WHITE PINES WIND PROJECT
NATURAL HERITAGE ASSESSMENT AND ENVIRONMENTAL IMPACT STUDY

DRAFT

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1 INTRODUCTION

wpd Canada Corporation (wpd) is a renewable energy development company based in Mississauga, Ontario dedicated to providing renewable energy for Ontario.

wpd is proposing to develop the White Pines Wind Farm (the Project) on privately-owned land in Prince Edward County, Ontario, in response to the Government of Ontario's initiative to promote the development of renewable electricity in the province. The Project was awarded an Ontario Feed-In-Tariff (FIT) contract with the Ontario Power Authority (OPA) in May, 2010 (FIT Contract NO. F-000675-WIN-130-601).

The Project Study Area is generally bounded by i) Brummell Road/Bond Road to the North; ii) Lighthall Road to the West; iii) Gravelly Bay Road to the East; and iv) Lake Ontario to the South. Settlements in the area include Picton, Milford, Port Milford and South Bay. All turbines, access roads, and underground collector lines will be located on private property and within the municipal road allowance. The location of the Project Study Area within Prince Edward County is shown on Figure 1, Appendix A.

The interconnection line is not considered a Project component and has therefore not been included within the NHA/EIS Assessment. The substation near the Picton Transformer Station is considered a Project component and has been included within the NHA/EIS Assessment. The substation is located north of Picton, on County Road 5, west of Elmbrook Road. The location of the northern substation is shown on Figure 2, Appendix A (see "Northern Study Area").

1.1 Project Overview

The basic components of the Project include 29 REpower MM92-2.05 MW wind turbine generators with a total maximum installed nameplate capacity of 59.45 MW (FIT Contract maximum of 60 MW), step-up transformers located adjacent to each turbine, an underground electrical power line system, two transformer substations, turbine access roads and a fenced storage area. Temporary components during construction include work and storage areas at the turbine locations and along access roads and laydown areas, and a fenced storage area (Figure 2, Appendix A).

The underground collector system will transport the electricity generated from each turbine to a substation located near Turbine 7 (T7) off Royal Road east of Dainard Road. An overhead interconnection line will connect the substation near T7 to a substation to be built near the Picton Transformer Station (TS).

wpd has elected to assess and seek approval for an alternative Project configuration, with two possible locations for Turbine 17 (T17). Final selection of the turbine site will be based on the

results of consultation, detail design and engineering work, as well as the conditions experienced during construction.

Temporary components during construction include work and storage areas at the turbine locations and along access roads, and a fenced storage area towards the south of the Project area (Figure 2, Appendix A).

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

1.2 Study Area and Project Location

The Project will be entirely located within Prince Edward County in eastern Ontario.

O. Reg. 359/09 defines a Project Location as:

"*a part of land and all or part of any building or structure in, on or over which a person is engaging in or proposes to engage in the project and any air space in which a person is engaging in or proposes to engage in the project*".

For the purposes of this Project, the Project Location includes the footprint of the facility components, plus any temporary work and storage locations. The boundary of the Project Location is used for defining setback and site investigation distances according to O. Reg. 359/09. The buildable area (construction area), which includes the footprint of the facility components, plus any temporary work and storage locations, would be staked on private lands. All construction and installation activities would be conducted within this designated area; this includes construction vehicles and personnel. Similarly, all installation activities related to collector lines within the municipal road allowance would be contained within the boundaries of the road allowance.

Although O. Reg. 359/09 considers the REA process in terms of the Project Location, the siting process for wind projects is an iterative process, and therefore final location of Project components is not available at Project outset. Therefore, a Project Study Area is developed to examine the general area within which the wind Project components may be sited; information gathered within this larger area feeds into the siting exercise.

The "Study Area" used for the records review component of this NHA report is shown on Figure 1, Appendix A.

The proposed "Project Location", as defined in O. Reg. 359/09, includes any air space and all parts of the land in, on or over which the Project is proposed. As required by the regulation, a 120 m "Zone of Investigation" has been identified around the outer limits of the Project Location; measured as 120 m from the outer limit of the Project Location, where site preparation and

construction activities will occur and where infrastructure will be located (MNR, 2011a). The outer limit includes the turbine blade tip where that component forms the outer limit of the Project Location. The Project Location and 120 m Zone of Investigation are shown on Figure 2, Appendix A.

2 RENEWABLE ENERGY APPROVAL REQUIREMENTS

2.1 Renewable Energy Approvals

wpd retained Stantec Consulting Ltd. (Stantec) to prepare a Renewable Energy Approval (REA) Application, as required under Ontario Regulation 359/09 - Renewable Energy Approvals under Part V.0.1 of the Act of the Environmental Protection Act (O. Reg. 359/09). According to subsection 6.(3) of O.Reg.359/09, the Project is classified as a Class 4 Wind Facility and will follow the requirements identified in O.Reg.359/09 for such a facility.

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 Natural Heritage Assessment (NHA) and Environmental Impact Study (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 Peterborough District Ministry of Natural Resources (MNR) with guidance provided from the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2011a) for submission as a component of the REA application for this Project.

Pursuant to O. Reg. 359/09, an NHA is required, 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 location, boundaries, characteristics and significance of the following natural features and areas must be determined in relation to the project location:

- wetlands, including coastal, northern and southern wetlands;
- woodlands;
- valleylands;
- wildlife habitat;
- life science and earth science areas of natural and scientific interest (ANSIs); 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 (50 m of an Earth Science ANSI), 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;
- within 120 m of provincially significant southern wetland, provincially significant coastal wetland, provincial park or conservation reserve;
- provincially significant earth science 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. In accordance with the Regulation, MNR must confirm that:

- the determination of the existence of natural features and the boundaries of natural features was made using applicable evaluation criteria or procedures established by MNR;
- the site investigation and records review were conducted using applicable evaluation criteria or procedures established or accepted by MNR, if no natural features are identified;
- the evaluation of significance or provincial significance of natural features was conducted using applicable evaluation criteria or procedures established or accepted by MNR; and
- the project location is not in a provincial park or conservation reserve.

Consideration of endangered and threatened species protected under the *Endangered Species Act* (ESA, 2007) is beyond the scope of this report. In consultation with the MNR, wpd and Stantec have been, and will be, reviewing the implications of the ESA 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:

- *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a)
- *Bats and Bat Habitats Guideline for Renewable Energy Projects* (MNR, 2011b)
- *Birds and Bird Habitats Guideline for Renewable Energy Projects* (MNR, 2011c)
- *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)
- *Ecological Land Classification for Southern Ontario: First Approximation and its Application* (Lee et al., 1998)
- *Eco-Regional Criteria (MNR, 2012)*

3 RECORDS REVIEW

This records review report was prepared in accordance with O. Reg. 359/09, s. 25 (3) with guidance provided from the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a).

This records review report describes all records reviewed, identifies the supporting data and lists all organizations contacted as part of the record search. It also provides the results of the analysis of records and identifies known natural features located in, or within, 120 metres of the Project Location.

3.1 Methods

A variety of background documents and sources of information were reviewed during the preparation of this report, including consultation with various agencies, organizations and the public. Information requested and sources of background information included, but were not limited to, the following:

Federal

- Environment Canada. Request for information to Denise Fell (Environmental Assessment Officer). July 28, 2011; and
- Environment Canada. National Wildlife Areas. http://www.on.ec.gc.ca/wildlife/nwa/eng/prince/princeedwardpoint_htm-e.html.

Provincial

- Ontario Ministry of Natural Resources (MNR). Communications with Eric Prevost (Renewable Energy Planning Ecologist), Melissa Laplante (Species at Risk Biologist), Audrey Lapenna (Species at Risk Biologist); Kate Pitt (Species at Risk Biologist) and Sarah Lewis (Renewable Energy Intern) June 2010- (ongoing);
- Natural Heritage Information Centre (NHIC) database. 2011. Natural Areas and Species records search. Biodiversity explorer, http:/nhic.mnr.gov.on.ca. OMNR, Peterborough;
- Land Information Ontario (LIO) digital mapping of natural heritage features. 2009 and 2011. Ontario Ministry of Natural Resources (MNR);
- Renewable Energy Atlas (2011) Bat hibernacula mapping;

- Ontario Ministry of Northern Development and Mines. Communications with Frank Brunton (Paleozoic Geoscientist). January 20, 2011;
- Ontario Ministry of Northern Development, Mines and Forestry. Mineral Deposit Inventory data. 2011;
- *Bats and Bat Habitats. Guidelines for Wind Power Projects*. Ontario Ministry of Natural Resources. July 2011;
- *Birds and Bird Habitats. Guidelines for Wind Power Projects*. Ontario Ministry of Natural Resources. December, 2011;
- Ontario Parks Planning and Management Information (http://www.ontarioparks.com/english/plan-res.html);
- Provincially Significant Wetland Evaluations (South Bay Marsh Provincially Significant Wetland Evaluation, Mosquin et al., 1986; South Bay Coastal Wetland Evaluation, Snetsinger and Kristensen, 1993; Ostrander Point Wetland Evaluation, Stantec, 2011a)
- Identification of Provincially and Regionally Significant Glacial Landforms in the Lake Ontario Portion of the Eastern Region. (Gorrell, 1991); and
- Natural Heritage Area – Life Science Checksheet for Black Creek Valley Marshes, Forest and McMahon Bluffs (Snetsinger and Snetsinger, 2000).

Local Municipal Government

- Prince Edward County. Notice of Draft Site Plan and a Proposal to Engage submitted March 15, 2011. Additional natural heritage data request and correspondence with Jo-Anne Egan, Manager of Planning Services, September 6, 2011.
- Prince Edward County. Public GIS database. 2008 and 2010.
- Prince Edward County Official Plan (2011) and associated schedules (September 2004)

Conservation Authority

- Quinte Conservation Authority. Correspondence with Tim Trustham (Planner/Ecologist) March, 2011.

Local Consultation

- Prince Edward County Field Naturalists Club. Correspondence with Cheryl Anderson, Past President. June, 2011;
- Prince Edward Point Bird Observatory (PEPtBO). Online data (http://www.peptbo.ca/index.html) and correspondence with Cheryl Anderson, Board Member. June 2011;
- Hastings Prince Edward Land Trust. Request for information to John Blaney, Secretary. September, 2011.
- Information regarding natural heritage features and wildlife in the Study Area received from the public (Public Open House, held on March, 22 2012 in Picton, ON);

Local Background Studies and Reports

- Prince Edward County South Shore Important Bird Area Conservation Plan (Wilson and Cheskey, 2001);
- An Investigation of the Breeding Birds of South Prince Edward County (Harris, 2000);
- Published accounts of bird presence and ranges within Prince Edward County (Weir, 2008; Sprague 1969; Sprague and Weir 1984; and Sprague 1987);
- Assessment of and Management Prescription for the Ostrander Point Crown Land Block in Prince Edward County (Bland, 1997);
- Royal Road Wind Farm, Prince Edward County. Protocols and Results of Avian Monitoring Program (Jaques Whitford, 2004); and
- Ostrander Point Wind Energy Park Natural Heritage Assessment and Environmental Impact Study (Stantec Consulting Ltd., 2011a).

Other Information Sources

- Bird Studies Canada. Correspondence with Kathy Jones (Ontario Volunteer Coordinator) and Denis Lepage (Senior Scientist); June- August, 2011;
- Nature Counts (http://www.naturecounts.ca) data. July, 2011.
- Important Bird Areas database (Bird Studies Canada and BirdLife International, undated);

- Ontbirds Archives (including regular Quinte Area Bird Reports);
- Christmas Bird Count database (Audubon Society); and
- Various wildlife atlases (birds, mammals, herpetofauna).

A summary of agencies contacted, information requested and responses received is provided in Table 3.1, Appendix B. Comments received from MNR are included as Appendix C.

The information received from each source and the manner in which it was used to identify natural features, provincial parks or conservation reserves that exist within 120 m of the Project Location (50 m for Earth Science ANSIs) is detailed in Section 3.2.

3.2 Results

A review of available background information has indicated the presence of known natural features occurring within the Project Study Area. The results of the records review search were used to determine whether the Project Location is in a known natural feature, within 50 m of an Earth Science ANSI, or within 120 m of other known natural features (as defined in Section 2.1).

A description of each known natural feature is provided in this section of the report and the location of each natural feature identified through the records review is shown on Figure 2 (Appendix A). Each natural feature identified through the records review and its relation to the Project Location is detailed in Table 3.2, Appendix B.

3.2.1 Wetlands and Coastal Wetlands

Prince Edward County contains approximately 11.5 % wetland cover (Ducks Unlimited, 2010; Henson and Brodribb, 2005). Within South Marysburgh Township, where the Project is proposed, wetland cover comprises approximately 5.7 % (Ducks Unlimited, 2010). Wetlands within the County are generally comprised of marsh and hardwood swamp with marshes bordering most lakes and lagoons found within the County (Chapman and Putman, 1984).

Based on the records review, a number of evaluated and unevaluated wetlands occur within the Study Area. One locally significant wetland (LSW) and five provincially significant wetlands (PSWs) occur within the Study Area: the South Bay Coastal PSW; South Bay Marsh PSW; Big Sand Bay PSW; the Black Creek PSW; Ostrander Point PSW and the Hallowell LSW (LIO 2011; NHIC 2011; PEC, 2011). Of these, all except one (the South Bay Coastal PSW) are found more than 120 m from the Project Location. Portions of the South Bay Coastal PSW occur within 120 m of the Project Location

Each wetland as identified by these sources, and its location relation to the Project Location, is shown on Figure 2, Appendix A.

3.2.1.1 Provincially Significant Wetlands

Five wetlands found within the Study Area have been evaluated in accordance with the Ontario Wetland Evaluation System (OWES) and are considered Provincially Significant Wetland:

- South Bay Marsh: The South Bay Marsh PSW is a 62 ha wetland comprised of two types. It is predominately marsh (97%) with a small percentage of swamp (3%). (NHIC, 2011). It is a coastal wetland that is located on the shore of South Bay and is noted for supporting nesting Black Tern, a provincial species of special concern (Mosquin et al., 1986). The South Bay Marsh PSW is not found in or within 120 m of the Project Location.

- Black Creek Wetland: The majority of this wetland complex occurs outside of the Study Area, but a narrow portion extends into the north western portion of the Study Area, south of Milford (LIO, 2011). The wetland follows Black Creek and is associated with the Black Creek Valley Life and Earth Science ANSIs (see Section 3.2.5). The Black Creek Wetland PSW is composed of 7% swamp and 93% marsh (NHIC, 2011). It is not found in or within 120 m of the Project Location.

- Big Sand Bay: This coastal wetland is composed of two wetland types (11% swamp and 89% marsh). It is located along the shore of Lake Ontario and extends into the south eastern corner of the Study Area. It is not found in or within 120 m of the Project Location.

- Ostrander Point Wetland: This 39 ha wetland is composed of two communities; swamp and marsh. It is considered an undisturbed coastal wetland. No rare species of vegetation were identified within the wetland; however it is known to provide year round habitat for Blanding's Turtle, host populations of amphibians and play a function for the stopover of migratory landbirds (Stantec, 2011a). The Ostrander Point Wetland is not found in or within 120 m of the White Pines Project Location.

- South Bay Coastal Wetland: The South Bay Coastal Wetland is primarily found along the shore of Lake Ontario. The complex extends north and east from the lake. The South Bay Coastal Wetland PSW is 231 ha in size and comprised of 66% swamp and 34% marsh (NHIC, 2011). It is noted for supporting provincially significant wildlife species (such as Black Tern, Snapping Turtle, Blanding's Turtle and Least Bittern).

Although these wetlands occur within the Study Area, only portions of the South Bay Coastal Wetland are located within 120 m of the White Pines Project Location.

As mapped by MNR, the South Bay Coastal Wetland boundary extends across Helmer Road and as such, the proposed collector line route along this section of the road is located in the MNR mapped wetland boundary. Additional project components, including a turbine (T23), its

buildable area, access road and collector lines, are located within 120 m of the South Bay Coastal Wetland boundary (Figure 2, Appendix A; Table 3.2, Appendix B).

3.2.1.2 Locally Significant Wetlands

One additional wetland has been evaluated by MNR in accordance with the Ontario Wetland Evaluation System (OWES) and was considered a non-provincially significant wetland. Wetlands evaluated as non-provincially significant wetlands are also referred to as Locally Significant Wetlands (LSWs). The Hallowell Wetland is found predominately west of the Study Area with its northernmost reach extending into the north-west corner of the White Pines Study Area. It is not found in or within 120 m of the Project Location.

No locally significant wetlands are known to occur in or within 120 m of the Project Location.

3.2.1.3 Unevaluated Wetlands

In addition to the above wetlands, several unevaluated (and unnamed) wetlands as identified by the MNR's unevaluated wetland mapping occur within the Study Area. Quinte Conservation, The Prince Edward County Official Plan or public GIS database did not identify any additional wetlands in the Study Area to those identified above.

Unevaluated wetlands are identified on Figure 2 (Appendix A). The blade tip of T17 extends approximately 5 m over the boundary of an unevaluated wetland and five additional unevaluated wetlands identified by MNR occur within 120 m of the Project Location (see Table 3.2, Appendix B).

3.2.1.4 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).

Of the wetlands identified within the Study Area, one coastal wetland is found within 120 m of the Project Location, the South Bay Coastal Wetland. The South Bay Coastal Wetland is discussed above in Section 3.2.1.1.

3.2.1.5 Wetlands Summary

The Project Location was identified as occurring within the MNR mapped boundary of one provincially significant wetland (a collector line on Helmer Road) and one unevaluated wetland (the blade tips of T17) through the records review. The South Bay Coastal Provincially Significant Wetland and six additional patches of unevaluated wetland also occurred within 120 m of the Project Location (Figure 2, Appendix A). Results of the records review for wetlands are summarized in Table 3.2, Appendix B and shown on Figure 2 (Appendix A).

3.2.2 Woodlands

The White Pines Study Area is located within the Huron-Ontario section of the Great Lakes – St. Lawrence Forest Region (Rowe, 1972). This section covers much of southwestern Ontario, the northern boundary of which is generally coincident with the Precambrian Shield. Sugar maple and beech are common over the entire section, with associates such as basswood, white and red ash, yellow birch, red maple, red, white, black and bur oaks, aspen species, butternut, bitternut hickory, hop-hornbeam, black cherry, sycamore and black walnut. In lowlands, other hardwood species can be found, such as blue-beech, silver maple, red and rock elm, black ash, eastern white cedar. Coniferous species including eastern red cedar, eastern white pine, eastern hemlock and balsam fir can be found amongst hardwood species where appropriate conditions are present.

According to Riley and Mohr (1994), Prince Edward County contains approximately 14.2% woodland cover. The northern portion of the Study Area is primarily agricultural, interspersed with woodland that is associated with the Black Creek Valley. MNR mapping (LIO, 2011) indicates the presence of woodland throughout much of the southern portion of the Study Area, particularly south of Royal Road.

The Prince Edward County Official Plan (2011) does not identify significant woodland or procedures for determining significant woodland for the County.

Physiographic conditions specific to southern Prince Edward County including shallow soils, lack of water holding capacity of soils, drainage, and microclimate produce naturally limiting factors on the tree growth and woodland type that are found in this region.

Although mapped as woodland by the LIO database, various field surveys that have historically been conducted within southern Prince Edward County indicate that much of the landscape is more accurately characterized as shrub dominated natural cover (Bland, 1997; Snetsinger 2000; Stantec, 2011a; Wilson and Cheskey 2001). Woodland within the landscape has generally been characterized as areas of trees that are sparse and open, interspersed with areas of dense thickets.

Eleven wooded areas are mapped by MNR as occurring within and/or adjacent to the proposed Project Location. Areas identified as woodland within MNR's database mapping are shown on Figure 2, Appendix A. Results of the records review for woodlands are summarized in Table 3.2, Appendix B.

3.2.3 Valleylands

Valleylands are linear natural areas that occur in a valley or other landform depression that have water flowing through or standing for some period of the year (MNR, 2010; MNR, 2011a).

For the purposes of this report, criteria as outlined in the Natural Heritage Assessment Guide (MNR 2011a) with reference to the Natural Heritage Reference Manual (MNR 2010) were applied to assist in the identification of valleylands. These include landform attributes such as areas of water conveyance, areas with well-defined valley morphology (e.g. floodplains, meander belts or slopes), distinctive geomorphic landforms (oxbows, bottomlands, terraces, deltas) and ecological attributes such as the presence of a linear naturally vegetated area.

The Prince Edward County Official Plan (2011) does not identify significant valleylands or procedures for determining significant valleyland for the County. Hazard lands mapping can sometimes be used to help (although imperfectly) identify the presence of valleylands. Quinte Conservation has identified floodplain mapping; these zones are restricted to the southern shore of Prince Edward County (along Lake Ontario) and the South Bay shore (Quinte Conservation, pers. comm., T. Trustham, Sept., 2010).

The White Pines Study Area is situated within the Prince Edward Peninsula physiographic region. This region of Ontario is considered a low limestone plateau and the area is generally characterized as a flat plain (Chapman and Putman 1984). Contour line mapping confirms the Study Area is predominately flat with little change in elevation (PEC Public GIS, 2010).

The Milford- Black Creek Valley has been identified as an extensive, well developed river valley (NHIC, 2011; Gorrell, 1991). It is associated with the Black Creek Wetland and has been designated as both a Regionally Significant Life Science ANSI and a Provincially Significant Earth Science ANSI; details related to these designations are discussed in Sections 3.2.1 and 3.2.5.

The records review indicates the presence of one valleyland, associated with Black Creek and Milford creek in and within 120 m of the White Pines Project Location. The location of the valleyland was delineated primarily based on topography and the presence of a linear vegetated watercourse valley. Its location in relation to the Project Location is shown on Figure 2, Appendix A.

3.2.4 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: seasonal concentration areas; movement corridors; rare vegetation communities or specialized habitats; and habitats of species of conservation concern.

Unlike other natural features such as woodlands, ANSIs or wetlands, known occurrence and location information for many components of significant wildlife habitat is often not available on a site specific basis. As a result background information that is available from the greater Study Area has been compiled and is used both to identify known significant wildlife habitat and also to inform the potential for candidate significant wildlife habitat components to occur. However, site specific field information is required to determine whether or not the required habitat to support a particular candidate significant wildlife habitat component is found in the White Pines Project Location or the 120 m Zone of Investigation.

3.2.4.1 Landscape Context

A compilation of background information on known wildlife use within the vicinity 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 any known significant wildlife habitat (SWH) components.

In Ontario ecological regions have been determined based on bedrock, climate, physiography and corresponding vegetation to enable landscape planning and monitoring (MNR, 2007). The White Pines Study Area is found in the Lake Simcoe-Rideau Ecoregion (Ecoregion 6E) of Ontario. This ecoregion extends from Lake Huron in the west to the Ottawa River in the east and is characterized by a relatively flat landscape. The majority of the area exists as agricultural land with deciduous and mixed forests covering a majority of the remaining landscape. Species characteristic of this ecoregion include sugar maple, American beech, white ash, white cedar, Wood Duck, spring peeper, bullfrog and Eastern Towhee (MNR, 2007).

The south shore of Prince Edward County is a limestone plateau and is characterized by relatively shallow soils (Chapman and Putman, 1984). The mixture of plants presently found within Prince Edward County reflects both the natural and human history of the area. The local geological conditions have strongly influenced the development of the area, which has in turn influenced the vegetation communities and associated wildlife species that are present today. Historically, many of the lands were used for agriculture, however the shallow soils resulted in unproductive farming and many farmlands were abandoned (Wilson and Cheskey, 2001). The abandoned lands were attractive to the Canadian Army who used various publically owned

lands within the southern shore during World War II for military training using tracked vehicles. Today, much of southern Prince Edward County consists of long-abandoned fields that are succeeding into shrub thicket habitats (IBA, 2010).

Its southern location, soil texture, drainage patterns, microclimate, and proximity to Lake Ontario all combine to create a unique set of conditions that supports several types of grassland, forest, shrub, wetland and alvar-like communities within the regional landscape.

The White Pines Study Area is situated along the Lake Ontario shoreline, though wind turbine locations were setback a minimum of 400 m from the shoreline, and the majority of turbines are sited more than 1 km from the shoreline. Aerial photography interpretation and a review of available background information regarding local landscape cover (see Section 3.2.1 and 3.2.2 above) indicate that the Study Area is comprised of a mosaic of open agricultural lands, woodland, wetland, alvar-like habitats and open shrubland (LIO, 2011; NHIC, 2011; Stantec, 2011a; Bland, 1997; Snetsinger 2000; Wilson and Cheskey, 2001; Henson and Brodribb, 2005).

Secondary source data were used to determine potential wildlife use of the Study Area. Inventories of wildlife that have been recorded as occurring within the range of the White Pines Wind Project Location 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). Based on a review of background information, known ranges of 138 species of birds, 19 species of mammals, 11 species of amphibians and 12 species of reptiles occur within the Study Area (Appendix D). It is important to note that the exact location of species occurrences are not available from these atlases and, instead, are recorded within 10 x 10 km squares. The potential for species to be present within the area occupied by the Project Location will be limited by the habitat suitability and availability supported within this area. Therefore the identified species recorded from these databases may not occur within the White Pines Wind Project Location.

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. One Count Circle partially extends to within the White Pines Study Area (Weir, 2008; National Audubon Society, 2011). The Count Circle is situated to include Prince Edward Point and the Prince Edward Point National Wildlife Area and both land and offshore waters north and west of this that fall within the 24 km diameter circle. The eastern portion of the Study Area, from Milford to South Bay and east is included within the Count Circle, but the majority of the circle is located outside the Study Area. Notable records from the Count Circle include thousands of overwintering waterfowl, as well as hundreds of gulls. Waterfowl guilds regularly observed include goldeneye, scaup, scoters, bay ducks, dabblers and others. Total observations from 2000 to 2010 indicate the four most abundant species observed across this ten year period were Long-tailed Duck, Canada Goose, Greater Scaup and Mallard (National Audubon Society, 2011). The most commonly observed landbirds

across this same time period included European Starling, Mourning Dove and House Sparrow (National Audubon Society, 2011).

3.2.4.2 Designated Natural Areas

Various designated natural areas occur within or adjacent to the Study Area. Though these areas are not identified as "natural features" within O. Reg. 359/09 a consideration of the functions supported by these sites may assist in the identification and evaluation of significant wildlife habitat that may be found in and within 120 m of the Project Location. Further information regarding the functions of these sites as they relate to specific components of candidate significant wildlife habitat is detailed within Sections 3.2.4.3 – 3.2.4.6. These areas are shown on Figure 1, Appendix A.

Prince Edward County South Shore Important Bird Area

BirdLife International, in cooperation with Bird Studies Canada and Nature Canada, identifies Important Bird Areas (IBAs). IBAs are areas that are designated for their support specific groups of birds: threatened birds, large groups of birds, and birds restricted by range or by habitat. Sites were identified by Bird Studies Canada using a set of criteria developed and applied by a Technical Steering Committee. The Prince Edward County South Shore IBA encompasses the southeastern peninsula of Prince Edward County as well as offshore waters, and overlaps the southern portion of the White Pines Study Area (Figure 1, Appendix A) (IBA Canada, 2010; Wilson and Cheskey, 2001).

The Prince Edward County South Shore IBA is also referred to as the Prince Edward Point IBA (IBA Canada, 2010) and is reported variously to encompass approximately 91 km^2 (26 km^2 of land and 65 km^2 of nearshore waters; Wilson and Cheskey, 2001) or 371 km^2 (26 km^2 of land and 345km^2 of nearshore waters; IBA Canada, 2010). For the purposes of this report, it will be referred to as the Prince Edward County South Shore IBA. The Prince Edward Point Bird Observatory and National Wildlife Area are located within the IBA at the tip of the Prince Edward Point peninsula, and the Point Petre Provincial Wildlife Management Area is located at the western end of the IBA.

The IBA has been designated as globally significant under the congregatory species category for wintering waterfowl and migratory landbirds and as nationally significant for colonial waterbird/seabird concentrations (IBA Canada, 2010). Almost 300 species of birds have been recorded within the IBA with about 220 species recorded per year, mostly as migrants (Canadian Migration Monitoring Network, undated). These observations are recorded from the Bird Observatory, located at the tip of the National Wildlife Area and the adjacent offshore waters (see below). Information on use and reasons for the IBA's designation of the IBA were used to assist in the identification and assessment of the potential for the Project Location and

Zone of Investigation to support significant wildlife habitat for migratory landbird stopover area and waterfowl stopover and staging areas.

Prince Edward Point National Wildlife Area

Prince Edward Point National Wildlife Area (NWA) occupies a portion of Long Point Peninsula at the southeast corner of Prince Edward County along the northeast shore of Lake Ontario. Located approximately 2.3 km east of the closest point of the White Pines Project Location, the Prince Edward Point NWA encompasses 560 ha located at the eastern tip of the peninsula. The wildlife area is home to the Prince Edward Point Bird Observatory and in 1996 joined the International Network of Monarch Butterfly Reserves (Environment Canada, 2011). The National Wildlife Area was established in 1980 as a result of the migration monitoring conducted through the bird observatory (IBA, 2010). The geographical features of the peninsula cause birds to concentrate at the tip of Prince Edward Point in large numbers and few other locations along Lake Ontario are considered to compare to the Point in density or abundance of migrants (Sprague 1987; Weir, 2008).

In addition to migrating birds, the wildlife area supports a diversity of habitats and is considered an important area for butterflies, bats, breeding grassland birds and overwintering waterfowl (Wilson and Cheskey, 2001; Environment Canada, 2011). Information on the functions supported by the NWA were used to assist in the identification and assessment of the potential for the Project Location and Zone of Investigation to support significant wildlife habitat for migratory landbird stopover area, migratory butterfly stopover area and waterfowl stopover and staging areas.

Prince Edward Point Bird Observatory

The Prince Edward Point Bird Observatory (PEPtBO) is located at Point Traverse within the Prince Edward Point National Wildlife Area. It is found approximately 7 km east of the closest point of the White Pines Project Location. The Observatory was established in 1995 as a migration monitoring station, though bird monitoring and research conducted in the area predates this by at least twenty-five years (PEPtBO, 2011). Migration monitoring occurs each spring and fall and includes daily censuses in addition to the netting and banding of migrating birds. Monitoring also includes the netting and banding of Saw-whet Owls each fall. The monitoring conducted at the station has established the Point as an important area for migrating birds in Ontario and it is considered a focal point for passerines, waterfowl and raptors. In total, about 300 species of birds have been recorded at Prince Edward Point, with about 220 species being recorded during the average year (Canadian Migration Monitoring Network, undated). During peak migration periods large numbers of birds can pass through the narrow point; during a five day period up to 80,000 passerines have been recorded passing through the narrow tip of the peninsula (Prince Edward County Field Naturalists, pers. comm, C. Anderson, June 2011). Data from the observatory was used to assist in the identification and assessment of the

potential for the Project Location and Zone of Investigation to support significant wildlife habitat for a migratory landbird stopover area.

Point Petre Provincial Wildlife Management Area

The Point Petre Wildlife Management Area is a 1,276 ha block of land that extends east of Point Petre and encompasses lands from the lake north to Army Reserve Road. During World War II the area was used for military maneuvers. Similar to Ostrander Point (see below) evidence of this use remains, primarily in the unmaintained road network that crosses the site. The wildlife area is managed for recreational activities including hunting and hiking. Habitat found within the Wildlife Area is typical of the County's southern shore; it encompasses shrubland, open grassland, open woodland and swamp woodland. In addition, in 1982 and 1983 Ducks Unlimited established two marsh impoundments in the Wildlife Area, using dams and dikes to back up the natural flow across the property and create the marshes (Harris, 2000; Wilson and Cheskey, 2001). The marshes are managed primarily to provide habitat for waterfowl and other wetland species.

Information on the functions supported by the Provincial Wildlife Management Area were used to assist in the identification and assessment of the potential for the Project Location and Zone of Investigation to support significant wildlife habitat for colonial bird nesting habitat, waterfowl stopover and staging areas and specialized raptor nesting habitat.

Ostrander Point Crown Land Block

The Ostrander Point Crown Land Block is a 324 ha property located along the south shore of the County. During World War II the Ostrander Block served as a training site for the Canadian Army and was used for tracked vehicles as well as a bombing range (Wilson and Cheskey, 2001). This has resulted in an unmaintained road system that criss-crosses the Crown Land Block.

From 2006- 2010 various wildlife inventories were conducted within the Crown Land Block, which indicated the property supported provincially significant wetland and coastal wetland, significant woodland and significant wildlife habitat (seasonal concentration area for migrating landbirds; rare alvar vegetation communities, specialized habitat for woodland amphibian breeding and declining shrub/successional breeding bird species of conservation concern) (Stantec, 2011a). Information on the significant functions supported by the Ostrander Crown Land Block was used to assist in the identification and assessment of the potential for the Project Location and Zone of Investigation to also support these significant natural features.

Conservation Areas

The Milford Mill Pond Conservation Area is found near the northern boundary of the Study Area. It is centered around the Mill Dam and serves primarily as a scenic picnicking area.

The Little Bluff Conservation Area is a recreational conservation area providing hiking and picnicking opportunities on the shore on Prince Edward Bay. The 28 ha conservation area is located at the top of a 20 m limestone bluff. A cobblestone beach is found at the base of the bluff. Resident species include Canada Geese, Mallards, bitterns and Virginia Rails (Quinte Conservation, 2010).

Prince Edward County Environmentally Sensitive Areas

The Prince Edward County Official Plan (Schedule A) identifies Great Blue Heron rookeries and osprey nesting sites and considers them Environmentally Sensitive Areas (PEC Official Plan, 2011). No such areas were identified in the Study Area.

The Official Plan also identifies "other sensitive sites or areas". These are areas considered to provide representative examples of Prince Edward County's geological and biological history and diversity (PEC Official Plan, 2011). Two such areas are identified within the White Pines Study Area; the first is located where Ostrander Point Road terminates at Lake Ontario, the second is the Milford Falls located at Milford (PEC Official Plan, 2011; Schedule A).

Information from the PEC Official Plan was used to assist in the identification and assessment of the potential for the Project Location and Zone of Investigation to support significant wildlife habitat for colonial bird nesting habitat.

3.2.4.3 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:

- winter deer yards;
- moose late winter habitat;
- colonial bird nesting sites;
- waterfowl stopover and staging areas;
- waterfowl nesting sites;
- shorebird migratory stopover areas;
- landbird migratory stopover areas;
- winter raptor feeding and roosting areas;
- Wild Turkey winter range;

- Turkey Vulture summer roosting areas;
- reptile (snake) hibernacula;
- bat hibernacula and bat maternity roosts;
- bullfrog concentration areas; and
- migratory butterfly stopover areas.

Wild Turkey winter range and Turkey Vulture summer roosting areas are no longer considered components of significant wildlife habitat by MNR and as such do not require consideration within this assessment (MNR, 2011a). Also, in accordance with provincial guidance, bullfrog concentration areas are now considered within the assessment of specialized habitat for amphibian breeding (see Section 3.2.4.5; MNR 2012).

The White Pines Project Location is situated in southern Ontario. A review of background information to assess the potential for seasonal concentration areas associated with this region of Ontario to be supported in the Study Area is provided below. The Study Area is not found within the range of moose and significant wildlife habitat components related to moose are not relevant to this assessment.

Winter Deer Yards

Deeryards are areas of key winter habitat for white-tailed deer. They usually consist of a core area of coniferous forest, which provides shelter from snow and wind, adjacent to an area of deciduous forest or other foraging habitat. White-tailed deer are known to occur in the vicinity of the Study Area (Dobbyn, 1994) however no deer yards were identified in the Study Area (LIO, 2011).

No winter deer yards were identified in or within 120 m of the White Pines Project Location. Given MNR has jurisdictional responsibility for identifying and designating these areas, this component is considered absent and is not carried forward to the site investigation.

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).

No nesting of colonial birds is known from the South Bay Coastal Wetland, the Ostrander Point Wetland or the Black Creek PSW, though Black Tern nesting has historically been confirmed in the South Bay Marsh and the Big Sand Bay PSW (Snetsinger and Kristensen, 1993; Mosquin et al., 1986; NHIC, 2011; BSC et al., 2008).

