified. Upon review of the potential presence of species of conservation concern (**Table 3.2, Appendix B**), there is only one plant species that has a slight potential to occur in this type of habitat: Paronychia fastigiata. This species flowers in spring/late fall in woodland and open habitat. Site investigations were conducted during the fall and this species was not identified in this feature. Based on the fact

that only one feature will be directly impacted and that only one species of conservation concern has a slight potential to be present but field investigations did not confirm its presence, we believe that additional botanical surveys are not warranted during other times of year. The botanical work done to date is sufficient to meet any potential concerns.

4.1.3 Woodland Assessment

Existing treed areas, woodlots or forest areas, including plantations, were identified and delineated through aerial photograph interpretation prior to undertaking site investigations, as described above. The presence, composition and boundaries of such features, where they occurred within 120 m of the Project Location, were confirmed during the vegetation surveys. Both site-specific and alternative site investigation methods were used to complete the woodland assessments in accordance with the methods described in Section 4.1.2.

Woodland features were compared to the definition of woodlands provided in O. Reg. 359/09, as amended through O. Reg. 521/10, whereby a “woodland” is defined as a treed area, woodlot or forested area, other than a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees, that is located south and east of the Canadian Shield.

The limits of all woodlands that occur, or partially occur, within 120 m of the Project Location were delineated through aerial photograph interpretation and field observations. Information regarding woodland size, species composition, ecological function and uncommon characteristics was collected during ELC surveys (**Section 4.1.2**) and through GIS analysis. Information pertaining to tree height, estimated woodland age and the presence of habitat features was recorded on the woodland assessment field forms for each woodland feature.

4.1.4 Wetland Verification and Delineation

Portions of previously unidentified wetlands identified during the course of the site investigations were delineated during the vegetation community assessment and vascular plant surveys. The wetland boundaries were mapped through an interpretation of aerial photographs based on observations made during the site investigations as to the limits of wetland communities in accordance with the methods outlined in the *Ontario Wetland Evaluation System (OWES) Southern Manual* (OMNR, 2002). Survey dates, times, and field personnel are summarized in **Table 4.1, Appendix B**. Boundaries of wetlands identified during the records review were revised based on observations made during the site investigations.

4.1.5 Bird Surveys

As noted in Section 3.2.6, bird studies were conducted by Hatch across four seasons between March 2009 and February 2010. The bird monitoring program was developed with reference to the following guidance documents:

- *Guideline to Assist in the Review of Wind Power Proposals – Potential Impacts to Birds and Bird Habitats v. 1.0* (MNR, 2007b);
- *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (Environment Canada, February 2007); and
- *Wind Turbines and Birds – A Guidance Document for Environmental Assessment* (Environment Canada, February 2007)

The 2009 bird study area was smaller than the current Study Area. Accordingly, supplementary breeding bird studies were conducted by Stantec in June 2010. In addition, winter raptor surveys were conducted by Stantec in 2010 - 2011 to monitor winter raptor activity within the Study Area. Survey methods and conditions are summarized below and, for the Hatch studies, are provided in **Appendix C**.

4.1.5.1 Summer Breeding (2010) Surveys

When additional property access was obtained in June, 2010, supplementary breeding bird point counts and area searches were conducted by Stantec. Following a site reconnaissance visit, grassland habitats within the Study Area (expanded from earlier versions used by Hatch) and off-road woodland habitats in the Study Area were targeted. Thirty-five additional woodland points and 13 grassland point counts in the Study Area were monitored between June 17 and June 22, 2010, and monitoring was repeated at least 10 days later between June 28 and July 2, 2010. Dates, survey times, survey conditions and surveyors are provided in **Table 4.1 (Appendix B)**. Point count locations are shown on **Figure 4** (**Appendix A**).

Breeding bird surveys in 2010 were conducted in order to characterize bird use of the overall Study Area as well as assess candidate significant wildlife habitat in woodlands. The protocols for the surveys were developed in compliance with Environment Canada's *Recommended Protocols for Monitoring Impacts on Wind Turbines on Birds* (Environment Canada, 2007b). Surveys were comprised of point counts augmented by area searches of natural features located within the Study Area. To quantify the relative abundance of species within the Study Area, point counts were divided into grassland and woodland habitat types.

Due to land access issues, some grassland point counts were conducted from the roadside. Thirteen point counts were located in open grassland habitats within the Study Area. Grassland habitat was agriculture dominated and separated into two categories: (a) crops were defined as being planted in rows and generally consisted of grains and (b) fields consisted of pasture, hay or fallow fields. The remaining point count locations were located within forest habitat.

Two woodland point counts were only surveyed once, in late June, due to initial land access restrictions. The remaining point count locations were surveyed twice during the month of June and in early July, once during a mid June visit and once during either a late June or early July visit. Ten minute point counts were conducted at each station between dawn and 10:30 a.m. Bird observations were recorded at four distance regimes: (a) within a 50 m radius, (b) between 50 and 100 m, (c) outside the 100 m radius, or (d) flyovers. For each point count, a record was made of the start time and a hand held GPS unit was used to geo-reference its location. A brief description of the habitat was recorded for each point count.

4.1.5.2 Winter Raptor Surveys

Given the presences of suitable habitat and the presence of known historical winter raptor concentration areas in the vicinity to the Study Area, the entire Zone of Investigation was identified as candidate significant winter raptor feeding and roosting areas. Surveys were conducted in January and February of 2011 to characterize the diversity and abundance of raptors that were using this area.

Diurnal wintering raptor surveys were conducted by Stantec within the study area on January 14 and 28, February 9, and March 11, 2011 between late morning and late afternoon. Survey dates, times, and weather conditions are summarized in **Table 4.1 (Appendix E)**. The purpose of the site investigation was to evaluate the significance of potential raptor winter feeding and roosting areas initially identified as candidate. The Study Area was inspected from roadways by two qualified observers while slowly driving (i.e., 30-40 km/h) and occasionally stopping to scan fields and woodlots using binoculars and, where birds were stationary and at a distance, a spotting scope. When raptors were detected, the location, species, number, behavior (i.e., perched, flying, hunting) and height was noted.

Dusk Short-eared Owl surveys were conducted in the same manner as the diurnal wintering raptor surveys, with investigation occurring in the early evening (**Table 4.1, Appendix E**).

4.1.6 Bat Habitat Surveys

The *Bats and Bat Habitats: Guidelines for Wind Power Projects* (MNR, March 2010) requires a physical investigation of the air, land and water within 120 m of the Project Location to determine if additional candidate bat significant wildlife habitat is present. This physical search was carried out in conjunction with the 2010 Ecological Land Classification survey, botanical inventory and habitat assessment (**Section 4.1.7**).

Information regarding the location of potential bat hibernacula features, such as bedrock outcroppings, abandoned mines and potential karst or karst-like features collected through the records review, was reviewed prior to site investigations. Such features, if present within the Zone of Investigation, were noted on the field forms.

Bat maternity roosts may occur in loose bark, hollow trees, snags or rock faces, but buildings are most commonly used roosts structures (Fenton, 1970). Large diameter trees (living or dead) that are taller than surrounding trees and relatively uncluttered by adjacent vegetation are requirements for important natural roosts of forest-dwelling bats (Kunz and Lumseden, 2003). Therefore, criteria used to identify potential bat maternity roosts in the field included:

- Presence of multiple large-diameter (>40 cm) snags;
- Snags that are taller than surrounding trees; or
- Snags that are in relatively open areas.

4.1.7 Assessment of Other Wildlife Habitat Features

Field investigations to identify wildlife habitat located within 120 m of the Project Location were conducted during the vegetation community and vascular plant surveys performed between September and December 2010. Survey dates, times, and field personnel are summarized in **Table 4.1 (Appendix B)**.

Surveys focused on identifying any wildlife habitat features within 120 m of the Project Location such as seeps, springs, vernal pools, potential hibernacula, areas of abundant mast, raptor nests etc. that may be designated as significant wildlife habitat (MNR, 2000) as well as assessing the presence of supporting features such as snags, downed debris, logs and tree cavities. In addition to the ELC field forms (Section 4.1.2), surveyors also filled out a woodland assessment form to document the presence or absence of potential habitat features.

Although other specific site visits were assigned to target particular groups (i.e. birds), all field surveys in the Study Area were conducted by qualified ecologists and are used as a means of recording all wildlife observed on site. As such, all observations made over the duration of the field program are compiled within the list of wildlife for the Study Area and are considered in the assessment of wildlife use in the area. Collectively, these multiple surveys, the habitats they cover and the period over which they occur (season and time of day) offer a comprehensive set of field observations for various flora and fauna species in the Study Area.

4.2 RESULTS OVERVIEW

4.2.1 Natural Features

Through aerial photograph interpretation and observations during the site investigations, a total of 90 discrete naturally-vegetated features were identified in, or within 120 m of, the Project Location. Each natural feature has been delineated based on contiguous woodland, wetland and grassland boundaries and assigned a unique identification number (**Figure 9, Appendix A**), which serves as a point of reference for the discussions that follow in Sections 5 and 6. The individual wetlands, woodlands, vernal pools, etc. that comprise these natural features also have been assigned unique identifiers to assist with cross-referencing and discussions during the evaluation of significance and impact assessment.

Unique identifiers for all natural features were generally assigned from west to east. However, as the Project Location was adjusted in response to the results of the site investigations, some features were no longer within the 120 m Zone of Investigation and were dropped, while other new features were added.

4.2.2 Vegetation Species

During the site investigations for the Wind Project components and Transmission Line, 265 species of vascular plants were recorded in, or within, the Zone of Investigation. Of that number, 203 species (77%) were native and 62 species (23%) were exotic. Species composition is reflective of the agricultural setting of the area as well as the substantial amounts of natural habitat remaining, often at the rear of the properties. Many of the exotic species existed primarily in the anthropogenic communities and along the edges of agricultural fields and roadways.

The majority (90%) of the native species observed within the Zone of Investigation surrounding the Wind Project components and Transmission Line are ranked S5 (secure - common, widespread and abundant in Ontario), and 10% are ranked S4 (apparently secure - uncommon but not rare in Ontario).

Site investigations within the Solar Lands resulted in the identification of 194 species of vascular plants in, or within, the Zone of Investigation. Of that number, 142 species (73%) were native and 52 species (27%) were exotic. The majority (91%) of the native species observed within the Solar Lands and corresponding Zone of Investigation are ranked S5 (secure - common, widespread and abundant in Ontario) and 9% are ranked S4 (apparently secure - uncommon but not rare in Ontario).

A complete list of plant species observed within the Zone of Investigation is provided in **Appendix F**. No provincially rare species (S1 – S3) were observed in, or within 120 m of, the Project Location. One locally rare species, white spruce (R1 in Haldimand County; Oldham, 1993), was found within the Study Area, however, all were planted or derived from planted

stock. There were no naturally established white spruce communities and as a result, the occurrence was not considered to be ecologically significant.

Due to the timing of some of the site investigations, a complete list of plant species was not attainable (i.e. December surveys). However, confirmation of ELC communities was possible based on the presence of canopy, sub-canopy and understorey vegetation. All project components are outside of all natural features with the exception of one: Feature 42a, CUP3-12A*. This is a young cultural plantation that is composed primarily of white and Norway spruce. Cultural meadow species (such as asters and goldenrods) dominated the ground layer. Some wet pockets of reed-canary grass and scirpus were also identified.

Upon review of the potential presence of species of conservation concern (**Figure 2.2, Appendix B**), there is only one plant species that has a slight potential to occur in this type of habitat: Paronychia fastigiata. This species flowers in spring/late fall in woodland and open habitat. Site investigations were conducted during the fall and this species was not identified in this feature. Based on the fact that only one feature will be directly impacted and that only one species of conservation concern has a slight potential to be present but field investigations did not confirm its presence, we believe that additional botanical surveys are not warranted during other times of year. The botanical work done to date is sufficient to meet any potential concerns.

4.2.3 Vegetation Communities

Natural vegetation communities within the Study Area were generally comprised of deciduous woodland and swamp, as well as swamp thickets and small meadow marsh communities in poorly-drained areas. One provincially rare vegetation community type (4 locations) was observed in or within 120 m of the Project Location, as follows:

- SWT2-4 - Buttonbush Mineral Thicket Swamp (S3) was found in four separate locations (Natural Features 8, 32, 51 and 74);

A Winterberry – Buttonbush Mineral Thicket Swamp (SWT2-14*) identified within Natural Feature 32 may also be considered a rare vegetation community given that both buttonbush and winterberry thicket swamps are considered S3 and S3S4, respectively. Further consultation with the NHIC is proposed to confirm the rarity of this community type. A Fresh-moist Black Walnut Lowland Deciduous Forest (FOD7-4) was identified during the field investigations, but it occurs more than 120 m from the Project Location (see **Figure 6.18**, **Appendix A**).

Four other vegetation communities identified within the Zone of Investigation are listed as S3S4 in Ontario:

- Silky Dogwood Mineral Thicket Swamp (SWT2-8) within Natural Features 7, 19, 49, 51, 55, 66, 75 and 76;

- Gray Dogwood Mineral Thicket Swamp (SWT2-9) within Natural Features 14, 19 and 47;
- Winterberry Organic Thicket Swamp (SWT3-7) within Natural Features 33, 51 and 73;
- Dry-fresh Oak – Hickory Deciduous Forest (FOD2-2) within Natural Features 22 and 32.

A detailed description of each vegetation community is provided in **Appendix F**. Raw data is provided through field forms in **Appendix E**.

4.2.4 Birds

Surveys of grassland and forest breeding birds conducted by Stantec in June 2010, targeted to the natural features within the Zone of Investigation surrounding each Project component identified 77 breeding bird species in the Study Area. An overall list of wildlife observed in the Study Area is provided in **Appendix G**. A complete list of all breeding bird species observed in each naturally vegetated feature during the 2010 site investigations is provided in **Appendix H**.

Nineteen species identified as species of conservation priority by Ontario Partners in Flight (2006) were observed within the Zone of Investigation, including open country birds (Northern Harrier, Short-eared Owl, American Kestrel, Eastern Kingbird, Savannah Sparrow, Vesper Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark), shrub-successional birds (Black-billed Cuckoo, Willow Flycatcher, Brown Thrasher, Field Sparrow, Eastern Towhee), forest birds (Northern Flicker, Eastern Wood-pewee, Wood Thrush, Rose-breasted Grosbeak) and birds that are more habitat generalists (Baltimore Oriole) (**Appendix G**).

Area-sensitive bird species are those identified as such in Appendix C of the *Significant Wildlife Habitat Technical Guide* (2000) or other literature as requiring a minimum of 20 ha of suitable grassland or forest habitat for breeding. Seven forest and one grassland area-sensitive nesting birds were observed during the 2010 point counts and other site investigations within woodland habitats in the Study Area. The Veery prefers to breed in forested areas greater than 10-20ha in size, while Ovenbird and Scarlet Tanager prefer 20ha and Sharp-shinned Hawk and American Redstart prefer 20-30ha of forest (Sandilands, 2005). Cooper's Hawk has been variously noted to require 4-50+ ha and Pileated Woodpecker 30-50 ha (Decision Support System Index #41, MNR, undated; Sandilands, 2005), although this latter species will incorporate smaller woodlots into its home range and therefore may not be a true area-sensitive species (Naylor et al. 1996). The single area sensitive grassland species, Upland Sandpiper, prefers to nest in open habitats greater than 25 ha in size. No minimum size was provided for Least Flycatcher although it is listed as an area-sensitive forest species in Appendix C of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000). All species are ranked S5 or S4 in Ontario (secure or apparently secure).

With respect to winter raptors, raptor densities observed on each of the four surveys conducted by Stantec in 2011 varied between 0.22 and 0.82 raptors per km for the entire Study Area. For comparison, Hatch observed densities of 0.245 – 0.275 raptors per km in 2009-2010 surveys.

In order of abundance, the following eight species were observed during the site investigations: Red-tailed Hawk, Rough-legged Hawk, American Kestrel, Northern Harrier, Short-eared Owl, Turkey Vulture, Sharp-shinned Hawk, Bald Eagle, and a single Cooper's Hawk (**Table 4.2, Appendix B**). Two species of special concern were observed during winter raptor surveys, including Bald Eagle and Short-eared Owl. Both are considered provincial species of special concern. A total of two Bald Eagles and twelve Short-eared Owls were observed over the course of winter raptor surveys (**Table 4.2, Appendix B**).

4.2.5 Wildlife and Wildlife Habitat

A list of all wildlife species observed during the 2010 site investigations is provided in **Appendix G**. In addition to the bird species discussed in Section 4.2.4, a total of five butterfly species, seven amphibians, two reptiles, and nine mammal species were observed. Two additional species of note were recorded. Monarch (S4B, provincial and federal species of concern) was recorded at numerous locations during fall migration, but was not noted in substantial numbers at any time. Snapping Turtle (S3, provincial and federal species of Special Concern) was not observed, but was reported by a landowner as being present within Natural Feature 34.

As discussed in Section 3.0, **Table 3.2** (**Appendix B**) identifies the provincially rare species and species of Special Concern historically reported within the general vicinity of the Project Location. The habitat requirements for each of these species, as well as an indication of their likely occurrence in or within the Project Location, are provided in **Table 3.2** (**Appendix B**). Suitable habitat for some of these species exists within the Study Area, and those considered present are discussed in the following sections.

4.3 NATURAL FEATURES – WIND

A summary of the corrections to the features, or potentially occurring features, identified through the Records Review as a result of the site investigations are outlined in **Table 4.3 (Appendix B)**. Any new features or functions identified as a result of the site investigation are also outlined in **Table 4.3** (**Appendix B**) and discussed in the text below. **Figures 6-1 to 6-17 (Appendix A)** show the results of the ELC site investigation, while **Figures 10-1 to 10-17 (Appendix A)** show the boundaries of the natural features (as appropriate) located within 120 m of the Wind Project Location. The location of this information relative to the Wind Project components is illustrated on these figures. Field notes for each survey conducted as part of the site investigation are provided in **Appendix E.**

The results of the site investigation program are provided below, in the context of natural features found within 120 m of the Wind Project Location.

4.3.1 Areas of Natural and Scientific Interest

Two life science ANSIs and 1 earth science ANSI were identified within the Study Area during the records review, however, none of these ANSIs occur within 120 m of the Wind Project Location.

No corrections were required to the results of the record review as a result of the site investigation (**Table 4.3, Appendix B**).

4.3.2 Wetlands

Vegetation communities occurring within 120 m of the Wind Project Location, as identified in the field, are shown on **Figures 6-1 to 6-17 (Appendix A)**. A detailed description of each community and a list of vascular species occurring from the Study Area are provided in **Appendix F**. Field notes are provided in **Appendix E.**

Natural vegetation communities within the Study Area were generally comprised of deciduous woodland and swamp, as well as swamp thickets and small meadow marsh communities in poorly-drained areas. One provincially rare thicket swamp community (Buttonbush Mineral Thicket Swamp (SWT2-4; S3) was found in four separate locations, within the Zone of Investigation in Natural Features 8, 32, 51 and 74. The Winterberry – Buttonbush Mineral Thicket Swamp (SWT2-14*) (Feature 32) may also be considered rare, given that both buttonbush and winterberry thicket swamps are considered S3 and S3S4, respectively.

The presence of the following PSWs within 120 m of the Wind Project Location was confirmed through site investigations:

- Fradenburg Tract (Natural Feature 32) – many more small pockets were present, and the complex appears more extensive than mapped by MNR;
- Grand River Marshes (Cayuga to Dunnville) (Natural Feature 65) – boundaries appeared accurate within the 120 m Zone of Investigation, where boundaries appeared to follow along the base of the Grand River valley slope
- Dunnville Marshes (Natural Feature 87) – boundaries appeared accurate within the 120 m Zone of Investigation

The Evan's Creek LSW (Natural Feature 66) was also confirmed through site investigations. The boundary of this feature upstream of Lakeshore Road was amended to exclude the dug pond and manicured lawn along the west side of Evans Creek observed during the site investigations

During the course of ELC and vegetation site investigations, numerous additional areas of wetland were identified within the Zone of Investigation. During the records review these areas

were identified as woodlands or as unevaluated wetlands (GRCA and LPRCA). The location and ELC boundaries of these features are shown on **Figures 6-1 to 6-17 (Appendix A)**, while the wetland boundaries according to OWES protocol are identified on **Figures 10-1 to 10-17 (Appendix A)**. One additional wetland was identified by the MNR through air photo interpretation following a site visit on March 15, 2011 (Feature 66). A discussion of the characteristics of each wetland and its relationship to evaluated wetlands within the Study Area is provided in **Section 5.2.1**. Corrections to the results of the record review to recognize the additional wetlands within the Zone of Investigation are identified in **Table 4.3** (**Appendix B**).

4.3.3 Valleylands

A valleyland is defined as a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year (MNR, 2010). ELC and vegetation surveys, along with information gathered during the water body surveys (Water Body and Water Assessment Report, Stantec, 2011), indicated and confirmed the presence of linear vegetated systems along defined watercourse features. Due to the relatively small catchment areas, flat topography and clay soil, the development of distinct and identifiable valleyland features within the Study Area was limited.

Within the GRCA watershed, distinct valleyland features within 120 m of the Wind Project Location were located along the various tributaries of the Grand River, including Holmes Creek, Sulpher Creek, Mazi Drain and various unnamed watercourses, where steep or valleyland slopes had been mapped by the GRCA based on OBM data (**Figure 10-1 to 10-17, Appendix A**). However, the headwater and upper reaches of the various tributaries to the Grand River were surrounded by relatively flat agricultural fields and would not be characterized as distinct valleyland features.

The Grand River is the most predominant valleyland feature within the Study Area. A portion of this valleyland was identified in associated with Natural Feature 65, where it occurred adjacent to Meadows Rd. The Grand River watershed is the largest in southern Ontario covering an area of approximately 6,734 km^2. The river originates near Dundalk and outlets to Lake Erie at Port Maitland, just south east of the Study Area. It is generally characterized by well-defined banks and valley slopes, natural riparian vegetation, floodplains and wetlands and provides a natural corridor from Lake Erie to the headwater of the Grand River and all of its major tributaries.

Within the LPRCA watershed, valleyland features within 120 m of the Wind Project Location were limited to the downstream reaches of Wardell's Creek and Evans Creek (i.e. south of Rainham Road) near the outlet to Lake Erie where slopes and naturally vegetated floodplain areas were observed (**Figure 10-10, Appendix A**). The headwater tributaries of Stoney Creek and other local drainage features outletting to Lake Erie, including the upper reaches of Evans Creek, generally included swales, agricultural drainage ditches and defined watercourses although no distinct valleyland features were associated with such features. Agricultural activities often encroached upon the banks of these watercourses.

Based on field investigations and aerial photograph interpretation, the valleyland features that occurred within 120 m of the Wind Project Location are identified on **Figures 10-1 to 10-17 (Appendix A)**. These valleylands included the Grand River, the lower reaches of Evan's Creek and the lower reaches of Wardell's Creek. Areas within 120 m of the Wind Project Location where no valley slopes or steep slopes have been mapped have been excluded from the valleylands layer as no distinct valleyland was identified in the field.

No corrections to the valleylands identified within the GRCA watershed were required, although those areas within the LPRCA watershed where valleyland features were identified based solely on the Regulation Limit as a proxy for potential valleyland features were revised based on field observations during the site investigation, as described above (**Table 4.4**, **Appendix B**).

4.3.4 Wildlife Habitat

4.3.4.1 Seasonal Concentration Areas

Features for which a trigger was considered to occur within the Study Area included:

- winter deer yards (MNR mapping);
- colonial bird nesting sites (PSW records);
- waterfowl stopover and staging areas (PSW records);
- waterfowl nesting habitat;
- landbird migratory stopover areas (MNR correspondence);
- raptor winter feeding and roosting areas (records review);
- Wild Turkey wintering areas (Christmas Bird Count results);
- Turkey Vulture summer roosting areas;
- reptile hibernacula (MNR information);
- bat hibernacula and maternity roosts (MNR information);
- Bullfrog concentration areas (PSW records); and
- migratory butterfly stopover areas (MNR information and air photos).

The results of the site investigation were used to confirm the presence/absence of these features in and within 120 m of the Wind Project Location, as well as to identify additional seasonal concentration areas that might exist in or within 120 m of the Wind Project Location.

Winter Deer Yards

The MNR has mapped winter deer yards in many of the woodlands in the Study Area, some of which occur within 120 m of the Wind Project location (**Figure 2, Appendix A**). Although site investigations did not identify the presence of features suitable for wintering deer, as outlined in the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) and Index #28 of the Decision Support System (MNR, undated), correspondence with the MNR indicated that features required by White-tailed Deer in Niagara Region were present in these woodlots. Winter deer yards are identified on **Figures 10-1 to 10-17** (**Appendix A**) based on the information received from the MNR (2000) and LIO (2010). An evaluation of significance will be completed in Section 5.2.

Colonial Bird Nesting Sites

Nesting colonial waterbirds were noted as a feature of several evaluated wetlands in the vicinity of the Study Area. The Wind Project Location falls within 120 m of 3 of these wetlands; Dunnville Marshes PSW (Feature 87), Grand River Marsh PSW (Feature 65) and Evans Creek LSW (Feature 66). However, no evidence of nesting colonies (i.e. heronries) was noted during site investigations in the portions of these wetlands and other unevaluated wetlands that occur in or within 120 m of the Wind Project Location. Candidate significant wildlife habitat for colonial nesting bird sites does not occur in or within 120 m of the Wind Project Location.

Waterfowl Stopover and Staging

The record review indicated that several evaluated wetlands in the vicinity of the Study Area supported staging waterfowl. Three of these wetlands occur within 120 m of the Project Location; the Dunnville Marsh PSW (Natural Feature 87), Grand River Marsh PSW (Natural Feature 65) and Evans Creek LSW (Natural Feature 66)). Site investigations confirmed these features supported wetland communities within proximity to Lake Erie. These features are considered candidate wildlife habitat for waterfowl stopover and staging

However, while other swamp and small marsh communities were identified during the site investigations (**Figures 6.1** to **6.18**, **Appendix A**), there were none that were considered to provide the standing water to serve as feeding ponds. No evidence of waterfowl stopover and staging was noted during site investigations in the portions of these wetlands and other unevaluated wetlands in or within 120 m of the Wind Project Location (Appendix E). No additional candidate significant wildlife habitat for waterfowl staging and stopover was identified in or within 120 m of the Project Location.

Waterfowl Nesting Habitat

While swamps and small marsh vegetation communities were identified within 120 m of the Wind Project Location, important habitat components required to support significant waterfowl nesting areas such as clusters of these habitat or flooded or poorly drained landscapes were not present (**Figure 6.1- 6.18, Appendix A; Appendix E**). While Canada Goose, Wood Duck and Mallard were considered breeding in the Study Area, field investigations did not identify waterfowl species or numbers that would be considered candidate significant wildlife habitat for waterfowl nesting (see **Appendix E; Appendix G; and Appendix H**). Candidate significant wildlife habitat for seasonal concentration areas supporting waterfowl nesting sites is considered absent in or within 120 m of the Wind Project Location.

Migratory Landbird Stopover Areas

Areas that provide a diversity of habitat types ranging from open grasslands to large (i.e. >10ha) woodlands within 5 km of the Lake Erie shoreline were considered potential candidate significant wildlife habitat for migrating landbird stopover areas (SWHTG, 2000; MNR correspondence).

Site investigations confirmed that twenty-three features found in and within 120 m of the Project Location met the habitat criteria established by MNR (i.e. woodlands at least 10 ha located adjacent to grassland habitats that occur within 5 km of the Lake Erie shoreline) (**Figure 6.1-6.18, Appendix A; Appendix E**). Features 42a, 42b, 44, 45b, 47, 49, 51, 53, 54, 55, 58, 66, 68, 69, 73, 74, 75, 76, 77, 81, 84, 86 and 87b are considered candidate significant wildlife habitat for seasonal concentration areas of migratory landbirds (**Table 4.5**, **Appendix B**). These are shown in **Figures 10.1 to 10.18, Appendix A**.

An evaluation of significance will be completed for each of these features in **Section 5.2**.

Raptor Winter Feeding and Roosting Areas

The winter raptor surveys conducted by Stantec in January and February, 2011 made a total of 306 raptors observations over the 4 surveys. Nine species of raptors were identified within the Study Area. Red-tailed Hawk was found to be the most abundance raptor (n=201) followed by Rough-legged Hawk (n=52), American Kestrel (n=15) and Northern Harrier (n=14). The average density of raptors observed throughout the 4 surveys within the Study Area was 0.46 raptors per kilometer, lower than that recorded by Environment Canada (2007) within the known Fisherville concentration area which extends southwest of the Study Area (2.14 raptors/kilometer). The density observed by Stantec is 2011 was also lower than that recorded at Amherst Island (3.14 raptors/kilometer) or Wolfe Island (1.4 raptors/kilometer).

Raptors were generally found throughout the Study Area, with very few to no raptors observed in the northeastern portion of the Wind Project Location. **Figure 9.0, Appendix A** depicts the areas of winter raptor concentration, as observed during the site investigations; scattered

observations of single raptors were not included with this area. The highest concentrations of raptors appeared to occur in the eastern portion of this area, which includes portions of the known Fisherville concentration area.

With reference to the *Significant Wildlife Habitat Technical Guide* (MNR, 2000), large open fields (i.e. > 20 ha), including hayfields, pastures and meadows, that are relatively undisturbed with good perching habitat and a history of use by winter raptors are most significant. Woodlands, hedgerows and fence posts adjacent to large grasslands provide perching and roosting opportunities for winter raptors. Through discussions with John Boos (MNR, July 21, 2011), where these habitat features occurred within the winter raptor concentration area described above, these natural features were identified as candidate winter raptor and roosting areas. Two candidate winter raptor feeding and roosting areas occur within 120 m of the Wind Project Location (**Figures 10.5** and **10.8**, **Appendix B**).

An evaluation of significance of the raptor concentration areas will be completed in Section 5.2.

Wild Turkey Winter Areas

During the winter, Wild Turkeys congregate in areas with two habitat features that are key to overwinter survival including (a) stands of mature coniferous trees (which provide shelter, thermal cover and reduce snow depths) – usually located in valleylands on the valley floor or lower slopes – and (b) seeps that provide an important source of water and food (Decision Support System Index #53, MNR, undated). Although one seep was noted within 120 m of the Wind Project Location (Natural Feature 62, **Figure 6.13, Appendix A**), there were no stands of mature coniferous trees in the vicinity. No Wild Turkeys were observed during the diurnal winter site investigations conducted by Stantec in 2010 – 2011 (**Table 4.2**, **Appendix B**). Historic observations by Hatch in 2009 identified the presence of Wild Turkey, however congregations of Wild Turkey were not observed and no regular use of a particular area was observed (**Appendix C**). Site investigations indicated this type of habitat was absent in or within 120 m of the Wind Project Location.

Turkey Vulture Summer Roosting Areas

No habitat features that would support Turkey Vulture summer roosting areas were identified in or within 120 m of the Wind Project Location (i.e. cliff ledges or large dead trees; see **Appendix E**). Site investigations conducted in the Study Area by Hatch and by Stantec did not observe the presence of Turkey Vulture roosting areas (**see Appendix E**).

Reptile Hibernacula

During the fall, snakes and turtles seek out areas in which to hibernate below the frost line. MNR indicates that the most important sites are associated with talus or karst areas, cliffs in large woodlands > 30 ha with an interior of mature forest, which have a more moderate climate than forest edges or small or narrow woodlands (Decision Support System Index #4, MNR,

undated). An abundance of tree stumps or logs, burrows, rock crevices (often associated with broken and fissured rock) is required.

Site investigations indicated this type of habitat was absent in or within 120 m of the Wind Project Location. A limestone bedrock outcropping was present at an abandoned quarry along the south side of Haldimand Road 20, west of South Cayuga Road, within Natural Feature 45 (**Figure 6-11, Appendix A**), but crevasses were largely horizontal. Despite a detailed search of this area, no cracks in the bedrock that went below the frost line were observed.

Other snake hibernacula features such as buried concrete or rock (e.g. culverts), rock crevices or abandoned animal burrows, which often occur with hedgerows, were absent from the Wind Project Location and 120 m Zone of Investigation. These features were investigated during the ELC surveys for potential hibernacula features. Soils are not necessarily rocky and therefore rock piles often observed along the edges of agricultural fields in other areas of the Province were not observed in, or within 120 m of the Wind Project Location.

Bat Hibernacula and Maternity Roosts

Consultation with the MNR identified the presence of 1 adit feature that could potentially support hibernating bats. The locations of such features are sensitive, and accordingly, it has not been mapped in this report. Candidate significant wildlife habitat is defined as the area measured in a 200 m radius surrounding a confirmed hibernacula (MNR, 2010). In this case, the Wind Project Location is sited well outside the candidate significant wildlife habitat, which may support bat hibernacula, with the nearest wind project component located more than 700 m from this feature.

The locations of karst-like or cave-like features, shown in red on **Figure 3 (Appendix A)**, are located well north or well west of the Wind Project Location. As a result, no candidate significant wildlife habitat in the form of seasonal concentration areas (bat hibernacula) was identified in or within 120 m of the Wind Project Location.

Bat maternity roosts may occur in loose bark, hollow trees, snags or rock faces, but buildings are most commonly used roosts structures (Fenton, 1970). Large diameter trees (living or dead) that are taller than surrounding trees and relatively uncluttered by adjacent vegetation are requirements for important natural roosts of forest-dwelling bats (Kunz and Lumsden, 2003).

Although no potential bat maternity roosts were noted within the Wind Project Location, large diameter snags with loose bark where this species may reside during roosting/rearing, were noted in 4 locations within the 120 m Zone of Investigation (**Table 4.6, Appendix B**). These snags were either shorter than the surrounding vegetation or were surrounded by relatively dense canopy or sub-canopy vegetation, or both. Based on the available literature described above (Fenton, 1970, Kunz and Lumsden, 2003), no candidate significant wildlife habitat in the form of bat maternity roosts was noted within the Wind Project Location or the 120 m Zone of Investigation.

Bullfrog Concentration Areas

Habitat for Bullfrogs was noted as a feature of several evaluated wetlands in the vicinity of the Study Area. The Wind Project Location is located within 120 m of two wetlands (Fradenburg Tract PSW and Evans Creek LSW) for which the presence of Bullfrog breeding habitat has been recorded. Bullfrogs live in permanent water, and preferred habitat includes large marshes and extensive areas of emergent shoreline vegetation for breeding (Decision Support System Index #14, MNR, undated). In the Study Area, this type of habitat is restricted to the marsh wetlands of the Grand River and marshy portions of the Lake Erie shoreline. Site investigations confirmed that suitable habitat was not present in or within 120 m of the Wind Project Location. As a result, no candidate significant wildlife habitat in the form of Bullfrog concentration areas was identified.

Migratory Butterfly Stopover Areas

Significant habitat may include significant breeding habitat (concentrations of its host plant, milkweed) and significant migratory stopover habitat (presence of large Monarch roosts); significance of both habitat types was evaluated. Observations of Monarchs consisted of single observations to small groups dispersed throughout the Study Area. Monarchs were not noted in any substantial numbers, nor were large stands of milkweed. Site investigations confirmed that suitable candidate significant wildlife habitat in the form of migratory butterfly stopover areas was identified within 120 m of the Wind Project Location (**Table 4.7**, **Appendix B**). An evaluation of significance of migratory butterfly stopover areas will be completed in Section 5.2.

Other Seasonal Concentration Areas

Site investigations did not identify the presence of any additional candidate significant wildlife habitat in the form of seasonal concentration areas within the Wind Project Location or the Zone of Investigation.

4.3.4.2 Animal Movement Corridors

In southern Ontario, corridors usually consist of naturally vegetated areas that run through more developed and open landscapes. As indicated in the *Significant Wildlife Habitat Technical Guide* (2000), it is seldom possible to observe wildlife species using corridors. ELC site investigations, mapping and aerial photography were used to assess the potential of areas with sufficient vegetation cover, natural areas and enough connectivity across the landscape to be considered candidate significant wildlife habitat. Such features included hedgerows and watercourses with natural riparian vegetation identified as connecting two or more larger natural features. Potential routes with higher connectivity between natural features through the Study Area are identified on **Figure 9** (**Appendix A**). The Grand River valley likely provides the best continuous corridor through the landscape. Branching off of the Grand River valley are several lines of relatively closely linked woodlands that form east-west routes through the Study Area. In the south, Wardell's Creek and Evans Creek provide routes connecting to Lake Erie. According to the *SWHTG* (2000), linkages between natural features through agricultural lands

(along hedgerows or fence lines) do not represent candidate significant animal movement corridors because these features do not provide the sole animal movement corridor in the Study Area. Many wildlife species move through open, agricultural land to reach natural areas (MNR, 2000).

4.3.4.3 Rare or Specialized Habitats

Rare Habitats

Rare habitats include those features with SRANKS ranging from S1 to S3. Several rare vegetation community types were identified during the records review (see **Section 3.2.6.3** and **Table 3.1** (**Appendix B**)**)**. None of these community types were observed during the site investigations in, or within 120 m of, the Wind Project Location.

One additional rare vegetation community type was observed at four separate locations. A Buttonbush Mineral Thicket Swamp (SWT2-4), which is provincially ranked S3 was identified at the following locations within 120 m of the Wind Project Location:

- Buttonbush Mineral Thicket Swamp (SWT2-4) - Natural Feature 8
- Buttonbush Mineral Thicket Swamp (SWT2-4) - Natural Feature 32
- Buttonbush Mineral Thicket Swamp (SWT2-4) - Natural Feature 51
- Buttonbush Mineral Thicket Swamp (SWT2-4) - Natural Feature 74

One additional rare vegetation community (Black Walnut Deciduous Forest (FOD7-4) – Natural Feature 68) was observed during the field investigations, although is located more than 120 m from the Wind Project Location.

The rare vegetation communities within 120 m of the Wind Project Location are identified on **Figures 6.1, 6.7, 6.13, 6.16** and **6.18** (**Appendix A**), respectively, and have been identified as rare vegetation communities (habitats) on **Figures 10.1, 10.7, 10.13, 10.16** and **10.18** (**Appendix A**), respectively.

One additional habitat feature, for which an ELC code is not available in Lee et al. (1998), which would likely be considered rare habitat based on the SRANK of similar ELC communities, is the Winterberry - Buttonbush Mineral Thicket Swamp (SWT2-14*) located within Natural Feature 32 (**Figure 6.7** and **Figure 10.7**, **Appendix A**). For the purposes of the NHA/EIS, we have assumed that this community type is considered rare within the Province and the Project has been sited to avoid direct impacts (as discussed in Section 6.0). Records pertaining to this community will be submitted to the NHIC to confirm this designation.

Specialized Habitats

Specialized habitat features for which a trigger was considered to occur within the Study Area included the following:

- sites supporting area-sensitive species;
- old growth or mature forest stands;
- seeps and springs;
- woodlands supporting amphibian breeding ponds;
- sites supporting nesting raptors; and
- turtle nesting habitat.

The results of the site investigations were used to determine the presence and extent of these features in, or within 120 m of the Wind Project Location as well as identify other specialized habitats that might exist in, or within 120 m of the Wind Project Location.

Sites Supporting Area Sensitive Species

Area-sensitive bird species are those identified as such in Appendix C of the *Significant Wildlife Habitat Technical Guide* (2000), or other literature as requiring a minimum of 10ha of suitable grassland or forest habitat for breeding.

Area Sensitive Woodlands

Features that would provide habitat for woodland breeding birds were identified through the ELC surveys. ELC communities that were considered to potentially support woodland birds included forest (coniferous, deciduous or mixed), swamp (coniferous, deciduous or mixed) and woodlands. Woodland features were delineated (**Figure 2.2, Appendix B**) and the area of each feature was calculated.

Breeding bird surveys were conducted in 19 of 48 (40%) woodlands greater than 10 ha located within the Study Area. Ten area-sensitive nesting birds were observed during 2010 point counts in woodland habitat that falls within 120 m of the Wind Project Location. Thirteen woodlands supported the following area-sensitive species (**Table 4.6, Appendix B**) and will be assessed using an evaluation of significance in **Section 5.2**, including:

- Natural Feature 7: White-breasted Nuthatch
- Natural Feature 10: Cooper's Hawk, White-breasted Nuthatch

- Natural Feature 19: White-breasted Nuthatch, Ovenbird
- Natural Feature 22: Cooper's Hawk, White-breasted Nuthatch, Veery
- Natural Feature 32: Cooper's Hawk, Hairy Woodpecker, Veery, Ovenbird, Scarlet Tanager
- Natural Feature 34: Sharp-shinned Hawk, White-breasted Nuthatch, Veery, American Redstart, Ovenbird
- Natural Feature 42: Ovenbird, Scarlet Tanager
- Natural Feature 51: Hairy Woodpecker, White-breasted Nuthatch
- Natural Feature 54: Veery, Scarlet Tanager
- Natural Feature 55: White-breasted Nuthatch, Ovenbird
- Natural Feature 58: Cooper's Hawk, Hairy Woodpecker, Least Flycatcher, White-breasted Nuthatch, Veery, Ovenbird
- Natural Feature 66: Hairy Woodpecker
- Natural Feature 68: White-breasted Nuthatch, Veery
- Natural Feature 73: White-breasted Nuthatch

Candidate significant wildlife habitat for area sensitive forest nesting birds was identified within those woodland features that were over 10 hectares in size or were found to support area sensitive species (**Table 4.8, Appendix B**). An evaluation of significance will be conducted in Section 5.2.

Area Sensitive Grasslands

Breeding bird surveys conducted by Stantec in 2010 identified a single area sensitive grassland bird breeding within 120 m of the Wind Project Location, the Upland Sandpiper which prefers to breed in suitable grasslands over 20 ha in size.

Candidate significant wildlife habitat for area sensitive grassland breeding birds was identified through the vegetation community assessment. All vegetation communities that constitute grassland habitat were identified as candidate significant wildlife habitat. Areas that are actively managed for agricultural activities are considered disturbed systems and are not considered candidates for significant wildlife habitat (MNR personal communication, January 26, 2011). Such areas include croplands as well as hayfields, as the farming practice of hayfield cutting before the end of the breeding cycle for grassland birds can reduce breeding success

and hayfields as a result are not considered to support viable populations of grassland breeding bird species.

Two areas of candidate significant wildlife habitat for grassland breeding birds were identified within 120 m of the Wind Project Location; grassland areas A and C in **Figure 10.4, 10.5, 10.8, 10.9** (**Appendix B**). An evaluation of significance will be conducted in Section 5.2.

Old Growth or Mature Forest Stands

Although many forest stands contained mature trees, stands showed evidence of forest management. Old growth ecosystems are characterized by the presence of old trees and their associated plants, animals and ecological processes and show little or no evidence of human disturbance (MNR 1994 in Uhlig et al, 2003). According to the information provided in Table 4 of the *Old Growth Forest Definitions for Ontario* (Uhlig et al, 2003), old growth forests within the deciduous forest region (Ecosite 7E) begin to take on 'old growth' characteristics forests stands are between 110 to 140 years of age (depending on species). None of the woodlands within the Study Area were identified in this age range. An evaluation of significance is not required.

Seeps and Springs

Criteria for determining the significance of seeps is outlined in Appendix Q of the SWHTG (MNR, 2000). Suggested factors include the abundance and location of seeps, the nature of the adjacent area, and the presence of rare species, and duration of surface water. Given the timing of the site investigations (fall) and apparent rarity of seeps in the landscape as a result of the imperfectly drained soils and excess water/low permeability restrictions, all seeps were considered to be significant and will be discussed in Section 5.2.

Only one seep was noted in Natural Feature 62 and is mapped on **Figure 10.14 (Appendix A)**. This seep occurs within a small white ash cultural woodland (CUW1-9*). Ground vegetation included goldenrods, asters and reed-canary grass. Minimal water depth (approx. 7 cm) was observed at this location as the downstream reach was dry (and recently disturbed – channelized). Substrate consisted of clay, cobble and gravel.

Woodlands Supporting Amphibian Breeding Ponds

According to the Decision Support System Index #40 (MNR, undated), characteristics of significant wildlife habitat in the form of amphibian woodland breeding ponds are ponds that must contain all of the following three elements: (a) permanent or temporary shallow water with no fish, (b) emergent or submergent vegetation, woody shrubs, logs and/or other shoreline structures and (c) a closed-canopy surrounding woodland with an abundance of downed woody debris. Closed-canopy woodlands with rather dense undergrowth that maintains a damp environment are preferred for salamanders in particular (MNR, 2000). All potential breeding ponds within closed-canopy woodlands are considered to be candidate significant wildlife habitat. Site investigations carried out in and within 120 m of the Wind Project Location

identified the presence of vernal pools in woodlands or standing water in wetlands in 19 natural features (**Table 4.6**, **Appendix B**). Characteristics of the woodland pools are summarized in **Table 4.6** (**Appendix B**) and are identified on the **Figures 10.1 to 10.17** (**Appendix A**). An evaluation of significance will be conducted in Section 5.2.

Sites Supporting Specialized Nesting Raptors

Several raptors, such as Osprey, Red-shouldered Hawk or Short-eared Owl, require somewhat specialized nesting habitat for long-term survival (MNR, 2000). Breeding bird results are provided in Appendix G1, field notes are provided in Appendix E. As noted in Section 3.0, Appendix Q of the SWHTG and Index 22 of the SWHTGDSS indicate that Osprey and Bald Eagle nesting locations should be considered for candidate significant wildlife habitat for specialized raptor nesting.

No occurrences of Osprey nesting were observed (**Appendix D**).

The Bald Eagle nest that was identified during the records review was confirmed as active during the site investigation program. It is found more than 2 km from the closest project component (a turbine location).

During site investigations in 2011, an active Red-tailed Hawk stick nest was recorded. This species does not meet the definition of candidate significant wildlife habitat for specialized habitat for nesting raptors (MNR, 2000 and MNR, 2009). No candidate significant wildlife habitat for raptor nesting was found in, or within 120 m of, the Project Location.

Turtle Nesting Habitat

The *Significant Wildlife Habitat Technical Guide* (MNR, 2000) indicates that turtles prefer to nest in relatively soft substrates such as sand or fine gravel in open, sunny areas. Waterlogged or inundated soils are not appropriate (Decision Support System Index #23, MNR, undated). Soils within the Study Area are heavy in texture, have poor drainage and are limited by excess water and low permeability (Section 3.2.1.1). Site investigations did not identify any small or unmapped pockets of sandy or gravelly soils within the Wind Project Location or Zone of Investigation (**Appendix D**). As a result, site investigations do not suggest the presence of potential turtle nesting areas in or within 120 m of the Project Location. An evaluation of significance is not required.

Assessment of Additional Specialized Habitat Features

Site investigations carried out in and within 120 m of the Wind Project Location did not identify the presence or potential presence of any additional specialized features.

4.3.4.4 Habitat of Species of Conservation Concern

Species of conservation concern observed in the Study Area include species with low S-Ranks, species of special concern (other than provincially endangered and threatened species) and Ontario Partners in Flight (PIF) priority species.

Rare Species

Three species of provincial special concern were identified within 120 m of the Wind Project Location: Snapping Turtle and Bald Eagle and Monarch.

- Snapping Turtle- The records review identified Snapping Turtle as being present within the Evans Creek LSW (Natural Feature 64) (**Figure 10.10**, **Appendix A**). This species was also reported by a landowner during the site investigations as being present within the watercourse traversing Natural Feature 34 (**Figure 10.7**, **Appendix A**). Field investigations confirmed suitable habitat was present within both the Evans Creek wetland and the watercourse which ran through Natural Feature 34. An evaluation of significance will be conducted in Section 5.2.

- Bald Eagle- Three Bald Eagles were observed over the course of winter raptor surveys. One of which was observed in proximity to a nest, however it is located outside of the Study Area, more than 2 km east of the nearest Project component (a turbine location). The other Bald Eagles were observed flying over the Study Area and were found to be using any particular habitat feature.

- Monarch butterfly: Monarchs were observed in Natural Features 22, 32 and 33 during the field investigations. At each location, they were observed in relatively low numbers (i.e. less than 5 individuals). Two species of milkweed, the host plants for the Monarch, were observed throughout the Wind Project Location and Zone of Investigation. However, significant concentrations of milkweed were not observed. During their fall migration, Monarchs will often aggregate overnight in large roosts in trees. During the fall field investigations, no such “Monarch roosts” were observed. Additional discussion specific to the function of migratory butterfly stopover areas is provided in Section 4.3.4.1. No evaluation of significance for Monarchs is required.

Species of conservation concern (S1-S3, special concern) identified by a search of the NHIC database are listed in **Table 3.2 (Appendix B)**. Thirty two plant, three odonate and butterfly, five amphibian and reptile, six bird and three mammal species were identified by the NHIC as potentially occurring within the study area. Habitat assessments were conducted in each feature in and within 120 m of the Project Location to determine the potential presence of these species of conservation concern. Based on field investigations, 19 of the plant species, two of the amphibian / reptile species and four of the bird species are considered absent from the Study Area. The remaining two bird species are present but not breeding. Results of the site

investigation and habitat assessment for each species of conservation concern identified through the records review are provided in **Table 3.2, Appendix B**.

Declining Populations – Woodland Breeding Birds

Studies conducted by Hatch (2009) and Stantec (2010) identified the presence of 17 Partners in Flight (PIF) priority species in the Wind Project Location and its Zone of Investigation (Ontario PIF, 2007) during the breeding season. These include forest species (Northern Flicker, Eastern Wood-Pewee, Wood Thrush, Rose-breasted Grosbeak), shrub/successional species (Black-billed Cuckoo, Willow Flycatcher, Brown Thrasher, Field Sparrow, Eastern Towhee), grassland/agricultural species (American Kestrel, Eastern Kingbird, Northern Harrier, Savannah Sparrow, Grasshopper Sparrow, Eastern Meadowlark, Bobolink) and other species (Baltimore Oriole). A summary of the breeding birds observed within each Feature is provided in **Appendix G**.

Candidate significant wildlife habitat for declining forest birds within the Wind Project Location or Zone of Investigation was identified as any woodland over 10 ha in size that may support significant populations of woodland PIF species (**Table 4.8, Appendix B**). An evaluation of significance is provided in Section 5.3.

Declining Populations - Grassland Breeding Birds

Candidate significant wildlife habitat for grassland breeding bird species of conservation concern was identified through the vegetation community assessment. All vegetation communities that constitute grassland habitat were identified as candidate significant wildlife habitat. Areas that are actively managed for agricultural activities are considered disturbed systems and are not considered candidates for significant wildlife habitat (MNR personal communication, January 26, 2011). Such areas include croplands as well as hayfields, as the farming practice of hayfield cutting before the end of the breeding cycle for grassland birds can reduce breeding success and hayfields as a result are not considered to support viable populations of grassland breeding bird species.

Two areas of candidate significant wildlife habitat for grassland breeding birds was identified within 120 m of the Wind Project Location; grassland areas A and C in **Figure 2.2, Appendix B**. Grassland PIF priority species were identified in area A. Feature specific breeding bird data was not available for area C. An evaluation of significance was conducted on Section 5.2.

4.3.4.5 Wildlife Habitat Summary

The following candidate significant wildlife habitat features are present within 120 m of the Wind Project Location, requiring an evaluation of significance:

- Seasonal concentration areas (winter deer yards, landbird migratory stopover areas, butterfly stopover areas and raptor feeding and roosting areas);

- Animal movement corridors (Grand River and local connections);
- Rare habitat (rare vegetation communities);
- Specialized habitats (area-sensitive woodland and grassland breeding bird species, seeps and amphibian woodland breeding ponds); and
- Habitat for species of conservation concern (Snapping Turtles and declining woodland and grassland breeding bird species).

4.3.5 Woodlands

As identified during the records review, there are numerous woodland communities scattered across the Study Area. The location, size and composition of these woodlands were identified and confirmed through air photo interpretation and field investigations.

Overall, a total of 92 woodlands were identified within the Study Area during the vegetation surveys. Of these woodlands, 75 occur in or within 120 m of the Wind Project Location. As noted in Section 3.2.7, woodlands were defined in accordance with s. 63(1) of O. Reg. 359/09, as amended through O. Reg. 521/10. Any features (or portions thereof) that did not satisfy this definition, such as meadow marshes, cultural meadows or thickets, were not considered "woodlands" for the purposes of this evaluation. The limits of all woodlands are identified on **Figures 10.1 to 10.17** (**Appendix A**).

