

**KINGSTON SOLAR LP
SOL-LUCE KINGSTON
SOLAR PV ENERGY PROJECT**

**APPLICATION FOR A
RENEWABLE ENERGY APPROVAL**

**NATURAL HERITAGE ASSESSMENT AND
ENVIRONMENTAL IMPACT STUDY**














**Submitted to:
Kingston Solar LP
55 Standish Court, 9th Floor
Mississauga, ON
L5R 4B2**

**Submitted by:
AMEC Environment & Infrastructure,
a Division of AMEC Americas Limited
160 Traders Blvd., Suite 110
Mississauga, Ontario
L4Z 3K7**

**June 2012
TC111406
168335-0002-160-RPT-0001**

IMPORTANT NOTICE

This Document was prepared exclusively for Kingston Solar LP by AMEC Americas Limited. The quality of information contained herein is consistent with the level of effort involved in AMEC services and based on i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions and qualifications set forth in this Document. This Document is intended to be used by Kingston Solar LP, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance upon this Document by any third party for any other purpose will be at that party's sole risk.

REV.	DATE	DETAILS OR PURPOSE OF REVISION	PREPARED	CHECKED	APPROVED
A	14/12/11	Issued for client review			
B	09/01/12	Issued for client review		Matt Evans	
C	04/05/12	Issued for client review		Matt Evans	
0	07/05/12	Issued for Use		Matt Evans	
1	01/06/12	Issued for Use		Matt Evans	
2	08/06/12	Issued for Use		Matt Evans	

EXECUTIVE SUMMARY

Kingston Solar LP (hereinafter referred to as the “Proponent”) intends to design and construct a solar power development in Eastern Ontario located within the municipal boundaries of the City of Kingston and Loyalist Township. The Project is designated as a Class 3 Solar Facility as defined by Section 4 of Ontario Regulation (O.Reg.) 359/09 (*Renewable Energy Approvals*). The proposed Project would span a total area of approximately 261 ha and would supply up to 100 MWac (megawatts of alternating current) of electricity to be fed into the Hydro One provincial distribution grid. The Project Location is bounded by Quabbin Road to the north, Mud Lake Road/County Road 19 to the west, McDonald Cartier Freeway (Highway 401) to the south, and Highway 38 to the east.

AMEC Environment & Infrastructure (AMEC) was retained by The Proponent to prepare a Renewable Energy Approval (REA) Application, as required under O.Reg. 359/09, and the *Environmental Protection Act* (EPA, Part V.0.1). The proposed Project will consist of approximately 426,000 photovoltaic (PV) panels (arranged in approximately 1 MW blocks consisting of 4,260 PV panels), inverter stations and transformers, a substation and an adjacent switchyard, a collector system of underground and/or overhead power lines, and access roads with culvert installations at associated watercourse crossings. Temporary Project components required during the construction phase include a central site for laydown and storage, and unpaved access routes between PV panels to allow for construction equipment access. The electrical power line collector system would transport the electricity generated from each PV panel block to the inverter station where it would be stepped up to a higher voltage and then transported to the substation for connection into the adjacent Hydro One transmission line via the switchyard.

This Natural Heritage Assessment (NHA) and Environmental Impact Study (EIS) are intended to satisfy the requirements outlined in Sections 24-28 and 37-38 of O.Reg. 359/09 and is to be submitted as a component of the REA application under the *Green Energy and Green Economy Act* (GEA). The Records Review report, Site Investigation report, Evaluation of Significance report and EIS are all presented within this Document.

As per the requirements of Section 25 in O.Reg. 359/09, a Records Review was conducted and all available background information and data were collected and reviewed in attempts to identify any natural features located within the Project Location or within 120 m of the Project Location (50 m for Earth Science Areas of Natural and Scientific Interest). The Records Review revealed that the following natural features occur both within the Project Location and within 120 m of the Project Location: woodlands, wetlands, and various types of wildlife habitat.

As per the requirements of Section 26 in O.Reg. 359/09, a Site Investigation was conducted with the purpose of: 1) confirming the status and boundaries of natural features identified in the Records Review, and 2) identifying any additional natural features not identified in the Records Review. Data collected during the Records Review concerning natural features, species occurrences and wildlife habitat were used to guide the scope and direction of the Site

Investigation. The Site Investigation involved detailed surveys of all the natural features found within the Project Location, or within the 120 m REA setbacks. These included surveys of the vegetation and wildlife (e.g., mammals, amphibians, reptiles, bats and birds) communities within each identified natural feature. The Site Investigation report concluded that several natural features identified in the Records Review were indeed present in the Project Location, or within 120 m of the Project Location. The Site Investigation report also describes several natural features that were not identified in the Records Review but were discovered during the Site Investigation's field surveys. All candidate significant natural features were carried forward to the Evaluation of Significance report. These natural features included several candidate significant woodlands, unevaluated wetlands (assumed to be significant), and candidate significant wildlife habitat (SWH).

As per the requirements of Section 27 of O.Reg. 359/09, an Evaluation of Significance was conducted on all candidate significant natural features identified within in the Project Location, or within 120 m of the Project Location, in the Records Review and Site Investigation. Those candidate significant natural features deemed significant by this evaluation proceeded to an EIS. The significant features located within the Project Location, or within 120 m of the Project Location, requiring an EIS included eight significant woodlands, 15 unevaluated wetlands (assumed to be significant), and SWH in the form of habitat of seasonal concentration, specialized habitats for wildlife, species of conservation concern, and animal movement corridors.

An EIS was conducted for each significant natural feature found within the Project Location, or within 120 m of the Project Location. The EIS identified and assessed potential environmental impacts on each individual significant natural feature and prescribed various mitigation measures aimed at avoiding or minimizing the recognized potential effects associated with the construction, operation and decommissioning phases of the proposed Project. With the application of the prescribed mitigation measures activities associated with the proposed Project are expected to have minimal to no net residual effects on the significant natural features identified and assessed within this report. Therefore, no post-construction monitoring is proposed.

The proposed Project is not located within the Niagara Escarpment Plan, the Oak Ridges Moraine Conservation Plan Area or the Protected Countryside of the Greenbelt Plan.

TABLE OF CONTENTS

	PAGE
EXECUTIVE SUMMARY	I
1.0 INTRODUCTION.....	1
1.1 Project Overview	1
1.2 Proponent.....	2
1.3 Project Requirements.....	2
2.0 RECORDS REVIEW	5
2.1 Records Review Methodology	6
2.2 Records Review Results	7
2.2.1 Woodlands	7
2.2.2 Wetlands	7
2.2.3 Valleylands.....	8
2.2.4 Wildlife Habitat	9
2.2.5 Areas of Natural and Scientific Interest (ANSI).....	31
2.2.6 Provincial Parks and Conservation Reserves.....	32
2.2.7 Summary of the Records Review	32
3.0 SITE INVESTIGATION	34
3.1 Site Investigation Methodology	34
3.1.1 Vegetation Community and Vascular Plant Assessment	35
3.1.2 Woodlands	35
3.1.3 Wetlands	35
3.1.4 Valleylands.....	36
3.1.5 Wildlife and Wildlife Habitat	36
3.1.6 Areas of Natural and Scientific Interest (ANSI).....	38
3.1.7 Alternative Investigations	39
3.2 Site Investigation Results.....	39
3.2.1 Overview	39
3.2.2 Vegetation Survey Results.....	40
3.2.3 Woodlands Survey Results.....	40
3.2.4 Wetlands Survey Results.....	41
3.2.5 Valleylands Survey Results	42
3.2.6 Wildlife Habitat Results	42
3.2.7 Areas of Natural and Scientific Interest (ANSI) Results.....	63
3.2.8 Summary of the Site Investigations Results	64
3.2.9 Corrections to the Records Review	64
3.3 Qualifications.....	65
4.0 EVALUATION OF SIGNIFICANCE.....	66
4.1 Approach to Evaluating Significance	66
4.2 Woodlands	67
4.3 Wetlands	69
4.4 Wildlife Habitat	72
4.4.1 Habitats of Seasonal Concentrations of Animals.....	72
4.4.2 Animal Movement Corridors	88
4.4.3 Habitat for Species of Conservation Concern.....	90