In June 2000, an active colony of Great Blue Herons was observed within the Point Petre Provincial Wildlife Management Area (Harris, 2000). The heronry was confirmed as active during the 2001-2005 Ontario Breeding Bird Atlas (Cadman et al., 2007; BSC et al., 2008). The heronry is located approximately 870 m from the closest project component (an access road) and is 1.13 km from the nearest wind turbine location (T16) (BSC et al., 2008). The colony is shown on Figure 2, Appendix A. A 300 m radius buffer zone was applied around the colony to define the edge of the candidate wildlife habitat for colonial bird nesting habitat (MNR, 2012). An additional 120 m is applied to the 300m zone to determine whether the Project Location is found within 120 m of candidate significant wildlife habitat. The Project Location was not in the 300 m considered candidate significant wildlife habitat for colonial bird nesting, nor did it extend to within 120 m of this zone.

Additionally, nesting of Bank Swallow, Cliff Swallow and Barn Swallow was confirmed within the Study Area during the Ontario Breeding Bird Atlas (BSC et al., 2008; Cadman et al., 2007).

No known colonial nesting sites occurred in the Project Location or Zone of Investigation. Site investigations to determine whether candidate significant wildlife habitat for colonial bird nesting sites is found in, or extends to within 120 m of, the Project Location were conducted (see Section 4.0).

Waterfowl Stopover and Staging Areas

Areas generally considered candidate significant wildlife habitat for waterfowl staging areas are very large wetlands, associated with lakes that generally have a diversity of vegetation communities interspersed with open water (MNR, 2000). Marshes along Great Lakes shorelines are considered particularly valuable (MNR, 2000).

Aquatic

The Prince Edward County shores are considered a significant site for waterfowl (MNR, 2000).

The IBA designation for congregatory species (waterfowl) is due to offshore aquatic waterfowl staging. The shoals and deep waters off the tip of Point Traverse and Prince Edward Point support globally significant concentrations of staging waterfowl during the winter months. Concentrations of Greater Scaup, Long-tailed Duck and White-winged Scoter regularly exceed 1% of their North American populations (IBA, 2010). Other species regularly recorded in large numbers include Common Loon, Horned Grebe, Common Goldeneye, Common Merganser and Red-breasted Merganser.

The marshes created by Ducks Unlimited within the Point Petre Provincial Wildlife Management Area are relatively large (56.5 ha and 57.4 ha) open water marshes located within close proximity to the lakeshore (Wilson and Cheskey, 2001). These marshes are considered a good location for waterfowl during fall migration (Ducks Unlimited, 2009). The eastern marsh

impoundment is found more than 850 m from the nearest point of the Project Location, while the western marsh impoundment is located more than 3.5 km away.

The footprint of the Project Location has been sited more than 400 m from the Lake Ontario shoreline at its closest point.

Terrestrial

Field studies that have been conducted to assess use of select lands within southern Prince Edward County as a terrestrial stopover area for waterfowl have indicated that waterfowl observations are restricted primarily to offshore waters (Jacques Whitford, 2004; Stantec, 2011a). The South Bay Coastal Wetland, found within 120 m of the Project Location, has been identified for supporting waterfowl staging (Snetsinger and Kristensen, 1993).

No known aquatic or terrestrial stopover or staging habitat is found in or within 120 m of the White Pines Project Location. Site investigations were conducted to determine whether the habitat requirements to support terrestrial waterfowl staging or stopover areas is found in or within 120 m of the Project Location. (Section 4.0)

Waterfowl Nesting Sites

Waterfowl nesting habitat typically includes upland habitat that is located near marshes, ponds or lakes. Sites considered candidate significant wildlife habitat for waterfowl nesting contain a high density of small and medium sized ponds, or are single wetlands that are large and diverse (MNR, 2000).

Various waterfowl species were confirmed breeding within the Study Area during the Ontario Breeding Bird Atlas (see Appendix D; Cadman et al., 2007). The South Bay Coastal Wetland was considered suitable breeding habitat for waterfowl, though this function was not confirmed during field work for the wetland evaluation (Snetsinger and Kristensen, 1993).

Site investigations were conducted to determine whether the habitat to support this type of seasonal concentration area is found in or within 120 m of the Project Location (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). Such areas include small ponds, marshes, and areas containing mudflats for staging and foraging (Ross et al., 2003).

The IBA and provincially significant wetlands found within the Study Area are not identified for supporting significant numbers of shorebirds during migration (Wilson and Cheskey, 2001;

Snetsinger and Kristensen, 1993; Mosquin et al., 1986; Stantec, 2011a; Environment Canada, 2011; NHIC, 2011).

As a result of the geological history of the area, the shorelines within the Study Area tend to be an exposed energetic environment composed of large cobble substrate rather than the soft mud substrates required by shorebirds.

While Sprague (1987) notes that the shorelines in the area are not suitable for large concentrations of shorebirds, small but regular numbers of shorebirds are regularly recorded during migration on mudflats and beach areas that are located within the National Wildlife Area (Ontbirds archives undated; PEPtBO, 2011). Prince Edward Point is also identified as an important area to shorebirds in the Ontario Shorebird Conservation Plan (Ross et al., 2003).

The White Pines Project Location is not found in or within 120 m of the shoreline of Lake Ontario. At its closest point the Project footprint has been sited 400 m from the shoreline and most turbines are located more than 1 km from the shoreline. As such, this component is not carried forward to the site investigation stage.

Landbird Migratory Stopover Areas

Migratory passerines are known to use forested landscapes along Great Lakes shorelines as stopover sites during spring and fall migration (Ewert et al., 2006; MNR, 2000). Landbirds tend to concentrate at tips of peninsulas, congregating in significant numbers at recognized stopover sites including Point Pelee, Point Traverse at Prince Edward Point and Long Point, while raptors and shorebirds concentrate along the Great Lakes shoreline during migration.

Areas that provide a diversity of habitat types ranging from open grasslands to large woodlands (i.e. greater than 10 ha) within 5 km of the Lake Erie or Lake Ontario shorelines are considered potential candidate significant wildlife habitat for migrating landbird stopover areas (MNR, 2000).

Many of the best sites are found within 2 km of the Lake (MNR, 2000) with recent research indicating migrants select forested areas in close proximity to water and may be particularly concentrated in riparian woodland located within 400 m of the lakeshore (Bonter et al., 2008; Ewert et al. 2006).

The Prince Edward County South Shore IBA is a globally significant concentration area for landbirds during both spring and fall migration periods with impressive numbers and diversity including 36 species of wood warbler, 20 species of sparrows and 12 species of flycatchers. Peak numbers of common species such as Tree Swallow, Blue Jay, Black-capped Chickadee, Golden-crowned Kinglet, Ruby-crowned Kinglet, Yellow-rumped Warbler, Dark-eyed Junco and White-throated Sparrow regularly exceed 200 individuals and sometimes exceed 2000.

During the fall migration, up to 2000 hawks a day can move up the point including large numbers of Sharp-shinned Hawks, Red-shouldered Hawks and Red-tailed Hawks. Prince Edward Point has also been recognized as a major concentration area for fall migrating Northern Saw-whet Owls (Sprague, 1987; Weir, 2008; Wilson and Cheskey, 2001). Netting studies (where owls are drawn into mist nets using taped calls) conducted at the PEPtBO indicate that relatively substantial numbers of Northern Saw-whet Owls pass through the Point each fall; 502 birds were captured in fall 2009, 1021 were captured in fall 2010, and 721 in fall 2011 (PEPtBO, 2011).

Most data that is available regarding migrating landbirds for the south shore of Prince Edward County is collected from the bird banding station located at the tip of the peninsula (see Figure 1, Appendix A). Geography may, in part, dictate use of shoreline areas as many birds concentrate at tips of peninsulas, opting to cross lakes at narrow spots (i.e. Rondeau, Long Point, Point Pelee and Point Traverse along the Prince Edward south shore). The extent to which this function is supported throughout the rest of the County, away from the tip is not well known (Harris, 2000). For most of the lands within the southern County, site specific data on use during migration is not available.

The evaluation of the ecological values supported by the provincially significant wetlands found within the White Pines Study Area concluded that the Ostrander Point PSW was the only wetland complex of the five PSWs within the Study Area that provided a significant function for landbirds during migration (Snetsinger and Kristensen, 1993; Mosquin et al., 1986; NHIC, 2011; Stantec, 2011a).

Radar studies and area search transects were completed by Acadia University at the Ostrander Crown Land Block. The majority of woodland within the Ostrander Crown Land Block is within 0.4 km from the shoreline, which has been identified as being of particular importance to migrating landbirds (Ewert et al. 2006). Results from Acadia's migratory survey recorded 103 species during spring migration and 120 species during fall migration in the Ostrander Crown Land Block. Vireos, thrushes and flycatcher were observed in good numbers during both spring and fall migration. Warblers, particularly Yellow Warbler, were found in higher numbers during the spring migration period (Stantec, 2011a).

Earlier radar work conducted simultaneously at both the Point (within the National Wildlife Area) and at the Ostrander Crown Land Block indicated that the activity level of migrants at the Crown Land Block was notably less than levels seen at the Point (R. Miliken, pers. comm. October, 2011).

Woodlands (i.e. greater than 10 ha) with a diversity of habitat (i.e. multiple ELC community classes; adjacent open habitats) are present within 5 km of the Lake Ontario shoreline within the White Pines Study Area (Figure 2, Appendix A). Further assessment of these features was undertaken during site investigations (see Section 4.0). The extent to which the natural features

found in the White Pines Project Location and 120 m Zone of Investigation support migrating landbirds was also assessed (see Section 5.0).

Winter Raptor Feeding and Roosting Areas

Open meadow or grassland habitats that support large and productive small mammal populations can provide critical winter feeding areas for wintering raptors (MNR, 2000). 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).

Environment Canada 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, 2007a).

Southern Prince Edward County has not been identified as an area supporting large populations of wintering raptors (Ontbirds, undated; Sprague, 1969; Wilson and Cheskey, 2001; Environment Canada, 2007). Sprague (1969) characterizes most owl and raptor species as “rare” winter visitors in the area. Annual results for the Prince Edward Point Christmas Bird Count from 2000- 2010 indicate relatively low numbers of raptors observed within the count circle (National Audubon Society, 2011), particularly compared to nearby areas such as Amherst Island and Wolfe Island (Weir, 2008; National Audubon Society, 2011).

Field studies that have been conducted to assess winter raptor use within southern Prince Edward County characterize use of the landscape by winter raptors as very low; very low raptors/kilometre have been recorded and no concentration areas have been observed (Jacques Whitford 2004; Stantec, 2011a).

Site investigations were conducted within the White Pines Study Area to determine whether the required habitat to support this type of seasonal concentration area is found in, or within 120 m of the Project Location (see Section 4.0).

Reptile (Snake) Hibernacula

Potential hibernacula include features such as animal burrows, rock crevices, fractured rocks at the base of cliffs or karst areas that provide an access for reptiles to hibernate below the frost line (MNR, 2000). These areas are often associated with water to prevent desiccation of the species.

The project is located within the ranges of various species of snakes (Appendix D; Oldham and Weller, 2000; Christie, 1997). There are no known reptile hibernacula in or within 120 m of the Project Location.

Site investigations were conducted to determine whether features that would support reptile hibernacula are found in or within 120 m of the Project Location (see Section 4.0).

Bat Hibernacula and Maternity Roosts

Hibernacula

Bats require specific environmental conditions for hibernating. These conditions are provided by features such as caves or abandoned mines (MNR, 2000; MNR 2011b). Karst topography and areas of exposed bedrock can be indicators of potentially suitable hibernacula habitat for bats.

Karst formations tend to be more common along joints between two different bedrock formations. Also, thin drift and exposed bedrock terrains with deep joints and potential features at edges of bedrock valleys and cliff edges are prime areas for karst, crevasse or cave formations. In the White Pines Study Area, there are joint systems that occur primarily along the South Bay shoreline and associated with the Black Creek Valley (Armstrong and Dodge, 2007). The Ontario Geological Survey mapping indicates that there is a shallow depth of overburden over the bedrock in the White Pines Study Area (Gao et al., 2006). Mapping of known and potential karst within Ontario indicates there is no observed evidence of karst within the Study Area (Brunton, 2008).

Correspondence with Mr. Frank Brunton, an Geoscientist with the Sedimentary Geoscience Branch of the Ontario Ministry of Northern Development and Mines (MNDN) indicated that significant caves have not been observed within the White Pines Study Area and that the type of geological formations that underlay this area are not conducive to significant cave formation. Small caves have been reported, but not personally observed by Mr. Brunton, in the vicinity of Lake on the Mountain (MNDN, Brunton, pers. comm., January 2011). This is located approximately 10 km north of the White Pines Study Area. No abandoned mines have been identified in the Study Area (LIO, 2011; OMNDMF AMIS database, 2010).

No known bat hibernacula have been identified within the Study Area (Renewable Energy Atlas, 2011).

Maternity Roosts

Depending on the species, maternity roosts for bats can include tree foliage, tree cavities and crevices under loose bark, or buildings. Within southern Ontario, most bat maternity roosts

occur within human structures and natural roosts are rare (MNR pers. comm., L. Hale, June 2011; Bringham, 1991; Kunz, 1982).

Candidate significant wildlife habitat for bat maternity roosts may be found in mixedwood or deciduous forests that contain a high density (ten per hectare or more) of large diameter (25 cm dbh or more) snags or cavity trees (MNR 2011b). The best candidate trees or snags for bat maternity roosts within these habitats are considered according to the following criteria (in order of importance): those that are the tallest; have cavities or crevices; have a large dbh; are within the highest density of snags/cavity trees; have a large amount of loose, peeling bark; have a cavity or crevice more than 10 m high; are tree species that provide good cavity habitat (i.e. aspen, maple, ash, oak or white pine), are within an open canopy; and exhibit early stages of decay.

There are no known maternity roosts in the Study Area.

Site investigations were conducted to determine whether candidate significant wildlife habitat for bat hibernacula or maternity roosts extends to within 120 m of the Project Location (see 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 Ontario (MNR, 2000). Large woodlands and open fields (>20 ha) within 5 km of the Lake Ontario shoreline are considered most significant, with presence of milkweed an important requirement for Monarch butterflies (MNR, 2000).

During fall migration, general patterns in movement occur, in particular the routes used to cross the Great Lakes. 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. The majority of fall migrating monarchs in Ontario use three such staging areas: Point Pelee, Long Point, and Presqu'ile Point (C. Taylor, pers. comm., 2006). Dr. Taylor indicated that most of the eastern Ontario populations of monarchs are believed to cross Lake Ontario at the Presqu'ile Point staging site.

In 1995, Canada and Mexico signed a joint declaration to create an International Network of Monarch Butterfly Reserves. The creation of a network of designated reserves in both Canada and Mexico was intended to recognize the need to act jointly to conserve and protect the monarch butterfly and its critical seasonal habitats. As part of this initiative Canada committed to nominating sites to become part of the international network of monarch butterfly reserves. In 1996, the Prince Edward Point National Wildlife Area joined the International Network of

Monarch Butterfly Reserves (Environment Canada, 2011). The National Wildlife Area is located approximately 2.3 km east of the closest point of the White Pines Project Location.

During field surveys conducted within the Ostrander Point Crown Land Block during the fall butterfly migration season Monarchs were not noted in any substantial numbers and the lands were not considered to support a significant stopover site for migratory butterflies (Stantec, 2011a).

There are no known butterfly stopover areas in the Study Area; however, the presence of habitat suitable to support migratory butterfly stopover areas in and within 120 m of the Project Location was assessed during site investigations (Section 4.0).

3.2.4.4 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). While river valleys, riparian areas and linkages between known wildlife habitats can serve as corridors, hedgerows can also serve as small linkages (MNR, 2000). Some examples of movement corridors are trails used by deer to move to wintering areas, and areas used by amphibians between breeding and summering habitat. In the absence of known animal movement corridors, this wildlife habitat can only be identified after other natural heritage features are identified and mapped (MNR, 2000).

No known animal movement corridors were identified in the Study Area (LIO, 2011).

3.2.4.5 Rare Vegetation Communities or Specialized Habitats

Rare Vegetation Communities

Rare vegetation community types known to occur within the Prince Edward area are identified within Appendix M of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000). These include open alvar (pavement and various grassland types), treed alvar, coastal meadow marsh, dune grassland and dry oak- shagbark hickory tallgrass woodland.

Alvar communities are generally described as areas of relatively flat limestone bedrock that support a distinctive set of plants and wildlife; plant life is generally comprised of mosses, lichens, grasses and sedges with tree development generally absent or stunted (Goodban, undated). True alvars in the Great Lakes Region are naturally open areas of thin soil over flat limestone or marble rock, where drought and extremes in soil moisture are the major factors limiting tree cover (Catling and Brownell, 1995).

Alvars are mapped as occurring over 12, 000 ha within the Picton Ecodistrict of Ontario (which includes Prince Edward County and the shoreline from Trenton to east of Kingston). This

comprises approximately 5% of total land cover and 14% of natural land cover. Of the 12,000 ha of alvar, less than one percent are considered "true" alvars (Henson and Brodribb, 2005).

The southern third of Prince Edward County, where the White Pines Study Area is situated, contains limestone bedrock which is covered by a shallow layer of soil. The southern location, soil textures, drainage patterns, microclimate and proximity to Lake Ontario have resulted in the development of "alvar-like" conditions throughout much of this area (Wilson and Cheskey, 2001; Henson and Brobribb, 2005). Plant species found in these areas include narrow-leaved vervain, bluets, spike-rush, and false pennyroyal.

The presence of these rare vegetation communities, or others, in and within 120 m of the Project Location was assessed during site investigations (Section 4.0).

Specialized Habitats

Specialized habitats are microhabitats that are critical to some wildlife species. The SWHTG (MNR, 2000) identifies the following potential specialized habitats:

- habitat for area-sensitive species;
- forests providing a high diversity of habitats;
- old-growth or mature forest stands;
- foraging areas with abundant mast;
- amphibian breeding ponds;
- turtle nesting habitat;
- specialized raptor nesting habitat;
- moose calving areas;
- moose aquatic feeding areas;
- mineral licks;
- mink, otter, marten, and fisher denning sites;
- highly diverse sites;
- cliffs; and
- seeps and springs.

Forests providing a high diversity of habitats and highly diverse areas are not considered components of significant wildlife habitat for renewable energy projects and as such are not included within this assessment (MNR 2011a).

A review of background information to assess the potential for specialized habitats that are associated with southern Ontario to be supported in the Study Area is provided below. The Study Area is not found within the range of moose and significant wildlife habitat components related to moose are not relevant to this assessment.

Habitats for Area-Sensitive Species

The *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR 2011a) identifies interior forest breeding bird and open country breeding bird habitat as specific specialized habitat types of habitat for area-sensitive species. Ontario Breeding Bird Atlas information indicates that the 10x10 km atlas squares that encompass the White Pines Study Area contain records of forest and open country area-sensitive breeding birds (Appendix D).

Interior Forest Breeding Birds

Woodlands larger than 30 ha are considered to have the potential to support and sustain populations of area-sensitive forest species (MNR, 2000). Woodlands must provide interior habitat (i.e. at least 200m from the woodland edge), which is influenced by woodland size and shape (MNR, 2000).

Open Country Breeding Birds

Large, contiguous undisturbed grasslands of at least 30 ha (and preferably 50 ha or more) are considered likely to support and sustain a diversity of grassland species (MNR, 2000). Areas that are actively managed for agricultural activities are considered disturbed systems and are not considered candidates for significant wildlife habitat (MNR pers. comm. J. Boos, January 26, 2011). Actively managed agricultural fields within the Project Location are not considered candidate significant wildlife habitat for grassland breeding bird species.

Site investigations were conducted to determine the presence of candidate significant wildlife habitat for interior forest and open country breeding birds in and within 120 m of the Project Location (see Section 4.0).

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. Old (i.e. more than 120 years old) undisturbed forest stands that have experienced little or no forestry management would be considered candidate significant wildlife habitat.

Much of southern Prince Edward County consists of long-abandoned fields that are succeeding into shrub thicket habitats (IBA, 2010) indicating that old-growth forests stands are unlikely to

occur. However, site investigations were conducted to determine the presence of these features in and within 120 m of the Project Location (see Section 4.0).

Foraging Areas with Abundant Mast

Forests containing numerous large beech and red oak can provide important food sources to enhance the survival and productivity of those birds and mammals that subsist on a fruit and nut diet (MNR, 2000).

No background information is available to identify the known presence of these features at the White Pines Project Location. Site investigations were conducted to determine the presence of these features in and within 120 m of the Project Location.

Amphibian Breeding Ponds

Woodland ponds (i.e. vernal pools) may provide important habitat for local amphibian populations. Ponds that contain a variety of vegetation structure in and around the edge of the pond, are undisturbed and are found adjacent to closed canopy woodlands with dense undergrowth that maintain a damp environment typically provide the best ponds for breeding (MNR, 2000). Wetlands (swamps and marshes) can also support important amphibian breeding habitats.

The Ontario Herpetofaunal Summary indicates the Project Study Area falls within the range of a number of common amphibian species (Appendix D; Oldham and Weller, 2000; Christie, 1997). Woodlands and wetlands are present within the Study Area and may provide amphibian breeding habitat.

Site investigations were conducted to determine the presence of candidate significant wildlife habitat for amphibian breeding to be present within 120 m of the Project Location.

Turtle Nesting Habitat

Sandy or fine gravel soils are a requirement for turtle nesting (MNR, 2000). Areas that would be considered candidate significant wildlife habitat for turtle nesting include areas containing sandy or fine gravel soils (i.e. shoreline beaches) adjacent to turtle habitat (weedy wetlands, lake or river shorelines). The NHA Guide (MNR 2011a) also identified turtle overwintering areas as specialized habitats. Permanent water bodies or large open aquatic wetlands could support overwintering turtles.

Various species of turtle occur within the range of the Study Area (Appendix D; Oldham and Weller, 2000; Christie, 1997). Snapping Turtle observations were confirmed in four of the five provincially significant wetland complexes that are found within the Study Area (Oldham and Weller, 2000; Mosquin et al., 1986; Snetsinger and Kristensen, 1993; Stantec, 2011a; NHIC,

2011). Of these wetland complexes, only the South Bay Coastal Wetland extends to within 120 m of the Project Location.

Site investigations were conducted to determine the presence of candidate significant wildlife habitat for turtle nesting in and within 120 m of the Project Location (see Section 4.0).

Specialized Raptor Nesting Habitat

The Significant Wildlife Habitat Technical Guide indicates that some raptors require somewhat specialized habitats for nesting.

Bald Eagle and Osprey

Under the criteria and guidelines outlined in Appendix Q (MNR, 2000) critical habitat features that would support specialized Bald Eagle and Osprey nesting habitat are identified as waterbodies with fish populations and trees with good visibility and flight lines.

Bald Eagle nests are found primarily along the Lake Erie shoreline in southern Ontario. Bald Eagle was not reported in Prince Edward County during the second Ontario Breeding Bird Atlas or through Bird Studies Canada's Bald Eagle Monitoring Program (Cadman et al., 2007; Allair, 2011; BSC et al., 2008). While no natural Bald Eagle nests were known to occur within the Study Area, MNR indicated two artificial nesting platforms have been installed for Bald Eagle in southern Prince Edward County (Appendix C). Use of the platforms was unconfirmed (MNR pers. comm., E.Prevost, May 2012).

Osprey nesting was confirmed within the White Pines Study Area during the second Ontario Breeding Bird Atlas (Cadman et al., 2007). Specifically an Osprey nest has been identified within the Provincial Wildlife Management Area (Harris, 2000). It is located approximately 870 m from the closest project component (an access road) and 1.13 km from the closest turbine location (T16). The location of the Osprey nest is shown on Figure 2, Appendix A.

A 300 m radius buffer zone was applied around the nest to define the edge of the candidate wildlife habitat for the candidate significant wildlife habitat (MNR, 2012). An additional 120 m is applied to the 300m zone to determine whether the Project Location is found within 120 m of candidate significant wildlife habitat. The Project Location was not in the 300 m considered candidate significant wildlife habitat, nor did it extend to within 120 m of this zone.

Woodland Raptor Nesting Habitat

During Ontario Breeding Bird Atlas field surveys Red-tailed Hawk, Merlin, Sharp-shinned Hawk and Cooper's Hawk nesting was confirmed within the White Pines Study Area (Appendix D; Cadman et al., 2007).

Site investigations were conducted to determine the presence of candidate significant wildlife habitat for specialized raptor nesting in and extending to within 120 m of the Project Location (see Section 4.0).

Mink, Otter, Marten and Fisher Denning Sites

Mink, otter, marten and fisher are predators that have specific habitat components that are critical to their survival. Marten, otter and fisher are found on the Canadian Shield and their range does not extend to within the White Pines Study Area (Dobbyn, 1994). Mink are known to occur within Prince Edward County, though the *Atlas of the Mammals of Ontario* does not indicate their presence within the south shore region of the County (Dobbyn, 1994).

Mink are found throughout southern Ontario and prefer natural undisturbed shorelines dominated by coniferous or mixed forests for feeding and denning (MNR, 2000). The White Pines Project Location has been setback a minimum of 400 m from the shoreline.

The White Pines Project Location is not found in or within 120 m of the shoreline. At its closest point the Project footprint has been sited 400 m from the shoreline. As such, this component is not carried forward to the site investigation stage.

Cliffs

Cliffs are dominated by bedrock with sharp or variable broken edges and a vertical relief greater than three metres (MNR, 2000). A 20 m limestone bluff is known to occur at the Little Bluff Conservation Area, located approximately 1 km north of the White Pines Project Location, however the Prince Edward County region of Ontario is considered a low limestone plateau (Chapman and Putman 1984) and the area is generally characterized as a flat plain. No cliffs are known to occur in or within 120 m of the Project Location and this component is not carried forward to the site investigation stage.

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 located within the Project Location.

The presence of seeps and springs in and within 120 m of the Project Location was determined during site investigations for the NHA (Section 4.0) and those conducted for the White Pines Water Body and Water Assessment Report (separate cover).

3.2.4.6 Species of Conservation Concern

Rare species include those that are designated as provincial species of special concern, those that are designated with provincially low s-ranks (i.e. S1- S3) or species that contain federal designations of special concern, threatened or endangered but that are not designated provincially. Rare species also include guilds whose populations are significantly declining.

Provincially endangered and threatened species are addressed under the requirements of the *Endangered Species Act* (2007). Information required to address these species is being submitted to MNR directly as part of a separate report. Where this information indicates that approvals or permits are required, these will be addressed separately through the applicable statute and its permitting process.

Rare Species

NHIC, wildlife atlases, information provided as a result of data requests to various organizations (i.e. Environment Canada/Canadian Wildlife Service, NatureCounts, Bird Studies Canada, Prince Edward Bird Observatory, Prince Edward Field Naturalists) and data provided by MNR (pers. comm., E. Prevost, June 2010; Appendix C) were the primary sources used to identify historic records of species of conservation concern that occur in the vicinity of the Study Area. Species that would be considered of conservation concern, and whose presence would be assessed within an evaluation of candidate significant wildlife habitat in the Study Area are listed in Table 3.3 (Appendix B). Thirteen species, including four plants (Carolina Whitlow-grass, Short-stalked Chickweed, Brainerd's Hawthorn, Ram's-head Lady Slipper), one butterfly (Monarch), one amphibian (Western chorus frog), three reptiles (snapping turtle, Northern map turtle, Eastern milksnake) and four birds (Great Black-backed Gull, Black Tern, Short-eared Owl and Red-headed Woodpecker) were identified with historic occurrences within the regional landscape. This list of potential species of conservation concern and their habitat requirements was cross referenced with habitat mapping, aerial photography and vegetation classifications to determine the suitability of the Project Location and 120 m Zone of Investigation to support them (Section 4.0).

Declining Populations

The Ontario Partners In Flight (PIF) program has identified a number of species that are considered conservation priorities for Bird Conservation Region ("BCR") 13 (Lower Great Lakes/St. Lawrence Plain region of southern Ontario) (Ontario PIF, 2008).

PIF indicates that the White Pines Study Area is located within an area of southern Ontario that supports low relative densities of priority avian species associated with forest habitats, low to moderate relative densities of priority species associated with grassland habitat and high densities of priority species associated with shrubland habitat (Ontario PIF, 2008). Ontario

Breeding Bird Atlas information indicates that atlas squares that encompass the White Pines Study Area contains records of 25 PIF identified species. Ten of these are grassland/agricultural birds, six are forest birds, five are shrub/successional species and four species are considered habitat generalists (Appendix D).

The *Natural Heritage Assessment Guide for Renewable Energy Projects* identifies the shrub/successional guild of birds as a component of Species of Conservation Concern (MNR, 2011a). Candidate significant wildlife habitat for woodland breeding birds and grassland breeding birds is considered within this assessment under specialized habitats for area-sensitive breeding birds (see above).

Background research indicates shrub/early successional habitat is found within southern Prince Edward County. Work completed by Stantec (2011a) at the Ostrander Crown Land Block confirmed the presence of approximately 208 ha of shrubland habitat within the Block. Field studies indicated it supported a healthy population of shrub/successional breeding bird species and it was considered significant wildlife habitat for shrub/successional breeding birds. This area occurs within 120 m of the White Pines Project Location (roadside collector lines along Babylon and Helmer Roads) and is shown on Figure 2.0, Appendix A. Site investigations were conducted to determine whether the White Pines Project Location and its 120 m Zone of Investigation provide the habitat requirements to support additional candidate significant wildlife habitat for declining shrub/successional breeding bird populations (see Section 4.0).

3.2.4.7 Candidate Significant Wildlife Habitat Summary

For most wildlife habitats defined in the Significant Wildlife Habitat Technical Guide (MNR, 2000) it is not possible to identify confirmed significant wildlife habitat through a review of background information. Background information is compiled and used to identify components of candidate significant wildlife habitat that may be present. A site investigation is required to confirm the presence and extent of the habitat components that are required to support candidate SWH.

No known significant wildlife habitat was identified in the White Pines Project Location through the records review. One confirmed significant wildlife habitat component (shrub/successional breeding bird habitat [ssbb4]) was identified as occurring within 120 m of the Project Location.

In addition, the presence of the following wildlife habitat components in the Project Location or 120 m Zone of Investigation is unknown, requiring site investigations to assess their presence:

1. Seasonal Concentration Areas
    - colonial bird nesting
    - waterfowl stopover and staging areas

- waterfowl nesting sites
- landbird migratory stopover areas
- raptor winter feeding and roosting areas
- reptile hibernacula
- bat hibernacula and maternity roosts; and
- migratory butterfly stopover areas.

2. Animal Movement Corridors

3. Rare Vegetation Communities or Specialized Habitats

- rare vegetation communities
- habitat for area-sensitive species
- old-growth or mature forest stands
- foraging areas with abundant mast
- amphibian breeding ponds
- turtle nesting habitat
- specialized raptor nesting; and
- seeps and springs.

4. Species of Conservation Concern

- rare species (see Table 3.3, Appendix B)

3.2.5 Areas of Natural and Scientific Interest (ANSIs)

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.

MNR identifies two types of ANSIs; life science and earth science (MNR, 2010). Life Science ANSIs are significant representative areas of Ontario's biodiversity and natural landscapes, while Earth Science ANSIs are geological in nature and consist of some of the more significant representative examples of bedrock, fossils and landforms in Ontario.

3.2.5.1 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 shown on Figure 2 (Appendix A).

Milford- Black Creek Valley Provincially Significant Earth Science ANSI is a subglacial tunnel valley that originates at the McMahon Bluff landform, approximately 4 km east of the Study Area (Gorrell, 1991). The valley extends from the Bluff south and west along Black Creek (see Figure 1, Appendix A). From the McMahon Bluff to the town of Milford the valley landform consists of a plateau of up to 20 m high surrounded by a narrow, steep ridge up to 5 m higher (Gorrell, 1991). West of Milford the valley ridge and plateau disappear but a channel in the bedrock is found through the valley to County Road 24. A second segment of the Earth Science ANSI occurs along the north side of Army Reserve Road to the east of Simpson Road.

Project components found in the ANSI boundary include access roads. Turbines, buildable areas, collector lines and access roads are also found within 50 m of the Earth Science ANSI boundary.

The Project Location in relation to the Earth Science ANSI is shown on Figure 2, Appendix A.

3.2.5.2 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 shown on Figure 2 (Appendix A). No provincially significant Life Science ANSIs were identified in or within 120 m of the Project Location.

ANSIs (not provincially significant) that occurred in or within 120 m of the Project Location included:

Prince Edward to Ostrander Point Candidate Life Science ANSI - The east portion of the Study Area is situated within the Prince Edward to Ostrander Point Candidate Life Science ANSI. This Candidate ANSI extends from Prince Edward Point to approximately Petticoat Point, encompassing 2000 ha. As noted by the MNR “the combination of size, extent of shoreline, known species diversity and special features make this site unique in the Site District” (Stantec, 2011a). The status of the ANSI is currently unconfirmed (MNR, pers. comm., E. Prevost, May, 2012).

Black Creek Valley Marshes and Forest Life Science ANSI - The Black Creek Valley Marshes and Forest Life Science ANSI is a riverine and riparian corridor connected to Lake Ontario and extending several kilometers through a predominately agricultural zone. The ANSI has been evaluated by MNR as a regionally significant Life Science ANSI (NHIC, 2011). The narrow

corridor follows Black Creek from the McMahon Bluff Escarpment Forests west to Lighthall Road (PEC Official Plan, 2011; LIO, 2011). It is associated with the Milford-Black Creek Valley Earth Science ANSI and the Black Creek PSW. Water levels in the creek are controlled by Lake Ontario and wetland communities within the ANSI change periodically in response to changing lake water levels (Snetsinger and Snetsinger, 2000). The Life Science ANSI is noted for the quality of its fairly mature deciduous and mixed forests on valley slopes and diverse marshes within the floodplain which are considered unmatched elsewhere within the physiographic region (NHIC, 2011; Snetsinger and Snetsinger, 2000). It is an extensive, well developed river valley with wetland and slope forest landforms and vegetation communities which are representative of the Prince Edward Peninsula Physiographic Region (NHIC, 2010; Snetsinger and Snetsinger, 2000). The site is considered to offer good waterfowl breeding and stopover opportunities and is well used for waterfowl hunting (Snetsinger and Snetsinger, 2000).

The blade tip of T04 extends over the Black Creek Valley marshes and Forest Life Science Life Science ANSI boundary. Additional project components found within 120 m of the ANSI boundary include the turbine base and buildable area for T04 and associated collector line.

The Project Location in relation to Life Science ANSIs is shown on Figure 2, Appendix A.

3.2.6 Provincial Parks and Conservation Reserves

There were no provincial parks or conservation reserves identified in or within 120 m of the Project Location through the records review (NHIC, 2011; Ontario Parks 2010).

3.3 Summary of Natural Features and Boundaries Identified

No provincial parks or conservation reserves were identified in or within 120 m of the White Pines Project Location.

The following known natural features were identified as occurring in or within 120 m of the Project Location:

- Wetlands (one PSW and six unevaluated wetlands);
- Woodlands (eleven woodland features);
- Valleyland (one; Black Creek Valleyland);
- Wildlife habitat (shrub/successional breeding bird habitat [ssbb4]);
- Earth Science ANSI (one; Milford Black Creek Valley Provincially Significant Earth Science ANSI); and
- Life Science ANSIs (two; Prince Edward to Ostrander Point Candidate Life Science ANSI and Black Creek Valley Marshes and Forest Life Science ANSI.

Each known natural feature as identified through the records review and the Project components found in and/or within 120 m of each feature are detailed in Table 3.2, Appendix B and are shown on Figure 2, Appendix A.

A site investigation is required to confirm the presence and boundaries of natural features found in or within 120 m of the White Pines Project Location and identify the presence of additional features not identified through the records review. This includes identifying the presence of potential candidate significant wildlife habitat features including:

1. Seasonal Concentration Areas

    - colonial bird nesting
    - waterfowl stopover and staging areas
    - waterfowl nesting sites
    - landbird migratory stopover areas
    - raptor winter feeding and roosting areas
    - reptile hibernacula
    - bat hibernacula and maternity roosts; and
    - migratory butterfly stopover areas.

2. Animal Movement Corridors

3. Rare Vegetation Communities or Specialized Habitats

    - rare vegetation communities
    - habitat for area-sensitive species;
    - old-growth or mature forest stands;
    - foraging areas with abundant mast;
    - amphibian breeding ponds;
    - turtle nesting habitat;
    - specialized raptor nesting; and
    - seeps and springs.

4. Species of Conservation Concern

    - rare species (see Table 3.3, Appendix B)

4 SITE INVESTIGATION

Site investigations were conducted in accordance with O. Reg 359/09, s. 26 (1), Natural Heritage Site Investigation. This report is prepared in accordance with s. 26 (3) with guidance provided from the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a).