The average size of the woodlands within the Study Area was approximately 34 ha, with sizes ranging from 0.3 ha to 217 ha and the median size of 11.9 ha. The majority (56 or 65%) of these woodlands contain interior forest habitat, which includes interior portions of the woodlands that are greater than 100 m from the woodland edge (boundary). A description of the attributes, composition and functions for each woodland found within, or comprising, the natural features within 120 m of the Wind Project Location is provided in **Table 4.6 (Appendix B)**.

4.3.6 Summary

Based on the records review and site investigation, the following natural features have been identified as candidate significant natural features in or within 120 m of the Wind Project Location, for which an evaluation of significance is required:

- Wetlands (3 PSW, 1 LSW and numerous unevaluated wetlands)
- Valleylands (Grand River valley, lower reaches of Evans Creek)
- Woodlands (75 woodlands)
- Wildlife Habitat

- Seasonal concentration areas (winter deer yards, landbird migratory stopover areas, butterfly stopover areas, waterfowl stopover and staging and raptor winter feeding and roosting areas);
- Animal movement corridors (Grand River and local connections);
- Rare habitat (rare vegetation communities);
- Specialized habitats (area-sensitive woodland and grassland breeding bird species, seeps and amphibian woodland breeding ponds); and
- Habitat for species of conservation concern (Snapping Turtles and declining woodland and grassland breeding bird species).

4.4 NATURAL FEATURES – SOLAR

4.4.1 Areas of Natural and Scientific Interest

Two life science ANSIs and 1 earth science ANSIs were identified within the Study Area during the records review, however, none of these ANSIs occur on, or within 120 m of the Solar Project Location.

4.4.2 Wetlands

Vegetation communities occurring within 120 m of the Solar Project Location, as identified in the field, are shown on **Figures 7-1 and 7-2 (Appendix A)**. A detailed description of each community and a list of vascular species occurring in the Solar Project Location and Zone of Investigation are provided in **Appendix F**. Field notes are provided in **Appendix E.**

Natural vegetation communities within the Solar Project Location and Zone of Investigation were generally comprised of deciduous woodland and swamp, as well as swamp thickets and small meadow marsh communities in poorly-drained areas. No rare vegetation communities occur in or within 120 m of the Solar Project Location. No PSWs or LSWs previously evaluated by the MNR occur within 120 m of the Solar Project Location, although the GRCA identified several unevaluated wetland pockets within the various woodlands adjacent to the Solar Project Location (**Figure 2, Appendix A**).

During the course of ELC and vegetation site investigations, these and other areas of wetland were identified within the Zone of Investigation. The location and ELC boundaries of these features are shown on **Figures 7-1 and 7-2 (Appendix A)**, while the wetland boundaries according to OWES protocol are identified on **Figures 11-1 and 11-2 (Appendix A).** A discussion of the characteristics of each wetland and its relationship to evaluated wetlands within the Study Area is provided in **Section 5.3.1**. Corrections to the results of the record

review to recognize the additional wetlands within the Zone of Investigation are identified in **Table 4.3** (**Appendix B**).

4.4.3 Valleylands

A valleyland is defined as a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year (MNR, 2010). No valleylands were identified during the records review as occurring in or within 120 m of the Solar Project Location. ELC and vegetation surveys, along with information gathered during water body surveys (Water Body and Water Assessment Report, Stantec, 2011), confirmed that no valleylands were identified on, or within 120 m of, the Solar Project Location.

Drainage within the Solar Project Location is split between the unnamed tributaries or the Grand River, which flow northward and eastward, and the headwater reaches of Wardell's Creek, which flow southward to Lake Erie (**Figure 2**, **Appendix A**). This area occurs along the watershed divided between the GRCA and LPRCA jurisdictions. The unnamed tributaries of the Grand River were confirmed as intermittent flow paths across existing agricultural fields that contained no natural vegetation or defined valley. East of Wilson Road, a watercourse south of the Solar Project Location flows through a cultural meadow that contains defined banks but no defined valleyland feature was observed.

The headwater reaches of Wardell's Creek, which eventually outlet to Lake Erie, drain southeast and then southwest through a cultural meadow south of Haldimand Road 20, although no defined valleyland feature was observed. Site investigation confirmed that the Regulation Limits utilized as a proxy for identifying potential valleyland features within the LPRCA watershed do not represent valleylands. As a result, LPRCA Regulation Limits identified during the records review within the southeast portion of the Solar Project Location have been excluded from the valleylands layer.

Based on field investigations and aerial photograph interpretation, no valleyland features occurred within 120 m of the Solar Project Location are identified on **Figures 11-1 to 11-2 (Appendix A)**. Areas within 120 m of the Solar Project Location where no valley slopes or steep slopes have been mapped have been excluded from the valleylands layer as no distinct valleyland was identified in the field.

No corrections to the valleylands identified within the GRCA watershed were required, as none were identified during the records review as being within 120 m of the Solar Project Location. However, those areas within the LPRCA watershed where valleyland features were identified based solely on the Regulation Limit as a proxy for potential valleyland features were revised based on field observations during the site investigation, as described above (**Table 4.4, Appendix B**).

4.4.4 Wildlife Habitat

4.4.4.1 Seasonal Concentration Areas

Features for which a trigger was considered to occur within the Solar Project Location included:

- winter deer yards (MNR mapping);
- colonial bird nesting sites (PSW records);
- waterfowl stopover and staging areas (PSW records);
- waterfowl nesting habitat;
- landbird migratory stopover areas (MNR correspondence);
- raptor winter feeding and roosting areas (records review);
- Wild Turkey wintering areas (Christmas Bird Count results);
- Turkey Vulture summer roosting areas;
- reptile hibernacula (MNR information);
- bat hibernacula and maternity roosts (MNR information);
- Bullfrog concentration areas (PSW records); and
- migratory butterfly stopover areas (MNR information and air photos).

The results of the site investigation were used to confirm the presence/absence of these features within 120 m of the Solar Project Location, as well as to identify additional seasonal concentration areas that might exist in or within 120 m of the Solar Project Location.

Winter Deer Yards

The MNR has mapped winter deer yards in many of the woodlands in the Study Area, some of which occur within 120 m of the Solar Project location (**Figure 2, Appendix A**). Although site investigations did not identify the presence of features suitable for wintering deer as outlined in the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) and Index #28 of the Decision Support System (MNR, undated), correspondence with the MNR indicated that features required by White-tailed Deer in Niagara Region were present in these woodlots. Winter deer yards are identified on **Figures 11.1** and **11.2** (**Appendix A**) based on the information received from the MNR (2000) and LIO (2010). An evaluation of significance will be conducted in Section 5.3.

Colonial Bird Nesting Sites

Nesting colonial waterbirds were noted as a feature of several evaluated wetlands in the vicinity of the Study Area. The Solar Project Location does not fall within 120 m of these evaluated wetlands, and no evidence of nesting colonies was noted during site investigations in unevaluated wetlands within 120 m of the Solar Project Location. No candidate significant wildlife habitat for colonial bird nesting sites was identified in or within 120 m of the Solar Project Location and an evaluation of significance is not required.

Waterfowl Stopover and Staging

No known waterfowl stopover or staging areas were identified in or within 120 m of the Solar Project Location during the record review. The Solar Project Location is comprised primarily of ploughed fields (**Figure 7.1 and 7.2, Appendix A**). Natural features found within 120 m of the Solar Project Location contain mixed swamp and deciduous forest (**Figure 7.1 and 7.2, Appendix A**). No habitat that would support significant waterfowl stopover or staging areas such as large wetlands, undisturbed shorelines, large ponds and small lakes were identified in or within 120 m of the Solar Project Location (**Appendix E**). No candidate significant wildlife habitat for waterfowl stopover and staging areas was identified in or within 120 m of the Solar Project Location and an evaluation of significance is not required.

Waterfowl Nesting

As noted above the Solar Project Location and adjacent 120 m is comprised primarily of ploughed fields and woodlands containing deciduous woodland and swamp communities. No ponds, clusters of marshes, beaver ponds or other habitat that would support waterfowl nesting was observed (**Figure 7.1** and **7.2**, **Appendix A**; **Appendix D**). Wood Duck was the only species of waterfowl that was recorded during site investigations (Appendix G2). No candidate significant wildlife habitat for waterfowl nesting sites was identified in or within 120 m of the Solar Project Location and an evaluation of significance is not required.

Migratory Landbird Stopover Areas

Areas that provide a diversity of habitat types ranging from open grasslands to large (i.e. >10ha) woodlands within 5 km of the Lake Erie shoreline were considered potential candidate significant wildlife habitat for migrating landbird stopover areas (SWHTG, 2000; MNR correspondence).

Six features are found within 120 m of the Solar Project Location; Features 29, 30, 31, 37, 39, and 40 (**Figure 7.1 and 7.2**, **Appendix A**):

- Features 29, 30, 31 are not located within 5 km of the Lake Erie shoreline and do not meet the criteria to be considered candidate significant wildlife habitat for a migratory landbird stopover area;

- Feature 37 is located within 5 km of Lake Erie however it is 3.9 ha. It did not meet the size criteria to be considered candidate significant wildlife habitat for a migratory landbird stopover area;

- Feature 39 is located within 5 km of Lake Erie. It is comprised of two separate woodlands, which are 6.2 and 5.6 ha respectively. It was comprised of sugar maple forest surrounded primarily by ploughed fields (**Figure 7.1 and 7.2, Appendix A**). It did not contain a diversity of habitat types and it did not meet the criteria to be considered candidate significant wildlife habitat for a migratory landbird stopover area;

- Feature 40 is a 13.4 ha woodland found within 5 km of Lake Erie. The woodland contained deciduous forest and swamp vegetation communities and with open grassland habitats (fallow, cultural meadow and hayfields). It is considered candidate wildlife habitat for a migratory landbird stopover area.

No candidate significant wildlife habitat for migratory landbird stopover areas was identified in the Solar Project Location (**Table 4.5**, **Appendix B**). However, one feature (Feature 40) considered candidate significant wildlife habitat for migratory landbird stopover areas is found within 120 m of the Solar Project Location (**Figure 11.2, Appendix A**). An evaluation of significance will be conducted in Section 5.3.

Raptor Winter Feeding and Roosting Areas

The winter raptor surveys conducted by Stantec in January and February, 2011 made a total of 25 raptor observations in proximity to the Solar Project Location. Four species were observed including Short-eared Owls (n=10), Rough-legged Hawks (n=10), Red-tailed Hawks (n=4) and Northern Harrier (n=1).

Raptor density was highest in the northwestern quadrate of the solar lands and to the north of the solar lands within the 120 m Zone of Investigation. Specifically, the 10 Short-eared Owls were observed during a single survey to the north of the Solar Project Location. Suitable coniferous or mixed roost feature did not occur within the Solar Project Location. Field observations identified a coniferous hedgerow that was used as a roost feature by the Short-eared Owls; however this feature was beyond the 120 m Zone of Investigation.

Raptors were generally found throughout the Solar Project Location, with no observations in the southeast corner. **Figure 9.0, Appendix B** depicts the areas of winter raptor concentration, as observed during the site investigations; scattered observations of single raptors were not included with this area. The highest concentrations of raptors appeared to occur in the eastern portion of this area, which includes portions of the known Fisherville concentration area.

With reference to the *Significant Wildlife Habitat Technical Guide* (MNR, 2000), large open fields (i.e. > 20 ha), including hayfields, pastures and meadows, that are relatively undisturbed with good perching habitat and a history of use by winter raptors are most significant. Woodlands,

hedgerows and fence posts adjacent to large grasslands provide perching and roosting opportunities for winter raptors. Through discussions with John Boos (MNR, July 21, 2011), where these habitat features occurred within the winter raptor concentration area described above, these natural features were identified as candidate winter raptor and roosting areas. One candidate winter raptor feeding and roosting areas occur within 120 m of the Solar Project Location (**Figure 11.1**, **Appendix B**).

An evaluation of significance of the raptor concentration area will be completed in Section 5.2.

Wild Turkey Winter Range

During the winter, Wild Turkeys congregate in areas with two habitat features that are key to overwinter survival: stands of mature coniferous trees (which provide shelter, thermal cover and reduce snow depths) – usually located in valleylands on the valley floor or lower slopes – and seeps (which provide an important source of water and food). Site investigations indicated this type of habitat was absent in or within 120 m of the Solar Project Location (**Figure 7.1** and **7.2**, **Appendix A**; **Appendix D**). An evaluation of significance is not required.

Turkey Vulture Summer Roosting Areas

No habitat features that would support Turkey Vulture summer roosting areas were identified in or within 120 m of the Solar Project Location (i.e. cliff ledges or large dead trees; see **Appendix E**). Site investigations conducted in the Study Area by Hatch and by Stantec did not observe the presence of Turkey Vulture roosting areas (**Appendix E**).

Reptile Hibernacula

During the fall, snakes and turtles seek out areas in which to hibernate below the frost line. MNR indicates that the most important sites are associated with talus or karst areas, cliffs in large woodlands > 30 ha with an interior of mature forest, which have a more moderate climate than forest edges or small or narrow woodlands (Decision Support System Index #4, MNR, undated). An abundance of tree stumps or logs, burrows, rock crevices (often associated with broken and fissured rock) is required. Site investigations indicated this type of habitat was absent in or within 120 m of the Solar Project Location. An evaluation of significance is not required.

Bat Hibernacula and Maternity Roosts

Bat maternity roosts may occur in loose bark, hollow trees, snags or rock faces, but buildings are most commonly used roosts structures (Fenton, 1970). Large diameter trees (living or dead) that are taller than surrounding trees and relatively uncluttered by adjacent vegetation are requirements for important natural roosts of forest-dwelling bats (Kunz and Lumsden, 2003). No candidate significant wildlife habitat in the form of bat maternity roosts was noted within the Solar Project Location or the Zone of Investigation. An evaluation of significance is not required.

Bullfrog Concentration Areas

Habitat for Bullfrogs was noted as a feature of several evaluated wetlands in the vicinity of the Study Area. The Solar Project Location is not located within 120 m of either wetland (Fradenburg Tract PSW and Evans Creek LSW) for which the presence of Bullfrog breeding habitat has been recorded. Bullfrogs live in permanent water, and preferred habitat includes large marshes and extensive areas of emergent shoreline vegetation for breeding (Decision Support System Index #14, MNR, undated). In the Study Area, this type of habitat is restricted to the marsh wetlands of the Grand River and marshy portions of the Lake Erie shoreline. Site investigations confirmed that suitable habitat was not present in or within 120 m of the Solar Project Location. As a result, no candidate significant wildlife habitat in the form of Bullfrog concentration areas was identified.

Migratory Butterfly Stopover Areas

Significant habitat may include significant breeding habitat (concentrations of its host plant, milkweed) and significant migratory stopover habitat (presence of large Monarch roosts); significance of both habitat types was evaluated. Observations of Monarchs consisted of single observations to small groups dispersed throughout the Study Area. Monarchs were not noted in any substantial numbers, nor were large stands of milkweed. Site investigations confirmed that suitable habitat was not present in or within 120 m of the Solar Project Location. As a result, no candidate significant wildlife habitat in the form of migratory butterfly stopover areas was identified.

Other Seasonal Concentration Areas

Site investigations did not identify the presence of any additional candidate significant wildlife habitat in the form of seasonal concentration areas within the Solar Project Location or the Zone of Investigation.

4.4.4.2 Animal Movement Corridors

In southern Ontario, corridors usually consist of naturally vegetated areas that run through more developed and open landscapes. As indicated in the *Significant Wildlife Habitat Technical Guide* (2000), it is seldom possible to observe wildlife species using corridors. ELC site investigations, mapping and aerial photography were used to assess the potential of areas with sufficient vegetation cover, natural areas and enough connectivity across the landscape to be considered candidate significant wildlife habitat. Such features included hedgerows and watercourses with natural riparian vegetation identified as connecting two or more larger natural features. Potential routes with higher connectivity between natural features through the Study Area are identified on **Figure 9** (**Appendix A**). The Grand River valley likely provides the best continuous corridor through the landscape, although this feature occurs well outside of the Solar Project Location. Branching off of this valley are several relatively closely-linked woodlands which form east-west routes through the Study Area, one of which crosses through the north

portion of the Solar Project Location (**Figure 11.1**) and another crosses further south, more than 120 m from the Solar Project Location (**Figure 11.2**). Within the landscape level routes provided in **Figure 11.1**, linkages between Natural Features 30 and 31 and Natural Features 29 to 30, through the agricultural lands, represent candidate significant animal movement corridors. According to the *SWHTG* (2000), linkages between natural features through agricultural lands (along hedgerows or fence lines) do not represent candidate significant animal movement corridors because these features do not provide the sole animal movement corridor in the Study Area. Many wildlife species move through open, agricultural land to reach natural areas (MNR, 2000). An evaluation of significance will be conducted in Section 5.3.

4.4.4.3 Rare or Specialized Habitats

Rare Habitats

Rare habitats include those features with SRANKS ranging from S1 to S3. No rare habitats were identified during the records review as being within the Study Area. Based on site investigations, no rare habitats were identified in or within 120 m of the Solar Project Location. ELC communities are identified on **Figures 7.1 and 7.2** (**Appendix A**). An evaluation of significance is not required.

Specialized Habitats

Specialized habitat features for which a trigger for candidate significant wildlife habitat was considered to occur within the Study Area include the following:

- sites supporting area-sensitive species;
- specialized raptor nesting habitat;
- amphibian woodland breeding ponds; and
- turtle nesting habitat.

The results of the site investigation were used to determine the presence and extent of these features within 120 m of the Solar Project Location as well as identify other specialized habitats that might exist within 120 m of the Solar Project Location.

Sites Supporting Area Sensitive Species

Area-sensitive bird species are those identified as such in Appendix C of the *Significant Wildlife Habitat Technical Guide* (2000), or other literature as requiring a minimum of 10ha of suitable grassland or forest habitat for breeding.

Area Sensitive Woodlands

Features that would provide habitat for woodland breeding birds were identified through the ELC surveys. ELC communities that were considered to potentially support woodland birds included forest (coniferous, deciduous or mixed), swamp (coniferous, deciduous or mixed), woodland and plantation. Woodland features were delineated (**Figure 2.2, Appendix B**) and the area of each feature was calculated.

Breeding bird point counts were conducted in 3 of the 7 woodlands in or within 120 m of the Solar Project Location. Five area-sensitive nesting bird species were observed during 2009 or 2010 point counts in these woodland habitats. All 3 woodlands supported area-sensitive species (**Table 4.6, Appendix B**):

- Feature 30: Ovenbird, Scarlet Tanager
- Feature 31: Pileated Woodpecker, White-breasted Nuthatch, Veery, Ovenbird
- Feature 39: White-breasted Nuthatch

Candidate significant wildlife habitat for area sensitive forest nesting birds was identified within those woodland features that were over 10 hectares in size or were found to support area sensitive species (**Table 4.8, Appendix B**). An evaluation of significance was conducted on Section 5.2. An evaluation of significance will be conducted in Section 5.3.

Area Sensitive Grasslands

Breeding bird surveys conducted by Stantec in 2010 did not identify any area sensitive grassland bird breeding within 120 m of the Solar Project Location. However, a single grassland area sensitive species, Upland Sandpiper, was observed elsewhere within the Study Area.

Candidate significant wildlife habitat for area sensitive grassland breeding birds was identified through the vegetation community assessment. All vegetation communities that constitute grassland habitat were identified as candidate significant wildlife habitat. Areas that are actively managed for agricultural activities are considered disturbed systems and are not considered candidates for significant wildlife habitat (MNR personal communication, January 26, 2011). Such areas include croplands as well as hayfields, as the farming practice of hayfield cutting before the end of the breeding cycle for grassland birds can reduce breeding success and hayfields as a result are not considered to support viable populations of grassland breeding bird species.

A single area of candidate significant wildlife habitat for grassland breeding birds was identified within 120 m of the Wind Project Location; grassland area B in **Figure 2.2, Appendix B**. An evaluation of significance was conducted on Section 5.3.

Specialized Raptor Nesting Habitat

No raptor nests were observed in the Solar Study Area (**Appendix E**). No candidate significant wildlife habitat for specialized raptor nesting occurred in or within 120 m of the Solar Project Location and no evaluation of significance is required.

Amphibian Woodland Breeding Ponds

According to the Decision Support System Index #40 (MNR, undated), characteristics of candidate significant wildlife habitat in the form of amphibian woodland breeding ponds are ponds that must contain all of the following three elements: permanent or temporary shallow water with no fish; emergent or submergent vegetation, woody shrubs, logs and/or other shoreline structures; and a closed-canopy surrounding woodland with an abundance of downed woody debris. All potential breeding ponds within closed-canopy woodlands are considered to be candidate significant wildlife habitat. Site investigations carried out in and within 120 m of the Solar Project Location identified the presence of vernal pools in woodlands or standing water in wetlands in 4 features (Natural Features 30, 31, 38 and 39; **Table 4.6, Appendix B**). Characteristics of the woodland pools are summarized in **Table 4.6** (**Appendix B**) and, where available, are identified on the **Figures 11.1 to 11.2** (**Appendix A**). An evaluation of significance will be carried out in Section 5.3.

Turtle Nesting Habitat

The *Significant Wildlife Habitat Technical Guide* (MNR, 2000) indicates that turtles prefer to nest in relatively soft substrates such as sand or fine gravel in open, sunny areas. Waterlogged or inundated soils are not appropriate (Decision Support System Index #23, MNR, undated). Soils within the Study Area are heavy in texture, have poor drainage and are limited by excess water and low permeability (Section 3.2.1.1). Site investigations did not identify any small or unmapped pockets of sandy or gravelly soils within the Solar Project Location or Zone of Investigation. As a result, site investigations indicated this type of habitat was absent in or within 120 m of the Solar Project Location. An evaluation of significance is not required.

Assessment of Additional Specialized Habitat Features

Site investigations carried out in and within 120 m of the Solar Project Location did not identify the presence or potential presence of any additional specialized habitats for wildlife.

4.4.4.4 Habitat of Species of Conservation Concern

Species of conservation concern observed in the Study Area include species with low S-Ranks, species at risk (other than provincially endangered and threatened species) and Ontario Partners in Flight (PIF) priority species.

Rare Species

One species of special concern, Short-eared Owl, was identified in proximity to the Solar Project Location. Two individuals were observed more than two weeks apart, on December 2 and December 23, 2010, in pasture habitat within the Zone of Investigation northwest of the Solar Project Location. Targeted surveys conducted in January and February 2011 observed Short-eared Owls within the Zone of Investigation, north of the Solar Project Location, including single observations during the dusk surveys on both January 14 and February 9, 2011. In addition, 10 Short-eared Owls were observed in the same location during the diurnal raptor surveys on January 14, 2011. Suitable coniferous or mixed roost feature did not occur within the Solar Project Location. Field observations on January 14 identified a coniferous hedgerow that was used as a roost feature by the 10 Short-eared Owls; however this feature was beyond the 120 Zone of Investigation. Suitable open habitat within the 120 m Zone of Investigation was identified as candidate significant wildlife habitat for species of conservation concern.

Declining Populations

Studies conducted by Hatch (2009) and Stantec (2010) identified the presence of thirteen Partners in Flight (PIF) priority species the study area (Ontario Partners in Flight, 2008) during the breeding season. These include forest species (Northern Flicker, Eastern Wood-Pewee, Wood Thrush, Rose-breasted Grosbeak), shrub/successional species (Willow Flycatcher, Field Sparrow), grassland/agricultural species (Eastern Kingbird, Northern Harrier, Short-eared Owl, Vesper Sparrow, Savannah Sparrow, Grasshopper Sparrow, Eastern Meadowlark, Bobolink) and other species (Baltimore Oriole). Some (but not all) of these occurred within the Solar Project Location or Zone of Investigation.

Candidate significant wildlife habitat for declining forest birds within the Wind Project Location or Zone of Investigation was identified as any woodland over 10 ha in size that may support significant populations of woodland PIF species (**Table 4.8, Appendix B**). An evaluation of significance is provided in Section 5.3.

Candidate significant wildlife habitat for grassland breeding bird species of conservation concern was identified through the vegetation community assessment. All vegetation communities that constitute grassland habitat were identified as candidate significant wildlife habitat. Areas that are actively managed for agricultural activities are considered disturbed systems and are not considered candidates for significant wildlife habitat (MNR personal communication, January 26, 2011). Such areas include croplands as well as hayfields, as the farming practice of hayfield cutting before the end of the breeding cycle for grassland birds can reduce breeding success and hayfields as a result are not considered to support viable populations of grassland breeding bird species.

A single area of candidate significant wildlife habitat for grassland breeding birds was identified within 120 m of the Wind Project Location; grassland area B in **Figure 2.2, Appendix.** Grassland PIF priority species were identified in area B. An evaluation of significance was conducted on Section 5.3.

4.4.4.5 Wildlife Habitat Summary

The following candidate significant wildlife habitat features are present within 120 m of the Solar Project Location, requiring an evaluation of significance:

- Seasonal concentration areas (winter deer yards, winter raptor feeding and roosting areas and migratory landbird concentration areas);
- Animal movement corridors (Grand River and local connections);
- Specialized habitats (area-sensitive woodland and grassland breeding bird species, amphibian woodland breeding ponds); and
- Habitat for species of conservation concern (Short-eared Owl, declining woodland and grassland breeding bird species).

4.4.5 Woodlands

Several woodlands occur within and adjacent to the Solar Project Location, the location, size and composition of which were identified and confirmed through aerial photograph interpretation and field investigations.

Overall, a total of 92 woodlands were identified within the Study Area during the vegetation surveys. Of these woodlands, 7 woodlands occur in or within 120 m of the proposed Solar Project Location. As noted in Section 3.2.7, woodlands were defined in accordance with s. 63(1) of O. Reg. 359/09, as amended through O. Reg. 521/10. Any features (or portions thereof) that did not satisfy this definition, such as meadow marshes, cultural meadows or thickets, were not considered “woodlands” for the purposes of this evaluation. The limits of all woodlands are identified on **Figures 11.1 to 11.2** (**Appendix A**).

The average size of the woodlands within the Study Area was approximately 34 ha, with sizes ranging from 0.3 ha to 217 ha and the median size of 11.9 ha. The majority (56 or 65%) of these woodlands contain interior forest habitat, which includes interior portions of the woodlands that are greater than 100 m from the woodland edge (boundary). A description of the attributes, composition and functions for each woodland found within, or comprising, the natural features within 120 m of the Solar Project Location is provided in **Table 4.6 (Appendix B)**.

4.4.6 Summary

Based on the records review and site investigation, the following natural features have been identified as candidate significant natural features in or within 120 m of the Solar Project Location, for which an evaluation of significance is required:

- Wetlands (numerous unevaluated wetlands)
- Woodlands (7 woodlands)
- Wildlife Habitat (winter deer yards, raptor feeding and wintering areas, animal movement corridors, habitat for area-sensitive species, amphibian woodland breeding ponds, habitat for rare species (Short-eared Owl), and habitat for declining woodland and grassland species)

4.5 NATURAL FEATURES – TRANSMISSION LINE

4.5.1 Areas of Natural and Scientific Interest

Two life science ANSIs and two earth science ANSIs were identified within the Study Area during the records review, however, none of these ANSIs occur on, or within 120 m of the Transmission Project Location.

4.5.2 Wetlands

Vegetation communities occurring within 120 m of the Transmission Project Location, as identified in the field, are shown on **Figures 8.1** to **8.6 (Appendix A)**. A detailed description of each community and a list of vascular species occurring from the Study Area are provided in **Appendix F**. Field notes are provided in **Appendix E.**

Natural vegetation communities within the Study Area were generally comprised of deciduous woodland and swamp, as well as swamp thickets and small meadow marsh communities in poorly-drained areas. No rare vegetation communities occur in or within 120 m of the Transmission Project Location. No PSWs or LSWs previously evaluated by the MNR occur within 120 m of the Transmission Project Location, although the GRCA identified portions of the woodland adjacent to the proposed collector sub-station as containing an unevaluated wetland (**Figure 2, Appendix A**).

During the course of ELC and vegetation site investigations, 12 of the natural features were identified as containing wetlands within the Zone of Investigation along the Transmission Project Location. The location and ELC boundaries of these features are shown on **Figures 8.1** through **8.6 (Appendix A)**, while the wetland boundaries according to OWES protocol are identified on **Figures 12.1** through **12.6 (Appendix A).** A discussion of the characteristics of each wetland and its relationship to evaluated wetlands within the Study Area is provided in

Section 5.3.1. Corrections to the results of the record review to recognize the additional wetlands within the Zone of Investigation are identified in **Table 4.3** (**Appendix B**).

4.5.3 Valleylands

A valleyland is defined as a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year (MNR, 2010). ELC and vegetation surveys, along with information gathered during water body surveys (separate cover), indicated and confirmed that no valleylands were identified on, or within 120 m of, the Transmission Project Location.

Drainage along the Transmission Project Location consists primarily of headwater reaches of several unnamed tributaries of Stoney Creek, within an area near the Solar Project Location draining southward to Wardell's Creek (**Figure 2**, **Appendix A**). These tributaries originate as grassed swales, roadside ditches and a few grassed waterways that convey agricultural runoff and runoff from Haldimand Road 20. The watercourse associated with Natural Feature 3 conveys flow in a vegetated channel southward to two pockets of the STC 1 LSW, although no defined valleyland feature or topographic depression was observed. No valleylands were identified along, or within 120 m of, the proposed Transmission Project Location.

Based on the results of the site investigation, the areas identified during the records review as being within Regulated Areas adjacent to the watercourses along Haldimand Road 20 have been excluded from the valleylands layer.

No corrections to the valleylands identified within the GRCA watershed were required, as none were identified during the records review as being within 120 m of the Transmission Project Location. However, those areas within the LPRCA watershed where valleyland features were identified based solely on the Regulation Limit as a proxy for potential valleyland features were revised based on field observations during the site investigation, as described above (**Table 4.3, Appendix B**).

4.5.4 Wildlife Habitat

4.5.4.1 Seasonal Concentration Areas

Features for which a trigger was considered to occur within the Transmission Study Area include:

- winter deer yards (MNR mapping);
- colonial bird nesting sites (PSW records);
- waterfowl stopover and staging areas (PSW records);

- waterfowl nesting habitat;
- landbird migratory stopover areas (MNR correspondence);
- raptor winter feeding and roosting areas (records review);
- Wild Turkey wintering areas (Christmas Bird Count results);
- Turkey Vulture summer roosting areas;
- reptile hibernacula (MNR information);
- bat hibernacula and maternity roosts (MNR information);
- Bullfrog concentration areas (PSW records); and
- migratory butterfly stopover areas (MNR information and air photos).

The results of the site investigation were used to confirm the presence/absence of these features in or within 120 m of the Transmission Project Location, as well as to identify additional seasonal concentration areas that might exist in or within 120 m of the Transmission Project Location.

Winter Deer Yards

The MNR has mapped winter deer yards in many of the woodlands in the Study Area, some of which occur within 120 m of the Wind Project location (**Figure 2, Appendix A**). Although site investigations did not identify the presence of features suitable for wintering deer as outlined in the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) and Index #28 of the Decision Support System (MNR, undated), correspondence with the MNR indicated that features required by White-tailed Deer in Niagara Region were present in these woodlots. Winter deer yards are identified on **Figures 12.1 to 12.6** (**Appendix A**) based on the information received from the MNR (2000) and LIO (2010). An evaluation of significance will be completed in Section 5.4.**Colonial Bird Nesting Sites**

Nesting colonial waterbirds were noted as a feature of several evaluated wetlands in the vicinity of the Study Area. The Transmission Project Location does not fall within 120 m of these evaluated wetlands, and no evidence of nesting colonies was noted during site investigations in unevaluated wetlands within 120 m of the Transmission Project Location. An evaluation of significance is not required.

Waterfowl Stopover and Staging

No evidence of waterfowl stopover and staging was noted during site investigations in the wetlands within 120 m of the Transmission Project Location (Appendix E).

Waterfowl Nesting Habitat

While swamps and small marsh vegetation communities were identified within 120 m of the Transmission Project Location, important habitat components required to support significant waterfowl nesting areas such as clusters of these habitats or flooded or poorly drained landscapes were not present (Figure 8.1 to 8.6, Appendix A; Appendix E). Candidate significant wildlife habitat for seasonal concentration areas supporting waterfowl nesting sites is considered absent from in or within 120 m of the Transmission Project Location.

Migratory Landbird Stopover Areas

Areas that provide a diversity of habitat types ranging from open grasslands to large (i.e. >10ha) woodlands within 5 km of the Lake Erie shoreline were considered potential candidate significant wildlife habitat for migrating landbird stopover areas (SWHTG, 2000; MNR correspondence).

One feature found within 120 m of the Transmission Project Location met the habitat criteria established by MNR (i.e. woodlands at least 10 ha located adjacent to grassland habitats that occur within 5 km of the Lake Erie shoreline). Feature 36 is a 44 ha woodland that is found within 5 km of the shoreline. It is considered candidate significant wildlife habitat for migratory landbird stopover areas.

Feature 36 is found at the southern extent of the Transmission Project Location; the line extends north from this point and all other features found in and within 120 m are located more than 5 km away from the shoreline. They are not considered candidate significant wildlife habitat for migratory landbirds.

Candidate significant wildlife habitat for migratory landbird stopover areas within 120 m of the Transmission Project Location is shown on **Figure 12.1** and **12.2** (**Appendix A**). An evaluation of significance will be completed for Feature 36 in **Section 5.2**.

Raptor Winter Feeding and Roosting Areas

The winter raptor surveys conducted by Stantec in January and February, 2011 made a total of 19 raptor observations in proximity to the Transmission Project Location. Two species were observed including Red-tailed Hawks (n=11) and Rough-legged Hawks (n=8). Raptor density was highest in the southern portion of the Transmission Project Location. **Figure 9.0, Appendix B** depicts the areas of winter raptor concentration, as observed during the site investigations; scattered observations of single raptors were not included with this area.

With reference to the *Significant Wildlife Habitat Technical Guide* (MNR, 2000), large open fields (i.e. > 20 ha), including hayfields, pastures and meadows, that are relatively undisturbed with good perching habitat and a history of use by winter raptors are most significant. Woodlands, hedgerows and fence posts adjacent to large grasslands provide perching and roosting

opportunities for winter raptors. Through discussions with John Boos (MNR, July 21, 2011), where these habitat features occurred within the winter raptor concentration area described above, these natural features were identified as candidate winter raptor and roosting areas. One candidate winter raptor feeding and roosting areas occur within 120 m of the Solar Project Location (**Figure 12.2**, **Appendix B**).

An evaluation of significance of the raptor concentration area will be completed in Section 5.2.

Wild Turkey Winter Range

During the winter, Wild Turkeys congregate in areas with two habitat features that are key to overwinter survival: stands of mature coniferous trees (which provide shelter, thermal cover and reduce snow depths) – usually located in valleylands on the valley floor or lower slopes – and seeps (which provide an important source of water and food). Site investigations indicated this type of habitat was absent in or within 120 m of the Transmission Project Location. An evaluation of significance is not required.

Turkey Vulture Summer Roosting Areas

No habitat features that would support Turkey Vulture summer roosting areas were identified in or within 120 m of the Transmission Project Location (i.e. cliff ledges or large dead trees; see Appendix E). Site investigations conducted in the Study Area by Hatch and by Stantec did not observe the presence of Turkey Vulture roosting areas (Appendix E). An evaluation of significance is not required.

Reptile Hibernacula

During the fall, snakes and turtles seek out areas in which to hibernate below the frost line. MNR indicates that the most important sites are associated with talus and karst areas, cliffs in large woodlands > 30 ha with an interior of mature forest, which has a more moderate climate than forest edges or small or narrow woodlands (Decision Support System Index #4, MNR, undated). An abundance of tree stumps or logs, burrows, rock crevices (often associated with broken and fissured rock) is required. Site investigations indicated this type of habitat was absent in or within 120 m of the Transmission Project Location. An evaluation of significance is not required.

Bat Maternity Roosts

Bat maternity roosts may occur in loose bark, hollow trees, snags or rock faces, but buildings are most commonly used roosts structures (Fenton, 1970). Large diameter trees (living or dead) that are taller than surrounding trees and relatively uncluttered by adjacent vegetation are requirements for important natural roosts of forest-dwelling bats (Kunz and Lumsden, 2003). No candidate significant wildlife habitat in the form of bat maternity roosts was noted within the

Transmission Project Location or the Zone of Investigation. An evaluation of significance is not required.

Bullfrog Concentration Areas

Habitat for Bullfrogs was noted as a feature of several evaluated wetlands in the vicinity of the Study Area. The Transmission Project Location is not located within 120 m of either wetland (Fradenburg Tract PSW and Evans Creek LSW) for which the presence of Bullfrog breeding habitat has been recorded. Bullfrogs live in permanent water, and preferred habitat includes large marshes and extensive areas of emergent shoreline vegetation for breeding (Decision Support System Index #14, MNR, undated). In the Study Area, this type of habitat is restricted to the marsh wetlands of the Grand River and marshy portions of the Lake Erie shoreline. Site investigations confirmed that suitable habitat was not present in or within 120 m of the Transmission Project Location. As a result, no candidate significant wildlife habitat in the form of Bullfrog concentration areas was identified.

Migratory Butterfly Stopover Areas

Significant habitat may include significant breeding habitat (concentrations of its host plant, milkweed) and significant migratory stopover habitat (presence of large Monarch roosts); significance of both habitat types was evaluated. Observations of Monarchs consisted of single observations to small groups dispersed throughout the Study Area. Monarchs were not noted in any substantial numbers, nor were large stands of milkweed. Site investigations confirmed that suitable habitat was not present in or within 120 m of the Transmission Project Location. As a result, no candidate significant wildlife habitat in the form of migratory butterfly stopover areas was identified.

Other Seasonal Concentration Areas

The site investigations did not identify the presence of any other candidate significant wildlife habitat in the form of seasonal concentration areas within the Transmission Project Location or the Zone of Investigation.

Triggers for candidate significant wildlife habitat for waterfowl stopover and staging areas, waterfowl nesting habitat and landbird migratory stopover areas, were identified during the record review; however, no evidence of any of these seasonal concentration habitats was found in or within 120 m of the Transmission Project Location. No evidence of moose late winter habitat, nesting waterfowl or Turkey Vulture summer roosts were noted within the Transmission Project Location or the Zone of Investigation during spring and summer field studies in 2009 (Hatch, 2010, Appendix C) or 2010.

4.5.4.2 Animal Movement Corridors

In southern Ontario, corridors usually consist of naturally vegetated areas that run through more developed and open landscapes. As indicated in the *Significant Wildlife Habitat Technical Guide* (2000), it is seldom possible to observe wildlife species using corridors. ELC site investigations, mapping and aerial photography were used to assess the potential of areas with sufficient vegetation cover, natural areas and enough connectivity across the landscape to be considered candidate significant wildlife habitat. Such features included hedgerows and watercourses with natural riparian vegetation identified as connecting two or more larger natural features. Potential routes with higher connectivity between natural features through the Study Area are identified on **Figure 9** (**Appendix A**). The Grand River valley likely provides the best continuous corridor through the landscape, although this feature is not located within 120 m of the Transmission Project Location. Branching from this valley are several relatively closely linked woodlands which form east-west routes through the Study Area, none of which cross Haldimand Road 20 along the Transmission Project Location (**Figures 12.1 to 12.6**, **Appendix A**). As such, there are no animal movement corridors within 120 of the Transmission Project Location. An evaluation of significance is not required.

4.5.4.3 Rare or Specialized Habitats

Rare Habitats

Rare habitats include those features with SRANKS ranging from S1 to S3. While several rare habitats were identified during the records review as being within the Study Area (**Table 3.1, Appendix B**), no rare habitats were identified in or within 120 m of the Transmission Project Location during the site investigations. ELC communities are identified on **Figures 8.1 to 8.6** (**Appendix A**).

Specialized Habitats

Specialized habitat features for which a trigger was considered to occur within the Transmission Study Area include:

- sites supporting area-sensitive species;
- specialized raptor nesting habitat;
- amphibian woodland breeding ponds; and
- turtle nesting habitat.

The results of the site investigation were used to determine the presence and extent of these features within 120 m of the Transmission Project Location as well as identify other specialized habitats that might exist in or within 120 m of the Transmission Project Location.

Sites Supporting Area Sensitive Species

Area-sensitive bird species are those identified as such in Appendix C of the *Significant Wildlife Habitat Technical Guide* (2000), or other literature as requiring a minimum of 10ha of suitable grassland or forest habitat for breeding.

Area Sensitive Woodlands

Features that would provide habitat for woodland breeding birds were identified through the ELC surveys. ELC communities that were considered to potentially support woodland birds included forest (coniferous, deciduous or mixed), swamp (coniferous, deciduous or mixed), woodland and plantation. Woodland features were delineated (**Figure 2.2**, **Appendix A**) and the area of each feature was calculated.

Three species of area-sensitive nesting birds were observed during 2009 or 2010 point counts in woodland habitats within 120 m of the Transmission Project Location. Three woodlands supported the following area-sensitive species (**Table 4.6, Appendix B**):

- Feature 4: White-breasted Nuthatch
- Feature 10: Cooper's Hawk, White-breasted Nuthatch
- Feature 19: White-breasted Nuthatch, Ovenbird

Candidate significant wildlife habitat for area sensitive forest nesting birds was identified within those woodland features that were over 10 hectares in size or were found to support area sensitive species (**Table 4.8, Appendix B**). An evaluation of significance was conducted on Section 5.2. An evaluation of significance will be conducted in Section 5.4.

Area Sensitive Grasslands

Breeding bird surveys conducted by Stantec in 2010 did not identify any area sensitive grassland bird breeding within 120 m of the Transmission Project Location. However, a single grassland area sensitive species, Upland Sandpiper, was observed elsewhere within the Study Area.

Candidate significant wildlife habitat for area sensitive grassland breeding birds was identified through the vegetation community assessment. All vegetation communities that constitute grassland habitat were identified as candidate significant wildlife habitat. Areas that are actively managed for agricultural activities are considered disturbed systems and are not considered candidates for significant wildlife habitat (MNR personal communication, January 26, 2011). Such areas include croplands as well as hayfields, as the farming practice of hayfield cutting before the end of the breeding cycle for grassland birds can reduce breeding success

and hayfields as a result are not considered to support viable populations of grassland breeding bird species.

A single area of candidate significant wildlife habitat for grassland breeding birds (Grassland Area A) was identified within 120 m of the Transmission Project Location (**Figure 2.2**, **Appendix B**). An evaluation of significance was conducted on Section 5.3.

Specialized Raptor Nesting Habitat

No raptor nests were observed in the Transmission Line Study Area (**Appendix E**). No candidate significant wildlife habitat for specialized raptor nesting occurred in or within 120 m of the Transmission Project Location and no evaluation of significance is required.

Amphibian Woodland Breeding Ponds

According to the Decision Support System Index #40 (MNR, undated), characteristics of significant wildlife habitat in the form of amphibian woodland breeding ponds are ponds that must contain all of the following three elements: permanent or temporary shallow water with no fish; emergent or submergent vegetation, woody shrubs, logs and/or other shoreline structures; and a closed-canopy surrounding woodland with an abundance of downed woody debris. All potential breeding ponds within closed-canopy woodlands are considered to be candidate significant wildlife habitat. Site investigations carried out in and within 120 m of the Transmission Project Location identified the presence of vernal pools in woodlands or standing water in wetlands in Natural Feature 19 (**Table 4.6, Appendix B**). Characteristics of the woodland pool are summarized in **Table 4.6 (Appendix B)**. An evaluation of significance will be conducted in Section 5.4.

Turtle Nesting Habitat

The *Significant Wildlife Habitat Technical Guide* (MNR, 2000) indicates that turtles prefer to nest in relatively soft substrates such as sand or fine gravel in open, sunny areas. Waterlogged or inundated soils are not appropriate (Decision Support System Index #23, MNR, undated). Soils within the Study Area are heavy in texture, have poor drainage and are limited by excess water and low permeability (Section 3.2.1.1). Site investigations did not identify any small or unmapped pockets of sandy or gravelly soils within the Transmission Project Location or Zone of Investigation. As a result, site investigations did not identify the presence of potential turtle nesting areas. An evaluation of significance is not required.

Assessment of Additional Specialized Habitats Features

Site investigations carried out in and within 120 m of the Transmission Project Location did not identify the presence or potential presence of old-growth forest stands or seeps or springs.

4.5.4.4 Habitat for Species of Conservation Concern

Species of conservation concern observed in the Study Area include species with low S-Ranks, species at risk (other than provincially endangered and threatened species) and Ontario Partners in Flight (PIF) priority species.

Rare Species

No species of special concern were identified within 120 m of the Transmission Project Location during the site investigations. An evaluation of significance is not required.

Declining Populations

Nineteen species identified as species of conservation priority by Ontario Partners in Flight (2006) were observed through site investigations within all Project Zones of Investigation. Some, but not all, occur within the Transmission Project Location and Zone of Investigation.

Candidate significant wildlife habitat for declining forest birds within the Transmission Project Location or Zone of Investigation was identified as any woodland over 10 ha in size that may support significant populations of woodland PIF species. Candidate woodland features are summarized in **Table 4.8, Appendix B**. An evaluation of significance is provided in Section 5.4.

Candidate significant wildlife habitat for grassland breeding bird species of conservation concern was identified through the vegetation community assessment. All vegetation communities that constitute grassland habitat were identified as candidate significant wildlife habitat. Areas that are actively managed for agricultural activities are considered disturbed systems and are not considered candidates for significant wildlife habitat (MNR personal communication, January 26, 2011). Such areas include croplands as well as hayfields, as the farming practice of hayfield cutting before the end of the breeding cycle for grassland birds can reduce breeding success and hayfields as a result are not considered to support viable populations of grassland breeding bird species.

A single area of candidate significant wildlife habitat for grassland breeding birds (Grassland Area A) was identified within 120 m of the Transmission Project Location; (**Figure 2.2, Appendix B**).Grassland PIF priority species were identified in area A. An evaluation of significance was conducted on Section 5.4.

4.5.4.5 Wildlife Habitat Summary

The following candidate significant wildlife habitat features are present within 120 m of the Transmission Project Location, requiring an evaluation of significance:

- Seasonal concentration areas (winter deer yards, migratory landbird stopover areas and winter raptor feeding and roosting areas);

- Specialized habitats (area-sensitive species, amphibian woodland breeding ponds); and
- Habitat for species of conservation concern (declining woodland and grassland breeding bird species).

4.5.5 Woodlands

Several woodlands occur adjacent to the proposed Transmission Project Location from the sub-station to just south of Hagersville, the location, size and composition of which were identified and confirmed through aerial photograph interpretation and field investigations.

Overall, a total of 86 woodlands were identified within the Study Area during the vegetation surveys. Of these woodlands, 17 woodlands occur in or within 120 m of the proposed Transmission Project Location. As noted in Section 3.2.7, woodlands were defined in accordance with s. 63(1) of O. Reg. 359/09, as amended through O. Reg. 521/10. Any features (or portions thereof) that did not satisfy this definition, such as meadow marshes, cultural meadows or thickets, were not considered “woodlands” for the purposes of this evaluation. The limits of all woodlands are identified on **Figures 12.1 to 12.6** (**Appendix A**).

The average size of the woodlands within the Study Area was approximately 34 ha, with sizes ranging from 0.3 ha to 217 ha and the median size of 11.9 ha. The majority (56 or 65%) of these woodlands contain interior forest habitat, which includes interior portions of the woodlands that are greater than 100 m from the woodland edge (boundary). In total, 17 woodlands were identified within 120 m of the Transmission Project Location. Woodlands were identified during the vegetation surveys to include any feature that satisfied the definition of woodland provided in O. Reg. 359/09. Any features (or portions thereof) that did not satisfy this definition, such as meadow marshes, cultural meadows or some thickets, were not considered “woodlands” for the purposes of this evaluation.

A description of the attributes, composition and functions for each woodlot found within, or comprising, the natural features within 120 m of the Transmission Project Location is found in **Table 4.6 (Appendix B)**.

4.5.6 Summary

Based on the records review and site investigation, the following natural features have been identified as candidate significant natural features in or within 120 m of the Transmission Project Location, for which an evaluation of significance is required:

- Wetlands (numerous unevaluated wetlands)
- Woodlands (17 woodlands)

- Wildlife Habitat (winter deer yards, habitat for area-sensitive species, winter raptor feeding and roosting areas , amphibian woodland breeding ponds, and habitat for declining woodland and grassland species)

4.6 QUALIFICATIONS

The following Stantec personnel were responsible for the site investigations, alternative site investigations and aerial photograph interpretation:

- Andrew Taylor, Terrestrial Ecologist (air photo interpretation, vegetation / wildlife surveys)
- James Leslie, Terrestrial Ecologist (wetland delineation)
- Melissa Straus, Terrestrial Ecologist (air photo interpretation, vegetation / wildlife surveys)
- Gwendolyn Weeks, Terrestrial Ecologist (vegetation / wildlife surveys, wetland delineation)

Curricula vitae are provided in **Appendix I**.

5.0 Evaluation of Significance

5.1 METHODS

Natural heritage information collected from the records review, the site investigation and consultations were analyzed to determine the significance and sensitivity of existing ecological features and functions. For all natural features existing in, or within 120 m of, the Project Location, a determination was made of whether the natural feature is provincially significant, significant, not provincially significant or not significant using evaluation criteria or procedures established or accepted by MNR.

Guidance documents used in the evaluation of significance for the natural features within the Study Area included:

- *Ontario Wetland Evaluation System* (MNR, 2002);
- *Natural Heritage Reference Manual* (MNR, 2010);
- *Significant Wildlife Habitat Technical Guide* (MNR, 2000); and
- *Haldimand County Official Plan* (2006)

Global, national and provincial status of wildlife and plants was provided by the Natural Heritage Information Centre. Status rankings are primarily based on the number of occurrences within each respective jurisdiction.

Provincial designations for species of special concern were obtained from the most recent Committee on the Status of Species at Risk in Ontario (COSSARO) assessments.

Any identified species or species habitat designated as threatened or endangered in accordance with the *Endangered Species Act* is beyond the scope of this report and will be dealt with through consultation with the MNR to confirm permit and approval requirements.

As established through the records review and site investigations, natural features present within 120 m of the Project Location requiring an evaluation of significance in accordance with s. 27 of O. Reg. 359/09 include:

- Wetlands;
- Valleylands;
- Woodlands;
- Candidate significant wildlife habitat, including:

- Seasonal concentration areas (winter deer yards, landbird migratory stopover areas, waterfowl stopover and staging and raptor feeding and wintering areas);
- Animal movement corridors (Grand River and local connections);
- Rare habitat (rare vegetation communities);
- Specialized habitats (area-sensitive species, amphibian woodland breeding ponds, seeps and springs); and
- Habitat for species of conservation concern (Snapping Turtle, Short-eared Owl, declining woodland and grassland species).

These are evaluated in Sections 5.2 through 5.4, according to the following procedures.

5.1.1 Wetlands

Wetlands were determined to be provincially significant if they had been identified as such by MNR. This information was obtained from NHIC and through correspondence with the local MNR District. Non-provincially significant wetlands are those that have been evaluated but did not receive sufficient points to be considered significant. Wetlands that have yet to be examined are termed unevaluated.

Wetland features not evaluated by MNR were assessed using a method for Wetland Characteristics and Ecological Functions Assessment (MNR, 2010) to provide a set of evaluation criteria focused on wetland attributes relevant to the completion of an Environmental Impact Statement (EIS) for renewable energy projects. The criteria to be evaluated are presented in Appendix C of the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, December 2010). All wetlands assessed under this approach are considered as provincially significant for the purposes of the NHA and project siting, and will be treated as such (MNR, December 2010).

Wetlands that occur within the Zone of Investigation were assessed using the Wetland Characteristics and Ecological Functions Assessment (MNR, 2010) to determine the functions and attributes relevant to the EIS. Where the wetland communities extend outside of the 120 m, they were included in the Wetland Characteristics and Ecological Functions Assessment to ensure accurate documentation of the features and functions. Only wetland communities contiguous with those inside the 120 m Study Area were assessed.