4.5	Summary of the Evaluation of Significance	95
4.6	Qualifications.....	96
5.0	ENVIRONMENTAL IMPACT STUDY.....	97
5.1	Overview of Project Footprint.....	98
5.1.1	Construction Phase.....	100
5.1.2	Operating Phase	101
5.1.3	Decommissioning Phase	102
5.2	Impacts of Project Activities to Natural Features	103
5.2.1	Overview	103
5.2.2	Significant Woodlands	103
5.2.3	Significant Wetlands	105
5.2.4	Significant Wildlife Habitat Features	106
5.2.5	Net Effects of Project Activities	114
5.3	General Project Mitigation and Contingency Measures.....	115
5.3.1	Air Quality/Noise - Exhaust and Dust Emissions	116
5.3.2	Fuel and Chemical Materials	117
5.3.3	Vegetation Removal.....	118
5.3.4	Sediment and Erosion Control	119
5.3.5	General Wildlife Mitigation	121
5.3.6	Pre-construction Monitoring.....	123
5.3.7	Construction Monitoring	123
5.4	Post-construction Wildlife Monitoring Plan (PWMP).....	124
6.0	CONCLUSIONS.....	128
7.0	CLOSURE.....	129
8.0	REFERENCES.....	130

LIST OF APPENDICES

Appendix A	Figures
Appendix B	Tables
Appendix C	Correspondence with OMNR
Appendix D	Records Review
Appendix E	2011 Stantec Survey and Recommended Workplan Report
Appendix F	Compiled Wildlife Species List
Appendix G	<i>Curricula vitae</i>
Appendix H	Communication with Non-participating Landowners
Appendix I	Field Data Sheets
Appendix J	Five Year Histories of Agricultural Fields in the Project Location
Appendix K	Plant List
Appendix L	2011 AMEC Wildlife Survey Summary Report
Appendix M	Acronyms
Appendix N	Four-letter Bird Species Alpha Codes
Appendix O	Base Flow Figures

1.0 INTRODUCTION

1.1 Project Overview

Kingston Solar LP intends to construct a solar power development in Eastern Ontario located within the municipal boundaries of the City of Kingston and Loyalist Township. The proposed Project is designated as a Class 3 solar farm as defined by Section 4 of Ontario Regulation (O.Reg.) 359/09 (*Renewable Energy Approvals*), and would supply up to 100 MWac (megawatts of alternating current) of electricity to be fed into the Hydro One provincial distribution grid. The development of the Project would help the Province of Ontario meet its goal of increasing the proportion of electricity generated from renewable sources.

This Natural Heritage Assessment (NHA) and Environmental Impact Study (EIS) are intended to satisfy the requirements outlined in Sections 24-28, and 37-38 of O.Reg. 359/09, and is to be submitted as a component of the REA application under the *Green Energy and Green Economy Act* (GEA). The Records Review report, Site Investigation report, Evaluation of Significance report and EIS are all presented within this document.

Figure 1-1 (Appendix A) shows the Regional Study Area in relation to Kingston, Odessa, and the McDonald Cartier Freeway (Highway 401). The Project Location is bounded by Quabbin Road to the north, Mud Lake Road/County Road 19 to the west, Highway 401 to the south, and Highway 38 to the east, and is located within the municipal boundaries of the City of Kingston and Loyalist Township (**Figure 1-2, Appendix A**).

As per the *Natural Heritage Assessment Guide* (NHAG; OMNR, 2011a), the “Project Location” refers to “...a part of land and all or part of any building or structure in, or over which a person is engaging in or proposes to engage in the project and any space in which a person is engaging in or proposes to engage in the project.” Natural heritage studies were conducted on natural features occurring within the Project Location and within a 120 m Project Setback (setback) from the Project Location. Studies occurred within a total area of approximately 261 ha.

All lands on which the solar panels would be located (**Figure 1-2, Appendix A**) are privately owned and would be leased by the Proponent for the duration of the Project. The proposed Sol-luce Kingston Solar PV Energy Project Location consists of:

- 426,000 solar photovoltaic (PV) panels (anchored to structural aluminum or galvanized steel racks) located on multiple sites with the cumulative capacity to generate up to 100 MWac of electricity;
- PV arrays arranged in blocks of approximately 1 MW (4,260 panels), and inverter station units to convert incoming power from direct current (DC) to alternating current (AC). A transformer at the inverter station will transform the outgoing AC power to 34.5 kilovolts (kV);
- PV array installations consisting of gravel access roads and water crossings where necessary, and inverter station installations consisting of concrete pads for inverter stations and footings as necessary for solar panel racks;

- A 34.5 kV collector system of underground and/or overhead power lines and fibre optic cabling to transport outgoing power along access roads on PV array sites and the municipal road allowance to the transformer (substation) or the adjacent switchyard;
- A substation at which transformers transform the power to 230 kV for interconnection to the adjacent Hydro One transmission line;
- An adjacent Hydro One switchyard to allow for an interconnect with the Hydro One transmission line;
- A maintenance and control building on the substation/switchyard site; and,
- Security fencing surrounding all Project sites.

Temporary facilities would be required during the construction phase but would be removed at the completion of the work. These would consist of:

- Temporary areas used for laydown and/or storage of construction materials, equipment, and temporary construction offices (**Figures 1-2a-f in Appendix A**);
- Temporary areas used for parking personal vehicles belonging to the construction crews; and,
- Unpaved access routes between PV panels to allow for construction equipment access.

The Proponent will provide design, construction, operation, and decommissioning of the Project. The proposed schedule is to commence construction in the fall of 2013 with completion in 2014. The lifespan of the Project is 20 years following which it would be decommissioned. The Project Location is provided in **Figure 1-2 (Appendix A)**.

1.2 Proponent

The Proponent's office and contact information are:

A. José De Armas
Project Development Manager
Kingston Solar LP
55 Standish Court, 9th Floor,
Mississauga, Ontario, L5R 4B2.

1.3 Project Requirements

To regulate the environmental approvals requirements for a renewable energy project, the Province has enacted O.Reg. 359/09 - *Renewable Energy Approvals* under Part V.0.1 of the *Environmental Protection Act* (REA, 2009). The Project is defined as a Class 3 Solar Facility by Section 4 of the Regulation. The Proponent must obtain a Renewable Energy Approval (REA) from the Ontario Ministry of the Environment (MOE) prior to developing the Project.

The Proponent and its environmental consultant, AMEC Environment & Infrastructure (AMEC), have prepared this Natural Heritage Assessment (NHA) and Environmental Impact Study (EIS) to provide the public, local communities, aboriginal communities and interested agencies with

an understanding of the plans for the Project. The NHA and EIS are intended to satisfy the requirements outlined within O.Reg. 359/09 (Sections 24-28, 37, and 38) and is submitted as a component of the REA application. The Project Location is not located within the Niagara Escarpment Plan, the Oak Ridges Moraine Conservation Plan Area or the Protected Countryside of the Greenbelt Plan. The requirements of this NHA, as specified under O.Reg. 359/09, are summarized in **Table 1-1 (Appendix B)**.

A NHA is required to determine whether any of the following natural features exist within the Project Location or within 120 metres of the Project Location:

- Wetlands;
- Coastal wetlands;
- Life Science Areas of Natural and Scientific Interest (ANSI);
- Earth Science ANSI (50 m);
- Valleylands;
- Woodlands;
- Wildlife habitat in the form of habitat of seasonal concentrations of animals, rare vegetation communities or specialized habitat for wildlife, animal movement corridors, and habitat of species of conservation concern; and,
- Provincial parks and conservation reserves.

This report identifies the boundaries and ecological structure and function of all natural features within the Project Location or within the 120 m REA setback of the Project Location. In instances where a natural feature is located within the Project Location or within the 120 m setback of the Project Location (50 m for a provincially significant Earth Science ANSI), this report provides an Evaluation of Significance of that natural feature, as per O.Reg. 359/09 (Section 27). The Evaluation of Significance for each identified feature is based on an existing Ontario Ministry of Natural Resources (OMNR) designation of the feature, or by using evaluation criteria and procedures established or accepted by the OMNR. OMNR documents referenced throughout the preparation of this report include the NHAG (OMNR, 2011a), and the *Significant Wildlife Habitat Technical Guide* (SWHTG; OMNR, 2000).

In instances where the Evaluation of Significance determines that a natural feature located within the Project Location or within the 120 m setback of the Project Location (50 m for a provincially significant Earth Science ANSI) is a significant natural feature, an EIS is required, as per O.Reg. 359/09 (Section 38). The EIS identifies and assesses any potential negative environmental impacts the Proposed Project may have on that particular significant natural feature and, where possible, prescribes appropriate mitigation measures to minimize those predicted negative effects.

All *Threatened* and *Endangered* species (Species at Risk) protected under Ontario's *Endangered Species Act* (ESA, 2007) are presented and discussed separately from this NHA and EIS. They are instead presented in the Approval and Permitting Requirements Document

(APRD) being submitted to the OMNR for consideration under the *Endangered Species Act*, 2007.