Site investigations were completed with the purpose of confirming the status and boundaries of known natural features identified through the records review and identifying any additional features. Data collected during the records review concerning natural features and species occurrences were used to guide the scope and direction of site investigations. The extent of the site investigation program and type of field surveys included in the program is reflective of the extent of natural features and potential for candidate significant wildlife habitat that were identified within the Project Study Area through the records review.

MNR was consulted on the proposed field investigation work program for the White Pines Wind Project (Stantec, June 8, 2010). MNR provided comments on the proposed work program in writing on June 10, 2010 and in person on June 14, 2010 and February 28, 2011. MNR has been consulted regularly regarding the White Pines project over the period of June 2010-present. Written comments received from MNR are included as Appendix C.

Ongoing field studies occurred in the White Pines Study Area during all seasons from December 2009 to March 2012. The field investigation program involved the identification of the vegetation communities and associated wetlands, wildlife habitat features and wildlife use of the Study Area (through wildlife monitoring surveys for amphibians, reptiles and birds). A summary of all field studies completed for the Project is provided in Table 4.1, Appendix B. Those surveys considered part of the “site investigation” program are described in Section 4.1. Field surveys conducted as part of the “evaluation of significance” program are described in Section 5.1.

Qualifications of field personnel are provided in Appendix E.

The following known natural features were identified as occurring in and within 120 m of the Project Location:

- Wetlands (one PSW and six unevaluated wetlands);
- Woodlands (eleven woodland features);
- Valleyland (one; Black Creek Valleyland);
- Wildlife habitat (shrub/successional breeding bird habitat [ssbb4]););
- Earth Science ANSI (one; Milford Black Creek Valley Provincially Significant Earth Science ANSI); and

- Life Science ANSIs (two; Prince Edward to Ostrander Point Candidate Life Science ANSI and Black Creek Valley Marshes and Forest Life Science ANSI.

A site investigation was conducted to confirm the presence and boundaries of the natural features found in or within 120 m of the White Pines Project Location and identify the presence of additional features not identified through the records review. This includes identifying the presence of potential candidate significant wildlife habitat features including:

1. Seasonal Concentration Areas

    - colonial bird nesting
    - waterfowl stopover and staging areas
    - waterfowl nesting sites
    - landbird migratory stopover areas
    - raptor winter feeding and roosting areas
    - reptile hibernacula
    - bat hibernacula and maternity roosts; and
    - migratory butterfly stopover areas.

2. Animal Movement Corridors

3. Rare Vegetation Communities or Specialized Habitats

    - rare vegetation communities
    - habitat for area-sensitive species;
    - old-growth or mature forest stands;
    - foraging areas with abundant mast;
    - amphibian breeding ponds;
    - turtle nesting habitat;
    - specialized raptor nesting; and
    - seeps and springs.

4. Species of Conservation Concern

    - rare species (see Table 3.3, Appendix B)

4.1 Methods

Land access was available for all land parcels where components of the wind project are proposed (i.e. the Project Location). Land access was also available for the majority of the 120 m Zone of Investigation of all wind project components (turbine locations and their associated construction areas, access roads and collector lines located on private property). The Project

Location and associated 120 m Zone of Investigation was traversed on foot and physically inventoried, where property access permitted. However, certain situations necessitated the need for an alternative site investigation because it was not reasonable to physically access these properties.

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. 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 application of the alternative site investigation was primarily restricted to areas where collector lines are sited within the municipal road allowance. Due to the large number of non-participating landowners along the collector lines located in the municipal road allowance, it was not deemed reasonable to contact each landowner to request and obtain access to their property. Since the proposed collector lines are restricted to the existing road allowance, 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.

For the majority of the wind project components, access was available for the 120 m Zone of Investigation. Alternative site investigations were restricted to very few locations. In these cases, adjacent properties were primarily in agricultural land use and did not contain natural features that would necessitate the need for physically visiting the property to complete a site investigation. Through an interpretation of aerial photographs and observations from the nearest property 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. In one instance, the 120 m Zone of Investigation incorporated natural features located on adjacent lands. In this case, natural habitat was contiguous with that located on adjacent optioned properties and the site characteristics and conditions were assessed through an interpretation of aerial photographs and observations from the nearest property line in conjunction with application of the results of the site investigation results from adjacent lands.

Field surveys undertaken detail conditions in the Project Location and 120 m Zone of Investigation current at the time of the surveys. The location of all field investigations was based on the information about the Project Location and layout that was current at the time of the respective survey. Dates, times, duration, field personnel and weather for each field survey conducted for the Project are presented in Table 4.1 (Appendix B).

The following sections provide details of the various survey methods used to identify the location and boundaries of natural features (as identified in O. Reg. 359/09) that are found in the White Pines Project Location or within the 120 m Zone of Investigation (see Section 2.1).

4.1.1 Vegetation Community Assessment

Ecological Land Classification (ELC) of the vegetation communities in the Project Location and Zone of Investigation was conducted September 21-24, 27-30, 2010 and June 13 - 17, 2011. Survey times, weather conditions and field personnel are summarized in Table 4.1 (Appendix B). Vegetation communities were delineated on aerial photographs and confirmed in the field. Vascular plant species lists were recorded separately for each community. Community characterizations were based on the ELC system and have been identified to the Vegetation Type unit level (Lee et al., 1998).

4.1.2 Wetland Confirmation and Delineation

Wetlands include land (such as a swamp, marsh, bog or fen) that is seasonally or permanently covered by shallow water and has hydric soils and vegetation dominated by hydrophytic or water tolerant plants (MNR, 2011a).

Site investigations were undertaken during the weeks of September 21-24, September 27-30, 2010, and June 13-17, 2011 to confirm the presence and extent of wetland communities that occurred within 120 m of the Project Location.

The methods of delineation followed protocols outlined in the Ontario Wetland Evaluation System (OWES) 3rd Edition and were conducted by an OWES certified surveyor (see Appendix E). In this evaluation system wetlands are defined as '*lands that are seasonally or permanently flooded by shallow water as well as lands where the water table is close to the surface; in either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic or water tolerant plants'*. The principal criterion for determining the boundary of wetlands is the species composition of the plant community. In general, the wetland to upland boundary is drawn through the zone of transition where upland species of trees and shrubs represent fifty percent of the woody species present. Where tree and shrub species are either not present or are inconclusive, the herbaceous layer is then used to assist in identifying the boundary. Where property access permitted, the wetland boundaries were surveyed using a Thales MobileMapper CE sub-metre GPS. If property access was not available, wetland delineations were based on air photo interpretation and roadside or property line assessments.

Wetland delineation under OWES differs from the distinction between Terrestrial Systems and Wetland Systems in ELC. The OWES delineation is based substantially on the predominance (more than 50% cover) of "wetland plants", while the ELC **"**Key to Systems" references a more comprehensive set of criteria including water table, soil moisture regime , percentage of

standing water or pools, predominance of wetland plant species cover and mean wetness index. The OWES is generally more prescriptive and arbitrary, while the ELC is generally more descriptive and subjective.

These differences in methods often lead to differences in wetland boundaries between the two systems. Under the current systems, it is possible to have areas in the landscape that will be considered as being inside wetland boundaries under OWES, but will be mapped as a terrestrial (i.e. non-wetland) community under ELC. While concern has been expressed at this discrepancy between the two systems, and it is anticipated that the MNR will work to reduce the discrepancy in future versions of these protocols, the application of the currently approved OWES and ELC will result in some areas of the terrestrial ELC system being included as part of OWES defined wetlands.

This problem is especially acute in complex landscapes such as are found in the White Pines Study Area. Highly variable drainage conditions due to shallow soils over bedrock and flat topography and the widespread presence of plant species with a wide tolerance for variable moisture regimes will result in some communities identified as alvar or Fresh -Moist Forest under ELC being mapped as wetland using the OWES criteria and methods.

A second complicating factor in the mapping of wetlands is the mosaic of land uses including areas of active and semi-abandoned agricultural land, and historically disturbed lands that have altered the natural vegetation succession patterns. In this variable landscape areas under agricultural use may also exhibit some characteristics of wetland. OWES is clear that lands converted to agricultural use are not considered wetlands, but where the use is lightly grazed pasture or unimproved hay the distinction may be difficult to make. The current first approximation of the ELC does not include detailed differentiating criteria between agriculture, cultural meadows and mineral marshes, so that in some cases lands currently under agricultural use may be categorized using the ELC as wetlands.

In order to accommodate these complicating methodological and landscape factors in the REA process, conservative interpretations of wetland delineation have been applied in the White Pines Study Area. In any areas of conflict between classification systems or uncertainty about land use, the land in question has been designated in this report as “wetland”. This conservative approach will result in some areas being designated wetland that may not merit the designation, but it will ensure consideration and protection of all wetland functions in the landscape. It is also appropriate given the large size of the Study Area and the opportunity that was available during siting for this Project to microsite around areas conservatively considered wetland features. This conservative approach may not be appropriate in all landscapes, or for all projects.

Survey dates, times, weather conditions and field personnel are summarized in Table 4.1 (Appendix B).

4.1.3 Woodlands

The presence and boundaries of all woodlands that occur, or partially occur, within 120 m of the Project Location were delineated through aerial photo interpretation and verified during ELC surveys (see Section 4.1.1). Survey dates, times, weather conditions and field personnel are summarized in Table 4.1 (Appendix B).

Treed areas identified during vegetation surveys were compared to the definition of woodlands provided in O.Reg 359/09 and the NHA Guide (MNR, 2011a) to delineate the limits of "woodlands". A woodland is considered as a treed area, woodlot or forested area, other than a cultivated orchard or Christmas tree plantation. In determining the boundaries of woodland, openings of 20 m or less between crown edges (including public roads, railways etc.) were not considered to divide the woodland into two features (MNR, 2011a).

Physiographic conditions specific to southern Prince Edward County including shallow soils, lack of water holding capacity of soils, drainage, and microclimate produce naturally limiting factors on the tree growth and woodland type that are found in this region, resulting in the predominance of "woodland" that is generally characterized as areas of trees that are sparse and open (see Section 3.2.2).

Information regarding ecological functions, attributes and uncommon characteristics was also collected during field surveys. Tree height, estimated stand age, presence of large and mature tree trees, snags, cavities, stick nests, disturbance, and specialized habitat features such as seeps, springs and vernal pools were recorded and detailed if present.

4.1.4 Valleylands

A valleyland is considered 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, 2011a).

Potential valleylands were identified during the records review through aerial photography interpretation and topographic mapping. One known valleyland, associated with Black Creek was identified through the records review.

The presence and boundaries of valleylands were confirmed during the site investigation. Field surveys to assess valleylands included:

- Vegetation community surveys (as detailed in Section 4.1.1) were used to identify linear vegetated riparian corridors.
- Waterbody assessments conducted for the White Pines Wind Project Waterbody and Water Assessment Report (Stantec, 2012a) on September 21, 22, 23 and 24 and October 13, 2010; and June 22, 23 and October 18 2011 identified watercourse

dimensions, morphology and riparian zones and were used to assist in the identification of valleylands.

- In addition, a field survey to assess the topography of the Study Area, valley morphology (meander, floodplain, slopes) width of valley, and presence of natural features, watercourses and presence of vegetation was conducted on May 3, 2011.

4.1.5 Candidate Significant Wildlife Habitat

No known significant wildlife habitat was identified in the White Pines Project Location through the records review. One confirmed significant wildlife habitat component (shrub/successional breeding bird habitat [ssbb4]) was identified as occurring within 120 m of the Project Location.

In addition, the presence of the following wildlife habitat components in the Project Location or the 120 m Zone of Investigation is unknown, requiring site investigations to assess their presence:

1. Seasonal Concentration Areas
    - Colonial bird nesting
    - waterfowl stopover and staging areas
    - waterfowl nesting sites
    - landbird migratory stopover areas
    - raptor winter feeding and roosting areas
    - reptile hibernacula
    - bat hibernacula and maternity roosts; and
    - migratory butterfly stopover areas.
2. Animal Movement Corridors
3. Rare Vegetation Communities or Specialized Habitats
    - rare vegetation communities
    - habitat for area-sensitive species;
    - old-growth or mature forest stands;
    - foraging areas with abundant mast;
    - amphibian breeding ponds;
    - turtle nesting habitat;

- specialized raptor nesting; and
- seeps and springs.

4. Species of Conservation Concern
    - rare species (see Table 3.3, Appendix B)

4.1.5.1 Wildlife Habitat Assessment Surveys

Surveys to determine the presence of habitat features that would support seasonal concentrations of animals, rare vegetation communities, animal movement corridors or specialized habitat for wildlife as outlined in the Significant Wildlife Habitat Technical Guide (MNR, 2000) were conducted in association with the Vegetation Community Surveys on September 21-24, 27-30, 2010 and June 13 - 17, 2011. Survey times, weather conditions and field personnel are summarized in Table 4.1, Appendix B.

Wildlife habitat assessment surveys focused on identifying any wildlife habitat features that occurred in or within 120 m of the Project Location such as seeps, springs, vernal pools, hibernacula, raptor nests, heronries etc., as well as assessing the presence of supporting habitat features such as snags, downed debris, logs and tree cavities. Where property access was available, surveys were conducted beyond 120 m from the Project Location in order to identify any candidate significant wildlife habitat extending to within 120 m of the Project Location associated with habitat components that were located more than 120 m from the Project Location. For example, many habitat features such as stick nests, breeding colonies, or vernal pools, are relatively small discrete points that may have more extensive zones of significant habitat associated with them that could extend into the 120 m Zone of Investigation.

Information on ecosites and habitat features present in and within 120 m of the Project Location gathered from ELC and Wildlife Habitat Assessment surveys were compared to the definitions of candidate significant wildlife habitat provided in the SWHTG (with reference to the Ecoregion Criteria) to determine the presence of candidate significant wildlife habitat components found in and within 120 m of the Project Location. The critical/specific habitat components that were assessed for each wildlife habitat component are detailed below.

Additional species specific surveys to assess wildlife use of candidate significant wildlife habitat were conducted and are detailed in the evaluation of significance report (Section 5.0).

4.1.5.2 Seasonal Concentration Areas

Seasonal concentration areas are areas where wildlife species aggregate at certain times of the year, on an annual or a predictable basis (i.e. migratory stopovers, wintering concentration areas).

COLONIAL BIRD NESTING SITES

Surveys to identify heronry colony locations were conducted during leaf-off, simultaneously with all winter raptor surveys (December 17, 2009; January 22, 2010; and February 17, 2010) with an additional survey conducted May 3, 2011. During each of these surveys the main roads within the Study Area were driven to achieve maximum coverage of the site. The fields and woodlands were scanned using binoculars to detect the presence of stick nests.

In addition, during each of the wildlife assessment surveys (see Section 4.1.5.1) walking surveys were conducted of lands in and within 120 m of the Project Location to identify the presence of features that would support colonial bird nesting sites (i.e. stick nest heronries, banks, cliffs).

WATERFOWL STOPOVER AND STAGING AREAS

The results of the Vegetation Community Assessments (Ecological Land Classification Surveys Section 4.1.1) and GIS analysis of the landscape were used to identify the presence of large wetlands or marshes, associated with lakes, that generally have a diversity of vegetation communities interspersed with open water (aquatic staging areas) or cultural meadows that flood each spring (terrestrial staging areas) (MNR, 2012). During field surveys that occurred March- May field the presence of flooding within the landscape would have been recorded.

WATERFOWL NESTING SITES

The results of the Vegetation Community Assessments (Ecological Land Classification Surveys Section 4.1.1) and GIS analysis of the landscape were used to identify large upland areas of open habitat that occurred adjacent to large marsh, swamp or swamp thicket communities or large clusters of these vegetation communities.

LANDBIRD MIGRATORY STOPOVER AREAS

The results of the Vegetation Community Assessments (Ecological Land Classification Surveys Section 4.1.1) were used in combination with GIS analysis to identify the presence of features containing a diversity of habitat types ranging from open grasslands to large woodlands (i.e. greater than 10 ha) that occurred within 5 km of the Lake Ontario shoreline.

RAPTOR WINTER FEEDING AND ROOSTING AREAS

The results of the Vegetation Community Assessments (Ecological Land Classification Surveys Section 4.1.1) and GIS analysis of the landscape were used to identify large open cultural meadows adjacent to coniferous, deciduous or mixed woodland.

REPTILE HIBERNACULA

Wildlife habitat assessments (see Section 4.1.5.1) included searches for habitat features that would provide an underground route and could act as potential hibernacula, including exposed rock crevices or inactive animal burrows.

BAT HIBERNACULA AND MATERNITY ROOSTS

Hibernacula

Wildlife habitat assessments included searches within the Project Location and 120 m Zone of Investigation for habitat features that would support bat hibernacula such as the presence of caves or abandoned mines.

Maternity Roosts

Surveys for habitat features that would support potential bat maternity roosts focused on woodlands that extended to within 120 m of the Project Location however the area searched extended beyond 120 m to enable the identification of wildlife habitat polygons that might originate beyond this distance, but where candidate wildlife habitat would extend to within 120 m of the Project Location. Wooded areas were traversed and the presence and frequency of features that may support maternity colonies of bats were recorded (i.e. large, mature snags, hollow trees or trees with large slabs of loose bark). Mixed woods or deciduous forests that contain a high density (10 per ha or more) of large diameter (25 cm diameter at breast height [dbh] or more) snags or cavity trees would be considered candidates for potential maternity colony roosts. Criteria from the MNR's '*Bats and Bat Habitats - Guidelines for Wind Power Projects'* (MNR, 2011b) were used to identify potential bat maternity roosts in the field, and included trees that: were the tallest; had cavities or crevices; had a large dbh; were within the highest density of snags/cavity trees (e.g. clusters of snags); had a large amount of loose, peeling bark; had a cavity or crevice high (>10m above the ground) in snag/cavity tree; were tree species that potentially provide good cavity habitat (e.g. white pine, maple, aspen, ash, oak); were within an open canopy; and, exhibited early stages of decay.

MIGRATORY BUTTERFLY STOPOVER AREAS

The results of the Vegetation Community Assessments (Ecological Land Classification Surveys Section 4.1.1) and GIS analysis of the landscape were used to identify large (i.e. greater than 10 ha) open cultural meadows adjacent to coniferous, deciduous or mixed woodland found within 5 km of the Lake Ontario shoreline.

4.1.5.3 Animal Movement Corridors

Since it is seldom possible to observe animals utilizing movement corridors, corridors were primarily identified using aerial photography of the Study Area. The results of the Vegetation Community Assessments (Ecological Land Classification Surveys Section 4.1.1) and the results of the determination of candidate significant wildlife habitat (primarily for amphibians and deer) were analyzed using GIS to identify linear vegetated corridors that would constitute candidate significant wildlife habitat for animal movement corridors.

4.1.5.4 Rare Vegetation Communities or Specialized Habitat

RARE VEGETATION COMMUNITIES

Vegetation communities were identified and assessed during the Vegetation Community Assessments (Ecological Land Classification Surveys Section 4.1.1) for all features within 120 m of the Project Location (as described in Section 4.1.1). Vegetation communities were ground-truthed where property access permitted. Where access was not permitted, delineations were completed based on field knowledge of adjacent lands and interpretation of satellite imagery.

Vegetation community classification codes were compared to the provincial S-ranks to determine candidate significant wildlife habitat for rare vegetation communities. S-ranks are rarity rankings applied to species and to vegetation communities at the provincial level, and are part of a system developed under the auspices of the Nature Conservancy. 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 as rare vegetation communities.

Delineation of communities as “alvar” habitat was based primarily on the parameters outlined in the Ecological Land Classification for Southern Ontario (Lee et al., 1998), although supplementary publications specific to alvar were also referenced (i.e. Brownell and Riley, 2000).

Lee et. al. (1998) defines alvar communities as “bedrock controlled sites on more or less level expanses of limestone”. Other defining features include a patchy mosaic of exposed limestone ‘pavement’, scant soil which mainly accumulates in cracks or ‘grykes’ and seasonal inundation of water alternating with extreme drought. Alvar communities are required to have an average soil depth of 15 cm or less over carbonate bedrock and should not have originated from, or be maintained by, anthropogenic or culturally based disturbances (Lee et al., 1998). Instead, alvar habitat should originate from and be maintained by severe environmental limitations imposed by very shallow soils over bedrock.

Other resources tend to place less of an emphasis on specific soil depths, and focus more on floral composition where limestone bedrock is at or near the surface (Catling 1995; Brownell and Riley 2000; Reschke et al. 1999). For example, Reschke et al. (1999) have conducted extensive studies of Great Lakes alvar communities and indicated that soil depths can be as deep as 30 cm for certain community types. The proximity of bedrock in these communities often cause extreme fluctuations in soil water content, where communities may be subject to saturation and drought conditions throughout the year. Certain plant species have adapted to these environmental fluctuations and tend to be encountered much more frequently in alvar habitat than any other community type. Their fidelity to alvar habitat varies with each species, but they are useful indicators of alvar or alvar-like conditions.

The Natural Heritage Information Center (NHIC) provides rankings for 14 alvar vegetation types, ranging from open meadows to woodland communities. The majority of these communities are assigned a rank of either S1 (critically imperiled in Ontario) or S2 (imperiled in Ontario), with no community ranked higher than S2S3 (imperiled to vulnerable in Ontario).

Vegetation communities in southern Prince Edward County have developed in large part as a result of historic anthropogenic or culturally based disturbances (the abandonment of agricultural practices, military training exercises, recreational vehicle use etc.). The ELC manual for southern Ontario (Lee et al. 1998; page 32) directs users to apply Cultural Ecosites (rather than Alvar Ecosites) to communities “originating from, or maintained by culturally based disturbances (e.g., planting, agriculture, clearing…grazing…)”.

Given the rarity of alvar vegetation types in the province and the widespread extent of alvar-like communities in the Study Area, Stantec took a conservative approach to identifying alvar communities in the Project Location and Zone of Investigation. Stantec did not rely on the origin and maintenance factors to preclude designation of the open communities as alvars. Rather, Stantec decided to give the origin and maintenance factors a reduced weight in this specific case and to delineate alvar ecosites based primarily on the presence of alvar-indicator species (as defined by Appendix N of the Significant Wildlife Habitat Technical Guide; MNR, 2000) and other physical characteristics such as soil depth, as described in the literature Lee et al., 1998; Goodban, undated; Brownell and Riley 2000; Catling, 1995; and Reschke et al., 1999).

Given the historical patterns of land clearing, past and ongoing disturbance and agriculture in PEC, it is likely that at least some of the communities identified as alvar ecosites originate from and/or, are maintained by culturally based disturbances. Stantec has taken a conservative approach to applying Alvar Ecosite community codes. This conservative approach may lump some communities with alvar-like conditions into the Alvar Ecosite with true alvar communities, but alvars are a critical component of the ecology of the landscape in the Point Petre to Prince Edward Point area and a conservative approach to identifying and protecting these communities was considered to be appropriate for this Project. Such a conservative approach may not be appropriate in all landscapes or for all projects.

SPECIALIZED HABITATS

Specialized habitats refer to specific habitat structures (e.g. cavities for nesting), elements (e.g. habitat patch size), or unique components (e.g. springs and seeps) required by a species to subsist.

HABITAT FOR AREA-SENSITIVE SPECIES

The results of the Vegetation Community Assessments (Ecological Land Classification Surveys Section 4.1.1) and GIS analysis were used to identify woodlands larger than 30 ha that provided interior habitat (i.e. at least 200 m from the woodland edge) and large, contiguous undisturbed grasslands of at least 30 ha.

The White Pines Study Area contained a mosaic of different vegetation community types. Two of these vegetation community types (treed alvar and cultural woodland) contained sparse and open tree cover. These communities met the definition of a "treed area" and were conservatively considered woodland for the purposes of defining woodland features for this report. However, these communities do not provide the canopy cover required to provide interior habitat for woodland breeding birds. As such, for the purposes of determining the amount of interior habitat with the potential to support interior woodland breeding birds, only areas of contiguous communities consisting of a canopy cover greater than 60% were used. In the case of White Pines this included deciduous, coniferous or mixed forests, cultural plantations and deciduous swamps.

OLD-GROWTH OR MATURE FOREST STANDS

Results of vegetation community classification and wildlife habitat assessment surveys (as described in Sections 4.1.1 and 4.1.5) were used to identify forests greater than 120 years old with no historical forestry management.

FORAGING AREAS WITH ABUNDANT MAST;

Vascular plant surveys were conducted in association with vegetation community classification surveys on September 21-24, 27-30, 2010 and June 13 - 17, 2011.

Within each vegetation community found within 120 m of the Project Location, the presence of trees such as large beech or red oak was recorded. Their abundance was classified as to whether they were rare, occasional, abundant or dominant within each community.

AMPHIBIAN BREEDING PONDS

The results of vegetation community classification and wildlife habitat assessment surveys (as described in Sections 4.1.1 and 4.1.5) were used to identify the presence of vernal pools,

swamp and marsh habitats that occurred in and within 120 m of the Project Location. For each vernal pool, the size of pool, presence and depth of standing water, surrounding vegetation community, emergent and submergent vegetation and canopy cover were recorded.

In addition, during turtle habitat assessment surveys (as described below) estimated size and depth of aquatic habitats was recorded.

TURTLE NESTING HABITAT

The results of vegetation community classification and wildlife habitat assessment surveys (as described in Sections 4.1.1 and 4.1.5) were used to identify watercourses and any marshy wetlands with open water that occurred within 120 m of the Project Location.

In addition, turtle habitat assessment surveys (and surveys for presence of turtles) were conducted from late April to late June 2011. Four surveys were conducted (over two days each) by two biologists. One survey was conducted in each of late April (April 20 and 21) and late May (May 18 and 19), and two surveys were conducted in June (June 15, 16 and June 28, 29).

Surveyors traversed the Project Location and Zone of Investigation on each of the survey dates. Estimated size and depth of aquatic habitat was recorded with details on potential basking sites, disturbance, presence of tadpoles, and an assessment of nesting habitat suitability (i.e. sparsely vegetated areas in close proximity to aquatic habitats).

Results of the vegetation community classification, wildlife habitat assessment and turtle habitat assessment surveys were analyzed with GIS to identify the presence of loose soils for nesting occurring in close proximity to areas of open permanent water.

SPECIALIZED RAPTOR NESTING HABITAT

Surveys to identify the presence of stick nests during leaf off within the Study Area were conducted simultaneously with all winter raptor surveys (December 17, 2009; January 22, 2010; and February 17, 2010) with an additional survey conducted May 3, 2011. During each of these surveys the main roads within the Study Area were driven to achieve maximum coverage of the site. The fields and woodlands were scanned using binoculars to detect the presence of stick nests.

In addition, during each of the wildlife assessment surveys (see Section 4.1.5.2) walking surveys were conducted of lands in the Project Location and the Zone of Investigation to identify the presence of stick nests.

SEEPS AND SPRINGS

Waterbody assessments conducted for the White Pines Wind Project Waterbody and Water Assessment Report (Stantec, 2012a) on September 21, 22, 23 and 24 and October 13 and 14, 2010; and June 22, 23 and October 18, 2011 were used to assess the presence of seeps and springs within the Study Area. During wildlife habitat assessments the presence of seeps and springs would also have been recorded (as described in Section 4.1.5.1).

4.1.5.5 Species of Conservation Concern

RARE SPECIES

Habitat mapping, according to the Ecological Land Classification system was completed for the Project as described in Section 4.1.1. Habitat mapping and ELC community results were compared to the habitat requirements of the species identified through the records review (Table 3.3, Appendix B) to determine whether the critical habitat components required to support each of the species occurred within the Project Location or 120 m Zone of Investigation.

DECLINING SPECIES (SHRUB-SUCCESSIONAL BREEDING BIRDS)

Habitat mapping, according to the Ecological Land Classification system was completed for the Project as described in Section 4.1.1. Habitat mapping and ELC community results were analyzed to identify the presence of shrub/early successional habitat communities (shrub alvar or cultural thicket communities) within the Project Location and 120 m Zone of Investigation. In addition, the stand description (heights and cover of each vegetation layer) was analyzed to determine whether additional vegetation communities contained the structure required to support shrub/successional breeding birds. Given the physiographic conditions present within this region that result in naturally limiting factors on tree growth, some vegetation communities that are dominated by “trees” are actually sparse and open with stunted tree growth. As a result, depending on the stand description and species present, from a wildlife perspective, some of these communities provide the function of supporting shrub/successional breeding birds, as opposed to woodland breeding birds. Vegetation communities containing low canopy cover and low canopy heights that were dominated by coniferous species that were stunted in growth (more resembling shrubs) were also considered candidate significant wildlife habitat for shrub-successional breeding birds.

4.1.6 Areas of Natural and Scientific Interest

ANSIs are defined as areas with life or earth science values related to protection, scientific study or education. The Ontario Ministry of Natural Resources retains responsibility for identifying the presence of ANSIs and delineating their boundaries. ANSIs as identified and delineated by MNR were used for the purposes of this assessment.

4.2 Results

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 4.2 (Appendix B). Any new features or functions identified as a result of the site investigation are detailed in Table 3.2 (Appendix B) and discussed in the text below.

Figures 3.1-3.5 (Appendix A) show the results of the ELC site investigation. Field notes for each survey conducted as part of the site investigation are provided in Appendix F.

The results of the site investigation program are provided below, in the context of natural features (as defined by O. Reg 359/09) found in and within 120 m of the Project Location.

4.2.1 Vegetation Communities

A summary of the vegetation communities occurring within 120 m of the White Pines Project Location, as identified by field investigations, is provided in Table 4.3 (Appendix B) and shown on Figures 3.1-3.5 (Appendix A). Table 4.4 provides detailed descriptions of each vegetation community occurring within 120 m of turbines and access roads, while Table 4.5 provides detailed descriptions of vegetation communities found within 120 m of roadside collector lines.

Field notes for the site investigation are provided in Appendix F. A photographic record illustrating typical vegetation community types found in the Study Area is provided in Appendix G.

The Project Location and associated 120 m consists of a mix of naturalized habitat and actively cultivated cropland (hay, soybean, and grains). A large majority of the croplands occur north of Royal Road, while south of Royal Road developing naturalized communities are commonly observed. These communities frequently consist of treed alvar, coniferous forest, and cultural woodland, with fewer occurrences of deciduous forest and deciduous swamp.

4.2.2 Wetlands

Site investigations confirmed that no wetland communities are found in the Project Location.

Boundaries of wetlands that extend to within 120 m of the White Pines Project Location, as ground-truthed by Stantec are shown on Figures 4.0 - 4.5, Appendix A. As discussed in Section 4.1.2 conservative interpretations of wetland delineation have been applied in the White Pines Study Area. In any areas of conflict between OWES and ELC classification systems or uncertainty about land use, the land is question has been designated in this report as “wetland”. A detailed description of each wetland is provided in Table 4.6, Appendix B.

4.2.2.1 Provincially Significant Wetland

Based on the records review, one provincially significant wetland complex, the South Bay Coastal Wetland, was identified as occurring in and within 120 m of the White Pines Project Location.

Site investigations confirmed the presence of the South Bay Coastal Wetland within 120 m of the Project Location. The wetland boundary and the Project Location in relation to the boundary are shown on Figures 4.0, 4.1 and 4.2, Appendix A.

Type, attributes, composition and functions of the wetland are described in Table 4.6 (and Table 5.3), Appendix B.

Site investigations confirmed that corrections were required to the South Bay Coastal Wetland boundary. The PSW boundary as verified during site investigations has been corrected, including rectifying mapping that showed the wetland boundary extending to within Helmer Road. MNR has been provided with the updated boundary information.

4.2.2.2 Locally Significant Wetland

No locally significant wetlands were identified in or within 120 m of the Project Location through the records review. No changes are required to the records review as a result of the site investigations (Table 4.2, Appendix B).

4.2.2.3 Unevaluated

Six unevaluated wetlands were identified as occurring in or within 120 m of the White Pines Project Location during the records review. Site investigations confirmed the presence of wetland in all six features (we6, we9, we10, we11, we13 and we18). Boundaries were amended based on ground truthing conducted by Stantec. MNR has been provided the boundary information for each of the wetland features.

Site investigations confirmed that we13 and we18 were contiguous; these are treated as one wetland feature and referred to as we13.

Site investigations also confirmed that the boundaries of wetland features we8, we16 and we17 as ground truthed by Stantec, extended to within 120 m of the White Pines Project Location (Figure 4.3 and 4.5, Appendix A). While these patches of unevaluated wetland were identified during the records review, their boundaries as mapped by MNR did not occur within 120 m of the Project Location (see Figure 2, Appendix A).

4.2.2.4 Additional Wetlands

During the course of wetland site investigations, eight additional wetland features were identified within the Zone of Investigation (we1, we2, we4, we5, we7, we12, we14, we15). The location and boundaries of these features as identified and delineated according to OWES protocol are identified on Figures 4.0- 4.5 (Appendix A).

4.2.2.5 Wetlands Summary

Site investigations confirmed that no wetland communities are located in the Project Location. Seventeen wetland communities were found within 120 m of the Project Location in:

- Feature we1 (additional wetland identified by Stantec);
- Feature we2 (additional wetland identified by Stantec);
- Feature we3 (South Bay Coastal PSW);
- Feature we4 (additional wetland identified by Stantec);
- Feature we5 (additional wetland identified by Stantec);
- Feature we6 (unevaluated wetland);
- Feature we7 (additional wetland identified by Stantec);
- Feature we8 (unevaluated wetland);
- Feature we9 (unevaluated wetland);
- Feature we10 (unevaluated wetland);
- Feature we11 (unevaluated wetland);
- Feature we12 (additional wetland identified by Stantec);
- Feature we13 (unevaluated wetland);
- Feature we14 (additional wetland identified by Stantec);
- Feature we15 (additional wetland identified by Stantec);
- Feature we16 (unevaluated wetland); and
- Feature we17 (unevaluated wetland).

Wetland features are shown on Figures 4.0-4.5, Appendix A. Type, attributes, composition and functions of each wetland community are described in Table 4.6 and Table 5.3 (Appendix B).

Corrections made to the records review for wetlands as a result of the site investigations are detailed in Table 3.2 and summarized in Table 4.2 (Appendix B).

4.2.3 Woodlands

Seven “treed” vegetation community types were identified in and within 120 m of the Project Location. These included: deciduous forest; coniferous forest; mixed forest; cultural plantation; cultural woodland; deciduous swamp; and treed alvar. Field notes are provided in Appendix F. A photographic record of the vegetation community types is provided in Appendix G.

Though the vegetation communities varied significantly with respect to canopy cover, tree density, structure, function, and composition, for the purposes of this assessment, each of these communities meets the basic definition of woodland as provided in O.Reg. 359/09 (i.e. a treed area). As such, a conservative approach has been taken to identify “woodland” that occurred within the White Pines Study Area and each of the seven community types were considered in the delineation of woodlands.

Woodlands found within the Study Area were generally comprised of a combination of these seven vegetation community types resulting in woodland features that are characterized as relatively complex and patchy mosaics.

Overall, upland coniferous woodlands were the most commonly observed community type. These woodlands were most commonly observed in large tracts south of Royal Road, often dominated by young to mid-age red cedar. The density of these communities varied; generally, red cedar treed alvars exhibited canopy cover between 25-60% and the red cedar coniferous forest communities had a canopy cover of greater than 60%. In dry areas, these red cedar forests often resembled coniferous plantations due to a generally mono-culture canopy and reduced diversity and structure within the overall stratum. Where moisture availability increased, these community types were often mixed with young green ash and bur oak, occasionally with a high density of common buckthorn.

North of Royal Road the Study Area contained a higher proportion of agricultural land, with linear tracts of woodland consisting primarily of deciduous upland and deciduous swamp communities. Coniferous upland communities were also present but less frequently encountered. The deciduous woodland communities included forest, cultural plantations, cultural woodlands, and swamp habitat. Forests and plantations had a canopy cover greater than 60%, while swamps and cultural woodlands had a canopy cover in the range of 25-60%. The swamp woodlands were typically the most mature, while the forest communities ranged from mid-age to mature. Cultural woodlands were typically young to mid-age with an open canopy.

Fourteen individual woodland features (i.e. treed areas bisected by an opening 20 m or more) were identified in and within 120 m of the Project Location. The boundaries of each woodland and the location of project components in relation to woodland communities are shown on Figures 5.0 to 5.5 (Appendix A).

A description of the attributes, composition and functions for each woodland found within, extending to within 120 m of the Project Location is provided in Table 4.7 (Appendix B).