Within the Study Area, wetlands are located within one of two watersheds: the Grand River or the Lake Erie. Through field investigations, a large number of wetlands were identified in this landscape, with a large number likely located outside of the Zone of Investigation and therefore unmapped as part of this exercise. Based on this, the majority of the wetlands in this landscape will be within 750 m of other wetlands, and most are functionally linked by a network of surface drainage features and/or wildlife linkages as discussed above. Therefore, it is theoretically appropriate that many, if not all of the wetlands in each of the two watersheds could be

complexed according to the guidelines provided in the *Ontario Wetland Evaluation System* (OWES) manual. Rather than going to these lengths, the approach taken has dealt with smaller functional units grouped by feature (i.e. large, distinct patch of natural habitat in the landscape) that are within 120 m of a project component.

Separation between features was typically determined by the presence of large areas of intervening agricultural lands. The impact assessment discussions provided in the Section 6 have focused on the wetland units that will be within 120 m of a project component, but have also considered how any impacts to these units may affect other wetlands in the broader landscape.

Data were collected through desktop procedures (e.g. aerial photograph interpretation) and on-site field investigations, where access was available. The criteria and procedures found within Appendix C of the Draft *Natural heritage Assessment Guide for Renewable Energy Projects* (MNR, 2010) are based on sections of the OWES – Southern Edition (MNR, 2002). Although this procedure does not evaluate the significance of these wetlands, it provides a procedure by which the significance of these wetlands can be assumed and their functions assessed based on the criteria established within the OWES manual. Specifically, these criteria were addressed in the following manner:

Biological Component

Wetland Size*:* The area is calculated for any wetland unit for which a portion extends into the 120 m zone around project components. Data is based on field surveys and/or aerial photo interpretation. (OWES Section 1.3)

Wetland Type*:* Each wetland type in the contiguous unit is listed in order of dominance. Data is based on field surveys and/or aerial photo interpretation. (OWES Section 1.1.2)

Site Type*:* Each site type in the contiguous unit is listed in order of dominance. Data is based on field surveys and/or aerial photo interpretation. (OWES Section 1.1.3)

Vegetation Communities*:* Each vegetation community in the contiguous unit is listed in order of dominance. Data is based on field surveys where possible. (OWES Section 1.2.2)

Proximity to Other Wetlands*:* Seven categories are provided in the OWES manual (page 48), with scoring points ranging from zero to eight. For this assessment, the most appropriate category that best describes the hydrologic connectivity to other wetlands is stated. Data is based on field surveys and/or aerial photo interpretation. (OWES Section 1.2.4)

Interspersion*:* An interspersion chart is created using the vegetation communities delineated. The interspersion number is provided in the Table. Data is based on field surveys and/or aerial photo interpretation. (OWES Section 1.2.5)

Open Water Types*:* The open water type number (page 52 of the OWES manual) is listed in the Table; data is based on field surveys and/or aerial photo interpretation. (OWES Section 1.2.6)

Hydrological Component

Flood Attenuation*:* Determination of Flood Attenuation using OWES is a 4 step process that examines upstream detention and wetland attenuation. For this assessment, a wetland's flood attenuation potential receives a designation of High, Moderate, or Low based on its type and relative position. Data is based on field surveys and/or aerial photo interpretation. (OWES Section 3.1):

- High – assigned to isolated wetlands;
- Moderate – assigned to all other wetland types;
- Low – assigned to wetlands located on one of the five large lakes or five major rivers (as defined on page 71 of the OWES manual).

Water Quality Improvement (Short Term):

- *Watershed Improvement Factor* (WIF) – this is based on presence/absence of these Site Types (data derived from field surveys where possible [OWES Section 3.2.1.1]):
    - High – assigned to riverine wetlands; lacustrine wetlands at lake inflow or outflow; or palustrine wetlands with inflow;
    - Moderate – assigned to isolated wetlands, or palustrine wetlands with no inflow;
    - Low – assigned to lacustrine wetlands on lake shoreline.
- *Adjacent and Watershed Land Use* (LUF) – this is based on the most appropriate category below that fits upstream land use in the catchment (data derived from field surveys where possible [OWES Section 3.2.1.2]):
    - High – assigned where land use is over 50% agriculture and/or urban;
    - Moderate – assigned where land use is between 30% and 50% agriculture and/or or urban;
    - Low – assigned where land use is over 50% forested or other natural vegetation.
- *Pollutant Uptake Factor* (PUT) – this is based on the *most* dominant vegetation form observed within the Study Area (data derived from field surveys where possible [OWES Section 3.2.1.3]):
    - High – assigned where there is a high proportion of emergent, submergent, and/or floating vegetation;

- Moderate – assigned where there is a high proportion of live trees, shrubs, herbs, or mosses;
- Low – assigned where there is a high proportion of wetland with little or no vegetation.

Water Quality Improvement (Long Term Nutrient Trap)*:* Wetlands with a retentive capacity for nutrients (e.g. those with organic soils) provide protection for recharging groundwater. Data is based on field surveys where possible, or soil series mapping (OWES Section 3.2.2):

- High – applied to wetlands located in a river mouth, or a bog, fen, or swamp with more than 50% coverage of organic soil;
- Moderate – applied where the wetland is a bog, fen, or swamp with less than 50% coverage of organic soil; or, wetland is a marsh with more than 50% coverage of organic soil;
- Low – applied to all other wetlands.

Water Quality Improvement (Groundwater Discharge): OWES establishes eight wetland features that provide evidence of discharge, where the evaluator must make observations on as many of the features as possible. This method is utilized in the Wetland Characteristics and Ecological Functions Assessment wherever field observations were made. Feature values (OWES Section 3.2.3) are summed and applied accordingly:

- High >5
- Moderate 3-5
- Low 0-2

Shoreline Erosion Control: Shoreline wetlands provide a measure of protection from shoreline erosion caused by flowing water or waves. The following designations are applied based on field surveys and/or aerial photo interpretation (OWES Section 3.4):

- High – Any part of the wetland, riverine or lacustrine, with shoreline vegetation dominated by trees and shrubs;
- Moderate – Any part of the wetland, riverine or lacustrine, with shoreline vegetation dominated by emergent or submergent vegetation;
- Low – Any part of the wetland, riverine or lacustrine, with shoreline vegetation dominated by other or no shoreline vegetation; or, wetland entirely isolated or palustrine.

Groundwater Recharge (Site Type): The following designations are applied based on field surveys where possible (OWES Section 3.5.1):

- High – Isolated or palustrine wetland;
- Moderate – Riverine wetland;
- Low – Lacustrine wetland.

Groundwater Recharge (Soils): The following designations are applied based on field surveys where possible, or soil series mapping (OWES Section 3.5.2):

- High – Isolated and palustrine on sand, loam, gravel, or till;
- Moderate – Riverine (not on major river) on sand, loam, gravel or till; isolated or palustrine on clay or bedrock;
- Low - Riverine (not on major river) on clay or bedrock; or lacustrine or on major river of any soil type.

Special Features

Species Rarity: All rare species observed during field surveys or species known to be present are documented and listed in the Table. Data is based on field surveys, review of background materials (including existing wetland evaluations), and correspondence with agencies where possible (OWES Section 4.1.3).

Significant Features and Habitats: All significant features and habitats present in the wetland are documented and listed in the Table. Features/Habitat of interest include Colonial Waterbird habitat, Winter Wildlife Cover, Waterfowl Staging and/or Moulting Areas, Waterfowl Breeding, and Migratory Passerine, Shorebird, or Raptor Stopover Area. Data is obtained from field surveys, background data, and correspondence with agencies where possible (OWES Section 4.2). The extensive field and background data gathered for this Project, with respect to avian wildlife, is reviewed as part of the Wetland Characteristics and Ecological Functions Assessment of significant features and habitats. Winter cover for wildlife was assessed through review of vegetation mapping based on site investigations (i.e. presence of coniferous or mixed swamps). Information on winter deer yards, obtained from Land Information Ontario (LIO) mapping, is also reviewed.

Fish Habitat: OWES (guided by the Canada Fisheries Act) states that the presence of individual species of fish is not scored. Instead, fish habitat values are based on presence spawning and nursery habitat, and presence of staging and migration habitat. The following designations are applied using the Wetland Characteristics and Ecological Functions Assessment (MNR, 2010); data will be based on field surveys or review of background data (OWES Section 4.2.6). The

extensive field and background data gathered for this Project, with respect to fish habitat, was reviewed as part of the Wetland Characteristics and Ecological Functions Assessment (MNR, 2010) to determine presence/absence of fish habitat. Where data was available, presence of fish spawning, nursery, migration and staging habitat is also noted:

- Present – Fish habitat present;
- Absent – Fish habitat not present.

The results of the Wetland Characteristics and Ecological Functions Assessment are presented in **Table 5.1** (**Appendix B**) and identified on **Figures 13.1** to **15.6**.

5.1.2 Valleylands

The identification and evaluation of significant valleylands based on the recommended criteria from MNR is typically the responsibility of planning authorities (MNR, 2010). Significant valleylands have not been identified or defined in the *Haldimand County Official Plan*, but are proposed to be identified as part of a future Natural Environment Study (Greenlands Study) proposed to be completed by the County (Policy 2.A.2). Once identified, any significant valleylands will be mapped as an overlay on Schedule E of the *Haldimand County Official Plan*.

In the absence of municipally identified significant valleylands, recommended criteria for evaluating significant valleylands, as identified in the *Natural Heritage Reference Manual* (MNR, 2010), include (a) landform-related functions and attributes (prominence as a distinctive landform, surface water and groundwater functions) ecological features (degree of naturalness, diversity, linkages) and restored ecological functions (restoration potential) (MNR, 2010). The significance of valleylands should be assessed within the context of the overall watershed (MNR, 2010).

A comparative evaluation of the various valleyland features in, and within, 120 m of the Project Location based on these criteria has been completed, with significance assigned based on the relative functions provided by each valleyland (**Table 5.2**). Significant valleylands have been identified on **Figures 13.1 to 15.6 (Appendix A)**

5.1.3 Areas of Natural and Scientific Interest

Life science ANSIs and earth science ANSIs were determined to be provincially significant if they had been identified as such by MNR. This information was obtained from NHIC and through correspondence with the local MNR District. However, there are no Life Science ANSIs located within 120 m and no Earth Science ANSIs located within 50 m of the Project Location.

5.1.4 Wildlife Habitat

The following section outlines the methods used to evaluate the significant of wildlife habitat features identified during site investigation.

5.1.4.1 Seasonal Concentration Areas

Winter Deer Yards

The MNR is responsible for managing deer in Ontario and are knowledgeable about the relative importance of local deer yards (MNR, 2000). Based on comments provided by MNR (March 1, 2011), criteria for determining the significance of deer congregation (wintering) areas within Ecoregion 7E and management unit 90A in Guelph District include the following:

- Size Class IV (>100 ha) for woodlands;
- Confirmed wintering deer density; and
- Deer yards make up less than 10% of the Summer Deer Range.

Analysis to identify significant deer yards within the Study Area was completed by the MNR based on their local knowledge of the area, unpublished deer observation data and the criteria above**.**

Waterfowl Stopover and Staging Areas

Evaluation criteria provided in Appendix Q (Table Q-1) of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) was used in the determination of significance. Criteria to be considered include relative importance of the site to local waterfowl populations, presence of species of conservation concern, species diversity, abundance, quality of habitat and size of site. All candidate waterfowl stopover areas were assumed to be candidate significant wildlife habitat.

Landbird Migratory Stopover Areas

Criteria outlined in the *Significant Wildlife Habitat Technical Guide* (Appendix Q) for evaluation of significance include; the presence of species of conservation concern, the diversity and abundance of species, the size of the site, habitat diversity, historical use and location of the site (i.e. those within 5 km of Great Lakes are most significant).

The SWHTG also notes that the relative ecological value of individual features in a particular area should be assessed in relation to other similar features in a larger area (i.e. a landscape) (SWHTG, p.4) and that a high emphasis should be placed on representation (SWHTG, p. 62).

Within the regional landscape known migratory bird stopover areas Selkirk Provincial Park and Rock Point Provincial Park occur west and east of the Study Area respectively. Long Point, widely recognized as one of the best areas for spring migration in Ontario, is approximately 40 km west along the shoreline and the tip of Long Point is found approximately 15 km across the lake from the Study Area.

The SWHTG also indicates that many sites that should be considered significant will have a long history of use. Features or locations that occur within the Study Area are not considered well known or regularly visited locations by birders (Pittaway, 2001; Ontbirds archives, various years).

Because a number of features are found within the regional landscape that met the minimum SWHTG criteria to be considered candidate (i.e. woodlands greater than 10ha within 5km of Lake Erie) the site criteria were further refined in order to select the best examples within the regional landscape.

The following criteria were applied for the evaluation of significance:

- Habitat Diversity: contained a diversity of habitat types (i.e. woodland, grassland, wetland);
- Location of Site: were located within 2 km of Lake Ontario; and
- Size: were >30 ha.

Features that met all three of the following criteria were considered significant wildlife habitat for migratory landbird stopovers.

Raptor Feeding and Wintering Areas

Criteria for determining the significance of raptor feeding and wintering areas is outlined in Appendix Q of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000). Suggested factors include relative importance of the site, the presence of species of concern, species diversity, abundance, level of disturbance, size and location of site, habitat quality and historical use of the site. Sites that are at least 25 to 30 ha in size provide the best habitat to support wintering raptors for the entire winter (MNR, 2000).

Through discussions with John Boos (MNR, June 21, 2011), specific natural features within the concentration area that consist of large (> 30 ha) grasslands, adjacent woodlands and perches (hedgerow, individual trees, fence posts) that represent the best habitat in the area would be considered significant winter raptor and feeding areas. Information on habitat, species diversity and abundance collected during the site investigations were applied to the criteria listed above to evaluate the significance of these features.

Migratory Butterfly Stopover Areas

Evaluation criteria provided in Appendix Q of the *SWHTG* (MNR, 2000) and personal comments from the MNR (MNR, February 1, 2011) were considered in the determination of significance. These include the following: number of sites in the area, number of species of concern, number of species in general (diversity), number of individuals (abundance), size of site, variety of habitats within site, sites within 5km of Lake Erie or Ontario shoreline, or sites historically used for 10 years or more; additionally, field/woodland sites >20ha within 5km of Lake Erie.

All features (woodland and/or grassland combinations) >20ha within 5km of Lake Erie were considered candidate significant wildlife habitat for migratory butterfly stopover areas. Site investigations were used to determine the presence and abundance of butterflies and the presence of preferred foraging plant species.

5.1.4.2 Animal Movement Corridors

Linkages between natural features were evaluated for significance along the landscape level routes identified in **Figure 9, Appendix A**. Criteria used in the evaluation of significance included the importance of the areas linked by the corridor (i.e. significance of woodland or other natural features), dimensions of the corridor (i.e. shorter, wider corridors more significant), continuity of the corridor (i.e. vegetated corridors along hedgerows, watercourses or ravine more significant), habitat structure of the corridor and risk of mortality for species using corridor (corridors over major road were less significant). Corridors that were consistent with two of the above criteria were identified as significant.

5.1.4.3 Rare and Specialized Habitats

Rare Vegetation Communities

All vegetation communities with an S-Rank of S1-S3 were considered to be significant wildlife habitat in the form of rare habitats as suggested in Appendix Q (Table Q-2).

Sites Supporting Area-sensitive Species

Evaluation criteria provided in Appendix Q (Table Q-2) of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) were considered in the determination of significance. These include: presence of rare, uncommon or declining species, overall area of the site, area of forest interior, age and tree composition of forest stand, amount of vertical stratification of the site, amount of closed canopy/open areas, degree of disturbance, amount of adjacent residential development, current representation of specialized habitat in the planning area, provision of significant wildlife habitat and potential for long term protection of the site. Large woodlots more than 10 ha in size are abundant in the Study Area.

The Draft *Significant Wildlife Habitat Ecoregion Criteria Schedules* (MNR, 2009) suggest that large woodland habitats supporting three or more species of area-sensitive birds be considered significant wildlife habitat in the form of habitat for area-sensitive species.

In total, 52 features were identified as candidate significant wildlife habitat for area sensitive forest nesting birds. Candidate features were evaluated as significant if they were greater than 30 ha in size and were found to support three or more area sensitive forest birds, or if they were greater than 30 ha in size and provided interior forest habitat (i.e. habitat more than 200 m from forest edge).

Three areas of candidate significant habitat for grassland breeding birds were identified based on the habitat assessment. The significance of these features was assessed using criteria from Appendix Q of the *SWHTG*, including size (i.e. patches greater than 30 ha in size) and provisions of significant wildlife habitat (i.e. rare vegetation community or presence of species of conservation concern). Those grassland habitats that were over 30 ha in size, or that supported species of conservation concern were considered significant.

Seeps and Springs

Criteria for determining the significance of seeps is outlined in Appendix Q of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000). Suggested factors include the abundance and location of seeps, the nature of the adjacent area, and the presence of rare species, and duration of surface water. Given the timing of the site investigations (fall) and apparent rarity of seeps in the landscape as a result of the imperfectly drained soils and excess water/low permeability restrictions, all seeps were considered significant. No springs were observed in or within 120 m of the Project Location.

Amphibian Woodland Breeding Ponds

Evaluation criteria provided in Appendix Q (Table Q-2) of the *Significant Wildlife Habitat Technical Guide* (SWHTG) (MNR, 2000) and Index #40 of the Decision Support System (MNR, undated) were considered in the determination of significance of amphibian woodland breeding ponds. Criteria outlined in the SWHTG (2000) include provision of significant wildlife habitat, degree of permanence, species diversity, presence of rare species, size and number of ponds, presence of emergent and submergent vegetation, presence of shrubs and logs at edge of pond, adjacent forest habitat, water quality and level of disturbance.

Information from site investigations were used to evaluate the candidate habitat in relation to the three essential components of amphibian woodland breeding pools described in the Decision Support System Index #40 (MNR, undated), including (a) permanent or temporary shallow water with no fish, (b) emergent or submergent vegetation, woody shrubs, logs and/or other shoreline structures and (c) a closed-canopy surrounding woodland with an abundance of downed woody debris.

5.1.4.4 Habitat for Species of Conservation Concern

Rare Species

Candidate significant wildlife habitat for species of conservation concern identified within the Study Area included Snapping Turtle and Short-eared Owl, both of which are considered species of Special Concern. Evaluation of the significance of their habitat was based on the condition of the existing habitat, evidence of use of the habitat and the size and location of the habitat.

Declining Species

Candidate significant grassland breeding bird habitat was evaluated for significance based on the presence or the suitability to support area sensitive species or species of conservation concern, specifically PIF priority species identified during the field investigations. Criteria used to evaluate the significance of grassland habitat patches include evidence of use of species of conservation concern, as identified through site specific point count surveys, condition of existing habitat and size of the habitat (i.e. patches greater than 30 ha in size). Habitat patches that provide suitable grassland vegetation, supported PIF species, or were over 30 ha in size were identified as significant; these habitat patches were considered suitable to support significant numbers of area sensitive and PIF priority grassland breeding birds (MNR, 2000).

Candidate significant woodland breeding bird habitat was evaluated for significance based on the presence of forest priority PIF species. Those candidate features that were found to support three or more PIF species, as identified through site specific point count surveys, were considered significant wildlife habitat for species of conservation concern.

5.1.5 Woodlands

Woodlands were evaluated for significance based on the evaluation criteria provided in Schedule H of the *Haldimand County Official Plan*, which suggest that a woodland that satisfies two of more of the following criteria is considered a significant woodland:

- Size - Woodlands greater than the following minimum patch size by Township based on current forest cover (as determined by MNR in 2005):
    - Walpole – 2 ha (less than 10% forest cover)
    - Rainham, Oneida and Dunn – 4 ha (between 10% and 15% forest cover)
    - North and South Cayuga – 10 ha (between 15% and 20% forest cover)
- Connectivity - woodlands located within 50 m of a Natural Environment Area as designated on Schedules E1 – E3 (Schedule D where appropriate)

- Proximity to Water - woodlands located within 30 m of any hydrological feature, including all creeks, streams, rivers, wetlands (only those > 0.5 ha) and lakes.

- Uncommon Characteristics - woodland containing threatened, endangered, special concern, provincially or locally uncommon plant or wildlife species

- Woodland Diversity - woodland complexes containing several (>2) vegetation community types and compositions

- Woodland Shape - Woodlands containing interior forest habitat, as defined as 100 m from woodland edge

One criteria recommended in the Haldimand County Official Plan was not utilized due to a lack of available information pertaining to managed woodlands, despite requests for this information from the MNR and County of Haldimand. Managed Woodlands, which are woodlands that are subject to long term forest management agreements with the Ministry of Natural Resources, the Ontario Forestry Association or the Haldimand Woodlot Association, were not identified. Of note, none of the woodlands within the Study Area are under agreement with the MNR and all previous MNR agreements have expired (per MNR comments dated March 1, 2011). Since this criteria reflects the economic benefit of woodlands, and not the ecological function of woodlands for which the NHA and EIS is intended to assess, this criteria was not considered critical in identifying significant woodlands.

A summary of the evaluation of woodland significance is provided in **Table 5.3** and all significant woodlands are identified on **Figures 13.1**-**13.17, 14.1**-**14.2** and **15.1**-**15.6**.

5.2 EVALUATION OF SIGNIFICANCE – WIND

Based on the records review and site investigation, the following natural features have been identified as candidate significant natural features in or within 120 m of the Wind Project Location, for which an evaluation of significance is required:

- Wetlands
- Valleylands
- Woodlands
- Wildlife Habitat
    - Seasonal concentration areas (winter deer yards, landbird migratory stopover, winter raptor feeding and roosting areas, waterfowl stopover and staging and migratory butterfly stopover areas);
    - Animal movement corridors;

- Rare habitats (rare vegetation communities);
- Specialized habitats (area-sensitive species, seeps and springs, amphibian woodland breeding ponds); and
- Habitat for species of conservation concern (Snapping Turtle, declining woodland and grassland species).

5.2.1 Wetlands

Sixty-two wetlands were examined through the Wetland Characteristics and Ecological Functions Assessment (MNR, 2010) protocol described in **Section 5.1.1,** 48 of which occur in or within 120 m of the Wind Project Location. All wetlands assessed under this approach are considered as provincially significant for the purposes of the NHA and project siting, and will be treated as such. **Table 5.1** (**Appendix B**) provides a detailed summary of the functions and attributes relevant to the EIS for each of the wetlands.

5.2.2 Valleylands

The Grand River valley and the lower reaches of Evan's Creek and Wardell's Creek identified on **Figures 10.1** to **10.17** were assessed based on the criteria provided by the MNR (2010) (**Table 5.2**). In the context of the overall watershed, the Grand River is the predominant valleyland feature within the Study Area and would be considered a significant valleyland.

The valleylands associated with the tributaries of the Grand River represent smaller, less defined features more impacted by adjacent agricultural activity and associated with local drainage catchments. These smaller features contain several natural features, although the riparian habitat is generally narrow as a result of adjacent agricultural activity. Where valleyland features were identified, they generally represent only the downstream reaches adjacent to the Grand River.

The valleylands associated with Wardell's Creek and Evan's Creek, which outlet directly to Lake Erie are well-defined and closely associated with evaluated wetlands. There is a direct connection to Lake Erie that extends upstream within define valley features to large woodland and wetland communities along the valleys and headwaters of these catchments. Although these connections are primarily local, and not on the same scale as the Grand River, the downstream reaches of these two valleylands are considered significant valleys. The downstream reaches of Wardell's Creek are not located within 120 m of the Wind Project Location.

The locations of the significant valleylands are identified on **Figures 13.1** to **13.17**, **Appendix A**.

5.2.3 Areas of Natural and Scientific Interest

There are no Life Science ANSIs within 120 m or Earth Science ANSIs within 50 m of the Wind Project location.

5.2.4 Woodlands

Seventy-five woodlands that occur in or within 120 m of the Wind Project Location were examined and evaluated using the significance criteria recommended in Schedule H of the *Haldimand County Official Plan* described in **Section 5.1.5**. Fifty-nine of the 75 woodlands assessed under this approach are considered significant woodlands.

Table 5.3 (**Appendix B**) provides a summary of the criteria satisfied by each woodland identified as occurring within 120 m of the Project Location based on the site investigations (vegetation and wildlife surveys) and GIS analysis of the landscape context. This table is to be read in conjunction with the information provided in **Table 4.6** (**Appendix B**). Significant woodlands within 120 m of the Wind Project location are shown on **Figures 13.1** to **13.17 (Appendix A)** and indicated in **Table 5.3** (**Appendix B**).

5.2.5 Wildlife Habitat

The *Significant Wildlife Habitat Technical Guide* (MNR, 2000) and Decision Support System (MNR, undated) were used to help decide what areas and features should be considered candidate significant wildlife habitat. An analysis of the results of the records review and site investigations determined that the following candidate significant wildlife habitat features are present within 120 m of the Wind Project Location, requiring an evaluation of significance:

- Seasonal concentration areas (winter deer yards, landbird migratory stopover, winter raptor feeding and roosting areas, and butterfly migratory stopover areas);
- Animal movement corridors (Grand River and local connections);
- Rare habitat (rare vegetation communities);
- Specialized habitats (area-sensitive species, seeps, amphibian woodland breeding ponds); and
- Habitat for species of conservation concern (Snapping Turtles, declining woodland and grassland species).

5.2.5.1 Seasonal Concentration Areas

Winter Deer Yards

Core areas of deer yards are generally characterized by coniferous forest with more than 60% canopy closure, adjacent to core feeding areas comprised of mixed or deciduous forest supporting woody species for browsing (Decision Support System Index #28, MNR, undated).

Although the woodlands in the Study Area and in the Zone of Investigation do not contain coniferous mixed forest, deer yards identified by the MNR as satisfying the evaluation criteria described in Section 5.1.4.1 above are considered to be significant wildlife habitat. Deer densities are estimated at 0.085965 deer / ha within management unit 90A, based on MNR's results from field investigations completed in 2000, where 89 deer were observed within 1,035.3 ha surveyed, which represents 31.62% of the areas sampled (MNR, unpublished).

Within management unit 90A, the total deer wintering area is 664nha of a total summer range greater than 9,000 ha (MNR, 2011).

Based on the assessment completed by the MNR, the following natural features that occur within 120 m of the Wind Project Location are considered to provide significant wildlife habitat for deer congregation (wintering): 7, 31, 32, 47 and 81 and require an EIS (MNR, March 1, 2011). These features are mapped on **Figures 13.1 – 13.17 (Appendix A).**

Waterfowl Stopover and Staging Areas

The natural features associated with the Dunnville Marsh PSW (Natural Feature 87), Grand River Marsh PSW (Natural Feature 65) and Evans Creek LSW (Natural Feature 66) were confirmed during site investigations to represent the only candidate wildlife habitat for waterfowl stopover and staging within 120 m of the Project Location. All wetlands identified as candidate waterfowl stopover and staging areas were assumed to be significant wildlife habitat.

Landbird Migratory Stopover Areas

Twenty-three features were considered candidate significant wildlife habitat for seasonal concentration areas of migratory landbirds as a result of site investigations. This included Features: 42a, 42b, 44, 45b, 47, 49, 51, 53, 54, 55, 58, 66, 68, 69, 73, 74, 75, 76, 77, 81, 84, 86 and 87b. These twenty-three features were evaluated using the criteria outlined in Section 5.1.4.1. Results are provided in **Table 5.4**, **Appendix B**.

Based on the evaluation of significance, six features are found within 120 m of the Wind Project Location that met the criteria for significant wildlife habitat for migratory landbird stopover areas. These include Features 42b, 66, 68, 69, 81, and 87b. These features are shown on **Figures 13.1 – 13.17** (**Appendix A**). An EIS will be completed for these features.

Raptor Winter Feeding and Roosting Areas

A well-known historical area for winter raptors occurs in the Fisherville area. Environment Canada (EC) has identified it as the second most important site in southern Ontario in terms of wintering raptor density (Environment Canada, 2007). This area generally occurs to the west of the Study Area, encompassing the western edge of the Wind Project Location. Most of the Study Area provides contiguous suitable habitat for winter raptors; open fields including hay, pasture and meadows with scattered, abutting woodlands for roosting sites. However, field in crop such as corn, soya or wheat would constitute "disturbed" areas that would be less important to feeding raptors. The open agricultural setting is likely to provide habitat for small mammal prey and potential perch sites, such as fence posts, are common. In addition, snow accumulation in this region is generally low, allow for easier prey detections and hunting.

Field investigations found relatively high species diversity with nine species of raptor observed across the Study Area. Two species of conservation concern were observed, Short-eared Owl and Bald Eagle. The average density across the Study Area was found to be 0.46 raptors per kilometer, lower than that found in the core Fisherville winter raptor area (2.14 raptor/km) or at other major winter raptor areas in Ontario such as Wolfe Island (1.4 raptors/km) and Amherst Island (3.14 raptors/km).

Two candidate winter raptor feeding and roosting areas were identified during site investigations in or within 120 m of the Wind Project Location (Section 4.3.4.1). These features were evaluated using the criteria outlined in Section 5.1.4.1. Results are provided in **Table 5.5**, **Appendix B**. Based on the evaluation of significance, neither of the two features found within 120 m of the Wind Project Location met the criteria for significant wildlife habitat for winter raptor feeding and roosting areas (**Figure 16**, **Appendix A**).

While overall raptor use in the study area was high, with over 300 individual raptors observed during the surveys, these species were not associated with the candidate winter raptor feeding and roosting areas identified within 120 m of the Wind Project Location.

Migratory Butterfly Stopover Areas

Based on the records review and comments from MNR, a number of features within 120 m of the Wind Project Location were identified as candidate significant wildlife habitat for migratory butterfly stopover areas (**Figure 2.2**, **Appendix A**). These features were considered candidate based on size and proximity to the Lake Erie shoreline. These features were evaluated using the criteria outlined in Section 5.1.4.1. Results are provided in **Table 5.6**, **Appendix B**.

Site investigations did not confirm the presence of butterflies using these habitat features, nor did the site investigations identify adequate amounts of preferred foraging plant species. As a result, no features within 120 m of the Wind Project Location were considered significant wildlife habitat in the form of migratory butterfly stopover areas.

5.2.5.2 Animal Movement Corridors

Areas identified as significant animal movement corridors within 120 m of the Wind Project Location are shown in **Figures 13.1** to **13.17, Appendix A**. These significant animal movement corridors provided good linkages between natural features, often following hedgerows, watercourses or ravines. At the site scale, these corridors provide linkages between significant natural features (e.g. significant woodlands). At the landscape level, these small corridors form part of the greater linkage matrix. These corridors will be discussed in the EIS.

5.2.5.3 Rare and Specialized Habitats

Rare Vegetation Communities

Two vegetation communities ranked S3 (Buttonbush Swamp Thicket – SWT 2-4, Winterberry-Buttonbush Swamp Thicket – SWT 2-14*) are considered to be significant wildlife habitat in the form of rare habitats and will be discussed in the EIS.

Sites Supporting Area-sensitive Species

Area Sensitive Woodlands

As a result of the habitat analysis, 39 candidate woodland features were identified within 120 m of the Wind Project Location. An analysis of the features is provided in **Table 5.7**, **Appendix B**. The follow features were found to be significant as they were greater than 30 ha in size and were found to support three or more area sensitive forest birds: 22, 32, 58, and 68a. The following features were considered significant as they were greater than 30 ha in size and provided interior forest habitat (i.e. habitat more than 200 m from forest edge), 7, 17, 34, 47, 49, 66a, 69, 76 and 81.

Area Sensitive Grasslands

As a result of the site investigation, two candidate grassland features were identified within 120 m of the Wind Project Location. The candidate grassland features are presented in **Table 5.8**, **Appendix B**. Grassland area A is comprised of 70.0ha of meadow habitat and was found to support grassland species of conservation concern. It has been evaluated as significant wildlife habitat. Grassland area C was comprised of 48.5 ha of meadow habitat. No feature specific breeding bird data was available for this feature. However, in consideration of the size and habitat present, this feature was evaluated as significant wildlife habitat. Significant wildlife habitat for area sensitive grassland species is mapped on **Figures 13.1** to **13.17 (Appendix A).**

Seeps and Springs

Given the apparent rarity of seeps in the landscape, as a result of the imperfectly drained soils and excess water/low permeability restrictions, the seep identified in Natural Feature 62 is considered to be significant wildlife habitat.

Amphibian Woodland Breeding Ponds

As a result of site investigations in and within 120 m of the Wind Project Location, 19 features were assessed as candidate significant wildlife habitat for amphibian breeding, requiring an evaluation of significance: Natural Features 8, 10, 15, 19, 22, 32, 38, 42, 45, 47, 49, 51, 54, 56, 68, 69, 71, 72, 77. **Table 5.9** (**Appendix B**) summarizes the characteristics of each feature and compares them to the three criteria identified in the Decision Support System Index #40 (MNR, undated). All 19 features assessed for frogs and toads met the criteria for significant wildlife habitat in the form of specialized habitats – amphibian woodland breeding ponds. A total of 16 of these features assessed for salamanders met the criteria. All significant amphibian woodland breeding ponds within 120 m of the Wind Project Location will be discussed in the EIS.

Significant wildlife habitat in the form of amphibian breeding pools in and within 120 m of the Wind Project Location are shown on **Figures 10-1** to **10-17** (**Appendix A**).

With respect to Vernal Pool 12 in Woodland 42a, additional details regarding its location and habitat are warranted since Turbine 53 and its associated access road and collector line are proposed within the woodland feature (plantation) (**Figure 10-8**). This small vernal pool is approximately 15 m^2 and <5 cm deep. No other vernal pools were observed within Woodland 42a. This vernal pool is located within the north-western portion of Woodland 42a (**Figure 13.8**, **Appendix A**) within a fresh-moist deciduous forest community dominated by shagbark hickory with soft maples (e.g., swamp and red maple) and green ash (FOD9-4B). No swamp or marsh communities are present. Surrounding woodland communities are also fresh-moist deciduous woodland (FOD6-5) and no standing water or evidence of vernal pools was observed. As such, the amphibian breeding habitat within Woodland 42a is limited to the vernal pool and associated attachment sites along the edge of this small feature.

A wetland community (as delineated in accordance with OWES) occurs within Woodland 42a that extends throughout the deciduous woodland feature. Some habitat features, such as fallen logs, moist soils and leaf litter, which would support amphibian populations following breeding, were noted. A portion of this wetland also extends into the cultural plantation adjacent to Turbine 53, which does not constitute amphibian breeding habitat. No canopy cover or downed woody debris (fallen logs), no standing water and no attachment sites that would support breeding were observed in this area. Vegetation structure is limited to grasses within the open portion of the cultural plantation.

5.2.5.4 Habitat for Species of Conservation Concern

Snapping Turtles have been reported within the Evans Creek LSW and the watercourse in Feature 34. Field investigations concluded that both features would provide adequate habitat requirements and size to support Snapping Turtles. Based on the presence of suitable habitat and evidence of use, both areas were evaluated as significant (**Figures 13.7** and **13.10**, **Appendix A**).

As a result of the site investigation, two candidate grassland features were identified within 120 m of the Wind Project Location. The candidate grassland features are presented in **Table 5.8, Appendix B**. Grassland area A is comprised of 70.0 ha of meadow habitat and was found to support grassland PIF priority species. It has been evaluated significant wildlife habitat. Grassland area C was comprised of 48.5 ha of meadow habitat. No feature specific breeding bird data was available for this feature. However, in consideration of the size and habitat present, this feature was evaluated as significant wildlife habitat. Significant wildlife habitat for grassland species of conservation concern is mapped on **Figures 13.1** to **13.17** (**Appendix A**).

Candidate woodlands that supported three or more PIF forest species were considered significant wildlife habitat in the form of habitat for species of conservation concern including natural features 7, 10, 14, 22, 31, 32, 34, 42a, 42b, 51, 54, 55, 58, 66a, 66b, 68a. The results of the evaluation of significance for woodlands supporting declining bird species in accordance with the evaluation criteria described in **Section 5.1.4** is provided for each feature in **Table 5.10** (**Appendix B**).

Specific to Woodland 42a, within which Turbine 53 and its associated access road and collector line are proposed, a total of 5 PIF (4 forest and 1 other) species were identified during the 2010 point count surveys completed by Stantec. These specific include Rose-breasted Grosbeak, Baltimore Oriole, Wood Thrush, Eastern Wood Peewee and Northern Flicker. All of these species are noted as being in decline within Ontario, although they are all ranked S5. Five of the 25 species observed within this community are considered declining species.

The PIF species were observed within the large deciduous woodland component of this feature, which provides edge and interior forest habitat, upland and wetland habitats, open areas within the canopy and occurs adjacent to grasslands, agricultural fields and the open habitat of the plantation. The long-term protection of this large feature is likely. Due to the diversity of declining species (5), size (139.1 ha), habitat diversity (multiple ELC, vernal pools, watercourse) and relatively undisturbed nature of the deciduous woodland, Woodland 42a is considered significant habitat for declining woodland species.

5.2.5.5 Summary

Significant wildlife habitat is present within 120 m of the Wind Project Location. It was identified and designated based on:

- Seasonal concentration areas (winter deer yards, landbird migratory stopover);
- Animal movement corridors;
- Rare habitat (rare vegetation communities);
- Specialized habitats (area-sensitive species, seeps and springs, amphibian woodland breeding ponds); and
- Habitat for species of conservation concern (Snapping Turtle, declining woodland and grassland bird species).

These features will be discussed in the EIS and are shown on **Figures 13.1** to **13.17 (Appendix A)**.

5.3 EVALUATION OF SIGNIFICANCE – SOLAR

Based on the records review and site investigation, the following natural features have been identified as candidate significant natural features in or within 120 m of the Solar Project Location, for which an evaluation of significance is required:

- Wetlands
- Woodlands
- Wildlife Habitat
    - winter deer yards
    - landbird migratory stopover areas
    - raptor feeding and wintering areas
    - animal movement corridors
    - sites supporting area-sensitive species
    - specialized raptor nesting areas
    - habitat for amphibian woodland breeding ponds

- habitat for species of conservation concern (Short-eared Owls, declining woodland and grassland species)

5.3.1 Wetlands

Sixty-two wetlands were examined through the Wetland Characteristics and Ecological Functions Assessment (MNR, 2010) protocol described in **Section 5.1.1,** 8 of which occur in or within 120 m of the Solar Project Location. All wetlands assessed under this approach are considered as provincially significant for the purposes of the NHA and project siting, and will be treated as such. **Table 5.1** (**Appendix B**) provides a detailed summary of the functions and attributes relevant to the EIS for each of the wetlands.

5.3.2 Valleylands

No valleylands were identified on, or within 120 m of, the Solar Land Project.

5.3.3 Areas of Natural and Scientific Interest

There are no Life Science ANSIs within 120 m or Earth Science ANSIs within 50 m of the Solar Project location.

5.3.4 Woodlands

Ninety-two woodlands were examined and evaluated using the significance criteria recommended in Schedule H of the *Haldimand County Official Plan***,** 7 of which occur in or within 120 m of the Solar Project Location. Six of the 7 woodlands assessed under this approach are considered significant for the purposes of the NHA and project siting, and will be treated as such.

Table 5.3 (**Appendix B**) provides a summary of the criteria satisfied by each woodland identified as occurring within 120 m of the Solar Project Location based on the site investigations (vegetation and wildlife surveys) and GIS analysis of the landscape context. This table is to be read in conjunction with the information provided in **Table 4.6 (Appendix B)**.

Significant woodlands are shown on **Figures 14.1 to 14.2** (**Appendix A**) and indicated in **Table 5.3**, **Appendix B**. The 6 significant woodlands include 30, 31, 38, 39a, 39b, and 40.

5.3.5 Wildlife Habitat

The *Significant Wildlife Habitat Technical Guide* (MNR, 2000) and Decision Support System (MNR, undated) were used to help decide what areas and features should be considered candidate significant wildlife habitat. An analysis of the results of the records review and site investigations determined that the following candidate significant wildlife habitat features are present within 120 m of the Solar Project Location, requiring an evaluation of significance:

- winter deer yards
- landbird migratory stopover areas
- raptor feeding and wintering areas
- animal movement corridors
- sites supporting area-sensitive species
- habitat for amphibian woodland breeding ponds
- habitat for species of conservation concern (Short-eared Owls, declining woodland and grassland species)

5.3.5.1 Seasonal Concentration Areas

Winter Deer Yards

Core areas of deer yards are generally characterized by coniferous forest with more than 60% canopy closure, adjacent to core feeding areas comprised of mixed or deciduous forest supporting woody species for browsing (Decision Support System Index #28, MNR, undated).

Although the woodlands in the Study Area and in the Zone of Investigation do not contain coniferous mixed forest, deer yards identified by the MNR as satisfying the evaluation criteria described in Section 5.1.4.1 above are considered to be significant wildlife habitat.

Deer densities are estimated at 0.085965 deer / ha within management unit 90A, based on MNR's results from field investigations completed in 2000, where 89 deer were observed within 1,035.3 ha surveyed, which represents 31.62% of the areas sampled (MNR, unpublished).

Within management unit 90A, the total deer wintering area is 664ha of a total summer range greater than 9,000ha (MNR, 2011).

Based on the assessment completed by the MNR, Natural Features 31 and 32 are considered to provide significant wildlife habitat for deer congregation (wintering) (MNR, March 1, 2010).

These features are mapped on **Figures 14.1** to **14.2 (Appendix A)** and will be discussed in the EIS.

Landbird Migratory Stopover Areas

One feature, Feature 40 was considered candidate significant wildlife habitat for seasonal concentration areas of migratory landbirds as a result of site investigations. It was evaluated using the criteria outlined in Section 5.1.4.1. These criteria included:

- Habitat Diversity: contained a diversity of habitat types (i.e. woodland, grassland, wetland);
- Location of Site: were located within 2 km of Lake Ontario; and
- Size: were >30 ha.

Features that met all three of the following criteria were considered significant wildlife habitat for migratory landbird stopovers. Results are provided in **Table 5.4, Appendix B**.

Feature 40 met only one of three of the criteria for significance; it contained a diversity of vegetation communities (grassland and deciduous woodland). However it does not meet the 30 ha size criteria and is not located within 2 km of the lakeshore. It is not considered significant wildlife habitat for a migratory landbird stopover area.

Raptor Winter Feeding and Roosting Areas

A well-known historical area for winter raptors occurs in the Fisherville area. Environment Canada (EC) has identified it as the second most important site in southern Ontario in terms of wintering raptor density (Environment Canada, 2007). This area occurs to the west of the Study Area, outside of the Solar Project Lands. Most of the Study Area provides contiguous suitable habitat for winter raptors; open fields including hay, pasture and meadows with scattered, abutting woodlands for roosting sites. However, field in crop such as corn, soya or wheat would constitute “disturbed” areas that would be less important to feeding raptors. The open agricultural setting is likely to provide habitat for small mammal prey and potential perch sites, such as fence posts, are common. In addition, snow accumulation in this region is generally low, allow for easier prey detections and hunting.

Field investigations found relatively high species diversity with nine species of raptor observed across the Study Area. Two species of conservation concern were observed, Short-eared Owl and Bald Eagle. The average density across the Study Area was found to be 0.46 raptors per kilometer, lower than that found in the core Fisherville winter raptor area (2.14 raptor/km) or at other major winter raptor areas in Ontario such as Wolfe Island (1.4 raptors/km) and Amherst Island (3.14 raptors/km).

One candidate winter raptor feeding and roosting area was identified during site investigations in or within 120 m of the Solar Project Location (Section 4.4.4.1). This feature was evaluated using the criteria outlined in Section 5.1.4.1. Results are provided in **Table 5.5**, **Appendix B**. Based on the evaluation of significance, Winter Raptor Area 2 found within 120 m of the Wind Project Location met the criteria for significant wildlife habitat for winter raptor feeding and roosting areas (**Figure 14.1** and **Figure 16**, **Appendix A**).

Winter Raptor Area 2, which is historically known for concentrations of Short-Eared Owls (Miles, 1996), was confirmed during the site investigations to provide habitat for this species. Two individuals were observed foraging in the field north of Meadows Road and 10 individuals were observed roosting in a coniferous plantation south of meadows Road. Species diversity and abundance for this area was high (25 individuals, 4 species), with Red-tailed Hawk, Rough-Legged Hawk and Northern Harrier also observed.

5.3.5.2 Animal Movement Corridors

Areas identified as significant animal movement corridors within 120 m of the Solar Project Location are shown in **Figures 14.1** to **14.2**, **Appendix A**. These significant animal movement corridors provided good linkages between natural features. At the site scale, these corridors provide linkages between significant natural features (e.g. significant woodlands). At the landscape level, these small corridors form part of the greater linkage matrix. Based on site investigations and the evaluation of significance, animal movement corridors are identified within 120 m of the Solar Project Location and will be discussed in the EIS.

5.3.5.3 Rare and Specialized Habitats

Sites Supporting Area Sensitive Species

Area Sensitive Woodlands

As a result of the habitat analysis, 5 candidate woodland features were identified within 120 m of the Solar Project Location. An analysis of the features is provided in **Table 5.7, Appendix B**. One of these features was found to be significant; feature 31 was over 30 ha in size and found to support more than 3 area sensitive species.

Area Sensitive Grasslands

As a result of the site investigation, one candidate grassland features was identified within 120 m of the Solar Project Location. The candidate grassland features are presented in **Table 5.8, Appendix B**. Grassland area B is comprised of 29.7 ha of low intensity pastured field and was found to support grassland species of conservation concern. It has been evaluated as significant wildlife habitat. Significant wildlife habitat for area sensitive grassland species is mapped on **Figures 13.1** to **13.17** (**Appendix A**).

Amphibian Woodland Breeding Ponds

As a result of site investigations in and within 120 m of the Solar Project Location, 4 features were assessed as candidate significant wildlife habitat for amphibian breeding, requiring an evaluation of significance: Natural Features 30, 31, 38, 39. **Table 5.9** (**Appendix B**) summarizes the characteristics of each feature and compares them to the three criteria identified in the Decision Support System Index #40 (MNR, undated). All features assessed met the criteria for significant wildlife habitat in the form of specialized habitats – amphibian woodland breeding ponds for frogs. Features 31, 38 and 39 met the criteria for significant amphibian woodland breeding ponds for salamanders. These features will be discussed in the EIS.

5.3.5.4 Habitat for Species of Conservation Concern

As a result of the site investigation, one candidate grassland feature was identified within 120 m of the Solar Project Location. The candidate grassland feature is presented in **Table 5.8, Appendix B**. Grassland area B is comprised of 29.7 ha of low intensity pastured field and was found to support grassland PIF priority species. Significant wildlife habitat for grassland species of conservation concern is mapped on **Figures 13.1** to **13.17** (**Appendix A**).

Candidate woodlands that supported three or more PIF forest species were considered significant wildlife habitat in the form of habitat for species of conservation concern including Natural Features 30 and 31.

5.3.5.5 Summary

Significant wildlife habitat is present within 120 m of the Solar Project Location. It was identified and designated based on:

- winter deer yards
- raptor feeding and wintering areas
- animal movement corridors
- sites supporting area-sensitive species
- habitat for amphibian woodland breeding ponds
- habitat for species of conservation concern (Short-eared Owls, declining woodland species)

These features are shown on **Figures 14.1** to **14.2** (**Appendix A**).

5.4 EVALUATION OF SIGNIFICANCE – TRANSMISSION LINE

Based on the records review and site investigation, the following natural features have been identified as candidate significant natural features in or within 120 m of the Transmission Project Location, for which an evaluation of significance is required:

- Wetlands
- Woodlands
- Wildlife Habitat
    - winter deer yards;
    - landbird migratory stopover areas
    - raptor winter feeding and roosting areas;
    - sites supporting area-sensitive species
    - amphibian woodland breeding ponds; and
    - habitat for species of conservation concern (declining woodland and grassland species)

5.4.1 Wetlands

Sixty-two wetlands were examined through the Wetland Characteristics and Ecological Functions Assessment (MNR, 2010) protocol described in **Section 5.1.1,** 12 of which occur in or within 120 m of the Transmission Project Location. All wetlands assessed under this approach are considered as provincially significant for the purposes of the NHA and project siting, and will be treated as such. **Table 5.1** (**Appendix B**) provides a detailed summary of the functions and attributes relevant to the EIS for each of the wetlands.

5.4.2 Valleylands

No valleylands were identified on, or within 120 m of, the Transmission Project Location.

5.4.3 Areas of Natural and Scientific Interest

There are no Life Science ANSIs within 120 m or Earth Science ANSIs within 50 m of the Transmission Project Location.

5.4.4 Woodlands

Ninety-two woodlands were examined and evaluated using the significance criteria recommended in Schedule H of the *Haldimand County Official Plan*, 17 of which occur along, or

within 120 m of, the Transmission Project Location. Thirteen of the seventeen woodlands assessed under this approach are considered significant for the purposes of the NHA and project siting, and will be treated as such.

Table 5.3 (**Appendix B**) provides a summary of the criteria satisfied by each woodland identified as occurring within 120 m of the Transmission Project Location based on the site investigations (vegetation and wildlife surveys) and GIS analysis of the landscape context. This table is to be read in conjunction with the information provided in **Table 4.6** (**Appendix B**).

Significant woodlands are shown on **Figures 15.1** to **15.6** (**Appendix A**) and indicated in **Table 5.3**, **Appendix B**. The thirteen significant woodlands include 1, 2, 3, 4, 6, 10, 11, 12, 13, 19, 20, 29 and 37.

5.4.5 Wildlife Habitat

The *Significant Wildlife Habitat Technical Guide* (MNR, 2000) and Decision Support System (MNR, undated) were used to help decide what areas and features should be considered candidate significant wildlife habitat. An analysis of the results of the records review and site investigations determined that the following candidate significant wildlife habitat features are present within 120 m of the Transmission Project Location, requiring an evaluation of significance:

- winter deer yards
- landbird migratory stopover areas
- raptor feeding and wintering areas
- animal movement corridors
- sites supporting area-sensitive species
- habitat for amphibian woodland breeding ponds
- habitat for species of conservation concern (Short-eared Owls, declining woodland and grassland species)

5.4.5.1 Seasonal Concentration Areas

Winter Deer Yards

Core areas of deer yards are generally characterized by coniferous forest with more than 60% canopy closure, adjacent to core feeding areas comprised of mixed or deciduous forest supporting woody species for browsing (Decision Support System Index #28, MNR, undated).

Although the woodlands in the Study Area and in the Zone of Investigation do not contain coniferous or mixed forest, deer yards identified by the MNR as satisfying the evaluation criteria described in Section 5.1.4.1 above are considered to be significant wildlife habitat.

Deer densities are estimated at 0.085965 deer / ha within management unit 90A, based on MNR's results from field investigations completed in 2000, where 89 deer were observed within 1,035.3 ha surveyed, which represents 31.62% of the areas sampled (MNR, unpublished).

Within management unit 90A, the total deer wintering area is 664ha of a total summer range greater than 9,000ha (MNR, 2011).

Based on the assessment completed by the MNR, there are no significant deer yards within 120 m of the Transmission Project Location (MNR, March 1, 2011). Based on the evaluation of significance, no EIS is required.

Landbird Migratory Stopover Areas

One feature, Feature 36 was considered candidate significant wildlife habitat for seasonal concentration areas of migratory landbirds as a result of site investigations. It was evaluated using the criteria outlined in Section 5.1.4.1. These criteria included:

- Habitat Diversity: contained a diversity of habitat types (i.e. woodland, grassland, wetland);
- Location of Site: were located within 2 km of Lake Ontario; and
- Size: were >30 ha.

Features that met all three of the following criteria were considered significant wildlife habitat for migratory land bird stopovers. Results are provided in **Table 5.4**, **Appendix B**.

Feature 36 met only one of three of the criteria for significance; it was greater than 30 ha in size. Habitat consisted primarily of deciduous forest surrounded by cropland. This feature did not provide a diversity of habitat types and it was not located within 2 km of the lakeshore. Therefore, it did not meet the criteria to be considered significant wildlife habitat for a migratory landbird stopover area.

Raptor Winter Feeding and Roosting Areas

A well-known historical area for winter raptors occurs in the Fisherville area. Environment Canada (EC) has identified it as the second most important site in southern Ontario in terms of wintering raptor density (Environment Canada, 2007). This area occurs to the west of the Study Area, outside of the Transmission Project Location. Most of the Study Area provides contiguous suitable habitat for winter raptors; open fields including hay, pasture and meadows with

scattered, abutting woodlands for roosting sites. However, field in crop such as corn, soya or wheat would constitute “disturbed” areas, which would be less important to feeding raptors. The open agricultural setting is likely to provide habitat for small mammal prey and potential perch sites, such as fence posts, are common. In addition, snow accumulation in this region is generally low, allow for easier prey detections and hunting.