2.0 RECORDS REVIEW

Section 24(1) of O.Reg. 359/09 requires that the proponent of a renewable energy project conduct a Records Review (RR), in accordance with Section 25. The table provided in Section 25 of O.Reg. 359/09 requires records from various federal, provincial and municipal agencies be obtained and reviewed, including:

1. Records that relate to provincial parks and conservation reserves that are maintained by the OMNR; and,
2. Records related to natural features that are maintained by:
 - i The OMNR;
 - ii The Crown in right of Canada;
 - iii A conservation authority, if the Project Location is in the area of jurisdiction of a conservation authority;
 - iv Each local and upper-tier municipality in which the Project Location is situated;
 - v The planning board of an area of jurisdiction of a planning board in which the Project Location is situated;
 - vi The municipal planning authority of an area of jurisdiction of a municipal planning authority in which the Project Location is situated;
 - vii The local roads board of a local roads area in which the Project Location is situated;
 - viii The Local Services Board of a board area in which the Project Location is situated; and,
 - ix The Niagara Escarpment Commission, if the Project Location is in the area of the Niagara Escarpment Plan.

Of the above sources, items v, vii, viii and ix do not apply to this RR based on jurisdictional responsibilities within the area of this proposed Project. In addition to the above sources, comments regarding natural heritage were also sought from local stakeholders, as outlined in O.Reg. 359/09.

As per Section 25 of O.Reg. 359/09, the purpose of the RR consultations is to determine whether the project is in, or within 120 m of, a provincial park or conservation reserve, or whether the Project Location is, (i) in a natural feature, (ii) within 50 m of an Earth Science ANSI, or (iii) within 120 metres of a Life Science ANSI. Furthermore, the purpose of the RR is to:

1. Obtain available baseline information about the area where the Project is being proposed; and,
2. To determine whether the Project Location is within the O.Reg. 359/09 setback distances of the boundaries of known natural features.

2.1 Records Review Methodology

Background information and data were collected and reviewed to identify existing natural features within 120 m of the Project Location. The RR involved a search for and an analysis of records set out in Column 1 of the table in Section 25 of O.Reg. 359/09. A summary of the records searched, documents reviewed, agencies contacted, and preliminary determinations is provided in **Tables 2-1 and 2-2 (Appendix B)**, and included, but were not limited to the following:

Federal Government:

- Environment Canada/Canadian Wildlife Service (EC/CWS).

Provincial Government:

- Peterborough District Ministry of Natural Resources (OMNR; **Appendix C**);
- OMNR Natural Heritage Information Centre (NHIC) database, Natural Areas and Species records search (<http://nhic.mnr.gov.on.ca/>);
- Land Information Ontario (LIO) digital mapping of significant natural features (OMNR, 2011); and
- Renewable Energy Atlas (2011) bat hibernacula mapping.

Local Municipality:

- Meetings with officials from the Loyalist Township, Greater Kingston Area, and Frontenac County;
- Frontenac County Official Plan (**Appendix D**);
- City of Kingston Official Plan (**Appendix D**); and
- Loyalist Township Official Plan (**Appendix D**).

Local Conservation Authority:

- Cataraqui Region Conservation Authority (CRCA; **Appendix D**); and
- Central Cataraqui Region Conservation Authority Natural Heritage Study.

Other Organizations and Data Sources:

- Important Bird Areas database (Bird Studies Canada and BirdLife International);
- Ontario Partners in Flight (PIF) - Ontario Landbird Conservation Plan: Lower Great Lakes/St. Lawrence Plain North American Bird Conservation;
- Field Survey Summary and Recommended Workplan (Stantec Consulting Ltd, **Appendix E**);
- Various wildlife atlases (Atlas of the Breeding Birds of Ontario(OBBA), Atlas of the Mammals of Ontario (AMO), Ontario Herpetological Atlas (OHA), Ontario Butterfly Atlas, Ontario Odonata Atlas; and

- Christmas Bird Count (The Audubon Society).

The RR identified the presence of several natural features occurring within 120 m of the Project Location, including woodlands, wetlands, and wildlife habitat. The information gathered is detailed below (Section 2.2) and discussed throughout the remainder of this document.

2.2 Records Review Results

The Project Location is located within the Great Lakes/St. Lawrence Forest Region and is composed of a mixture of hay fields, pastures, sod farms, old fields, early successional meadows and shrublands, woodlands, and wetlands. Considerable areas of land have been allowed to regenerate creating a mosaic of regenerating grassland meadows, shrublands and forests. Woodlands in the Project Location are typically fragmented, regenerating, and mixed-aged; undisturbed mature woodlands are uncommon.

2.2.1 Woodlands

O.Reg 359/09 and the OMNR's NHAG (OMNR, 2011a) define a woodland as "...a treed area, woodlot or forested area, other than a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees, that is located south and east of the Canadian Shield as shown in Figure 1 in the Provincial Policy Statement issued under Section 3 of the Planning Act and approved by the Lieutenant Governor in Council by Order in Council No. 140/2005". Using this definition and LIO mapping provided by the OMNR (OMNR, 2010a), 35 woodland features were identified within 120 m of the Project Location (**Figure 2-1a, Appendix A**). The Cataraqui Region Conservation Authority (CRCA) uses the OMNR's Ecological Land Classification (ELC; Lee *et al.*, 1998) definition of a woodland as "...an area with at least 60% tree cover" and have identified woodland areas throughout the Project Location in their 2006 Natural Heritage Study (CRCA, 2006; also see **Figure 2-1a, Appendix A**). The CRCA has identified 61 woodlands occurring within 120 m of the Project Location as significant (**Figure 2-1a, Appendix A**). Of the 61 woodlands identified by the CRCA, 17 are considered "significant woodlands" and 44 are considered "contributory woodlands". The criteria used to determine woodland significance by the CRCA differ than those presented in the NHAG and are presented in **Table 2-3 (Appendix B)**

For the purposes of this *NHA*, the OMNR's definition of woodland (OMNR, 2011a) will be used. A Site Investigation (SI) will be conducted on the 35 woodlands identified in this Record Review to further assess their boundaries, ecological characteristics and functions, and to confirm that they meet the definition of woodland provided in O.Reg. 359/09 and in the NHAG.

2.2.2 Wetlands

A review of Land Information Ontario (LIO) mapping (OMNR, 2010a), Natural Resources Canada (NRCan) mapping, the CRCA Natural Heritage Study (CRCA, 2006), the Natural Heritage Information Centre (NHIC) database (NHIC, 2011), the City of Kingston Official Plan (2011), and aerial photograph interpretation indicated that no provincially significant wetlands

(PSW), locally significant wetlands (LSW), or coastal wetlands were located within the Project Location. The Odessa Lake Swamp PSW was identified adjacent to, but outside of, the Project Location's western boundary (**Figure 2-1b, Appendix A**).

Seventy-two unevaluated wetlands were identified within the City of Kingston municipal boundaries. Of these 72 wetlands, 24 were identified as occurring within 120 m of the proposed Project Location (**Figure 2-1b, Appendix A**). No data or previous records describing the characteristics of these wetlands were available. Each of these 24 wetlands will be surveyed and assessed during the SI. The SI will also survey for any additional unmapped wetlands within 120 m of the Project Location.

2.2.2.1 Provincially Significant Wetlands

No provincially significant wetlands were located in, or within 120 m of, the Project Location. The Odessa Lake Swamp PSW (an International Biological Program Site and Life Science Site) is located at the head of Odessa Lake, adjacent to the western boundary of the Project Location (CRCA, 2006; NHIC, 2011), but greater than 120 m from the Project Location (**Figure 2-1b, Appendix A**). A review of the NHIC databases indicates the existence of several vegetation communities associated with the Odessa Lake Swamp, including open water, marshes, thickets, and deciduous and coniferous treed swamps. Although this wetland is not within the 120 m setback, it is important to identify its existence adjacent to the Project Location and consider any possible hydrological connections it may have to other wetlands found within the Project Location boundaries. The RR does not indicate any hydrological connections, or proximity within 1 km of wetlands that occur within the Project Location but this will be examined more closely during the SI. The SI will also look for any additional wetland features occurring in, or within 120 m of, the Project Location that were not identified in the RR.

2.2.2.2 Locally Significant Wetlands

No locally significant wetlands were located in, or within 120 m of, the Project Location.

2.2.2.3 Unevaluated Wetlands

The RR identified 24 unevaluated wetlands as occurring within 120 m of the proposed Project Location (**Figure 2-1b, Appendix A**). No data or previous records describing the characteristics of these wetlands were available. Each of these 24 wetlands will be surveyed and assessed during the SI. The SI will also survey for any additional unmapped wetlands within 120 m of the Project Location.