4.2.4 Valleylands

Valleylands are defined as a natural area that is south and east of the Canadian Shield and occurs in a valley or other landform depression that has water flowing through or standing for some period of the year (MNR, 2010). The presence of one valleyland, associated with Black Creek, was identified through the records review.

Site investigations confirmed that the topography of the Project Location is predominately flat and no additional valleylands were identified in or within 120 m of the Project Location through site investigations.

ELC and vegetation surveys, along with information gathered during the water body surveys (Water Body and Water Assessment Report, Stantec, 2012a), indicated and confirmed the presence of a linear vegetated system along a defined watercourse feature within the Black Creek Valley.

The Milford- Black Creek Valley has been identified as an extensive, well developed river valley (NHIC, 2011; Gorrell, 1991). The riverine and riparian corridor originates at Lake Ontario end extends several kilometers through a primarily agricultural zone (Snetsinger and Snetsinger, 2000).

Site investigations confirmed that immediately east of Milford, the Black Creek Valley is a relatively broad channel. West of County Road 10, the watercourse and channel narrow.

To the east of the 120 m Zone of Investigation, the valleyland was characterized as a well-defined valley containing a defined watercourse. Slope vegetation was composed of mature sugar maple, with a basin inclusive of Eastern hemlock and American basswood.

The boundary of the valleyland extended to within 120 m of the Project Location in only one location; at the western end of the valleyland limit (see Figure 5.5). At this point, slope steepness was reduced to a gradual incline and as it extended west, it rapidly transitioned to a flat upland field that contained a low lying grass swale.

Habitat within the Zone of Investigation consisted primarily of white pine plantation and a red cedar cultural woodland. An actively used vehicle pathway extended though both the plantation and cultural woodland, providing access to the southern agricultural fields. The area contained by the proposed Project Location footprint was characterized as flat agricultural land.

No corrections were required to the results of the records review as a result of the site investigation (Table 4.2, Appendix B). Based on field investigations and aerial photograph

interpretation, the valleyland feature that occurred within 120 m of the White Pines Project Location is identified on Figure 5.0 and 5.5 (Appendix A).

4.2.5 Wildlife Habitat

Results of the site investigation program are provided below to identify natural features supported in or within 120 m of the Project Location. The results are considered within the context of criteria for candidate significant wildlife habitat as outlined within the Significant Wildlife Habitat Technical Guide (MNR, 2000) with consideration of the habitat characteristics provided in the Significant Wildlife Habitat Ecoregion Schedules (MNR, 2012) in order to determine whether the Project Location supports candidate significant wildlife habitat.

Candidate significant wildlife habitat, as identified through the site investigation is shown on Figures 6.0- 6.5, Appendix A.

As described in Section 4.2.1, areas of the Project Location and Zone of Investigation found north of Royal Road are sited within a predominately agricultural landscape with crops comprised primarily of hay, soy, corn and grains. Linear woodlands associated with watercourses span east to west across the landscape, commonly occurring at the back of the agricultural fields (Figures 3.4 and 3.5, Appendix A).

South of Royal Road the landscape is quite different; it contained large tracts of young to mid-age red cedar interspersed with a mosaic of more open habitat types (cultural woodlands, shrub and open alvar, small cultural meadows). The site investigation results are reflective of the information gathered through the records review; that the area contains abandoned agricultural fields that are (and have) succeeded. Smaller areas of actively managed agricultural lands are present south of Royal Road (Figures 3.1- 3.4, Appendix A).

4.2.5.1 Seasonal Concentration Areas

COLONIAL BIRD NESTING SITES

Swamps and large bodies of water can support heronries. A number of swamps are found within 120 m of the Project Location however none of these supported a heronry. For swallows, colonial nesting sites can include cliffs, banks and artificial structures.

No evidence of colonial bird nesting sites (i.e. heronries, eroding banks, sandy hills, pits, steep slopes or rock faces) was identified in or within 120 m of the Project Location during field work completed in the Study Area (Appendix F).

Candidate significant wildlife habitat for colonial bird nesting was not found in or within 120 m of the Project Location.

WATERFOWL STOPOVER AND STAGING AREAS

Areas generally considered candidate significant wildlife habitat for waterfowl staging areas are very large wetlands, associated with lakes that generally have a diversity of vegetation communities interspersed with open water (MNR, 2000). Marshes along Great Lakes shorelines are considered particularly valuable (MNR, 2000).

Aquatic

Marsh communities with open water occurred within the Study Area, but are generally associated with the shoreline of the lake, or with the two open marshes located within the Provincial Wildlife Area. None of these areas occurred in or within 120 m of the Project Location. All turbine bases have been set back a minimum of 400 m from the shoreline with most found more than 1 km from the shore.

No open aquatic marsh areas were identified in or within 120 m of the Project Location during site investigations (Figures 3.1- 3.5, Appendix A; Table 4.2, Appendix B; Appendix F).

Terrestrial

Terrestrial stopover habitat is not defined within the SWHTG. The Ecoregion Criteria identify cultural meadows and cultural thickets that flood annually each spring as terrestrial stopover habitat for waterfowl (MNR, 2012).

The White Pines Project Location is found predominately in actively managed agricultural fields and treed and shrub alvar. Cultural meadows or cultural thickets were relatively limited (Figure 3.1 and 3.4, Appendix A) and the results of field surveys conducted from March to May (see Table 4.1, Appendix B) indicated these areas did not provide the standing water required to serve as feeding ponds. Consultation with local landowners also confirmed areas of standing water in cultural fields and/or large flocks of waterfowl have not been regularly observed.

The habitat components required to support candidate significant wildlife habitat for waterfowl stopover and staging areas did not occur in or within 120 m of the White Pines Project Location.

WATERFOWL NESTING SITES

Waterfowl nesting habitat typically includes upland habitat that is located near marshes, ponds or lakes. Sites considered candidate significant wildlife habitat for waterfowl nesting typically contain a high density of small and medium sized ponds, or are single wetlands that are large and diverse (MNR, 2000) but can also include marshes or coastal inlets.

While deciduous swamp, dogwood thicket swamp and small meadow marsh vegetation communities were identified during site investigations, important habitat components required to

support significant waterfowl nesting areas such as clusters of ponds, open water marshes, lakes, bays or coastal inlets were not present in or within 120 m of the Project Location (Figures 3.1- 3.5, Appendix A; Appendix F).

Candidate significant wildlife habitat for seasonal concentration areas supporting waterfowl nesting sites is considered absent in or within 120 m of the White Pines Project Location.

LANDBIRD MIGRATORY 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 Ontario shoreline are considered potential candidate significant wildlife habitat for migrating landbird stopover areas (MNR, 2000).

Woodlands in or within 120 m of the Project Location that were larger than 10 ha included woodland features wo1, wo3, wo5, wo6, 7 and wo8. Of these only two woodlands occurred within 5 km of the Lake Ontario shoreline (features wo1 and wo3).

Site investigations confirmed that woodland features wo1 and wo3 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 Ontario shoreline) to be considered candidate significant wildlife habitat for a migratory landbird stopover area (Figures 3.0-3.5, Appendix A).

Woodland feature wo1 (mlsa1) was a 2784 ha woodland that comprised various vegetation communities (see Table 4.7, Appendix B). It occurred adjacent to the lakeshore and stretched north to a distance of 3 km from the shore of Lake Ontario. Areas of fallow habitat, cultural meadow and agricultural lands are interspersed with the woodland communities (Figures 3.0-3.5, Appendix A).

Woodland feature wo3 (mlsa2) was a 232 ha woodland that is 3.8 km from the Lake Ontario shoreline at its closest point. It is a linear vegetated feature consisting primarily of deciduous woodland, deciduous swamp and coniferous woodland communities (see Table 4.7, Appendix B) surrounded primarily by actively managed agricultural lands. Some smaller patches of open habitats are located adjacent to the feature; primarily in the western most portion (Figures 3.0-3.5, Appendix A).

Features mlsa1 and mlsa2 are considered candidate significant wildlife habitat for seasonal concentration areas of migratory landbirds. The boundaries of these features and the location of the Project Location in relation to candidate significant wildlife habitat for migratory bird stopover areas are shown on Figures 6.0-6.5, Appendix A.

The Project is located in and within 120 m of mlsa1 and within 120 m of mlsa2. An evaluation of significance (including migratory landbird field surveys) was completed for each of these features (see Section 5.0).

RAPTOR WINTER FEEDING AND ROOSTING AREAS

With reference to the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) and the Ecoregion Criteria (MNR, 2012) candidate significant wildlife habitat for wintering raptor sites include large open fields such as cultural meadows (i.e. > 20 ha) that are relatively undisturbed with good perching habitat and are adjacent to coniferous, mixed or deciduous woodland. Actively harvested hayfields are not considered one of the vegetation community types that constitutes candidate significant wildlife habitat for raptor winter feeding and roosting areas (MNR, 2012).

Many raptor wintering areas are used from year to year (MNR, 2000). As indicated within the records review (Section 3.2.4) presence of winter raptors within southern Prince Edward County is generally characterized as low with no areas of concentration known to occur.

This is not surprising, considering the habitat found within the southern Prince Edward County landscape does not contain the habitat features known to attract and support raptors in winter (i.e. wide open windswept fields containing perches). The landscape cover, habitat and physiology are not comparable to areas such as Fisherville, Wolfe Island and Amherst Island that are known to support significant populations of raptors in winter.

Generally the White Pines Study Area does not contain the wide open cultural fields required to support large and productive small mammal populations and support significant populations of wintering raptors (see Figures 3.1 – 3.5, Appendix A; Table 4.3, Appendix B; Appendix F).

Site investigations confirmed the majority of open fields in study area are actively managed for agriculture (primarily row crops and harvested hay) and these are not considered to constitute candidate significant wildlife habitat. Habitat within the Study Area is generally characterized as a mosaic of open and closed canopy woodland vegetation community types (i.e. cultural woodlands, treed alvar, coniferous woodlands).

Site investigations confirmed the presence of one cultural meadow that met the criteria for candidate significant wildlife habitat for a winter raptor feeding and roosting area (i.e. greater than 20 ha adjacent to a woodland community). Feature wr1 is a 24 ha cultural meadow that is adjacent to treed alvar and coniferous forest (Figure 3.1, Appendix A).

This feature is considered candidate significant wildlife habitat for seasonal concentration areas of wintering raptors and is shown on Figures 6.0 and 6.1, Appendix A.

The Project is located in and within 120 m of candidate significant wildlife habitat for wintering raptors. An evaluation of significance (including winter raptor field surveys) was completed (see Section 5.0).

REPTILE HIBERNACULA

Snake hibernacula features such as rock crevices, abandoned animal burrows or other areas that provide access below the frost line were generally absent from the Project Location and 120 m Zone of Investigation.

During site investigations two rock piles were identified within 120 m of the Project Location. Both features appeared to consist of rock piles covering old well locations. It was not apparent through visual investigations whether either of the rock piles contained an underground chamber that would provide the required conditions to serve as a hibernacula (i.e. access below the frost line and close to the water table).

The locations of these features are indicated on Figures 6.0 and 6.3, Appendix A. A photographic record is provided in Appendix H. The features are located approximately 48 m apart and are approximately 14 m east of the outer extent of the buildable area for the access road from T21 to T22.

The features are located at the southern extent of a heavily grazed pasture, on the boundary of a transition to a treed alvar/pasture community complex. Habitat immediately surrounding the two rock piles included open pasture with sparse cedar tree cover.

Rept1 and rept2 are considered candidate significant wildlife habitat for seasonal concentration areas of reptile hibernacula and are shown on Figures 6.0 and 6.3, Appendix A.

An evaluation of significance was completed (see Section 5.0).

BAT HIBERNACULA AND MATERNITY ROOSTS

Candidate significant wildlife habitat for bat maternity roosts may be found in mixedwood or deciduous forests that contain a high density (ten per hectare or more) of large diameter (25 cm dbh or more) snags or cavity trees (MNR 2011b).

No features that would support bat hibernacula such as caves, abandoned mines or underground foundations were observed during site investigations (Appendix F).

Growing conditions within southern Prince Edward County are considered limited as a result of the shallow soils overlaying bedrock within the region. As a result woodland habitat is generally sparse and stunted. Large diameter trees (i.e. >25 dbh) required to support candidate significant wildlife habitat for bat maternity roosts were uncommon. Snags were considered rare or rare to occasional in all woodland features and none of the trees observed that were greater than 25 dbh were considered candidate snag or cavity trees. No snags or trees suitable for supporting significant maternity colonies (i.e. those with particularly large slabs of loose bark or suitable cavities) were observed during site investigations (Table 4.7, Appendix B; Appendix F).

No natural critical habitat features were identified within 120 m of the Project Location that may support candidate significant wildlife habitat for bat maternity colonies. The Project Location does not support candidate significant wildlife habitat for seasonal concentration areas for bats. No evaluation of significance is required.

MIGRATORY BUTTERFLY STOPOVER AREAS

Significant habitat may include significant breeding habitat (open fields with concentrations of its host plant, milkweed) and significant migratory stopover habitat (large woodlands and open fields (>20 ha) within 5 km of Lake Ontario); significance of both habitat types was evaluated.

One 24 ha cultural meadow is found in the Study Area (Figure 3.1, Appendix A), however milkweed occurrences within the field were scattered and were not abundant; it was primarily comprised of a mix of grasses and broad-leaved plants (Appendix F). The cultural meadow does not meet the criteria to be considered candidate significant breeding habitat for Monarch, however it is a field (>20ha) found adjacent to a coniferous woodland that is found within 5 km of Lake Ontario. It is described in Table 4.4, Appendix B. Turbine 25, associated buildable areas, access road and collector line are found within the cultural meadow.

Site investigations confirmed that suitable candidate significant wildlife habitat in the form of migratory butterfly stopover areas was identified in the Project Location. Feature mb1 is shown on Figure 6.1, Appendix A. An evaluation of significance of migratory butterfly stopover areas has been completed in Section 5.0.

4.2.5.2 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). As indicated in the SWHTG (MNR, 2000), it is seldom possible to observe wildlife species using corridors. ELC site investigations, mapping and aerial photography were used to identify linear vegetated areas that would be considered candidate significant wildlife habitat for animal movement corridors.

In southern Ontario corridors generally consist of naturally vegetated areas that run through developed and open landscapes connecting remaining natural areas (MNR, 2000).

Movement corridors are trails used by deer to move to wintering areas, and areas used by amphibians between breeding and summering habitat. In the absence of known animal movement corridors, this wildlife habitat can only be identified after other natural heritage features are identified and mapped (MNR, 2000).

Candidate significant wildlife habitat for deer did not occur in the Study Area (See Section 3.2.4); therefore no movement corridors are identified for deer.

Candidate significant wildlife habitat for amphibian breeding has been identified within 120 m of the Project Location (see Section 4.2.5.3, below). However, suitable upland habitats for summering habitat occurred immediately adjacent to each candidate significant wildlife habitat (see Figures 3.1- 3.5). Amphibians breeding within features identified as candidate for amphibian breeding do not have to travel within a defined corridor to reach suitable summering habitat. Consequently, candidate significant wildlife habitat for animal movement corridors did not occur in or within 120 m of the White Pines Project Location.

4.2.5.3 Rare or Specialized Habitats

RARE VEGETATION COMMUNITIES

Figure 3.1-3.5, Appendix A and Tables 4.4 and 4.5, Appendix B summarize the vegetation communities found in and within 120 m of the Project Location. Ecological Land Classification field sheets are provided in Appendix F. A photo log showing various communities in the Subject Property is found in Appendix G.

As discussed in Section 4.1.5, Stantec has taken a conservative approach to applying Alvar Ecosite community codes. This conservative approach may lump some communities with alvar-like conditions into the Alvar Ecosite with true alvar communities,

A total of 967 hectares of alvar habitat was mapped in relation to the White Pines Project Location consisting of three alvar vegetation types:

- ALO1-6 Dry-Fresh Canada Blue Grass Open Alvar
- ALS1-4 Red Cedar Scrub Shrub Alvar
- ALT1-7 Red Cedar Treed Alvar

Twenty alvar “features” were identified in and within 120 m of the Project Location, ranging in size from 0.5 (al7) – 584 ha (al4). These are shown on Figures 7.0- 7.5, Appendix A.

Although a number of invasive, non-native plants were observed as widespread and common, alvar vegetation communities contained plant species characteristic of alvar habitat, as defined by Appendix N of the Significant Wildlife Habitat Technical Guide (MNR, 2000). These species include tufted hairgrass, flat-stemmed spikerush, early buttercup, small skullcap, narrow-leaved vervain and false pennyroyal.

The soils of the alvar communities in the Study Area were typically 14 to 30 cm in depth comprised of fine textured soils with no development of soil horizons. There was no exposed bedrock observed within any of the alvar communities. In some areas, the soils contained an abundance of stones, often forming a layer of cobble stone on the soil surface. Generally, areas with abundant cobble stones represented drier portions of the White Pines Study Area.

Two Bedrock Cultural Ecosites (cultural woodlands CUW2-3 and 2-4) also included the presence of alvar indicator species. These woodlands were not assigned alvar ELC codes (i.e. "AL") because of a disparity in soil depths, high frequency of cultural meadow inclusions, and distinctly different flora composition, including relatively high abundance of green ash. Bedrock Cultural Ecosites revealed relatively high dissimilarity (3-6 cm) between the average soil depth and the median depth. The AL communities, for comparison, did not have a difference of greater than 1cm. This deviation in soil depth often correlated with the fluctuations observed in the herbaceous species layer, including complexed herbaceous layers, with patchy indicators of alvar, wetland, and cultural meadow.

A description of the attributes, composition and functions for each alvar feature found within or extending to within 120 m of the Project Location is provided in Table 4.8 (Appendix B). Alvar features are shown on Figures 7.0-7.5, Appendix A.

Candidate significant wildlife habitat for alvar communities is found in and within 120 m of the Project Location as shown on Figures 7.0-7.5, Appendix A. An evaluation of significance was conducted (see Section 5.0).

AREA-SENSITIVE BREEDING BIRDS

Interior Woodland Breeding Birds

Large woodlands providing at least 4 ha of interior habitat (i.e. 200 m from the edge) are considered to provide habitat for area-sensitive breeding bird species (MNR, 2000).

Fourteen woodland features were confirmed as occurring in or within 120 m of the White Pines Project Location during site investigations (see Figures 5.0- 5.5, Appendix A). Of these, four woodlands are larger than 30 ha (wo1, wo3, wo5 and wo8). The woodlands within the Study Area generally provided limited interior habitat and tree growth was considered sparse and stunted. Woodland habitat within the Study Area did not typically contain the mature, closed canopy forests that are required components for supporting interior birds. Only woodland features 1 and 3 contained interior habitat. These features contained 0.9 and 1.3 ha of interior habitat respectively. No woodlands in or within 120 m of the Project Location provided at least 4 ha of interior habitat.

None of the woodlands that occurred in or within 120 m of the Project Location provided the minimum interior habitat requirements to sustainable populations of interior woodland breeding birds. Candidate significant wildlife habitat for interior woodland breeding birds was not found in or within 120 m of the Project Location.

Open Country Breeding Birds

Habitat within the Study Area is generally characterized as a mosaic of open and closed canopy woodland vegetation community types (i.e. cultural woodlands, treed alvar, coniferous woodlands).

Generally the White Pines Study Area does not contain the wide open grassland fields that would support significant populations of open country breeding birds (see Figures 3.1 – 3.5, Appendix A; Table 4.3, Appendix B; Appendix F). Site investigations confirmed the majority of open fields in study area are actively managed for agriculture (primarily row crops and harvested hay) and these are not considered to constitute candidate significant wildlife habitat.

Large, contiguous undisturbed grasslands of at least 30 ha (and preferably 50 ha or more) were not found in the Study Area. Candidate significant wildlife habitat for open country breeding birds was not found in or within 120 m of the Project Location.

OLD-GROWTH OR MATURE FOREST STANDS

Old (i.e. more than 120 years old) undisturbed forest stands that have experienced little or no forestry management would be considered candidate significant wildlife habitat (MNR, 2000).

While several features contained forest vegetation communities that were considered to be mature, no woodlands meeting the definition of old-growth (i.e. more than 120 years old) were identified in or within 120 m of the Project Location (Table 4.7, Appendix B; Appendix F).

FORAGING AREAS WITH ABUNDANT MAST

Forests containing numerous large beech and red oak can provide important food sources to enhance the survival and productivity of those birds and mammals that subsist on a fruit and nut diet (MNR, 2000). Both beech and red oak trees were observed in Features wo3 and wo5, however in both features the abundance of these species was categorized as “rare” (Appendix F). Woodlands did not provide the numerous large beech and red oak trees that characterize specialized habitat for foraging areas with abundant mast and no candidate significant wildlife habitat for this type of habitat was identified in or within 120 m of the Project Location.

AMPHIBIAN BREEDING PONDS

Candidate significant wildlife habitat in the form of amphibian woodland breeding ponds are ponds that contain 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.

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. Wetlands (swamps and marshes) that contain surface water can also support important amphibian breeding habitats.

Physiographic conditions specific to southern Prince Edward County include shallow soils that are considered to lack of water holding capacity. The conditions within the area generally create pooling water within the landscape in the spring and dry drought like conditions through summer.

One vernal pool was identified in the Zone of Investigation during site investigations (see Figure 6.0, Appendix A). It was located within a sugar maple forest and adjacent to green ash deciduous swamp (see Figure 6.5, Appendix A). The vernal pool was approximately 5 x 8 m with a water depth of 20 cm. Submergent plant species were present within the pool and shrubs were present along the edges of the pool. It is shown on Figure 6.5, Appendix A. The vegetation community associated with the pool is considered candidate significant wildlife habitat (feature ah12) and is shown on Figure 6.5 (Appendix A) and described in Table 4.9 (Appendix B).

Two additional small ponds were located adjacent to each other, within a sedge meadow marsh (see Figure 6.4, Appendix A). The sedge meadow marsh is adjacent to a green ash deciduous swamp. Both ponds contained water depths of 40 cm in May 2011. The vegetation communities associated with these two pools are considered candidate significant wildlife habitat (feature ah7) and is shown on Figure 6.4 (Appendix A) and described in Table 4.9 (Appendix B).

Site investigations carried out in and within 120 m of the Project Location also identified the presence of 11 additional wetland communities that contained standing water. These were predominately green ash or silver maple swamps. These features are considered candidate significant wildlife habitat for amphibian breeding.

In total, thirteen features were identified as candidate significant wildlife habitat for amphibian breeding and are identified on Figures 6.0- 6.5 (Appendix A). Characteristics of the each candidate significant wildlife habitat feature for amphibian breeding are summarized in Table 4.9 (Appendix B). An evaluation of significance was conducted (Section 5.0).

TURTLE NESTING HABITAT

In the White Pines Study Area, open aquatic areas providing the permanent open water habitat required by turtles were restricted primarily to the marsh wetlands associated with the Lake Ontario and South Bay shorelines as well as the open water marsh impoundments found within

the Point Petre Provincial Wildlife Management Area. At its closest point the Project footprint has been sited 400m from the shoreline and most turbines are located more than 1 km from the shoreline. The closest marsh impoundment is located more than 850 m from the Project Location.

The shallow soil over bedrock that is found within the Project Location and Zone of Investigation results in poor drainage, which creates pooling water in the spring that dries up (creating the alvar-like conditions found within the area). Areas of open aquatic water are predominately absent from in or within 120 m of the Project Location (see Figures 3.1 – 3.5, Appendix A; Table 4.3, Appendix B; Appendix F).

One open aquatic area is found within 120 of the access road to T07 (see Figure 3.3, Appendix A). It was a created dug pond used for cattle watering and did not provide suitable habitat to support turtle nesting (i.e. emergent vegetation or basking sites).

Site investigations indicate that the required habitat components for candidate significant wildlife habitat for turtle nesting (i.e. the presence of loose soils for nesting occurring in close proximity to areas of open permanent water) are not found in the Project Location or 120 m Zone of Investigation.

Snapping Turtle is further discussed in Table 3.3, Appendix B.

The Blanding's Turtle (a provincially threatened species) is known to travel relatively far distances from overwintering habitats and nesting habitat is present within the Study Area. This species is being addressed separately under the requirements of the Endangered Species Act (2007).

SPECIALIZED RAPTOR NESTING HABITAT

No naturally occurring raptor nests were observed during the course of site investigations in or within 120 m of the Project Location. Constructed nesting platforms were observed within the Study Area, however man-made nesting sites are not considered candidate significant wildlife habitat (MNR, 2012).

Candidate significant wildlife habitat for specialized raptor nesting was not found in or within 120 m of the Project Location.

SEEPS AND SPRINGS

Geological and landscape conditions within the Study Area are generally not conducive to seeps (i.e. a bedrock layer near the surface with relatively shallow soils).

No seeps or springs were identified during site investigations for the NHA or those conducted for the Water Assessment and Water Body Report (Appendix F; Stantec, 2012a). Candidate significant wildlife habitat for specialized habitats (seeps and springs) was not found in or within 120 m of the Project Location.

4.2.5.4 Species of Conservation Concern

RARE SPECIES

Results of the site investigation for each species of conservation concern identified through the records review are provided in Table 3.3, Appendix B.

The results of the site investigation indicated that potential habitat to support two species identified through the records review occurred within 120 m of the Project Location.

Western Chorus Frog- candidate significant wildlife habitat for chorus frog is identified and considered within the context of amphibian breeding habitat. Thirteen features were identified as candidate significant wildlife habitat for amphibian breeding and are identified on Figures 6.0-6.5 (Appendix A). Characteristics of the each candidate significant wildlife habitat feature for amphibian breeding are summarized in Table 4.9 (Appendix B). An evaluation of significance was conducted (Section 5.0).

Eastern Milksnake- critical habitat components that are considered candidate significant wildlife habitat for milksnake include hibernacula features. Two potential reptile hibernacula were identified within 120 m of the Project Location. Rept1 and rept2 are considered candidate significant wildlife habitat for seasonal concentration areas of reptile hibernacula and are shown on Figures 6.0 and 6.3, Appendix A. A photographic record of the features is provided in Appendix H. An evaluation of significance was conducted (Section 5.0).

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 as part of these requirements is being submitted to MNR as part of the White Pines Species at Risk Report (separate cover). Where this information indicates that approvals or permits are required, these will be addressed separately through the applicable statute and its permitting process.

DECLINING SHRUB/SUCCESSIONAL BREEDING BIRDS

Site investigations confirmed the presence of red cedar scrub shrub alvar habitat and buckthorn cultural thicket communities in and within 120 m of the White Pines Project Location. In addition some red cedar treed alvar communities and red-cedar green ash woodland communities were found to contain an open canopy and were dominated by stunted red cedars. Vegetation

communities that comprised these characteristics were considered to have the potential to support shrub/successional breeding bird species.

Contiguous areas of these communities, that were 10 ha or larger were considered to have the potential to support sustainable populations of shrub/successional breeding birds (MNR, 2012).

Known significant wildlife habitat for shrub/successional breeding birds was identified during the records review on the Crown Land Block (feature ssbb4). Site investigations confirmed the presence of shrubland habitat within the Crown Land Block but as a result of site investigations of adjacent lands the feature boundary was amended (see Figure 3.2, Appendix A).

In addition to known significant wildlife habitat feature ssbb4, seven additional features containing contiguous vegetation communities that were considered to have the potential to support shrub/successional breeding birds were identified as candidate significant wildlife habitat for shrub/successional breeding birds. These features ranged from 16.6 to 162 ha and were generally comprised primarily of red cedar treed alvar communities. Some contained a complex of red cedar treed alvar, red cedar scrub shrub alvar and red cedar-green ash cultural woodland communities.

Candidate significant wildlife habitat for specialized habitat supporting shrub/successional breeding birds is present in and within 120 m of the Project Location; it is shown on Figures 6.0-6.5, Appendix A. An evaluation of significance has been completed (Section 5.0).

4.2.5.5 Candidate Significant Wildlife Habitat Summary

The following candidate significant wildlife habitat components were identified in and/or within 120 m of the Project Location through site investigations:

1. Seasonal Concentration Areas

    - landbird migratory stopover areas (2 candidate features: mlsa1 and mlsa2)
    - raptor winter feeding and roosting areas (1 candidate feature: wr1)
    - reptile hibernacula (2 candidate features: rept1 and rept2)
    - migratory butterfly stopover areas (1 candidate feature: mb1)

2. Rare or Specialized Habitats

    - alvar habitat (20 features: al1- al20)
    - amphibian breeding ponds (13 features: ah 1- ah13)

3. Species of Conservation Concern

    - rare species (Western Chorus Frog and Eastern Milksnake)
    - declining shrub/successional breeding birds (8 features: ssbb1, ssbb2, ssbb3, ssbb4, ssbb5, ssbb6, ssbb7 and ssbb8)

Candidate significant wildlife habitat found in and within 120 m of the Project Location is shown on Figures 6.0- 6.5 (Appendix A) and detailed in Table 3.2, Appendix B. Project components found in or within 120 m of each feature are detailed in Table 3.2.

4.2.6 Areas of Natural and Scientific Interest

ANSIs as identified and delineated by MNR were used for the purposes of this assessment.

One provincially significant Earth Science ANSI (the Milford- Black Creek Valley Provincially Significant Earth Science ANSI) was identified in and within 120 m of the Project Location, as shown on Figure 2 (Appendix A).

Two life science ANSIs, the Prince Edward to Ostrander Point Candidate Life Science ANSI- and the Black Creek Valley Marshes and Forest Life Science ANSI were identified as occurring in and within 120 m of the Project Location.

Site investigations conducted by Stantec confirmed the presence of life science values, as discussed in further subsections. No corrections were required to the results of the records review as a result of the site investigations (Table 4.2, Appendix B).

ANSIs found in and within 120 m of the Project Location are shown on Figure 2, Appendix A.

4.3 Summary

Maps showing the boundaries and type of natural features located within 120 m of the Project Location, as well as the location of each feature relative to the Project Location are provided in Figures 4.0-4.5 (wetlands), Figures 5.0-5.5 (woodlands and valleylands), Figures 6.0-6.5 candidate significant wildlife habitat and Figures 7.0-7.5 (alvar).

A list of all natural features identified through site investigations and the project components that are found in and within 120 m of each feature is provided in Table 3.2, Appendix B.

A summary of the corrections made to the records review as a result of site investigations is provided in Table 4.2, Appendix B.

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 White Pines Project Location, for which an evaluation of significance is required:

- Wetlands (17 wetlands; one PSW, eight unevaluated wetlands and eight additional wetlands identified by Stantec);
- Woodlands (14 woodland features; eleven identified through record review; three additional identified by Stantec);
- Valleyland (one; Black Creek Valleyland);
- Wildlife habitat- seasonal concentration areas
    - landbird migratory stopover areas (2 candidate features: mlsa1 and mlsa2)
    - raptor winter feeding and roosting areas (1 candidate feature: wr1)
    - reptile hibernacula (2 candidate features: rept1 and rept2)
    - migratory butterfly stopover areas (1 candidate feature: mb1)
- Wildlife habitat- rare or specialized habitats
    - alvar habitat (20 features: al1- al20)
    - amphibian breeding ponds (13 features: ah 1- ah13)
- Wildlife habitat- species of conservation concern
    - rare species (Western Chorus Frog and Eastern Milksnake)
    - declining shrub/successional breeding birds (8 features: ssbb1, ssbb2, ssbb3, ssbb4, ssbb5, ssbb6, ssbb7 and ssbb8)
- Earth Science ANSI (one; Milford Black Creek Valley Provincially Significant Earth Science ANSI); and
- Life Science ANSIs (two; Prince Edward to Ostrander Point Candidate Life Science ANSI and Black Creek Valley Marshes and Forest Life Science ANSI.

An evaluation of significance has been completed for each feature (Section 5.0).

5 EVALUATION OF SIGNIFICANCE

5.1 Methods

Natural heritage information collected during the records review, site investigations 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. Comments and information received from MNR were used to assist in the evaluation of significance.

Natural features identified or confirmed through the site investigation as occurring in the Project Location or Zone of Investigation and requiring an evaluation of significance included:

- Wetlands (17 wetlands; one PSW, eight unevaluated wetlands and eight additional wetlands identified by Stantec);
- Woodlands (14 woodland features; eleven identified through record review; three additional identified by Stantec);
- Valleyland (one; Black Creek Valleyland);
- Wildlife habitat- seasonal concentration areas
    - landbird migratory stopover areas (2 candidate features: mlsa1 and mlsa2)
    - raptor winter feeding and roosting areas (1 candidate feature: wr1)
    - reptile hibernacula (2 candidate features: rept1 and rept2)
    - migratory butterfly stopover areas (1 candidate feature: mb1)
- Wildlife habitat- rare or specialized habitats
    - alvar habitat (20 features: al1- al20)
    - amphibian breeding ponds (13 features: ah 1- ah13)
- Wildlife habitat- species of conservation concern
    - Rare species (Western Chorus Frog and Eastern Milksnake)
    - Declining shrub/successional breeding birds (8 features: ssbb1, ssbb2, ssbb3, ssbb4, ssbb5, ssbb6, ssbb7, ssbb8)
- Earth Science ANSI (one; Milford Black Creek Valley Provincially Significant Earth Science ANSI); and

- Life Science ANSIs (two; Prince Edward to Ostrander Point Candidate Life Science ANSI and Black Creek Valley Marshes and Forest Life Science ANSI.

5.1.1 Wetlands

Significance of wetlands is determined by the MNR using procedures established in the Ontario Wetland Evaluation System (OWES) (MNR, 2002). Non-provincially significant wetlands are those that have been evaluated but did not receive sufficient points to be considered provincially significant. Wetlands that have yet to be examined are termed unevaluated. For the purposes of this evaluation wetlands previously identified and confirmed by MNR as provincially significant or non-provincially significant are considered to meet the requirements for a determination of significance. Unless field investigations provided evidence to contradict these assessments, the designation as assigned by MNR is used.

A method for Wetland Characteristics and Ecological Functions Assessment (WCEFA) was developed by MNR 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, 2011a).

Wetlands that occur within 120 m of the White Pines Project Location but that have not previously been evaluated by MNR were assessed using the WCEFA to determine the potential impacts created by construction of wind turbines, their access roads, and associated infrastructure (project components). Where the aforementioned wetland communities extended outside of the 120 m Zone of Investigation, they were included in the assessment to ensure accurate documentation of the features and functions. Only wetland communities contiguous with those inside the 120 m Zone of Investigation were assessed.

Data were collected through desktop procedures (e.g. aerial photograph interpretation) and on-site field investigations conducted within property boundaries. The criteria and procedures found within Appendix C of the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2011a) 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*:* This figure is based on the overall size of the contiguous wetland, including areas that are within but extend outside of 120 m zone. Data is based on field surveys and/or aerial photo interpretation. (OWES Section 1.3)

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

Site Type*:* The wetland site type is stated. 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, based on the requirements of OWES. Data is based on field surveys where possible. (OWES Section 1.2.2)

Proximity to Other Wetlands*:* The approximate distance to the next closest wetland unit is provided. Data is based on field surveys and/or aerial photo interpretation. (OWES Section 1.2.4)

Interspersion*:* An estimate of the total number of interspersion points is provided, with consideration given to the scale of the map and complexity of the wetland type delineations. The interspersion number is provided in the results 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 results table; data is based on field surveys and/or aerial photo interpretation. (OWES Section 1.2.6)

Hydrological Component

Flood Attenuation*:* The general proximity of the wetland within the local watershed is stated, indicating if it is headwater, mid-reach, or river-mouth. An estimate of the catchment area is also be provided, based on Digital Elevation Mapping, or topographic map interpretation.