Field investigations found relatively high species diversity with nine species of raptor observed across the Study Area. Two species of conservation concern were observed, Short-eared Owl and Bald Eagle. The average density across the Study Area was found to be 0.46 raptors per kilometer, lower than that found in the core Fisherville winter raptor area (2.14 raptor/km) or at other major winter raptor areas in Ontario such as Wolfe Island (1.4 raptors/km) and Amherst Island (3.14 raptors/km).

One candidate winter raptor feeding and roosting area was identified during site investigations in or within 120 m of the Wind Project Location (Section 4.5.4.1). These features were evaluated using the criteria outlined in Section 5.1.4.1. Results are provided in **Table 5.5, Appendix B**. Based on the evaluation of significance, Winter Raptor Area 1 found within 120 m of the Transmission Project Location did not meet the criteria for significant wildlife habitat for winter raptor feeding and roosting areas (**Figure 15.2** and **Figure 16**, **Appendix A**).

While overall raptor use in the study area was high, with over 300 individual raptors observed during the surveys, these species were not associated with the candidate winter raptor feeding and roosting areas identified within 120 m of the Transmission Project Location.

5.4.5.2 Animal Movement Corridors

No animal movement corridors were identified in or within 120 m of the Transmission Project Location.

5.4.5.3 Rare and Specialized Habitats

Sites Supporting Area Sensitive Species

Area Sensitive Woodlands

As a result of the habitat analysis, 6 candidate woodland features were identified within 120 m of the Transmission Project Location. An analysis of the features is provided in **Table 5.7, Appendix B**. One of these features was found to be significant; Feature 19 was over 30 ha in size and provided interior forest habitat.

Area Sensitive Grasslands

As a result of the site investigation, one candidate grassland features was identified within 120 m of the Transmission Project Location. The candidate grassland features are presented in

Table 5.8, **Appendix B**. Grassland area A is comprised of 70.0ha of meadow habitat and was found to support grassland species of conservation concern. It has been evaluated as significant wildlife habitat. Significant wildlife habitat for area sensitive grassland species is mapped on **Figures 13.1** to **13.17** (**Appendix A**).

Amphibian Woodland Breeding Ponds

As a result of site investigations in and within 120 m of the Transmission Project Location, one feature was assessed as candidate significant wildlife habitat for amphibian breeding, requiring an evaluation of significance (Feature 38). **Table 5.9** (**Appendix B**) summarizes the characteristics of this feature and compares them to the three criteria identified in the Decision Support System Index #40 (MNR, undated). This feature met the criteria for significant wildlife habitat in the form of specialized habitats – amphibian woodland breeding ponds for both frogs and salamanders. This significant amphibian woodland breeding pond will be discussed in the EIS.

5.4.5.4 Habitat of Species of Conservation Concern

As a result of the site investigation, one candidate grassland feature was identified within 120 m of the Transmission Project Location. The candidate grassland feature is presented in **Table 5.8**, **Appendix B**. Grassland area A is comprised of 70.0ha of meadow habitat and was found to support grassland PIF priority species. It has been evaluated significant wildlife habitat. Significant wildlife habitat for grassland species of conservation concern is mapped on **Figures 13.1** to **13.17** (**Appendix A**).

Candidate woodlands that supported three or more PIF forest species were considered significant wildlife habitat in the form of habitat for species of conservation concern including natural features 4 and 10.

5.4.5.5 Summary

Significant wildlife habitat is present within 120 m of the Transmission Project Location. It was identified and designated based on:

- Specialized habitats (area-sensitive species, amphibian woodland breeding ponds); and
- Species of conservation concern (habitat for declining grassland and woodland species).

These features are shown on **Figures 15.1** to **15.6** (**Appendix A**).

5.5 SUMMARY

This Natural Heritage Assessment was undertaken to identify natural features found within the Grand Renewable Energy Park Project Location and the Zone of Investigation, and evaluate their significance. This report has been prepared in accordance with *O. Reg. 359/09*.

Based on an assessment of background information and the results of on-site field investigations, the following natural features were within 120 m of the Project Location, requiring an Environmental Impact Study (EIS) under O. Reg. 359/09 s.38:

5.5.1 Wind Project

Significant natural features in the Wind Project Location and Zone of Investigation are shown on **Figures 13.1 – 13.7 (Appendix A)** and are summarized in **Table 5.11** (**Appendix B**), which include:

- Significant woodlands
- Significant wetlands
- Significant wildlife habitat
    - Seasonal concentration areas (winter deer yards and landbird migratory stopover areas);
    - Animal movement corridors (Grand River and local connections);
    - Rare habitat (rare vegetation communities);
    - Specialized habitats (area-sensitive species, seeps and springs, amphibian woodland breeding ponds); and
    - Habitat for species of conservation concern (Snapping Turtle, declining woodland and grassland species).

5.5.2 Solar Project

Significant natural features in the Solar Project Location and Zone of Investigation are shown on **Figures 14.1 – 14.2 (Appendix A)** and are summarized in **Table 5.11** (**Appendix B**), which include:

- Significant woodlands
- Significant wetlands
- Significant wildlife habitat

- Seasonal concentration areas (winter deer yards, raptor winter feeding and roosting areas);
- Animal movement corridors;
- Specialized habitats (area-sensitive species, amphibian woodland breeding ponds); and
- Species of conservation concern (Short-eared Owl, declining woodland and grassland species).

5.5.3 Transmission Project

Significant natural features in the Transmission Project Location and Zone of Investigation are shown on **Figures 15.1 – 15.6 (Appendix A)** and are summarized in **Table 5.11** (**Appendix B**), which include:

- Significant woodlands
- Significant wetlands
- Significant wildlife habitat
  - Specialized habitats (area-sensitive species, amphibian woodland breeding ponds); and
  - Species of conservation concern (declining woodland and grassland species).

An Environmental Impact Study is required to identify and assess any negative environmental effects and develop mitigation measures to the above-noted significant features that occur within 120 m of the Project Location.

5.6 QUALIFICATIONS

The following Stantec personnel were responsible for the application of evaluation criteria and procedures:

- Valerie Wyatt, Senior Project Manager (wildlife habitat)
- Chris Powell, Environmental Planner (woodlands, valleylands)
- James Leslie, Terrestrial Ecologist (wetland evaluation)
- Shannon Catton (wildlife habitat)
- Andrew Taylor (wildlife habitat)

Curricula vitae are provided in **Appendix I**.

6.0 Environmental Impact Study

6.1 ENVIRONMENTAL IMPACT STUDY – WIND

6.1.1 Description of the Wind Project

The wind component of the Project will consist of 148.6 MW (nameplate capacity) of wind power. This will be achieved via the utilization of 65 Siemens SWT-2.221 and 2 Siemens SWT-2.126 wind turbines, construction of access roads to the turbines, and an underground and above-ground collection system leading to a central substation. The Wind Project Location includes all land and structures associated with the Wind Project and any air space in which the Wind Project will occupy. This includes structures such as turbines, access roads and power lines as well as any temporary work areas which are required to be utilized during the construction of the Wind Project.

The tower of each wind turbine will require the construction of a concrete foundation to a depth of up to approximately 3 m and approximately 16.7 m wide depending upon subsurface conditions. Excavation for each foundation takes approximately two to three days, and construction of each foundation (formwork, rebar placement and concrete pour) is completed within a week (Construction Plan Report, Stantec 2011). Towers will be 100 m high with three rotor blades, each 49 m in length, yielding a maximum blade tip height of 149 m. Following foundation curing, the assembly and erection of each turbine takes three to five days depending on wind conditions.

Based on the preliminary findings of 8 boreholes, comprehensive dewatering is not anticipated for the excavations of the turbine foundations. The native soils consist of very low permeability clay and there would be virtually no groundwater seepage in foundation excavations. Any seepage or surface water infiltration should be easily controlled with sump pumps and dewatering rates should be well under 50,000l/day, with little drawdown in surrounding soils (P. Healy, Stantec, pers. comm.). All water pumped during dewatering activities will be directed away from natural features and not directly into wetlands. Further dewatering recommendations should be reviewed upon the completion of the detailed engineering design. Additional detail is provided in the Construction Plan Report (separate cover).

Access roads are required to access each turbine site from existing roads during both the construction and operation phases of the Project. New/upgraded access roads will be constructed to support construction and transportation vehicles (including operating and maintenance phases) to each turbine site. Where possible, access has been planned in a manner that reduces the amount of land required to access the turbine sites or utilizes existing access roads, thus reducing potential impacts on the existing environment. For the wind component of the Project, the road scope of work includes approximately 45 km of access roads.

During construction, the access roads will be constructed to provide a road width of approximately 5 m in straight sections with an additional 1 m compacted shoulders on each side for a total of 7 m. The roads may potentially be wider where turning of large construction vehicles (e.g. transport trucks delivering blades, towers, and nacelles) is required from local roads. To account for these variances, a 50 m wide "constructible area" from the municipal roads to the location of the wind turbine generators has been studied as part of the REA process.

The excavated depth of the roadbed will be approximately 750 mm and consist of engineered fill and crushed gravel (Construction Plan Report, Stantec 2011). Within 30 m of wetlands, no excavation will take place; the roadbed material will be placed over the existing surface on geotextile material with equalization culverts to ensure no ponding or disruption of surface water flow. Turbine laydown (prior to turbine erection) will take place adjacent to the access roads and have been incorporated into the Wind Project Location design by designating a 50 m wide "constructible area" for the access roads. No site preparation is needed for the turbine laydown areas. The road construction for each turbine utilizes one to two excavators, two to three dump trucks and compaction equipment. The access road to each turbine will typically take one to three days of construction time.

Crane pads will be constructed at the same time as the access roads and will be adjacent to turbine locations within the "constructible area" around each turbine. A conceptual turbine installation plan has been provided for illustrative purposes (**Appendix K**). The general crane pad area will be approximately 20 m x 40 m and will typically consist of the same make up as the access road, whereas the crane platform (where the crane sits) may consist of a heavier granular make up depending on site conditions. No excavation or dewatering is anticipated to allow for the construction of the crane pads. The excavated soil will be stockpiled and used for site rehabilitation. After construction, the crane pads will be removed and the native topsoil replaced.

With the exception of the plantation associated with Feature 42a (significant woodland), all significant natural features will be avoided during construction, with all crane pads sited a minimum of 20 m from any natural feature. Silt fencing and soil erosion control measures will be implemented as necessary to prevent surface and groundwater sedimentation. No impacts to natural features are anticipated from the construction of the crane pads.

A generator step-up transformer, located near the base of each turbine, is required to transform the electricity generated in the nacelle of each turbine to a common collection system line voltage. From each step-up transformer, 35 kV collector circuits carry the electricity to the Project's substation located near Haldimand Road 20 and Wilson Road. The collector lines will be buried underground on private property from the turbines to the municipal road rights-of-way, at which time the lines will be switched to overhead lines. The overhead lines will be constructed on single wooden pole structures, similar to existing distribution lines located throughout the area. In most cases, the underground lines will be built within the proposed

access roads to minimize the amount of land disturbed during construction of the Project. Typically the collector lines will be buried at a depth of 1.2 m so that agricultural production can continue on the lands above the collector lines. In some cases, the collector lines will be below the water table. Generally, power cable trenches will be backfilled with sand, but within 30 m of any wetland, power cable trenches will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit.

In accordance with O. Reg. 359/08, s. 37, no part of the Project is sited within a provincially significant southern or coastal wetland (and as a condition of the application of the Wetland Characteristics and Ecological Functions Assessment (MNR, 2010) protocol, all wetlands within 120 m of the Wind Project Location are treated as provincially significant; **Sections 5.2.1, 5.3.1** and **5.4.1**). Furthermore, since the Wind Project Location includes the air space in which a project operates, the wind turbines have been sited such that no part of a turbine blade overhangs a wetland.

The construction, installation or expansion of a renewable energy generation facility is not permitted within a provincially significant southern wetland, provincially significant coastal wetland, or a provincial park or conservation reserve (unless otherwise permitted under the Provincial Parks and Conservation Reserves Act, 2006) (O. Reg. 359/08, s. 37). Such facilities may be permitted within the following areas subject to the completion of an EIS:

- provincially significant northern wetland;
- provincially significant life science ANSI;
- significant valleyland;
- significant woodland;
- significant wildlife habitat;
- within 120 m of the above natural features, provincially significant southern wetland, provincially significant coastal wetland, provincial park or conservation reserve;
- provincially significant earth science area of natural and scientific interest (ANSI); or
- within 50 m of a provincially significant earth science ANSI (O. Reg. 359/09, s. (38(1)).

With only one exception, all turbines, access roads and the collector system have been located outside of significant natural features:

- Feature 42 (**Figure 13.8**): Turbine 53 and a portion of its associated access road and collector line will be located within a cultural plantation (CUP3-12) that has been evaluated as a significant woodland (Woodland 42a) habitat for declining woodland birds.

The following Project components have been proposed along existing access roads through significant natural features, however, will not require the removal of natural vegetation:

- Feature 22 (**Figure 13.5**). The access road and underground collector line associated with Turbine 16 follows the existing farm laneway through the southernmost projection of Woodland 22. No widening of the existing laneway is required.

- Feature 55 (**Figure 13.11**): The collector line between Turbines 37 and 38 follows the existing farm laneway through a deciduous forest evaluated as a significant woodland (Woodland 55). No access road is proposed through this feature.

- Feature 69 (**Figure 13.15**): The collector line between Turbines 3 and 6 crosses Feature 69 along an existing farm access road through the woodland. The collector line between Turbines 3 and 6 follows the existing farm laneway through a deciduous forest evaluated as a significant woodland (Woodland 69). No access road is proposed through this feature.

Various parts of the Wind Project are constructed within 120 m of wetlands, significant woodlands, significant valleylands and significant wildlife habitat. Construction and installation of a renewable energy facility may be permitted within significant valleylands, woodlands and wildlife habitat, or within 120 m of these natural features as well as within 120 m of a provincially significant southern wetland or provincially significant coastal wetland, subject to the completion of an EIS (O. Reg. 359/09, s. (38(1)).

The following sections provide a detailed description of the potential negative environmental effects of the Wind Project, identify appropriate mitigation measures and describes how the environmental effects monitoring plan and construction plan will address any negative environmental effects (O. Reg. 359/09, s. 38(2)(a)). Distances for any component within 120 m of a significant natural feature are provided. The impact assessment was conducted on a feature basis, rather than a turbine-by-turbine basis, so that potential impacts to significant natural features arising from multiple project components could be considered together.

Potential effects, mitigation and net effects, and post-construction monitoring recommendations are summarized in **Table 6.1**.

6.1.2 Potential Impacts

The potential impacts associated with the proposed construction of the Wind Project components are identified and assessed in this section of the EIS, with appropriate mitigation, restoration and enhancement measures recommended to protect, and where feasible enhance, the natural heritage features and ecological functions.

6.1.2.1 Wetlands

The site layout has minimized disturbance to the most important habitat features within the Study Area and has minimized the length of new access roads, which typically are responsible for the largest amount of disturbed footprint during construction (Arnett *et al.*, 2007). Efforts were made to incorporate the current road network at the site to the greatest extent possible. All components of the Wind Project are sited outside wetland boundaries; therefore there will be no direct loss of wetland habitat or function.

Construction has been proposed within 30 m of wetland edges for a number of wetland features, however, no construction is proposed within 5 m of any wetland feature. No excavation is proposed within 30 m of any wetland feature.

Potential indirect effects may arise through changes to wetland hydrology during or after construction, either by increasing or decreasing flow contributions (runoff) to these features. To accommodate existing overland flows and maintain surface water contributions to wetlands, and therefore avoid impacting wetland hydrology, culverts have been proposed beneath the construction access roads to convey runoff following storm events.

These culverts have been sized to accommodate flows up to the 5 year storm, with greater flows proposed to overtop these temporary structures. Equalization culverts have also been proposed to accommodate surface water runoff from swales that extend across existing agricultural fields. The location of each culvert is identified on **Figures 13.1** to **15.6**, with a summary of sizing details provided in **Appendix J**. Site specific refinement to the location / design of individual culverts may occur during detailed design to ensure proper placement and sizing to convey flows, prevent pooling and maintain hydrology. However, the commitment is to install equalization culverts in any flow path to ensure flows are conveyed to adjacent natural features.

Indirect impacts resulting from construction activities, such as disturbance to wildlife, dust generation, sedimentation and erosion, are expected to be short term, temporary in duration and mitigable through the use of standard site control measures. During construction, there will be increased traffic and the potential for accidental spills.

During operation, some materials such as lubricating oils and other fluids associated with transmission line maintenance have the potential for discharge to the on-site environment through accidental spills resulting in a potential impact to the natural features. Improper

disposal of wastes (fluids, containers, cleaning materials) could also have a negative impact on the features. The dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency of these activities.

6.1.2.2 Woodlands

The site layout has minimized disturbance to the most important habitat features within the Study Area and has minimized the length of new access roads, which typically are responsible for the largest amount of disturbed footprint during construction (Arnett *et al.*, 2007). Efforts were made to incorporate the current road network at the site to the greatest extent possible, where feasible. However, in some cases, access roads were shifted further from woodlands than existing roads to increase setbacks / buffers.

With the exception of Woodland 42, all construction is proposed outside significant woodlands, no closer than 1 m to the woodland edge. Where components of the Wind Project are sited outside significant woodlands, there will be no direct loss or fragmentation of habitat or habitat function. Further assessment of specific impacts associated with the loss of cultural plantation associated with Woodland 42 is provided below.

Potential indirect effects may arise through changes to hydrology during or after construction. Indirect impacts resulting from construction activities, such as disturbance to wildlife, dust generation, sedimentation and erosion, are expected to be short term, temporary in duration and mitigable through the use of standard site control measures. During construction, there will be increased traffic and the potential for accidental spills.

During operation, some materials such as lubricating oils and other fluids associated with transmission line maintenance have the potential for discharge to the on-site environment through accidental spills resulting in a potential impact to the natural features. Improper disposal of wastes (fluids, containers, cleaning materials) could also have a negative impact on the features. The dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency of these activities.

6.1.2.3 Significant Wildlife Habitat

All components of the Wind Project are sited outside significant wildlife habitat, including amphibian (frogs, salamanders) woodland breeding ponds, migratory bird stopover areas, deer wintering areas, etc. Therefore, there will be no direct loss of habitat or habitat function. Potential indirect effects may arise through changes to wetland hydrology during or after construction, where access roads or grading activity alter the existing flow patterns supporting adjacent natural features, as described in Section 6.1.2.2.

Potential indirect impacts include increased risk of mortality to frogs, salamanders, snakes and turtles on new access roads. Roads can impact wildlife populations through direct mortality from vehicles, as well as through the increased isolation of populations resulting in decreased genetic

diversity (LesBarreres, 2007). Within forest habitats, gravel roads through forests create partial barriers to terrestrial salamander movement, as they less commonly enter roadside habitats compared with forest habitats (Marsh et al, 2005).

Traffic speed is one of the key factors which influences mortality (Farmer and Brooks, 2007), and traffic volume influences both mortality (Fahrig, 2007) and connectivity. During operation of the Project, access roads would experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights.

Indirect impacts resulting from construction activities, such as disturbance to amphibians, birds and deer, dust generation, sedimentation and erosion, are expected to be short term, temporary in duration and mitigable through the use of standard site control measures. During construction, there will be increased traffic and the potential for accidental spills. Disturbance to local amphibian populations due to increased activity during construction would be temporary. Disturbance during operation of the turbines would also be minimal and temporary due to the periodic nature of maintenance and the fact that local populations would likely adapt to the new structures.

Indirect impacts during construction and operation could include disturbance or disruption to the wetland features and wildlife. Since wind power is a relatively new method of producing electricity, there is little literature on the direct effects of wind turbine sound on wildlife. Only one study is known to deal specifically with wind turbines as sound emitters, rather than general urban noises (Rabin et al., 2006). Masking of auditory environmental signals, such as amphibian calls, may be significant immediately underneath the turbine (Rabin et al., 2006), but the effects rapidly decline with distance from the turbine. A study of low frequency noise and vibration at a modern wind farm determined that vibration is 1/5th to 1/100th of the limit of human perception within 25 m of the turbine base (Legerton et al., 1996). While amphibians may be more perceptive of vibration, vibration magnitude drops off significantly as distance increases (K. Smith, Aercoustics, pers. comm. in Stantec, 2011). No turbines are located within 60 m of significant amphibian breeding habitat (base). Nine of the eleven turbines within 120 m of significant amphibian habitat are located more than 100 m from turbine centre to the features assumed to support significant woodland amphibian populations. These are considered sufficient setbacks to mitigate any noise and vibration effects to amphibians.

Roads can impact wildlife populations through direct mortality from vehicles, as well as through the increased isolation of populations resulting in decreased genetic diversity (LesBarreres, 2007). Traffic speed is one of the key factors which influences mortality (Farmer and Brooks, 2007), and traffic volume influences both mortality (Fahrig, 2007) and connectivity. However, during operation, access roads would experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic would primarily be restricted to daytime hours.

Project effects on breeding birds may occur indirectly from disturbance or directly through mortality. Disturbance from construction and operations of turbines, access roads, and crane paths have the potential to affect use of adjacent habitats by birds and bird collisions with turbines may result in direct mortality during operations. Indirect effects have the potential to be greater threats to birds than direct mortality. Destruction, fragmentation, and disturbance of habitat as a result of wind energy projects were identified as larger threats to breeding birds than direct mortality (Kingsley and Whittam, 2007).

During operation, direct mortality of birds may occur from collisions with turbines. Various studies throughout North America have documented bird collisions at wind facilities and investigated the underlying mechanisms. In general, resident breeding birds breeding tend to have lower collision rates than non-residents, at least partly because they become familiar with the turbines and avoid them (Kingsley and Whittam, 2007).

Collision risk is partly a function of the rate of exposure of birds to the turbine blade sweep and types of behaviour that occurs within this range. Most studies indicate that direct mortality at wind facilities is low, especially when compared to other anthropogenic structures (Arnett et al., 2007; Kingsley and Whittam, 2007; National Academy of Sciences, 2007), and are not expected to be significant at a population level (Arnett et al., 2007).

In Minnesota, the density of breeding grassland birds including Bobolink, Red-winged Blackbird, and Savannah Sparrow was reduced by 50% within 80 m of turbines (Leddy et al., 1999). Studies to date conducted by Stantec did not indicate a reduction of density of breeding grassland birds approaching turbines (Stantec, 2010b). Post-construction studies conducted at the Melancthon EcoPower® Centre near Shelburne Ontario recorded low mortality of resident forest dwelling breeding birds (Stantec 2010). Studies to date conducted by Stantec did not indicate a reduction of density of breeding grassland birds approaching turbines (Stantec, 2010b). No disturbance information exists for shrubland birds, some of which have been identified as priority species by PIF (2006). Avoidance of significant natural features (e.g. area sensitive woodland and grassland bird habitat) minimizes potential habitat impacts.

Disturbance from construction activity, such as increased traffic, noise, or dust, may result in avoidance of habitats by birds. These effects are greatest if disturbance occurs during critical life stages such as courtship or nesting (NWCC, 2002). Currently construction is scheduled to begin in Fall 2011 for a period of approximately 12 months, with construction proposed during the critical period for breeding forest birds (late May to end of June). Such impacts are minimized by avoiding construction activity immediately adjacent to significant woodland bird habitat (e.g. area sensitive, PIF species) during this period.

Disturbance of birds may occur during all phases of the Project as a result of increased human activities on-site (e.g. site preparation, turbine assembly, maintenance activities). However, these activities have a similar level of disturbance to wildlife compared to the ongoing level of

agricultural activities that currently occur adjacent to the feature. It is likely that resident birds have adapted to these levels of periodic human activity.

Studies specific to the wind industry indicate that avian productivity of breeding birds does not appear to be negatively affected at many wind facilities (Kingsley and Whittam, 2007). However, most studies to date that document avoidance, disturbance or displacement effects have focused mainly on grassland or open country birds. There is relatively little research on effects on wind energy disturbance on forest breeding birds. At the Erie Shores Wind Farm, located along the Lake Erie shoreline west of the Project Location, turbines are situated at the edge of woodlots, but resident woodland species, appeared to readily habituate to their presence (James, 2008). Disturbance studies conducted at the Melancthon EcoPower® Centre by Stantec concluded that population densities of forest breeding birds have remained generally consistent between the pre-construction and post-construction conditions (Stantec, 2010).

Impacts to wildlife could result during construction from wildlife entering the construction area. Where construction is proposed within 30 m of a significant natural feature, sediment fencing will be erected along the feature edge acting as a barrier to prevent small animals, amphibians and reptiles from moving into the construction area or onto access roads. Fencing will also be erected around the perimeter of the construction area preventing wildlife from entering the area.

With respect to the movement of wildlife through the area, some species may experience temporary avoidance or displacement effects during construction due to the influx of human activity and noise, however once the Project is operating, human activity around the facilities would decrease, thus allowing local wildlife movement patterns to quickly re-establish.

Sensory disturbance of wildlife using the corridor may occur during all phases of the Project as a result of increased on-site human activities (e.g., site preparation, turbine assembly, maintenance activities). However, a certain level of sensory disturbance to wildlife resources in the Project Study Area already exists from ongoing agricultural, rural, and domestic activities. Studies related to the sensory effects of constructing and operating wind farms on big game resources, carried out in the Western U.S., have shown that there is no significant effect (Strickland and Erickson, 2003) and no reduction in use of the area immediately within wind project locations (Arnett et al., 2007). These studies indicate that species are either unaffected by this type of development, given their small footprint and preservation of the existing land-use, or that they can readily adapt to the presence of the wind plant.

6.1.3 General Mitigation Measures

The following best management practices and other measures intended to minimize or mitigate potential adverse impacts on adjacent significant natural features will be implemented, where required and reasonable, during the construction and operation of the various turbines, access roads and collector lines.

6.1.3.1 Vegetation Removal

Based on the approach taken to site turbines, access roads and collector lines outside of the significant natural features, impacts to existing natural vegetation communities has been avoided for the most part. There are only limited circumstances where removal of existing vegetation is proposed, as described in Section 6.1.1. The majority of the lands impacted by the Wind Project consist of agricultural fields planted with a variety of crops. Features impacted include hedgerows between fields being crossed by proposed access roads, one cultural plantation (Feature 42a) where a turbine, access road and collector line will be installed and the existing vegetation along the immediate edges of the existing farm access through Feature 22.

Where vegetation removal is proposed the following mitigation measures will be employed:

- As appropriate and prior to construction the limits of vegetation clearing will be staked in the field. The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area to pre-disturbance conditions at the direction of a qualified ecologist (with enhancement of any disturbed areas to be encouraged).

- To the extent practical, tree and/or brush clearing would be completed prior to or after the breeding season for migratory birds (May 1 to July 31). Currently, construction is planned for fall 2011. However, should clearing be required during the breeding bird season, prior to construction, surveys will be undertaken to identify the presence/absence of nesting birds or breeding habitat. If a nest is located, a designated buffer will be marked off within which no construction activity will be allowed while the nest is active. The radius of the buffer width ranges from 5- 60 m depending on the species. Buffer widths are based on the species sensitivity and on buffer width recommendations that have been reviewed and approved by Environment Canada;

- The boundaries of all wetlands within 30 m of the proposed construction area will be flagged / staked in the field by a qualified ecologist prior to construction to assist with the demarcation of the construction area, to ensure construction activities avoid these sensitive areas and to assist with the proper field installation of E&S controls;

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with species native to Ecoregion 7E or the local area.

6.1.3.2 Sediment and Erosion Control Measures

In order to minimize erosion potential and the introduction of sediment into the natural features during grading and construction activities, a number of erosion and sediment (E&S) control measures will be implemented prior to the initiation of any construction.

Erosion susceptibility in this area is relatively low. Due to the flat topography of the area, there are no steep or elongated slopes that would accelerate runoff during a storm event. The clay soils in the area are relatively cohesive and resist the erosive forces of runoff, more so than less cohesive particles, such as silt or fine sand. As such, the risk of erosion and resulting sedimentation within downstream natural features is limited, although not absent. As such, erosion and sediment controls will be installed during construction to minimize potential impacts.

The proximity and sensitivity of adjacent natural features increases the risk of sedimentation resulting from the detachment of soil materials within a construction area. As such, all natural features identified within 30 m of any proposed construction area are at higher risk of sediment transfer and erosion from grading and topsoil removal.

E&S control measures will be in installed to minimize erosion impacts adjacent to natural features, as appropriate. The following measures / guidelines will be implemented, as required, during the construction of the Wind Project components:

- Erosion control measures include seeding / naturalization of buffer strips and maintaining natural vegetation. Other measures, such as erosion control matting, netting or erosion control blankets, are not anticipated;
- Sediment control measures include perimeter silt fencing, mud mats (access roads), check dams (rock or strawbales), and sediment bags (dewatering);
- Silt barriers (e.g., fencing) will be erected along wetland and woodland edges located within 30 m of construction work areas (access roads, laydown areas) to minimize potential sediment transport to the natural features. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area (i.e. side slopes of access roads, realigned grassed swales) are re-stabilized with vegetation or the area has been returned to pre-disturbance conditions;
- Where the installation of an equalizing culvert is proposed, appropriate erosion control measures (i.e. rip rap, strawbales, seeding) will be installed at the ends of each culvert to prevent erosion;
- Where culverts are proposed within 30 m of a natural feature, enhanced sediment and erosion control measure (i.e. straw bales, double rows of sediment fencing, check dams) will be installed as added protection to filter runoff and further minimize potential

sedimentation within the downstream features (wetland, woodland). This added protection is proposed to reduce environmental risk;

- As appropriate and prior to construction, the limits of vegetation clearing will be staked in the field. The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include immediate rehabilitation of the disturbed area to pre-disturbance conditions;

- Excavated soil from crane pads will be stockpiled and re-used on site, as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. After construction, the crane pads will be removed and the native topsoil replaced to reflect pre-disturbance conditions to the largest degree possible;

- All disturbed areas will be re-vegetated immediately, or as soon as conditions allow (i.e. based on time of year); and

- In all cases where the construction of an access road is proposed within 10 m of a natural feature, the area between the access road and the feature will be naturalized (seeded) to establish a natural vegetated buffer along the edge of the community. All seeding and /or replanting of these areas will use species native to Ecoregion 7E and will be native to the site and/or surrounding natural features. Areas greater than 10 m in width are assumed to be returned to agricultural production following construction activities (as they occur today);

Specific E&S control measures will be selected, located and sized by an engineer during the detailed design stage to ensure proper functioning of these measures. All E&S controls will be installed prior to construction and will be maintained during and following construction to ensure their effectiveness at protecting the adjacent natural features.

6.1.3.3 Dewatering

In order to mitigate any impacts to natural features during dewatering activities, the following measures will be implemented, as required and necessary:

- The area to be used for dewatering will be clearly marked with flagging and/or snow-fencing prior to work commencing;

- During site preparation, silt fencing will be included to retain sediments on site so they do not enter any natural feature. All sediment control structures will be inspected regularly, and repaired/maintained as necessary;

- All water pumped during dewatering activities will be directed away from natural features and not directly into wetlands;
- The use of sediments bags (or filter rings) will be used as appropriate to filter out suspended sediment prior to discharge. Any sediment bags or filter rings will be monitored during pumping to ensure their efficacy, with any clogging or failures to be rectified immediately; and
- After the staging area and dewatering work area is no longer required, any remaining disturbed soils will be returned to pre-disturbance conditions or reseeded with native species as appropriate as soon as feasible. All seeding and replanting will use species native to Ecoregion 7E and will be native to the site and/or surrounding natural features.

Further dewatering recommendations will be reviewed upon the completion of the detailed engineering design. Additional detail is provided in the Construction Plan Report (separate cover).

6.1.3.4 Wildlife Mitigation

Where a proposed access road crosses between two natural features (i.e. between wetland and upland habitat, or across a hedgerow), culverts will be installed beneath the access road to allow for animal movement. Some culverts will double as equalization culverts allowing flows to be conveyed beneath the access road, however, where animal movement is to be accommodated, the following elements will be incorporated into the design to the culvert:

- The construction and installation of the culverts will consider the needs of these species;
- Culverts will consist of small diameter CSP pipes with at least a 0.3 m / 1 foot opening;
- Culverts will be countersunk and backfilled with native materials to provide moist natural substrate bottom to maintain habitat continuity
- Low stature opening cover will be provided to minimize predation; and
- Culverts will be designed to avoid standing water.
- Fencing along the access roads between natural features will be provided to funnel species into the culvert and prevent / minimize road crossings.

Access roads are typically responsible for the largest amount of disturbed footprint during construction (Arnett et al., 2007). However, all access roads have been located within agricultural fields or along existing access roads through Feature 22. Therefore, the Wind Project will not result in the removal of significant wildlife habitat, fragmentation or disturbance.

Potential disturbance effects to birds would be minimized through avoiding construction activities during sensitive periods (i.e. the breeding season). When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

Specific mitigation measures include the following:

- To the extent practical, construction activities required within 120 m of Features 7, 17, 19, 22, 31, 32, 34, 47, 49, 66a, 68a, 69, 76, and 81 should not occur during the breeding season for forest birds (May 1 to July 31). Should activities be required in this area during the breeding bird season, prior to construction, surveys would be undertaken to identify the presence/absence of nesting birds within the woodland where construction activities are to occur within 30 m of the woodland edge. If a nest is located, a designated buffer will be marked off within which no construction activity will be allowed while the nest is active. The radius of the buffer width ranges from 5 - 60 m depending on the species. Buffer widths are based on the species sensitivity and on buffer width recommendations that have been reviewed and approved by Environment Canada.

- Potential disturbance effects to turtles would be minimized through avoiding construction activities in areas where turtles may be encountered during sensitive periods (i.e. breeding season). While no parts of the project location are located within or adjacent to significant wildlife habitat for turtle nesting or wintering, the project location is adjacent to a number of wetlands (assumed significant for the purposes of this project) and water bodies which turtles may use or be founded within at different times of year.

  To the extent practical, construction activities should not occur during the breeding / nesting season for turtles. However, should construction activities occur during these periods, additional barriers (i.e. silt fencing) should be erected around areas of disturbed soils in areas adjacent to wetland / water course features to discourage turtles from nesting / laying eggs in these areas. Should a turtle nest be encountered, a buffer will be established and the nest will be protected from construction activities (such as with a wire cage) and monitored until the nest is no longer active.

  Precautions will also be taken to avoid any areas that could contain hibernating turtles during construction activities occurring during the winter.

- Additional post-construction monitoring for disturbance and mortality are identified within the **Environment Effects Monitoring Plan** (**EEMP**).

Should wildlife be found within the construction area, the use of standard care protocols for the removal of species will be used with instructions for the contractor to contact the appropriate ecological staff if a rare species specimen has been identified within the construction area.

6.1.3.5 Rehabilitation and Naturalization

The majority of the areas impacted by construction are currently actively farmed, with the exception of the plantation associated with Feature 42 (Turbine 53) and areas where hedgerows will be crossed by access roads or collector lines (e.g. access to Turbine 25, between Turbine 37 and 68, access to Turbine 64). It is anticipated that the majority of the areas temporarily impacted by construction will return to agricultural production, including those areas used for rotor assembly and blade installation.

The majority of the temporary laydown areas will be returned to pre-construction agricultural conditions, with the exception of Feature 42, which will be revegetated with species native to Ecoregion 7E and native to the site and/or surrounding natural features. Further discussion of the specifics associated with minimizing vegetation removal and re-establishing natural vegetation cover following construction is provided in Section 6.1.19.

Where access roads are proposed less than 10 m from a natural feature, the intervening area will be naturalized to provide a natural vegetated buffer along between the Wind Project Location and adjacent natural features. These areas will be seeded species native to Ecoregion 7E and native to the site and/or surrounding natural features to encourage the establishment of native ground cover and to prevent the establishment of invasive species. These buffers will function to minimize impacts on the adjacent natural features by filtering runoff from access roads, providing adjacent grassland habitat along the edge of forest communities and increasing species diversity.

The swales beneath the blades of Turbines 10 and 16 will be realigned turbine to divert surface runoff and avoid erosion / flooding at the base of the turbine foundation or within the construction area. These realigned swales will be seeded with native species to stabilize the soils and increase roughness to reduce potential erosion.

6.1.3.6 Turbine Installation Plan

A typical turbine installation plan is provided in **Appendix K** to illustrate the setbacks to be maintained during construction, with the various construction areas (e.g. access road, construction area, laydown, rotor assembly) illustrated in relation to and adjacent natural feature. While the configuration and orientation of the plan will be amended, as required, to suite each turbine and access road appropriately, this plan shows that construction activity will be focused within the agricultural fields located furthest from the natural features. A 20 m setback will be maintained during construction from the adjacent natural features, within which no construction activity or other disturbance will occur.

There are 3 exceptions where the typical installation layout will not be feasible due to the proximity of adjacent natural features (e.g. Turbine 9 and 24) or where installation is proposed within a significant woodland (Turbine 53). In these cases, an alternate installation plan / configuration will be prepared and confirmed through detailed design, however, alternate

installation plans are provided for reference in **Appendix I** and discussed in Section 6.1.11, 6.1.19 and 6.1.31.

The following sections provide an assessment of the potential environmental impacts and mitigation measures to be implemented through the planning, construction and operation of the proposed Wind Project on a feature by feature basis. The general impacts and mitigation measures described above apply to each of the project components below, as applicable. Additional monitoring of potential impacts to determine the effectiveness of proposed mitigation measures are described in Section 6.4 and further detailed in the Environmental Effects Monitoring Plan.

6.1.4 Natural Feature 5

Feature 5 is a 63.5 ha woodland located west of Decewsville Road, between Irish Line and Highway 3 (**Figure 13-2, Appendix A**) and comprised of upland sugar maple-dominated forest and swamp maple and green ash deciduous swamps. There are two watercourses mapped within it. The feature has been identified as a significant woodland based on size, proximity to a water feature, and community diversity. It has been identified as containing a wetland (assumed significant for the purposes of this Project). The wetland is a headwater, palustrine swamp on soils with high clay content and intermittent inflow. The wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.4.1 Adjacent Project Components

Feature 5 falls within 120 m of Turbine 43 and its associated access road and underground collector line.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
T43 - base	44	44
T43 - blade tip	1	1
access road	73	49

*minimum distances represented in the above table

6.1.4.2 Mitigation and Net Effects

Potential effects to the wetland and significant woodland are outlined in **Section 6.1.2.** Construction is planned within the 120 m zone of influence of the wetland. A minimum 44 m setback is planned between the wetland edge and any physical structure (turbine foundation) on the ground (excluding the turbine blade airspace). The blade tips are located a minimum of 1 m from the edge of the feature (See **Figure I-2, Appendix I**). Given the limited footprint of the

turbine foundation, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

No power cable trenches are proposed within 30 m of the wetland, and the turbine foundation is at least 44 m from the wetland. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area per Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the potential disturbance of natural vegetation.
- All equipment refueling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the woodland and wetland habitat therefore there will be no direct loss or fragmentation of woodland or wetland or the functions for which it was identified.

The mitigation strategy to protect the significant woodland and wetland will include:

- With the exception of a few trees within sparse hedgerow along the access road (outside of Feature 5), no vegetation clearing is proposed. Tree clearing will be performed in accordance with the mitigation measures described in Section 6.1.3.1.
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible,

the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Post construction monitoring for mortality and disturbance.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency of these activities.

6.1.5 Natural Feature 7

Feature 7 is a 117.6 ha woodland located west of Reeds Road, between Irish Line and Highway 3 (**Figure 13-2, Appendix A**) and comprised of upland sugar maple-dominated forest, swamp maple, red maple and green ash deciduous swamps and silky dogwood thicket swamp communities. There are two watercourses mapped within it. The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, and community diversity. It has been identified as containing two wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of deer yard and habitat for area-sensitive forest and declining woodland bird species. Two distinct headwater palustrine swamp communities were identified on soils with high clay content and intermittent inflow. The wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.5.1 Adjacent Project Components

Feature 7 falls within 120 m of Turbines 34, 41 and 45 and their associated access road and underground collector line. The overhead collection system is adjacent to Feature 7 along Kohler Road and Irish Line.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Deer Yard) (m)	Approximate Distance to SWH (AS Species) (m)	Approximate Distance to SWH (Declining Sp) (m)
T34 - base	107	107	107	107	107
T34 - blade tip	65	65	65	65	65
T41 - base	87	87	87	87	87
T41 - blade tip	44	44	44	44	44
T45 - base	56	56	56	56	56
T45 - blade tip	13	13	13	13	13
access road (T34/T45/T41)	10	10	10	10	10

*minimum distances represented in the above table

6.1.5.2 Mitigation and Net Effects

Potential effects to the wetland, significant woodland and habitat for area-sensitive forest and declining bird species are outlined in **Section 6.1.2**. Construction is planned within the 120 m zone of influence of the wetland. The minimum setback between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace) is 56 m (Turbine 45), while the access road comes within 10 m of the dripline of the adjacent woodland / wetland feature. Construction of the access road will not encroach within this 10 m setback area, which will be demarcated in the field and protected with appropriate erosion and sediment controls. Given the limited footprint of the turbine foundations, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland (between Turbine 34 and 43) will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

The turbine foundations are at least 56 m from the wetland. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area per Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the woodland, wetland and significant wildlife habitat therefore there will be no direct loss or fragmentation of woodland, wetland or the habitat functions for which it was identified.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for area-sensitive woodland birds, declining woodland bird species and wintering deer. Potential disturbance effects to breeding birds and deer can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary and, where feasible, will take place outside the sensitive periods for woodland birds (May – mid-July) and wintering deer (January-February). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the wind plant is operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

The mitigation strategy to protect the significant woodland, wetland and significant wildlife habitat will include:

- With the exception of a few trees within sparse hedgerow along the access road (outside of Feature 7), no vegetation clearing is proposed. Tree clearing will be performed in accordance with the mitigation measures described in Section 6.1.3.1.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- Post construction monitoring for mortality and disturbance.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30 km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency of these activities.

6.1.6 Natural Feature 8

Feature 8 is a 193.5 ha woodland located west of Reeds Road and north of Highway 3 (**Figure 13-1, Appendix A**) and comprised of rolling upland shagbark and sugar maple-dominated deciduous forest with low areas supporting buttonbush thicket swamp, a provincially rare vegetation community. This feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, and community diversity. It has been identified as containing six wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding ponds and a rare vegetation community. Six small distinct headwater palustrine wetland communities (5 swamps and 1 marsh) were identified on soils with high clay content and intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

This Feature extends to the north of the Project Location into the adjacent Taquanyah Conservation Area, which includes a large wetland restoration project adjacent to Mill Creek that was created when the former dam structure was removed by the GRCA. This restoration area is located approximately 450 northwest of the project components. As well, aggregate activities occur adjacent to the west side of this Feature, approximately 2 km west of the adjacent project components.

6.1.6.1 Adjacent Project Components

Feature 8 falls within 120 m of Turbines 33 and 36 and their associated access road and underground collector line.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Rare Vegetation Community (m)	Approximate Distance to Significant Amphib Pools (m)
T33 - base	84	99	102	>120
T33 - blade tip	41	56	59	>120
access road (T33)	4	43	38	>120
T36 - base	77	89	>120	>120
T36 - blade tip	34	46	102	>120
access road (T36)	5	5	36	47

*minimum distances represented in the above table

6.1.6.2 Mitigation and Net Effects

Potential effects to the wetland, significant woodland and amphibian woodland breeding ponds are outlined in **Section 6.1.2**. With respect to the rare vegetation community (SWT2-4 Buttonbush Mineral Thicket Swamp), potential impacts include direct disturbance during construction through encroachment or indirect impacts resulting from siltation, dust or changes in hydrology. Buttonbush has a coefficient of conservatism of 7, which indicates a high sensitivity to disturbance. However, the setback proposed between the project components and the swamp thicket is sufficient to mitigate potential indirect impacts on this community.

Construction is planned within the 120 m zone of influence of the wetland. The access road to Turbine 36 is located within 5 m of a wetland, where it crosses a farm field between the large contiguous woodland / wetland community and an isolated open aquatic community within soy field. A naturally vegetated buffer will be established along this access road to minimize impacts of construction. A wildlife culvert will be installed between these two communities to provide a wildlife passage beneath the access road (in accordance with the standards outlined in Section 6.1.3.4) (**Figure I-1, Appendix I**). This access road will be demarcated in the field and protected with appropriate erosion and sediment controls.

The access road to Turbine 33 will maintain a 43 m setback from the adjacent wetland community, which is the buttonbush swamp. There are no overland flows routes that will be disrupted by the construction of the access road.

With respect to the turbines, a minimum 89 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). The blades will be a minimum of 46 m from the adjacent wetland. Given the limited footprint of the turbine foundations, provision of equalization culverts (where required), the proposed separation from the adjacent wetland communities and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.
- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.
- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

Only the access road is proposed within 120 m of the amphibian woodland breeding pools. The turbines will be more than 120 m from the nearest woodland amphibian breeding pool. No impacts on amphibian breeding are anticipated. During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited amphibian mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. To mitigate impacts during construction, a wildlife culvert will be installed beneath the access road to Turbine 36 and fencing will be installed along the access road where is passes between the woodland and open aquatic community to allow movement beneath the proposed access road.

All components of the Wind Project are sited outside of the woodland habitat Feature 8 therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

The mitigation strategy to protect the significant woodland, wetlands and significant wildlife habitat will include:

- No vegetation clearing is proposed. A natural vegetated buffer will be established as described in Section 6.1.3.5 and as identified on **Figure I-1** (**Appendix I**).
- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- Post construction monitoring for mortality and disturbance

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency of these activities.

6.1.7 Natural Feature 9

Feature 9 is a 72.1 ha woodland located east of Feature 7, and west of Reeds Road, between Irish Line and Highway 3 (**Figure 13-1, Appendix A**). Aerial photography interpretation indicates the feature is comprised of upland forest and thicket swamp. The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, and community diversity. It has been identified as containing three wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of deer yard and habitat for area-sensitive forest species. Three distinct headwater palustrine swamp communities were identified on soils with high clay content and intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.7.1 Adjacent Project Components

Feature 9 falls within 120 m of Turbine 36 and its associated access road and underground collector line. The overhead collection system is adjacent to Feature 7 along Kohler Road and Irish Line.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
T36 - base	115	>120
T36 - blade tip	72	97
access road (T36)	>120	>120

*minimum distances represented in the above table

6.1.7.2 Mitigation and Net Effects

Potential effects to the wetland and significant woodland are outlined in **Section 6.1.2.** The turbine blade tip is located within 97 m and 72 m of the wetland and woodland, respectively, while the turbine foundation will be located a minimum of 115 m from the adjacent woodland and more than 120 m from the wetland. The access road is not located within 120 m of this feature. Given the limited footprint of the turbine foundations, the proposed separation from the adjacent wetland communities and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

The mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- No vegetation clearing is proposed;
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency of these activities.

6.1.8 Natural Feature 10

Feature 10 is a 20.9 ha woodland located on the south side of Haldimand Road 20 and north of Concession 6 (**Figure 13-4, Appendix A**) and comprised of sugar maple and shagbark hickory-dominated forests. The feature has been identified as a significant woodland based on woodland size and shape, proximity to a water feature, and community diversity. It has been identified as containing a wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding ponds and habitat for declining forest species. One headwater palustrine swamp community occurs adjacent to Haldimand Road 20 on soils with high clay content and intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.8.1 Adjacent Project Components

Feature 10 falls within 120 m of Turbine 58 and its associated access road and underground collector line.

Project Component	Approximate Distance to Woodland (m)	Approximate Distance to SWH (Declining Sp) (m)
T58 - base	57	57
T58 - blade tip	14	14
access road (T58)	111	111

*minimum distances represented in the above table

6.1.8.2 Mitigation and Net Effects

Potential effects to the significant woodland and associated habitat for declining forest bird species are outlined in **Section 6.1.2**.

All components of the Wind Project are sited outside of the woodland habitat Feature 10 therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified. Construction is planned within 120 m of the woodland, and associated declining woodland bird habitat, with a minimum distance between the woodland and any physical structure on the ground (excluding the turbine blade airspace) no less than 57 m.

Some vegetation removal will occur within the hedgerow that extends south from Feature 10 to accommodate construction of the access road. Mitigation of potential impacts associated with the removal of trees within this hedgerow will be implemented in accordance with Section 6.1.3.1.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for declining forest species. Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary, and is anticipated to take place outside the sensitive periods for territorial birds (May – mid-July).

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours. Appropriate protection and mitigation measures will be undertaken in this area per Section 6.1.3 and the following mitigation measures will be implemented:

- With the exception of a few trees where the proposed access road will cross the hedgerow located between Feature 10 and 90, no vegetation clearing is proposed. The hedgerow will be maintained with the access road proposed along its west side. Tree clearing will be performed in accordance with the mitigation measures described in Section 6.1.3.1.

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- Post construction monitoring for mortality and disturbance.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency of these activities.

6.1.9 Natural Feature 14

Feature 14 is a 14.4 ha woodland located on south of Irish Line and east of Little Road (**Figure 13-3**, **Appendix A**) and comprised of shagbark hickory-dominated forest. A watercourse is mapped in the northeast corner. The feature has been identified as a significant woodland based on woodland size and shape, connectivity and proximity to a water feature. It has been identified as containing a wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of habitat for declining forest species. One headwater palustrine swamp community occurs on soils with high clay content and intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge. Adjacent Project Components

Feature 14 falls within 120 m of the blade tips of Turbine 46.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Declining Species) (m)
T46 - base	>120	>120	>120
T46 - blade tip	>120	>120	>120

*minimum distances represented in the above table

6.1.9.1 Mitigation and Net Effects

Potential effects to the significant woodland and associated habitat for declining species are outlined in **Section 6.1.2.** All components of the Wind Project are sited outside of the significant woodland, wetland and habitat feature. Only the mapped Constructible Area around Turbine 46 is located within 120 m of the significant woodland and associated declining woodland bird habitat. Therefore, there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

Given the limited footprint of the turbine foundations and proposed separation from the adjacent woodland and wetland communities, no direct or indirect impacts are anticipated on the woodland, wetland or associated breeding bird populations. Similarly, no impacts on hydrologic conditions supporting the adjacent wetland are anticipated.

No project components are planned within the 120 m zone of influence of the significant wildlife habitat for declining woodland bird species. Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary and, where feasible, will take place outside the sensitive periods for woodland birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the wind farm is operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

To ensure impacts are minimized, the mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- No vegetation clearing is proposed.
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency of these activities.

6.1.10 Natural Feature 15

Feature 15 is a 12.7 ha woodland located on south of Irish Line and west of Kohler Road (**Figure 13.3, Appendix A**). The portions of the feature adjacent to the project were dominated by two types of deciduous forest; sugar maple dominated with basswood and red oak, and a section of red oak co-dominating with shagbark hickory. Along the northern edge of this feature a watercourse meanders through an open meadow marsh. The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature and community diversity. It has been identified as containing two wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of deer yard and amphibian woodland breeding ponds. Two mid-reach palustrine swamp communities occur on soils with high clay content with intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.10.1 Adjacent Project Components

Feature 15 falls within 120 m of Turbine 28 and the access road and underground collector line associated with Turbine 23.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Amphib Pools) (m)
T28 - base	66	68	>120
T28 - blade tip	24	26	>120
access road (T23)	62	62	89

*minimum distances represented in the above table

6.1.10.2 Mitigation and Net Effects

Potential effects to the wetland, significant woodland and amphibian woodland breeding ponds are outlined in **Section 6.1.2.** Construction is planned within the 120 m zone of influence of the wetland. A minimum 68 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). The access road is located a minimum of 62 m from the adjacent wetland and woodland. Given the limited footprint of the turbine foundation, provision of equalization culverts (where required along access to Turbine 23), and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

No power cable trenches are proposed within 30 m of the wetland, and the turbine foundation is at least 68 m from the wetland. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.
- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.
- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

Project components are planned within the 120 m zone of influence of the amphibian woodland breeding pools. However, given that a minimum setback of 89 m has been maintained from these ponds, impacts are not anticipated on these features. Potential effects are further described in Section 6.1.2.3. No wildlife culverts are proposed sine the proposed access road to Turbine 23 does not cross between two natural features (e.g. agricultural fields to the west for at least 850 m.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

All components of the Wind Project are sited outside of the significant woodland at Feature 15, therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

Appropriate protection and mitigation measures will be undertaken in this area per Section 6.1.3 and the following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.
- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency of these activities.