2.2.3 Valleylands

Valleylands are natural areas that occur in a valley or other landform depression that has water flowing through or standing for some period of the year (OMNR, 2009; OMNR, 2010b). Based on LIO mapping (OMNR, 2010a), the CRCA Natural Heritage Study (CRCA, 2006), and NHIC Natural Areas Mapping (NHIC, 2010), no valleylands are present within any of the Project's

120 m setback areas. The absence of valleylands within 120 m of the Project Location will be confirmed during the SI.

2.2.4 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; OMNR, 2009; OMNR, 2011a). To ensure a comprehensive approach to identifying and evaluating candidate significant wildlife habitat (SWH), the SWHTG (OMNR, 2000) has grouped wildlife habitats into four categories: habitats of seasonal concentrations of animals, rare vegetation communities or specialized habitat for wildlife, animal movement corridors, and habitats of species of conservation concern. The SWHTG further divides these four categories of wildlife habitat into sub-groups for the purpose of identifying and evaluating candidate SWH. The draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) provide further guidance on the identification and evaluation of candidate SWH. Both the SWHTG and the SWH Ecoregion 6E Criteria Schedules were consulted throughout the RR for the purpose of identifying candidate SWH.

A compilation of secondary source background information on known wildlife use of the Project Location was undertaken. Using this information, the RR was conducted to identify wildlife habitat features that may be present in or within 120 m of the proposed Project Location to determine whether the area contains confirmed SWH. Inventories of wildlife were compiled from available literature and resources including the Atlas of the Mammals of Ontario (Dobbyn, 1994), the Ontario Herpetofaunal Summary (Oldham and Weller, 2000), the Ontario Odonata Atlas (OMNR, 2005), the Ontario Butterfly Atlas (Holmes *et al.*, 1991), and the Atlas of the Breeding Birds of Ontario (Cadman *et al.*, 2007). Species identified through the review of background information were used in identifying potential candidate SWH in the area (discussed below in relevant sections). It was determined that 147 species of birds, 52 species of mammals, 15 species of amphibians, 16 species of reptiles, 26 species of odonata (dragonflies and damselflies), and 59 species of lepidopterans (butterflies) have previously been recorded within the Regional Study Area (listed in **Appendix F**). Latin species names of each wildlife species identified in the RR and during subsequent studies will not be referenced in the *NHA* report text, but will be listed in **Appendix F**. Many of the species previously recorded within the Regional Study Area are ranked as S5/G5 (Very Common, Demonstrably Secure) or S4/G5 (Common to Very Common). However, 24 wildlife species are considered to be species of conservation concern (see Section 2.2.4.3). In accordance with the NHAG, species listed as *Threatened* or *Endangered* under Ontario's *Endangered Species Act* (ESA 2007) were excluded from the *NHA*. Information on *Threatened* or *Endangered* species is provided under a separate document as part of the APRD.

It is important to note that the exact location of any species occurrences are not available from the resources reviewed and occurrences are, instead, recorded within 10 x 10 km squares. Consequently, while the species may occur within the Regional Study Area, it does not confirm the presence of these species or their habitat within 120 m of the Project Location. However, information gained through the RR regarding the occurrence of wildlife species in, or within

120 m of the Project Location is informative and was used to assist the focus of the SI and the identification of wildlife habitat features within 120 m of the Project Location, as well as to determine whether the area contains candidate SWH.

2.2.4.1 Habitats of Seasonal Concentrations of Animals

Habitats of seasonal concentrations of animals are areas where wildlife occurs in relatively high densities for that species at specific periods in their life cycles and/or in particular seasons. Habitat of seasonal concentrations of animals tends to be localized and relatively small in relation to the area of habitat used at other times of the year (OMNR, 2009). The SWHTG (OMNR, 2000) identifies 14 potential types of habitats of seasonal concentrations of animals:

- Winter Deer Yards;
- Colonial Bird Nesting Sites (Hérons, Terns and Swallows);
- Waterfowl Stopover and Staging Areas (Aquatic and Terrestrial);
- Waterfowl Nesting Sites;
- Shorebird Migratory Stopover Areas;
- Raptor Wintering Areas;
- Reptile Overwintering Habitat;
- Bat Hibernacula and Bat Maternity Roosts;
- Bullfrog Concentration Areas;
- Landbird Migratory Stopover Areas;
- Migratory Butterfly Stopover Areas;
- Moose Late Winter Habitat;
- Wild Turkey Winter Range; and,
- Turkey Vulture Summer Roosting Areas.

Habitat of seasonal concentrations of animals may also include International Bird Areas (IBA) and Wildlife Management Areas (WMA). Appendix B of the NHAG (OMNR, 2011a) and the draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) provide more detailed information and guidance for identifying candidate SWH in the form of habitats of seasonal concentrations of animals.

Based on consultations with the OMNR, five types of habitats of seasonal concentrations of animals identified in the SWHTG were excluded from the RR. The habitats of seasonal concentrations of animals excluded, including the rationale for exclusion, are as follows:

- Landbird Migratory Stopover Areas: The SWHTG includes criteria for only those sites associated within the 5 km shoreline of Lake Ontario in Ecoregion 6E and the proposed Project is located greater than 5 km from Lake Ontario. Therefore, this wildlife habitat does not apply to the proposed position of this Project Location;
- Migratory Butterfly Stopover Areas: The SWHTG includes criteria for only those sites associated within the 5 km shoreline of Lake Ontario in Ecoregion 6E and the proposed

- Project is located greater than 5 km from Lake Ontario. Therefore, this wildlife habitat does not apply to the proposed position of this Project Location;
- Moose Late Winter Habitat: This habitat not considered to occur within Ecoregion 6E; OMNR, 2012). Therefore, this wildlife habitat does not apply to the proposed position of this Project Location;
 - Wild Turkey Winter Range: This habitat type is no longer considered to be SWH, as outlined in Appendix B of the NHAG; OMNR, 2011a);
 - Turkey Vulture Summer Roosting Areas: This habitat type is also no longer considered to be SWH, as outlined in Appendix B of the NHAG; OMNR, 2011a); and,
 - Based on discussions with the OMNR and guidance provided in the draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012), the five aforementioned seasonal concentrations habitats will not be addressed further in this NHA.

Winter Deer Yards

According to OMNR mapping and winter deer yard surveying (Stantec, 2011) no significant deer yards are known in, or within 120 m of, the Project Location or within 120 m of the Project Location (OMNR, 2010a). Winter deer yards are areas of key winter habitat for White-tailed Deer. Deer yards consist of a core area of mainly coniferous trees (e.g., pines, hemlock, cedar, spruce) with a canopy cover of more than 60% and provided shelter from snow and wind (OMNR, 2000). The land surrounding the core area is usually mixed or deciduous forest with understory shrubs and small trees, especially white cedar, providing winter food (OMNR, 2000). According to OMNR mapping and winter deer yard surveying (Stantec, 2011) no significant deer yards are known in, or within 120 m of the Project Location (OMNR, 2010a). Since OMNR is the only authority able to identify significant winter deer yards (OMNR, Pers. Comm., November 2011), the presence of candidate significant deer wintering habitat within 120 m of the Project Location will not be discussed in the SI report (Section 3).

Colonial Bird Nesting Sites (Herons, Terns, and Swallows)

Colonial birds are a diverse group of birds that nest in groups or colonies, (e.g., herons, gulls, terns, and swallows). Among the colonial bird species, there are three distinct types of nesting habitats: 1) banks and artificial structures (swallows), 2) tree/shrub habitat (herons), and 3) ground habitat (gulls and terns). As described in the SWH Ecoregion 6E Criteria Schedules (OMNR, 2012), two species of swallow (Cliff Swallow and Bank Swallow), four species of herons (Great Blue Heron, Black-crowned Night-Heron, Great Egret and Green Heron) and five species of gulls and terns (Herring Gull, Great Black-backed Gull, Little Gull, Common Tern and Caspian Tern) are identified as colonial nesting birds in Ecoregion 6E.

A review of the background information identified 147 bird species as possible, probable or confirmed breeders in the area, of which five are colonial nesting bird species (Cliff Swallow, Bank Swallow, Great Blue Heron, Green Heron, and Herring Gull,). No candidate significant colonial bird nesting sites are known to occur in, or within 120 m of, the Project Location. Air photo interpretation and a review of LIO mapping indicated that banks and artificial structure habitat and tree/shrub habitat may be available in woodlands and wetlands situated within the

120 m of the Project Location. For that reason, the presence of candidate significant colonial bird nesting sites within 120 m of the Project Location will be carried forward to the SI and examined more closely.