Water Quality Improvement (Short Term):

- *Watershed Improvement Factor* (WIF) – this is based on presence/absence of specific site types (i.e. riverine, lacustrine wetlands at lake inflow or outflow; or palustrine wetlands with inflow isolated wetlands, or palustrine wetlands with no inflow or lacustrine wetlands on lake shoreline. The data is derived from field surveys where possible [OWES Section 3.2.1.1]):

- *Adjacent and Watershed Land Use* (LUF) – estimated percent of land use and land use type (i.e. agricultural, urban or forested) is included for the catchment (data derived from field surveys where possible [OWES Section 3.2.1.2]):

- *Pollutant Uptake Factor* (PUT) – this is based on the single *most* dominant vegetation form observed within the wetland community (data derived from field surveys where possible [OWES Section 3.2.1.3]), described as:
    - high proportion of emergent, submergent, and/or floating vegetation.
    - a high proportion of live trees, shrubs, herbs, or mosses.
    - 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. A characterization of wetland type and soil conditions is provided. Data are based on field surveys where possible, or soil series mapping (OWES Section 3.2.2):

- *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 (OWES Section 3.2.3). Where available, data indicative of groundwater discharge is provided.
- *Shoreline Erosion Control:* Shoreline wetlands provide a measure of protection from shoreline erosion caused by flowing water or waves. A description of the dominant shoreline vegetation is provided based on field surveys and/or aerial photo interpretation (OWES Section 3.4):
- *Groundwater Recharge (Site Type):* Site type is included based on field surveys where possible (OWES Section 3.5.1):
- *Groundwater Recharge (Soils):* Soil type is indicated for each wetland unit, based on county soil mapping. (OWES Section 3.5.2)

Special Features

Species Rarity: All rare species observed during field surveys or species known to be present are documented and listed in the WCEFA results table. Data is based on field surveys, review of background materials (including existing wetland evaluations), and correspondence with agencies where possible (OWES Section 4.1.2).

Significant Features and Habitats: 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 Areas. All significant features and habitats present in the wetland are documented and listed in the results table. Data is based on field surveys, background data, and correspondence with agencies where possible (OWES Section 4.2). The extensive field and background data gathered for the Project, with respect to avian wildlife, was reviewed as part of the assessment of significant features and habitats. Information on significant deeryards, obtained from Land Information Ontario (LIO) mapping, was 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. An indication of presence/absence is provided, as well as its hydro-period (i.e., permanent or intermittent). (OWES Section 4.2.6)

5.1.2 Woodlands

An assessment of woodland significance was applied to each woodland identified in or within 120 m of the Project Location, using the guidance and criteria outlined in MNR's *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a). Criteria to be used to evaluate the significance of woodlands include woodland size, interior, proximity to other natural features, linkages, water protection, diversity, and uncommon characteristics.

Woodlands are to be assessed within the context of the regional landscape and standards for each criteria vary based on the percentage of woodland cover in the municipality where the project is proposed.

The White Pines Project is located in Prince Edward County, which contains approximately 14.2% woodland cover (Riley and Mohr, 1994). In areas with 5-15% woodland cover the minimum standards are:

Woodland Size- woodlands are considered significant if they are greater than 4 ha.

Woodland Interior- woodlands are considered significant if they have any interior habitat (defined as more than 100m from the edge).

Proximity to other significant woodlands or habitats- woodlands are considered significant if they are located within 30m of an identified significant feature or fish habitat *and* the woodland is 1 ha or larger

Linkages- woodlands are considered significant if they are located between two other significant features each of which is within 120 m *and* the woodland is 1 ha or larger

Water Protection- woodlands are considered significant if they are located within 50m of a sensitive hydrological feature (i.e. fish habitat, groundwater discharge, headwater area) and the woodland is 0.5 ha or larger

Woodland diversity- woodlands are considered significant if they have an area dominated by native natural occurring woodland species *and* the woodland is 1 ha or larger

Uncommon characteristics- woodlands are considered significant if they have uncommon species composition, cover type, age or structure or are older than 100 years old *and* the woodland is 1 ha or larger

Woodlands that meet the minimum standard for any one of these criteria are considered significant.

5.1.3 Valleylands

An assessment of valleyland significance was applied to each valleyland identified in or within 120 m of the Project Location, using the guidance and criteria outlined in MNR's *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a).

Recommended criteria for designating significant valleylands include landform related functions and attributes (surface water functions), ecological features (degree of naturalness and linkage function), and restored ecological functions (restoration potential and value) (MNR, 2011a). The significance of valleylands should be assessed within the context of the overall watershed (MNR, 2010).

Valleylands that meet any one of these criteria are considered significant.

5.1.4 Significant Wildlife Habitat

Although specific site visits are assigned to target particular groups (i.e. amphibians, reptiles, birds), all visits 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 of the site.

Given a review of available background information and an analysis of candidate significant wildlife habitat components that occurred in or within 120 m of the Project Location (see Section 4.2.5) a four-season pre-construction field survey program was conducted.

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 fauna species on site.

The field survey program to assess wildlife use of the Study Area included:

- Winter raptor driving surveys (December 2009 – February 2010);
- Winter raptor walking transect surveys (January- March 2012);
- Amphibian and crepuscular bird species surveys (April-June, 2010);
- Breeding bird point count and area search surveys (June 2010);
- Fall migratory passerine survey (September-October, 2010);

- Fall migratory raptor and staging survey (September-October, 2010);
- Spring migratory passerines survey (April-May, 2011); and
- Reptile surveys (April- June, 2011).

Additional surveys targeting particular species at risk were also completed within the White Pines Study Area. Species at risk are legislated under the *Endangered Species Act* (2007). It is not a regulatory requirement of O.Reg 359/09. As such, information regarding these surveys is not a component of the Natural Heritage Assessment but is being submitted to MNR directly as part of a separate Species At Risk Report as part of MNR's Approval and Permitting Requirements.

The following candidate significant wildlife habitats were identified as occurring in and within 120 m of the Project Location, requiring an evaluation of significance.

1. Seasonal Concentration Areas
    - landbird migratory stopover areas (2 candidate features: mlsa1 and mlsa2)
    - raptor winter feeding and roosting areas (1 candidate feature: wr1)
    - reptile hibernacula (2 candidate features: rept1 and rept2)
    - migratory butterfly stopover areas (1 candidate feature: mb1)
2. Rare or Specialized Habitats
    - alvar habitat (20 features: al1- al20)
    - amphibian breeding ponds (13 features: ah 1- ah13)
3. Species of Conservation Concern
    - rare species (Western Chorus Frog and Eastern Milksnake)
    - declining shrub/successional breeding birds (3 features: ssbb1, ssbb2 and ssbb3, ssbb4, ssbb5, ssbb6, ssbb7, ssbb8)

Methods used to evaluate the significance of each component of candidate significant wildlife habitat are provided below.

5.1.4.1 Landbird Migratory Stopover Areas

Routes were chosen that corresponded to the major habitats likely to be utilized by migratory songbirds that occurred within the Project Location and the associated 120 m Zone of Investigation (Figure 8.0, Appendix A).

Within mlsa1 five transects were surveyed in fall 2010 and six in spring 2011. Transects were placed to correspond to the Project Location that was current at the time of the respective surveys.

Within mlsa2 two transects were surveyed in fall 2010 and one in spring 2011. Transects were placed to correspond to the Project Location that was current at the time of the respective surveys.

All migratory landbird survey routes are shown on Figure 8.0 Appendix A.

To characterize use during the fall migration period, each route was traversed during eight separate visits once a week between September 2 and October 21, 2010. During the spring migration period the surveys were conducted during six separate visits once per week between April 22 and May 27, 2011. Survey dates, times, weather conditions and personnel are summarized in Table 4.1, Appendix B.

All species and their total numbers observed along the route were recorded, as well as the habitat type(s) being surveyed. A handheld GPS unit was used to georeference route start and end point locations. Georeference points were also taken at 30 minute intervals along each route. Although MNR's guidance document (*Birds and Bird Habitats: Guidelines for Wind Power Projects*) was not available at the time surveys commenced, methods used are consistent with those recommended by MNR (MNR, 2011c).

Surveys conducted in spring 2011 surveys consisted of 500 m transects. All species and their total numbers observed along the transect were recorded, as well as the habitat type(s) being surveyed. A handheld GPS unit was used to georeference transect start and end point locations.

Evaluation criteria provided in Appendix Q (Table Q-1) of the Significant Wildlife Habitat Technical Guide (MNR, 2000) with consideration of criteria identified in the Ecoregion Criteria (MNR, 2012) were used to evaluate the significance of wildlife habitat for landbird migratory stopover areas.

Criteria 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).

5.1.4.2 Raptor Winter Feeding and Roosting Areas

To characterize the diversity and abundance of raptors that were using the White Pines Study Area driving surveys were conducted. Three winter raptor surveys were completed on December 17, 2009; January 22, 2010; and February 17, 2010. Survey dates, times and weather conditions are summarized in Table 4.1 (Appendix B). Each survey involved driving the

main roads within the Study Area during the day at slow speeds (i.e., 30-40km/h) to achieve maximum coverage of the site. The fields and woodlands were scanned using binoculars to detect birds. A spotting scope was used for closer inspection of stationary birds. When raptors or owls were observed, the location, species, number, behaviour (i.e. perched, flying, hunting) and height was noted. All other bird and wildlife observations were also recorded and mapped.

In addition to driving surveys, walking transect surveys were conducted in the specific feature identified as candidate significant wildlife habitat for a winter raptor feeding and roosting area (i.e. fallow habitat 20 ha or greater in proximity to woodlots). The results of the site investigation indicated one candidate significant wildlife habitat occurred within the White Pines Study Area. It is identified as wr1 and shown on Figure 6.1, Appendix A. Surveys occurred twice a month from January- March, 2012 for a total of six surveys. Surveys were conducted by two surveyors on each of January 19, 30, February 9, 24, March 8 and March 21, 2012. On each survey date, the two surveyors traversed through the cultural meadow in transects spaced approximately 100 m apart. Significant effort was also expended searching conifer trees found in the adjacent densely-treed area for roosting owls such as Saw-whet Owls or Long-eared Owls.

Survey dates, times and weather conditions are summarized in Table 4.1 (Appendix B). All raptor and owl observations were recorded on a field map of the candidate habitat, as well as the appropriate field data form.

Evaluation criteria provided in Appendix Q (Table Q-1) of the Significant Wildlife Habitat Technical Guide (MNR, 2000) with consideration of criteria identified in the Ecoregion Criteria (MNR, 2012) were used to evaluate the significance of wildlife habitat for raptor winter feeding and roosting areas.

Criteria include; the relative importance of the site, presence of species of conservation concern, the diversity and abundance of species, the size of the site, level of disturbance, location of the site, habitat quality and historical use of the site.

5.1.4.3 Reptile Hibernacula

Field surveys were conducted from late April to late June 2011, to observe reptiles during their active periods. Four surveys were conducted (over two days each) by two biologists. One survey was conducted in each of late April (April 20 and 21) and late May (May 18 and 19), and two surveys were conducted in June (June 15, 16 and June 28, 29). Surveys consisted of two qualified biologists walking all portions of the Project Location and Zone of Investigation to observe reptiles or features that would support reptiles (i.e. presence of permanent water, potential hibernacula, basking sites etc.).

When reptiles were observed their location was recorded using a GPS and notes were taken on behavior and habitat in use. No reptiles were handled during the surveys and observers

maintained distance and duration around all reptiles to minimize disturbance to the animals. Date, times and weather conditions during each surveys are provided in Table 4.1, Appendix B.

While reptile surveys provided information on presence of reptiles and supporting habitat features found within the Study Area, emergence surveys of the two potential reptile hibernacula were conducted to assess the significance of these features.

During the early spring season, snakes emerge to bask, but rarely stray far from their hibernaculum; therefore, presents of a basking snake suggests a hibernaculum is present. Surveys to assess whether rept1 and rept2 support hibernacula were conducted in spring of 2012. A total of four surveys were conducted in late March to early May 2012; the survey window was selected according to seasonal weather conditions.

Survey dates were selected based on suitable weather conditions; dates that were sunny and warm. Due to early unseasonably warm weather, surveys were conducted March 21, 22 and 29 2012. Two additional surveys were conducted; April, 19 and May 3 2012,.

Each survey at these locations consisted of a visual inspection for the presence of snakes. Visual inspections included a search of areas in close proximity to the potential hibernacula that provide basking opportunities for snakes. Should snakes be observed notes would be taken on the species, number, behavior and proximity to potential hibernacula.

Criteria provided in the Eco-regional Criteria (MNR, 2012) were applied to assess the significance of the hibernacula. To be considered significant, a congregation of a minimum of five individuals of one species or individuals of two or more snake species must be present.

5.1.4.4 Migratory Butterfly Stopover Areas

Presence of butterflies was recorded during all field surveys conducted during the fall migration period for butterflies. A total of 14 dates were surveyed through September 2010 with either two or three surveyors present onsite. In addition, four dates were surveyed in early to mid-October, 2010. Dates, survey times, weather conditions and field personnel are summarized in Table 4.1, Appendix B.

Evaluation criteria provided in Appendix Q (Table Q-1) of the Significant Wildlife Habitat Technical Guide (MNR, 2000) with consideration of criteria identified in the Ecoregion Criteria (MNR, 2012) were used to evaluate the significance of wildlife habitat for migratory butterfly stopover areas. Criteria outlined within the SWHTG include relative importance of the site, presence of species on conservation concern, species diversity, abundance, size of the size, habitat diversity, location, level of disturbance and historical use of the area.

Areas considered significant for migratory butterflies are generally the only known (or one of only a few known) within the planning area that have a known history of use (i.e. 10 years) and support multiple species with high numbers of individuals.

5.1.4.5 Rare Vegetation Communities

Surveys for vascular plants were conducted from September 21-24, and 27-30, 2010. Surveys to target alvar vegetation species occurred during the week of June 13-17, 2011. Survey times, weather conditions and field personnel are summarized in Table 4.1, Appendix B.

English colloquial names and scientific binominals of plant species generally follow Newmaster et al. (1998). Appendix N of The Significant Wildlife Habitat Technical Guide (2000) was used to identify vascular plants that are considered to be indicators of alvar habitat or remnant habitat in Southern Ontario.

Plant species were considered rare if designated provincially as S1 (critically imperiled), S2 (imperiled) or S3 (vulnerable). Species having a high coefficient of conservatism (9 or 10) as designated by Oldham et al. (1995) were also considered species of note.

Evaluation criteria provided in Appendix Q (Table Q-2) of the Significant Wildlife Habitat Technical Guide (MNR, 2000) with consideration of criteria identified in the Ecoregion Criteria (MNR, 2012) were used to evaluate the significance of wildlife habitat for rare vegetation communities (alvar). Criteria include current representation of community type within the planning area; degree of rarity (i.e. rare or uncommon species); diversity of site; condition of community; size and location of site; potential for long-term protection of site and provision of significant wildlife habitat.

5.1.4.6 Amphibian Breeding Areas

Amphibian call count surveys were conducted on April 27-28; May 4, 11-12, 18; and June 5-6, 23-24, 2010. A total of twenty-eight stations within the Study Area were surveyed (Figure 8.0, Appendix A). Survey dates, times, weather conditions and field personnel are summarized in Table 4.1, Appendix B. Calling amphibian surveys followed the protocols identified in the Marsh Monitoring Program Manual (Bird Studies Canada, 1994) and the Amphibian Road Call-Counts Participants Manual (Environment Canada, 1997). Surveys were conducted between one-half hour after sunset and midnight.

The protocol involved the surveyor standing at each selected station and listening for three minutes. Amphibians were recorded to be within each surveyed station if they were within 100 metres of the surveyor. Consistent with the Marsh Monitoring Program protocol, all calling activity was ranked using one of the following three abundance code categories: (1) calls not simultaneous – number of individuals can be accurately counted; (2) some calls simultaneous –

number of individuals can be reliably estimated; and (3) full chorus – calls continuous and overlapping, so number of individuals cannot be reliably estimated.

In addition, visual inspections of all areas containing standing water that occurred in and within 120 m of the Project Location were conducted; estimated size and depth of aquatic habitat, presence of tadpoles and amphibian presence were recorded from April to June 2011. One survey was conducted in each of late April (April 20 and 21) and late May (May 18 and 19), and two surveys were conducted in June (June 15, 16 and June 28, 29).

Evaluation criteria provided in Appendix Q (Table Q-2) of the *Significant Wildlife Habitat Technical Guide* (SWHTG) (MNR, 2000) were considered in the determination of significance of amphibian 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.

5.1.4.7 Rare or Declining Species

RARE SPECIES- WESTERN CHORUS FROG

Amphibian surveys were conducted in the Study Area as described in Section 5.1.4.6.

Evaluation criteria provided in Appendix Q (Table Q-3) of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) were considered in the determination of significance for significant wildlife habitat for Western Chorus Frog. These include: degree of rarity of species, documented significant decline in a species, species whose range is solely or primarily found in Ontario, condition of existing habitat at the site, size of species population at the site, size and location of habitat, potential for long-term protection of the habitat, representation of species/habitat within municipality, evidence of use of the habitat and species of interest to the planning authority.

RARE SPECIES- EASTERN MILKSNAKE

Reptile species and habitat assessment surveys were conducted in the Study Area as described in Section 5.1.4.3.Evaluation criteria provided in Appendix Q (Table Q-3) of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) were considered in the determination of significance for significant wildlife habitat.

DECLINING SHRUB/SUCCESSIONAL BREEDING BIRDS

A comprehensive breeding bird survey program was conducted within the Study Area to characterize the number and relative abundances of species using the Study Area.

Two rounds of surveys for breeding birds were conducted; with six person days per round. The first was conducted on May 31, June 1-4, and 7 and the second round was conducted from June 14-19, 2010. Surveys were comprised of point counts and were augmented by area searches through the Study Area. Surveys began at, or within, half an hour of sunrise and were completed by 10:00 a.m. Weather conditions (i.e., precipitation and visibility) were within the parameters required by monitoring programs such as Environment Canada's Breeding Bird Survey or the Ontario Forest Bird Monitoring Program, and are provided in Table 4.1 (Appendix B).

A total of 57 point counts were conducted, and were distributed throughout the Study Area to characterize the relative abundance of species breeding within the Study Area. The location of all point counts conducted is shown on Figure 8.0, Appendix A.

Point counts were conducted in compliance with Environment Canada's "Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds" (Environment Canada, 2007b). Ten minute point counts were conducted twice at each station, in early June and late June. Bird observations were recorded at four distance regimes, within a 50 m radius, 50 to 100 m, outside the 100 m radius, or flyovers. For each point count, a record was made of the start time and a hand held GPS unit was used to georeference its location. A brief description of the habitat was made for each point count. To standardize the data, densities per 10 ha were calculated for each point count.

Area searches were conducted to identify as many breeding bird species as possible that were utilizing the Study Area. All main habitat types found within 120 m of the Project Location were traversed on foot during each visit. All species observed were recorded along with which habitat type(s) the species was observed in as well as the level of breeding evidence detected.

Surveys were conducted in compliance Environment Canada's "Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds" (Environment Canada, 2007b). Though MNR's guidance document (*Birds and Bird Habitats: Guidelines for Wind Power Projects*) was not available at the time breeding bird surveys were conducted, methods used are consistent with those recommended by MNR (MNR, 2011c).

Details of the point count locations and area searches located within each candidate feature are provided in Table 5.10, Appendix B..

Evaluation criteria provided in Appendix Q (Table Q-3) of the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) were considered in the determination of significance for significant wildlife habitat for shrub/successional breeding birds. While these criteria are general and were written to apply to rare species generally, MNR has provided detailed criteria for significance specific to shrub/successional breeding birds within the Ecoregion Criteria (MNR, 2012).

As a result, the Ecoregion Criteria were applied to assist in the evaluation of significance of shrub/successional breeding bird habitat. Shrub habitats greater than 10 ha are considered likely to support and sustain a diversity of shrub/successional breeding birds (MNR 2012). Habitats meeting this size criteria and containing at least one breeding indicator (i.e. Brown Thrasher or Clay-coloured Sparrow) and two common species (Field Sparrow, Black-billed Cuckoo, Eastern Towhee or Willow Flycatcher), or the presence of one breeding special concern species (Yellow-breasted Chat or Golden-winged Warbler) are considered significant wildlife habitat for shrub/successional breeding birds (MNR, 2012).

5.1.5 Areas of Natural and Scientific Interest

Life Science and Earth Science ANSIs were treated as 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.

5.2 Results: Study Area Overview

5.2.1 Vegetation Species

A total of 324 species of vascular plants were recorded from the White Pines Study Area, chronicled over a spring and fall inventory, as well as incidental observations. This number reflects all optioned properties surveyed, including property outside of the current Project Location and 120 m Zone of Investigation. Of the species recorded, 76% are considered native, which is reflective of the overall extent of naturalized habitat found within the Study Area.

Of the native species observed, 216 (88%) are ranked as S5 (common, widespread, and abundant in Ontario); 27 species are S4 (uncommon but not rare), and one species is S3 (vulnerable in Ontario). The S3 species observed was butternut (Juglans cinerea), an endangered species of tree with a declining population due to a non-native fungal pathogen. The butternut trees are located more than 120 m from the Project Location. Details regarding their presence is being submitted to MNR as part of the White Pines Species at Risk Report (separate cover). Where this information indicates that approvals or permits are required, these will be addressed separately through the applicable statute and its permitting process.

A list of vascular plant species occurring from the White Pines Study Area is provided in Appendix I. A photographic record of vegetation community types typically found within the Study Area is provided in Appendix G.

5.2.2 Wildlife

A list of all wildlife species observed during field investigations within the White Pines Study Area is provided in Appendix J. A total of 154 bird species, nine amphibians, six reptiles, two butterflies, three odonata and six mammal species were observed. The majority of species

found within the Project Study Area are ranked S5 (i.e., secure - common and widespread and abundant in Ontario), or S4 (i.e., apparently secure – uncommon but not rare). Appendix K provides a complete list of breeding bird species observed during Stantec's 2010 field surveys as well as results of the point count surveys. A total of 90 species of birds were considered likely to be breeding within the Study Area.

The resident species identified with rankings of S3 to S1 included three reptiles (Snapping Turtle, Blanding's Turtle and Eastern Milksnake) and one amphibian species (Western Chorus Frog).

A total of eight species of amphibians were detected in the Study Area through amphibian call count surveys. Overall, Spring Peepers were the most abundant species throughout the Study Area, followed by Gray Treefrog, American Toad, Chorus Frog, Green Frog, American Bullfrog, Wood Frog and Pickerel Frog, in decreasing abundance. One additional species, Northern Leopard Frog was observed during other field investigations. Results of the amphibian call count surveys for the Study Area are provided in Table 5.1, Appendix B. Of these, seven species occurred within features found within 120 m of the Project Location.

Table 5.2, Appendix B provides a detailed list of the most abundant species observed overall in the Study Area. The 10 most abundant breeding bird species overall were Song Sparrow (3.52 pairs/10ha), Savannah Sparrow (2.51 pairs/10ha), American Robin (2.4 pairs/ha), Red-winged Blackbird (2.29 pairs/10ha), Common Yellowthroat (2.12 pairs/10ha), Eastern Towhee (2.01 pairs/10ha), Bobolink (1.9 pairs/10ha), Chipping Sparrow (1.45 pairs/10ha), Field Sparrow (1.34 pairs/10ha) and White-throated Sparrow (1.23 pairs/10ha).

In "woodland" habitat, the 10 most abundant species observed within the White Pines Study Area were American Robin (3.61 pairs/10ha), Common Yellowthroat (3.18 pairs/10ha), Red-winged Blackbird (2.76 pairs/10ha), Red-eyed Vireo (2.33 pairs/10ha), Song Sparrow (2.12 pairs/10ha), Bobolink (1.49 pairs/10ha), Common Grackle (1.49 pairs/10ha), Eastern Wood-pewee (1.49 pairs/ha), Ovenbird (1.27 pairs/ha), and Black-capped Chickadee (1.27 pairs/10ha). Due to the variable nature of tree cover in the Study Area, some grassland species were observed in areas identified as "woodland" habitat.

In grassland habitat, the 10 most abundant species were Savannah Sparrow (7.21 pairs/10ha), Bobolink (4.52 pairs/10ha), Red-winged Blackbird (3.69 pairs/10ha), Song Sparrow (3.35 pairs/10ha), Eastern Meadowlark (1.68 pairs/10ha), American Robin (1.51 pairs/10ha), Chipping Sparrow (1.51 pairs/10ha), Barn Swallow (1.34 pairs/10ha), Eastern Kingbird (1 pair/10ha) and Field Sparrow (1 pair/10ha).

The 10 most abundant species observed in shrub/successional habitat were Eastern Towhee (4.57 pairs/10ha), Song Sparrow (4.57 pairs/10ha), Common Yellowthroat (2.63 pairs/10ha), White-throated Sparrow (2.49 pairs/10ha), American Robin (2.35 pairs/10ha), Field Sparrow

(2.35 pairs/10ha), Mourning Dove (1.94 pairs/10ha), Chipping Sparrow (1.8 pairs/10ha), House Wren (1.52 pairs/10ha) and Cedar Waxwing (1.25 pairs/10ha).

A total of 108 species were observed during the fall passerine migration of 2010. The most abundant species observed in the White Pines Study Area during fall migration included Common Grackle (2078), Blue Jay (1069), American Robin (580), Black-capped Chickadee (466), White-throated Sparrow (465), Yellow-rumped Warbler (357), American Goldfinch (297), Red-winged Blackbird (290), Canada Goose (275) and Rusty Blackbird (266).

A total of 90 species were observed during the spring passerine migration of 2011. The most abundant species observed in the White Pines Study Area during spring migration included Song Sparrow (189), American Robin (146), White-throated Sparrow (135), American Crow (98), Black-capped Chickadee (97), Chipping Sparrow (89), Field Sparrow (88), Eastern Towhee (84), Blue Jay (61) and Nashville Warbler (59).

5.3 Results: Natural Features in and within 120 m of the Project Location

5.3.1 Wetlands

Seventeen wetland communities were confirmed as occurring within 120 m of the Project Location during site investigations:

- Feature we1 (additional wetland identified by Stantec);
- Feature we2 (additional wetland identified by Stantec);
- Feature we3 (South Bay Coastal PSW);
- Feature we4 (additional wetland identified by Stantec);
- Feature we5 (additional wetland identified by Stantec);
- Feature we6 (unevaluated wetland);
- Feature we7 (additional wetland identified by Stantec);
- Feature we8 (unevaluated wetland);
- Feature we9 (unevaluated wetland);
- Feature we10 (unevaluated wetland);
- Feature we11 (unevaluated wetland);
- Feature we12 (additional wetland identified by Stantec);
- Feature we13 (unevaluated wetland);
- Feature we14 (additional wetland identified by Stantec);
- Feature we15 (additional wetland identified by Stantec);

- Feature we16 (unevaluated wetland); and
- Feature we17 (unevaluated wetland).

Wetland features are shown on Figures 4.0-4.5, Appendix A. No wetlands occurred in the Project Location.

The South Bay Coastal Wetland extends to within 120 m of the Project Location. It has been evaluated by MNR as provincially significant (Snetsinger and Kristensen, 1993). Boundaries as confirmed during the site investigation program within 120 m of the Project Location are shown on Figures 4.0, 4.1 and 4.2 (Appendix A).

During site investigations eight wetlands identified as unevaluated by MNR and eight additional wetland communities identified by Stantec were confirmed within 120 m of the Project Location. Results of the Wetlands Characteristics and Ecological Functions Assessment for wetland communities occurring within 120 m of the White Pines Project Location are provided in Table 5.3, Appendix B. All wetlands assessed using the WCEFA tool are considered significant for the purposes of this project. An EIS has been completed for each of these features (Section 6.0)

5.3.2 Woodlands

The fourteen woodlands that occurred in or within 120 m of the White Pines Project Location were evaluated using the significance criteria recommended in *The Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011) as described in Section 5.1.2.

Table 5.4 (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 4.7 (Appendix B).

Nine of the woodlands met at least one of the criteria and are considered significant woodland (Woodland features 1, 2, 3, 4, 5, 6, 7, 8, 11).

Significant woodlands within 120 m of the Wind Project location are shown on Figures 9.0-9.5 (Appendix A) and indicated in Table 5.4 (Appendix B).

5.3.3 Valleylands

One valleyland was confirmed during site investigations. The Black Creek Valleyland extends to within 120 m of the White Pines Project Location.

Results of the evaluation of significance are provided in Table 5.5 (Appendix B). The valleyland meets the criteria for three of the four criteria; surface water function, degree of naturalness and linkage function. Valleylands meeting any of the criteria are considered significant.

The project location is not in a significant valleyland; one significant valleyland is found within 120 m of the White Pines Project Location. The significant valleyland is shown on Figure 9.0, Appendix A. An EIS has been completed (Section 6.0).

5.3.4 Wildlife habitat

5.3.4.1 Landbird Migratory Stopover Areas

Appendix L provides a detailed list of the migratory bird species and numbers observed during Stantec's migration surveys in each candidate significant wildlife habitat feature. Field notes are provided in Appendix F.

MLSA1

A total of 8051 birds of 105 species were observed in mlsa1 during fall passerine migration surveys. During fall the most abundant species observed were Common Grackle (1996 individuals), Blue Jay (1012), American Robin (557), White-throated Sparrow (441) and Black-capped Chickadee (422).

During spring migration, 1595 birds of 81 species were observed. During spring migration, the most abundant species observed in mlsa 1 included Song Sparrow (168 individuals), American Robin (128), White-throated Sparrow (99), American Crow (83) and Field Sparrow (80).

Species of conservation concern observed during the passerine surveys included:

- Rusty Blackbird (federal species of special concern); 266 individuals in fall and 4 in spring;
- Bald Eagle (provincial species on special concern); a single individual observed in fall
- Great Black-backed gull (S2B); a single individual observed in fall
- Gray-cheeked Thrush (S2S4B); a single individual observed in fall
- Canada Warbler (provincial species on special concern, federally threatened); a single individual observed in fall

Species at risk (i.e. those provincially threatened or endangered) are addressed under the *Endangered Species Act* (2007). Information related to occurrences of these species within the Study Area is being submitted to MNR directly as part of a separate report.

This feature is not the only site in the planning area and other sites provide a more significant function for a migratory landbird stopover area, particularly within Prince Edward Point National Wildlife Area. As noted in Section 3.2.4 the geographical features of the peninsula cause birds

to concentrate at the tip of Prince Edward Point in large numbers and few other locations along Lake Ontario are considered to compare to the Point in density or abundance of migrants (Sprague 1987; Weir, 2008).

However, during migration, feature mlsa1 supported relatively high numbers of individuals as well as a diversity of species, including rare species. It is considered a large site with a variety of habitat types and is located adjacent to the Lake Ontario shoreline. Results of the evaluation of significance for mlsa1 are provided in Table 5.6 (Appendix B).

Feature mlsa1 is considered meet the criteria for significance for presence of species of conservation concern, the diversity and abundance of species, the size of the site, habitat diversity, and location of the site (i.e. those within 5 km of Great Lakes are most significant). It is considered significant wildlife habitat for a migratory landbird stopover area.

MLSA2

A total of 404 birds of 49 species were observed in this feature during fall passerine migration surveys. The most abundant species were generally consistent with those recorded in mlsa1 and included Common Grackle (82 individuals), American Crow (61), Blue Jay (57), Black-capped Chickadee (44) and White-throated Sparrow (24).

A total of 337 birds were recorded of 56 species during spring passerine migration surveys. The most abundant species observed were White-throated Sparrow (36), Black-capped Chickadee (25), Song Sparrow (21), American Robin (18) and Double-crested Cormorant (15).

Species of conservation concern observed in mlsa2 during passerine migration surveys included:

- Golden-winged Warbler (threatened federally, special concern provincially); a single individual in spring
- Rusty Blackbird (special concern federally); four individuals in spring

Results of the evaluation of significance for mlsa2 are provided in Table 5.6 (Appendix B). As discussed above, mlsa2 is not considered the only site in the planning area. Relative to other sites that have been assessed within the planning area (including the Prince Edward Point National Wildlife Area, the Ostrander Crown Land Block and mlsa1) mlsa2 supported relatively lower numbers of birds, individuals and species on conservation concern. It is a linear vegetated feature predominately surrounded by actively managed agricultural fields. For the most part, it lacks the natural open field habitats required in association with the woodland, however small patches of cultural meadow are located at the westernmost extent of the woodland feature.

Regardless, feature mlsa2 is considered to meet the criteria for significance for presence of species of conservation concern, diversity and abundance of species, size of the site, habitat diversity, and location of the site in relation to the lakeshore. It is considered significant wildlife habitat for a migratory landbird stopover area.

SUMMARY

Significant wildlife habitat for migratory landbird stopover areas (features mlsa1 and mlsa2) is shown on Figures 9.0-9.5, Appendix A. The Project Location is found in and within 120 m of mlsa1 and is within 120 m of mlsa2. An Environmental Impact Study has been completed for these features (see Section 6.0).

5.3.4.2 Raptor Winter Feeding and Roosting Areas

Results of the driving surveys conducted within the Study Area are provided in Table 5.7, Appendix B. Field notes are provided in Appendix F.

In total 17 raptor observations were recorded, with thirteen on Dec. 17, 2009 and four on Jan. 22, 2010. No raptors were observed on Feb. 17, 2010. A total of five different species were observed, including Northern Harrier, Red-tailed Hawk, Cooper's Hawk, Great Horned Owl and Red-shouldered Hawk. The majority of observations were of Red-tailed Hawk (65%) followed by Red-shouldered Hawk (18%). Only single observations were made of the other three species.

Raptors/km at known areas of concentration for winter raptor hotspots are 3.14 raptors/km at Amherst Island, 2.14 at Fisherville and 1.4 at Wolfe Island (Environment Canada, letter, September 21, 2007). Within the White Pines Study Area raptors/km was 0.22 raptors/km on December 17th and 0.05 raptors/km on January 22nd.

Incidentally, observed use of the overall White Pines Study Area during January- March 2012 by winter raptors was also characterized as very low (B. Holden, pers. comm, March 2012).

The results of the driving surveys confirmed information compiled from background sources (see Section 3.2.4); that the use of the southern Prince Edward County landscape by winter raptors is generally very low.

None of the 13 raptors observed during driving surveys were located within (or within close proximity) of feature wr1. Raptors were generally observed within the northern portion of the Study Area, within the more open agricultural landscape.

Despite considerable effort (six search days with two surveyors) searching potential roost trees and open field habitat no owls or raptors were observed roosting or feeding in candidate significant wildlife habitat for winter raptors (wr1) over the course of walking transect surveys.

No evidence of owls (i.e. pellets) was observed and the cultural meadow did not appear to support an abundant population of prey; no rodents or rodent trails were observed.

Field survey information on habitat characteristics and species use of candidate significant wildlife habitat feature wr1 were applied to the evaluation criteria provided in Appendix Q (Table Q-1) of the Significant Wildlife Habitat Technical Guide (MNR, 2000) to determine the significance of feature wr1.

Presence of species of conservation concern, Species Diversity and Abundance - No raptors or owls were observed using the site during driving surveys conducted in 2009- 2010 or during walking transect surveys conducted in 2012. No historic records of species of conservation concern are known to occur from this site.

Size of site and level of disturbance- The site is located in southern Prince Edward County. Habitat is comprised of a 24 ha cultural meadow surrounded by actively managed hayfields and coniferous woodland. It is contained within a landscape that is generally not comprised of the wide open field habitat required by winter raptors. The coniferous forest located adjacent to the cultural meadow is traversed by roads, fences and appeared to be used for storage of equipment and materials.

Location of site and Habitat quality - The habitat found within southern Prince Edward County landscape does not contain the habitat features known to attract and support raptors in winter (i.e. wide open windswept fields containing perches). Generally the White Pines Study Area does not contain the wide open cultural fields required to support large and productive small mammal populations and support significant populations of wintering raptors (see Figures 3.1 – 3.5, Appendix A; Table 4.3, Appendix B; Appendix F). Feature wr1 was a 24 ha cultural meadow that is found adjacent to treed alvar and coniferous forest (Figure 3.1, Appendix A).

Relative importance in the planning area and historical use of area- Southern Prince Edward County has not been identified as an area supporting large populations of wintering raptors (Ontbirds, undated; Sprague, 1969; Wilson and Cheskey, 2001; Environment Canada, 2007). Sprague (1969) characterizes most owl and raptor species as “rare” winter visitors in the area. Annual results for the Prince Edward Point Christmas Bird Count from 2000- 2010 indicate relatively low numbers of raptors observed within the count circle (National Audubon Society, 2011), particularly compared to nearby areas such as Amherst Island and Wolfe Island (Weir, 2008; National Audubon Society, 2011).

Given the absence of raptors using the feature, lack of documented historic use of the landscape context and consideration of the habitat, Feature wr1 is not considered significant wildlife habitat for winter raptors. No significant wildlife habitat for winter concentrations of raptors was found in or within 120 m of the Project Location.

5.3.4.3 Reptile Hibernacula

During general field investigations, no snakes were observed within the pasture/treed alvar communities that include the potential hibernacula features.

During targeted reptile hibernacula confirmation surveys conducted March 21, 22, 29 and April 19 and May 3 2012 to monitor the two potential hibernacula features for snake activity or emergence a single garter snake was observed on April 19th. It was found approximately 20 m from the candidate hibernacula features.