6.1.11 Natural Feature 19

Feature 19 is a 96.7 ha woodland located south of the intersection of Haldimand Road 20 and Concession 6 (**Figure 13-4, Appendix A**). The portions of this feature that were adjacent to project components were comprised mainly of deciduous forest and swamp communities. Forested portions were dominated by shagbark hickory; poplars; sugar maple with hickory and American beech associates; or sugar maple with white ash. The swamp areas were treed (silver maple or green ash) or dominated by gray dogwood shrubs. A small area of meadow marsh and one area of open water were also observed. The feature has been identified as a significant woodland based on woodland size and shape, proximity to a water feature and community diversity. It has been identified as containing three wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding ponds and habitat for area-sensitive and declining bird species.

Three mid-reach palustrine swamp communities occur west of Haldimand Road 20 (north and south of Concession 6) on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.11.1 Adjacent Project Components

Feature 19 falls within 120 m of Turbines 20 and 24 and their associated access roads and underground collector lines.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (AS Species) (m)	Approximate Distance to Significant Habitat for Woodland Declining Species (m)
T20 - base	43	>120	43	43
T20 - blade tip	<1	>120	<1	<1
T24 - base	47	48	47	47
T24 - blade tip	4	5	4	4
access road (T24)	5	11	5	5

*minimum distances represented in the above table

6.1.11.2 Mitigation and Net Effects

Potential effects to the wetland, significant woodland, amphibian woodland breeding ponds and habitat for and habitat for area-sensitive and declining bird species are outlined in **Section 6.1.2.**

Construction is planned within the 120 m zone of influence of the wetland. A minimum 48 m setback is planned between the wetland edge and any physical structure on the ground (e.g. turbine foundation) (excluding the turbine blade airspace). The turbine has been sited to maximize setbacks from the adjacent wetland and woodland feature, with woodland occurring on both the west and east side of the turbine. The location of the turbine avoids blade overhang of the adjacent woodlands and wetland to the west, with a minimum setback of 47 m and 48 m from the nearest woodland and wetland, respectively.

A minimum setback during construction will be maintain from the wetland (10 m) and woodland (5 m) to avoid encroachment and minimize edge affects. This differs from the typical turbine installation plan provided in **Appendix K** due to the limited space available within the open agricultural field. As such, the following additional measures are proposed to prevent encroachment and minimize potential impacts on the adjacent natural features:

- The boundary of the adjacent wetland swill be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- The entire access road and turbine installation area will be surrounded with silt fence to demarcate the work area and minimize offsite transfer of sediment;
- The area between the access road and the woodland to the east will be naturalized with native grassland species and will be maintained as a natural buffer, while the area to the west will be maintained as an agriculture field (**Figure I-4, Appendix I**);

- Areas between the turbine installation area and Natural Feature 19 will be seeded prior to construction to encourage the establishment of a natural buffer during construction

- An alternate turbine installation plan is required for the assembly and erection of Turbine 24 that maintains the setbacks (described above). Due to area constraints, the configuration of the installation area will differ from the 'typical' plan. In this regard, the constructible area has been amended to accommodate this reconfiguration while maintaining setbacks from the adjacent wetland and woodland feature (**Figure 13.4**). Further details to confirm the installation plan will be prepared as part of detailed design.

The access road is proposed to cross an existing swale (currently farmed) that crosses the north end of the agricultural field, where flows are conveyed east to west from Natural Feature 20 to the wetlands and watercourses associated with Feature 19. To maintain flows to the downstream wetland and to prevent flooding upstream of the access, a culvert will be installed where the access road crosses the existing swale (**Figure13.4, Appendix A; Figure I-4, Appendix I; Appendix J**). This swale will be seeded and erosion control measures (i.e. rip rap) will be installed at the end of the culvert to minimize erosion and to encourage the establishment of natural vegetation across the field. No other impacts on hydrology are anticipated as a result of this project component.

The swale located nearest Turbine 24, which conveys runoff between the 2 lobes of Feature 19, is located within the turbine installation area. This area is level and free of obstacles so no clearing / disturbance to existing soil is anticipated. During construction, this swale will be realigned around the work area to avoid flooding while maintaining downstream flows. The realigned swale will be seeded and appropriate erosion and sediment controls installed to minimize erosion potential. These measures will be temporary during construction, following which it is anticipated that the area beneath the turbine will be returned to agricultural production. No other impacts on hydrology are anticipated as a result of this project component.

Given the limited footprint of the turbine foundation, the above-grade construction of all portions of the access road within 30 m with provisions for equalization culverts to ensure no ponding or disruption of surface water flow, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected

to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.
- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.
- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.
- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the significant woodland, and therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for area-sensitive and declining woodland bird species. The turbine will be located within an open field surrounded by woodland that is considered significant habitat for area sensitive bird species, however, no reduction of interior forest habitat will occur as a result of the placement of Turbine 24. As identified in Section 6.1.3.4, potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary, and is anticipated to take place outside the sensitive periods for territorial birds (May – mid-July). As such, potential disturbance to these species during construction will be avoided.

When the wind plant is operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

The mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- No vegetation clearing is proposed.
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- Any construction activity required during the breeding bird season will be conducted in accordance with the mitigation measures outlined in Section 6.1.3.4.
- Post construction monitoring for mortality and disturbance.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.
- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency of these activities.

6.1.12 Natural Feature 20

Feature 20 is a 6.2 ha woodland located north of the intersection of Haldimand Road 20 and Kohler Road (**Figure 13-4, Appendix A**). This small feature was comprised of a deciduous forest that was bisected by a small, linear, meadow marsh. The forested portion was dominated by shagbark hickory with green ash and bur oak, and a dense American beech understory. The feature has been identified as a significant woodland based on woodland shape and proximity to a water feature. It has been identified as containing a wetland (assumed significant for the purposes of this Project). This mid-reach palustrine marsh community occurs east of Haldimand Road 20 (upstream from Feature 19) on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.12.1 Adjacent Project Components

Feature 20 falls within 120 m of the blade tips of Turbine 24 and its associated access roads and underground collector lines. Of note, the woodland associated with Feature 19, as well as Haldimand Road 20, are located between Natural Feature 20 and the adjacent project components.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
T24 - base	>120	>120
T24 - blade tip	113	119
access road (T24)	62	11

*minimum distances represented in the above table

6.1.12.2 Mitigation and Net Effects

Potential effects to the wetland and significant woodland are outlined in **Section 6.1.2.** Construction is planned within the 120 m zone of influence of the wetland. While the blade tips of Turbine 24 are located within 120 m of the woodland and wetland, no impacts are anticipated on this feature. The woodland community associated with Feature 20 will acts as a buffer for any impacts associate with the construction or operation of the turbine.

No power cable trenches are proposed within 30 m of the wetland, and the turbine foundation is at least 162 m from the wetland. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.
- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.
- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the significant woodland at Feature 20, therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified. The access road entrance to Haldimand Road 20 (south side) is located within 120 m of Feature 20. As such, potential impacts associated with construction (e.g. turning vehicles, may be anticipated but to no greater degree than current traffic volumes along Haldimand Road 20.To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.
- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will

be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.13 Natural Feature 22

Feature 22 is a 32.0 ha woodland located on south of Irish Line and west of Kohler Road (**Figure 13-5, Appendix A**). This feature consisted of forest communities, dominated by sugar maple with American beech; red oak with bitternut and shagbark hickory; sugar maple with red oak; or shagbark hickory. An area of cultural meadow was also present at the south edge. The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, community diversity and uncommon characteristics (the presence of a Monarch, a federal and provincial species of Special Concern). It also supports significant wildlife habitat in the form of amphibian woodland breeding ponds and habitat for area-sensitive and declining forest bird species.

6.1.13.1 Adjacent Project Components

Feature 22 falls within 120 m of Turbines 16 and 48 and their associated access roads. The access road and underground collector line associated with Turbine 16 cuts across the southernmost projection of Feature 22 along an existing farm laneway (**Figure 13-5, Appendix A; Figure I-5**, **Appendix I**).

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Rare Vegetation Community (m)	Approximate Distance to Significant Amphib Pools (m)	Approximate Distance to Significant AS Woodland Habitat (m)	Approximate Distance to Significant Habitat for Woodland Declining Species(m)
T48 - base	109	109	>120	109	109
T48 - blade tip	66	66	107	66	66
access road (T48)	100	>120	115	100	100
T16 - base	95	>120	>120	86	43
T16 - blade tip	52	>120	>120	52	52
access road (T22)	0	>120	>120	0	0

*minimum distances represented in the above table

"0" indicates that the project component crosses through the natural feature (along an existing farm road)

6.1.13.2 Potential Effects

An existing access road through the woodland will be used to gain access during construction and operation of Turbine 16. A site visit was conducted by representatives of Samsung and Stantec on December 3, 2010 to measure the width of the existing laneway and to characterize the adjacent vegetation, in order to supplement previous site investigations. The access through the woodland is approximately 61 m long (as measured through GIS) and approximately 5 m wide (field measurement) at its narrowest part. Construction of the 7-m wide road profile (5 m road with 1 m on either side for clearance) at this location requires selective vegetation clearing (tree trimming) within 1 m on either side of the existing laneway, resulting in the loss of four or five young sugar maple trees (**Photo Sheet 1**, **Appendix J**).

Alteration or removal of vegetation for construction of the access road could have the potential to affect both flora and fauna through loss of species diversity, by reducing or fragmenting available habitat (especially for species with low mobility), from the introduction or spread of invasive species, and from the temporary disruption to movement of wildlife. However, in this case, vegetation removal will be limited to only a select few young trees (sugar maples) located close to the existing access road. Other potential effects of disturbance are summarized in **Section 6.1.2**.

6.1.13.3 Mitigation and Net Effects

The Project layout has minimized disturbance to the woodland and has minimized the length of access road and underground collector line crossing the woodland feature by using the existing farm access. The feature is already disturbed in this location, and the small amount of vegetation clearing (tree trimming) is not expected to introduce new invasive species or form a barrier to wildlife movement. No rare vegetation will be removed.

The selective clearing along the existing road will not fragment the woodland or associated habitat provided for area-sensitive and declining forest bird species. As observed at other existing crossings in the Study Area, the canopy will be mostly or entirely closed over a road of this width. In accordance with *Natural Heritage Reference Manual* (MNR, 2010) woodlands should only be considered separate units if a bisecting opening is 20 m or more exists between crown edges.

Clearing activities during construction will result in the removal of vascular plants along the edge of the existing farm access road, as well as four or five young sugar maples, over a very small area. Results of the site investigation found that plant species in this part of the feature were locally and provincially common. No rare species of vegetation are to be removed as part of the Project.

The access road is proposed to cross several existing swales (currently farmed - soy), where flows are conveyed in a general southwest to northeast direction. To maintain flows and to prevent flooding upstream of the access, several equalization culverts will be installed where the access road crosses the existing swale (**Figure13.5 and Appendix J**). Erosion control measures (i.e. rip rap) will be installed at the end of each culvert to minimize erosion.

The swale located nearest Turbine 16, which conveys runoff between the 2 lobes of Feature 22, is located within the turbine installation area. The turbine and its foundation are not located within this overland drainage feature. During construction, this swale will be realigned around the work area to avoid flooding while maintain downstream flows. The realigned swale will be seeded and appropriate erosion and sediment controls installed to minimize erosion potential. These measures will be temporary during construction, following which it is anticipated that the area beneath the turbine will be returned to agricultural production. No other impacts on hydrology are anticipated as a result of this project component.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for area-sensitive woodland birds and declining woodland bird species. Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary and, where feasible, will take place outside the sensitive periods for woodland birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the wind plant is operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

There will be no direct loss of amphibian breeding habitat or habitat function. Project components are planned within between 107 m (turbine blade tip) and 115 m (access road, turbine base) of the amphibian woodland breeding pools. .

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. Amphibians are at increased risk from vehicle collisions in spring.

During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

The mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- With the exception of the removal of a few trees to widen the existing access through Feature 22, no vegetation clearing is proposed. Vegetation clearing along the access road through Feature 22 will be performed in accordance with the mitigation measures described in Section 6.1.3.1.

- Any construction activity required during the breeding bird season will be conducted in accordance with the mitigation measures outlined in Section 6.1.3.4.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Post construction monitoring for mortality and disturbance.
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- All equipment refueling will occur well away from the amphibian habitat. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.14 Natural Feature 28

Feature 28 is a 9.9 ha woodland located northeast of the intersection of Kohler Road and Concession 4 (**Figure 13-6, Appendix A**). This feature is primarily forested, but contains a small opening along the western edge that is evident from the aerial photo. The forested portion was dominated by shagbark hickory with bur oak, green ash, and regenerating sugar maple. The feature has been identified as a significant woodland based on woodland size and shape, and proximity to a water feature.

6.1.14.1 Adjacent Project Components

Feature 28 falls within 120 m of Turbine 10 and its associated access roads and underground collector lines.

Project Component	Approximate Distance to Significant Woodland (m)
T10 - base	95
T10 - blade tip	52
access road (T20)	56

*minimum distances represented in the above table

6.1.14.2 Mitigation and Net Effects

Potential effects to the significant woodland are outlined in **Section 6.1.2.** All components of the Wind Project are sited outside of the significant woodland at Feature 28, therefore, there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

The access road is proposed to cross an existing swale through an active farm field (soy), where flows are conveyed in a general southwest to northeast direction. The western side of the access road will include ditching to convey surface runoff to a proposed equalization culvert that will be installed where the access road crosses the existing swale (**Figure13.5 and Appendix J**). This culvert will maintain flows and prevent flooding upstream of the access. Erosion control measures (i.e. rip rap) will be installed at the end of each culvert to minimize erosion. The ditch along the access road will be seeded with native grassland species to stabilize soils and minimize erosion potential.

A grassed swale located beneath the blade sweep of Turbine 10, which conveys runoff across the farm field from Feature 28, is located within the turbine installation area. During construction, this swale will be realigned around the work area to avoid flooding while maintaining downstream flows. The realigned swale will be seeded and appropriate erosion and sediment controls installed to minimize erosion potential. These measures will remain in place following construction to reflect current field conditions. No other impacts on hydrology are anticipated as a result of this project component.

The mitigation strategy to protect the significant woodland will include:

- No vegetation clearing is required.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.
- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.15 Natural Feature 31

Feature 31 is a 57.2 ha woodland located along the east side of Wilson Road 20 and extends across Sutor Road to the east (**Figure 14.1**). It consists of a diversity of habitat consisting primarily of deciduous forest and swamp communities, with areas of meadow marsh within the feature and cultural meadow present at the edge. Forested areas were dominated by American beech, sugar maple, red oak and shagbark hickory. Swamp communities were dominated by swamp maple with green ash or shagbark with red maple. Small vernal pools were rare within the feature and two dug ponds were observed, one located within a meadow marsh at the southern edge of the community. This woodland is considered significant deer wintering habitat.

Interior forest habitat is present within this feature, although no rare species or rare community types were present. Ovenbird and Veery, both areas sensitive species, were observed in this feature, along with six PIF species. Two sensitive species (CC=9) were also identified.

A total wetland area of approximately 24.5 ha in size was identified, with three headwater palustrine swamp communities identified on soils with high clay content and evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.15.1 Adjacent Project Components

Feature 31 falls within 120 m of Turbines 56 and their associated access roads and underground collector lines.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to SWH (Deer Yard) (m)	Approximate Distance to SWH (AS Species) (m)	Approximate Distance to SWH (Declining Sp) (m)
T56-base	104	104	104	104
T56-blade tip	61	61	61	61
access road (T25)	16	16	16	16

*minimum distances represented in the above table

6.1.15.2 Mitigation and Net Effects

Potential effects to the, significant woodland, amphibian woodland breeding ponds and habitat for area-sensitive and declining forest bird species are outlined in **Section 6.1.2.**

All components of the Wind Project are sited outside of the significant woodland at Feature 31; therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified. Construction is planned within 120 m of the woodland and associated area sensitive and declining woodland bird habitat, as well as deer wintering area with a minimum distance between the woodland and any physical structure on the ground (excluding the turbine blade airspace) no less than 104 m. Given the limited footprint of the turbine foundation, separation from Feature 31 and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

The access road to Turbine 25 is located within 16 m of the woodland community, where it crosses a hedgerow that connects Feature 31 and 32. This hedgerow is identified as an animal movement corridor. Some vegetation removal will occur within this hedgerow to accommodate construction of the access road. Mitigation of potential impacts associated with the removal of trees within this hedgerow will be implemented in accordance with Section 6.1.3.1. A wildlife culvert will be installed between these two communities to provide a wildlife passage beneath the access road (in accordance with the standards outlined in Section 6.1.3.4) (**Figure I-9**, **Appendix I**). This access road will be demarcated in the field and protected with appropriate erosion and sediment controls.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for area-sensitive woodland birds, declining woodland bird species and wintering deer. Potential disturbance effects to breeding birds and deer can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary and, where feasible, will take place outside the sensitive periods for woodland birds (May – mid-July) and wintering deer (January-February). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

To ensure impacts are minimized, the mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- With the exception of where the proposed access road will cross the two hedgerows located between Feature 31 and 32, no vegetation clearing is proposed. Tree clearing will be performed in accordance with the mitigation measures described in Section 6.1.3.1.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- Post construction monitoring for mortality and disturbance.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.16 Natural Feature 32

Feature 32 is a 108.4 ha woodland located south of Meadows Road, east of Yaremy Road (**Figure 13-7, Appendix A**). This large feature consisted of forest communities with thicket swamps throughout. The forested areas observed were dominated by sugar maple with American beech; sugar maple with red oak; red oak with shagbark hickory; sugar maple with red oak and American beech; or sugar maple with white ash. The swamp thickets were dominated by buttonbush (a provincially rare vegetation community), or winterberry with buttonbush associates. A single, small area of cattail marsh was present at the far eastern edge of the feature. The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, community diversity and uncommon characteristics (PSW, several plant species with high coefficients of conservatism). This feature also supports significant wildlife habitat in the form of deer yard, amphibian woodland breeding ponds and habitat for area-sensitive and declining forest bird species.

Five mid-reach palustrine swamp communities occur on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge. These wetlands are contiguous with the Fradenburg Tract Provincially Significant Wetland.

6.1.16.1 Adjacent Project Components

Feature 32 falls within 120 m of Turbines 25 and 56 and their associated access roads and underground collector lines, as well as the access road and underground collector line for Turbines 29 and 42.

Project Component	Approx Distance to Significant Woodland (m)	Approx Distance to Wetland (m)	Approx Distance to SWH (Deer Yard) (m)	Approx Distance to Rare Vegetation Community (m)	Approx Distance to SWH (Amphib Pools) (m)	Approx Distance to SWH (AS Species) (m)	Approx Distance to SWH (Declining Sp) (m)
T25 - base	44	53	44	>120	>120	43	>120
T25 - blade tip	1	10	1	>120	112	<1	>120
access road (T25)	5	92	92	>120	85	5	32
T56 - base	47	>120	47	>120	>120	47	96
T56 - blade tip	4	>120	4	>120	>120	4	53
access road (T56)	5	5	5	5	>120	5	>120
access road (T29)	5	5	5	38	>120	5	5

*minimum distances represented in the above table

6.1.16.2 Mitigation and Net Effects

Potential effects to the wetland, significant woodland, amphibian woodland breeding ponds and habitat for area-sensitive and declining forest bird species are outlined in **Section 6.1.2.**

Construction is planned within the 120 m zone of influence of the wetland. With respect to the turbines, a minimum 53 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). The blades will be a minimum of 10 m from the adjacent wetland (Turbine 25). Given the limited footprint of the turbine foundations, provision of equalization culverts (where required), the proposed separation from the adjacent wetland communities and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

The access road to Turbine 56 and 25 (north end of the property) will follow an access road, which crosses between two wetland pockets. One of the wetlands is a rare vegetation community (SWT2-4 Buttonbush Swamp Thicket). Potential impacts include direct disturbance during construction through encroachment or indirect impacts resulting from siltation, dust or changes in hydrology. Buttonbush has a coefficient of conservatism of 7, which indicates a high sensitivity to disturbance.

A naturally vegetated buffer will be established along this access road to minimize impacts of construction on adjacent vegetation and vegetation communities. A wildlife culvert will be installed between these two communities to provide a wildlife passage beneath the access road (in accordance with the standards outlined in Section 6.1.3.4) (**Figure I-8, Appendix I**). This access road will be demarcated in the field and protected with appropriate erosion and sediment controls.

Given the above-grade construction of all portions of the access road within 30 m with provisions for equalization culverts to ensure no ponding or disruption of surface water flow and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly

maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- The entire access road and turbine installation area will be surrounded with silt fence to demarcate the work area and minimize offsite transfer of sediment;

- The area between the access road and the woodland to the east will be naturalized with native grassland species and will be maintained as a natural buffer, while the area to the west will be maintained as an agriculture field (**Figure I-8**, **Appendix I**);

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for area-sensitive woodland birds, declining woodland bird species and wintering deer. Potential disturbance effects to breeding birds and deer can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary and, where feasible, will take place outside the sensitive periods for woodland birds (May – mid-July) and wintering deer (January-February). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season

or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

To ensure impacts are minimized, the mitigation strategy to protect the significant woodland, wetland and significant wildlife habitat will include:

- With the exception of where the proposed access road will cross the two hedgerows located between Feature 31 and 32, no vegetation clearing is proposed. Tree clearing will be performed in accordance with the mitigation measures described in Section 6.1.3.1.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- Post construction monitoring for mortality and disturbance.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.17 Natural Feature 33

Feature 33 is a 8.3 ha woodland located north of Haldimand Road 20, east of Yaremy Road (**Figure 13-7, Appendix A**). This feature consisted of forest communities with pockets of thicket swamp. The forested areas were dominated by sugar maple with red oak, while the thicket swamps were dominated by willow with gray and red-osier dogwood; or winterberry. A single area of cattail marsh was present at the southern edge. The feature has been identified as a significant woodland based on woodland shape, connectivity, proximity to a water feature, community diversity and uncommon characteristics (the presence of Monarch, a federal and provincial species of Special Concern). It has been identified as containing two wetlands (assumed significant for the purposes of this Project).

Two mid-reach palustrine swamp communities occur on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.17.1 Adjacent Project Components

Feature 33 falls within 120 m of Turbines 29 and 42 and their associated access roads and underground collector lines.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
T29 - base	120	120
T29 - blade tip	78	78
access road (T29)	28	27
T42 - base	76	84
T42 - blade tip	33	41

*minimum distances represented in the above table

6.1.17.2 Mitigation and Net Effects

Potential effects to the wetland and significant woodland are outlined in **Section 6.1.2.** Construction is planned within the 120 m zone of influence of the wetland.

With respect to the turbines, a minimum 84 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). The blades will be a minimum of 41 m from the adjacent wetland (Turbine 25). Given the limited footprint of

the turbine foundation, the above-grade construction of all portions of the access road within 30 m, the provision of equalization culverts (where required) and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

All components of the Wind Project are sited outside of the significant woodland at Feature 33, and therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

Appropriate protection and mitigation measures will be undertaken in this area per Section 6.1.3 and the following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.
- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.
- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.
- No vegetation clearing is proposed. A natural vegetated buffer will be established as described in Section 6.1.3.5 and as identified on **Figure I-10** (**Appendix I**).
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.18 Natural Feature 34

Feature 34 is a 78.2 ha woodland located north of Haldimand Road 20, west of Yaremy Road (**Figure 13-7, Appendix A**). In the vicinity of the project components, this forested feature contained a watercourse along the north edge, and sloped up from there toward the south. The forest was dominated by sugar maple with red oak. The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, community diversity and uncommon characteristics (Dunnville Grand River Alluvial Marshes PSW, and the presence of Snapping Turtle, a provincial species of special concern occurring downstream of the project location in the PSW, as identified by the landowner). It also supports significant wildlife habitat in the form of deer yard, habitat for area-sensitive and declining forest bird species, and habitat for a species of conservation concern (Snapping Turtle).

6.1.18.1 Adjacent Project Components

Feature 34 falls within 120 m of Turbines 22 and its associated access road and underground collector line (**Figure 13-7, Appendix A**).

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Significant AS Woodland Habitat (m)	Approximate Distance to Significant Habitat for Woodland Declining Species(m)	Approximate Distance to Snapping Turtle Habitat (m)
T22 - base	92	92	92	>120
T22 - blade tip	49	49	49	78
access road (T22)	83	83	83	106

*minimum distances represented in the above table

6.1.18.2 Mitigation and Net Effects

Potential effects to the significant woodland and associated area sensitive and declining woodland bird species habitat are outlined in **Section 6.1.2.**

With respect to the turbines, a minimum 92 m setback is planned between the woodland and any physical structure on the ground (excluding the turbine blade airspace). The blades will be a minimum of 49 m from the adjacent woodland (Turbine 22). Given the limited footprint of the turbine foundation, separation from the adjacent natural features and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for area-sensitive and declining woodland bird species. Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary and, where feasible, will take place outside the sensitive periods for woodland birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

Snapping Turtles have been identified within the watercourse that flows through Feature 34 south of the Turbine 22. A setback of 83 m (access road) will be maintained from the edge of the woodland within which this watercourse and associated habitat are located. In addition to this physical setback, the woodland vegetation adjacent to watercourse will provide a natural buffer for this habitat as well. The mitigation measures to restrict and deal with wildlife within the construction area outlined within Section 6.1.3,4 will be implemented. No direct impacts on Snapping Turtle habitat will occur.

To ensure impacts are minimized, the mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- With the exception of a few trees within the hedgerow along the access road (outside of Feature 7), no vegetation clearing is proposed. Tree clearing will be performed in accordance with the mitigation measures described in Section 6.1.3.1.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- Post construction monitoring for mortality and disturbance.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.19 Natural Feature 42

Feature 42 is a 216.5 ha woodland located west of Haldimand Road 50, extending from Haldimand Road 20 in the north, straddling Bains Road and Rainham Road to the south (**Figures 13-8** and **13-9, Appendix A**). This large feature is predominantly forested, divided between natural forested areas and plantations. The natural forests were dominated by beech; sugar maple and beech; sugar maple with other hardwoods such as shagbark hickory and red maple; shagbark hickory and red oak; or shagbark hickory with red and swamp maples and green ash. Four separate woodland communities were identified within this larger contiguous feature.

The northern portion of this feature, along Haldimand Road 20, consisted of a poplar plantation. The plantation north of and adjacent to Bains Road was very young and consisted primarily of planted white pine and spruce with some ashes. West of Sutor Road, a shagbark hickory deciduous forest with small swamp thickets and maple swamp pockets is present. A watercourse runs through the section south of Bains Road, which consists of the above mentioned forests as well as a large plantation of white pine and spruce (**Figure 13-9, Appendix A**).

Woodland 42a and 42b have been identified as significant woodlands based on woodland size and shape, proximity to a water feature, and community diversity. The feature has also been identified as containing four wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of, amphibian woodland breeding pools, habitat for declining woodland bird species (5 PIF species) and as a migratory bird stopover area (42b only).

Four mid-reach palustrine swamp communities and one mid-reach palustrine marsh community occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.19.1 Adjacent Project Components

Turbine 53 and its associated access road and underground collector line are proposed within the cultural plantation portion of woodland 42a. The feature is located within 120 m of Turbines 17, 27, 44, 52 and 55 and their associated access roads and underground collector lines. It is also adjacent to the roadside overhead collection system along Haldimand Road 20 and Bains Road.

Feature	Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (AS Species) (m)	Approximate Distance to SWH (Declining Sp) (m)	Approximate Distance to Significant Habitat for Migratory Birds (m)
42a	T27 - base	>120	>120	>120	>120	>120
	T27 - blade tip	>120	>120	>120	>120	>120
	T44 - base	160	>120	>120	>120	>120
	T44 - blade tip	118	>120	>120	118	>120
	access road (T44)	11	103	11	>120	>120
	T17 - base	43	51	>120	43	>120
	T17 - blade tip	1	8	>120	1	>120
	access road (T17)	2	35	2	>120	>120
	T52 - base	57	128	>120	57	>120
	T52 - blade tip	14	85	>120	14	>120
	access road (T52)	5	31	>120	5	>120
	T53 – base	43	54	>120	43	>120
	T53 - blade tip	0	11	>120	0	>120
	access road (T53)	1	12	1	>120	>120
42b	T55 - base	64	>120	>120	64	64
	T55 - blade tip	21	>120	>120	21	21
	access road	1	9	>120	>120	1
42c	Collector line	0	>120	>120	>120	>120

*minimum distances represented in the above table

“0” indicates that the project component occurs within the natural feature

6.1.19.2 Potential Effects

The construction of the project components, including the clearance of an area for construction, rotor assembly and laydown, will result in the loss of 1.72 ha. Trees within the vicinity of the turbine that will be impacted by construction include young white pine (S5) and Norway spruce (SE5), both of which are common in Ontario.

No direct loss of trees or woodland habitat is anticipated as a result of the installation of the underground collection line. The power cable trench will be installed between plantation rows and backfilled, allowing current land uses to continue above.

Alteration or removal of vegetation for construction of the access road could have the potential to affect both flora and fauna through loss of species diversity, by reducing or fragmenting available habitat (especially for species with low mobility), from the introduction or spread of invasive species, and from the temporary disruption to movement of wildlife.

Other potential effects of disturbance are summarized in **Section 6.1.2**.

6.1.19.3 Mitigation and Net Effects

The direct loss of habitat as a result of the access road crossing is negligible as it is a very small proportion of the woodland feature (<0.01%). Habitat beyond the 7 m wide final road profile will be re-vegetated as soon as conditions allow. The clearing required for the road will not fragment the woodland or the habitat provided for area-sensitive and declining forest bird species. At present, canopy cover is limited due to the young age of this plantation, which also functions as a nursery.

The turbine blades, at their lowest point above the ground (approximately 50 m) will be approximately twice the height of any mature trees in the woodland below. The canopy opening created for the wind turbine, once revegetated, will be less than 20 m across; however there will be disturbance effects to the birds inhabiting the woodland beneath the blades.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

Clearing activities during construction will result in the removal of vascular plants and portions of plant communities over an area of 0.471 ha for the road and turbine foundation, plus the temporary removal of an additional 0.490 ha for the crane pad. Additional land will be cleared temporarily to allow for the assembly of the rotor. Results of the site investigation found that the vegetation community was dominated by planted white spruce, white pine and ash; plant species in this part of the feature were locally and provincially common. No rare species were observed, nor are anticipated to occur, within this community (See Section 4.1.2). The crane pad and any laydown areas will be revegetated as soon as conditions allow.

This differs from the typical turbine installation plan provided in **Appendix K** as the installation will occur within the significant woodland (plantation). As such, the following additional measures are proposed to prevent encroachment and minimize potential impacts on the adjacent natural features:

- The boundary of all vegetation clearing will be flagged / staked in the field by a qualified ecologist prior to construction;

- The entire access road and turbine installation area will be surrounded with silt fence to demarcate the work area, minimize offsite transfer of sediment and prevent encroachment;

- An alternate turbine installation plan is required for the assembly and erection of Turbine 53 to maintain as much existing vegetation as possible and to avoid the adjacent woodland and wetland features. Due to area constraints, the configuration of the installation area will differ from the 'typical' plan (see **Figure I-8, Appendix I**). In this regard, the constructible area has been amended to accommodate this reconfiguration while maintaining setbacks from the adjacent wetland and woodland feature (**Figure 13.8**). Further details to confirm the installation plan will be prepared as part of detailed design.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for declining forest species. As observed during the point count surveys in 2010, PIF species known to occur within this feature, and there habitat requirements, are as follows:

- Rose-breasted Grosbeak: This common species breeds in deciduous forests, along forest edges and within second growth deciduous forests with relatively open canopy (Cadman et al., 2007).

- Baltimore Oriole: This species nests in woodland edges, wooded riparian areas, hedgerows with tall trees, open forest and urban parks, with the majority of nests in deciduous trees (elm, maple, poplar) (Cadman et al., 2007). The greatest abundance of this species in Ontario is in Kingston and throughout the Carolinian region (Cadman at al. 2007).

- Wood Thrush: This species is widely distributed in deciduous and mixed forests across southern Ontario, and prefers woodland habitats with large trees and a thick understorey (Cadman et al., 2007).

- Eastern Wood Peewee: In Ontario, this species typically breeds in deciduous and mixed forests (Cadman et al., 2007), with a preference for open areas near the nest provided by forest edges, clearings, roadways and water (Peck and James, 1987). This species feeds on flying insects, often returning to the same exposed perch in the canopy of deciduous forests (Cadman et al., 2007).

- Northern Flicker: This species nests in a variety of habitats, including deciduous, mixed and coniferous forests, individual or scattered trees in open agricultural land, residential areas, beaver ponds, marshes, burns and campgrounds (Sandilands, 2010). They prefer to nest in open areas and tend to avoid forest interior, and have a preference for deciduous and mixed forests over coniferous forests (Sandilands, 2010). Ideal areas include numerous snags and much dead wood adjacent to open, grassy or herbaceous sites.

The flicker feeds mostly on the ground and prefers open areas such as lawns, pastures, agricultural land, grassy meadow and recent clear cuts and burns, although is the most opportunistic and versatile woodpecker in terms of foraging habitat (Sandilands, 2010). Conversion of old fields to coniferous plantations has resulted in the loss of habitat for this species (Sandilands, 2010).

These species are all woodland breeding birds with a preference for deciduous and mixed forest communities. Coniferous plantations are not preferred habitat for these species. The habitat requirements for the PIF species known to occur within Woodland 42 are provided by the deciduous woodland north of the plantation, which will not be directly impacted by the Wind Project components. Removal of 1.74 ha of plantation habitat through the construction of Turbine 53 and its associated access road will not adversely impact these species. Since these species primarily utilize the deciduous forest communities, and given the sparse canopy cover within the plantation, the proposed access road and turbine will not fragment or create barriers to movement, within this habitat feature. It is proposed that additional trees species (specifically deciduous trees) will be planted within the coniferous plantation, which will encourage further long-term naturalization of the plantation area to habitat more suitable for these PIF species.

Potential disturbance effects to declining woodland breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary, and is anticipated to take place outside the sensitive periods for territorial birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species (PIF species) or disturbance/avoidance effects.

With respect to migratory birds, woodland 42b (south of Bains Road) is identified as a significant migratory bird stopover area. Potential disturbance effects on the use of this feature can also be minimized by avoiding sensitive migratory periods (spring and fall migration). Pre- and post-construction disturbance monitoring will be completed for this feature.

No project components are sited within wetlands. Construction is planned within the 120 m zone of influence of the wetlands. With respect to turbines, a minimum 51 m setback is planned between the wetland edge and the nearest physical structure (access road in the central portion of the feature) on the ground (excluding the turbine blade airspace). Access roads are proposed within a minimum of 11 m of a wetland. Construction of the access road will not encroach within this 11 m setback area, which will be demarcated in the field and protected with appropriate erosion and sediment controls.

Various access roads surrounding Feature 42 will cross existing swales (currently farmed or through the cultural plantation), where flows are conveyed to the wetland and woodland communities within the feature. To maintain flows to these wetlands and to prevent flooding upstream of the access road, culvert will be installed where the access road crosses existing

swales (**Figure13.8, Appendix A; Figure I-11, Appendix I; Appendix J**). These swales will be seeded and erosion control measures (i.e. rip rap) will be installed at the end of the culvert to minimize erosion and to encourage the establishment of natural vegetation across the field. No other impacts on hydrology are anticipated as a result of this project component.

A wildlife culvert will be installed beneath the access road to Turbine 53, within the cultural plantation, which will double as an equalization culvert. This culvert will provide a wildlife passage beneath the access road (in accordance with the standards outlined in Section 6.1.3.4) (**Figure I-11**, **Appendix I**). No impacts on amphibian breeding habitat in anticipated.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road and the installation of equalization culverts as required, no appreciable changes to surface water flow are anticipated.

No power cable trenches are proposed within 30 m of the wetland, and the turbine foundations are at least 54 m from the wetland. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- Clearing of vegetation is proposed within the cultural plantation associated with woodland 42a. No other vegetation clearing is proposed. Tree clearing will be performed in accordance with the mitigation measures described in Section 6.1.3.1.

- Additional tree planting to offset the impacts associated with the removal of 1.74 ha of existing cultural plantation will occur within the open areas of the plantation. A detailed planting plan outlining the species native to Ecoregion 7E and the local area will be prepared through detailed design and implemented following construction.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. Disturbed areas will be revegetated using species native to Ecoregion 7E that are native to the site and/or surrounding natural features.

- Post construction monitoring for mortality and disturbance.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.20 Natural Feature 47

Feature 47 is a 200.4 ha woodland located northeast of the intersection of Kohler Road and Concession 4 (**Figure 13-13, Appendix A**). The upland portion of this feature adjacent to the Project was dominated by sugar maple with white ash and American beech. A watercourse runs through the forested portion of this feature as well as through the agricultural field, buffered by a green ash swamp and a small dogwood swamp thicket. Two small pockets of reed canary grass meadow marsh exist in the feature as well as a linear maple swamp. The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature and community diversity. It has been identified as containing four wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of deer yard, amphibian woodland breeding ponds and habitat for area-sensitive forest bird species.

Four mid-reach palustrine swamp communities occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.20.1 Adjacent Project Components

Feature 47 falls within 120 m of Turbine 57 and their associated access roads and underground collector lines.

Feature	Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Deer Yard) (m)	Approximate Distance to AS Woodland (m)
47	T57 - base	43	43	43	43
	T57 - blade tip	1	1	1	1
	access road (T57)	5	5	5	5

*minimum distances represented in the above table

6.1.20.2 Mitigation and Net Effects

Potential effects to the wetland, significant woodland and significant wildlife habitat in the form of area-sensitive forest bird species and deer wintering are outlined in **Section 6.1.2.**

Construction is planned within the 120 m zone of influence of the wetland. With respect to the turbine, a minimum 43 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). The access road will be located

within 5 m (minimum) of the wetland, although the area between the access road and wetland area will be naturalized with native species of vegetation.

Given the limited footprint of the turbine foundation, the above-grade construction of all portions of the access road within 30 m, the provision of equalization culverts (where required) and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for area-sensitive woodland bird species. The turbine will be located within an open field outside the woodland boundary. As identified in Section 6.1.3.4, potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary, and is anticipated to take place outside the sensitive periods for territorial birds (May – mid-July. Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.
- No vegetation clearing is proposed.
- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- Post construction monitoring for mortality and disturbance.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.
- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.21 Natural Feature 49

Feature 49 is a 68.3 ha woodland located southeast of the intersection of Haldimand Road 20 and Aikens Road (**Figure 13-14, Appendix A**). This feature contained forest and treed swamp communities. Forests were dominated by sugar maple with either: red oak, white ash, American beech, or shagbark hickory. Swamp communities consisted of green ash with swamp maple; white elm; or swamp maple. A watercourse runs through the northern portion of this feature, surrounded by a white elm lowland forest. Also, small pockets of dogwood thicket swamp and willow swamp exist along Aikens Road. This feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, and community diversity. It has been identified as containing seven wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding ponds and habitat for area-sensitive forest bird species.

Seven headwater palustrine swamp communities occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.21.1 Adjacent Project Components

Feature 49 falls within 120 m of Turbines 15, 49 and 50 and their associated access roads and underground collector lines. It is also adjacent to the roadside overhead collection system along Aikens Road.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Significant AS Woodland Habitat (m)
T15 - base	50	68	50
T15 - blade tip	7	25	7
access road (T15)	121	32	121
T49 - base	64	68	>120
T49 - blade tip	22	25	>120
T50 - base	114	114	114
T50 - blade tip	71	71	71
access road (T49/T50)	5	5	5

*minimum distances represented in the above table

6.1.21.2 Mitigation and Net Effects

Potential effects to the wetland, significant woodland and significant wildlife habitat in the form of amphibian woodland breeding ponds and habitat for area-sensitive forest bird species are outlined in **Section 6.1.2**

Construction is planned within the 120 m zone of influence of the wetland. With respect to turbines, a minimum 68 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). The access road is located a minimum of 5 m from the adjacent wetland, where a small portion of the community extends into the agricultural field. For the majority of its length, the access road maintains an average 45 m setback (approximate) from the adjacent wetland and woodland feature. Equalization culverts will be installed beneath the access to convey flows, where required (**Figure 13.14, Appendix A**).

Given the above-grade construction of all portions of the access road within 30 m with provisions for equalization culverts to ensure no ponding or disruption of surface water flow and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.
- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.
- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.
- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the significant woodland at Feature 49, therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for area-sensitive woodland birds. Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary and, where feasible, will take place outside the sensitive periods for woodland birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

A wildlife culvert will be installed beneath the access road to Turbine 50, between the marsh (Feature 50) and swamp (Feature 49) communities, which will double as an equalization culvert. This culvert will provide a wildlife passage beneath the access road (in accordance with the standards outlined in Section 6.1.3.4) (**Figure 13.14**, **Appendix A**).

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.22 Natural Feature 50

Feature 50 is a 1.6 ha meadow marsh located northeast of the intersection of Aikens Road and Rainham Road (**Figure 13-14, Appendix A**). This small feature, located within an agricultural field, was dominated by a reed canary grass meadow marsh. It has been identified as containing a wetland (assumed significant for the purposes of this Project).

It consists of a headwater palustrine swamp community on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.22.1 Adjacent Project Components

Feature 50 falls within 120 m of Turbine 49 and a short stretch of the access road and underground collector line associated with Turbine 50.

Project Component	Approximate Distance to Wetland (m)
T49 - base	95
T49 - blade tip	52
access road	24

*minimum distances represented in the above table

6.1.22.2 Mitigation and Net Effects

Potential effects to the wetland are outlined in **Section 6.1.2.**

Construction is planned within the 120 m zone of influence of the wetland. With respect to turbines, a minimum 95 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). The access road is located a minimum of 24 m from the adjacent wetland. Equalization culverts will be installed beneath the access to convey flows, where required (**Figure 13.14, Appendix A**).

Given the above-grade construction of all portions of the access road within 30 m with provisions for equalization culverts to ensure no ponding or disruption of surface water flow and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

A wildlife culvert will be installed beneath the access road to Turbine 50, between the marsh (Feature 50) and swamp (Feature 49) communities, which will double as an equalization culvert. This culvert will provide a wildlife passage beneath the access road (in accordance with the standards outlined in Section 6.1.3.4) (**Figure 13.14**, **Appendix A**).

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.23 Natural Feature 51

Feature 51 is a 65.1 ha woodland located southeast of the intersection of Aikens Road and Haldimand Road 20 (**Figures 13-13** and **13-14, Appendix A**). This large treed feature is a mix of upland forests dominated by sugar maple with various hardwoods such as shagbark hickory, beech, oak, or white pine and swamps dominated by green ash. Along forest edges and throughout the woodlot, there were open pockets of thicket swamps, including a rare buttonbush swamp thicket community with dogwood and or winterberry), meadow marshes, and shallow marshes. A watercourse traverses through the middle portion of this feature, as well as along the northeastern boundary, where it is surrounded by an elm lowland forest. The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, and community diversity. It has been identified as containing six wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of a rare vegetation community and habitat for declining forest bird species.

Six mid-reach palustrine swamp communities and two mid-reach palustrine marsh communities occur in this feature on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge. A seep is located upstream (south) of this wetland within Feature 62, although flow contributions are limited.

6.1.23.1 Adjacent Project Components

Feature 51 falls within 120 m of Turbines 19, 26 and 30 and their associated access roads and underground collector lines.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Rare Vegetation Community (m)	Approximate Distance to Significant Habitat for Woodland Declining Species(m)
T19 - base	43	62	>120	43
T19 - blade tip	1	19	>120	1
access road (T19)	5	54	>120	5
T26 - base	49	49	49	49
T26 - blade tip	6	6	6	6
access road (T26)	41	17	71	41
T30 - base	59	66	>120	59
T30 - blade tip	17	23	>120	17
access road (T30)	65	65	>120	65

*minimum distances represented in the above table

6.1.23.2 Mitigation and Net Effects

Potential effects to the wetland, significant woodland and significant wildlife habitat in the form of rare vegetation community and habitat for declining forest bird species are outlined in **Section 6.1.2**

Construction is planned within the 120 m zone of influence of the wetland. With respect to the turbines, a minimum 49 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips come within 6 m of the wetland adjacent to Turbine 26, but do not overhang this feature. The access road is located a minimum of 54 m from the adjacent wetland. Equalization culverts will be installed beneath the access to convey flows, where required (**Figure 13.14, Appendix A**).

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road plus the 54 m setback between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

No power cable trenches are proposed within 30 m of the wetland, and the turbine foundation is at least 49 m from the wetland. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

With respect to the rare vegetation community (SWT2-4 Buttonbush Mineral Thicket Swamp) located within 49 m of the foundation of Turbine 26, potential impacts include direct disturbance during construction through encroachment or indirect impacts resulting from siltation, dust or changes in hydrology. Buttonbush has a coefficient of conservatism of 7, which indicates a high sensitivity to disturbance. During construction, a minimum setback of 20 m will be maintained between construction area and the rare vegetation community, which will be vegetated during construction and appropriate erosion control measures installed to demarcate the work area and prevent siltation within the adjacent community. Due to the limited footprint of the turbine foundation and access road, no hydrologic impacts on this rare vegetation community are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the woodland habitat Feature 51 therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for declining forest species. Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary, and is anticipated to take place outside the sensitive periods for

territorial birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the wind plant is operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

The mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- No vegetation clearing is proposed.
- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- Post construction monitoring for mortality and disturbance.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.
- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.24 Natural Feature 52

Feature 52 is a 0.4 ha meadow marsh located southeast of the intersection of Haldimand Road 20 and Townline Road (**Figure 13-13, Appendix A**). This small feature consists of a small pond surrounded by a reed-canary grass meadow marsh intermixed with cultural meadow ground cover. It has been identified as a wetland (assumed significant for the purposes of this Project).

A headwater palustrine marsh community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.24.1 Adjacent Project Components

Feature 52 falls within 120 m of the access road and underground collector line for Turbine 19.

Project Component	Approximate Distance to Wetland (m)
access road (T19)	5

*minimum distances represented in the above table

6.1.24.2 Mitigation and Net Effects

Potential effects to the wetland are outlined in **Section 6.1.2**. Construction is planned within the 120 m zone of influence of the wetland. A minimum 5 m setback is planned between the wetland edge and the access road. An equalization culvert will be installed beneath the access to convey flows, where required (**Figure 13.14, Appendix A**). This culvert will also function as a wildlife corridor in accordance with the criteria established in Section 6.1.3.4.

A naturally vegetated buffer will be established between the access road and wetland at this location to minimize impacts of construction on adjacent vegetation and vegetation communities. This access road will be demarcated in the field and protected with appropriate erosion and sediment controls.

Given the above-grade construction of all portions of the access road within 30 m with provisions for equalization culverts to ensure no ponding or disruption of surface water flow and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- No vegetation clearing is proposed.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.25 Natural Feature 53

Feature 53 is a 10.0 ha woodland located south of Haldimand Road 20 and east of South Cayuga Road (**Figure 13-11, Appendix A**). The northern portion of this feature was dominated by a deciduous forest, comprised of sugar maple with shagbark hickory. The feature has been identified as a significant woodland based on woodland size and shape, connectivity, and proximity to a water feature.

6.1.25.1 Adjacent Project Components

Feature 53 falls within 120 m of Turbine 47.

Project Component	Approximate Distance to Significant Woodland (m)
T47 - base	>120
T47 - blade tip	110

*minimum distances represented in the above table

6.1.25.2 Mitigation and Net Effects

Potential effects to the significant woodland are outlined in **Section 6.2.** All components of the Wind Project are sited outside of the significant woodland at Feature 53, therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.26 Natural Feature 54

Feature 54 is a 38.2 ha woodland located east of South Cayuga Road and north of Bains Road (**Figure 13-11, Appendix A**). This feature was represented by a mixture of community types. Forested portions were dominated by sugar maple with shagbark hickory; or shagbark hickory. Coniferous plantations of white spruce, and white pine with Norway spruce were present. Cultural woodlands dominated by white ash and staghorn sumac were present, as were areas of cultural meadow. The feature has been identified as a significant woodland based on woodland size and shape, proximity to a water feature, and community diversity. It also supports significant wildlife habitat in the form of winter deer yard, amphibian woodland breeding pools and habitat for area-sensitive and declining forest bird species.

6.1.26.1 Adjacent Project Components

Feature 54 falls within 120 m of Turbines 14, 39 and 40 and their associated access roads and underground collector lines.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Significant Amphib Pools (m)	Approximate Distance to Significant Habitat for Woodland Declining Species(m)
T14 - base	55	80	55
T14 - blade tip	12	37	12
access road (T14)	22	60	22
T39 - base	104	>120	104
T39 - blade tip	61	>120	61
T40 - base	49	>120	49

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Significant Amphib Pools (m)	Approximate Distance to Significant Habitat for Woodland Declining Species(m)
T40 - blade tip	6	100	6
access road (T39/T40)	5	57	5

*minimum distances represented in the above table

6.1.26.2 Mitigation and Net Effects

Potential effects to the significant woodland are outlined in **Section 6.1.2.** All components of the Wind Project are sited outside of the significant woodland at Feature 54, therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

The access road to Turbine 14 is proposed along the northern edge of the cultural woodland and meadow near the west side of Feature 54. While these cultural communities are contiguous with the larger Feature 54, these areas themselves are not considered significant natural features due to separation and cultural influences. The access road will follow the edge of the property, which will require removal of some white ash, staghorn sumac and European buckthorn prior to construction. No rare species were observed, nor are anticipated to occur, within this edge community. No other vegetation clearing is proposed.

In addition to the mitigation measures proposed in Section 6.1.3.1, the following additional measures are proposed to prevent encroachment and minimize potential impacts on the adjacent natural features:

- The boundary of all vegetation clearing will be flagged / staked in the field by a qualified ecologist prior to construction;
- The entire access road and turbine installation area will be surrounded with silt fence to demarcate the work area, minimize offsite transfer of sediment and prevent encroachment;
- Tree clearing will be performed in accordance with the mitigation measures described in Section 6.1.3.1.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for declining forest species. Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction will be temporary, and is anticipated to take place outside the sensitive periods for territorial birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the wind farm is operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- With the exception of the access road for Turbine 14, no additional vegetation removal is proposed.
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.
- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.27 Natural Feature 55

Feature 55 is a 39.4 ha woodland located west of South Cayuga Road and north of Bains Road (**Figure 13-11, Appendix A**). This feature was comprised of treed and thicket swamps. Treed swamps were dominated by red maples, while the thicket swamps were dominated by silky dogwood or young red maples. The feature has been identified as a significant woodland based on woodland size and shape, proximity to a water feature, and community diversity. It has been identified as containing a wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of deer yard and habitat for area-sensitive and declining forest bird species.

One headwater palustrine swamp communities occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.27.1 Adjacent Project Components

Feature 55 falls within 120 m of Turbines 35, 37, 38 and 68 and their associated access roads and underground collector lines. Additionally, the access road between Turbines 37 and 38 crosses the feature using an existing farm access road.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Significant Habitat for Woodland Declining Species(m)
T35 - base	44	44	44
T35 - blade tip	1	1	1
T38 - base	46	44	46
T38 - blade tip	3	1	3
access road (T35/T38)	83	83	83
T37 - base	44	43	44
T37 - blade tip	1	<1	1
T68 - base	>120	>120	>120

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Significant Habitat for Woodland Declining Species(m)
T68 - blade tip	100	99	93
access road (T37/T68)	28	20	28

*minimum distances represented in the above table

6.1.27.2 Potential Effects

A site visit was conducted by representatives of Samsung and Stantec on December 3, 2010 to measure the width of the existing laneway and to characterize the adjacent vegetation, in order to supplement previous site investigations. The existing road through this section of the wetland was slightly raised and surfaced with dirt and gravel, with upland grasses and asters along the edges. The width of the road ranged from approximately 7.9 to 8.2 m. Photographs are provided in **Appendix J**.

An underground collector line between Turbines 37 and 38 is proposed along the existing access road. Power cable trenches within the existing access road, and within 30 m of the wetland , will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. No vegetation removal is required to install the collector line. This existing farm road will not be used as an access road for the Wind Project or during construction. Alternate access from the north (Haldimand Road 20) and south (Bains Road) will be provided to avoid this feature.

Other potential effects of disturbance are summarized in **Section 6.1.2**.