Candidate significant colonial nesting bird sites for ground nesting colonial birds is identified as any rocky island or peninsula (natural or artificial) within a lake or large river (OMNR, 2012). As the Project is located at least 8 km from the Lake Ontario shoreline and no large rivers with rocky islands or peninsulas are located in, or within 120 m of, the Project Location, colonial nesting sites for ground nesting birds were not carried forward to the SI.

Waterfowl Stopover and Staging Areas

As described in the SWHTG, prior to migration many waterfowl congregate in large flocks and set up a pattern of pre-migration staging, whereby the birds move in groups between feeding ponds and a large water body for roosting (OMNR, 2000). During migration, waterfowl require stopover areas that supply food to replenish energy reserves, resting areas, and cover. There are two types of waterfowl stopover and staging areas: terrestrial and aquatic. Terrestrial areas can be fields which temporarily flood during spring, providing important habitat for migrating waterfowl. Aquatic areas would be ponds, marshes, lakes and other more permanently wet areas which provide important habitat for both local and migrating waterfowl (OMNR, 2012).

As described in the SWH Ecoregion 6E Criteria Schedules, 29 species of waterfowl are identified as utilizing stopover and staging areas in Ecoregion 6E (OMNR, 2012). Two of those species, Wood Duck and Mallard, are identified as utilizing terrestrial stopover and staging areas in Ecoregion 6E (OMNR, 2012). Of the 29 waterfowl species identified in the SWH Ecoregion 6E Criteria Schedules, six waterfowl species using both terrestrial habitats and aquatic habitats (American Black Duck, Northern Pintail, Gadwall, Green-winged Teal, Blue-winged Teal, and Northern Shoveler) and four waterfowl species using only aquatic habitats (Common Merganser, Hooded Merganser, Ring-necked Duck, and Wood Duck) were documented through a review of the background information as using the Project Location for migration.

The Kingston region features a variety of large wetlands in proximity to Lake Ontario as well as an abundance of shoreline habitat that supports migrating and overwintering waterfowl, which act as seasonal stopovers and staging areas. Wolfe and Amherst Islands are well known for large seasonal concentrations of waterfowl and are designated Important Bird Areas. Furthermore, Cataraqui Bay and Little Cataraqui Creek Wetland provide open marsh and shoreline habitat for a wide variety of waterfowl. The lands comprising the Project Location are largely agricultural or successional and contain few sizeable wetlands or areas of seasonal flooding. Due to the large area of waterfowl stopover habitat close to the Project Location, it is expected that migrating waterfowl will be drawn to these higher quality areas instead of low quality wetlands or any flooded agricultural lands occurring within the Project Location. No candidate waterfowl stopover and staging areas are known to occur in, or within 120 m of the Project Location. The presence of candidate significant waterfowl stopover and staging areas in, or within 120 m of, the Project Location will be confirmed during the SI.

Waterfowl Nesting Sites

Waterfowl nesting sites are generally large, undisturbed areas with an abundance of ponds and wetlands. Vegetation is an important component of waterfowl nesting sites as most species nest in grassy cover, shrubby fields adjacent to wetlands, or in tree cavities along shorelines or swamps (OMNR, 2000). Table 1.2.2 of the SWH Ecoregion 6E Criteria Schedules describes candidate waterfowl nesting areas as extending 120 m from a wetland (>0.5 ha) or a wetland (>0.5 ha) and any small wetlands (0.5 ha) within 120 m or a cluster of three or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur.

Nine species of waterfowl (American Black Duck, Northern Pintail, Northern Shoveler, Gadwall, Blue-winged Teal, Green-winged Teal, Wood Duck, Hooded Merganser and Mallard) are identified in the SWH Ecoregion 6E Criteria Schedules as potentially nesting in Ecoregion 6E (OMNR, 2012). Geese are not identified in the SWH Ecoregion 6E Criteria Schedules.

As identified above, a review of the background information identified 147 bird species as possible, probable or confirmed breeders in the area, of which six are waterfowl species (American Black Duck, Mallard, Blue-winged Teal, Wood Duck, Gadwall, and Northern Shoveler). No candidate significant waterfowl nesting sites are known to occur in, or within 120 m of the Project Location. Nonetheless, based on air photo interpretation and a review of LIO mapping, the Project Location contains both woodlands and wetlands which may be used as waterfowl nesting sites, if the wetlands are surrounded by suitable vegetation. For that reason, the presence of candidate significant waterfowl nesting sites within 120 m of the Project Location will be confirmed during the SI.

Shorebird Migratory Stopover Areas

Migrating shorebirds often follow the shorelines of the Great Lakes because they provide some of the best shorebird migratory stopover habitat due to their location along migration routes and because wave action maintains large and productive beaches (OMNR, 2000). During inclement weather, large numbers of shorebirds may accumulate in shoreline stopover areas that produce abundant food and provide safe places to rest.

As described in the SWH Ecoregion 6E Criteria Schedules, 22 species of shorebirds are identified as potentially using the region during migration (OMNR, 2012). Of the 22 shorebird species identified in the SWH Ecoregion 6E Criteria Schedules, no shorebirds were documented through a review of the background information as using the Project Location for migration.

The Lake Ontario shoreline and associated inlets, bays and harbours typically provide the best habitat for migrating shorebirds; however, the SWH Ecoregion 6E Criteria Schedule identifies shorelines of riparian wetlands, usually muddy and non-vegetated, as key habitat characteristics of shorebird migratory stopover areas, whereas intensive agricultural fields are not included

within this habitat criteria (OMNR, 2012). As no significant shorebird stopover areas are known within the 120 m setback, the Project Area is located approximately 8 km from the Lake Ontario shoreline, and the SWH outlines that only suitable habitats for shorebird stopover areas occurring within 5 km of shoreline can be considered candidate, it was deemed unlikely that the Project Location and 120 m setback supports significant numbers of migratory bird species.

While the Project Location itself is located approximately 8 km from the Lake Ontario shoreline and no candidate significant shorebird stopover areas are known within 120 m of the Project Location, interpretation of aerial photography and LIO mapping suggest potentially suitable wetland habitats may be present within 120 m of the Project Location. For that reason, the presence of candidate significant shorebird migratory stopover areas within 120 m of the Project Location will be confirmed during the SI.

Raptor Wintering Areas

Open fields, including hayfields, pastures, and meadows that support large and productive small mammal populations (e.g., mice, voles) are important to the winter survival of many birds of prey (OMNR, 2000). In addition, scattered fence posts or snags for perches, and relatively mature woodlots nearby for roosting are important areas for wintering raptors (OMNR, 2000).

As described in the SWH Ecoregion 6E Criteria Schedules, six raptor species (Rough-legged Hawk, Red-tailed Hawk, Northern Harrier, American Kestrel, Snowy Owl and Short-eared Owl (*Special Concern*)) are identified as potentially using winter feeding and roosting areas in Ecoregion 6E (OMNR, 2012). Based on a review of background information, 129 species of birds are known to occur within the range of the Project Location, which includes four winter raptor species found in Ecoregion 6E (Red-tailed Hawk, Northern Harrier, American Kestrel, and Short-eared Owl).

Communication with local residents and project owners revealed an annual local presence of raptor species along Unity Road and area which have included American Kestrel, Northern Harrier, Red-tailed Hawk and Snowy Owl. Nearby Amherst Island is a known concentration area for wintering raptor species. Amherst Island occurs 10 km south of the Project Location and recent data from the Amherst Island Christmas Bird Count indicates a strong annual presence of all six winter raptor species within the Amherst Island count area (**Table 2-4**). The count area encompasses Amherst Island only and no mainland area (Janice Scott, personal communication, 2012). Amherst Island contains of large tracts of low intensity agricultural land as well as the Kingston Field Naturalists (KFN) Property, a protected grassland habitat owned by the KFN Club. During March 2011 raptor surveys, Stantec reported Red-tailed Hawk, American Kestrels as well as one Short-eared Owl (Stantec, 2011). This sighting occurred in proximity to the intersection of County Road 19 and Howes Road (**Figure 2-1a**).

Given the sighting of Short-eared Owl within the Project Location, one candidate significant raptor wintering area is known to occur within 120 m of the Project Location. Based on air photo interpretation and a review of LIO mapping, a number of woodlands and wetlands with open fields likely to provide prey and potential perch sites are present in the Project Location. For

that reason, the presence of candidate significant raptor wintering areas within 120 m of the Project Location will be confirmed during the SI.