To be considered significant, a congregation of a minimum of five individuals of one species or individuals of two or more snake species must be present. The species survey results indicated the presence of a single individual. The features did not meet the criteria to be considered significant wildlife habitat for reptile hibernacula.

No significant wildlife habitat for reptile hibernacula was found in or within 120 m of the Project Location.

5.3.4.4 Migratory Butterfly Stopover Areas

One feature was identified as candidate significant wildlife habitat for migratory landbirds. Mb1 was a 24 ha cultural meadow that occurred adjacent to coniferous woodland within 5 km of the Lake Ontario shoreline.

During field surveys conducted through September- mid October 2010 very few butterflies were observed within the White Pines Study Area. Observations primarily included observations of single individuals or small numbers of monarchs. One group of 200 Monarchs was observed on a single survey date (September 22, 2010). The observation occurred at the south eastern corner of the Study Area, near the intersection of Babylon and Gravelly Bay Roads. It did not occur in or within 120 m of the Project Location. No butterflies were observed in feature mb1 through the fall migration season.

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. The majority of fall migrating monarchs in Ontario use three such staging areas: Point Pelee, Long Point, and Presqu'ile Point (C. Taylor, pers. comm., 2006). Dr. Taylor indicated that most of the eastern Ontario populations of monarchs are believed to cross Lake Ontario at the Presqu'ile Point staging site.

Feature mb1 does not have a known history of use, did not support multiple species or high numbers of individuals. No significant wildlife habitat for migratory butterfly stopover areas occurred in or within 120 m of the White Pines Project Location.

5.3.4.5 Rare Vegetation Communities

Twenty alvar "features" were identified in and within 120 m of the Project Location, ranging in size from 0.5 (al7) – 584 ha (al4). These are shown on Figures 7.0- 7.5, Appendix A.

Regional Representation

Alvar habitat within Ontario's Great Lakes region has been well documented and mapped, with the most significant remaining alvars being discussed in Brownell and Riley (2000). This publication breaks Ontario's alvars into 13 physiographic regions, in which the White Pines Study Area is inclusive of the 'Napanee Plain South and Prince Edward Peninsula'. In this region Brownell and Riley provide documentation of three alvar sites: Deseronto, Point Anne, and Salmon River, all of which occur north of Picton in the vicinity of Hwy 401. While this publication does mention the Picton alvars as one of the "Other Documented Alvar Sites", it is not considered Provincially Significant based on the five evaluation criteria they used: representation, site condition, diversity, special features, and ecological function (MNR; pers.comm. Wasyl Bakowsky, Dec. 2011).

The White Pines Study Area occurs within Ecodistrict 6E-15, as per the Great Lakes Conservation Blueprint for Terrestrial Biodiversity (Henson and Brodribb, 2005). This Ecodistrict covers 237,229 hectares, 45% of which occurs within Prince Edward County. This document confirms the limited presence of significant alvar habitat in this Ecodistrict, stating that over 12,000 hectares of alvars are mapped in 6E-15, but that less than 1% (117 ha) of these are considered true alvars.

The greatest area of alvar habitat within the Study Area was concentrated to the south of Royal Road, extending east toward Prince Edward Point. Table 4.8 (Appendix B) provides a detailed review of the alvar features observed within the Project Location and Zone of Investigation, shown in Figures 7.0- 7.5 (Appendix A).

The evaluation of significance is provided in Table 5.8, Appendix B. This table was developed to provide an alvar-by-alvar assessment, according to the evaluation criteria described in the SWHTG (MNR, 2000).

Alvar vegetation is well represented in Prince Edward County, and the White Pines alvar features are not considered significant based on the assessment of Regional Representation.

Features and Functions

Appendix N of The Significant Wildlife Habitat Technical Guide (2000) provides a list of vascular plants that are considered to be indicators of alvar habitat or remnant habitat in Southern Ontario. Six of these plants were observed within the Study Area during field surveys – tufted hairgrass (S4S5), flat-stemmed spikerush (S4), early buttercup (S4), small skullcap (S4), false pennyroyal (S4) and narrow-leaved vervain (S4). The first two species were the most

commonly observed in the Study Area, with notably fewer observations of the remaining species. None of these species are considered Provincially Significant, although each of them has a Coefficient of Conservatism (CC) value of 9, with the exception of flat-stemmed spikerush, which has a CC value of 8. These values indicate that each of these species has a high to very high fidelity to a specific habitat conditions. Alvar indicator species that were observed in each alvar feature are provided in Table 4.8, Appendix B.

Alvar species observed for the Study Area are treated with somewhat conflicting habitat descriptions in available literature. For example, Catling (1995) considers tufted hairgrass and flat-stemmed spikerush (the two most common alvar indicator species in the Study Area) as having high (71-85%) and extreme (86-100%) alvar confinement, respectively. Voss (1972) and Flora of North America (2008) provide broader habitat descriptions, including wet meadows for both species, and ditches and waste places for the later. Such conflicting reports are somewhat mitigated by the Significant Wildlife Habitat Ecoregion Criteria Schedules (MNR, 2012); i.e., defining criteria for confirmed significant alvar habitat includes one or more alvar indicator species (among other criteria).

Given other factors, including recent land use practices (clearing and agriculture), and physical characters such as the absence of exposed bedrock, and soil depth generally exceeding 15 cm, the White Pines alvars would not qualify as true alvar as described by Henson and Brodribb, (2005). These units are largely early succession habitats originating from, and/or maintained by agriculture, and are expected to succeed into closed canopy systems similar to the shrub dominated cover known for the region (Bland, 1997; Snetsinger 2000; Stantec 2011a; Wilson and Cheskey 2001), and the cultural woodlands and deciduous forests interspersed throughout the study area. Key evidence of agricultural activity is summarized in Table 4.8, including cedar fence lines, evidence of grazing and tree clearing, and the presence of young pioneer species, including green ash. This assessment is consistent with reports that indicate the presence of alvar-like conditions in the area (rather than true alvar), including the Great Lakes Conservation Blue Print (Henson and Brodribb, 2005), and the Prince Edward County South Shore Important Bird Area Conservation Plan (Wilson and Chesky, 2001)

The majority of plant and wildlife species supported within the alvar communities are considered common or very common in Ontario. Based on this assessment, the alvar units do not contribute unique or specialized habitat functions to the Study Area.

The field results and existing background information were applied to the evaluation criteria outlined in the SWHTG. The results of the evaluation of significance for each alvar feature are provided in Table 5.8, Appendix B.

Alvar Ecosite communities documented for the study area represent alvar-like conditions, controlled largely by cultural influences. Regardless of origin and maintenance factors, MNR considers all alvar habitat (ALO, ALT and ALS vegetation types) in Ecoregion 6E to be provincially rare (MNR, pers. comm. K. Durst, March, 2010); as a result all Alvar Ecosites (AL)

are considered significant wildlife habitat for the purposes of this report. Significant alvar habitat found in and within 120 m of the Project location is shown on Figures 9.0-9.5, Appendix A.

An Environmental Impact Study has been conducted that identifies potential impacts and recommended mitigation measures to alvar features documented in the NHA (Section 6.0).

5.3.4.6 Amphibian Breeding Areas

As a result of site investigations in and within 120 m of the Wind Project Location, 13 features were assessed as candidate significant wildlife habitat for amphibian breeding, requiring an evaluation of significance (Figure 6.0-6.5, Appendix A). Table 4.9 (Appendix B) summarizes the characteristics of each feature and provides species information specific to each feature as a result of amphibian call count and visual inspection surveys.

The evaluation of significance is provided in Table 5.9, Appendix B. A key requirement for significant wildlife habitat in the form of amphibian breeding ponds, are ponds that contain permanent or temporary shallow water with no fish (MNR, undated).

Of the 13 features assessed, 4 met the criteria for significant wildlife habitat in the form of specialized habitats – amphibian breeding habitat. Features ah1, ah4, ah12 and ah13 contained evidence of standing water that persisted through the summer, contained species diversity, as well as relatively good quality and undisturbed habitats to support amphibian breeding.

The remaining features were not considered significant wildlife habitat for amphibian breeding primarily due to a lack of water permanence. An assessment of the criteria used to determine significance for each feature is provided in Table 5.9, Appendix B.

The project location is not sited within significant wildlife habitat for amphibian breeding. Significant wildlife habitat in the form of four amphibian breeding areas occurred within 120 m of the White Pines Project Location and is shown on Figures 9.0-9.5 (Appendix A). An Environmental Impact Study was completed (Section 6.0)

5.3.4.7 Rare or Declining Species

RARE SPECIES

EASTERN MILKSNAKE

During field investigations milksnakes were observed on three dates at three different locations:

1. September 24, 2010 on Babylon Road just west of Whattams Road (Figure 6.1, Appendix A);

2. June 15, 2011 on Maypul Layn Road a short distance north of Royal Road (Figure 6.4, Appendix A); and
3. June 16, 2011 one found dead in a hayfield south of Royal Road and east of Dainard Road, approximately 800m east of the June 15 observation (Figure 6.4, Appendix A).

Due to the wide range of habitats utilized by milksnakes, generalized habitat for milksnake is widespread. Critical habitat components for milksnake that were found within 120 m of the Project Location included two reptile hibernacula (see Figure 6.3, Appendix A).

As potential hibernacula were located approximately 3.4 km to 5.4 km away from the milksnake observations use of these hibernacula by the individuals observed is unlikely.

However, use of the potential hibernacula by other milksnakes, and reptiles in general, is discussed in Section 5.3.4.3.

WESTERN CHORUS FROG

Western Chorus Frog was recorded breeding in the Study Area. Provincially, the species is considered to be one population and has been assessed by COSSARO as not at risk with healthy populations occurring in many areas in southern Ontario (COSSARO, 2009). However, COSEWIC has split the species into two populations with the Great Lakes-Shield population (occurring at this site) of the Western Chorus Frog considered threatened.

Relatively small numbers of Chorus Frogs (i.e. single individuals to up to 3 individuals) were recorded at 60 % of the amphibian survey stations. Chorus frog was not recorded on the remaining 40% of survey stations (see Table 5.1, Appendix B). The number of individuals is not considered significant and the Study Area is not considered to be significant wildlife habitat based on the presence of this species. However, presence of Chorus Frog was considered as one criterion in the consideration of candidate significant wildlife habitat for amphibian breeding. The results of the evaluation of significance for amphibian breeding are provided in Table 5.9, Appendix B and discussed in Section 5.3.4.6. An environmental impact study has been completed for features considered significant wildlife habitat for amphibian breeding and is provided in Section 6.0.

ADDITIONAL SPECIES

In addition to species identified during the records review, Golden-winged Warbler (federally threatened and a species of special concern provincially) was observed during Stantec's field investigations. A total of two Golden-winged Warbler sightings occurred during site investigations conducted in 2010 and 2011. An adult Golden-winged Warbler was observed during breeding bird area searches within the South Bay Coastal Wetland area, this observation occurred more than 700 m from the White Pines Project Location and did not occur in the Project Location or within the 120 m Zone of Investigation. In addition, one individual was observed during spring migration surveys.

Additional species of conservation concern were observed by Stantec during field investigations during migration only and are not considered to be breeding within the White Pines Study Area:

- One Canada Warbler, (a species of special concern federally and provincially) was observed during fall migration.
- Eight Rusty Blackbirds (a species of special concern federally, but not listed provincially) were observed during spring migration and 706 observed during fall migration.
- Twenty Bald Eagles (not at risk federally, special concern provincially) were observed flying over the Study Area during the fall raptor and passerine migration. They were not observed during the breeding or winter seasons.

DECLINING SPECIES

Shrub habitats greater than 10 ha are considered likely to support and sustain a diversity of shrub/successional breeding birds (MNR 2012). Habitats meeting this size criteria and containing at least one breeding indicator (i.e. Brown Thrasher or Clay-coloured Sparrow) and two common species (Field Sparrow, Black-billed Cuckoo, Eastern Towhee or Willow Flycatcher), or the presence of one breeding special concern species (Yellow-breasted Chat or Golden-winged Warbler) were considered significant wildlife habitat for shrub/successional breeding birds (MNR, 2012).

As a result of site investigations, eight features were identified as candidate significant wildlife habitat for shrub/successional breeding birds. One feature (ssbb4) was identified through the record review; an evaluation of significance was conducted by Stantec (2011a). The feature has been evaluated as significant wildlife habitat for shrub/successional breeding birds (Stantec 2011a) and is considered significant for the purposes of this report. The remaining seven features required an evaluation of significance.

Table 5.10, Appendix B provides the species observed within each feature as a result of the breeding bird point count and area search surveys as well as the evaluation of significance.Of the seven features assessed, six met the criteria for significance; ssbb1, ssbb2, ssbb3, ssbb5, ssbb6 and ssbb7. These features are considered significant wildlife habitat for shrub/successional breeding birds.

While feature ssbb8 met the size criteria (at 16.6 ha) it did not meet the species requirements to be considered significant; no indicator species were observed in the feature.

Significant wildlife habitat for shrub-successional breeding bird species (ssbb1, ssbb2, ssbb3, ssbb4, ssbb5, ssbb6 and ssbb7) is found within 120 m of the Project Location. An Environmental Impact Study has been completed (see Section 6.0).

5.3.5 Areas of Natural and Scientific Interest

5.3.5.1 Earth Science

One Earth Science ANSIs was identified in the Project Location and the Zone of Investigation. The Milford Black Creek Valley has been confirmed as a provincially significant Earth Science ANSI.

One provincially significant Earth Science ANSI is found in and within 120 m of the Project Location. It is shown on Figures 9.0-9.5. An EIS has been completed for the feature (Section 6.0)

5.3.5.2 Life Science

The status of the Candidate Provincially Significant Life Science ANSI is currently unconfirmed; it is therefore not considered provincially significant (MNR, personal communication, E. Prevost, May 2012). The Black Creek Valley Marshes and Forest Life Science ANSI has been evaluated as regionally significant by MNR.

No provincially significant Life Science ANSIs were found in or within 120 m of the White Pines Project Location and therefore an environmental impact study is not required.

5.4 Summary

Maps showing the boundaries of significant natural features found in and 120 m of the Project Location, as well as the location of each feature relative to the Project Location are provided in Figures 9.0- 9.5 (Appendix A).

A list of all significant natural features identified through site investigations and the project components that are found in and within 120 m of each feature is provided in Table 3.2, Appendix B and summarized in Table 4.2, Appendix B.

Based on the evaluation of significance, the following natural features have been identified as significant natural features in or within 120 m of the White Pines Project Location, for which an environmental impact study is required:

- Wetlands (17 wetlands; one PSW, eight unevaluated wetlands and eight additional wetlands identified by Stantec);
- Woodlands (9 woodland features; wo1, wo2, wo3, wo4, wo5, wo6, wo7, wo8, wo11);
- Valleyland (one; Black Creek Valleyland);
- Wildlife habitat- seasonal concentration areas

  - landbird migratory stopover areas (2 features: mlsa1 and mlsa2)

- Wildlife habitat- rare or specialized habitats
  - alvar habitat (20 features: al1- al20)
  - amphibian breeding ponds (4 features: ah1, ah4, ah12 and ah13)
- Wildlife habitat- species of conservation concern
  - declining shrub/successional breeding birds (7 features: ssbb1, ssbb2, ssbb3, ssbb4, ssbb5, ssbb6 and ssbb7); and
- Earth Science ANSI (one; Milford Black Creek Valley Provincially Significant Earth Science ANSI).

An environmental impact study identifying potential impacts and recommended mitigation measures has been completed for each feature (Section 6.0).

6 ENVIRONMENTAL IMPACT STUDY

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 (O. Reg. 359/09, s. (38(1)):

- 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)).

In accordance with O. Reg. 359/08, s. 37, no part of the White Pines 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 protocol [MNR, 2011a], all wetlands within 120 m of the White Pines Project Location are treated as provincially significant; see Section 5.3.1). Furthermore, since the 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 White Pines Project Location is sited:

- within 120 m of significant wetlands;
- in and within 120 m of significant woodlands;
- within 120 m of a significant valleyland;
- in and within 120 m of significant wildlife habitat components;

- in and within and within 50 m of a Provincially Significant Earth Science ANSI.

As such, an EIS is required to assess potential negative environmental effects and identify mitigation measures designed to prevent or minimize potential negative effects.

6.1 Description of the Project

6.1.1 Project Components

The Project Location generally consists of the following:

Long-term Land Use Components (for duration of operation; i.e. 20 years)

- 29 REpower MM92-2.05 MW wind turbine generators (18 m diameter foundation base)
- Approximately 16.7 km of turbine access roads (5 m in width)
- Two substations: approximately 70 m x 70 m
- Underground collector system: corridor between the turbines, including a 0.5 m wide trench per collector line. Fibre optic cables will also be placed in the same trench.
- Above or underground roadside collector lines, to be placed in the municipal road allowance.
- Storage area: 50 m x 60 m.

Temporary Land Use Components (required only for construction of the Project, i.e. less than one year duration)

- Construction area at each turbine (50 m x 100 m): includes a turbine staging area for construction of the turbine foundation and assembly of the turbine base and rotor (nacelle and blades), and a 30 m x 45 m crane pad to support the crane used for turbine construction.
- Crane laydown area: 6 m x 120 m.
- Staging areas for access roads: 15 m wide corridor to each turbine location (15.5 m at a turning radii), includes long term access road (5 m) and temporary staging (10 m) areas, and 30 m wide access road entrances off municipal roads.
- Staging areas for collector lines (15 m- reduced to 5 m for operation). Along roadside collector lines, placed in the municipal road allowance, staging areas encompassing the entire municipal road allowance (10- 20 m) on each side of the road are being assessed for the purposes of this report.

6.2 Summary of Construction Details

Construction activities are anticipated to be ongoing for 6-12 months from the start of construction. The projected timing and duration of key construction activities is provided in Table 6.1, Appendix B.

Lands to be temporarily used during construction are staging areas for access roads, aboveground interconnection lines, and underground cable construction, transformer station laydown and construction area, delivery truck turnaround areas, staging areas at each turbine location, and crane laydown areas. Any temporary structures used during construction would not be serviced, and would be placed within the delineated construction work areas.

Following construction, all temporary work locations would be restored to pre-impact conditions. Restoration work would start following installation of each wind turbine and removal of all construction materials and equipment from each turbine site. This includes removal of the granular and geotextile material from applicable areas. Additional detail is provided in Section 6.5.

Full details of construction will be provided in the White Pines Wind Project Construction Plan Report (Stantec, 2012b).

The basic project components include wind turbine generators and associated access roads and collector line systems. The project layout is shown on Figure 3.0.

Wind Turbine Generators

The Project will include 29 REpower MM92 2.05 MW wind turbines, each consisting of a 100 m steel tube tower, three 45.2 m blades (92.5 m rotor diameter), a nacelle, rotor hub and step-up transformer. wpd has elected to assess and seek approval for an alternative Project configuration, with two possible locations for Turbine 17 (T17). Final selection of the turbine site will be based on the results of consultation, detail design and engineering work, as well as the conditions experienced during construction. For the purposes of the EIS the two locations have been treated as individual turbines; habitat removal calculations and distance calculations include consideration of both locations, though only one location will be built.

A 50 m x 100 m construction area will be used around the base of each turbine. Within the construction area will be a turbine staging area for construction of the turbine foundation and assembly of the turbine, and a crane pad where the crane will rest during turbine installation.

Turbine components will be delivered directly to the staging areas for temporary storage until assembled. Staging areas will not be excavated or gravelled, and will be restored to pre-existing conditions at the end of construction. Turbine staging areas will be used to varying degrees throughout the construction phase.

The turbine tower base is approximately 4 m in diameter and will be anchored to the concrete foundation using large diameter anchor bolts. Each turbine will have a poured-in-place reinforced concrete foundation. The foundation will likely be an inverted "T" configuration with a diameter of approximately 18 m. Note all distances provided in the EIS to turbine base are measured from the outer extent of the foundation (i.e. 18 m from the turbine tower). An area approximately 23 m x 23 m will be excavated, and the foundation is anticipated to be 3 m deep. Groundwater seepage will have to be controlled during grubbing and stripping and during subsequent excavation and fill placement. As such, it is possible that some dewatering activities may be required.

Each turbine is equipped with a step-up transformer. From each step-up transformer44 kV underground collector lines will carry the electricity generated by the turbines to a substation located on private property, along the access road to the turbine designated T07.

Crane pads will be constructed at the same time as the access roads and will be adjacent to each turbine location, within the construction area. The general crane pad area will be approximately 30 m x 45 m. Generally, the process for crane pad construction will be the same as that for access roads; surface material will be stripped and stockpiled (topsoil separate from subsoil) and a gravel or stone base applied. The excavated soil will be re-used on site as feasible. Once the turbine erection is complete, the gravel area around each turbine and the crane pads will be kept, while the remaining construction area will be rehabilitated to pre-existing conditions. Perimeter surface hydrology will be maintained during crane pad construction.

A heavy-lift crawler crane will be used to assemble the turbines. Crane laydown areas are temporary platforms for the helper cranes and will be put in place at the same time as the access roads. The movement of the crane between turbine sites, termed 'crane paths' will take place along access roads and municipal roads where possible, and the crane will be in some places broken down and transported to other turbine sites for re-assembly.

Access Roads

Approximately 16.7 km of new access roads will be required to support construction and transportation vehicles to turbine and transformer station sites, and for use periodically during the operation phase of the Project for ongoing turbine maintenance. The gravel access roads will be approximately 5 m wide (5.5 m at a turning radius) with a 10 m wide staging area (15 m total), and include 30 m wide access road entrances off municipal roads (with a 15 m wide staging area). Staging areas will be temporary and will be restored to pre-existing conditions at the end of the construction phase. No blasting is anticipated for the excavation of the access roads. All access roads have been sited in consultation with the landowner to reduce potential impacts to drainage systems and, where applicable, farm operations and agricultural lands. Where access roads occur within non-agricultural lands, they were sited outside of wetland features, and were setback to wetlands to the extent possible.

Collector Lines

Where feasible, underground collector lines have been incorporated into access roads. A trench is ploughed and reel trucks dispense the cable at a depth of approximately 1.0 m. The cables will be bedded in sand and the trench will be backfilled with the excavated material. Fibre optic communication lines would run with the collector lines in the same trench. No blasting is anticipated for the installation of the underground collector lines.

Roadside collector lines will be sited within the municipal road allowance. Lines will either be overhead (entailing either replacing existing wood poles or installing new wood poles and stringing the associated line) or underground (entailing trenching or direct drilling of the line). Final details of the line requirements will be developed at the detailed design stage in consultation with the County. With the exception of a few locations where the collector line is restricted to the road bed (to avoid wetland feature we3 where the wetland boundary extends to the road edge) the entire span of the municipal road allowance has been included within the assessment of temporary land use, though this entire area will not be used for installation of the line.

6.3 Land Use of Project Location

The Project Location and the associated 120 m Zone of Investigation consisted of a mix of naturalized habitat and actively cultivated cropland (hay, soybean, and grains). The majority of the croplands occurred north of Royal Road, while south of Royal Road developing naturalized communities were common. These communities frequently consisted of treed alvar, coniferous forest, and cultural woodland, with fewer occurrences of deciduous forest and deciduous swamp.

Nine of the twenty-nine turbines are sited within lands currently managed for agriculture. Of the twenty turbines located in natural habitats; two are sited within cultural meadows, thirteen are in woodland habitat, four are in habitat classified as both woodland and alvar (i.e. treed alvar vegetation communities) and one is in shrub alvar habitat.

Total amount of natural vegetation to be removed for the duration of project operation (i.e. long term removal areas) is 15.0 ha. An additional 40.5 ha of vegetation removal or disturbance is required during the construction of the Project. Long-term removal areas include infrastructure that will remain in place for the entire project duration, including turbine bases and access roads. The evaluation of the total amount of vegetation to be impacted during construction includes consideration of the entire municipal road allowance (on both sides of the road) for roadside collector lines, and considers the potential for either overhead or underground collector lines. Detailed design undertaken in consultation with the County will determine on which side of the road allowance the collector lines will be located, and the construction method (overhead or underground). Therefore the assumption of disturbance of the entire road allowance is considered conservative in terms of area and magnitude of impact. The evaluation of total

amount of vegetation to be impacted also includes habitat that would be removed for both T17 and its alternate location (T17A), though only one location will be built.

Vegetation to be removed or disturbed for the project consists primarily of coniferous woodland and treed alvar. Details on habitat removal by vegetation community type is provided in Table 6.2, Appendix B. Details on habitat to be removed by natural feature type is provided in Table 6.3, Appendix B.

6.4 EIS Overview

Significant natural features found in and within 120 m of the Project Location are shown on Figures 9.0- 9.5, Appendix A.

Based on the evaluation of significance, the following natural features have been identified as significant natural features in or within 120 m of the White Pines Project Location, for which an environmental impact study is required:

- Wetlands (17 wetlands; one PSW, sixteen considered significant for the purposes of this report);
- Woodlands (9 woodland features; wo1, wo2, wo3, wo4, wo5, wo6, wo7, wo8, wo11);
- Valleyland (one; Black Creek Valleyland);
- Wildlife habitat- seasonal concentration areas
    - landbird migratory stopover areas (2 features: mlsa1 and mlsa2)
- Wildlife habitat- rare or specialized habitats
    - alvar habitat (20 features: al1- al20)
    - amphibian breeding areas (4 features: ah1, ah4, ah12 and ah13)
- Wildlife habitat- species of conservation concern
    - Declining shrub/successional breeding birds (7 features: ssbb1, ssbb2, ssbb3, ssbb4, ssbb5, ssbb6 and ssbb7); and
- Earth Science ANSI (one; Milford Black Creek Valley Provincially Significant Earth Science ANSI).

The following sections provide a detailed description of the potential negative environmental effects of the White Pines Wind 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)). Distances for any project component within 120 m of a significant natural feature are provided (50 m for the Earth Science ANSI).

The Natural Heritage Reference Manual (2010), the Significant Wildlife Habitat Technical Guide (MNR, 2000), the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2011a) and the SWHTG Decision Support System (SWHTGDSS) in addition to relevant scientific literature and knowledge were used to assist in the evaluation of impacts and mitigation measures.

6.4.1 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.

6.4.1.1 Vegetation Removal

Natural features where habitat will be removed include woodlands and alvar habitat. 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 the extent practical, tree and/or brush clearing will be completed prior to or after the core nesting season for migratory birds (May 1 to July 31). 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 will range 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.

- Prior to the start of construction activity, the topsoil/seedbank will be stripped and preserved; material will be reapplied in suitable rehabilitation areas post construction.

- 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 6E or the local area.

- Additional mitigation for the removal of natural habitat is provided in Section 6.5 with mitigation measures specific to the removal of woodland and alvar features found in Sections 6.7 and 6.10.

6.4.1.2 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, 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. In addition, the Study Area is underlain by limestone bedrock which is covered by a shallow layer of soil. As such, the risk of erosion and resulting sedimentation within downstream natural features is limited, although not absent. 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 White Pines Wind Project components:

- Sediment control measures, which may 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, woodland and alvar community edges located within 30 m of construction areas (including staging areas and 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 are re-stabilized with vegetation;

- Where the installation of an equalizing culvert is proposed (see Figure 10.0), appropriate erosion control measures (i.e. rip rap, strawbales, seeding) will be installed at the ends of each culvert to prevent erosion; and

- Where culverts are proposed within 30 m of a natural feature(see Figure 10.0), 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.

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.

6.4.1.3 Dewatering

Site specific geotechnical investigations to be completed prior to construction activities will provide further details related to geologic conditions. Dewatering requirements will be re-assessed as part of the geotechnical investigations.

If groundwater is encountered during excavations, good construction practices will be used, such as minimizing the length of time that the excavation is open and monitoring seepage into the excavation. Should pumping be required to dewater excavated areas, water will be directed into the nearest drain or spread across the buildable area and appropriate energy dissipation techniques will be used to reduce the potential for erosion and scouring. Discharge piping will be free of leaks and will be properly anchored to prevent bouncing and snaking during surging. The rate of discharge will be monitored to ensure no erosion or flooding occurs. If energy dissipation measures are found to be inadequate, the rate of dewatering will be reduced or ceased until satisfactory mitigation measures are in place.

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 significant 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 and/or reseeded with native species as appropriate as soon as feasible. All seeding and replanting will use species native to Ecoregion 6E 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 White Pines Construction Plan Report (separate cover).

6.5 Natural Areas Management Strategy

Total amount of natural vegetation to be removed for the duration of project operation is 15.0 ha with an additional 40.5 ha of temporary vegetation removal or disturbance required for construction of the Project.

Given the complexity of vegetation community types, the anthropogenic influence on the development of the natural heritage features, and the overlap of the delineation of natural features found within the Project Location, habitat to be removed is often classified under more than one natural feature type (i.e. woodland is also alvar habitat which is also significant wildlife habitat).

In order to mitigate for habitat lost temporarily for construction of the Project as well as habitat loss resulting from the installation of long-term infrastructure (i.e. turbine foundations and access roads) a Natural Areas Management Strategy will be developed for lands within the Project Location and 120 m Zone of Investigation. The strategy will be designed to restore as well as enhance and preserve the natural heritage qualities of the natural habitats currently found within the Project Location and Zone of Investigation, and will include consideration of all natural areas, such as woodlands, wetlands and alvar habitats. Restoration and enhancement efforts will include efforts to promote native biodiversity throughout the study area, and may include restoration of alvar habitats, woodland and/or meadow communities as appropriate. Using this approach, mitigation for all terrestrial heritage features and functions including woodlands and alvars will be coordinated to create healthy, self-sustaining ecosystems.

The Natural Areas Management Strategy will include the following aspects:

- A Replanting and Restoration Plan will be developed for the Project. This plan will ensure that all disturbed areas of the construction site will be restored to preconstruction grades as soon as conditions allow. Temporary construction areas will be treated with

preserved topsoil/seedbanks and allowed to regenerate. A cover crop will be applied as determined by a qualified professional to prevent establishment of undesirable non-native species while the native seedbank germinates. Areas will be seeded with suitable native seed from local sources to the extent possible. Cultural communities will be managed to support alvar flora where appropriate, by seeding or transplanting locally available sources of native alvar species, and selectively thinning canopy cover. Plant material may be salvaged from areas where long-term infrastructure is proposed and floristic composition is suitable.

- An Invasive Species Management Plan will be developed for the Project with the goal of managing spread of the invasive species in areas of construction related disturbance. This Plan will incorporate removal of controllable occurrences of problematic species, such as scots pine, silver poplar, multiflora rose, common lilac and young populations of swallow-wort. Invasive species will be removed mechanically or by other appropriate means, under the direction of a qualified professional. Some species such as common buckthorn and Tartarian honeysuckle are well established on the landscape and eradication may be an unrealistic objective. The Invasive Species Management Plan will include a site assessment phase to establish achievable targets for invasive species management. Areas within 120 m of project components will be priority management areas.

- A Vegetation Monitoring Plan will be developed for the project to monitor the success of the Replanting and Restoration Plan and the Invasive Species Management Plan. The monitoring program will track the success of restoration and invasive species management efforts and provide adaptive management contingencies where targets are not met. The program will continue for a full growing season post management, or until no additional effort is required to achieve management objectives.

- The Plans will be developed in consultation with MNR.

- Management efforts will be coordinated with other interest groups willing to partner that have specific knowledge of alvar habitat management and the local natural heritage of the area.

- Records of the restoration and invasive species control work will be kept so that successes or failures can be communicated to interested groups to contribute to the management of alvar and woodland habitats in Ontario.

An assessment of the potential impacts and recommended mitigation measures specific to each natural feature is provided below.

6.6 Wetlands

No wetlands occurred in the Project Location.

Seventeen wetland features were identified as occurring within 120 m of the Project Location. Wetland features include the South Bay Coastal PSW (feature we3), unevaluated wetlands (features we6, we8, we9, we10, we11, we13, we16 and we17), and additional wetlands identified by Stantec during site investigations (features we1, we2, we4, we5, we7, we12, we14, and we15).

The South Bay Coastal Wetland is an evaluated provincially significant wetland. All other wetlands occurring within 120 m of the Project components are considered significant for the purposes of this report (refer to the Evaluation of Significance; Section 5.3.1), and require an EIS to identify and assess potential impacts and recommend appropriate mitigation measures and follow-up monitoring. These wetlands are shown in Figures 4.0-4.5, Appendix A.

Project components found within 120 m of each wetland feature are detailed below.

Feature Number	Project Component(s) located in Natural Features	Total Amount of Habitat Removal Required	Project Component(s) located within 120 m (approximate closest point in parenthesis)
we1	None	None	• T29 (turbine base: 55 m; construction area: 33 m) • Access road (21 m) • Collector lines (21 m)
we2	None	None	• T26 (construction area: 100 m; turbine base >120 m) • Access road (45m) • Collector line (45m)
we3	None	None	• T23 (turbine base: 52 m; construction area: 31m) • T25 (turbine base: 44 m; construction area:24m) • Access road (1 m) • Collector line (>1 m; along existing road)
we4	None	None	• T24 (turbine base: 60 m; construction area: 20 m), • Access road (32 m) • Collector lines (32 m)
we5	None	None	• T22 (construction area: 105 m; turbine base >120m), • Access road (14 m) • Collector line (14 m)
we6	None	None	• Access road (82 m) • Collector line (82 m)
we7	None	None	• Substation (114 m)
we8	None	None	• Access road (50 m)

Feature Number	Project Component(s) located in Natural Features	Total Amount of Habitat Removal Required	Project Component(s) located within 120 m (approximate closest point in parenthesis)
			• Collector line (50 m)
we9	None	None	• Collector line buildable area along existing road, in municipal road allowance adjacent to feature (>1 m). Alternately, line may be placed on opposite side of road from feature.
we10	None	None	• T17 (turbine base: 37 m; construction area:14 m) • T17 alternate (turbine base: 39 m; construction area: 9.5 m) • T14 (turbine base: 46 m; construction area: 23 m) • T15 (construction area: 92 m; turbine base >120 m) • Access road (5 m) • Collector line (5 m)
we11	None	None	• T13 (turbine base: 115 m; construction area:52 m) • Access road (9 m) • Collector line (72 m)
we12	None	None	• Access road (13 m) • Collector line (13 m)
we13	None	None	• T05 (turbine base: 45 m; construction area:28 m) • T06 (turbine base: 110 m; construction area: 37 m) • Access road (28 m) • Collector line buildable area along existing road, in municipal road allowance adjacent to feature (>1 m)
we14	None	None	• Collector line buildable area along existing road, in municipal road allowance adjacent to feature (>1 m). Alternately, line may be placed on opposite side of road from feature.
we15	None	None	• T05 (turbine base: 86 m; construction area:71 m) • Access road (81 m) • Collector line (97 m)
we16	None	None	• Collector line buildable area along existing road, in municipal road allowance adjacent to feature (>1 m). Alternately, line may be placed on opposite side of road from feature.
we17	None	None	• Collector line buildable area along existing road, in municipal road allowance adjacent to feature (>1 m)

*the distance to turbine base as provided is measured to the outer extent of the turbine foundation; an 18 m diameter extending from the turbine tower.

6.6.1 Potential Effects

All proposed Project components (turbines, access roads, collector lines and substation locations) were located outside of wetland boundaries as identified and confirmed through the site investigation program. Some project components (collector lines to be sited in municipal road allowances along existing roads) were located within 1 m of wetland features. This distance represents project components that were located where existing roads cross wetland features; otherwise Project components are generally separated by greater than 20 m from wetland features. Exceptions include features we3, we5, we10 and we12, where access roads and collector lines are 1 m, 14 m, 5 m and 13 m from wetlands at the closest point, respectively. These data are summarized in the table above for each wetland feature.

Prior to final siting of the Project, wetlands were identified applying a very conservative approach (see Section 4.1.2). This information was used to assist in the final siting of Project components; with substantial effort allocated to the design of the final layout to ensure Project components were sited outside of conservatively identified wetland boundaries and separation distances were maximized to the extent possible as an impact avoidance strategy.

As a result, there will be no direct loss of wetland habitat or function related to the Project. Indirect impacts resulting from construction activities, such as dust generation, sedimentation, and erosion are expected to be short term, temporary in duration and controllable through the use of standard site control measures. Other potential indirect effects are discussed below.

Potential impacts specific to each wetland feature are provided in Table 6.4, Appendix B.

Wetland adjacent to Substation.