6.1.27.3 Mitigation and Net Effects

Potential effects to the significant woodland, wetland and declining forest species habitat are outlined in **Section 6.1.2.** All components of the Wind Project are sited outside of the significant woodland and wetland, therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified. No vegetation removal is required.

Construction is planned within the 120 m zone of influence of the wetland. With respect to the turbines, a minimum 43 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips come within less than 1 m of the wetland, but do not overhang this feature. The access road is located a minimum of 20 m from the adjacent wetland. Equalization culverts will be installed beneath the access road to convey flows, where required (**Figure 13.11, Appendix A**).

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road plus the 20 m setback between the access road and the wetland, and the small

proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

The collector line will be installed underground within the existing farm access road through the woodland (**Figure I-13, Appendix I**). No vegetation clearing is proposed to install this line. Disturbance to wildlife will occur during construction but these impacts will be temporary and localized along the access road.

Results of the site investigation found that plant species in this part of the feature were locally and provincially common. No rare species or communities of vegetation are immediately adjacent to the planned road upgrade.

Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction (turbine, access roads and collector line) will be temporary, and is anticipated to take place outside the sensitive periods for territorial birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

A wildlife culvert will be installed beneath the access road between Turbines 68 and 37 where the access road crosses the narrow hedgerow. This culvert will double as an equalization culvert. This culvert will provide a wildlife passage beneath the access road (in accordance with the standards outlined in Section 6.1.3.4) (**Figure 13.11**, **Appendix A**).

In addition to the mitigation measures proposed in Section 6.1.3.1, the following additional measures are proposed to prevent encroachment and minimize potential impacts on the adjacent natural features:

- With the exception of the removal of a few trees from the hedgerow that extends southward from Feature 55, no vegetation clearing is proposed. Vegetation clearing along the access road will be performed in accordance with the mitigation measures described in Section 6.1.3.1.

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Specific erosion and sediment control will be installed along both sides of the existing farm access through the woodland and wetland feature prior to the installation of the collector line to prevent silt and sediment from entering the adjacent wetland.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- All equipment refueling will occur well away from the amphibian habitat. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.28 Natural Feature 56

Feature 56 is a 6.7 ha woodland located west of Haldimand Road 50 and north of Bains Road (**Figure 13-11, Appendix A**). This feature consisted of forest in the central portions, and swamp at the north and south edges. The forested community was dominated by red maple with American beech and red oak, while the swamp community consisted of red maples. The feature has been identified as a significant woodland based on proximity to a water feature, and community diversity. It has been identified as containing a wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding ponds.

One headwater palustrine swamp community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.28.1 Adjacent Project Components

Feature 56 falls within 120 m of Turbine 68 and its associated access road and underground collector line.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Significant Amphib Pools (m)
T68 - base	63	84	119
T68 - blade tip	20	41	76
access road (T68)	12	13	95

*minimum distances represented in the above table

6.1.28.2 Mitigation and Net Effects

Potential effects to the wetland and significant woodland are outlined in **Section 6.1.2.** Construction is planned within the 120 m zone of influence of the wetland. With respect to the turbines, a minimum 84 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). The access road will be located a minimum of 13 m from the wetland community, although only at the point where it curves southward to Bains Road. Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road plus the 84 m setback between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

No power cable trenches are proposed within 30 m of the wetland, and the turbine foundation is at least 84 m from the wetland. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the significant woodland at Feature 56, therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- No vegetation clearing is proposed.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.29 Natural Feature 58

Feature 58 is a 172.21 ha woodland located immediately south of Bains Road, extending from west of Haldimand Road 50 to Townline Road (**Figures 13-8** and **13-12, Appendix A**). At the eastern end of the feature, deciduous forest and swamp communities were present. The forest was dominated by red oak with sugar maple, while the swamp was dominated by green ash with red maple. Along Bains Road, forested portions were dominated by shagbark hickory with green ash; shagbark hickory with red oak; sugar maple with other hardwoods such as

basswood or green ash; sugar maple with oak; or poplar. Swamps were dominated by green ash or swamp maple. A cattail shallow marsh and green ash cultural woodland were observed along Haldimand Road 50. Reed canary grass meadow marshes were present east of South Cayuga Road, at the western end of the feature, and along Bains Road.

The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, and community diversity. It has been identified as containing six wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of habitat for area-sensitive and declining forest bird species. Six mid-reach palustrine swamp communities occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.29.1 Adjacent Project Components

Feature 58 falls within 120 m of Turbine 11 and its associated access road and underground collector line. It also is adjacent to the roadside overhead collection system associated with South Cayuga Road, Bains Road and Haldimand Road 50.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Significant AS Woodland Habitat (m)	Approximate Distance to Significant Habitat for Woodland Declining Species(m)
T11 - base	>120	>120	>120	>120
T11 - blade tip	98	>120	98	98
access road (T11)	1	5	1	1

*minimum distances represented in the above table

6.1.29.2 Mitigation and Net Effects

Potential effects to the significant woodland, wetland and associated area sensitive and declining woodland bird species habitat are outlined in **Section 6.1.2**. All components of the Wind Project are sited outside of the woodland feature, and therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

With respect to the turbines, only the blade tips are located within 120 m of the natural features, will be a minimum of 98 m from the adjacent woodland (Turbine 11). Given the limited footprint of the turbine foundation, separation from the adjacent natural features and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Project components are planned within the 120 m zone of influence of the significant wildlife habitat for area-sensitive and declining woodland bird species. Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during

construction. The noise of construction will be temporary and, where feasible, will take place outside the sensitive periods for woodland birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

The access road to Turbine 11 is located a minimum of 5 m from the wetland. This alignment was required to avoid the existing agricultural operation of the property. A naturally vegetated buffer will be established between the access road and wetland at this location to minimize impacts of construction on adjacent vegetation and vegetation communities. This access road will be demarcated in the field and protected with appropriate erosion and sediment controls.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.
- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.
- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.
- No vegetation removal is proposed.
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- Post construction monitoring for mortality and disturbance.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.30 Natural Feature 59

Feature 59 is a 3.9 ha meadow marsh located south of Bains Road and west of Haldimand Road 50 (**Figure 13-12, Appendix A**). This feature represented the riparian area of a small drainage feature within an agricultural field, and was dominated by reed canary grass. It has been identified as containing 2 wetlands (assumed significant for the purposes of this Project).

Two mid-reach palustrine marsh communities occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.30.1 Adjacent Project Components

Feature 59 falls within 120 m of Turbine 12 and its associated access road and underground collector line.

Project Component	Approximate Distance to Wetland (m)
T12 - base	55
T12 - blade tip	12
access road (T12)	11

*minimum distances represented in the above table

6.1.30.2 Mitigation and Net Effects

Potential effects to the wetland are outlined in **Section 6.1.2.** Construction is planned within the 120 m zone of influence of the wetland. With respect to turbines, a minimum 55 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips will be located within 12 m of the wetland, while the access road is located a minimum of 11 m from the wetland (which is a small open water feature adjacent to Haldimand Road 50). Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road plus the 11 m setback between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.
- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.
- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.
- No vegetation removal is proposed.
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- Post construction monitoring for mortality and disturbance.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the

objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.31 Natural Feature 66

Feature 66 is a 207.6 ha woodland located north of the Lake Erie shoreline and west of Haldimand Road 50 (**Figure 13-10, Appendix A**). This large feature is predominantly forested with locally significant linear wetlands occurring in association with watercourses in the center and along the western edge. The natural forest was dominated by shagbark hickory with red oak, green ash, sugar and red maple, and American beech. The conifer plantations were dominated by white pine, with Norway spruce in some areas. Swamps were dominated by green ash while swamp thickets were dominated by dogwood or meadowsweet. An area of meadow marsh and swamp thicket also existed along lakeshore road.

The feature has been identified as two separate significant woodland features (66a and 66b) based on woodland size and shape, connectivity, proximity to a water feature, and community diversity. It has been identified as containing eighteen wetlands (LSW, PSW and others assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of habitat for area-sensitive and declining forest bird species, migratory bird stopover habitat and waterfowl stopover habitat.

Eighteen individual wetland communities were identified within Feature 66. This was achieved with the assistance of MNR staff, who met out on site with Stantec to review and delineate wetland features within the cultural plantation. These wetlands include twelve river-mouth palustrine swamp communities, one river-mouth riverine swamp community, three mid-reach palustrine wetland communities and two river-mouth palustrine marsh communities. These wetlands occur on soils with high clay content with evidence of intermittent inflow, with the exception of wetland 66-m that is located adjacent to Evans Creek, which is a permanent stream. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge. Some of these wetlands are contiguous with the Evans Creek LSW, while others are hydrologically connected to the wetlands along Wardell's Creek, which are part of the Wardell's Creek PSW.

The valley feature associated with Evans Creek that extends through this feature has been identified as a significant valley south on Rainham Road. With the exception of the overhead collector line along Lakeshore Road, no project components are located in or within 120 m of the significant valleyland (see Section 6.1.45).

6.1.31.1 Adjacent Project Components

Feature 66 falls within 120 m of Turbines 9 and 51 and their associated access roads and underground collector lines.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Significant AS Woodland Habitat (m)	Approximate Distance to Significant Habitat for Woodland Declining Species(m)	Approximate Distance to Significant Habitat for Migratory Birds (m)
T9 - base	43	43	43	43	47
T9 - blade tip	1	<1	<1	1	4
access road (T9)	5	5	5	5	5
T51 - base	52	52	52	52	52
T51 - blade tip	2	2	2	2	2
access road (T51)	52	52	52	52	52

*minimum distances represented in the above table

6.1.31.2 Mitigation and Net Effects

Potential effects to the wetland are outlined in **Section 6.1.2.** Construction is planned within the 120 m zone of influence of the wetland. With respect to turbines, a minimum 43 m setback is proposed between the wetland edge and any physical structure on the ground (excluding the

turbine blade airspace). Blade tips will be located less than 1 m from the wetland, but not within or overhanging the wetland communities. The access road is located a minimum of 5 m from the wetland, which includes a narrow vegetated swale north of the existing trailer park.

Construction of the access road will not encroach within this 5 m setback area, which will be demarcated in the field and protected with appropriate erosion and sediment controls. This alignment was proposed to follow an existing maintained trail / roadway used to access the lagoon system at the north of the property. A naturally vegetated buffer will be established and/or enhanced between the access road and wetland / woodland community to the west to minimize impacts of construction on adjacent vegetation and vegetation communities. This access road will be demarcated in the field and protected with appropriate E&S controls.

The access road will cross existing swales (currently flowing through the adjacent cultural meadow and plantation from the east) where flows are conveyed westward to downstream wetland and woodland communities. To maintain flows to these wetlands and to prevent flooding upstream of the access road, culvert will be installed where the access road crosses existing swales (**Figure13.10, Appendix A; Figure I-12, Appendix I; Appendix J**). These swales will be seeded and erosion control measures (i.e. rip rap) will be installed at the end of the culvert to minimize erosion and to encourage the establishment of natural vegetation across the field. No other impacts on hydrology are anticipated as a result of this project component.

Given the limited footprint of the turbine foundation, at-grade construction of all portions of the access road, 5 m setback between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

The plan to install Turbine 9 will differ from the typical turbine installation plan provided in **Appendix K,** due to the narrow area between the cultural plantations east and west of the maintained cultural meadow where the turbine will be constructed. Adjacent wetland communities also limit the areas available for construction. As such, the following additional measures are proposed to prevent encroachment and minimize potential impacts on the adjacent natural features:

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- The entire access road and turbine installation area will be surrounded with silt fence to demarcate the work area, minimize offsite transfer of sediment and prevent encroachment;

- An alternate turbine installation plan is required for the assembly and erection of Turbine 9 to maintain as much existing vegetation as possible and to avoid the adjacent woodland and wetland features. Due to area constraints, the configuration of the installation area will differ from the 'typical' plan (see **Figure I-12, Appendix I**). In this regard, the constructible area has been amended to accommodate this reconfiguration while maintaining setbacks from the adjacent wetland and woodland feature (**Figure 13.10**). Further details to confirm the installation plan will be prepared as part of detailed design.

All components of the Wind Project are sited outside of the woodland, wetland and significant wildlife habitat features, and therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

With respect to migratory birds, woodland 66a and 66b are identified as a significant migratory bird stopover area, due to their size, diversity and proximity to Lake Erie (**Table 5.4, Appendix B**). Potential disturbance effects on the use of this feature can also be minimized by avoiding sensitive migratory periods (spring and fall migration). Pre- and post-construction disturbance monitoring will be completed for this feature.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

A wildlife culvert will be installed beneath the access road immediately north of the trailer park, which will double as an equalization culvert. This culvert will provide a wildlife passage beneath the access road (in accordance with the standards outlined in Section 6.1.3.4) (**Figure I-12**, **Appendix I**).

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- No clearing of natural vegetation is proposed. The proposed access road and Turbine 9 will be located within an existing cultural meadow that is mowed (maintained).

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not

disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. Disturbed areas will be revegetated using species native to Ecoregion 7E that are native to the site and/or surrounding natural features.

- Post construction monitoring for mortality and disturbance.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.32 Natural Feature 67

Feature 67 is a 7.4 ha woodland located immediately south of Lakeshore Road, east of Evans Point Line (**Figure 13-10, Appendix A**). This small feature consisted of a young pine-spruce plantation. The feature has been identified as a significant woodland based on connectivity and proximity to a water feature.

6.1.32.1 Adjacent Project Components

Feature 67 falls within 120 m of the access road and underground collector line associated with Turbine 51, which is located on the opposite side of Lakeshore Road. It also is adjacent to the roadside overhead collection system associated with Lakeshore Road.

Project Component	Approximate Distance to Significant Woodland (m)
access road (T51)	10

*minimum distances represented in the above table

6.1.32.2 Mitigation and Net Effects

Potential effects to the significant woodland are outlined in **Section 6.1.2**. All components of the Wind Project are sited outside of the significant woodland at Feature 67, and therefore, there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified. The access road to Turbine 51 is located on the opposite of Lakeshore Road from Feature 67.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately. Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.33 Natural Feature 68

Feature 68 is a 145.6 ha woodland located south of Rainham Road between Haldimand Road 50 and Townline Road (**Figures 13-10** and **13-12, Appendix A**). At the western end of this feature, the vegetation communities consisted of deciduous forest and swamps. Forests present were dominated by sugar maple with shagbark hickory; or sugar maple with red oak. Swamp communities were dominated by green ash; or green ash with red maple, red oak, sugar maple and shagbark hickory. An area of cultural woodland, dominated by green ash, was present at the south edge. At the eastern end of the feature, forest communities were comprised of red oak with sugar maple; or white ash with sugar maple, red maple, basswood and shagbark hickory. Two areas of reed canary grass meadow marsh were present.

The feature has been identified as a significant woodland based on woodland size and shape, connectivity, and proximity to a water feature. It has been identified as containing three wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding ponds, habitat for area-sensitive and declining forest bird species and as a migratory bird stopover area. Two marsh and one swamp community occur within this feature and are considered headwater palustrine features. They occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.33.1 Adjacent Project Components

Feature 68 falls within 120 m of Turbines 2, 4, 5 and 21 and their associated access roads and underground collector lines. Feature 68 is also adjacent to the roadside overhead collection system associated with South Cayuga Road and Haldimand Road 50.

Project Component	Approx Distance to Significant Woodland (m)	Approx Distance to Wetland (m)	Approx Distance to Significant Amphib Pools (m)	Approx Distance to Significant AS Woodland Habitat (m)	Approx Distance to Significant Habitat for Woodland Declining Species(m)	Approx Distance to Significant Habitat for Migratory Birds (m)
T2 - base	63	>120	147	63	63	63
T2 - blade tip	20	>120	104	20	20	20
access road (T2)	4	>120	>120	4	4	4
T4 - base	94	104	>120	94	94	94
T4 - blade tip	52	61	96	52	52	52
access road (T4)	5	15	78	5	5	5
T5 - base	44	44	>120	44	44	44
T5 - blade tip	1	1	>120	1	1	1
access road (T5)	96	104	>120	96	96	96

Project Component	Approx Distance to Significant Woodland (m)	Approx Distance to Wetland (m)	Approx Distance to Significant Amphib Pools (m)	Approx Distance to Significant AS Woodland Habitat (m)	Approx Distance to Significant Habitat for Woodland Declining Species(m)	Approx Distance to Significant Habitat for Migratory Birds (m)
T21 - base	50	100	>120	50	50	50
T21 - blade tip	7	57	>120	7	7	7
access road (T21)	4	5	>120	4	4	4

*minimum distances represented in the above table

6.1.33.2 Mitigation and Net Effects

Potential effects to the significant woodland, wetland and wildlife habitat are outlined in **Section 6.1.2.** Construction is planned within the 120 m zone of influence of the wetland. With respect to turbines, a minimum 44 m setback is proposed between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips will be located 1 m from the wetland, but not within or overhanging the wetland communities. The access road is located a minimum of 5 m from the wetland.

Construction of the access road will not encroach within this 5 m setback area, which will be demarcated in the field and protected with appropriate erosion and sediment controls. A naturally vegetated buffer will be established between the access road and wetland / woodland communities to minimize impacts of construction on adjacent vegetation and vegetation communities, in accordance with Section 6.1.3.2.

The access road will cross existing swales (currently flowing through the adjacent agricultural fields) where flows are conveyed to the wetland and woodland communities. To maintain flows to these wetlands and to prevent flooding upstream of the access road, culverts will be installed where the access road crosses existing swales (**Figure13.10, 13.12, Appendix A; Figure I-12, Appendix I; Appendix J**). These swales will be seeded and erosion control measures (i.e. rip rap) will be installed at the end of the culvert to minimize erosion and to encourage the establishment of natural vegetation across the field. No other impacts on hydrology are anticipated as a result of this project component.

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road plus the 5 m setback between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

All components of the Wind Project are sited outside of the woodland, wetland and significant wildlife habitat features, and therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified. No encroachment into or through the significant natural features will occur.

Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction (turbine, access roads and collector line) will be temporary, and is anticipated to take place outside the sensitive periods for territorial birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

With respect to migratory birds, woodland 66a is identified as a significant migratory bird stopover area, due to its size, diversity and proximity to Lake Erie (**Table 5.4, Appendix B**). Potential disturbance effects on the use of this feature can also be minimized by avoiding sensitive migratory periods (spring and fall migration). Pre- and post-construction disturbance monitoring will be completed for this feature.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.
- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.34 Natural Feature 69

Feature 69 is a 80.4 ha woodland located north of Lakeshore Road between Townline Road and Haldimand Road 49 (**Figure 13-15, Appendix A**). The large feature is a complex mix of a series of upland forests, swamps, thicket swamps, meadow marshes, and dug ponds. Forests were dominated by either sugar maple with oak, white ash, red maple, basswood, or beech; or

shagbark hickory with red oak, green ash, and/or white ash. Swamps were dominated by green ash or swamp maple while thicket swamps were dogwood dominated. A series of meadow marshes, dominated by reed-canary grass, jewelweed, or forbs, were concentrated along the western edge of the feature.

The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, and community diversity. It has been identified as containing four wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding ponds and habitat for area-sensitive forest bird species.

Four headwater palustrine swamp communities occur on soils with high clay content, 3 of which with evidence of intermittent inflow and one with evidence of permanent inflow and outflow (wetland 69a). These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.34.1 Adjacent Project Components

Feature 69 falls within 120 m of Turbines 1, 3, 6, 8, 69 and their associated access roads and underground collector lines. The collector line between Turbines 3 and 6 will follow an existing farm access road through Feature 69, but this farm access will not be used as an access road to the Wind Project. Access to the turbines will not cross through this feature.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Significant Amphib Pools (m)	Approximate Distance to Significant AS Woodland Habitat (m)	Approximate Distance to Significant Habitat for Migratory Birds (m)
T1 - base	66	66	>120	66	66
T1 - blade tip	23	23	>120	23	23
T3 - base	44	>120	>120	44	44
T3 - blade tip	1	>120	>120	1	1
access road (T3/T1)	5	15	>120	5	5
T6 - base	56	90	61	56	56
T6 - blade tip	13	47	18	13	13
T8 - base	73	70	99	73	73
T8 - blade tip	30	28	56	30	30
T69 - base	43	83	>120	43	43
T69 - blade tip	0	40	>120	0	0
access road (T8/T69/T6)	2	6	16	2	2

*minimum distances represented in the above table

6.1.34.2 Potential Effects

A site visit was conducted by representatives of Samsung and Stantec on December 3, 2010 to measure the width of the existing laneway and to characterize the adjacent vegetation, to supplement previous investigations. The existing road through this section of the wetland was slightly raised and surfaced with dirt and gravel, with upland grasses and asters along the edges. Adjacent vegetation communities are a complex pattern of deciduous upland forest and swamp. The width of the road ranged from approximately 5.5 to 6.7 m. Photographs are provided in **Appendix J**.

An underground collector line between Turbines 3 and 6 is proposed along the existing farm road. Power cable trenches through this feature, and within 30 m of the wetland, will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. No vegetation removal is required to install the collector line. This existing farm road will not be used as an access road for the Wind Project or during construction. Alternate access from the north (Rainham Road) and south (Lakeshore Road) will be provided to avoid this feature.

Other potential effects of disturbance are summarized in **Section 6.1.2**.

6.1.34.3 Mitigation and Net Effects

Potential effects to the significant woodland, wetland and wildlife habitat are outlined in **Section 6.1.2.** Construction is planned within the 120 m zone of influence of the wetland. With respect to turbines, a minimum 70 m setback is proposed between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips will be located 23 m from the wetland and not within or overhanging the wetland communities. The access road is located a minimum of 6 m from the wetland.

Construction of the access road will not encroach within this 6 m setback area, which will be demarcated in the field and protected with appropriate erosion and sediment controls. A naturally vegetated buffer will be established between the access road and wetland / woodland communities to minimize impacts of construction on adjacent vegetation and vegetation communities, in accordance with Section 6.1.3.2.

The access road will cross existing swales (currently flowing through the adjacent agricultural fields) where flows are conveyed to the wetland and woodland communities. To maintain flows to these wetlands and to prevent flooding upstream of the access road, culverts will be installed where the access road crosses existing swales (**Figure13.10, 13.12, Appendix A; Figure I-12, Appendix I; Appendix J**). These swales will be seeded and erosion control measures (i.e. rip rap) will be installed at the end of the culvert to minimize erosion and to encourage the establishment of natural vegetation across the field. No other impacts on hydrology are anticipated as a result of this project component.

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road plus the 6 m setback between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

The collector line will be installed underground within the existing farm access road through the woodland (**Figure I-18, Appendix I**). No vegetation clearing is proposed to install this line. Disturbance to wildlife will occur during construction but these impacts will be temporary and localized along the access road. Results of the site investigation found that plant species in this part of the feature were locally and provincially common. No rare species or communities of vegetation are immediately adjacent to the planned road upgrade.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

All components of the Wind Project are sited outside of the woodland, wetland and significant wildlife habitat features, and therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified. No encroachment into or through the significant natural features will occur.

Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction (turbine, access roads and collector line) will be temporary, and is anticipated to take place outside the sensitive periods for territorial birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

With respect to migratory birds, woodland 69 is identified as a significant migratory bird stopover area, due to its size, diversity and proximity to Lake Erie (**Table 5.4, Appendix B**). Potential disturbance effects on the use of this feature can also be minimized by avoiding sensitive migratory periods (spring and fall migration). Pre- and post-construction disturbance monitoring will be completed for this feature.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected

to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.
- Specific erosion and sediment control will be installed along both sides of the existing farm access through the woodland and wetland feature prior to the installation of the collector line to prevent silt and sediment from entering the adjacent wetland.
- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- All equipment refueling will occur well away from the amphibian habitat. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.35 Natural Feature 70

Feature 70 is a 1.5 ha woodland located immediately south of Feature 69 (**Figure 13-15, Appendix A**). This small linear feature occurs along a watercourse and is dominated by red oak with white ash. The feature has been identified as a significant woodland based on connectivity and proximity to a water feature.

6.1.35.1 Adjacent Project Components

Feature 70 falls within 120 m of Turbine 54 and its associated access road and underground collector line.

Project Component	Approximate Distance to Significant Woodland (m)
T54 - base	99
T54 - blade tip	56
access road (t54)	5

*minimum distances represented in the above table

6.1.35.2 Mitigation and Net Effects

Potential effects to the significant woodland are outlined in **Section 6.1.2**. All components of the Wind Project are sited outside of the significant woodland at Feature 70, therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

Construction is planned within the 120 m of a significant woodland. With respect to turbines, a minimum 99 m setback is proposed between the woodland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips will be located 56 m from the wetland and not within or overhanging the wetland communities. The access road is located a minimum of 5 m from the woodland.

Construction of the access road will not encroach within this 5 m setback area, which will be demarcated in the field and protected with appropriate erosion and sediment controls. A naturally vegetated buffer will be established between the access road and wetland / woodland communities to minimize impacts of construction on adjacent vegetation and vegetation communities, in accordance with Section 6.1.3.2.

The access road will cross a watercourse and existing swales (currently flowing through the adjacent agricultural fields) where flows are conveyed southward to Lake Erie. To maintain flows and to prevent flooding upstream of the access road, culverts will be installed where the access road crosses existing swales (**Figure13.10, 13.12, Appendix A; Figure I-12, Appendix I; Appendix J**). These swales will be seeded and erosion control measures (i.e. rip rap) will be installed at the end of the culvert to minimize erosion and to encourage the establishment of natural vegetation across the field. No other impacts on hydrology are anticipated as a result of this project component.

A wildlife culvert will be installed beneath the access road between Turbines 1 and 54 where the access road crosses the watercourse. This culvert will double as an equalization culvert. This culvert will provide a wildlife passage beneath the access road (in accordance with the standards outlined in Section 6.1.3.4) (**Figure 13.15**, **Appendix A**).

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road plus the 5 m setback between the access road and the woodland, no appreciable changes to surface water flow are anticipated.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer

required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.36 Natural Feature 71

Feature 71 is a 3.5 ha woodland located immediately east of Haldimand Road 49 north of Ramsey Road (**Figure 13-15, Appendix A**). This small woodlot is comprised of deciduous sugar maple – ash forest; a small reed-canary grass meadow marsh occurred at the periphery, although is not considered a significant woodland. It has been identified as containing a wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding pools.

One headwater palustrine swamp community occurs on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.36.1 Adjacent Project Components

Feature 71 falls within 120 m of Turbine 7 and its associated access road and underground collector line. It also is adjacent to the roadside overhead collection system associated with Haldimand Road 49.

Project Component	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Amphib Pools) (m)
T7 - base	75	>120
T7 - blade tip	32	>120
access road (T71)	12	68

*minimum distances represented in the above table

6.1.36.2 Mitigation and Net Effects

Potential effects to the significant wildlife habitat in the form of amphibian woodland breeding pools are outlined in **Section 6.1.2**. Project components are planned within the 120 m zone of influence of the wetland and amphibian woodland breeding pools.

With respect to turbines, a minimum 75 m setback is proposed between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips will be located 32 m from the wetland and not within or overhanging the wetland communities. The access road is located a minimum of 12 m from the wetland.

Construction of the access road will not encroach within this 12 m setback area, which will be demarcated in the field and protected with appropriate erosion and sediment controls. A naturally vegetated buffer will be established between the access road and wetland / woodland communities to minimize impacts of construction on adjacent vegetation and vegetation communities, in accordance with Section 6.1.3.2.

The access road will cross existing swales (currently flowing through the adjacent agricultural fields) where flows are conveyed to the wetland and woodland communities. To maintain flows to these wetlands and to prevent flooding upstream of the access road, culverts will be installed where the access road crosses existing swales, as required (**Figure13.14, Appendix A**). These swales will be seeded and erosion control measures (i.e. rip rap) will be installed at the end of the culvert to minimize erosion and to encourage the establishment of natural vegetation across the field. No other impacts on hydrology are anticipated as a result of this project component.

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road plus the 12 m setback between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

The collector line will be installed underground within the existing farm access road through the woodland (**Figure I-18, Appendix I**). No vegetation clearing is proposed to install this line. Disturbance to wildlife will occur during construction but these impacts will be temporary and localized along the access road.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.
- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.
- Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.
- All equipment refueling will occur well away from the amphibian habitat. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.37 Natural Feature 72

Feature 72 is a 0.9 ha woodland located just north of Feature 71 (**Figure 13-15, Appendix A**). This small woodlot was comprised of deciduous shagbark hickory forest. It has been identified as a wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding pools.

6.1.37.1 Adjacent Project Components

Feature 72 falls within 120 m of Turbine 7.

Project Component	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Amphib Pools) (m)
T7 - base	109	>120
T7 - blade tip	66	106
access road	109	>120

6.1.37.2 Mitigation and Net Effects

Potential effects to the wetland and significant wildlife habitat in the form of amphibian woodland breeding pools are outlined in **Section 6.1.2**. Project components are planned within the 120 m zone of influence of the wetland and amphibian woodland breeding pools.

With respect to turbines, only the turbine blade tips will be located within 120 m of the wetland, which will be located a minimum of 109 m from the wetland boundary. The amphibian breeding ponds are located more than 120 m from the project components. Therefore, there will be no direct loss or fragmentation of the wetland or the functions for which it was identified.

Given the limited footprint of the turbine foundations and proposed separation from the adjacent wetland communities, no direct or indirect impacts are anticipated on the wetland or associated

amphibian breeding ponds. Similarly, no impacts on hydrologic conditions supporting the adjacent wetland are anticipated.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.
- Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- All equipment refueling will occur well away from the amphibian habitat. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.38 Natural Feature 73

Feature 73 is a 50.4 ha woodland located immediately east of Haldimand Road 49 north of Ramsey Road (**Figure 13-15, Appendix A**). The portions of this primarily forested feature adjacent to project components consist of a deciduous forest dominated by shagbark hickory with red oak and white ash; shagbark hickory with green ash and basswood; sugar maple with white ash; or sugar maple with oak. A maple swamp with a small pocket of winterberry thicket swamp occurs along the northwestern edge while a green ash swamp occurs along the western edge. A small area of cultural meadow occurs at the southwestern edge of the feature. Two roads, Ramsey Road and Haldimand Road 49, dissect the southern portion of this feature. The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, and community diversity.

It has been identified as containing two wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of habitat for declining forest bird species. Two headwater palustrine swamp communities occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.38.1 Adjacent Project Components

Feature 73 falls within 120 m of Turbine 7. It also is adjacent to the roadside overhead collection system associated with Haldimand Road 49 and Ramsey Road.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Significant Habitat for Woodland Declining Species(m)
T7 - base	102	110	102
T7 - blade tip	60	67	60
access road (T7)	96	96	96

*minimum distances represented in the above table

6.1.38.2 Mitigation and Net Effects

Potential effects to the wetland, significant woodland and significant wildlife habitat are outlined in **Section 6.1.2**. Construction is planned within the 120 m zone of influence of the wetland. With respect to the turbines, a minimum 110 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips will

be located 67 m from the wetland and not within or overhanging the wetland communities. The access road is located a minimum of 96 m from the wetland.

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road plus the 117 m setback between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

No power cable trenches are proposed within 30 m of the wetland, and the turbine foundation is at least 110 m from the wetland. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

All components of the Wind Project are sited outside of the woodland habitat Feature 5 therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction (turbine, access roads and collector line) will be temporary, and is anticipated to take place outside the sensitive periods for territorial birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the turbines is operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

The mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- No vegetation clearing is proposed.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- Post construction monitoring for mortality and disturbance.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.39 Natural Feature 74

Feature 74 is a 18.4 ha woodland located east of Marshall Road and south of Haldimand Tract Road (**Figure 13-16, Appendix A**). The portions of this small forested feature adjacent to the Project consist of a deciduous forest dominated by shagbark hickory and green ash, a red maple swamp, and a provincially significant buttonbush thicket swamp along the eastern edge. The feature has been identified as a significant woodland based on woodland size and shape, proximity to a water feature, and community diversity. It has been identified as containing two wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of a rare vegetation community.

Two headwater palustrine swamp communities occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.39.1 Adjacent Project Components

Feature 74 falls within 120 m of Turbine 65 and its associated access road and underground collector line.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Rare Vegetation Community (m)
T65 - base	76	76	>120
T65 - blade tip	33	33	83
access road (T65)	120	120	>120

*minimum distances represented in the above table

6.1.39.2 Mitigation and Net Effects

Potential effects to the wetland and significant woodland are outlined in **Section 6.1.2**. Construction is planned within the 120 m zone of influence of the wetland. A minimum 76 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips will be located 33 m from the wetland and not within or overhanging the wetland communities. The access road is located a minimum of 120 m from the wetland.

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road plus the 76 m setback between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

No power cable trenches are proposed within 30 m of the wetland, and the turbine foundation is at least 76 m from the wetland. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.
- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the significant woodland at Feature 74, therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

With respect to the rare vegetation community (SWT2-4 Buttonbush Mineral Thicket Swamp) located within 83 m from the blade tips of Turbine 65, potential impacts include indirect impacts

resulting from siltation, dust or changes in hydrology. The rare vegetation community is located within the woodland and is buffered from adjacent land use activity by a deciduous forest community 9FIOD9-4). Buttonbush has a coefficient of conservatism of 7, which indicates a high sensitivity to disturbance. During construction, a minimum setback of more than 75 m will be maintained between construction area and the rare vegetation community. Due to the limited footprint of the turbine foundation and access road, no hydrologic impacts on this rare vegetation community are anticipated.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.
- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.40 Natural Feature 75

Feature 75 is a 32.2 ha woodland located at the western terminus of Ramsey Road west of Johnson Road (**Figure 13-16, Appendix A**). The western portion of this medium-sized feature consisted primarily of swamps dominated by green ash or red maple, with open pockets of dogwood thicket swamps. A small section of upland deciduous forest, dominated by oaks and ashes, occurred between the two ash swamps. A cultural meadow existed along the northern edge of the woodlot with a small dug pond.

The feature has been identified as a significant woodland based on woodland size and shape, proximity to a water feature, and community diversity. It has been identified as containing a wetland (assumed significant for the purposes of this Project). One headwater palustrine swamp community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.40.1 Adjacent Project Components

Feature 75 falls within 120 m of Turbines 66 and 67 and their associated access roads and underground collector lines.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
T66 - base	43	43
T66 - blade tip	<1	1
access road (T66)	3	5
T67 - base	>120	>120
T67 - blade tip	115	113
access road (T67)	50	32

*minimum distances represented in the above table

6.1.40.2 Mitigation and Net Effects

Potential effects to the wetland and significant woodland are outlined in **Section 6.1.2**. Construction is planned within the 120 m zone of influence of the wetland. With respect to turbines, a minimum 43 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips will be located 1 m outside of the wetland and less than 1 m from the woodland edge, but will not overhang the wetland or woodland communities. The access road is located a minimum of 5 m from the wetland.

Construction of the access road will not encroach within this 5 m setback area, which will be demarcated in the field and protected with appropriate erosion and sediment controls. A

naturally vegetated buffer will be established between the access road and wetland / woodland communities to minimize impacts of construction on adjacent vegetation and vegetation communities, in accordance with Section 6.1.3.2.

The access road will cross a watercourse and existing swales (currently flowing through the adjacent agricultural fields) where flows are conveyed away from the wetland and woodland communities. To prevent flooding upstream of the access road, culverts will be installed where the access road crosses the watercourse and existing swales, as required (**Figure13.16, Appendix A**). These swales will be seeded and erosion control measures (i.e. rip rap) will be installed at the end of the culvert to minimize erosion and to encourage the establishment of natural vegetation across the field. No other impacts on hydrology are anticipated as a result of this project component.

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road, the buffer proposed between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the woodland habitat Feature 75 therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

The mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- No vegetation clearing is proposed.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.41 Natural Feature 76

Feature 76 is a 47.1 ha woodland located south of Ramsey Road and east of Johnson Road (**Figure 13-17, Appendix A**). This feature is located south of the Dunnville Airport and the northern forest portion was shagbark hickory and/or red oak dominated. This forest is bisected by a watercourse that supports meadow marshes along the bank. An open dogwood thicket swamp exists along the northeastern edge of the feature.

The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, and community diversity. It has been identified as containing a wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of area-sensitive forest bird species

One mid-reach palustrine swamp community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.41.1 Adjacent Project Components

Feature 76 falls within 120 m of Turbine 64 and associated access roads and underground collector lines.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Significant AS Woodland Habitat (m)
T64 - base	47	47	47
T64 - blade tip	5	5	5
access road (T64)	5	5	5

*minimum distances represented in the above table

6.1.41.2 Mitigation and Net Effects

Potential effects to the wetland, significant woodland and wildlife habitat are outlined in **Section 6.1.2**. Construction is planned within the 120 m zone of influence of the wetland. With respect to the turbines, a minimum 47 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips will be located a minimum of 5 m from the wetland and will not overhang the wetland or woodland communities. The access road is located a minimum of 5 m from the wetland.

Construction of the access road will not encroach within this 5 m setback area, which will be demarcated in the field and protected with appropriate erosion and sediment controls. A naturally vegetated buffer will be established between the access road and wetland / woodland communities to minimize impacts of construction on adjacent vegetation and vegetation communities, in accordance with Section 6.1.3.2.

The access road will cross existing swales (local drainage) where flows are conveyed away from the wetland and woodland communities. To prevent flooding upstream of the access road, culverts will be installed where the access road crosses the watercourse and existing swales, as required (**Figure13.17, Appendix A**). Where implemented, these swales will be seeded and erosion control measures (i.e. rip rap) will be installed at the end of the culvert to minimize erosion and to encourage the establishment of natural vegetation across the field. No other impacts on hydrology are anticipated as a result of this project component.

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road, the buffer proposed between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the woodland habitat Feature 76 therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

Potential disturbance effects to breeding birds can be minimized through avoidance of periods of vulnerability during construction. The noise of construction (turbine, access roads and collector line) will be temporary, and is anticipated to take place outside the sensitive periods for territorial birds (May – mid-July). Appropriate mitigation will be implemented in accordance with Section 6.1.3.4.

When the turbines are operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

The mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- With the exception of a few trees where the proposed access road will cross the hedgerow extending eastward from Feature 76, no vegetation clearing is proposed. Tree clearing will be performed in accordance with the mitigation measures described in Section 6.1.3.1.

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.

- Post construction monitoring for mortality and disturbance.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible,

the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.42 Natural Feature 77

Feature 77 is a 40.9 ha woodland located northeast of the Dunnville Airport (**Figure 13-17, Appendix A**). This feature consisted of a young shagbark hickory forest along the southeastern edge of the feature with a green ash swamp, green ash cultural woodland, and a swamp white oak swamp. A small pocket of cultural meadow and cultural thicket also existed along the agricultural edge.

The feature has been identified as a significant woodland based on woodland size and shape, connectivity, proximity to a water feature, and community diversity. It has been identified as containing two wetlands (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding pools.

Two mid-reach palustrine swamp communities occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.42.1 Adjacent Project Components

The blade sweep area of Turbine 59 extends over the southeastern cultural woodland edge of Feature 77. The feature also falls within 120 m of the associated access roads and underground collector lines.

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to Significant Amphib Pools (m)
T59 - base	62	65	>120
T59 - blade tip	19	22	103
access road (T59)	5	5	>120

*minimum distances represented in the above table

6.1.42.2 Mitigation and Net Effects

Potential effects to the wetland and significant woodland are outlined in **Section 6.1.2**. Construction is planned within the 120 m zone of influence of the wetland. With respect to turbines, a minimum 65 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). Blade tips will be located 22 m from the wetland and not within or overhanging the wetland communities. The access road is located a minimum of 5 m from the wetland.

The access road will cross existing swales (local drainage) where flows are conveyed away from the wetland and woodland communities. To prevent flooding upstream of the access road, culverts will be installed where the access road crosses the watercourse and existing swales, as required (**Figure13.17, Appendix A**). Where implemented, these swales will be seeded and erosion control measures (i.e. rip rap) will be installed at the end of the culvert to minimize erosion and to encourage the establishment of natural vegetation across the field. No other impacts on hydrology are anticipated as a result of this project component.

Given the limited footprint of the turbine foundation, the at-grade construction of all portions of the access road, the buffer proposed between the access road and the wetland, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- All equipment refueling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

All components of the Wind Project are sited outside of the woodland habitat Feature 76 therefore there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity. During operation of the Project, access roads will experience very little traffic on a daily basis and both mortality and barrier effects are expected to be negligible. Amphibians are most susceptible in spring, particularly cool spring nights. Maintenance vehicle traffic will primarily be restricted to daytime hours.

The mitigation strategy to protect the significant woodland and significant wildlife habitat will include:

- No vegetation clearing is proposed.
- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- As appropriate and prior to construction the limits of vegetation clearing will be staked in the field. The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.
- Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.
- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.
- Speed limit signage will be erected to communicate 30km/hr limit.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.43 Natural Feature 78

Feature 78 is a 1.3 ha meadow marsh located north of Meadows Road and east of Yaremy Road (**Figure 13-7, Appendix A**). This feature was associated with a drainage feature, and consisted of a meadow marsh dominated by reed canary grass, cattails, asters and goldenrods.

It has been identified as containing a wetland (assumed significant for the purposes of this Project).

One mid-reach palustrine marsh community occurs on soils with high clay content with evidence of permanent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.43.1 Adjacent Project Components

Feature 78 falls within 120 m of the access road and underground collector line for Turbine 22, which is located on the opposite side of Meadows Road. It also is adjacent to the roadside overhead collection system associated with Meadows Road.

Project Component	Approximate Distance to Wetland (m)
access road	18

*minimum distances represented in the above table

6.1.43.2 Mitigation and Net Effects

Construction is planned within the 120 m zone of influence of the wetland. All components of the Wind Project are sited outside of the wetland at Feature 67 and therefore, there will be no direct loss or fragmentation of woodland habitat or the functions for which it was identified.

A minimum 18 m setback is planned between the wetland edge and any physical structure on the ground (excluding the turbine blade airspace). The access road to Turbine 22 will be constructed above-grade on the opposite side of Meadows Road from Feature 78. No impacts on hydrology as a result of the proposed access road are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

To minimize or eliminate disturbance effects, the following mitigation measures will be implemented:

- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation.

- All equipment refuelling will occur well away from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately. Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.44 Natural Feature 90

Feature 90 is a 6.4 ha wetland and riparian hedgerow along a tributary located on the south side of Haldimand Road 20 and north of Concession 6 (**Figure 13-4, Appendix A**). It is comprised of a primarily meadow marsh community through agricultural fields, with a hedgerow of deciduous trees sporadically lining an intermittent watercourse. The feature has been identified as a wetland (assumed significant for the purposes of this Project).

One headwater palustrine marsh community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

6.1.44.1 Adjacent Project Components

The access and underground collector line to Turbine 58 falls within 120 m of the wetland associated with Feature 90.

Project Component	Approximate Distance to Wetland (m)
T58 - base	>120
T58 - blade tip	>120
access road (T58)	<1

*minimum distances represented in the above table

6.1.44.2 Mitigation and Net Effects

Potential effects to the wetland are outlined in **Section 6.1.2.** Construction of the access road is planned within the 120 m zone of influence of the wetland. An existing crossing (6.1 m wide) over the watercourse and associated riparian wetland will be used as part of the proposed access road. Upgrades to the existing culvert and access road are anticipated and will occur outside of the wetland area (i.e. within the 6.1 m opening). No encroachment into the wetland will occur to construct the access road.

Given the above-grade construction of the access road with provisions for equalization culverts to ensure no ponding or disruption of surface water flow, and the small proportion of the feature potentially affected, no appreciable changes to surface water flow are anticipated.

Power cable trenches within 30 m of the wetland will be backfilled with sand, with a clay plug every 30 m to ensure that groundwater entering the trenches is not drawn along the sand-filled conduit. When considered together with the small proportion of the feature potentially affected, no appreciable changes to groundwater flow are anticipated.

A wildlife culvert will be installed beneath the access road between Turbines 1 and 54 where the access road crosses the watercourse. This culvert will double as an equalization culvert. This culvert will provide a wildlife passage beneath the access road (in accordance with the standards outlined in Section 6.1.3.4) (**Figure 13.15**, **Appendix A**).

Appropriate protection and mitigation measures will be undertaken in this area in accordance with Section 6.1.3, as wetlands can be particularly sensitive to soil compaction and indirect hydrological effects. The following mitigation measures will be implemented:

- No vegetation clearing is proposed.
- Sediment control barriers in accordance with Section 6.1.3.2 will be erected along wetland edges that occur within 30 m of construction work areas to minimize sediment transport to the wetland. These barriers will be regularly monitored and properly

maintained during and following construction until soils in the construction area are re-stabilized with vegetation.

- Specific erosion and sediment control will be installed along both sides of the existing farm access across the wetland feature prior to the installation of the access road and collector line to prevent silt and sediment from entering the adjacent wetland.

- The boundary of the adjacent wetland will be flagged / staked in the field by a qualified ecologist prior to construction as a measure to ensure proper location of erosion and sediment controls and construction fencing to prevent encroachment;

- Portions of the access roads within 30 m of the wetland will be constructed above-grade to avoid interfering with groundwater flow, and will include equalization culverts to maintain surface flow contributions to the wetland.

- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.

- All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Excavated soil from crane pads will be re-used on site as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions. Once the laydown areas are no longer required, vegetation will be surveyed to assess damage and the potential for natural regeneration. If required, areas will be reseeded with native species.

- Vehicle movements within construction areas and access roads will be minimized to avoid the harassment of wildlife. Maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less.

- Speed limit signage will be erected to communicate 30km/hr limit.

- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

During operation of the facility, the dust and disturbance to vegetation as a result of maintenance vehicle traffic is expected to be negligible due to the infrequency and separation of these activities.

6.1.45 Features Adjacent to Collector Lines

The overhead collector line system is the only Wind Project component found within the Zone of Investigation for 30 of the features (numbers 16, 17, 23, 24, 25, 26, 27, 35, 36, 37, 43, 44, 45, 46, 48, 57, 60, 64, 65, 68, 79, 81, 82, 83, 84, 85, 86, 87, 88 and 89).

6.1.45.1 Potential Effects

Overall, construction activities are to be low impact and very short term in duration. All work will be completed in the road right-of-way and will not require vegetation clearing. The overhead conductors will be strung on existing poles or replacement poles, or in the event that there are no existing poles, on new poles. For installation of new lines, wood poles would be set to a depth of approximately 2 to 3 m. All construction activities would be conducted from vehicles within the road allowance. The poles will be installed at a shallow depth and the total area impacted will be small, therefore there are no anticipated changes to the surface water or groundwater contributions to the features.

Disturbance effects to wildlife will be negligible (i.e. at the same scale as existing traffic travelling on the municipal road) and very short in duration (less than one day). During operation there may be occasional system maintenance, but regular impacts from day to day use of the road system and maintenance activities associated with the road are expected to have higher impacts.

6.1.45.2 Mitigation and Net Effects

No mitigation is necessary if conductors are strung on existing or replacement poles. If new poles are required, standard sediment, erosion and spill control measures will be implemented.

No net adverse effects are anticipated.

6.1.46 Grassland Habitat

Components of the Wind Project are sited adjacent to two grasslands that have been identified as significant wildlife habitat for area sensitive grassland birds and species of conservation concern, (A and C) as shown on **Figures 13.5, 13.8 and 13.9** (**Appendix A**). These grassland areas support area sensitive or declining grassland species. Turbine 48 is located within 120 m of grassland feature A, but has been sited to avoid the grassland area and will not result in the removal of grassland habitat. In two cases, overhead collector lines run adjacent to grassland habitat features A and C.

6.1.46.1 Potential Effects

Construction activity, such as increased traffic, noise, or dust, also has the potential to indirectly disturb birds, particularly breeding birds, and their habitats. Disturbance of birds may occur during all phases of the Project as a result of increased on-site human activities (e.g. site preparation, turbine assembly, maintenance activities). The current level of human activity is low, and is generally restricted to recreational uses.

Disturbance from construction activity, such as increased traffic, sound, or dust, may result in avoidance of habitats by birds. These effects are greatest if disturbance occurs during critical life stages such as courtship or nesting (NWCC, 2002).

Sound levels during operations might also result in disturbance effects to breeding grassland birds. Sound from wind turbines likely has the greatest effect on wildlife at low wind speeds, whereas at high wind speeds the sound from the turbines is masked by the sound of the wind.

6.1.46.2 Mitigation and Net Effects

Potential disturbance effects to breeding grassland birds can be minimized through avoidance of periods of vulnerability during construction. When the Wind Project is operational, mortality and disturbance monitoring studies will be conducted to determine if the turbine operation results in collision with significant bird species or disturbance/avoidance effects.

The mitigation strategy should include:

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- Post construction monitoring for mortality and disturbance (see **Section 6.5**)
- As appropriate and prior to construction the limits of vegetation clearing will be staked in the field. The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area.
- In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas.

6.1.47 Animal Movement Corridors

Animal movement corridors have been drawn in a conceptual way (**Figures 13.1 to 13.17, Appendix A**), and it is important to note that the boundaries shown do not represent physical limits of animal movement. Overhead collector lines are to be installed along existing road rights-of-way and are not expected to present an additional barrier to wildlife movement. A total of 12 Wind Project components are located within 120 m of significant animal movement corridors, including 2 turbines (56 and 17) that are located adjacent to an animal movement corridor.

The siting of access roads between two natural features (i.e. between wetland and upland habitat, or across a hedgerow), also has the potential to impact the movement of small mammals, amphibians and reptiles between these features. A total of 15 turbine access roads are proposed between two natural features (**Figures 13.1 to 13.18)**

The following components are within 120 m of significant animal movement corridors:

Project Component	Minimum Distance to Animal Movement Corridor
T17 (Figure 13.8)	Within 5 m
T56 (Figure 13.7)	Within 5 m
Access Road (T23) (Figure 13.3) Access Road (T 29) (Figure 13.7) Access Road (T42) (Figure 13.7) Access Road (T46) (Figure 13.3)	Overlaps (crosses) Overlaps (crosses) Overlaps (crosses) Overlaps (crosses)
T36 (Figure 13.1)	91 m to base, 41 m to blade tip
T48 (Figure 13.5)	102 m to base, 52 m to blade tip
T65 (Figure 13.16)	81 m to base, 31 m to blade tip
T66 (Figure 13.16)	71 m to base, 21 m to blade tip
Access Road (T8) (Figure 13.15) Access Road (T59) (Figure 13.17)	Within 5 m Within 5 m

6.1.47.1 Potential Effects

Siting the Project outside of the movement corridor to the greatest extent possible has largely precluded disturbance to local flora, fauna, habitat, and movement functions supported by the features.

Disruption of the animal movement corridor between Natural Features 31 and 32 could result from the construction of Turbine 56 and the access road to Turbine 25will result in the fragmentation of the hedgerow that connects the two features (**Figure 13.7, Appendix A**). However, these impacts are anticipated to be temporary and avoidance of this area during construction is anticipated. However, given the relative open landscape of agricultural fields, wildlife will take an alternate route. No impact to the animal corridor between Natural Features 42 and 39 are anticipated due to the location of Turbine 17 between the 2 features. The corridor is 350 m long and consists primarily of agricultural fields. (**Figure 13.8, Appendix A**). The

turbine location will not result in disruption of the corridor or the creation of gaps and is situated to avoid interference with wildlife movement (i.e. does not create barrier effects).

Some species may experience temporary avoidance or displacement effects during construction due to the influx of human activity and noise, however once the Project is operating, human activity around the facilities will decrease, thus allowing local wildlife movement patterns to quickly re-establish.

During construction, the access roads will experience some traffic, which will vary in intensity as the construction phases progress. Equipment used during construction activities has the potential to injure slower moving wildlife such as snakes and turtles. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality and from barrier effects is anticipated to be minimal because of the temporary (i.e., one breeding season or less) nature of the increased traffic activity.

Sensory disturbance of wildlife using the corridor may occur during all phases of the Project as a result of increased on-site human activities (e.g., site preparation, turbine assembly, maintenance activities). However, a certain level of sensory disturbance to wildlife resources in the Project Study Area already exists from ongoing agricultural, rural, and domestic activities. Studies related to the sensory effects of constructing and operating wind farms on big game resources, carried out in the Western U.S., have shown that there is no significant effect (Strickland and Erickson, 2003) and no reduction in use of the area immediately within wind project locations (Arnett et al., 2007). These studies indicate that species are either unaffected by this type of development, given their small footprint and preservation of the existing land-use, or that they can readily adapt to the presence of the wind plant.