Reptile Overwintering Habitat

Reptile (snake) hibernacula are often in animal burrows, rock crevices, and other areas that enable the animals to hibernate below the frost line and are often in association with water to prevent desiccation (OMNR, 2000). Frequently, snake hibernacula are found among broken rocks at the base of cliffs or in karst areas, and in rock piles, rubble and old foundations because these landforms often provide suitable subterranean crevices ideal for hibernation. Turtle overwintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen (OMNR, 2012). These areas may support congregations of turtles if overwintering habitats are limited (OMNR, 2012).

As described in the SWH Ecoregion 6E Criteria Schedules, eight snake species (Eastern Garter Snake, Northern Brown Snake, Smooth Green Snake, Northern Ring-necked Snake, Northern Water Snake, Northern Red-bellied Snake, Eastern Milk Snake-*Special Concern* and Northern Ribbon Snake-*Special Concern*), one lizard species (Five-lined Skink-*Special Concern*) and three turtle species (Midland Painted Turtle, Snapping Turtle, and Northern Map Turtle-*Special Concern*) are identified in Ecoregion 6E (OMNR, 2012). Based on a review of background information, seven of the snake species, with the exception of the Northern Ring-necked Snake, Five-lined Skink, and all three turtle species identified in Ecoregion 6E are known to occur in the Regional Study Area. Consultation with the OMNR revealed there are no records available for candidate significant reptile hibernacula or turtle overwintering sites in the Project Location. Nonetheless, the presence of snake and turtle species within the Project Location, the potential presence of reptile hibernacula features such as buried concrete or rock (e.g., building foundations), rock crevices or animal burrows, and the presence of wetlands potentially suitable for overwintering turtles within 120 m of the Project Location suggest the potential presence of candidate significant reptile hibernacula and turtle overwintering sites. As such, the presence of candidate significant reptile hibernacula and turtle overwintering sites within 120 m of the Project Location will be confirmed during the SI.

Bat Hibernacula

The locations and site characteristics of bat hibernacula are relatively poorly known (OMNR, 2012). Of the information available, bat hibernacula generally consist of caves, abandoned mine shafts, and underground foundations, features which are rare in south-central Ontario landscapes.

Inventories of wildlife were compiled from available literature and resources including the Atlas of the Mammals of Ontario (Dobbyn, 1994). Based on a review of background information, five species of bats known to hibernate in Ontario have been recorded within the Regional Study Area including Small-footed Myotis, Northern Myotis, Little Brown Myotis, Big Brown Bat, and Silver-haired Bat. Based on a review of the Renewable Energy Atlas (OMNR, 2010b), a single bat hibernacula is known to exist near Murvale, approximately 1 km north of the 120 m setback.

No records of known bat hibernacula were found within the Project Boundaries or 120 m setback. Regardless, bat hibernacula surveys will be conducted as part of the SI. Acoustic surveys for bats are not proposed as the installation and operation of the proposed solar farm is not expected to interfere with nightly/seasonal bat activity (e.g., foraging, migrating). The main concern regarding the bat surveys is simply to identify any potential bat habitat and to ensure that this habitat is not impacted by the proposed project.

A review of bat hibernacula will be carried forward into the SI stage to identify the presence of any unrecorded features (e.g., caves or karst features) potentially suitable for supporting candidate significant bat hibernacula.

Bat Maternity Colonies

SWH Ecoregion 6E Criteria Schedules lists four species of bats (Northern Myotis, Little Brown Myotis, Big Brown Bat, and Silver-haired Bat) that utilize maternity colonies. For these species, tree cavities and crevices under loose bark or buildings can provide maternity roost habitat (Fenton, 1970). No records of known bat hibernacula or maternity roosts were found within the Project Boundaries or 120 m setback. Regardless, bat hibernacula and maternal roosting sites surveys will be conducted as part of the SI. Acoustic surveys for bats are not proposed as the installation and operation of the proposed solar farm is not expected to interfere with nightly/seasonal bat activity (e.g., foraging, migrating). The main concern regarding the bat surveys is simply to identify any potential bat habitat and to ensure that this habitat is not impacted by the proposed project.

A review of maternal colony roosts will be carried forward into the SI stage to identify the presence of any unrecorded features (e.g., large diameter trees, snags, and crevices) potentially suitable for supporting candidate significant bat maternal colonies.

Bullfrog Concentration Areas

As described in the SWHTG, bullfrogs are primarily aquatic and found in marsh habitat (OMNR, 2000). Bullfrogs require permanent waterbodies for survival as bullfrog tadpoles may take up to several years before undergoing metamorphosis (OMNR, 2000). Both Appendix B of the NHAG (OMNR, 2011a) and the SWH Ecoregion 6E Criteria Schedule outline bullfrog concentration areas within the context of amphibian breeding habitat (wetland). For that reason, the RR for bullfrog concentration areas in this report is discussed in Section 2.2.4.2 (*Rare Vegetation Communities or Specialized Habitats for Wildlife*).

Summary for Habitats of Seasonal Concentrations of Animals

Based on the RR, candidate SWH in the form of habitats of seasonal concentrations of animals that may occur within 120 m of the Project Location include:

- Colonial Bird Nesting Sites;
- Waterfowl Stopover and Staging Areas;

- Waterfowl Nesting Sites;
- Shorebird Migratory Stopover Areas;
- Raptor Wintering Areas;
- Reptile Overwintering Habitat; and,
- Bat Hibernacula and Maternal Colonies.

The potential presence of these candidate SWH within 120 m of the Project Location will be confirmed during the SI (Section 3).

2.2.4.2 Rare Vegetation Communities or Specialized Habitat for Wildlife

Rare Vegetation Communities

Rare vegetation communities are areas that contain a provincially rare vegetation community or are rare within the planning area. A list of rare vegetation communities for southern Ontario has been prepared and described in a document entitled *Natural Heritage Resources of Ontario: S-ranks for Communities in Site Regions 6 and 7* (Bakowsky, 1997). A review of this document indicated that there are over 20 rare vegetation communities which occur with the broader area of Ecoregion 6E.

The Project Location is located on the border between Lennox & Addington County and Frontenac County. Appendix M in the SWHTG identifies the presence of four rare vegetation communities in both Lennox & Addington County and Frontenac County: Dry Annual Open Alvar Pavement Type (ALO1-2), Northern Dropseed - Little Bluestem - Scirpus-like Sedge Alvar Grassland Type (ALO1-3), White Cedar - White Spruce - Philadelphia Panic Grass Treed Alvar Grassland Type (ALO1-4), and Tufted Hairgrass - Canada Bluegrass - Philadelphia Panic Grass Alvar Grassland Type (ALO1-5). Graminoid Coastal Meadow Marsh Type (MAM4-1) is a rare vegetation community found in Frontenac County, whereas Red Cedar - Early Buttercup Treed Alvar Grassland Type (ALT1-5) is located in Lennox & Addington County (OMNR, 2000). A search of the NHIC database identified a Tufted Hairgrass - Canada Bluegrass - Philadelphia Panic Grass Alvar Grassland Type (ALO1-5) as a rare vegetation community located within the Project Location (SRANK: S2S3). A detailed description of each rare vegetation community found during the RR is found in **Table 2-5 (Appendix B)**. The OMNR indicated the presence of two alvars within the project location. The boundaries of the alvars are presented in **Figure 2-1b (Appendix A)**.

The presence of candidate significant rare vegetation communities within 120 m of the Project Location will be confirmed during the SI. The plant species lists generated during the SI for areas suspected of containing alvar communities shall be compared to the list of alvar indicator plant species contained in Appendix N of the SWHTG (OMNR, 2000)

Specialized Habitat for Wildlife

Specialized habitat for wildlife are areas that support wildlife species that have highly specific habitat requirements (e.g., area-sensitive birds, obligate wetland species), are areas with

exceptionally high species diversity or community diversity (e.g., forest habitats with interior forest habitats, heterogeneous ecosystems), and are areas that provide habitat that greatly enhance species' survival (OMNR, 2000; OMNR, 2011a).

The SWHTG (OMNR, 2000) identifies many specialized habitats for wildlife, but this list has since been refined in the NHAG (OMNR, 2011a) and SWH Ecoregion 6E Criteria Schedules (OMNR, 2012). As outlined in Appendix B of the NHAG, 19 types of specialized habitats for wildlife are recognized, including:

- Habitat for Area-Sensitive Species (Interior Forest Breeding Birds);
- Habitat for Area-Sensitive Species (Open Country Breeding Birds);
- Old Growth or Mature Forest Stands;
- Forest Areas with Abundant Mast;
- Amphibian Breeding Habitat (Woodland);
- Amphibian Breeding Habitat (Wetland);
- Turtle Nesting Habitat;
- Woodland Raptor Nesting Habitat;
- Bald Eagle Nesting Habitat and Winter Feeding and Roosting Areas;
- Osprey Nesting, Foraging and Perching Habitat;
- Moose Calving Habitat;
- Moose Aquatic Feeding Habitat;
- Mineral Licks;
- Denning Sites;
- Seeps and Springs;
- Marsh Breeding Bird Habitat;
- Wolf Rendezvous Sites;
- Sharp-tailed Grouse Leks; and,
- Terrestrial Crayfish Habitat.