The substation is the only Project component sited within 120 m of wetland we7.Given the substation is a relatively small gravel pad (70 x 70 m), its installation does not require the removal of any native vegetation and it has been setback more than 100 m from the wetland feature, no appreciable changes to the current hydrological processes are anticipated.

Wetlands adjacent to collector lines

A collector line system is the only Project component sited within 120 m of wetland features we9, we14, we16 and we17. No components of the Project are located within the wetland boundaries. Wetland features we3, we10 and we13 also contain segments of the wetland that occur adjacent to roadside collector lines.

All construction of the collector line will occur outside of wetland boundaries. At select locations where Helmer Road and Babylon Road bisect wetland we3, due to the proximity of wetland vegetation to the road edge (within the municipal road allowance) the collector line placement will be restricted to the road bed. These locations are illustrated on Figure 10.0.

The remaining placement of roadside collector lines within the existing municipal road allowance will occur more than 1 m from wetland feature boundaries. All construction activities will be conducted from vehicles parked in the right-of-way. Construction activities during the installation of the transmission line are anticipated to be low impact and short term in duration.

The type of construction proposed involves works having little or minimal impact to pervious areas and precludes the potential for effects associated with changes in water influence (i.e. surface and ground water changes).

The wetland units are located adjacent to county roads and currently experience impacts from current day to day use and maintenance of the roadway. During operation there may be occasional system maintenance to the collector line, but regular impacts from the current day to day use of the road system and maintenance activities associated with the road and existing transmission lines (where they occur) are expected to have higher impacts.

Wetlands within 120m of turbines/access roads

Wetland features we2, we6, we8 and we 12 were found within 120 m of an access road. Wetland features we1, we3, we5, we10, we11, we13 and we15 were found within 120m of one or more turbine bases as well as access roads.

During construction, there will be increased vehicular traffic and the potential for accidental spills. These potential impacts will be avoided where possible and mitigated via implementation of a sediment and erosion protection plan, including the identification of specific locations for material stock-piling and maintenance activities to isolate any spills from the wetland.

The proposed development plan may slightly alter surface water inputs to the wetland. New access roads and infrastructure can alter surface flow, and the small increase in hard surface area could result in increased run-off quantities during precipitation events. The percent area converted to hard surfaces is negligible and no effect to the water balance is anticipated. In some instances, new access roads cross drainage features in the upstream catchment of wetlands. Construction of these crossings may disrupt the quality of surface water input to wetlands. Consideration of these crossings is also required to maintain existing flow conditions through the duration of the Project.

Vegetation clearing and construction disturbance in close proximity to wetland features may create new edges in adjacent communities. Such edges may cause changes in vegetation composition as result of increased exposure to sun and wind, particularly in closed canopy situations, and create opportunities for the introduction and spread of invasive species in nearby wetland units. The effect is somewhat minimized by habitat preferences of invasive species; i.e., new edges will be created in upland communities only.

6.6.2 Mitigation Measures

Avoidance was the main strategy used to minimize impacts to wetland features within 120 m of the Project Location. A very conservative approach was taken to identifying wetlands (see Section 4.1.2) and all components of the Project were sited outside the identified wetland feature boundaries. As such, protection of wetlands will be accomplished by applying standard best management and mitigation strategies to construction and operational activities.

The following mitigation measures will be implemented:

- No development will be permitted within the wetland boundary.
- 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;
- Where possible, and as appropriate, access roads will be constructed at or near existing grade to maintain surface flow contributions to wetlands.
- Where new access roads cross existing drainage features, design will include culverts or other appropriate structures of sufficient size to accommodate flow. Locations of culverts are shown on Figure 10.0, Appendix A.
- Mitigation measures for vegetation removal will be implemented as outlined in Section 6.4.1.1
- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2
- Mitigation measures for dewatering will be implemented as outlined in Section 6.4.1.3.
- All refuelling activities will occur well away from 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.

Mitigation measures to be applied to each wetland feature are provided in Table 6.5, Appendix B.

6.6.3 Net Effects

A combination of feature avoidance and implementation of the mitigation measures described above ensure anticipated adverse effects to wetlands are minimized or avoided during construction and operation of the Project. No adverse net effects to wetland features are anticipated as a result of the Project.

6.7 Woodlands

Nine of the woodlands found in the Project Location and Zone of Investigation met at least one of the evaluation of significance criteria and are considered significant woodland (woodland features wo1, wo2, wo3, wo4, wo5, wo6, wo7, wo8, wo11) and require an EIS to identify and assess potential impacts and recommend appropriate mitigation measures and follow-up monitoring.

Significant woodlands within 120 m of the Project Location are shown on Figures 9.0-9.5 (Appendix A) and indicated in Table 5.4 (Appendix B).

A total of 49.4 ha of woodland habitat will be removed or disturbed. In the short term 35.2 ha will be removed or disturbed for construction of the Project, and in the long term 14.2 ha of woodland habitat will be removed for the duration of the project.

Project components found in and within 120 m of each woodland feature are detailed below.

Feature Number	Project Component(s) located in Natural Features	Feature Size (ha)	Total Amount of Habitat Removal Required Short Term (ha)	Total Amount of Habitat Removal Required Long Term (ha)	Project Component(s) located within 120 m (approximate closest point in parenthesis)
wo1	• T11-14, T16-20, T21, T22-24, T26, T28, T29 • 9.3 km of access road • Collector Lines	2784	30.5	12.3	• Substation (8m) • T07 (turbine base: 42m) • T15 (turbine base: 41m) • T21 (turbine base: 41m) • T27 (turbine base: 45m) • Collector Lines (adjacent) • Access Roads (adjacent)
wo2	• Collector lines located in municipal road allowance	13	0.6	0	• Access road (north side of Royal Road)
wo3	• T05 (construction area only), T09 and T10 • 1.1 km of access road • Collector Lines	232	3.2	1.3	• T05 (turbine base: 10 m) • T06 (turbine base: 57m) • T08 (turbine base: 75 m) • Collector Lines (adjacent) • Access Roads (adjacent)
wo4	• T03 • 140 m of access road • Collector lines	4.6	0.4	0.3	• Access Road (adjacent) • Collector Line (adjacent)
wo5	• 333 m of access road	208	0.4	0.3	• T01 (turbine base: 119m)

Feature Number	Project Component(s) located in Natural Features	Feature Size (ha)	Total Amount of Habitat Removal Required Short Term (ha)	Total Amount of Habitat Removal Required Long Term (ha)	Project Component(s) located within 120 m (approximate closest point in parenthesis)
	• collector lines				• T02 (turbine base: 40 m) • T04 (turbine base: 42 m) • Access road (adjacent) • Collector line (adjacent)
wo6	• Collector lines located in municipal road allowance. Alternately, line may be placed on opposite side of road from feature.	19	0.08	0	• Collector line buildable area along existing road, in municipal road allowance adjacent to feature (>1 m). Alternately, line may be placed on opposite side of road from feature.
wo7	• None	13	0	0	• Access road and collector lines (97 m)
wo8	• None	32	0	0	• T10 (111 m from blade tips; turbine base >120 m) • Access Road (68 m) • Collector Line (68m)
wo11	• None	4.7	0	0	• Collector line buildable area along existing road, in municipal road allowance adjacent to feature (>1 m). Alternately, line may be placed on opposite side of road from feature.

*the distance to turbine base as provided is measured to the outer extent of the turbine foundation; an 18 m diameter extending from the turbine tower.

6.7.1 Potential Impacts

6.7.1.1 Woodland Feature 1

Woodland feature 1 was a 2784 ha feature that was comprised of a mosaic of different vegetation community types (see Figures 5.0- 5.4, Appendix A). It occurred adjacent to the lakeshore and stretched north to a distance of 3 km from the shore of Lake Ontario. The woodland was bisected by numerous roads (both County roads and private landowner roads) and the resulting patchiness of community types led to the feature being generally comprised of mixed canopy cover, ranging from an open canopy (in treed alvar, cultural woodland communities) to closed cover (primarily coniferous forest communities). The woodland supported significant wildlife habitat (migratory landbirds and amphibian breeding habitat). It was considered significant based on three of the seven criteria; its size, proximity to other significant woodlands and presence of woodland interior habitat (Table 5.4, Appendix B).

Approximately 42.8 ha (1.5%) of this feature will be removed for construction of the Project with 12.3 ha (0.4% of woodland wo1) of this amount removed for the duration of project operation. Habitat to be removed consists primarily of red cedar coniferous forest and red cedar treed alvar.

Clearing of trees will be required to facilitate the installation of 9.3 km of access road, collector lines (e.g., along road corridors) and fifteen turbine locations. Siting constraints such as noise setbacks, access restrictions, production efficiency, proximity to other turbines and lot lines required placement of the turbine locations in the woodland feature.

Clearing activities during construction will result in the removal of vascular plants and portions of plant communities. All plant species observed within woodland wo1 were considered common in Ontario. The treed alvar communities are considered rare communities of vegetation; an assessment of the impacts to alvar communities is provided in Section 6.10. The woodland also supported significant wildlife habitat in the form of a migratory landbird stopover area and amphibian breeding habitat. Potential impacts and mitigation measures related to these functions are provided in Sections 6.9 and 6.11.

Alteration or removal of vegetation for construction of Project components 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. Impacts such as soil erosion and compaction during construction are expected to be minimal given the shallow soil layer and bedrock present.

Vegetation communities dominated by red cedar comprised the majority of woodland feature wo1. Within Prince Edward County white-tailed deer use red cedar for food and cover (MNR personal communication, May 2012). Sensory disturbance of wildlife, including white-tailed deer, using the woodland 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 project. Given the small spatial scale of the woodland habitat that would be removed for the duration of the Project (i.e. <0.4%), it is not expected to impact use of the woodland by deer or result in a limitation to the available food or cover resources.

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 is the potential for spills and contamination to the woodland. Storage of fuel, and activities with the potential to cause contamination will occur in properly protected and sealed areas. Improper disposal of wastes (fluids, containers, cleaning materials) could also have a negative impact on the feature.

6.7.1.2 Woodland Feature 2

Woodland feature wo2 was a 13 ha feature comprised of an ash deciduous forest and surrounding a residence and a cultural woodland (see Figures 5.0 and 5.5). It was considered significant based on one of the seven criteria; its size (Table 5.4, Appendix B).

A collector line will be placed within the municipal road allowance. The evaluation of the total amount of vegetation to be impacted during construction includes consideration of the entire municipal road allowance (on both sides of the road) for roadside collector lines, and considers the potential for either overhead or underground collector lines. Approximately 0.6 ha of woodland feature wo2 overlaps with the municipal road allowance and has been included here as habitat with the potential to be impacted during construction of the project (i.e. short-term duration). Detailed design undertaken in consultation with the County will determine which side of the road allowance the collector lines will be located, and the construction method (overhead or underground). Therefore this method of evaluation is considered conservative in terms of area and magnitude of impact.

During the detailed design stage, the final collector line location will be sited around feature wo2 to the extent possible. Should removal or disturbance be required to the 0.6 ha of woodland feature wo2 that is found within the municipal road allowance, it would be restricted to the edge of the feature. No rare vegetation communities or species would be removed for installation of the collector line.

Indirect impacts to the woodland 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 (as described in Section 6.7.2 below). During construction, there will be increased traffic and the potential for accidental spills.

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.

6.7.1.3 Woodland Feature 3

Woodland feature wo3 was a 232 ha linear feature originating east of County Road 10 and extending west to Lighthall Road. It primarily follows a watercourse. The feature is comprised of a mosaic of vegetation community types (coniferous woodland, treed alvar, cultural woodland, swamp and deciduous woodland) and was bisected by two north-south roads. It was considered significant based on three of the seven criteria; its size, provision of interior and

linkages (i.e. is located between two other significant features each of which is within 120 m) (Table 5.4, Appendix B).

Approximately 4.5 ha (1.9%) of this feature would be removed or disturbed for construction of the Project with 1.3 ha (0.6% of woodland feature wo3) of this amount removed for the duration of the Project's operation. Habitat to be removed consists primarily of red cedar coniferous forest and a red cedar coniferous forest/red cedar treed alvar complex community.

Clearing of trees would be required to facilitate the installation of 1.1 km of access road, collector lines (e.g., along road corridors) and two turbine locations. Siting constraints such as noise setbacks, access restrictions, production efficiency, proximity to other turbines and lot lines required placement of the turbine locations in the woodland feature.

Clearing activities during construction would result in the removal of vascular plants and portions of plant communities. All plant species observed within woodland wo3 are considered common in Ontario. The treed alvar community is considered a rare community of vegetation; an assessment of the impacts to alvar communities is provided in Section 6.10. The woodland also supports significant wildlife habitat in the form of a migratory landbird stopover area. Potential impacts and mitigation measures related to this function is provided in Section 6.9.

Alteration or removal of vegetation for construction of Project components 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.

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 is the potential for spills and contamination to the woodland. Storage of fuel, and activities with the potential to cause contamination should occur in properly protected and sealed areas. Improper disposal of wastes (fluids, containers, cleaning materials) could also have a negative impact on the feature.

6.7.1.4 Woodland Feature 4

Woodland feature wo4 was a relatively small (4.6 ha) isolated deciduous woodland. It was a sugar maple forest that was actively managed for logging and syrup operations.

It was considered significant based on two of the seven criteria; its size and dominance of a native natural species (sugar maple) (Table 5.4, Appendix B).

One turbine base (T03), its buildable area and 140 m of access road and collector line are sited within the woodland feature. A total of 0.7 ha (15%) of the feature would be removed for construction of the Project. Siting constraints such as noise setbacks, access restrictions,

production efficiency, proximity to other turbines and lot lines required placement of the turbine location in the woodland feature.

Clearing activities during construction would result in the removal of vascular plants and portions of plant communities. All plant species observed within woodland wo4 are considered common in Ontario. Habitat to be removed is restricted to the edges; no new edges would occur and no fragmentation of the existing feature would occur. However, total area of the woodland would be reduced to approximately 3.9 ha.

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 is the potential for spills and contamination to the woodland. Storage of fuel, and activities with the potential to cause contamination should occur in properly protected and sealed areas. Improper disposal of wastes (fluids, containers, cleaning materials) could also have a negative impact on the feature.

6.7.1.5 Woodland Feature 5

Woodland feature wo5 was a 208 ha linear feature that followed Black Creek. It was predominately a deciduous woodland with some areas of cultural plantation occurring within the 120m Zone of Investigation. Land use immediately surrounding the woodland feature was comprised of managed agricultural lands. It was considered significant based on five of the seven criteria; size, provision of interior habitat, proximity to other significant woodlands, water protection and dominance of a native natural species (sugar maple) (Table 5.4, Appendix B).

A portion of access road and collector line are sited within the westernmost extent of the woodland. In addition, three turbine bases occur within the 120 m Zone of Investigation (40 m at closest point).

Clearing activities during construction would result in the removal of vascular plants and portions of plant communities. All plant species observed within woodland wo5 were considered common in Ontario. Habitat to be removed is restricted to the westernmost edge of the feature. To the extent possible, the access road was sited along an existing road that is maintained by the landowner and used to access the agricultural fields found to the south of the feature. A total of 0.7 ha (0.3%) of the feature would be removed or disturbed for construction of the Project with 0.3 ha (0.1%) of this amount removed for the project's operation. Habitat to be removed consists of white pine plantation/cultural meadow complex and a red cedar cultural woodland.

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 is the potential for spills and contamination to the woodland. Storage of fuel, and activities with the potential to cause contamination should occur in properly protected and sealed areas. Improper disposal of wastes (fluids, containers, cleaning materials) could also have a negative impact on the feature.

6.7.1.6 Woodland Feature 6

Woodland feature wo6 was a 19 ha isolated woodland comprised of cultural woodland and deciduous swamp communities. It was considered significant based on two of the seven criteria; its size and the provision of interior habitat (Table 5.4, Appendix B).

A collector line will be placed within the municipal road allowance. The evaluation of the total amount of vegetation to be impacted during construction includes consideration of the entire municipal road allowance (on both sides of the road) for roadside collector lines, and considers the potential for either overhead or underground collector lines. Approximately 0.08 ha of the red cedar-green ash cultural woodland community within woodland feature wo6 overlaps with the municipal road allowance and has been included here as habitat with the potential to be impacted during construction of the project (i.e. short-term duration). Detailed design undertaken in consultation with the County will determine which side of the road allowance the collector lines will be located, and the construction method (overhead or underground). Therefore this method of evaluation is considered conservative in terms of area and magnitude of impact.

During the detailed design stage, the final collector line location will be sited around feature wo6 to the extent possible. Should removal or disturbance be required to the 0.08 ha of cultural woodland community that is found within the municipal road allowance, it would be restricted to the edge of the feature. No rare vegetation communities or species would be removed for installation of the collector line.

During operation there may be occasional system maintenance, but regular impacts from day to day use of the road system are expected to have higher impacts.

6.7.1.7 Woodland Feature 7

Woodland feature wo7 was a 13 ha feature comprised of sugar maple deciduous forest (see Figures 5.0 and 5.5). Land use immediately surrounding the woodland feature was comprised of intensively managed agricultural lands. It was considered significant based on two of the seven criteria; its size and the provision of interior habitat (Table 5.4, Appendix B).

No components of the Project are located in the feature. An access roads and collector line are the only project components located within 120 m of woodland feature wo7 and occurred approximately 97 m from the feature.

All activities required for the Project would be located outside of the woodland boundaries. No direct impact to the function, form or habitat is expected during construction or operation of the Project.

Construction activities are proposed 97 m at their closest point to feature wo7. This distance is considered sufficient to attenuate potential negative effects. Due to the rural and agricultural

land uses currently occurring directly adjacent to the feature, it is not considered highly sensitive to temporary disturbances.

Similarly, during operation there may be occasional use of the access roads, but impacts from regular agricultural practises occurring adjacent to the feature are expected to have higher impact. During operation, the setback of 97 m from the feature to the access road is considered sufficient to attenuate the potential for spills and contamination to the woodland.

6.7.1.8 Woodland Feature 8

Woodland wo8 was a 32 ha linear woodland feature comprised of an ash lowland deciduous woodland. Land use immediately surrounding the woodland feature was comprised of managed agricultural lands. It was considered significant based on three of the seven criteria; its size and the provision of interior habitat and water protection (Table 5.4, Appendix B).

Feature wo8 is within 120 m of the blade tips of T10 (111 m away) and the associated access road (68 m away). The base of T10 is sited more than 120 m from feature wo8. No Project components are within this woodland.

All activities required for the Project would be located outside of the woodland boundaries. No direct impact to the function, form or habitat is expected during construction or operation of the Project.

Construction activities would occur more than 60 m at their closest point to woodland feature wo8. Similar to feature wo7, this distance is considered sufficient to attenuate potential negative effects. During operation, the setback of 68 m from the feature to the access road is considered sufficient to attenuate the potential for spills and contamination to the woodland.

6.7.1.9 Woodland Feature 11

Woodland feature wo11 was a small (4.7 ha) isolated green ash cultural woodland located adjacent to Royal Road. It was considered significant based on one of the seven criteria; its size (Table 5.4, Appendix B).

For this woodland (wo11) the collector line system is the only Project component found within the 120 m Zone of Investigation. No Project components occurred in the woodland. The collector system would be installed within the municipal road allowance either adjacent to woodland wo11 or on the opposite side of the road. Construction activities include upgrading the line, where existing transmission lines currently exist, or installing new lines.

All activities required for the Project would be located outside of the woodland boundaries. No direct impact to the function, form or habitat is expected during construction or operation of the Project.

Overall, construction activities are to be low impact and very short term in duration. The collector line (a trenched line if installed underground or poles if aboveground) would be installed at a shallow depth and the total area impacted would be small, therefore there are no anticipated changes to the surface water or groundwater contributions to the features. Construction activities adjacent to each feature are expected to be short term in duration and spatially small in scale, and so minimal dust would be generated.

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.

6.7.2 Mitigation measures

Mitigation measures by feature are provided in Table 6.6, Appendix B. The following mitigation measures will be implemented for significant woodland within the White Pines Study Area:

- Mitigation measures for vegetation removal will be implemented as outlined in Section 6.4.1.1
- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2
- Mitigation measures for dewatering will be implemented as outlined in Section 6.4.1.3.
- All refuelling activities will occur well away from the woodlands. 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.
- A Natural Areas Management Strategy will be created and implemented for the Project as described in Section 6.5. The strategy will include:
    - A Replanting and Restoration Plan. All disturbed areas of the construction site will be restored to preconstruction grades as soon as conditions allow.
    - An Invasive Species Management Plan will be created for the Project in consultation with MNR with the goal of managing spread of the invasive species in areas of construction related disturbance.
    - A Vegetation Monitoring Plan will be created for the project to monitor the success of the Replanting Plan and the Invasive Species Management Plan.

6.7.3 Net Effects

Potential impacts and mitigation measures for each woodland feature are provided in Table 6.6, Appendix B.

Indirect effects can be controlled through the use of standard mitigation measures as discussed above. The total vegetation removal required would remove a small proportion of the woodland habitat evaluated as significant for the purposes of this Project that occurred within the landscape. Approximately 35.2 ha (1.1%) of significant woodland would be removed or disturbed for construction of the Project with an additional 14.2 ha (0.5%) removed for the Project's operation. More than 99% of the current woodland cover would be maintained within the landscape. The creation of a Replanting and Restoration plan, an Invasive Species Plan and an associated Monitoring Plan will enhance and preserve the natural heritage qualities of the woodland habitats currently found within the Project Location and Zone of Investigation.

6.8 Valleylands

One valleyland, assessed as significant is located within 120 m of the White Pines Project Location (Figure 9.5, Appendix A). No project components are located in identified significant valleyland boundaries.

The following components are within 120 m of the Black Creek Valleyland:

Feature Number	Project Component(s) located in Natural Features	Project Component(s) located within 120 m (approximate closest point in parenthesis)
Black Creek Valleyland	• None	• T01 (blade tips: 109 m; turbine construction area:117 m; turbine base: >120m) • Access road and collector line (72 m at closest point)

6.8.1 Potential Effects

Potential effects to valleylands can be ecological or geological (related to the hazard component). No disruption or fragmentation of the valleyland is required for the Project. Potential effects to other identified significant natural features (i.e. woodlands) found within the valleyland system are discussed in Section 6.7. Potential effects to the watercourses and fish habitat located within the valleyland are addressed in the Water Assessment and Water Body Report (Stantec, 2012a) that was prepared as part of the REA application package for the Project.

6.8.2 Mitigation Measures

Best management practices during construction are recommended to mitigate potential negative effects to natural vegetation associated with the valleyland. These include:

- General mitigation measures for sediment and erosion control as outlined in Section 6.4.1.2.

6.8.3 Net Effects

There will be no disruption to the functions of the significant valleyland found within 120 m of the Project Location.

6.9 Migratory Landbird Stopover and Staging Area

Two features were identified as significant wildlife habitat for a migratory landbird stopover and staging area; mlsa1 and mlsa2 (Figures 9.0-9.5, Appendix A).

Mlsa1 (woodland feature wo1) was a 2784 ha feature that was comprised of a mosaic of different vegetation community types. It occurred adjacent to the lakeshore and stretched north to a distance of 3 km from the shore of Lake Ontario.

Mlsa2 (woodland feature wo3) was a 232 ha woodland that is 3.8 km from the Lake Ontario shoreline at its closest point. It is a linear vegetated feature consisting primarily of deciduous woodland, deciduous swamp and coniferous woodland communities surrounded primarily by actively managed agricultural lands.

Project components located in and within 120 m of each feature are detailed below.

Feature Number	Project Component(s) located in Natural Features	Feature Size (ha)	Total Amount of Habitat Removal Required Short Term (ha)	Total Amount of Habitat Removal Required Long Term (ha)	Project Component(s) located within 120 m (approximate closest point in parenthesis)
Mlsa1	• T11-14, T16-20, T21, T22-24, T26, T28, T29 • 9.3 km of access road • Collector Lines	2784	30.5	12.3	• Substation (8m) • T07 (turbine base: 42m) • T15 (turbine base: 41) • T21 (turbine base: 41m) • T27 (turbine base: 45m) • Collector Lines (adjacent) • Access Roads (adjacent)
Mlsa2	• T05, T09 and T10 • 1.1 km of access road • Collector Lines	232	3.2	1.3	• T06 (turbine base: 57m) • T08 (turbine base: 75m) • Collector Lines (adjacent) • Access Roads (adjacent)

*the distance to turbine base as provided is measured to the outer extent of the turbine foundation; an 18 m diameter extending from the turbine tower.

6.9.1 Potential Effects

Potential effects to migratory landbirds may occur indirectly from disturbance or directly through mortality. Indirect effects such as destruction, fragmentation, and disturbance of habitat as a result of wind energy projects have been identified as larger threats than direct mortality (Kingsley and Whittam, 2007).

6.9.1.1 Direct Effects

During operation, direct mortality from collision with wind turbines is a potential effect. Each turbine that is installed has an impact by directly adding to mortality rates (Masden et al., 2010). From a conservation perspective, the critical issue is whether or not this source of mortality is sufficiently great to impact populations.

Various studies have been conducted throughout North America to document bird collisions at wind facilities and to determine why collisions may be occurring and the extent to which they occur. From a review of the available literature, it appears that most collisions are of nocturnal migratory songbirds (Kingsley and Whittam, 2007), at least partly because they are the most abundant species at wind energy facilities (National Academy of Sciences, 2007). In addition, most fatalities at operational facilities in Canada have been found from May through October, with the fall migration period (August to October) experiencing 61% of all fatalities (Environment Canada et al., 2011).

Landbirds typically migrate in broad fronts (Drewitt and Langston, 2008; Diehl et al., 2003; Ewert et al., 2006). Studies suggest that most passerines migrate at altitudes above the height wind turbines (Zimmerman, 1998) however when ascending or descending as they cross the lake, or when traveling in low cloud or fog conditions, birds may be at increased risk of collision with man-made structures.

The main factors identified as contributors to avian fatality at wind energy facilities are generally density of birds, topography and weather (Thomas et al., 2011). However, the risk of collision may be a complex interaction among variables.

Recent research examining the relationship between risk factors and recorded bird mortality did not find a relationship between birds per hour and bird collisions per turbine, indicating that bird use does not necessarily equate to high mortality rates (Ferrer et al., 2011). Rather, Ferrer et al. (2011) found that the probability of collisions depends on species behaviours and topographical factors. Individuals whose behaviour does not place it within the rotor swept zone are considered to be at lower risk of collisions with turbines (USFWS, 2012). Additionally, under many conditions, some birds have demonstrated the ability to detect and alter flight paths to avoid collision (EchoTrack Inc., 2005; Plissner et al., 2008; USFWS, 2012).

"Nearshore" turbines (defined as those within 250 m of the lakeshore) were shown to be responsible for a disproportionate amount of bird and bat mortality at the Erie Shores Wind Project, which is also located at a shoreline location in a raptor migration corridor (but in an agricultural landscape found along Lake Erie) (James, 2008). James estimated that bat mortality could be reduced by 50% and bird mortality by 80% at the Erie Shores Wind Project if turbines were not placed in the "nearshore" area. Research has also shown that migrants select forested areas in close proximity to water and may be particularly concentrated in riparian woodland located within 400 m of the lakeshore (Bonter et al., 2008; Ewert et al., 2006).

Mortality rates can be regional and site specific meaning that mortality rates from other regions are not necessarily predictive of rates that will occur at a proposed site. As a result, quantitative predictions of mortality rates cannot be made on a site-specific basis. However, to date, results from operational monitoring studies have shown relatively consistent results from site to site with little variation (Kerlinger et al., 2011). Mortality monitoring surveys at existing facilities contribute to the knowledge base about collision mortality and while they cannot be directly extrapolated, they can be used to characterize potential impacts from proposed facilities.

Mortality rates are available for several operating wind projects, though no operating facilities occurred within southern Prince Edward County at the time of writing. In addition, no operational facilities are known to occur that contain the comparable topography, habitat cover, geographic location and avian use factors that are found together at the White Pines site. Geographically, the Wolfe Island Wind Plant is the only operating project located within close proximity to the White Pines Project Location. While Wolfe Island does not contain the habitat types that are found within the south shore of Prince Edward County it is located along a shoreline and is within an Important Bird Area (though designated for different criteria than the Prince Edward County IBA).

Mortality rates at operational facilities in Ontario average approximately 2.5 birds/turbine/year (MNR, 2011c). The highest fatality rate to date in Ontario has been observed at the Wolfe Island facility; at 13.4 birds/turbine/year in 2009-2010 and 10.0 birds/turbine/year in 2010-2011 (Stantec 2010 and Stantec 2011b).This rate includes all species across all periods of the year and includes wintering and breeding birds in addition to migrating landbirds.

The Maple Ridge Wind Facility in New York was identified as an area where large numbers of nocturnal migrants pass over (Evans, 2009). While habitat within the landscape is comprised of woodland, grassland and agricultural communities, the site is located approximately 30 km from the Lake Ontario shoreline. Estimated bird mortality at the Maple Ridge Wind Facility has ranged from 3.1-9.48 birds/turbine/year from 2006- 2008 (Jain et al., 2007; Jain et al., 2008; Jain et al., 2009).

The mortality rates observed at operational facilities in Ontario are considered low, with no evidence of large scale fatality events or significant population impacts (Friesen, 2011). The few occurrences of multi-bird mortality events that have been recorded at wind facilities (in the

United States) were not caused by collision with turbines rather these have been attributed to steady burning lights at the facilities (Friesen, 2011).

Monitoring results to date from operational facilities indicate that wind turbines are not a major concern with respect to the sustainability of migratory bird populations in Ontario (Friesen, 2011; MNR 2011c) and are a small contributor to overall bird mortality when compared to other anthropogenic structures (Arnett et al., 2007; Kingsley and Whittam, 2007; National Academy of Sciences, 2007; Kerlinger et al., 2011).

Mortalities of migrating landbirds from the wind project are expected to be distributed among a variety of species, most of which were found to be abundant as documented in the NHA/EIS for the Project. As a group, songbirds are considered the most abundant group in the terrestrial ecosystem (NAS, 2007). Migratory passerines that were found to be the most common within the White Pines Wind Project Location were: Common Grackle, Blue Jay, American Robin, White-throated Sparrow, Black-capped Chickadee, Song Sparrow, American Crow and Field Sparrow. These species are among the most common and widespread species in Ontario and are considered to be able to respond relatively quickly to population fluctuations (Drewitt and Langston, 2008). Existing studies indicate that the number of individuals that collide with wind turbines has been low relative to the large number of individuals that have been recorded moving through landscapes, and as compared to regional or provincial populations.

Based on known bird mortality rates from operational wind projects, MNR has set a threshold for bird mortality (MNR, 2011c). If mortality levels are maintained below the threshold, the Project would not be considered to have significant impacts to populations of migratory landbirds. An Environmental Effects Monitoring Plan has been developed for the White Pines Wind Project. In the event that the threshold for bird mortality is exceeded, a contingency and adaptive management plan will be implemented to reduce bird mortality and ensure that the mortality rates are maintained below the threshold level.

6.9.1.2 Indirect Effects

Wind facilities are considered to have a relatively small operational footprint and consequently the direct loss of habitat is considered low (National Research Council, 2007). However, indirect effects as a result of habitat loss can potentially include shifts in species abundance, avoidance, and behavioural disruption.

Approximately 42.8 ha (1.5%) of feature mlsa 1 would be removed or disturbed for construction of the Project with 12.3 ha (0.4% of feature mlsa 1) of this amount removed for the duration of the Project's operation. Habitat to be removed consists primarily of red cedar coniferous forest and red cedar treed alvar.

Approximately 4.5 ha (1.9%) of feature mlsa 2 would be removed or disturbed for construction of the Project with 1.3 ha (0.6% of feature mlsa2) of this amount removed for the duration of

project operation. Habitat to be removed consists primarily of red cedar coniferous forest with some red cedar treed alvar.

Potential impacts and mitigation measures for the removal of the woodland and alvar habitats that comprise features mlsa1 and mlsa2 are provided in Section 6.7 and 6.10.

Potential impacts to migratory landbirds from the Project during construction include disturbance due to increased traffic, noise, or dust. The most adverse impacts associated with construction noise typically occur if critical life cycle activities are disrupted (i.e. nesting, mating) (NWCC, 2002). Because migrating landbirds in general are able to use a much wider range of habitat types during migration compared to the breeding season, it is expected that the effects of disturbance would be less significant during migration than during the breeding season.

Information regarding the effects on migrating passerines of disturbance and habitat fragmentation due to wind turbines is limited. A recent radar study examining characteristics of important stopover locations for migrating birds concluded that while migrants used fragments of forested habitat in close proximity to the shores of the Great Lakes for stopovers, the size of forest patches within the landscape was not identified as a significant factor distinguishing concentration areas from non-concentration areas (Bonter et al., 2008).

Given the small spatial scale of the woodland habitat within the regional landscape that would be impacted (i.e. <1%), it is not expected to impact use of the woodland by migratory landbirds or impact available food resources. Given the open canopy cover, complex mosaic nature of the woodland and the current gaps due to existing roads (county and private) the creation of additional narrow gaps in landscape and the associated impacts of gap creation are considered limited. Access roads will be 15 m (the access buildable area) for the construction of the project, reduced to 5 m for operation. Woodland areas are considered to be generally continuous even if intersected by gaps 20 m or less in width between crown edges (MNR 2010). The structural complexity of the existing woodland feature will be maintained.

Birds may move around the wind farm, or gain additional altitude and fly well above turbine height (SNH, 2009). The results of radar work conducted by EchoTrack to study night-time bird and bat activity during the 2004 autumn migration period at six wind facilities in Alberta showed many birds increased their flight height and slowed their flight speed when they approached the wind turbines (EchoTrack Inc., 2005). Since no such behaviour was observed at the control sites, the research suggests that it was the presence of the turbines that led to this behaviour. By increasing altitude and flying well above the turbine blades, birds avoided the wind turbines and effectively reduced the risk of collision (EchoTrack Inc., 2005).

This avoidance response may eventually contribute to an impact (i.e. reduced population size as a result of lower breeding success due to the expenditure of energy during migration than the bird would have otherwise) (Masden et al., 2010). The extent to which an avoidance is considered an impact depends on the species, size of wind project, spatial arrangement of the turbines, type of movements (i.e. local movements or annual migrations) and the incurred

energetic cost (Masden et al., 2009). Masden et al. 2010 concluded that the energetic cost expended to avoid a wind project was undetectable and insignificant compared with other factors such as strong or unfavourable winds.

The potential for turbines to act as a barrier to movement has also been identified as a potential impact. Reviews of available literature suggest the barrier effect has not been proven to significantly impact on the fitness of bird populations (Drewitt and Langston, 2006) however the effect of wind farms as barriers to migratory bird movement is not yet fully understood and has not been well studied (Telleria, 2009; Masden et al., 2009).

6.9.2 Mitigation Measures

Based on research indicating migrants may concentrate within riparian areas located within 400 m from shorelines (Bonter et al., 2008; Ewert et al., 2006) and information estimating bird mortality could be significantly reduced if turbines were not placed in the "nearshore" area (i.e within 250 m) (James, 2008), wpd opted to incorporate a minimum turbine setback of 400 m to the Lake Ontario shoreline during siting.

The following mitigation measures will be implemented:

- Turbine lighting must conform to Transport Canada standards. Lights with the shortest allowable flash durations and the longest allowable pause between flashes are preferred.
- To the extent possible, no steady burning lights/floodlights will be used at the facility.
- Mitigation measures for vegetation removal will be implemented as outlined in Section 6.4.1.1
- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2
- Mitigation measures for dewatering will be implemented as outlined in Section 6.4.1.3.
- A Replanting and Restoration Plan will be created for the Project as described in Section 6.5.
- A Vegetation Monitoring Plan will be developed for the project to monitor the success of the Replanting Plan and the Invasive Species Management Plan as described in Section 6.5.
- Post construction mortality monitoring for birds will be conducted twice weekly (3-4 day intervals) mortality monitoring at ten turbines from May 1 to October 31, and weekly monitoring for raptors during November, for a period of three years. Searcher efficiency

and scavenger trials will be conducted each year according to current guidance documents (as detailed in the Environmental Effects Monitoring Plan, White Pines Wind Project Design and Operations Report).

- Post-construction monitoring for disturbance will be conducted in mlsa1 and mlsa2 for a period of three years, using the same protocols as the pre-construction surveys.

- The Environmental Effects Monitoring Plan also identifies performance objectives to assess the effectiveness of the proposed mitigation measures and describes a response and contingency plan that will be implemented if performance objectives cannot be met.