6.1.47.2 Proposed Mitigation and Net Effects

The Study Area landscape is relatively well-forested, with numerous woodland projections, hedgerows, and vegetated riparian areas, and animals have multiple options for sheltered movement. While construction of Turbine 56 and the access road to Turbine 25 will result in fragmentation of the wide hedgerow between Natural Features 31 and 32, there are several other hedgerows and a riparian zone located to the south that will permit the movement of wildlife between these two features (**Figure 13.7, Appendix A**)

To minimize the potential mortality and disruption of movement across access roads, the following mitigation will be implemented:

- During operation, maintenance vehicle traffic will primarily be restricted to daytime hours. Vehicle speeds will be restricted to 30 km/h or less; and
- Speed limit signage will be erected to communicate 30 km/hr limit.

- Light pollution can disrupt natural diurnal rhythms of wildlife, and is particularly harmful to nocturnal and migratory animals. The potential effects of artificial light pollution can be mitigated by ensuring that direct glare is avoided by installing low intensity and downward pointing lights. All outdoor lighting will be turned off when not in use, except where used for security and safety purposes, where motion sensors will be used.

- In those instances where access roads are proposed between two natural features (i.e. between upland and lowland habitat, across a hedgerow that extends between two larger natural features or across watercourses with riparian vegetation), culverts will be installed beneath the access road to allow for animal movement (**Figure 13.1 to 13.8**). Some culverts will double as equalization culverts allowing flows to be conveyed beneath the access road, however, where animal movement is to be accommodated, the following elements will be incorporated into the design to the culvert:

- Wildlife culverts will be constructed in accordance with the design criteria outlined in Section 6.1.3.4

Fencing along the access roads between the natural features will be provided to funnel species into the culvert and prevent / minimize road crossings.

Disturbance impacts during construction are anticipated to be minimal given they are short-term in duration and spatially limited to the work areas and immediately adjacent areas. There will be minimal loss of habitat and disruption of the corridors. Negative impacts to the functions they support will be minimal.

6.1.48 Waterfowl Staging and Stopover Areas

Feature 65, 66 and 87 were evaluated as significant wildlife habitat for staging waterfowl. The overhead collector line system, located within the municipal right-of-way, is the only Project component found within 120 m of these features.

6.1.48.1 Potential Effects

The collector line system will be installed within the municipal right-of-way. All construction activities would be conducted from vehicles within the right-of-way and will be spatially limited to the work areas and immediately adjacent areas

Overall, construction activities are to be low impact and short term in duration. The poles will be installed at a shallow depth and the total area impacted will be small, therefore there are no anticipated changes to the surface water or groundwater contributions to the adjacent woodlands. Construction activities adjacent to the feature are expected to be short term in duration (completed within a day) and small in scale, so minimal dust would be generated. Indirect impacts resulting from construction activities, such as dust generation, sedimentation

and erosion, are expected to be short term, temporary in duration and mitigable through the use of standard site control measures.

During operation there may be occasional system maintenance, but regular impacts from day to day use of the road system and maintenance activities associated with the road and existing transmission line are expected to have higher impacts.

Wildlife using the Grand River or Lake Erie waters and associated Features (65, 66 and 87) are not expected to be negatively impacted by the Project. A collector line currently exists along the Grand River and Lake Erie shorelines and staging waterfowl and Bald Eagles will be accustomed to occasional maintenance activities during operation of the line as well as regular traffic that occurs.

6.1.48.2 Proposed Mitigation and Net Effects

Mitigation measures addressing best management practices during construction are recommended to mitigate potential negative effects. These include:

- Inspectors will ensure construction vehicles and personnel stay within the demarcated areas, thereby limiting the disturbance of natural vegetation;
- All equipment refuelling should occur well away from the wetlands. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately;
- Any fuel storage and activities with the potential for contamination will occur in properly protected and sealed areas; and
- Excess material will either be removed from the site or graded into the right-of-way shoulder.

There will be no disruption to the functions of the significant wildlife habitat found within 120 m of the Project Location.

6.1.49 James N. Allen Provincial Park

James N. Allen Provincial Park is identified by Ontario Parks as a “non-operating” park. This 117 ha park is located on the north shore of Lake Erie, about 7 km southwest of Dunnville, with access via King's Row. There are no visitor facilities and it consists of 1 km of pebble beach, 100 m of fine sand beach and approximately 60 hectares is forest and wetlands. James N. Allen Provincial Park is intended to protect natural and scenic areas for scientific, educational and recreational use, with this park specifically identified as a good spot for swimming, boating, walking and bird-watching (Ontario Parks, 2003).

A portion of the James N. Allen Park Woodlot-Wetland PSW occurs within the southern portion of the Park, which includes a mix of swamp and marsh that supports nesting colonial waterbirds, active feeding areas for Great Blue Heron, and locally significant winter cover for wildlife and fish spawning and rearing. This PSW is not located within 120 m of the Wind Project.

As confirmed through site investigations, the vegetation communities along the northern edge of the Park, which occur within 120 m of a proposed collector line, include a fresh moist Red Oak – Shagbark Hickory deciduous forest (FOD9-6*) and a green ash cultural woodland (CUW1-4*). These features are part of natural Feature 81 (**Figure 13.15, Appendix A**).

6.1.49.1 Potential Effects

A proposed overhead collector line will be constructed on the north side of Kings Row, which runs along the north side of the Park. No other Wind Project components are proposed within 120 m of the Park. All construction activities will occur on the opposite side of Kings Row from the Park and will be low impact and very short term in duration. All work will be completed within the road right-of-way and will not require vegetation clearing. The overhead conductors will be strung on existing poles or replacement poles, or in the event that there are no existing poles, on new poles.

For installation of new lines, wood poles would be set to a depth of approximately 2 to 3 m. All construction activities would be conducted from vehicles within the road allowance. The poles will be installed at a shallow depth and the total area impacted will be small, therefore there are no anticipated changes to the surface water or groundwater contributions to the features.

During construction, disturbance effects to wildlife will be negligible (i.e. at the same scale as existing traffic travelling on the municipal road) and very short in duration (less than one day). During operation there may be occasional system maintenance, but regular impacts from day to day use of the road system and maintenance activities associated with the road are expected to have higher impacts.

No impacts on the natural features or ecological functions within the vegetation communities that occur within 120 m of the collector line are anticipated. The communities along Kings Row include a narrow (less than 120 m) deciduous woodland, cultural woodland likely established as a restoration / naturalization project, and agricultural fields. The more natural features and scenic areas associated with the Park are located further south and closer to the Lake Erie shoreline, including the PSW, larger contiguous woodland, beach and rare vegetation community (Graminoid Coastal Meadow Marsh (MAM4-1). Recreational uses appear to be focused closer to Lake Erie (i.e. parking facilities, beach access), while there is limited evidence of recreational use within the communities located within 120 m of the Project.

6.1.49.2 Mitigation and Net Effects

No mitigation is necessary if conductors are strung on existing or replacement poles. If new poles are required, standard sediment, erosion and spill control measures will be implemented. No net adverse effects are anticipated.

No loss of natural vegetation will occur and no intrusion into the Park, temporarily or permanently, is proposed. No impact on the ability of the Park to protect the wetlands, woodlands and Lake Erie shorelines that occur within its boundaries is anticipated. The Park and its natural features will remain intact as no intrusions or even temporary works are proposed within the Park boundaries. The natural features, functions and values for which this Park has been established will not be impacted by the proposed collector line. The ability of the Park to fulfil its role in the protected areas system, the integrity of the Park as a whole and the ecological features and functions for which the Park was established, will not be impacted as a result of the proposed collector line.

6.2 ENVIRONMENTAL IMPACT STUDY – SOLAR

A summary of the natural features located within 120 m of the solar components of the Project, their relative location, potential impacts, recommended mitigation measures and overall net effects is provided in **Table 6.1** (**Appendix B**).

6.2.1 Description of Solar Project

The solar power generation part of the Project will include the installation of approximately 425,000 solar photovoltaic (PV) panels on land designated for this purpose generally bounded by Mount Olivet Road to the west, Meadows Road to the north, Sutor Road to the east and Haldimand Rd 20 to the south (see **Figure 14.1** to **14.2**, **Appendix A**). Some additional solar PV panels will be located just south of Haldimand Rd 20 on Ontario Realty Corporation (ORC) property facing the solar farm to the north.

Each solar PV panel is fabricated using multi-crystalline manufacturing techniques and are mounted on structural aluminum frames in rows. Each frame is fixed position, facing south and angled 21 degrees to the horizon. The rows of frames are supported by vertical structural steel posts that are founded in the ground to a depth below the frost line.

The basic building block of the solar farm is a 1 MW rated solar module. There are 100 solar modules forming the entire solar farm. A 1 MW solar module consists of approximately 72 straight rows of 60 solar PV panels each mounted on frames. Physical arrangements may vary slightly from module to module to accommodate physical, environmental and archaeological constraints within the designated solar farm area. Each solar PV panel in a row generates Direct Current (DC) power and the power is collected through a low voltage wiring system to the end of each row.

A 2.4 m high chain link fence will be installed around the entire perimeter of the solar farm to prevent unauthorized access to the solar panel area. In addition, a 6 m wide berm will be constructed around the perimeter of the Solar Project Location to provide a landscaping barrier for landowners of adjacent residences where close proximity occurs to the solar PV panels. The berm will be vegetated immediately following construction with native grassland species in order to stabilize the berm and minimize visual impacts.

Solar access roads (laneways) are required to access each row of solar PV panels during construction and operation (maintenance). The minimum road width between solar panel rows will be 3 m. These access roads will not be graveled but instead seeded with native grassland species following construction and used sparingly during maintenance activities.

A 4 m wide gravel road will be constructed around the outside of each 1 MW solar module for construction and operational purposes. A total of approximately 40 km of graveled access road will be required.

Minimal change from the existing grades is anticipated but some grading will be performed to accommodate the construction of internal solar module access roads. This will include smoothing of the existing topsoil, but will not result in significant changes to existing topography or catchment areas. At present, the existing agricultural fields are relatively flat, with the boundary between the GRCA and LPRCA watersheds crossing diagonally from the northwest to south east. Runoff from the north half of the Solar Lands drains southward to Feature 30 and 31, and then eastward along an existing intermittent watercourse that flows along the south side of these features. Runoff from the south half of the Solar Lands drains towards the southwest of the property, where it enters existing roadside ditches along Haldimand Road 20. No alteration to the existing catchments or watershed divide will occur. Further details to confirm pre- and post-development grading / topography of the site will be provided during detailed design.

Power at the end of each solar PV panel row is collected by a larger wiring system that is connected to two 500 Kilowatt (kW) DC to Alternating Current (AC) power inverter panels. Each power inverter panel is connected to a solar step up (SSU) pad-mounted transformer and is mounted on a precast concrete base foundation / vault at a central point on one-side of each solar module. The power output from each of the 1 MW SSUs (100 MW in total) is connected via 5 underground 35 kV power cable circuits to the Collector Substation located within the solar farm land area.

6.2.2 Adjacent Natural Features

There are 7 natural features located within 120 m of the Solar Project Location described in **Section 6.2.1**. Within these natural features, 6 significant woodlands, 7 significant wetlands and 7 natural features with significant wildlife habitat features were identified within 120 m of the Solar Project Location. The following is a summary description of each of these natural features, functions, location and distance from the Solar Project Location:

Natural Feature 30

This 13.0 ha natural feature is located within the central portion of the solar lands, north of Haldimand Road 20, west of Mount Olivet Road and south of Meadows Road (**Figure 14.1**). It consists of both deciduous forest and swamp communities, with a small meadow marsh community along the southern boundary and a dug pond supporting a shallow marsh community in the southeast corner. The western portion of the feature canopy was dominated by red oak with sugar maple and shagbark hickory, while the eastern portion was dominated by shagbark hickory with white ash. The central portion of this woodland consisted of deciduous swamp draining eastward that was dominated by a relative open canopy of swamp maple.

The feature has been identified as a significant woodland based on woodland size and shape, proximity to a water feature, and community diversity. It has been identified as containing wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding pools and habitat for declining woodland species.

Two headwater palustrine swamp communities occur on soils with high clay content with evidence of surface water inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Six vernal pools were identified along ATV ruts within this feature, which supported leopard frog tadpoles. The total wetland area measured approximately 5.7 ha in size. Interior forest habitat is present within this feature, although no rare species or rare community types were present. Natural Feature 30 is located within 120 m of the Solar Project Location, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Deer Yard) (m)	Approximate Distance to SWH (Amphib Pools) (m)	Approximate Distance to SWH (Declining Sp) (m)
Solar Panels	36	36	36	36	36
Fence	31	31	34	31	31

*Note: Vernal pools were identified throughout this woodland / wetland feature. A conservative distance was estimated based on the distance to the edge of the woodland.

*minimum distances represented in the above table

Natural Feature 31

Feature 31 is a 57.2 ha woodland located along the east side of Wilson Road 20 and extends across Sutor Road to the east (**Figure 14.1**). It consists of a diversity of habitat consisting primarily of deciduous forest and swamp communities, with areas of meadow marsh within the feature and cultural meadow present at the edge. Forested areas were dominated by American beech, sugar maple, red oak and shagbark hickory. Swamp communities were dominated by swamp maple with green ash or shagbark with red maple. Small vernal pools were rare within

the feature and two dug ponds were observed, one located within a meadow marsh at the southern edge of the community. This feature has been identified as providing significant wildlife habitat for wintering deer, area sensitive and declining woodland birds, and amphibian breeding ponds.

Interior forest habitat is present within this feature, although no rare species or rare community types were present. Ovenbird and Veery, both areas sensitive species, were observed in this feature, along with six PIF species. Two sensitive species (CC=9) were also identified.

A total wetland area of approximately 24.5 ha in size was identified, with three headwater palustrine swamp communities identified on soils with high clay content and evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 31 is located within 120 m of the Solar Project Location, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Deer Yard) (m)	Approximate Distance to SWH (Amphib Pools) (m)	Approximate Distance to SWH (Declining Sp) (m)
Solar Panels	32	38	32	32	32
Fence	30	32	30	30	30

*Note: Vernal pools were identified throughout this woodland / wetland feature. A conservative distance was estimated based on the distance to the edge of the woodland.

*minimum distances represented in the above table

Natural Feature 37

This 4.5 ha natural feature is located along the south side of Haldimand Road 20 east of Mount Olivet Road (**Figure 14.1**). This feature consisted of meadow marsh along the north side of the feature separating the deciduous swamp and forest community from Haldimand Road 20. The meadow marsh consisted of reed canary grass, while the mid-age swamp community was dominated by bur oak with balsam poplar and white elm. No interior forest habitat, rare species or rare community types were present.

The feature has been identified as containing wetland (assumed significant for the purposes of this Project). One headwater palustrine swamp community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 37 is located within 120 m of the Solar Project Location, as follows:.

Natural Feature 37 contains significant wetland and wildlife habitat (deer yard) within 120 m of the Solar Project Location, as follows:

Project Component	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Deer Yard) (m)
Access Road	14	55
Fence	55	67
Berm	66	102
Transmission Line	16	43

*minimum distances represented in the above table

Natural Feature 38

This 7.7 ha natural feature is located along the south side of Haldimand Road 20 between Mount Olivet Road to the west and Wilson Road to the east (**Figure 14.2**). This medium-sized woodlot consists of various swamps, dominated by green ash with swamp maple, red maple with bur oak, or swamp maple with bur oak.

The feature has been identified as a significant woodland based on woodland shape, proximity to a water feature and community diversity. It has been identified as containing wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding pools.

One headwater palustrine swamp community and one headwater palustrine marsh community occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Interior forest habitat is present within this community, although no rare species or rare community types were present.

Natural Feature 38 is located within 120 m of the Solar Project Location, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Deer Yard) (m)
Solar Panels	31	31	47
Fence	24	24	36
Berm	19	19	36

*minimum distances represented in the above table

Natural Feature 39

This 23.1 ha natural feature consists of two woodlands (39a and 39b) connected along a tributary of Wardell's Creek, which extends from the west side of Wilson Road downstream to Haldimand Road 20 (**Figure 14.2**). The woodlands were dominated by sugar maple with American beech or white ash, while the areas along the watercourse were dominated by green ash swamps with pockets of crack willow. A small section of cultural dogwood thicket was

found along the western edge of the woodland 39a (north). Woodland 39a contained interior forest habitat. Eastern milksnake was observed along Wilson Road east of Woodland 39b, and 5 PIF species were observed in this feature.

Woodland 39a has been identified as a significant woodland based on woodland shape, proximity to a water feature and the presence of a species at risk (milksnake). Woodland 39b has been identified as a significant woodland based on proximity to a water feature and the presence of a species at risk (milksnake). This feature has been identified as containing wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding pools and habitat for declining forest birds.

One mid-reach palustrine marsh community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge. Natural Feature 39 is located within 120 m of the Solar Project Location, as follows:

Natural Feature 39a

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Deer Yard) (m)	Approximate Distance to SWH (Declining Sp) (m)
Solar Panels	26	37	31	31
Fence	26	32	27	27
SWM Pond	>120	74	>120	74

*minimum distances represented in the above table

Natural Feature 39b

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to SWH (Deer Yard) (m)	Approximate Distance to SWH (Declining Sp) (m)
Solar Panels	76	82	76
Fence	68	74	68

*minimum distances represented in the above table

Natural Feature 40

This 13.5 ha natural feature is located along the south side of Haldimand Road 20 east of Wilson Road (**Figure 14.2**). This mid-age to mature forest community consisted of two deciduous woodland communities dominated by oaks and sugar maple in the west and red oak

with sugar maple and shagbark hickory is the east. A deciduous swamp community occurs at the northeast corner of the feature dominated by bur oak and green ash. Several residences were observed along Haldimand Road 20 within or adjacent to this feature. Interior forest habitat was present in this feature, although no rare species or rare community types were present.

The feature has been identified as a significant woodland based on woodland size, shape, proximity to a water feature and community diversity. It has been identified as containing wetland (assumed significant for the purposes of this Project). One headwater palustrine swamp community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 40 is located within 120 m of the Solar Project Location, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Deer Yard) (m)
Solar Panels	35	>120	50
Fence	18	>120	31
Berm	15	>120	28

*minimum distances represented in the above table

Natural Feature 41

This 1.5 ha natural feature is located along the north side of Haldimand Road 20, south of Natural Feature # 31, along an unnamed tributary of the Grand River between Mount Olivet Road to the west and Wilson Road to the east (**Figure 14.2**). This small meadow marsh (0.7 ha) was dominated by reed canary grass and meadow marsh along a small drainage feature. No interior forest habitat, rare species or rare community types were present.

The feature has been identified as containing wetland (assumed significant for the purposes of this Project). One headwater palustrine marsh community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 41 is located within 120 m of the Solar Project Location, as follows:

Project Component	Approximate Distance to Wetland (m)
Solar Panels	32
Fence	14
Berm	100

*minimum distances represented in the above table

Other Significant Natural Features identified within 120 m of the Solar Project Location include habitat for species of conservation concern, raptor winter feeding and roosting areas, grasslands for area-sensitive and declining bird species and animal movement corridors.

Raptor Winter Feeding and Roosting Area 2

The Solar Project Location is located within 120 m of a significant raptor winter feeding and roosting area, as depicted on **Figure 14.1** and **16** (**Appendix A**), as observed during the site investigations. This concentration area includes a well-known historical area for winter raptors surrounding in the Fisherville area (Miles, 1996). Raptor density was highest in the northwestern quadrate of the solar lands and to the north of the solar lands within the 120 Zone of Investigation. Raptors were generally found throughout the Solar Project Area, with no observations in the southeast corner. Four species of raptors (25 individuals) were observed in proximity to the Solar Project Location. These species, and a summary of their habitat requirements, are as follows:

- Short-eared Owl: The Short-eared Owl is a species of Special Concern in Ontario. It breeds in large expanses of open habitat, such as prairie and coastal grasslands, heathlands, shrub-steppe and tundra, but also in agricultural areas (Wiggins et al., 2006). They prefer grasses ranging from 30 to 50 cm tall, which helps to conceal the nest location, as nests are built on the ground, preferably on slight mounds or ridges (Sandilands, 2010). They are not known to nest in actively grazed pastured lands (Dechant et al., 1999).

  Breeding is associated with cyclic populations of small mammals (Sandilands, 2010). Their diet consists primarily of small rodents and voles, supplemented by other small bird species in coastal areas (Sandilands, 2010). They hunt primarily by coursing 0.3 to 5 m above open habitats, such as pastures, old fields and marshes, but usually at heights of 2 m or less (Sandilands, 2010).

  In winter, the Short-eared Owl roosts on the ground communally in old fields and agricultural lands, with communal roosts containing as many as 200 birds (Sandilands, 2010). As snow accumulates, they will seek shelter and concealment in coniferous trees, typically 3 m or less from the ground (Sandilands, 2010). Hunting territories are defended in winter, especially when voles are scarce, and other species may be attacked. This species is relatively common in Haldimand County during the winter (Cadman, 1994).

- Red-tailed Hawk: The Red-tailed Hawk nests in open woodlands or at forest edges and requires large open areas for hunting. Maximum species densities are observed in agricultural areas containing small tracts of forest (Sandilands, 2010). This species nests in trees, along the edge of deciduous woodlands, but constructing platforms of dead and fresh branches and twigs.

This species hunts in the open from a tall perch, but often pounces on prey from flight (Sandilands, 2010). Its prey consists of small mammals (voles, mice, shrews and snowshoe hare), birds, amphibians, snakes and grasshoppers, but occasionally may take larger prey such as beavers (Sandilands, 2010). Because of its flexible diet, food is seldom a limiting factor in species abundance.

In southern Ontario, some birds are year-round residents while others come from more northern habitats. This species spends most of its time in open habitat or at woodland edges, with a preference to perch in a small group of trees, although in Ontario, it frequently perches on fence posts and large hay bales (Sandilands, 2010). Meadow voles are the most important winter prey for this species. This species is the most common wintering species in Ontario, with populations increasing over time (Sandilands, 2010).

- Rough-legged Hawk: The Rough-legged Hawk nests primarily in tundra habitat and is restricted to Hudson Bay coast in Ontario (Sandilands, 2010). In winter, it inhabits open country habitat and may frequent marshes. While this species typically avoids wooded areas, which are often defended by Red-tailed Hawks, areas with sparse ground cover are preferred to those with dense cover but higher prey densities (Sandilands, 2010).

  This species selects perches in trees and utility poles, often lower than other hawks. When snow is greater than 10 cm, it typically perches near a road. This species is highly dependent on the meadow vole and has an abundance cycle related to vole populations (Sandilands, 2010). This species is a common wintering species in Ontario, with populations increasing over time.

- Northern Harrier: Northern Harrier nests in wetlands and large fields, including cattail marshes, bogs, open swamps, grassy meadows, pastures and hay and grain fields. In southern Ontario, they nest primarily in marshes, open fields and agricultural lands (Sandilands, 2005). Nests are built primarily on the ground out of sticks and branches, but occasionally out of grass.

  In Ontario, the home range of a pair ranges from 250 to 640 ha of suitable foraging habitat (Cadman, 1993), with hunting occurring away from the nest sites. They hunt by coursing low over fields and by perching on the ground or rarely from a higher perch (Sandilands, 2010). Idle and abandoned fields are preferred hunting grounds, with prey consisting of small rodents and mammals as large as cottontails (Sandilands, 2010).

  In winter, harriers prefer large, open areas for hunting, with populations in Ontario directly related to available vole populations (Sandilands, 2010). They utilize communal roosts next to hunting areas that are often traditional, and may be shared with Short-eared Owls (Sandilands, 2010). As snow depth increases, roosts become concentrated in higher areas with less snow cover. This species is common in Haldimand County during the winter (Cadman, 1994).

Large open habitats occur within the Solar Location, although these fields were ploughed and contained no grassland habitat. Grasslands to the north and northwest of the Solar Project Location provided lightly pastured habitat suitable for winter raptor foraging.. Coniferous or mixed roost feature did not occur within the Solar Project Location. Field observations identified a coniferous hedgerow north of the Solar Project Location that was used as a roost feature by 10 Short-eared Owls, however this hedgerow was located more than 120 from the Solar Project Location. The Solar Project Location is located within 120 m of (but not within) a significant raptor winter feeding and roosting area.

Habitat of Species of Conservation Concern

Grassland B was identified as providing significant wildlife habitat for species of conservation concern. It was identified as providing suitable foraging habitat for 2 Short-eared Owls (December), with additional observations of this species (10 Short-eared Owls) to the north of the Solar Project within a coniferous hedgerow (beyond 120 m from the Solar Project location).

Grasslands

One significant grassland habitat area (Area B) is located within 120 m of the Solar Project Location and is associated with the pasture to the north of Meadows Road. (**Figure 14.1, Appendix A**). This feature has been identified as significant wildlife habitat for area sensitive and declining grassland bird species. The fields within the Solar Project Location were ploughed and contained no grassland habitat.

Animal Movement Corridors

Natural Features 29, 30 and 31 are connected by animal movement corridors (**Figure 14.1, Appendix A**), which represent the western limit of a larger east-west corridor that extends eastward to the Grand River. These corridors are actively managed as agricultural fields, although a small drainage feature and sparse hedgerow connect Natural Features 30 and 31.

6.2.3 Potential Effects and Mitigation

Construction and installation of a renewable energy facility may be permitted within significant valleylands, woodlands or wildlife habitat, or within 120 m of these natural features as well as within 120 m of a provincially significant southern wetland or provincially significant coastal wetland, subject to the completion of an EIS (O. Reg. 359/09, s. (38(1)).

The following sections provide a detailed description of the potential negative environmental effects of the Solar Project Location, identify appropriate mitigation measures and describes how the environmental effects monitoring plan and construction plan will address any negative environmental effects (O. Reg. 359/09, s. 38(2)(a)). Similar to the Wind and Transmission Line, impact assessment was conducted on a feature basis, rather than a components-by-component

basis, so that potential impacts to significant natural heritage features arising from multiple project components could be considered together.

6.2.3.1 Direct Impacts to Natural Features

All wetlands and woodlands have been avoided through the siting of the Solar Project Location. No natural features will be directly impacted through the siting and construction of the Solar Project Location.

Significant Wetlands

The following significant wetlands occur within 120 m of the solar components of this project: 30, 31, 37, 38, 39, 40 and 41. The specific distance from each wetland to each Solar Project component is provided in Section 6.2.2. The majority of the solar panels and associated access roads, fencing and electrical equipments have maintained a minimum 30 m setback from the boundary of the adjacent wetland features (Natural Feature 30, 31, 37, 39 and 40). The solar panels adjacent to Natural Feature 41 are located 32 m from the wetland boundary, although the fence encroaches to within 14 m. A fence and vegetated berm are also located 24 m and 19 m, respectively, from the wetland associated with Natural feature 38, although they occur on the opposite side of Haldimand Road 20.

The berm will be naturalized using grassland species native to Ecoregion 7E and will be native to the site and/or surrounding natural features. No direct impacts are anticipated as a result of the project components.

The 30 m buffer located adjacent to the wetlands(30a, 30b) will be naturalized to create a vegetated buffer between the wetlands and Solar Project Location (**Figure I-6 and I-7, Appendix A**). The area between the Solar Project Location and Feature 41 will also be naturalized to create a vegetated buffer. In all cases, species native to Ecoregion 7E and native to the site and/or surrounding natural features will be used to stabilize these buffer areas and establish a natural buffer between the Solar project location and adjacent wetlands.

During grading and construction activities, potential erosion and sedimentation is possible, although proper erosion and sediment controls and construction management practices can minimize potential impacts. Dust generation during such activities may also impact adjacent wetlands vegetation.

As discussed in Section 6.2.1, no significant grading is proposed on the solar lands and existing drainage patterns will be maintained, ensuring any surface water flows currently draining to the various wetlands will be maintained. Only surface smoothing is proposed with no changes to topography or catchment / watershed divides to occur. Lands where solar panels are proposed will continue to drain as they currently drain, via overland sheet flow to the adjacent natural features. The access road and collector substation will have a stormwater management (SWM)

system (grassed ditches along road directly flows to a SWM pond at Haldimand Road 20) to maintain current flows.

Discussion regarding the collector substation, O&M building and associated access roads that occur on the solar lands is provided in **Section 6.3.3.1**.

Significant Woodlands

The following significant woodlands occur within 120 m of the solar components of this project: 30, 31, 38, 39a, 39b, and 40. The specific distance from each woodland to each Solar Project component is provided in Section 6.2.2. The majority of the solar panels and associated access roads and electrical equipment have maintained a minimum 30 m setback from the dripline of these woodland features (Natural Feature 30, 31 and 38). Fencing and berming associated with Natural Feature 38 and 40 are located less than 30 m from the dripline, although they occur on the opposite side of Haldimand Road 20. Berming will not be continuous around the Solar Project Location. No impacts are anticipated as a result of these berms.

The solar panels and fence associated with Natural Feature 39a are located a minimum of 26 m from the dripline, although this occurs at only one location (one tree) and the remainder of the setbacks is approximately 30 m. No direct impacts on significant woodlands are anticipated.

Minimal change from the existing grades is anticipated with the exception of minor grading to accommodate the construction of internal solar module access roads. No grading is proposed beyond the limits of the Solar Project Location as identified on **Figures 14.1 and 14.2**. As such, no grading within the root zone or removal of limbs from the trees within these significant woodlands is proposed.

Discussion regarding the substation, O&M building and associated access roads that occur on the solar lands is provided in **Section 6.3.3.1**.

Significant Wildlife Habitat

The following natural features contain significant wildlife habitat within 120 m of the solar components of this project: 30, 31, 37, 38, 39a, 39b and 40. The specific distance from each wildlife habitat feature to each Solar Project component is provided in Section 6.2.2. All solar panels and associated access roads and electrical equipments have maintained a minimum 30 m setback from the dripline of the adjacent wetland features. The only case where the proposed Solar Project Location are located less than 30 m from significant wildlife habitat is the fence adjacent to Natural Feature 39a, which as discussed above occurs only at one location (one tree) and the remainder of the setback is approximately 30 m.

No removal of natural vegetation within the Natural Features is proposed. The woodlands and wetlands that provide habitat for area sensitive birds, deer wintering, declining bird species and vernal pools for amphibian breeding will not be directly impacted by the Project. No rare

species or rare vegetation communities will be removed or impacted through the construction or operation of the solar panels.

Removal of existing hedgerows, which are sparse and provide minimal connectivity between natural features, will accommodate the construction of the solar modules and associated access roads. No rare vegetation species were observed within the features.

No removal of natural vegetation associated with grassland habitat will result from the construction of the Solar Project. All significant grassland habitat and winter raptor roosting and feeding habitat is located north of the Solar Project Location. This includes the pasture area where the 2 Short-eared Owls (4 species overall) were observed, along with the roosting habitat for Short-eared Owls observed beyond 120 m from the Solar Project Location. No direct impacts to grassland habitat or winter raptor roosting and feeding areas are anticipated.

One solar module is proposed between Natural Feature 30 and 31 (**Figure 14.1, Appendix A**), although an unobstructed and naturalized corridor is proposed to maintain connectivity between these features. A 280 m wide by 325 m long corridor linking these features has been proposed and as such, no fences have been constructed that would obstruct east-west wildlife movement.

One solar module is also proposed between natural Feature 29 and 30 **Figure 14.1, Appendix A**), which combined with the security fencing along either side has the potential to obstruct wildlife movement along the corridor. Therefore, to mitigate impacts on wildlife movement, specifically deer, a gap in the security fencing will be maintained along the north side of the access road and transmission line to the southwest of Woodland 30. This area will be fenced off to maintain a secure perimeter around the solar modules, but will maintain a 35 m (approx.) wide corridor to allow for the free movement of deer in an east-west direction (**Figure 17.1**, **Appendix A**). This corridor will include obstructions (i.e. bollards, large stones, paige wire fence) to restrict trespass and ATV movement while encouraging use by deer and other mammals (i.e. cedars, native plant species). Further details regarding the selection and design of appropriate measures to maintain this corridor for deer, while maintaining site security and preventing trespass and ATV activity, will be explored during detailed design.

Disturbance from construction activity, such as increased traffic, noise, or dust, may result in the temporary avoidance of wildlife habitats (woodlands, wetlands, grasslands) by birds and other wildlife. These effects are greatest if disturbance occurs during critical life stages such as courtship or nesting (NWCC, 2002). However, the return to these habitats is expected once construction is complete.

Since the panels will be suspended above grade, the property will remain porous to allow for the movement of small rodents, amphibians and reptiles across the site. Areas beneath and surrounding the solar panels will be vegetated with native grassland species.

Vernal pools within features 10, 19 and 38, as well as the surface drainage patterns that sustain these amphibian breeding areas, will be maintained. ATV activity that has created some of the

vernal pools observed in natural feature 30 will no longer occur, however, the disruption caused by such activities (ruts, vegetation trampling, disruption to wildlife) are likely more detrimental than the benefits associated with ceasing such activity.

Surface drainage between Natural Feature 30 and 31 will not be impacted as this flow path and adjacent land area will be maintained and naturalized. Discussion regarding the substation, O&M building and associated access roads that occur on the solar lands is provided in **Section 6.3.3.1**.

6.2.3.2 Hydrologic Impacts

A passive system of SWM will be comprised of local ditches/swales along the solar module access roads constructed through the area. Because the solar cells are mounted above the ground, infiltration, filtration through vegetation and other natural hydrologic process will continue similar to existing conditions.

Drainage will generally be directed to existing receiving systems (drainage paths, roadside ditches, wetlands etc.) via sheet flow as under current conditions. Existing catchment area boundaries will be maintained. Localized drainage to the central wetland and woodland features north of Haldimand Road 20 (Natural feature 30, 31 and 41) will be maintained as no grading or construction is proposed within 30 m of these natural features. Drainage south of Haldimand Road will be conveyed via the roadside ditches proposed along the gravel access road and sheet flow from beneath the solar modules will be conveyed to the via a realigned swale collector system to its current discharge location (tributary of Wardell's Creek). Further details on the proposed SWM plan for this area are provided within the Design and Operation Report (under separate cover).

No watercourse crossings are proposed within the Solar Project Location. Setbacks of at least 30 m have been maintained from the riparian vegetation associated with Natural Feature 39 and 41. Instead, the areas between the natural features and proposed Solar Project Location will be seeded and allowed to naturalize with native plant species, which will not only benefit local wildlife using the area but will also provide a vegetated buffer between the Solar Project Location and adjacent watercourse features to filter and retain runoff.

Berms surrounding the solar facility will be vegetated to avoid erosion of the slopes and to provide a visual buffer for the solar facility. Equalization culverts will be installed through the berm along existing swales to maintain existing overland flow routes, minimize flooding and prevent hydrologic impacts on downstream features.

6.2.3.3 Vegetation Removal

The majority of the proposed solar land development will be located within existing agricultural fields. Natural vegetation is limited to existing woodlands and meadow marsh habitats, as well as narrow bands of riparian vegetation along various watercourses. Through the application of

30 m setbacks to these features, no removal of natural vegetation is proposed. No clearing or grubbing is proposed, with the exception of the removal of existing hedgerows where solar modules and access roads are proposed. These hedgerows extended east-west and north-south across the solar lands. No rare vegetation species were identified within the Zone of Investigation.

To the extent practical, tree and/or brush clearing would be completed prior to or after the breeding season for migratory birds (May 1 to July 31). Currently, construction is planned for fall 2011. However, should clearing be required during the breeding bird season, prior to construction, surveys will be undertaken to identify the presence/absence of nesting birds or breeding habitat. If a nest is located, a designated buffer will be marked off within which no construction activity will be allowed while the nest is active. The radius of the buffer width ranges from 5- 60 m depending on the species. Buffer widths are based on the species sensitivity and on buffer width recommendations that have been reviewed and approved by Environment Canada.

Disturbance to breeding birds that occur within the adjacent woodland areas is not anticipated since a 30 m minimum setback has been maintained from such features.

6.2.3.4 Land Use Activity and Operation

The intensity of land use activity within the solar lands will increase during construction, with the level of disturbance and disruption anticipated to increase over current agricultural activity. However, this impact will be temporary in nature until the Project has been constructed. Once complete, human activity will be limited to normal maintenance activities associated with the solar panels and internal roadways.

During operation, maintenance vehicle traffic will primarily be restricted to daytime hours.

Light pollution can disrupt natural diurnal rhythms of wildlife, and is particularly harmful to nocturnal and migratory animals and animals in flight. The potential effects of artificial light pollution can be mitigated by ensuring that direct glare is not be visible beyond the substation boundaries, which can be avoided by installing low intensity and downward pointing lights. All outdoor lighting will be turned off when not in use, except where used for security and safety purposes, where motion sensors will be used.

Solar energy technologies, such as those proposed as part of the Solar Project, present tremendous environmental benefits when compared to conventional energy sources. Their main advantage is the lack of emissions of gaseous or liquid pollutants or waste products resulting from the operation of the solar modules during the generation of electricity (Tsoutsos *et* al, 2005).

6.2.3.5 Construction and Grading

Construction impacts have the potential to negatively affect the significant natural features within 120 m of the Solar Project Location. Activities related to development, such as grading, cut-and-fill, and presence of heavy machinery can cause soil erosion and compaction, while machinery can destroy over-hanging vegetation. Encroachment into the natural areas can also occur by machinery, foot traffic, and discarding or storage of construction materials outside the construction envelope.

Grading within the root zone of edge tree species may damage existing root systems or result in soil compaction. Soil compaction by heavy machinery may lead to reduced oxygen available to roots, reduced infiltration, impaired drainage and corresponding reduced root growth and ability to absorb water and minerals. Encroachment by heavy machinery has the potential to damage the root zone, limbs or trunks of edge species or disturb / destabilize natural vegetation.

Standard construction practices will be employed to ensure no sedimentation and/or damage is incurred to the wetlands, woodlands and wildlife habitat present within the Solar Project Location or the identified buffer areas.

No grading is proposed beyond the limits of the Solar Project Location as identified on **Figures 14.1 and 14.2**. Minimal grading is proposed across the Solar Project Location and will be limited to minor grading to accommodate the construction of internal solar module access roads. No grading is proposed within the land adjacent to the natural features (i.e. beyond the fence line). Grading within the root zone or removal of limbs from the trees within these significant woodlands will not occur (minimum setback of 15 to 30 m).

To prevent potential impacts, a construction fence (or heavy duty silt fence) will be installed prior to any on-site work and maintained during all phases of construction to control potential sediment transport from erosion and to function as a visual boundary to mark the limits of the work site and assist in controlling encroachment or incidental damage to edge species during construction and grading activities.

Due to the relatively flat topography of the area, grading requirements are not anticipated to involve significant earth movement works. No significant landforms or distinctive topography occur within the Solar Project Location. Generally, the solar panels will be constructed close to existing grades, subject to minor smoothing or removal of small hummocks to maintain sheet flow drainage beneath the solar modules. Grading work will be required for the construction of the access roads and associated roadside ditches. These roadways will consist of gravel and will not be paved, thereby reducing potential impacts associated with increased imperviousness.

Construction activity, such as increased traffic, noise or dust, has the potential to indirectly disturb birds or other wildlife, particularly breeding birds and their habitats. While the greatest increase in potential disturbance will occur during construction (e.g. site preparation and solar panel assembly), some disturbance of wildlife may occur during all phases of the Project (e.g.

maintenance activities). The current level of human activity is low and is generally restricted to agricultural uses.

Noise levels during construction will be elevated. Heavy machinery (i.e. bulldozers and scrappers) will be the primary contributor to ambient noise, although more sudden, intense noises will likely startle some wildlife species. The proper muffling of construction machinery will occur to keep noise levels at a minimum. Many of the edge species are not likely to be critically impacted by construction noise as they become accustomed to increased ambient noises. However, the more sensitive wildlife species may move deeper into the wooded areas or into other natural features. Large mammals may be displaced from the site due to increased traffic and construction noise (Arnett *et al.*, 2007). However, a certain level of sensory disturbance to game and wildlife resources in the Study Area already exists from ongoing agricultural activities. Once construction activity ceases, noise levels associated with the solar lands will be minimal and many of these species will likely return.

To avoid disturbance to winter foraging of Short-eared Owls north of the Solar Project Location, construction should avoid sensitive wintering period when they are particularly vulnerable to energy loss due to disturbance (December to February). If construction is necessary during the winter season, it should not take place during the most sensitive time of day (half hour before dusk to one hour after dusk) to minimize disturbance effects.

To avoid disturbance to grassland bird, construction should avoid peak breeding season for migratory birds (May 1 to July 31). Currently, construction is planned for August to November. However, if construction is necessary during the peak breeding season, it should not take place during the most sensitive times of day (when call activity is highest, in the first few hours after dawn, and shortly before dusk) and to minimize disturbance effects.

6.2.3.6 Sediment and Erosion Control

In order to minimize erosion potential and the introduction of sediment into the natural features during grading and construction activities, a number of erosion and sediment (E&S) control measures will be implemented prior to the initiation of any construction.

Erosion susceptibility in this area is relatively low. Due to the flat topography of the area, there are no steep or elongated slopes that would accelerate runoff during a storm event. The clay soils in the area are relatively cohesive and resist the erosive forces of runoff, more so than less cohesive particles, such as silt or fine sand. As such, the risk of erosion and resulting sedimentation within downstream natural features is limited, although not absent. As such, erosion and sediment controls will be installed during construction to minimize potential impacts.

The proximity and sensitivity of adjacent natural features increases the risk of sedimentation resulting from the detachment of soil materials within a construction area. As such, all natural features identified within 30 m of any proposed construction area are at higher risk of sediment transfer and erosion from grading and topsoil removal.

Appropriate erosion and sediment controls will be employed during all phases of construction to minimize the potential deposition of silt and sediment within the receiving systems as a result of site grading works. Measures to stabilize and restore any disturbed areas as soon as possible will be combined with appropriately designed erosion control measures to minimize erosion potential and capture any eroded materials prior to being transported downstream into the adjacent watercourse, wetlands or other natural features.

E&S control measures will be in installed to minimize erosion impacts adjacent to natural features, as appropriate. The following measures / guidelines will be implemented, as required, during the construction of the Wind Project components:

- Erosion control measures include seeding / naturalization of buffer strips and maintaining natural vegetation. Other measures, such as erosion control matting, netting or erosion control blankets, are not anticipated;

- Sediment control measures include perimeter silt fencing, mud mats (access roads), check dams (rock or strawbales), and sediment bags (dewatering);

- Silt barriers (e.g., fencing) will be erected along wetland and woodland edges located within 30 m of construction work areas (access roads) to minimize potential sediment transport to the natural features. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area (i.e. side slopes of access roads, realigned grassed swales) are stabilized with vegetation or the area has been returned to pre-disturbance conditions;

- Where the installation of an equalizing culvert is proposed (access roads), appropriate erosion control measures (i.e. rip rap, strawbales, seeding) will be installed at the ends of each culvert to prevent erosion;

- Where culverts are proposed within 30 m of a natural feature, enhanced sediment and erosion control measure (i.e. straw bales, double rows of sediment fencing, check dams) will be installed as added protection to filter runoff and further minimize potential sedimentation within the downstream features (wetland, woodland). This added protection is proposed to reduce environmental risk;

- As appropriate and prior to construction, the limits of vegetation clearing (hedgerows) will be staked in the field. The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include immediate rehabilitation of the disturbed area to pre-disturbance conditions;

- All disturbed areas will be re-vegetated immediately, or as soon as conditions allow (i.e. based on time of year); and

- The area between the access roads and the adjacent features will be naturalized (seeded) to establish a natural vegetated buffer along the edge of the community. All seeding and /or replanting of these areas will use species native to Ecoregion 7E and will be native to the site and/or surrounding natural features.

Specific E&S control measures will be selected, located and sized by an engineer during the detailed design stage to ensure proper functioning of these measures. All E&S controls will be installed prior to construction and will be maintained during and following construction to ensure their effectiveness at protecting the adjacent natural features.

In order to minimize the introduction of invasive species, the establishment of a self-perpetuating, dense vegetated cover crop beneath and between the solar panel arrays is proposed. This will minimize the ability of opportunistic invasive and non-native species to become established beneath the solar modules. The appropriate seed mix will also contain a diversity of native grassland species native to Ecoregion 7E and the local area that will comprise the long-term vegetative cover over the extent of the Solar Project Location.

6.2.4 Net Effects

A minimum 30 m buffer has been maintained from the majority of the natural features in siting the solar modules, fencing, berms, access roads and operation and maintenance facilities. Natural Features 37, 38 and 40, as well as the significant grassland habitats and associated winter raptor roosting and feeding area and rare species habitat, occur outside, but within 120 m, of the Solar Project Location.

The buffer areas between the development setback and the natural features will be naturalized with native plant species intended to be maintained as a 25 to 30 m vegetated buffer zone. The lands immediately adjacent to the woodlands and wetlands have been disturbed by agricultural activities in the past (annually) and provide little benefit in terms of ecological function, habitat or natural vegetation. Enhancing these areas through the establishment of naturalized buffers will benefit and enhance the adjacent natural features and associated habitat. Over time, these areas will become an extension of the natural features they are intended to protect.

A 280 m wide by 325 m long corridor linking Natural Features 30 and 31 has been proposed that will consist of natural native vegetation, maintain current flow patterns and remain unobstructed by ensuring no fences cross this proposed feature. Although the movement of large mammals further westward from Natural Feature 30 will be interrupted by the fences surrounding the solar modules and access roads, ingress and egress to Natural Feature 30 will remain available from natural habitats in the east.

Maintaining minimum setbacks during grading and construction activities will avoid soil compaction and prevent inadvertent damage or encroachment into the natural features. Soil compaction by heavy machinery may lead to reduced oxygen available to roots, reduced soil-water infiltration, impaired drainage and corresponding reduced root growth and ability to absorb water and minerals. Encroachment by heavy machinery has the potential to damage the root zone, limbs or trunks of edge species or disturb / destabilize natural vegetation. Best management practices with respect to minimizing noise, light and other disturbance during construction will be employed.

Natural flow patterns and surface water contributions to existing wetlands will be maintained by ensuring that existing surface water catchment boundaries are not adversely altered and access roads do not interfere with the contribution of flows to these features (e.g. cross-culverts to be installed as required). Surface flow within the buffer areas will not be altered as existing grades will remain.

Overall, the Solar Project, including the solar modules, access roads, fencing and berming is not anticipated to result in adverse environmental impacts. While a large area of agricultural land will be fenced off and covered with solar panels, the Natural Features located in and within 120 m of the Solar Project Location will be maintained, protected and enhanced through the establishment of minimum 30 m development setbacks, naturalization of buffer areas and enhancement of the east-west corridor between Natural Features 30 and 31.

A large area of land will be naturalized as a result of the establishment of buffers and corridors, which at present is actively farmed and possess minimal vegetated cover to support wildlife function. Overtime, these natural areas will become extensions of the natural features they were intended to buffer.

6.2.5 Post-Construction Monitoring Plan

Details regarding the potential negative impacts, mitigation strategy, objectives, monitoring plan and contingency measures to be implemented during construction and operation of the Solar Project are provided in **Table 6.2**. The following is a summary of the proposed monitoring plan.

During construction, best management practices for on-site grading and construction have been recommended. To ensure these measures are properly employed, the following monitoring measures are recommended:

- weekly monitoring of erosion and sediment control measures (and following major storm events) to ensure proper maintenance and functioning; rectify any discrepancies immediately; weekly visual inspections to ensure proper storage of fuel or other potential contaminants to minimize potential for on-site spills; rectify any discrepancies immediately

- weekly monitoring of construction fences to prevent encroachment into adjacent natural features; rectify any discrepancies immediately;

- weekly inspection of drainage ditches, culverts and general flow patterns to ensure proper site drainage.

During the operation of the Solar Project Location, few impacts are anticipated to the natural features and wildlife in the area. To confirm whether the proposed mitigation measures are protecting the natural features, the following post-construction measures are proposed:

- monitoring of winter wildlife movement within and adjacent to the Solar Project Location, including along the proposed corridor and adjacent to the proposed fencing, to determine the barrier effect of the project on local animal movement corridors and general circulation;

- to ensure the establishment of native grassland species within the proposed buffer areas and beneath the proposed solar modules, vegetation monitoring of these areas is recommended to ensure successful propagation of a nursery crop, successful propagation of native grassland species and to minimize the introduction of non-native or invasive species to the area.

6.3 ENVIRONMENTAL IMPACT STUDY – TRANSMISSION LINE

A summary of the natural features located within 120 m of the transmission line components of the Project, their relative location, potential impacts, recommended mitigation measures and overall net effects is provided in **Table 6.1 (Appendix B)**.

6.3.1 Description of Transmission Line

The transmission line component of the Project will consist of the following measures to convey electricity generated from the wind and solar generation facilities to the existing transmission line south of Hagersville:

- Collector Substation and Access Road

- Transmission Line and Interconnect Stations

- Operations and Maintenance Building

These components are summarized below with additional detail describing the substation components provided in the Construction Plan Report (separate cover).

6.3.1.1 Collector Substation and Access Road

The Collector Substation will be constructed within the Solar Project Location south of Natural Feature 30 (see **Figure 15.1**) to accumulate the power circuits from the wind and solar generation facilities. A detailed figure identifying the Collector Substation and associated access road, SWM facilities and temporary construction staging area is provided on **Figure 17.1** (**Appendix A**).

Approximately 250 MW of power will arrive via both underground cable collector circuits from the solar modules and overhead pole line conductor circuits (collector lines from the wind turbines), where it will be transformed from a 34.5 kV collection voltage to a 230 kV transmission voltage.

The Collector Substation will consist of a prefabricated modular electrical building, 6 capacitor banks, two power transformers and a termination gantry. All of these features will be constructed on concrete foundations within an 85 m by 85 m (7,225 m^2) prepared base of engineered fill and crushed stone. A grounding grid will be built within the crushed stone and extend to 1 m beyond the 2.4 m high perimeter chain link fence that will surround the substation.

The capacitor banks will be installed in separate concrete containment foundations to contain any insulating fluid that may leak from the capacitors. Each transformer will be mounted on a concrete base foundation within an oil containment facility that would capture all of the oil insulating fluid within each transformer in the event of a leak. A sound attenuation wall will be constructed around the perimeter of the two power transformers to minimize the escape of transformer noise into the surrounding environment. The termination gantry facilitates the connection of the collector substation to the overhead transmission tower adjacent to the substation.

A 5 m wide access road will be constructed from Haldimand Rd 20 to the Collector Substation along the western limit of the Solar Project Location (see **Figure 15.1**). The depth of the roadbed will be approximately 750 mm and consist of engineered fill and crushed gravel on top.

Area drainage from the collector station will be accomplished through a series of swales adjacent to the proposed access road that will collect and convey runoff from the substation area and the access road towards Haldimand Rd 20. The total drainage area associated with the substation and access road “hard” surfaces is less than 2 ha and therefore a formal water quality control pond is not appropriate. In addition to the conveyance of runoff, the series of swales will also provide water quality control in the form of grassed swales, which is a suitable SWM practice for such an area according to the Ontario MOE guidelines (MOE, 2003). Water quantity control, will be accomplished by providing a dry pond area for the accumulation and slow release of runoff before it enters the existing ditch and drainage system along Haldimand Road 20.

6.3.1.2 Transmission Line and Interconnect Stations

A 20 km long overhead 230 kV transmission line will be constructed from the substation to connect the power generated by the wind and solar generation equipment to the Ontario electricity grid that is accessible at a location south of Hagersville. The transmission line will be located along Haldimand Road 20 within the municipal road right-of-way (see **Figure 15.1 to 15.6, Appendix A**).

The transmission line will consist of 3 vertically stacked lines suspended on 28 m high monopole structures, which will be erected on concrete foundations within the existing Haldimand Rd 20 right-of-way. The structures will generally be spaced approximately 150 to 200 m apart, except where (a) adjacent to other transmission line components, (b) where significant changes in line direction occur or (c) to avoid significant natural features. Through Nelles Corners, at the intersection of Haldimand Rd 20 and Highway 3, the overhead transmission line will transition to underground cable for a length of approximately 1 km (**Figure 15.4, Appendix A**). The underground cable is required to avoid violating required safety clearances over the built infrastructure of Nelles Corners. The underground cable will be housed within a concrete encased 230 kV ductbank a minimum of 1.2 m below grade, and will be backfilled with thermal fill to dissipate heat of cable power losses throughout the ground. The underground ductbank will be constructed entirely within the Haldimand Rd 20 right-of-way.