Based on consultation with the OMNR and a review of Appendix B of the NHAG (OMNR, 2011a), four specialized habitats for wildlife identified in the SWHTG are no longer considered in the assessment of candidate specialized habitats for wildlife, including:

- Forests Providing a High Diversity of Habitats;
- Highly Diverse Areas;
- Cliffs; and,
- Mink, Otter, Marten, and Fisher Denning Sites.

Based on consultation with the OMNR and a review of SWH Ecoregion 6E Criteria Schedule, five types of specialized habitats for wildlife are not considered to occur within or very near to the Project Location, including:

- Moose Calving Habitat;

- Moose Aquatic Feeding Habitat;
- Denning Sites;
- Wolf Rendezvous Sites; and,
- Sharp-tailed Grouse Leks.

No specialized habitats for wildlife are known from the Project Location. However, aerial photo interpretation and a review of wildlife records indicate specialized habitats may be present within 120 m of the proposed Project Location.

Habitat for Area-Sensitive Species (Interior Forest Breeding Birds)

Large, natural blocks of mature woodland habitat are important for interior forest breeding birds. Typically, interior forest breeding bird habitat is within mature (>60 years old) forest stands or woodlots 30 ha or greater in size with at least 10 ha of forest interior habitat (based on areas at least 200 m from the forest edge; OMNR, 2000). Area-sensitive birds are those species whose distribution is restricted to relatively large patches with forest interior habitat and are often missing from highly fragmented landscapes. Area-sensitive forest birds are heavily dependent on forest habitat metrics, such as percent forest cover and patch size, and forest quality (Sibley, 2001). Patch size appears to be dependent on forest cover, becoming more important in areas with less than 30 percent forest cover (Environment Canada, 2007).

As described in Table 1.3 of the SWH Ecoregion 6E Criteria Schedules, 13 woodland bird species are identified as potentially nesting in woodlands within Ecoregion 6E (OMNR, 2012). Based on a review of background information, 147 species of birds are known to occur within the Regional Study Area, which includes eight area-sensitive woodland species (Yellow-bellied Sapsucker, Red-breasted Nuthatch, Veery, Black-throated Green Warbler, Blackburnian Warbler, Ovenbird, Scarlet Tanager, and Winter Wren) listed for Ecoregion 6E. No candidate significant interior forest breeding bird habitats are known to occur within 120 m of the Project Location. Nonetheless, based on air photo interpretation and a review of LIO mapping, a number of large woodlands and wetlands providing forest interior habitat appeared to be present in the Project Location including OMNR woodlands 1, 9, 17, 18, 22, 23, and 34. For that reason, the presence of candidate significant interior forest breeding bird habitats within 120 m of the Project Location will be confirmed during the SI.

Habitat for Area-Sensitive Species (Open Country Breeding Birds)

Large fields with abundant vegetation and scattered trees and shrubs are important open country habitat for birds. A number of area-sensitive birds require areas of relatively large open grasslands as they are more likely to be buffered from disturbance, more likely to increase the distance of nesting habitat to woody edges (thereby reducing nest predation and parasitism), and provide more opportunities for nesting (OMNR, 2000). Grasslands with a variety of vegetation structure, density, and composition tend to support a greater diversity of grassland nesting birds because different species require different nesting habitat (OMNR, 2000). Other species nesting in these habitats may not require extensive areas, but have very specific habitat requirements which limit their distribution (OMNR, 2000). For these species, grasslands areas

provide essential food, cover and nesting habitat. Appendix Q in the SWHTG identifies large grasslands greater than 30 ha are likely most significant, and support and sustain a high diversity of these species, whereas open country habitats used for intense farming activity (i.e., row-cropping) are not considered candidate significant habitats for open country breeding birds (OMNR, 2000).

Table 1.3 of the SWH Ecoregion 6E Criteria Schedules lists six woodland bird species (Upland Sandpiper, Grasshopper Sparrow, Vesper Sparrow, Northern harrier, Savannah Sparrow, and Short-eared Owl) are identified as potentially nesting in open country habitat within Ecoregion 6E (OMNR, 2012). Based on a review of background information, 147 species of birds are known to occur within the Regional Study Area, of which all six listed open country breeding bird species are included.

The Project Location and 120 m setback is located within the Napanee Limestone Plain Important Bird Area (IBA). This IBA is centred around the town of Napanee with upland habitats occurring between Belleville and Kingston. The Napanee Limestone Plain IBA can generally be described as being a mosaic of shallow soil habitats (i.e., grassland), with scattered hawthorn or Red Cedar, and small wood-lots. The original clearing of the grassland habitats for settlement purposes has left them in early stages of succession, and have become important areas for grassland and alvar bird species (IBA Canada, 2011).

Based on OMAFRA Agricultural Land-Use Mapping (1:50,000), agriculture is the dominant land-use in the Project Location, signifying a large area of open land is present. The presence of candidate significant open country breeding bird habitat (non-agriculture fields) within 120 m of the Project Location will be confirmed during the SI.

Old Growth or Mature Forest Stands

True old growth, or mature, forest stands in southern Ontario are very rare due to past logging practices and development pressures (OMNR, 2000). Generally these forest sites are characterized by having a large proportion of trees in older age classes, many of them over 120 to 140 years old (OMNR, 2000). The undisturbed nature, closed canopy and moist growing conditions of mature forest stands allow environmental conditions to exist that cannot be found within younger wooded areas (OMNR, 2000). Mature forests that do exist provide significant habitat and contain a diversity of features such as various tree heights, species, and ages, tree cavities, fallen logs, fungi, and soil moisture conditions (OMNR, 2000).

The Project is located within the Great Lakes - St. Lawrence Forest Region's (OMNR, 2011a). Due to past settlement and rural development, agriculture, and forestry, the landscape has been, in many areas, fragmented (CRCA, 2006). The City of Kingston possesses an average forest cover of 34% (Beach, 2010). The forest cover in rural and urban areas for Loyalist Township ranges between 14% - 32% (CRCA, 2006). No candidate significant old growth or mature forest stands are known to occur within 120 m of the Project Location. Forested areas will be examined during the SI to determine the presence of old growth or mature forest stands within 120 m of the Project Location.

Foraging Areas with Abundant Mast

Mast-producing tree species are an important source of food for birds and mammals who consume the fruits and nuts (OMNR, 2000). Areas containing numerous mast-producing trees are important foraging areas, especially when the animals require energy rich food to help build fat reserves for the winter. Forest types which contain numerous American Beech and Red Oak trees supply energy-rich beechnuts and acorns, and open areas containing large patches of berry-producing shrubs are examples of foraging areas with abundant mast (OMNR, 2000).

Maintenance of large woodland tracts with mast-producing tree species is important for bears. Within the 6E Ecoregion, an isolated and distinct population of black bears is known to occur within the Bruce Peninsula (OMNR, 2012). As the Project Location is not proposed within the Bruce Peninsula area, specialized foraging habitat with abundant mast for bears does not apply.

The Project Location overlaps with the range of American Beech and Red Oak suggesting that potential candidate significant foraging areas with abundant mast are present within 120 m of the Project Location for other wildlife dependent on food resources produced from mast trees. The presence of candidate significant foraging areas with abundant mast within 120 m of the Project Location will be confirmed during the SI.

Amphibian Breeding Habitat (Woodland)

Amphibian woodland breeding habitats consist of pools, wetlands or lakes within or adjacent (120 m) to woodlands (OMNR, 2000). Such water bodies may be small and ephemeral (vernal), but nevertheless are important to local amphibian populations within a landscape, especially if they provide the only suitable habitat in the area (OMNR, 2000). The best breeding ponds are unpolluted and contain a variety of vegetation structures, both in and around the edge of the pond, for egg-laying and calling by frogs, damp closed-canopy adjacent habitats with dense undergrowth and moist fallen logs (OMNR, 2000). Sites with several ponds and/or ponds close to creeks are especially valuable (OMNR, 2000).