- All refuelling activities will occur well away from mlsa1 and mlsa2. 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.

6.10 Alvar

Twenty alvar "features" were identified in and within 120 m of the Project Location, ranging in size from 0.5 (al7) – 584 ha (al4). Alvar ecosite communities documented for the study area represent alvar-like conditions, controlled largely by cultural influences. Regardless of origin and maintenance factors, MNR considers all alvar habitat (ALO, ALT and ALS vegetation types) in Ecoregion 6E to be provincially rare; as a result all Alvar Ecosites (AL) are considered significant wildlife habitat for the purposes of this report.

Significant alvar features in the Project Location and120 m Zone of Investigation are shown on Figures 9.0-9.5 (Appendix A) and indicated in Table 5.8 (Appendix B).

Approximately 26.6 ha of alvar habitat will be removed or disturbed for construction of the Project, with 7.3 ha of this amount removed for the duration of Project operation. This is comprised primarily of treed alvar habitat (75%) with small areas of open alvar and shrub alvar also to be removed (see Table 6.2, Appendix B). All treed alvar communities were also considered part of significant woodlands. As such the total amount of habitat to be removed within these communities has also been included under the assessment of significant woodlands. Impacts to these communities in relation to their functions as woodlands are discussed in Section 6.7.

Project components found in and within 120 m of each alvar feature are detailed below.

Feature Number	Project Component(s) located in Natural Features	Feature Size (ha)	Total Amount of Habitat Removal RequiredShort-term	Total Amount of Habitat Removal Required Long-term	Project Component(s) located within 120 m
al1	• T26 blade tips and construction area	6.4	0.06	0	• T26 (turbine base: 16.7 m) • Access road (28 m) • Crane pad (4.9 m)
al2	• 60 m of access road and collector lines	1.7	0.06	0.05	• Access road and collector line (adjacent)
al3	• Collector lines located in municipal road allowance. Alternately, line may be placed on opposite side of road from feature.	2	0.03	0	• Collector line
al4	• T24 (blade tips and construction area), T27, T28 • 2.5km of access road and associated collector lines • 5.3 km of roadside collector lines located in the municipal road allowance. Note in some locations the line may be placed on opposite side of road from feature.	584	11.5	2.8	• T24 (turbine base: 21 m) • T29 (turbine base: 77 m) and construction area (11 m) • access road and collector lines (adjacent)
al5	• None	4.3	0	0	• T29 (blade tip: 8 m; construction area: 22 m; base: 44.5 m) • access road and collector line (68.5 m)
al6	• T23 • 140 m of access road and associated collector lines	24.1	0.3	0.2	• access road and associated collector line (adjacent)
al7	• None	0.5	0	0	• Roadside collector lines (>99.7 m). Lines located in the municipal road allowance. Note the line may be placed on opposite side of road from feature.
al8	• T21, T22 • 1.0 km of access road and associated	66.4	2.1	1.1	• access road (adjacent) • collector lines

Feature Number	Project Component(s) located in Natural Features	Feature Size (ha)	Total Amount of Habitat Removal RequiredShort-term	Total Amount of Habitat Removal Required Long-term	Project Component(s) located within 120 m
	collector • Roadside collector lines. Lines located in the municipal road allowance. Note the line may be placed on opposite side of road from feature.				(adjacent)
al9	• 480 m of roadside collector lines located in the municipal road allowance.	16	0.9	0	• Roadside collector lines (adjacent)
al10	• None	17.1	0	0	• Roadside collector lines (> 28 m). Lines located in the municipal road allowance. Note the line may be placed on opposite side of road from feature.
al11	• T18 • 250 m of access road and associated collector lines	37.5	0.5	0.4	• T19 (turbine base: 117 m) • access road and associated collector lines (adjacent)
al12	• 267m of access road and associated collector line	41.2	0.5	0.2	• Access road and associated collector line (adjacent)
al13	• None	15.9	0	0	• access road (71.5 m; located across Hilltop Road) • roadside collector lines (>32 m). Lines located in the municipal road allowance. Note the line may be placed on opposite side of road from feature.
al14	• T17 blade tips and construction area • T17 (alternate) • 291m of access road and associated collector lines • roadside collector lines located in the municipal road allowance. Note the line may be placed on	19.2	0.9	0.7	• T17 (turbine base: 24 m) • T16 (turbine base: 91m; construction area; 30 m)

Feature Number	Project Component(s) located in Natural Features	Feature Size (ha)	Total Amount of Habitat Removal RequiredShort-term	Total Amount of Habitat Removal Required Long-term	Project Component(s) located within 120 m
	opposite side of road from feature.				
al15	• None	17.2	0	0	• Access road (35 m) • T13 crane laydown area (81 m)
al16	• 50 m of access road • T12 construction area	0.9	0.02	0.001	• T12 (turbine base: 63.9 m; blade tip: 27.8 m) • T12 access road (adjacent) • Collector lines (not aligned with access road, 60.3 m) • T12 crane laydown area (12.9 m)
al17	• 60 m of collector line	14.8	0.07	0.04	• T12 (blade tip: 33.8 m; turbine base: 70 m; construction area :42.7 m) • Collector lines (adjacent) • access road ending at T12: (74 m)
al18	• T11, T13 • 894 m of access road (675 m of collector lines associated with roads) • 423 m of collector lines (not associated with roads)	76.6	1.8	1.3	• Collector lines located in the municipal road allowance. Note the line may be placed on opposite side of road from feature.
al19	• 456 m of access road • Collector lines (off-road and roadside)	16.6	0.5	0.4	• access road and collector line (adjacent)
al20	• None	4.6	0	0	• T08 (blade tip: 38.6 m, base: 75 m, construction area: 10.5 m) • access road and collector line (10.7 m)

*the distance to turbine base as provided is measured to the outer extent of the turbine foundation; an 18 m diameter extending from the turbine tower.

6.10.1 Potential Effects

Features within 120m of Roadside Collector Lines

Overhead collector lines are the only Project component found within 120 m of features al3 al7, al9, and al10.

- Features al7 and al10

At their closest point, alvar features al7 and al10 occur 99.7 m and 28 m respectively from the edge of the municipal road allowance where collector lines may be placed. The collector system would be installed within the municipal road allowance either adjacent to al7 and al10 or on the opposite side of the road. Construction activities include upgrading the line, where existing transmission lines currently exist, or installing new lines. No project components are sited within these features. There will be no direct loss of habitat or function to the features.

Construction activities are expected to be short term in duration and small in scale, and so minimal dust would be generated. During operation there may be occasional maintenance of the collector lines but noise and disturbance from these activities is expected to be lower impact than the regular disturbance impacts from day to day use of the road system and maintenance activities associated with the road. The spatial separation of at least 28 and 99.7 m from the closest potential point of construction activities to these features is considered sufficient to limit the potential for negative effects from these activities. Operational impacts are considered negligible.

- Features al3 and al9

For features al3 and al9 a roadside collector line is the only Project component within 120 m of the feature. A collector line will be placed within the municipal road allowance. The evaluation of the total amount of vegetation to be impacted during construction includes consideration of the entire municipal road allowance (on both sides of the road) for roadside collector lines, and considers the potential for either overhead or underground collector lines. As a result, all areas of features al3 and al9 that overlap with the municipal road allowance have been included here as habitat with the potential to be impacted during construction of the project (i.e. short-term duration). This includes 0.03 ha of al3 and 0.9 ha of al9. Detailed design undertaken in consultation with the County will determine which side of the road allowance the collector lines will be located, and the construction method (overhead or underground). Therefore this method of evaluation is considered conservative in terms of area and magnitude of impact.

During the detailed design stage, the final collector line location will be sited to minimize disturbance of removal of habitat for features al3 and al9 to the extent possible. Should removal or disturbance be required to the 0.03 ha of al3 and 0.9 ha of al9 that is found within the

municipal road allowance, it would be restricted to the edge of the feature and to habitat that occurs along an existing road edge.

Indirect impacts to the alvar habitat 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 (as described in Section 6.10.2 below). During construction, there will be increased traffic and the potential for accidental spills.

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.

Features within 120 m of Access Roads or Turbines

Alvar features al5, al13, al15 and al20 occurred within 120 m of access roads or turbines (as detailed above).

No components of the Project are located in these features. All activities required for the Project would be located outside of these alvar feature boundaries. No direct impact to the function, form or habitat is expected as a result of construction or operation of the Project.

Construction activities are proposed 35 m at their closest point to alvar feature al15 and more than 32 m from feature al13. These distances are considered sufficient to attenuate potential negative effects from construction activities.

Construction activities are proposed within 10 m of al20 and 22 m of al5. Indirect impacts to the alvar habitat 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 (as described in Section 6.10.2 below). Impacts such as soil erosion and compaction during construction are expected to be minimal given the shallow soil layer and bedrock present throughout the Study Area. During construction, there will be increased traffic and the potential for accidental spills. Areas adjacent to constructed roads and turbine pads also have increased potential for the introduction or spread of exotic species.

Where access roads and turbine bases are found within 30 m of alvar features there is the potential for changes to hydrology during operation of the Project. For features al5, al13 and al15 turbine foundations and access roads are sited more than 35 m at their closest point. An access road (and associated collector line) are found within 10.7 m of feature al20. The potential effects to the vegetation or function of feature al20 as a result of hydrological changes are considered very low as the alvar feature is subject to extreme inundation and drying through the year and as a result is well adapted to hydrological extremes.

Features In the Project Location

Some removal and disturbance of alvar-like vegetation communities will be required for the construction and operation of the Project. This applies to alvar features al1, al2, al4, al6, al8, al11, al12, al14, al16, al17, al18 and al19.

No rare species of vegetation are to be removed as part of the Project. Six alvar-indicator flora species were recorded during site investigations. These species have high CC values (coefficient of conservatism) indicating some susceptibility to disturbance; however, occurrence of all species is widespread and common throughout the study area, including common occurrence in cultural (non-alvar) habitats. The relative abundance of alvar indicators is not expected to decrease as a result of direct removal of alvar-like habitat, and no change to flora biodiversity is anticipated as a result of the project.

In addition to the direct removal and fragmentation of alvar-like habitat, construction disturbance increases the potential for the introduction or spread of exotic flora species. Site investigations documented 78 (24 percent) of non-native species in the Subject Property. Highly invasive species (Category 1 – 3 as per Urban Forest Associates, 2002) and non-native species identified as problematic to alvar communities (as per Goodban, undated) include common buckthorn, honeysuckles, scots pine, silver poplar, multiflora rose, common lilac, swallow-wort, Canada thistle, hawkweed species, bouncing-bet, sedum species, and several legume and graminoid species.

As discussed above, where access roads and turbine bases are found within 30 m of alvar features there is the potential for changes to hydrology. This applies to each of features al1, al2, al4, al6, al8, al11, al12, al14, al16, al17, al18 and al19. The potential effects to alvar vegetation or function as a result of hydrological changes are considered very low as the alvar features are subject to extreme inundation and drying through the year and as a result are well adapted to hydrological extremes.

The alvar-like habitats are highly interspersed with other natural habitats, including cultural, forest, swamp and marsh community classes, and agricultural land use in the area. Alvar-like units did not support wildlife that was unique to the Study Area; rather wildlife and wildlife habitat attributes resulted from the close association of community classes. For example, the study area supported species of conservation concern (declining avian shrubland breeding species) in open canopy and shrub/successional habitats. As such, effects and mitigation for significant wildlife habitat for this function are assessed in elsewhere in this report (see Section 6.12).

6.10.2 Mitigation Measures

Loss of alvar-like habitat will be addressed through the creation and implementation of a Natural Areas Management Strategy. The strategy will be created to enhance and preserve the natural heritage qualities of the alvar-like habitats currently found within the Project Location and Zone

of Investigation, and will include mitigation for other natural areas, such as woodlands. Restoration should not target alvar-like conditions where environmental conditions are unsuitable; rather will include efforts to promote native biodiversity throughout the study area, and may include restoration of woodland and/or meadow communities.

Mitigation measures for each feature are provided in Table 6.7, Appendix B. Specific mitigation strategies for alvar-like communities are summarized as follows:

- A Natural Areas Management Strategy will be developed and implemented for the Project as described in Section 6.5. The strategy will include:
    - A Replanting and Restoration Plan. All disturbed areas of the construction site will be restored to preconstruction grades as soon as conditions allow.
    - An Invasive Species Management Plan will be created for the Project in consultation with MNR with the goal of managing spread of the invasive species in areas of construction related disturbance.
    - A Vegetation Monitoring Plan will be created for the project to monitor the success of the Replanting Plan and the Invasive Species Management Plan.
- Records of the restoration and invasive species control work will be kept and successes or failures communicated and contributed to knowledge of alvar habitats in Ontario.
- Management efforts will be coordinated with other interest groups willing to partner that have specific knowledge of alvar habitat management and the local natural heritage of the area.
- Mitigation measures for vegetation removal will be implemented as outlined in Section 6.4.1.1
- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2
- Mitigation measures for dewatering will be implemented as outlined in Section 6.4.1.3.
- Where possible, and as appropriate, access roads will be constructed at or near existing grade.
- All refuelling activities will occur well away from alvar communities. 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.

Post-construction monitoring will be conducted to confirm the accuracy of predicted effects and adapt the management plan as necessary (see Table 6.8, Appendix B). The Environmental Effects Monitoring Plan details the monitoring program methods, identifies performance objectives to assess the effectiveness of the proposed mitigation measures and describes a response and contingency plan that will be implemented if performance objectives cannot be met. The EEMP is provided in the White Pines Design and Operations Report (separate cover).

6.11 Amphibian Breeding Areas

As a result of the evaluation of significance, four features were considered significant wildlife habitat for amphibian breeding; features ah1, ah4, ah12 and ah13.

All components of the project footprint are sited outside of significant wildlife habitat (amphibian breeding areas). One component, the blade tips of turbine T05 extend over amphibian breeding habitat feature ah12, and as such are considered to be within the Project Location. Feature ah12 is comprised of a vernal pool as well as the surrounding upland community (a sugar maple forest) and a deciduous swamp. The blade tips of T05 extend over the upland portion (the sugar maple forest community) of the feature.

Components of the Project located within the 120m Zone of Investigation of significant wildlife (amphibian breeding areas) include:

Feature	Project Component(s) located in Natural Features	Amount of habitat to be removed	Project Component(s) located within 120 m (distance at closest point)
Ah1	None	0	• Roadside collector line (>1 m). Note the line may be placed on opposite side of road from feature.
Ah4	None	0	• Roadside collector line (adjacent). Note the line may be placed on opposite side of road from feature.
Ah12	T05 blade tips	0	• T05 (turbine base: 22 m; construction area: 0.5 m) • Access road and collector line (11 m)
Ah13	None	0	• T06 (blade tip: 64.5 m; turbine base: 101.5 m; construction area: 37.5 m) • Access road (7 m) • Collector lines located in the municipal road allowance. Note the line may be placed on opposite side of road from feature.

*the distance to turbine base as provided is measured to the outer extent of the turbine foundation; an 18 m diameter extending from the turbine tower.

6.11.1 Features ah1 and ah4

Two significant wildlife habitat features for amphibian breeding areas, ah1 and ah4, are located adjacent to Babylon and Helmer Roads. Roadside collector lines, to be installed in the municipal road allowance, are the only project component found within 120 m of these features. No turbines or access roads are proposed within 120 m of these features.

6.11.1.1 Potential Effects

All components of the Project are sited outside of features ah1 and ah4. No loss of habitat, alteration of groundwater or surface water flow is anticipated from the Project.

Installation of collector lines is proposed within municipal road allowance. All work will be completed in the roadway or the municipal road allowance.

The type of construction proposed involves works having little or minimal impact to pervious areas and precludes the potential for effects associated with changes in water influence (i.e. surface and water changes).

Construction activities are to be low impact and very short term in duration. The amphibian habitat features are located adjacent to county roads and currently experience higher impact from current use. During operation there may be occasional system maintenance, but regular impacts from the current use of the road system and maintenance activities associated with the road are expected to have higher impacts.

6.11.1.2 Mitigation Measures

The Project components are sited outside the natural features considered significant amphibian breeding areas.

The following mitigation measures will be implemented:

- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2
- All refuelling activities will occur well away from features ah1 and ah4. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

6.11.2 Features ah12 and ah13

Two significant wildlife habitat features for amphibian breeding areas, ah12 and ah13, are located in or within 120 m of permanent project components (turbines, collector lines and

access roads) and/or temporary project components (crane pads and laydown areas). Significant amphibian breeding habitat ah12 is within the blade sweep of one turbine (T05).

6.11.2.1 Potential Effects

As all construction activities are sited outside the amphibian habitat boundaries there will be no direct loss of amphibian habitat or function as a result of the Project. The vernal pool found within ah12 will not be impacted. No encroachment during construction or installation is proposed within these natural features. The potential negative effects to amphibian breeding habitat during Project construction and decommissioning activities include short-term sensory disturbance to species using these areas, localized dust generation, soil erosion, sedimentation and chemical or fuel spills, and may occur indirectly from disturbance (affect use of adjacent habitats).

At its closest point, construction activities would occur 0.5 m from ah12. All construction activities for the installation of T06 and its access road would be separated from ah13 by County Road 13.

Development on adjacent land can have significant impacts on breeding pond functions if it alters ground or surface water flow. Woodland ponds which dry up before larvae transform as a result of disruptions to hydrological function become unsuitable sites for reproduction. In addition, tree cutting in the vicinity of the pond or development in terrestrial habitats used as summer range can affect amphibian habitat by changing the moisture regime of the woodland. The release of contaminants (i.e. road salt, sediments, accidental spills) in surface runoff may affect breeding ponds due to the sensitivity that amphibians have to aquatic toxicants.

No new edge would be created and there would be no clearing of trees in or near features ah12 or ah13 that could result in desiccation or drying. No changes to surface water drainage to the features are anticipated.

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 where land based disturbance is proposed within 120 m of the feature.

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.

During construction of the turbines, the access roads will experience some traffic, which will vary in intensity as the construction phase progresses. The gravel access road for T06 is separated from feature ah13 by County Road 10. Amphibians are at an increased risk from

vehicle collisions in spring, particularly on cool rainy nights as they move towards warmer road surfaces (SWHTGDSS, Index #40). Given the temporary (i.e., one breeding season or less) nature of the increased traffic activity, the restriction of construction activities primarily to daytime hours and the design of access roads (unpaved gravel low speed traffic) the risk of increased mortality during construction is considered low. Some limited mortality is possible, however, the potential long-term effects to wildlife populations from this mortality is anticipated to be minimal.

During operation, direct mortality of amphibians is a potential risk due to vehicles using the access roads for turbine maintenance activities. Given the short-term and temporary nature of the maintenance activity, access roads will experience very little traffic on a daily basis and mortality effects are expected to be negligible. Avoidance behaviour of amphibian breeding habitats due to operational use (e.g., maintenance) of the access roads is not expected.

Effects of turbine noise on amphibian populations are relatively unknown and not-well understood; however, individual reproductive success has been directly related to calling effort in frogs (Sun and Narins, 2004). Therefore, noise is a concern because it can interfere with calling rates, which could in turn impact fitness (Sun and Narins, 2004, Penna et al., 2005). As well, noise may not allow breeding frogs to properly hear and move toward breeding aggregations (Maxell and Hokit, 1999).

Masking of auditory environmental signals, such as mammal warning cries or 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). The edge of the foundation of T05 is sited 22 m from ah12, and 89 m from the vernal pool found within the feature. The foundation of T06 is located more than 100 m from ah13 and is located across a regularly used road, County Road 10. Existing auditory signal masking from traffic noise and direct mortality effects for ah13 are likely greater from daily vehicle traffic and maintenance of the roadway.

During operation of the facility, some materials such as lubricating oils and other fluids associated with turbine maintenance have the potential for discharge to the on-site environment through accidental spills resulting in a potential impact to amphibian habitat through ground or surface water contamination.

6.11.2.2 Mitigation Measures

The following mitigation measures will be implemented:

- 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.
- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2
- All refuelling activities will occur well away from ah12 and ah13. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

6.11.2.3 Net Effects

Considering the temporary nature of construction effects, the distance between the features and the Project components, and the periodic nature of maintenance activities, it is likely that resident herpetiles will adapt to the Project quickly. Consequently, no significant net negative effects are anticipated to amphibian breeding populations and their habitats.

6.12 Shrub Successional Breeding Bird Habitat

As a result of the evaluation of significance, six features were considered significant wildlife habitat for shrub/successional breeding birds; features ssbb1, ssbb2, ssbb3, ssbb5 and ssbb6 and ssbb7. One additional feature, ssbb4, was previously assessed as significant and is treated as such for the purposes of this report.

Components of the Project located in and within the 120 m Zone of Investigation of significant wildlife habitat (shrub/successional breeding bird areas) include:

Feature	Project Component(s) located in Natural Features	Feature Size (ha)	Total Amount of Habitat Removal Required Short-term	Total Amount of Habitat Removal Required Long-term (% of total feature)	Project Component(s) located within 120 m (distance at closest point)
Ssbb1	• T27, T28 • 2 km of access road and associated collector lines • Roadside collector line (in municipal road allowance)	162	3.5	2.1	• T29 (turbine base: 81 m; construction area 24 m)
Ssbb2	• T26 (blade tips and construction area) • 141 m of access road and associated collector lines	20.3	0.2	0.1	• T26 (turbine base: 17 m)
Ssbb3	None	49	0	0	• Roadside collector line (33 m)

Feature	Project Component(s) located in Natural Features	Feature Size (ha)	Total Amount of Habitat Removal Required Short-term	Total Amount of Habitat Removal Required Long-term (% of total feature)	Project Component(s) located within 120 m (distance at closest point)
Ssbb4	• T23, T24 • 1.3 km m of access road and associated collector lines • Roadside collector line (in municipal road allowance)	330	5.7	1.5	• Roadside collector line (in municipal road allowance)
Ssbb5	• T18, T19 (blade tips and construction area) • 1.2 km of access road and associated collector lines	44.5	0.9	0.8	• T19 (turbine base: 16 m)
Ssbb6	• 273 m of access road and associated collector lines • Roadside collector line (in municipal road allowance)	38.3	0.3	0.2	• Roadside collector line (in municipal road allowance)
Ssbb7	• T17 (alternate), T11 • T14 (blade tips only) • T13 and T17 (blade tips and construction area) • 874 m of access road and associated collector lines • Roadside collector line (in municipal road allowance)	107	2.7	2.0	•T12 (turbine base: 87 m; construction area 68 m) •T13 (turbine base: 16 m) •T14 (turbine base: 32 m; construction area 8 m) •T15 (turbine base: 36 m; construction area: 27 m) •T16 (turbine base: 87 m; construction area: 35 m) •T17 (turbine base: 25 m)

*the distance to turbine base as provided is measured to the outer extent of the turbine foundation; an 18 m diameter extending from the turbine tower.

6.12.1 Ssbb3

Overhead collector lines are the only Project component found within 120 m of feature ssbb3. Feature ssbb3 occurs 33 m from the edge of the municipal road allowance where collector lines may be placed. The collector system would be installed within the municipal road allowance either adjacent to ssbb3 or on the opposite side of the road. Construction activities include upgrading the line, where existing transmission lines currently exist, or installing new lines.

No project components are sited within the feature.

6.12.1.1 Potential Effects

There will be no direct loss of habitat or function to the shrub/successional breeding bird feature.

Construction activities are expected to be short term in duration and small in scale, and so minimal dust would be generated. During operation there may be occasional maintenance of the collector lines but noise and disturbance from these activities is expected to be lower impact than the regular disturbance impacts from day to day use of the road system. Resident breeding birds nesting along the road edge of this community have likely adapted to the presence of noise and human activity. The spatial separation of at least 33 m from the closest potential point of construction activities is considered sufficient to limit the potential for negative effects from these activities. Operational impacts are considered negligible.

6.12.1.2 Mitigation Measures

The following mitigation measures will be implemented:

- Inspectors will ensure construction vehicles, equipment and personnel stay within the municipal road allowance for operations;
- No refuelling or maintenance of vehicles in, or adjacent to the municipal road allowance. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

6.12.2 Ssbb1, ssbb2, ssbb4, ssbb5, ssbb6 and ssbb7

For six of the features (ssbb1, ssbb2, ssbb4, ssbb5, ssbb6 and ssbb7) wind turbines, access roads and their buildable areas are found in the feature and/or within the 120m Zone of Investigation.

6.12.2.1 Potential Effects

Project effects on forest breeding birds may occur indirectly from disturbance or directly through mortality. Disturbance from construction and operation of turbines, access roads, and crane paths has 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 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).

DIRECT IMPACTS

During construction there is the potential for the direct loss of nests if construction activities occur in the breeding season. The implementation of mitigation measures such as avoiding activities that could disturb or destroy nests during key periods or protecting active nests with buffer zones reduces the risks to nests.

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 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 (see Section 6.9.1.1 for additional discussion). Species that engage in behaviours such as aerial displays or actively hunt within the blade sweep are considered to be at higher risk. The most common shrub/successional breeding bird species found within the Project Location and Zone of Investigation included Song Sparrow, Eastern Towhee, Field Sparrow, White-throated Sparrow and Yellow Warbler. These species are not expected to engage in high risk behaviours during breeding season; life cycle activities for these species (mating, foraging and rearing of young) typically occur at heights that are below the blade sweep zone. While Wilson's Snipe and American Woodcock are not specifically identified as shrub/successional species, they were recorded in the shrub/successional habitats within the Project Location and Zone of Investigation. These species conduct aerial mating displays, and may be at higher risk to collisions with turbines.

As discussed in Section 6.9.1.1 in greater detail, the mortality rates observed to date at operational facilities in Ontario are considered low, with no evidence of large scale fatality events or significant population impacts (Friesen, 2011). Monitoring results to date from operational facilities indicate that wind turbines are not a major concern with respect to the sustainability of migratory bird populations in Ontario (Friesen, 2011; MNR 2011c) and are a small contributor to overall bird mortality when compared to other anthropogenic structures (Arnett et al., 2007; Kingsley and Whittam, 2007; National Academy of Sciences, 2007;Kerlinger et al., 2011).

INDIRECT IMPACTS

Indirect impacts during construction and operation could include disturbance or disruption to breeding birds. 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).

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). Edge effects may increase predation, parasitism and may affect bird habitat use, reproductive success and site fidelity. Nesting success of shrub-successional species has been observed to be lower at edges (Fink et al., 2006).

Direct loss of the shrub-successional habitat from the White Pines Wind Project would be 19.8 ha for construction with 6.7 ha of this amount lost for the duration of the Project (i.e. 20 years). The total vegetation removal required would remove a small proportion of the shrub/successional habitat evaluated as significant for the purposes of this Project that occurred within the landscape. Approximately 0.9% of shrub/successional breeding would be removed or disturbed for the Project's operation (i.e. 6.7 ha of the 751.1 ha evaluated as significant wildlife habitat). Overall cover of shrub-successional habitat will be maintained within the landscape, with >99% of this habitat type retained.

Noise levels during operations might also result in disturbance effects to breeding birds. Habib et al. (2007) found that noise from compressor stations (which produce sound at 75 to 90 dB(A) at the source) reduced pairing success of Ovenbirds (a forest songbird) by 15%. Levels of noise that may be experienced by shrub/successional breeding birds from operation of the wind turbines is influenced by a number of factors such as distance from receptor, direction of the receptor (i.e. up or down wind) or weather effects (wind speed and direction). For example, noise from wind turbines are more likely to have the least effect on wildlife at high wind speeds, as the sound from the turbines can be masked by the sound of the wind. Reijnen et al. (1996) suggest that noise levels that are below 47 dB(A) will not have significant effects on breeding birds. Barber et. al. (2010) suggest that physiological responses to noise exposure in animals may begin to appear at exposure levels of 55- 60 dB(A). Studies also indicate that birds adjust their songs to compensate for environmental background noises (Brumm, 2004; Barber et al., 2010) and that many species of wildlife easily habituate to regular noise (Penna et al., 2005).

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. Studies of bird densities in grassland habitats have documented localized avoidance behavior in some species (Leddy et al., 1999; Johnson et al., 2000; Erickson et al., 2004). Avoidance behavior was documented from 50 m to 180 m from turbine bases. Other studies have shown no avoidance of wind turbines (Shaffer and Johnson, 2008; James 2008) while others show species nesting in higher abundances near turbines (de Lucas et al., 2004). To date, a review of existing research at operating facilities suggests that wind facilities have little impact on the nesting of birds (Strickland et al., 2011).

However information specific to shrubland birds is currently limited. A recent study of reproductive success in shrub-nesting passerines at an operational wind facility in Texas concluded there was no apparent influence of wind turbine proximity on the reproductive

success of the species studied (Gordon, October 19, 2010 presentation at NWCC conference). Additional recent research to examine population trends at existing operational facilities concluded that the main impacts to bird populations may be from construction activities but that there was little evidence for consistent post-construction population declines in any species (Pearce-Higgins et al., 2012).

6.12.2.2 Mitigation Measures

The following mitigation measures will be implemented:

- Mitigation measures for vegetation removal will be implemented as outlined in Section 6.4.1.1
- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2
- Mitigation measures for dewatering will be implemented as outlined in Section 6.4.1.3.
- All refuelling activities will occur well away from features ssbb1- ssbb7. 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.
- A Replanting and Restoration Plan will be developed for the Project as described in Section 6.5.
- A Vegetation Monitoring Plan will be developed for the project to monitor the success of the Replanting Plan and the Invasive Species Management Planas described in Section 6.5.
- Post construction mortality monitoring for birds will be conducted twice weekly (3-4 day intervals) mortality monitoring at ten turbines from May 1 to October 31, and weekly monitoring for raptors during November, for a period of three years. Searcher efficiency and scavenger trials will be conducted each year according to current guidance documents (as detailed in the Environmental Effects Monitoring Plan, White Pines Wind Project Design and Operations Report).
- Post-construction monitoring for disturbance will be conducted in significant shrub/successional breeding bird habitat for a period of three years, using the same protocols as the pre-construction surveys in addition to a paired point count study

design (as detailed in the Environmental Effects Monitoring Plan, White Pines Wind Project Design and Operations Report).

- An Environmental Effects Monitoring Plan has been created for the Project that details the mortality monitoring program methods, identifies performance objectives to assess the effectiveness of the proposed mitigation measures and describes a response and contingency plan that will be implemented if performance objectives cannot be met (see Table 6.8, Appendix B).

6.13 Provincially Significant Earth Science ANSI

The Project layout in relation to the Earth Science ANSI boundary is shown on Figures 9.4 and 9.5 (Appendix A).

The portion of the Earth Science ANSI that the Project Location occurs within is broadly described as a “channel of bedrock” (Gorrell, 1991).

Project components sited in the ANSI and the 50 m Zone of Investigation are detailed below:

Feature	Project Component(s) located in Natural Features	Feature Size (ha)	Temporary Land Use footprint (>1 year)	Long-term Land Use footprint	Project Component(s) located within 50 m (distance at closest point)
Milford-Black Creek Valley Earth Science ANSI	• 166 m of access road and collector line from T01 to T02 • 250 m of access road from T12 to T13 • 212 m of access road from T09 to T10	928	1.2 ha	0.4 ha	• T10 (construction area: 44.5; turbine base >50 m) • Access road and collector lines (adjacent)

6.13.1 Potential Effects

Potential impacts to the Earth Science ANSI from construction of the access roads could include erosion or loss of part of the feature (NHRM, 2010). Alteration or destruction of landforms can also occur where grading activities are undertaken.

Turbines are sited more than 50 m from the ANSI boundary. The installation of turbine foundations is located outside of the Earth Science boundary and would not result in the loss of form or function of the Earth Science ANSI.

Three portions of access road are proposed within the ANSI boundary; a 166 m stretch from T01 to T02, a 212 m stretch from T09 to T10 and a 250 m stretch from T12 to T13. Access roads will be gravel roads. They will be approximately 5 m wide (5.5 m at a turning radius) with a 10 m wide staging area (15 m total). Staging areas will be temporary and will be restored to

pre-existing conditions at the end of the construction phase. No blasting is anticipated for the excavation of the access roads.

The area required for installation of the access roads comprises a very small area within the ANSI (1.2 ha of the 928 ha feature; approximately 0.1% of the ANSI's land mass). A number of county roads and actively managed agricultural lands are currently located within the ANSI, and it is currently subject to impacts associated with these activities. No reduced stability or integrity of the landform is expected as a result of the construction and operation of small stretches of narrow gravel roads. The Project is not expected to result in a loss of the feature or function of the earth science ANSI.

6.13.2 Proposed Mitigation

The following mitigation measures will be implemented:

- Mitigation measures for vegetation removal will be implemented as outlined in Section 6.4.1.1;
- Mitigation measures for sediment and erosion control will be implemented as outlined in Section 6.4.1.2;
- Mitigation measures for dewatering will be implemented as outlined in Section 6.4.1.3.; and
- Where possible, and as appropriate, access roads occurring within the ANSI (i.e. the 166 m stretch from T01 to T02, a 212 m stretch from T09 to T10 and a 250 m stretch from T12 to T13) will be constructed at or near existing grade.

6.13.3 Net effects

The Earth Science ANSI has been designated for its geological importance, and not its ecological importance. As such, the predominant aspect of the feature is associated with its subsurface composition and land area. Works for the Project that are proposed in the ANSI are spatially small and shallow works that would not impact the Earth Science ANSI feature or its function. There would not be a loss of provincially significant earth science values as a result of the Project.

6.14 Monitoring Plans

6.14.1.1 Construction Monitoring

During construction, best management practices for on-site construction have been recommended.

Monitoring commitments that will be implemented during construction of the Project have been detailed in the White Pines Wind Project Construction Report (separate cover).

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 for construction of the Project are provided in Table 6.8 (Appendix B).

6.14.1.2 Post-construction Monitoring

A post-construction monitoring study 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 (2011b and 2011c) and other provincial guidance that was available at the time of writing. 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 for operation of the Project are provided in Table 6.8 (Appendix B).

The major components include mortality monitoring, disturbance monitoring and habitat restoration and enhancement monitoring. These aspects are outlined below, with the detailed plan provided in the White Pines Wind Project Design and Operations Report (separate cover).

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 has been submitted in the Design and Operations Report as part of the REA application. Mortality monitoring will include the following:

- Mortality monitoring twice weekly (3-4 day intervals) at ten turbines from May 1- October 31st, for a period of three years. Surveys for raptor mortality will be continued once per week from November 1- 30. Searcher efficiency and scavenger trials will be conducted each year according to protocols provided in MNR's Bat and Bird guidance documents (2011b and 2011c).

- The plan identifies performance objectives to assess the effectiveness of the proposed mitigation measures and describes a response and contingency plan that will be implemented if performance objectives cannot be met

Disturbance Monitoring

Elements of the post-construction monitoring program to determine disturbance to wildlife include:

- A transect-based study to assess disturbance effects to migratory land birds resulting from wind turbine operation during migration.
- A point count, area search and paired point count study to assess disturbance effects resulting from wind turbine operation to shrub/successional breeding birds.

Habitat Restoration and Enhancement Monitoring

- A Vegetation Monitoring Plan will be developed for the project to monitor the success of the Replanting Plan and the Invasive Species Management Plan.

The monitoring programs will be reassessed by MNR and wpd 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.

6.15 Summary

Potential impacts, mitigation, net effects and post-construction monitoring recommendations for all natural features in the White Pines Project Location and the Zone of Investigation have been detailed in Sections 6.6- 6.13. With the implementation of the recommended mitigation measures and associated monitoring to confirm the effectiveness of mitigation measures (with the application of contingency plans where necessary) as outlined the Environmental Impact Study, the Project can be constructed and operated without incurring significant impacts on the significant natural features that are found in the Project Location and Zone of Investigation.

7 CLOSURE

This Natural Heritage Assessment and Environmental Impact Study for the White Pines Wind Project has been prepared in accordance with O. Reg. 359/09, s. 24 through 28, 37 and 38. This report is one component of the REA application for the Project.

Once the identified protective, mitigation and compensation measures are applied to the environmental features discussed above, the construction and operation of the Project is not predicted to result in significant residual environmental impacts 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 has been 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 wpd. wpd is committed to implementing all the appropriate protection, mitigation and monitoring measures as they apply to the construction and operation of the Project.

This report has been prepared by Stantec for the sole benefit of wpd Canada Corporation, and may not be used by any third party without the express written consent of wpd Canada Corporation. The data presented in this report are in accordance with Stantec's understanding of the Project as it was presented at the time of reporting.

Sincerely,

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