Two transitioning stations will be required at each end of the underground ductbank north and south of Nelles Corners to facilitate transitioning of the overhead transmission line. The transitioning stations will contain an A-frame galvanized steel lattice type structure anchored to a 20 m by 20 m concrete foundation. A grounding grid will be built within crushed stone beneath the concrete foundation and will extend to 1 m beyond the 2.4 m high perimeter chain link fence surrounding each station.

At the north end of the transmission corridor, the transmission line will terminate at an interconnect station located on the north side of Haldimand Rd 20 (**Figure 15.6, Appendix A**). The transmission line overhead conductors will terminate on a termination gantry (structure) contained within the interconnect station, which will be enclosed by a 40 m wide by 40 m long by 2.4 m high chain link fence. The station will be built on a prepared base of engineered fill and crushed stone to a depth of 600 mm. A grounding grid will be built within the crushed stone and extend to 1 m beyond the 2.4 m high perimeter chain link fence. The remaining area will be used for temporary storage and staging during construction.

The station will contain two termination gantries anchored to concrete foundations. One gantry will be used for the termination of the transmission line and the other to facilitate Hydro One's connection of the power collection circuit to the existing transmission circuit that originates at the Nanticoke Power Generating Station. In addition, a 230 kV isolation switch will be installed on a concrete foundation between the two termination gantry structures and a small EHouse will be installed within the fenced enclosure for the station.

The interconnect station has a small footprint and therefore requires minimal SWM infrastructure. All proposed surfaces will be gravel and therefore similar to existing conditions, so water quantity controls are not required. Water quality control will be provided through the use of swales alongside the proposed access roads that convey drainage from the site to the existing ditches alongside Haldimand Road 20.

A temporary construction staging area for the construction of the transmission line will be located adjacent to the interconnect station on the north side of Haldimand Rd 20. It will be consist of a 0.4 ha (1 acre) graveled compacted surface suitable for vehicular truck traffic that will be used for parking, equipment and material storage, water and rinsing facilities (to be brought in by tanker), laydown areas for electrical components and others. The total area of the interconnect station and associated staging area is 60 m by 180 m (**Figure 15.6, Appendix A**).

6.3.1.3 Operations and Maintenance Building

An operations and maintenance (O&M) facility will be constructed on the south side of Haldimand Rd 20 opposite the solar lands for this Project, just east of Mt. Olivet Rd (see **Figure 15.1, Appendix A**). A detailed figure identifying the O&M building and associated access road, SWM facilities and temporary construction staging area is provided on **Figure 17.2** (**Appendix A**).

This prefabricated engineered structure, measuring 24 m wide by 85 m long by 7 m high and constructed on concrete foundations, will be used as an Operations and Maintenance (O&M) facility and will contain several offices, employee welfare facilities, control facilities, solar farm and wind farm spare parts storage space, a public greeting centre, common areas, maintenance work area and vehicle storage facilities.

The employee welfare facilities will be supported by a potable water supply well on the property as well as septic tank and filter bed for approximately 20 workers. An access road to the O&M building will intersect with Haldimand Rd 20 and proceed due south to the building parking area located directly south of Woodland 38.

Electrical power for the O&M facility will be provided from Haldimand County Hydro power circuits located on Haldimand Rd 20. The power will be delivered by overhead wires on overhead poles installed adjacent to the access road from Haldimand Rd 20 and will terminate on a transformer pole adjacent to the O&M building. The transformer will step down the power supply to a voltage that can be utilized within the building. The final connection of the power will be made through underground cable from the transformer pole to the building electrical service located within the building.

The O&M facility has a total area of about 3.2 ha, including building storage, parking areas and access road, plus a septic system and SWM facility (**Figure 15.1, Appendix A)**. Drainage from this area is generally southerly towards the existing channel at the south property limit associated with Natural Feature 39. SWM (conveyance, treatment and detention) will be

achieved through a combination of grassed swale drainage ditches and an end-of-pipe constructed wetland facility.

Drainage from the access road and O&M building/parking areas will be conveyed to the end-of-pipe facility through grassed swale drainage ditches which themselves provide water quality treatment benefits, in addition to moderate peak flow reduction. The SWM pond will provide both water quality treatment (sediment removal) and water quantity control (discharge rate restricted to existing conditions) and will be planted with vegetation species tolerant to a variety of moisture conditions. The basin will discharge in a non-erosive fashion to the existing channel at the southern site boundary. Overland flow from beneath the solar modules will be conveyed via a swale proposed along the west side of Natural Feature 39a that will outlet downstream of the SWM pond.

6.3.2 Adjacent Natural Features

There are 19 natural features located within 120 m of the Transmission Line components of the Project described in **Section 6.3.1**. Within these natural features, 15 significant woodlands, 15 significant wetlands and 13 significant wildlife habitat features were identified within the Zone of Investigation along the 20 km transmission line and associated transmission line components (substation, O&M building). The following is a summary description of each of these natural features and their relative location:

Natural Feature 1

This13.9 ha natural feature is located along the south side of Haldimand Road 20, adjacent to the right-of-way (**Figure 15.6**). It is hydrologically connected to Natural Feature 2 by a small watercourse that flows southward along the east side of the feature. The woodland area consists of a mature deciduous swamp community that is dominated by green ash and scattered oak trees. Some interior forest habitat is present within this community, although is limited and likely impacted by the contiguous residential uses. A small marsh community is also located in the southwest portion of the feature, although evidence of cattle grazing was observed. No rare species or community types were identified within this community.

The feature has been identified as a significant woodland based on woodland shape and proximity to a water feature. It has been identified as containing wetland (assumed significant for the purposes of this Project). One headwater palustrine swamp community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 1 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
Transmission Line	21	19

*minimum distances represented in the above table

Natural Feature 2

This 6.2 ha natural feature is located along the north side of Haldimand Road 20 and is separated from the right-of-way by approximately 60 m. This natural feature is hydrologically connected to Natural Feature # 1 (**Figure 15.6**). The woodland area appeared to consist of a middle age deciduous swamp community dominated by green ash and scattered white elms. No interior forest habitat, rare species or rare community types were identified within this community.

The feature has been identified as a significant woodland based on woodland size and proximity to a water feature. It has been identified as containing wetland (assumed significant for the purposes of this Project). One headwater palustrine swamp community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 2 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
Transmission Line	58	58

*minimum distances represented in the above table

Natural Feature 3

This 8.7 ha natural feature is located along the north side of Haldimand Road 20, south of Townline Road (**Figure 15.5**). It is located in close proximity to Natural Feature # 2. A wooded swamp community at the north of the feature narrows close to Haldimand Road 20, where it extends to the edge of the right-of-way. This middle age swamp wetland community appears to be dominated by green ash and scattered elm trees. No rare species or rare community types were identified within this community, although it appears to contain interior forest habitat within the northern portion of the feature. This swamp is hydrologically connected to the STC 2 LSW south of Haldimand Road 20 (located approximately 500 m downstream).

The feature has been identified as a significant woodland based on woodland shape and proximity to a water feature. It has been identified as containing wetland (assumed significant for the purposes of this Project). One mid-reach palustrine swamp community occurs on soils

with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 3 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
Transmission Line	18	18

*minimum distances represented in the above table

Natural Feature 4

This10.4 ha natural feature is located along the north side of Haldimand Road 20, south of Highway 3 and west of Dry Lake Road (**Figure 15.4**). It consists of an isolated deciduous woodland that extends to the edge of the right-of-way, which is comprised of sugar maple, red oak and American beech, with a small (0.1 ha) inclusion of wetland fronting onto Haldimand Road 20. The swamp community is dominated by green ash with red-osier dogwood in the understorey. Interior forest habitat is present and four PIF species were identified in the woodland (**Table 4.6**).

The feature has been identified as a significant woodland based on woodland size, shape, and connectivity. It has been identified as containing wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding pools and habitat for declining woodland bird species. One headwater palustrine swamp community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 4 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Declining Sp) (m)
Transmission Line	18	18	18

*minimum distances represented in the above table

Natural Feature 6

This 15.2 ha natural feature consisted almost entirely of a young, cultural plantation of white spruce located to the southwest of the intersection of Haldimand Road 20 and Concession 8 (**Figure 15.4**). Understorey consisted of old field species such as goldenrods, asters and wild carrot. The plantation is separated from Haldimand 20 by a small cultural meadow. A tributary

of Stoney Creek flows along the south side of Concession 8 north of this feature. No interior forest habitat, rare species or rare community types were identified within this community.

The feature has been identified as a significant woodland based on woodland size and proximity to a water feature.

Natural Feature 6 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)
Transmission Line	1

*minimum distances represented in the above table

Natural Feature 10

Feature 10 is a 20.9 ha woodland located on the south side of Haldimand Road 20 and north of Concession 6 (**Figure 15-3, Appendix A**) and comprised of sugar maple and shagbark hickory-dominated forests. This mid-age to mature forest, which extends to the edge of the right-of-way, was dominated by sugar maple and contained interior forest habitat. Cooper's Hawk, an areas sensitive species, was observed in this feature, along with four PIF species. Two meadow marsh communities dominated by reed canary grass occur along Haldimand Road 20 at the north and south edges of this feature, totaling 2.3 ha in size, both of which are associated with headwater reaches of Stoney Creek. A shagbark hickory community, including a vernal pool, was also present in the southwest portion of this feature adjacent to Turbine 58 more than 120 m from the transmission line (see **Figure 15.3** and **Table 4.6**).

The feature has been identified as a significant woodland based on woodland size and shape, proximity to a water feature, and community diversity. It has been identified as containing wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding ponds and habitat for declining forest species.

One headwater palustrine swamp community occurs adjacent to Haldimand Road 20 on soils with high clay content and intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 10 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Amphib Pools) (m)	Approximate Distance to SWH (Declining Sp) (m)
Transmission Line	17	14	17	17

*Note: Vernal pools were identified throughout this woodland / wetland feature. A conservative distance was estimated based on the distance to the edge of the woodland.

*minimum distances represented in the above table

Natural Feature 11

This7.4 ha natural feature is located along the north side of Haldimand Road 20, north of Link Road, opposite Natural Feature 10 (**Figure 15.3**). This mature forest community, which extends to the edge of the right-of-way, was separated from Natural Feature 10 by Haldimand Road 20. It was dominated by sugar maple, with some American beech and red oak. Interior forest habitat is present, although no rare species or rare community types were identified within this community. A tributary of Stoney Creek flows within 30 m of the southern tip of this feature.

The feature has been identified as a significant woodland based on woodland shape and proximity to a water feature.

Natural feature 11 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)
Transmission Line	3

*minimum distances represented in the above table

Natural Feature 12

This 2.3 ha natural feature is located south east of the intersection of Haldimand Road 20 and Link Road, with frontage along both roadways (**Figure 15.3**). This feature, which extends to the edge of the right-of-way, consists of a mature deciduous woodland community comprised of sugar maple, American beech and red oak located downstream of Natural Features 10 and 11. This woodland is considered deer wintering habitat. A tributary of Stoney Creek flows through the central portion of this woodland feature. No interior forest habitat, rare species or rare community types were identified within this community.

This feature contains no significant natural features.

Natural Feature 13

This 2.3 ha natural feature is located along the north side of Haldimand Road 20, west of Little Road, and consists of significant woodland and wetland (**Figure 15.3**). It is located opposite Natural Feature 80 and extends to the edge of the right-of-way, with the exception of several residences. This mature deciduous forest feature is comprised of two separate forest communities, with a small (0.3 ha) inclusion of deciduous swamp along Haldimand Road 20 at the west end of the feature. The forest community is dominated by sugar maple and red oak, with shagbark hickory within the western portion of the feature and American beech within the eastern portion of the woodland. A small inclusion of hawthorn is also present. No rare species or rare community types were identified within this community, although it appears to contain interior forest habitat. Several residences fronting onto Haldimand Road 20 occur within this feature.

The feature has been identified as a significant woodland based on woodland size, shape and community diversity. It has been identified as containing wetland (assumed significant for the purposes of this Project). One headwater palustrine swamp community occurs adjacent to Haldimand Road 20 on soils with high clay content and intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 13 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
Transmission Line	16	16

*minimum distances represented in the above table

Natural Feature 18

This0.2 ha natural feature is located along the north side of Haldimand Road 20, north of Concession 6, opposite Natural Feature # 19 (**Figure 15.2**). It consists of a small (0.3 ha) mid-age deciduous swamp community that extends to the edge of the right-of-way, which is dominated by green ash with red-osier dogwood in the understorey. No interior forest habitat, rare species or rare community types were identified within this community. A tributary of Stoney Creek flows through the central portion of this swamp feature.

The feature has been identified as containing wetland (assumed significant for the purposes of this Project). One headwater palustrine swamp community occurs adjacent to Haldimand Road 20 on soils with high clay content and intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 18 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Wetland (m)
Transmission Line	1

*minimum distances represented in the above table

Natural Feature 19

This 96.7 ha natural feature is located along the south side of Haldimand Road 20, between Concession 5 and 6, opposite Natural Feature 11 and 20 (**Figure 15.2**). This large (97 ha) feature, which extends to the edge of the right-of-way, was comprised of a diversity of deciduous swamp, swamp thicket and forest communities, with small inclusions of meadow marsh along tributaries of Stoney Creek. The deciduous forests were dominated by sugar maple and red oak, while the deciduous swamps were dominated by green ash. Ovenbird, an areas sensitive species, was observed in this feature, along with two PIF species. Interior forest habitat is present within this community, along with two vernal pools located within the deciduous forest communities set back from Haldimand Road (**Figure 15.2**). The overall wetland is approximately 47 ha in size, and is located along several headwater tributaries of Stoney Creek. A dug pond is present within the north portion of the swamp, approximately 80 m from Haldimand Road 20.

The feature has been identified as a significant woodland based on woodland size and shape, proximity to a water feature and community diversity. It has been identified as containing wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding ponds and habitat for area-sensitive and declining bird species.

Three mid-reach palustrine swamp communities occur west of Haldimand Road 20 (north and south of Concession 6) on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 19 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Amphib Pools) (m)	Approximate Distance to SWH (AS Species) (m)
Transmission Line	16	16	>120	16

*minimum distances represented in the above table

Natural Feature 20

This 6.2 ha natural feature is located along the north side of Haldimand Road 20, west of the intersection with Kohler Road, opposite Natural Feature 19 (**Figure 15.2**). The mid-age forest community, which extends to the edge of the right-of-way, was dominated by shagbark hickory, with green ash, bur oak and American beech, and was bisected by a small linear meadow marsh community. The marsh community (0.6 ha) located along a tributary of Stoney Creek was dominated by reed canary grass. Interior forest habitat is present within this feature, although no rare species or rare community types were present.

The feature has been identified as a significant woodland based on woodland shape and proximity to a water feature. It has been identified as containing wetland (assumed significant for the purposes of this Project). This mid-reach palustrine marsh community occurs east of Haldimand Road 20 (upstream from Feature 19) on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 20 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
Transmission Line	7	10

*minimum distances represented in the above table

Natural Feature 29

This 55.9 ha natural feature is located along the north side of Haldimand Road 20, west of Mount Olivet Road (**Figure 15.1**) and consisted of a diversity of open woodland, cultural meadow, meadow marsh and swamp thicket communities. The meadow along the eastern portion of the feature occurred over shallow soils. The swamp thicket areas along Haldimand Road 20 were dominated by red osier dogwood with a sparse canopy of green ash, with a small area of reed canary grass meadow marsh observed at the west end of the feature. A mature deciduous forest community containing interior forest habitat occurred in the west portion of the feature dominated by sugar maple with shagbark hickory and red oak. A second forest community dominated by shagbark hickory and white ash is located at the north of the feature. An area of open water, likely an abandoned quarry, occurred within the south central portion of the site, located approximately 150 m from Haldimand Road 20. While no interior forest habitat is present, it is large enough to provide habitat for area sensitive species. No rare species or rare community types were present.

The feature has been identified as a significant woodland based on woodland size, shape, proximity to a water feature and connectivity. It has been identified as containing wetland (assumed significant for the purposes of this Project). Two headwater palustrine swamp communities occur east of Haldimand Road 20 (upstream from Feature 19) on soils with high

clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 29 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (AS Species) (m)
Transmission Line	17	17	17

*minimum distances represented in the above table

Natural Feature 30

This13.0 ha natural feature is located within the central portion of the solar lands, north of Haldimand Road 20, west of Mount Olivet Road and south of Meadows Road (**Figure 15.1**). It consists of both deciduous forest and swamp communities, with a small meadow marsh community along the southern boundary and a dug pond supporting a shallow marsh community in the southeast corner. The western portion of the feature canopy was dominated by red oak with sugar maple and shagbark hickory, while the eastern portion was dominated by shagbark hickory with white ash. The central portion of this woodland consisted of deciduous swamp draining eastward that was dominated by a relative open canopy of swamp maple. Six vernal pools were identified along ATV ruts within this feature, which supported leopard frog tadpoles. The total wetland area measured approximately 5.7 ha in size. Interior forest habitat is present within this feature, although no rare species or rare community types were present.

The feature has been identified as a significant woodland based on woodland size and shape, proximity to a water feature, and community diversity. It has been identified as containing wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding pools and habitat for declining woodland species.

Two headwater palustrine swamp communities occur on soils with high clay content with evidence of surface water inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge

Natural Feature 30 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Amphib Pools) (m)	Approximate Distance to SWH (Declining Sp) (m)
Collector Substation	40	42	40	40
Access Road	35	37	35	35
Transmission Line	61	61	61	61

*minimum distances represented in the above table

Natural Feature 36

This 44.1 ha natural feature is located along the south side of Bains Road, west of Mount Olivet Road (**Figure 15.1**). This mature forest community was dominated by sugar maple with green ash and white oak. A deciduous swamp dominated by swamp maple was identified along the southeastern edge of the community. Interior forest habitat is present within this feature, although no rare species or rare community types were present.

The feature has been identified as a significant woodland based on woodland size, shape, proximity to a water feature and community diversity. It has been identified as containing wetland (assumed significant for the purposes of this Project). Two headwater palustrine swamp communities occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge

Natural Feature 36 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (AS Species) (m)
Transmission Line	101	>120	101

*minimum distances represented in the above table

Natural Feature 37

This 4.5 ha natural feature is located along the south side of Haldimand Road 20 east of Mount Olivet Road (**Figure 15.1**). This feature consisted of meadow marsh along the north side of the feature separating the deciduous swamp and forest community from Haldimand Road 20. The meadow marsh consisted of reed canary grass, while the mid-age swamp community was dominated by bur oak with balsam poplar and white elm. No interior forest habitat, rare species or rare community types were present.

The feature has been identified as containing wetland (assumed significant for the purposes of this Project). One headwater palustrine swamp community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 37 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Wetland (m)
Transmission Line	16

*minimum distances represented in the above table

Natural Feature 38

This7.7 ha natural feature is located along the south side of Haldimand Road 20 between Mount Olivet Road to the west and Wilson Road to the east (**Figure 14.2**). This medium-sized woodlot consists of various swamps, dominated by green ash with swamp maple, red maple with bur oak, or swamp maple with bur oak.

The feature has been identified as a significant woodland based on woodland shape, proximity to a water feature and community diversity. It has been identified as containing wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding pools.

One headwater palustrine swamp community and one headwater palustrine marsh community occur on soils with high clay content with evidence of intermittent inflow. These wetlands are situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Interior forest habitat is present within this community, although no rare species or rare community types were present.

Natural Feature 38 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)
O&M Building	71	71
Access Road	32	32
Ditches	30	30

*minimum distances represented in the above table

Natural Feature 39

This 23.1 ha natural feature consists of two woodlands (39a and 39b) connected along a tributary of Wardell's Creek, which extends from the west side of Wilson Road downstream to Haldimand Road 20 (**Figure 14.2**). The woodlands were dominated by sugar maple with American beech or white ash, while the areas along the watercourse were dominated by green ash swamps with pockets of crack willow. A small section of cultural dogwood thicket was found along the western edge of the woodland 39a (north). Woodland 39a contained interior forest habitat. Eastern milksnake was observed along Wilson Road east of Woodland 39b, and 5 PIF species were observed in this feature.

Woodland 39a has been identified as a significant woodland based on woodland shape, proximity to a water feature and the presence of a species at risk (milksnake). Woodland 39b has been identified as a significant woodland based on proximity to a water feature and the presence of a species at risk (milksnake). This feature has been identified as containing wetland (assumed significant for the purposes of this Project) and supports significant wildlife habitat in the form of amphibian woodland breeding pools and habitat for declining forest birds.

One mid-reach palustrine marsh community occurs on soils with high clay content with evidence of intermittent inflow. This wetland is situated in a predominantly agricultural watershed with no evidence of groundwater discharge.

Natural Feature 39 is located within 120 m of the Transmission Line components, as follows:

Project Component	Approximate Distance to Significant Woodland (m)	Approximate Distance to Wetland (m)	Approximate Distance to SWH (Deer Yard) (m)	Approximate Distance to SWH (Declining Sp) (m)
SWM Pond	>120	70	113	74
Ditches	22	22	37	14

*minimum distances represented in the above table

6.3.3 Potential Effects and Mitigation

Potential impacts associated with the Transmission Line components include an increase in impervious surface cover (substation, access, O&M building), corresponding impacts to the hydrologic cycle through reduced recharge and increased runoff from hardened surfaces, and encroachment into, over and adjacent to natural features. With respect to the transmission line and pole structures, potential impacts include disturbance during construction of the monopoles and foundations, dewatering during installation of concrete foundations, and encroachment into adjacent woodland and wetland features.

Construction and installation of a renewable energy facility may be permitted within significant valleylands, woodlands and wildlife habitat, or within 120 m of these natural features as well as within 120 m of a provincially significant southern wetland or provincially significant coastal wetland, subject to the completion of an EIS (O. Reg. 359/09, s. (38(1)). With the exception of where transmission lines may overhang individual trees that may encroach within the right-of way along Haldimand Road 20, the significant natural heritage features described in **Section 5** and identified on **Figures 15.1 to 15.6** have been avoided through the location of the Collector Substation, O&M facility, access road, transmission line and poles outside of such features.

The following sections provide a detailed description of the potential negative environmental effects of the Transmission Line components, identify appropriate mitigation measures and describes how the environmental effects monitoring plan and construction plan will address any negative environmental effects (O. Reg. 359/09, s. 38(2)(a)). Similar to the Wind and Solar Project, impact assessment was conducted on a feature basis, rather than a turbine-by-turbine basis, so that potential impacts to significant natural heritage features arising from multiple project components could be considered together.

6.3.3.1 Direct Impacts to Natural Features

Significant Wetlands

The following significant wetlands were identified within Natural Features 1, 2, 3, 4, 10, 13, 18, 19, 20, 29, 30, 36, 37 38 and 39 (**Figures 15.1 to 15.6, Appendix A**) The specific distance from each wetland to each Transmission Project component is provided in Section 6.3.2.

In accordance with O. Reg. 359/09, s. 37, no part of the Project is sited within a provincially significant southern wetland (and as a condition of the application of the Wetland Characteristics and Ecological Functions Assessment (MNR, 2010) protocol, all wetlands within 120 m of the Project Location are treated as provincially significant; **Sections 5.2.1, 5.3.1 and 5.4.1**). Furthermore, since the Project Location includes the air space in which a project operates, the transmission lines have been sited such that no transmission lines overhang a wetland.

The transmission line is located adjacent to the following wetlands: 1, 2, 3, 4, 10, 13, 18, 19, 20, 29 and 37. There will be no direct loss of wetland habitat or function. The Transmission Line

has been sited along the opposite side of the road from all wetlands (with one exception) to avoid potential interference or encroachment during construction or future maintenance activities. In only one instance (between Natural Feature 18 and 19), where wetlands are located on both sides of Haldimand Road 20, the transmission line passes immediately adjacent to, but not over, the wetland in Natural Feature 18. The transmission line will pass over the maintained portion of the existing right-of-way.

The monopole structures have been located outside of all wetlands. Poles will be located within the municipal right-of-way a minimum of 6 m (maximum ranging from 9.5 m to 11.5 m depending on width of right-of-way) from the existing edge of pavement. The transmission lines may be located less than 6 m from the edge of pavement, where required to avoid crossing any wetland features, as they will be suspended approximately 4 m out from each pole structure.

No grading or removal of natural vegetation is proposed to install the Transmission Line. Any vegetation impacted during construction is located within the municipal right-of-way and subject to current maintenance operations. Construction activities during the installation of the monopoles and installation of the transmission line are anticipated to be low impact and short duration. Any disturbance to local wildlife that may occur will be temporary in nature. The wetlands along Haldimand Road 20 currently experience higher impact from daily vehicle traffic and maintenance of the roadway.

All buildings, access roads, fencing, electrical equipment and SWM facilities associated with the Collector Substation and the O&M facility have maintained a minimum 30 m setback from the wetland boundary in Natural Feature 30 and 38, respectively (**Figure 15.1, Appendix A**). No direct impacts on the wetlands are anticipated. The lands located adjacent to the wetlands will be naturalized to create a vegetated buffer between the wetlands and Transmission Line components. Access to the O&M facility has been directed to the east side of Natural Feature 38 to avoid direct impacts on the wooded swamp and small meadow marsh feature located at the northwest corner of Natural Feature 38.

During grading and construction activities associated with these facilities, potential erosion and sedimentation is possible, although proper erosion and sediment controls and construction management practices can minimize potential impacts. Dust generation during such activities may also impact adjacent wetlands vegetation.

No significant grading is proposed during the construction of these facilities and existing drainage patterns will be maintained, ensuring any surface water flows currently draining to the various wetlands will be maintained.

There are no significant wetland located within 120 m of the Interconnect Station or Transitioning Stations proposed adjacent to Haldimand Road 20 (**Figure 15.4 and 15.6, Appendix A**).

Significant Woodlands

The following significant woodlands occur within 120 m of the Transmission Project components of this project: 1, 2, 3, 4, 6, 10, 11, 13, 19, 20, 29, 30, 36 and 39. The specific distance from each woodland to each Transmission Line component is provided in Section 6.3.2.

The O&M facility and associated access road and SWM collector system are proposed adjacent to Natural Feature 38. The O&M facility itself will be a minimum of 71 m from the dripline of the woodland, while the access road and associated roadside ditch will maintain a setback of 30 m. No encroachment or grading within the adjacent buffer area is proposed. Therefore, no impacts on the Natural Feature 38 are anticipated.

The Collector Substation and associated access road are proposed adjacent to Natural Feature 30. The Collector Substation itself will be a minimum of 40 m from the dripline of the woodland, while the access road and associated roadside ditch will maintain a setback of 35 m. Fencing around the Collector Substation will provide a physical barrier between the proposed development and adjacent natural features, and will be a minimum of 31 m from the dripline. No encroachment or grading within the adjacent buffer area is proposed. Therefore, no impacts on the Natural Feature 38 are anticipated.

The Transmission Line itself is located adjacent to the following significant woodlands: 1, 2, 3, 4, 6, 10, 11, 13, 19, 20, 29, 30 and 36. For 8 of the 12 significant woodlands that exist adjacent to the Transmission Line along Haldimand Road 20, construction activities will occur on the opposite side of the road. No direct impacts to the form, function or habitat of these woodlands is expected during construction or operation of the project.

Of the 5 remaining significant woodlands, the Transmission Line is located on the same side of the Haldimand Road for 3 of the woodlands (Natural Feature 2, 6, 11) and crosses from one side of Haldimand Road 20 to the other adjacent to Natural Feature 19. In all cases, transmission line will be installed within the right of way in cleared areas and located between 6 and 15 m from the existing road edge, as appropriate.

Direct impacts to woodland features may result from clearing and site preparation for the installation of the monopole structures within portions of the woodlands that encroach within the right-of-way. Tree removal and site preparation to construct the foundations and install the pole structures will result in localized disturbance and loss of woodland within the footprint of the monopole foundation, although the extent of impacts will be minimal.

The last significant woodland located adjacent to the Transmission Line is associated with Natural Feature 30, which occurs within the central portion of the solar lands. The Transmission Line will be located a minimum of 61 m from the dripline and will not result in direct impacts to this feature.

There are no significant woodlands located within 120 m of the Interconnect Station or Transitioning Stations proposed adjacent to Haldimand Road 20 (**Figure 15.4 and 15.6, Appendix A**).

Significant Wildlife Habitat

The following natural features contain significant wildlife habitat within 120 m of the Transmission Project components of this project: 2, 4, 10, 11, 12, 13, 19, 29, 30, 36 and 39. The specific distance from each significant wildlife habitat feature to each Transmission Line component is provided in Section 6.3.2.

No removal of natural vegetation is proposed within the majority of the natural features along Haldimand Road 20, with the exception of localized areas of Natural Features 2, 6, 11 and 19 that may be directly impacted during the clearing and site preparation to install the monopoles, as required, within the right of way along Haldimand Road 20.

No impacts to deer yards, vernal pools or area sensitive species are anticipated as a result of these small encroachments. No rare species were identified within these features. Any disturbance to local wildlife populations is anticipated to be temporary during construction. These areas are already susceptible to more permanent disturbance resulting from traffic along Haldimand Road 20 and common wildlife species in the area have likely adapted to such impacts.

A few significant grassland habitats occur adjacent to the proposed Transmission Line, although these features occur beyond the maintained road shoulders, ditches and other areas maintained within the right of way. As a result, no direct impacts to these features are anticipated.

No animal movement corridors exist within the Transmission Project Location.

Fencing is proposed around the Collector Substation and O&M facility. These structures are not proposed within an animal movement corridor and no fencing will encroach within 30 m of the significant wildlife habitat in the adjacent natural features. No direct impacts on significant wildlife habitat are anticipated.

Disturbance from construction activity, such as increased traffic, noise, or dust, may result in the temporary avoidance of wildlife habitats (woodlands, wetlands, grasslands) by birds and other wildlife. These effects are greatest if disturbance occurs during critical life stages such as courtship or nesting (NWCC, 2002). However, the return to these habitats is expected once construction is complete.

Vernal pools within Natural Features 10 and 30, as well as the surface drainage patterns that sustain these amphibian breeding areas, will not be impacted. They occur within the natural features and no encroachment during construction or installation of the monopole structures is

proposed within these natural features. The vernal pools located within Natural Features 19 and 38 are located further than 120 m from the Transmission Project Location.

There is no significant wildlife habitat located within 120 m of the Interconnect Station or Transitioning Stations proposed adjacent to Haldimand Road 20 (**Figure 15.4 and 15.6, Appendix A**).

6.3.3.2 Hydrologic Impacts

Drainage will generally be directed to existing receiving systems (drainage paths, roadside ditches, wetlands etc.) via sheet flow as under current conditions. Ditches will be constructed along the main access roads to the Collector Substation and O&M facility to capture and convey runoff from the gravel roadways via grassed ditches to 2 SWM facilities.

Since the total drainage area associated with the Collector Substation (including the access road "hard" surfaces) is less than 2 ha, only minor impacts to local hydrology are anticipated. A dry pond will provide quantity (and quality in conjunction with the grassed ditches) for the gravel access road to the Collector Substation. A separate wet pond facility will be constructed south of the O&M facility to mange runoff from the building, access roads and gravel parking / storage areas.

Existing catchment area boundaries will be maintained. Localized drainage to the central wetland and woodland features north of Haldimand Road 20 (Natural feature 30) will be maintained as no grading or construction is proposed within 30 m of these natural features. Drainage south of Haldimand Road will be conveyed via the roadside ditches proposed along the gravel access road to the wet pond facility. Sheet flow from beneath the solar modules will be conveyed to the via a realigned swale collector system to its current discharge location (tributary of Wardell's Creek and associated riparian wetland communities).

Further details on the proposed SWM plan for this area are provided within the Design and Operation Report (under separate cover).

6.3.3.3 Vegetation Removal

The Transmission Project components will occur either within existing agricultural fields or along the existing right of way associated with Haldimand Road 20. Natural vegetation in these areas is limited to maintained roadside ditches and portions of adjacent natural features that encroach into the right of way. No natural vegetation occurs within the agricultural fields located within the Transmission Project Location.

The only areas where vegetation removal is proposed are within the local areas surrounding the proposed monopoles structures that will be cleared for the construction of the monopole foundations. Clearing and grubbing of these areas will be required, however, the extent of this

disturbance will be limited to the existing right of way. No rare vegetation species were identified within the Zone of Investigation.

To the extent practical, tree and/or brush clearing would be completed prior to or after the breeding season for migratory birds (May 1 to July 31). Currently, construction is planned for fall 2011. However, should clearing be required during the breeding bird season, prior to construction, surveys will be undertaken to identify the presence/absence of nesting birds or breeding habitat. If a nest is located, a designated buffer will be marked off within which no construction activity will be allowed while the nest is active. The radius of the buffer width ranges from 5- 60 m depending on the species. Buffer widths are based on the species sensitivity and on buffer width recommendations that have been reviewed and approved by Environment Canada.

6.3.3.4 Land Use Activity and Operation

The intensity of land use activity within the Transmission Project Location will increase during construction, with the level of disturbance and disruption anticipated to increase over current agricultural activity. The areas adjacent to Haldimand Road 20 where the transmission line is proposed currently experience traffic noise, dust generation and disturbance. Increased activity associated with the transmission line will be localized and temporary during construction. Once complete, human activity will be limited to normal maintenance activities associated with the Transmission Line components.

During operation, human activity and vehicle traffic (maintenance or otherwise) will primarily be restricted to daytime hours.

Light pollution can disrupt natural diurnal rhythms of wildlife, and is particularly harmful to nocturnal and migratory animals and animals in flight. The potential effects of artificial light pollution can be mitigated by ensuring that direct glare is not be visible beyond the substation boundaries, which can be avoided by installing low intensity and downward pointing lights. All outdoor lighting associated with the Collector Substation, O&M facility and other Project components will be turned off when not in use, except where used for security and safety purposes, where motion sensors will be used.

6.3.3.5 Construction and Grading

Construction impacts have the potential to negatively affect the significant natural features within 120 m of the Solar Project Location. Activities related to development, such as grading, cut-and-fill, and presence of heavy machinery can cause soil erosion and compaction, while machinery can destroy over-hanging vegetation. Encroachment into the natural areas can also occur by machinery, foot traffic, and discarding or storage of construction materials outside the construction envelope.

Grading within the root zone of edge tree species may damage existing root systems or result in soil compaction. Soil compaction by heavy machinery may lead to reduced oxygen available to roots, reduced infiltration, impaired drainage and corresponding reduced root growth and ability to absorb water and minerals. Encroachment by heavy machinery has the potential to damage the root zone, limbs or trunks of edge species or disturb / destabilize natural vegetation.

Standard construction practices will be employed to ensure no sedimentation and/or damage is incurred to the wetlands, woodlands and wildlife habitat adjacent to the Collector Substation and O&M facility. Similar measures will be employed adjacent to the monopole structures to reduce encroachment into the adjacent woodlands.

No grading is proposed beyond the limits of the Transmission Line Location as identified on **Figures 15.1 to 15.6**. Grading will be limited to minor grading to accommodate the construction of the access roads and to construct the Collector Substation, O&M facility and associated SWM facilities. These roadways will consist of gravel and will not be paved, thereby reducing potential impacts associated with increased imperviousness.

No grading is proposed within the land adjacent to the natural features (i.e. beyond the fence line). Grading within the root zone or removal of limbs from the trees within these significant woodlands will not occur (minimum setback of 30 m).

To prevent potential impacts, a construction fence (or heavy duty silt fence) will be installed prior to any on-site work and maintained during all phases of construction to control potential sediment transport from erosion and to function as a visual boundary to mark the limits of the work site and assist in controlling encroachment or incidental damage to edge species during construction and grading activities.

Construction activity, such as increased traffic, noise or dust, has the potential to indirectly disturb birds or other wildlife, particularly breeding birds and their habitats. While the greatest increase in potential disturbance will occur during construction (e.g. site preparation and solar panel assembly), some disturbance of wildlife may occur during all phases of the Project (e.g. maintenance activities). The current level of human activity is low and is generally restricted to agricultural uses.

Noise levels during construction will be elevated. Heavy machinery (i.e. bulldozers and scrappers) will be the primary contributor to ambient noise, although more sudden, intense noises will likely startle some wildlife species. The proper muffling of construction machinery will occur to keep noise levels at a minimum. Many of the edge species are not likely to be critically impacted by construction noise as they become accustomed to increased ambient noises. However, the more sensitive wildlife species may move deeper into the wooded areas or into other natural features. Large mammals may be displaced from the site due to increased traffic and construction noise (Arnett *et al.*, 2007). However, a certain level of sensory disturbance to game and wildlife resources in the Study Area already exists from ongoing

agricultural activities. Once construction activity ceases, noise levels associated with the solar lands will be minimal and many of these species will likely return.

To avoid disturbance to grassland birds, construction should avoid peak breeding season for migratory birds (May 1 to July 31). Currently, construction is planned for August to November. However, if construction is necessary during the peak breeding season, it should not take place during the most sensitive times of day (when call activity is highest, in the first few hours after dawn, and shortly before dusk) and to minimize disturbance effects.

6.3.3.6 Erosion and Sediment Control

In order to minimize erosion potential and the introduction of sediment into the natural features during grading and construction activities, a number of erosion and sediment (E&S) control measures will be implemented prior to the initiation of any construction.

Erosion susceptibility in this area is relatively low. Due to the flat topography of the area, there are no steep or elongated slopes that would accelerate runoff during a storm event. The clay soils in the area are relatively cohesive and resist the erosive forces of runoff, more so than less cohesive particles, such as silt or fine sand. As such, the risk of erosion and resulting sedimentation within downstream natural features is limited, although not absent. As such, erosion and sediment controls will be installed during construction to minimize potential impacts.

The proximity and sensitivity of adjacent natural features increases the risk of sedimentation resulting from the detachment of soil materials within a construction area. As such, all natural features identified within 30 m of any proposed construction area are at higher risk of sediment transfer and erosion from grading and topsoil removal.

Appropriate erosion and sediment controls will be employed during all phases of construction to minimize the potential deposition of silt and sediment within the receiving systems as a result of site grading works. Measures to stabilize and restore any disturbed areas as soon as possible will be combined with appropriately designed erosion control measures to minimize erosion potential and capture any eroded materials prior to being transported downstream into the adjacent watercourse, wetlands or other natural features.

E&S control measures will be in installed to minimize erosion impacts adjacent to natural features, as appropriate. The following measures / guidelines will be implemented, as required, during the construction of the Transmission Line components:

- Erosion control measures include seeding / naturalization of buffer strips and maintaining natural vegetation. Other measures, such as erosion control matting, netting or erosion control blankets, are not anticipated;

- Sediment control measures include perimeter silt fencing, check dams (rock or strawbales), and sediment bags (dewatering);

- Silt barriers (e.g., fencing) will be erected along wetland and woodland edges located within 30 m of construction work areas (monopole structures, foundations) to minimize potential sediment transport to the natural features. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation or the area has been returned to pre-disturbance conditions;

- Where the installation of an equalizing culvert is proposed, appropriate erosion control measures (i.e. rip rap, strawbales, seeding) will be installed at the ends of each culvert to prevent erosion;

- Where culverts are proposed within 30 m of a natural feature, enhanced sediment and erosion control measure (i.e. straw bales, double rows of sediment fencing, check dams) will be installed as added protection to filter runoff and further minimize potential sedimentation within the downstream features (wetland, woodland). This added protection is proposed to reduce environmental risk;

- As appropriate and prior to construction, the limits of vegetation clearing will be staked in the field. The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be employed to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that will include immediate rehabilitation of the disturbed area to pre-disturbance conditions;

- All disturbed areas will be re-vegetated immediately, or as soon as conditions allow (i.e. based on time of year); and

- Areas disturbed during the installation of each monopole structure will be vegetated (seeded) with species native to Ecoregion 7E and native to the site and/or surrounding natural features to stabilize disturbed areas following construction.

Specific E&S control measures will be selected, located and sized by an engineer during the detailed design stage to ensure proper functioning of these measures. All E&S controls will be installed prior to construction and will be maintained during and following construction to ensure their effectiveness at protecting the adjacent natural features.

In order to minimize the introduction of invasive species, the establishment of a self-perpetuating, dense vegetated cover crop is proposed within the buffer areas and other areas disturbed during construction. This will minimize the ability of opportunistic invasive and non-native species to become established beneath the solar modules. The appropriate seed mix will also contain a diversity of native grassland species native to Ecoregion 7E and the local area that will comprise the long-term vegetative cover in these areas.

Such measures will be employed around all Transmission Line components, including the Collector Substation, O&M facility, access roads, SWM facility, monopole installation areas, Transitioning Stations and Interconnect Station.

6.3.4 Net Effects

No net effects are anticipated as a result of the proposed Transmission Project components. The transmission line has been located to avoid encroachment or overhang of wetlands along Haldimand Road 20, with the majority of the transmission line occurring on the opposite side of the road. Only small encroachments into significant woodlands may occur where these features encroach into the right of way, although impacts will be localized and minimized through construction best management practices, erosion and sediment control measures and timing. No impacts on significant wildlife habitat are anticipated.

With respect to the Collector Substation, a minimum setback of 31 m will be maintained from the adjacent wetland and woodland (Natural Feature 30) (**Figure I-6, Appendix I**). The O&M facility will maintain a 30 m setback from the wetland and woodland feature (Natural Feature 38) (**Figure I-7, Appendix I**). The 30 and 31 m buffer areas, respectively, between these facilities and the natural features will be naturalized with native plant species intended to be maintained as a 30 m vegetated buffer zone in perpetuity. Grassland species native to Ecoregion 7E and native to the site and/or surrounding natural features will be used to stabilize these buffer areas and establish a natural buffer between the project components and adjacent wetlands.

The lands immediately adjacent to the woodlands and wetlands have been disturbed by agricultural activities in the past (annually) and provide little benefit in terms of ecological function, habitat or natural vegetation. Enhancing these areas through the establishment of naturalized buffers will benefit and enhance the adjacent natural features and associated habitat. Over time, these areas will become an extension of the natural features they are intended to protect.

Maintaining minimum setbacks during grading and construction activities will avoid soil compaction and prevent inadvertent damage or encroachment into the natural features. Soil compaction by heavy machinery may lead to reduced oxygen available to roots, reduced soil-water infiltration, impaired drainage and corresponding reduced root growth and ability to absorb water and minerals. Encroachment by heavy machinery has the potential to damage the root zone, limbs or trunks of edge species or disturb / destabilize natural vegetation. Best management practices with respect to minimizing noise, light and other disturbance during construction will be employed.

Natural flow patterns and surface water contributions to existing wetlands will be maintained by ensuring that existing surface water catchment boundaries are not adversely altered and access roads do not interfere with the contribution of flows to these features (e.g. cross-culverts to be installed as required). Surface flow within the buffer areas will not be altered as existing grades will remain.

Overall, the Transmission Project is not anticipated to result in adverse environmental impacts. Although temporary disturbance during construction can be anticipated, the Natural Features located in and within 120 m of the Transmission Project Location will be maintained, protected and enhanced through the establishment of minimum 30 m development setbacks, naturalization of buffer areas and the implementation of best management practices to reduce encroachment and other impacts during the construction.

6.3.5 Post-Construction Monitoring Plan

Details regarding the potential negative impacts, mitigation strategy, objectives, monitoring plan and contingency measures to be implemented during construction and operation of the Transmission Project are provided in **Table 6.2**. The following is a summary of the proposed monitoring plan.

During construction, best management practices for on-site grading and construction have been recommended. To ensure these measures are properly employed, the following monitoring measures are recommended:

- weekly monitoring of erosion and sediment control measures (and following major storm events) to ensure proper maintenance and functioning; rectify any discrepancies immediately; weekly visual inspections to ensure proper storage of fuel or other potential contaminants to minimize potential for on-site spills; rectify any discrepancies immediately

- weekly monitoring of construction fences to prevent encroachment into adjacent natural features; rectify any discrepancies immediately;

- weekly inspection of drainage ditches, culverts and general flow patterns to ensure proper site drainage.

During the operation of the Transmission Line components, no impacts are anticipated to the natural features and wildlife in the area. Any areas disturbed during construction and grading activities will be stabilized and naturalized. To confirm whether the proposed mitigation measures are protecting the natural features, the following post-construction measures are proposed:

- to ensure the establishment of native grassland species within the proposed buffer areas and beneath the proposed solar modules, vegetation monitoring of these areas is recommended to ensure successful propagation of a nursery crop, successful propagation of native grassland species and to minimize the introduction of non-native or invasive species to the area.

6.4 POST-CONSTRUCTION MONITORING

A post-construction monitoring study for birds, bats and other wildlife has been developed in consultation with the Ministry of Natural Resources that is consistent with guidance provided in MNR's Bat and Bird guidance documents (2010) and other provincial guidance that was available at that time. A summary of the potential negative effects to significant natural features, mitigation strategies, performance objectives, monitoring plan principles (including general methods, location, frequency, rationale and reporting),and contingency measures are outlined in **Table 6.2** (**Appendix B**).

6.4.1 Mortality Monitoring

Details regarding the mortality monitoring required in accordance with the MNR bird and bat guidelines are discussed in detail in the Environmental Effects Monitoring Plan (EEMP). This information forms the basis of the monitoring components of the Construction Plan Report and the EEMP that has been submitted in the Design and Operations Report as part of the REA application. Mortality monitoring is not a necessary component of this Natural Heritage Assessment, but generally will include the following:

- Mortality monitoring at a subset of proposed turbines from mid April- end of November, for a period of three years. Searcher efficiency and scavenger trials will be conducted each year according to Environment Canada's protocols (2007b) and available guidance from the MNR.

Details regarding mortality monitoring are provided in the Environmental Effects Monitoring Plan.

6.4.2 Disturbance Monitoring

Elements of the post-construction monitoring program to determine disturbance to wildlife include:

- A point count-based study to assess disturbance effects to declining forest breeding birds (Feature 42).

- A transect-based study to assess disturbance effects to migratory land birds resulting from wind turbine operation during migration.

- Visual monitoring for changes to hydrological conditions in wetlands and significant woodlands, weekly during construction and seasonally for one year following construction.

The monitoring program will be reassessed by MNR and Samsung at the end of each monitoring year. Pending the reassessment results, the program methodologies, frequencies, and durations may be reasonably modified by the parties to better reflect the findings.

6.4.2.1 Woodland Breeding Birds (Declining Species)

Background

Wooded habitats within the study area support ten area-sensitive breeding forest bird species (Hairy Woodpecker, White-breasted Nuthatch, Veery, Ovenbird, Scarlet Tanager, Sharp-shinned Hawk, American Redstart, Cooper's Hawk, Pileated Woodpecker and Least Flycatcher) and four breeding forest bird species (Northern Flicker, Eastern Wood-Pewee, Wood Thrush, Rose-breasted Grosbeak) that have been identified as priority species by Ontario Partners in Flight (PIF) (NHA/EIS, Section 4.3.4.3, 4.4.4.3, 4.5.4.3).

Turbine 53 and its associated access road and collector line are proposed within significant habitat for declining woodland bird species (Feature 42). As such, a post-construction point count-based study will be implemented to identify and assess any actual disturbance effects to the declining woodland species in this Feature during breeding.

Monitoring

Pre-construction point count surveys were completed within Feature 42 in 2010 (**Figure 4**, **Appendix A**). To supplement this data specific to the location of the proposed project components, additional breeding bird point count surveys will be completed in 2011 based on specific habitat features (plantation, deciduous woodland).

Each of the surveys will include a ten-minute point count at each location and each point will be surveyed twice in June, during the peak of the breeding season, for a minimum of three years (one year pre-construction, two years post-construction). Surveys will be conducted at the times of day and under the weather conditions outlined in the MNR's guidance document (2010a).

The number of woodland species of conservation concern observed will be compared to pre-construction conditions. Particular attention will be paid to dominant species or those species identified as priority species that breed consistently or in high numbers on the site. For individual species, breeding pair density is a standard measure that will be used to compare among years.

MNR, along with the proponent and other relevant agencies, will collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect is occurring, and whether such an effect is attributable to the Wind, Solar or Transmission Projects and not external factors. These discussions will determine if and when contingency measures will be undertaken. The best available science and information should be considered when determining appropriate mitigation.

6.4.2.2 Migratory Landbird Surveys

Background

Woodlands adjacent to the Great Lakes shoreline can serve as important stopover locations for migrating landbirds. In consideration of the proximity of various woodlands to the shoreline of Lake Erie, it was determined that the site supports significant wildlife habitat in the form of seasonal concentration areas (migratory landbird stopover areas) (NHA/EIS, Section 5.2.5.1). Pre-construction and post-construction transect surveys will be implemented to assess any actual disturbance effects to migratory landbirds.

Monitoring

A minimum of 6 transect survey routes for migrating landbirds will be conducted within the 4 significant migratory bird stopover areas (Feature 42b, 66, 68, 69) located within 120 m of a wind turbine. The route locations and survey methods will be the same as during pre- and post-construction, providing technical and statistical validity to assess disturbance effects. Surveys begin half an hour after sunrise and continue for approximately two hours. The number of individuals of each species observed on the surveys is recorded and the results will be compared to pre-construction data. The surveys will be conducted on two days per week in spring (early April through end of May) and fall (mid-August through end of October) for a minimum of three years (1 year pre-construction and 2 years post-construction).

MNR, along with the proponent and other relevant agencies, will be asked to collectively review the results of the post-construction monitoring to determine if an ecologically significant disturbance/avoidance effect is occurring, and whether such an effect is attributable to the wind turbines and not external factors. These discussions will determine if and when the contingency plan will be implemented and if any additional measures are warranted. The best available science and information will be considered when determining appropriate mitigation.

6.4.2.3 Wetland and Woodland Hydrology

Background - Wetlands

All components of the Wind Project are sited outside wetland boundaries; therefore there will be no direct loss of wetland habitat or function. Potential indirect effects may arise through changes to wetland hydrology during or after construction.

Indirect impacts resulting from construction activities, such as disturbance to wildlife, dust generation, sedimentation and erosion, are expected to be short term, temporary in duration and mitigable through the use of standard site control measures. During construction, there will be increased traffic and the potential for accidental spills.

Background - Woodlands

Where components of the Wind Project are sited outside significant woodlands, there will be no direct loss or fragmentation of habitat or habitat function. Potential indirect effects may arise through changes to hydrology during or after construction. Where components are sited inside a significant woodland, hydrologic function may be adversely affected.

Indirect and direct impacts resulting from construction activities, such as disturbance to amphibians, dust generation, sedimentation and erosion, are expected to be short term, temporary in duration and mitigable through the use of standard site control measures. During construction, there will be increased traffic and the potential for accidental spills.

Monitoring

Any changes to hydrological conditions in wetlands and significant woodlands within 120 m of the Project Location will be determined through weekly visual inspection during construction, and once seasonally in spring and summer the first year post-construction.

6.5 SUMMARY OF IMPACTS AND MITIGATION

Potential impacts, mitigation, net effects and post-construction monitoring recommendations for all natural features in the Wind, Solar, and Transmission Project Locations and their Zones of Investigation have been summarized in **Table 6.1** (**Appendix B**). With the implementation of mitigation measures discussed in the preceding sections, the Wind, Solar and Transmission Projects can be constructed and operated within acceptable levels of environmental effects.

6.6 QUALIFICATIONS

The following Stantec personnel were responsible for the assessment of environmental effects:

- Valerie Wyatt, Senior Project Manager
- Chris Powell, Environmental Planner
- Shari Muscat, Environmental Planner

Curricula vitae are provided in **Appendix I**.

7.0 Conclusions

This Natural Heritage Assessment and Environmental Impact Study for the Grand Renewable Energy Park Project has been prepared in accordance with O. Reg. 359/09, s. 24 through 28, 37 and 38.

Once the identified protective, mitigation and compensation measures are applied to the environmental features discussed above, the construction and operation of the Project is expected to have acceptable net negative effects on the significant features and functions identified through the Natural Heritage Assessment process. An environmental effects monitoring plan that includes a post-construction monitoring program will be developed to confirm the accuracy of predicted effects as well as to monitor the effects to other natural elements.

Stantec Consulting Ltd. prepared this Natural Heritage Assessment and Environmental Impact Study for SPK. SPK is committed to implementing all the appropriate protection, mitigation and monitoring measures as they apply to the construction and operation of the Project.

This information is respectfully submitted in support of the proposed Grand Renewable Energy Park on behalf of SPK.

Sincerely,

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