As described in the SWH Ecoregion 6E Criteria Schedules, seven amphibian species (Eastern Red-spotted Newt, Blue-spotted Salamander, Spotted Salamander, Gray Treefrog, Spring Peeper, Chorus Frog and Wood Frog) are identified in Ecoregion 6E (OMNR, 2012). Based on a review of background information, 15 species of amphibian are known to occur within the Regional Study Area, which includes six woodland breeding amphibian species identified in Ecoregion 6E (Eastern Red-spotted Newt, Spotted Salamander, Gray Treefrog, Spring Peeper, Chorus Frog and Wood Frog). Based on a review of available resources, no records of candidate significant amphibian woodland breeding habitats are available within 120 m of the Project Location. Nonetheless, based on air photo interpretation and a review of LIO and CRCA mapping, the presence of woodland area within 120 m of the Project Location containing wetland features suggested the potential presence of candidate significant amphibian woodland breeding habitat. OMNR woodlands containing wetland features include 1, 5, 9, 13, 14, 15, 17,

18, 19, 31 and 34. As such, the presence of candidate significant amphibian woodland breeding habitat within 120 m of the Project Location will be confirmed during the SI.

Amphibian Breeding Habitat (Wetland)

Wetland habitats support a high diversity of wildlife species, including amphibians such as bullfrogs (OMNR, 2000). Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within southern Ontario landscapes (OMNR, 2012). If logs and shrubs are present, the significance of the area increases because these habitat features provide additional shelter, concealment from predators, foraging opportunities and locations to call for mates (OMNR, 2012). Areas supporting breeding amphibians are important within southern Ontario landscapes, and any wetland supporting breeding bullfrog populations (or bullfrog concentration areas) is considered significant.

As described in the SWH Ecoregion 6E Criteria Schedules, 12 amphibian species (Eastern Red-spotted Newt, Blue-spotted Salamander, Spotted Salamander, Gray Treefrog, Spring Peeper, Chorus Frog, American Toad, Northern Leopard Frog, Pickerel Frog, Green Frog, Mink Frog and American Bullfrog) are identified in Ecoregion 6E (OMNR, 2012). Based on a review of the Ontario Herpetofaunal Summary Atlas (2011), 15 species of amphibian are known to occur within the Regional Study Area, which includes eleven of the amphibian species identified in Ecoregion 6E (excludes Blue-spotted Salamander). Based on a review of available resources, no records of candidate significant amphibian wetland breeding habitat are available within 120 m of the Project Location. Nonetheless, based on air photo interpretation and a review of LIO wetlands mapping, the presence of wetland area in, or within 120 m of, the Project Location suggested the potential presence of candidate significant amphibian wetland breeding habitat. LIO mapping shows the presence of twenty-four wetlands in, or within 120 m of the Project Location. There is evidence that marsh habitat (OMNR wetland 18) suitable for a Bullfrog concentration area may exist within 120 m of the Project Location. As such, the presence of candidate significant amphibian wetland breeding habitat in, or within 120 m of, the Project Location will be confirmed during the SI.

Turtle Nesting Habitat

Turtle nesting areas must provide sand and/or gravel that the turtles can dig their nests in, and are often south to south-west facing to maximize exposure to sunlight for egg incubation (OMNR, 2000). Sand and gravel beaches adjacent to shallow areas of marshes, lakes, and rivers are most frequently used (OMNR, 2012). If the turtle travels from the aquatic environment in search of a suitable nesting area, optimally, safe movement corridors will be present between the nesting and aquatic habitat (OMNR, 2000).

As described in the SWH Ecoregion 6E Criteria Schedules, three turtle species (Midland Painted Turtle, Snapping Turtle and Northern Map Turtle (*Special Concern*)) are identified in Ecoregion 6E (OMNR, 2012). Based on a review of background information, all three of these species of turtle are known to occur within the Regional Study Area. Based on a review of available resources, no records of candidate significant turtle nesting habitats are available

within 120 m of the Project Location. Nonetheless, based on air photo interpretation, the presence of woodlands and wetlands potential supporting turtle nesting habitat within 120 m of the Project Location suggested the potential presence of candidate significant turtle nesting habitat. As such, the presence of candidate significant turtle nesting habitat within 120 m of the Project Location will be confirmed during the SI.

Woodland Raptor Nesting Habitat

Raptors typically nest in intermediate-aged to mature woodlands that provide large sturdy trees for nesting and perching, and open understory flight and hunting prey (OMNR, 2000). Important factors in woodland nesting habitat selection for several species of raptors are species composition, size, and age of forest stand (OMNR, 2000). The SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) indicates that all natural woodlands or conifer plantations greater than 30 ha with 10 ha of interior forest habitat (determined by a 200 m buffer from the woodland edge) are considered to be candidate significant woodland raptor nesting habitat.

As described in the SWH Ecoregion 6E Criteria Schedules, six raptor species (Northern Goshawk, Cooper's Hawk, Sharp-shinned Hawk, Red-shouldered Hawk, Barred Owl, and Broad-winged Hawk) are identified (OMNR, 2012). Based on a review of background information, eight species of raptor listed above (Northern Goshawk, Cooper's Hawk, Sharp-shinned Hawk, Red-shouldered Hawk, Northern Saw-wheat, Broad-winged Hawk, Long-eared Owl and Barred Owl) are known to have occurred within the Regional Study Area. Based on a review of available resources, no records of candidate significant woodland raptor nesting habitats are available within 120 m of the Project Location. Nonetheless, the presence of breeding raptor species within the Regional Study Area and the presence of a large woodland (woodland 18) within 120 m of the Project Location, suggested the potential presence of candidate significant woodland raptor nesting habitat. As such, the presence of candidate significant woodland raptor nesting habitat within 120 m of the Project Location will be confirmed during the SI.

Bald Eagle Nesting Habitat and Winter Feeding and Roosting Areas

Bald Eagles use shoreline habitat associated with lakes and large rivers (rarely small lakes and rivers) for nesting and foraging (OMNR, 2000). As Bald Eagles are predominantly fish-eating birds, productive areas of open water or deep-water marshes supporting large quantities of fish are required to feed growing young (OMNR, 2000). Nests are usually built in large trees near shore or over water and are often reused, becoming extremely large as new nest material is added each year (OMNR, 2000). The Bald Eagle shows a distinct preference for islands with no particular preference for mixed, coniferous, or deciduous forest, but do show a preference for live trees and conifers in Ontario for nesting purposes, in open old growth forest/mature stands with 30% - 50% canopy cover (OMNR, 2000). Large trees (with a diameter at breast height greater than 60 cm) with crotches large enough to support the large nest are essential. They typically require an area of 255 ha for nesting, shelter, feeding, and roosting, and build nests within 50 to 200 m from the shoreline (Cadman *et al.*, 2007; OMNR, 2000). Nests are typically near the top of the nest tree, which must provide an unobstructed view and flight path in all

directions (OMNR, 2000). Bald Eagles require an area of approximately 255 ha for nesting, shelter, feeding, and roosting (OMNR, 2000).

Bald Eagles winter along shorelines of large waterbodies that provide areas of open water, with abundant and accessible fish (OMNR, 2000). Bald Eagles roost in large trees growing in shoreline forest stands or on cliffs (OMNR, 2000). The location of winter roosting sites changes within and among winters depending upon ice conditions and fish distribution, but the same general areas are used traditionally and often the same trees will be used year after year (OMNR, 2000). An abundant supply of undisturbed mature trees or snags distributed evenly along a shoreline is important to ensure that eagles can alter their winter distribution patterns depending upon ice conditions and fish distribution (OMNR, 2000). Snags are preferred for perches and roosts, as are tall trees with large horizontal branches and should provide an unobstructed view (OMNR, 2000).

Based on a review of background information, Bald Eagles are not known to occur in the Project Location, and no evidence of breeding has been documented for the Regional Study Area in the OBBA (Cadman *et al.*, 2007). Records of possible and confirmed breeding occurred in the Gananoque/Ivy Lea region east of Kingston along the St. Lawrence River (Cadman *et al.* 2007). Based on the absence of Bald Eagle sightings during the breeding season, the absence of nearby large lakes and rivers suitable for nesting (8 km from Lake Ontario shoreline), and the habitat preferences of Bald Eagles in Ontario, it is unlikely that this species is nesting within 120 m of the proposed Project Location. Nonetheless, the rare status of the Bald Eagle (*Special Concern*), and records of possible/probable/confirmed breeding occurring regions nearby justifies the identification of candidate significant Bald Eagle nesting habitat. For that reason, the presence of candidate significant Bald Eagle nesting habitat and winter feeding and roosting areas within 120 m of the Project Location will be confirmed during the SI.

Osprey Nesting, Foraging and Perching Habitat

Similar to Bald Eagles, Osprey use shoreline habitat associated with lakes and large rivers (rarely small lakes and rivers) for nesting and foraging (OMNR, 2000). As Osprey are obligate fish-eating birds, productive areas of open water or deep-water marshes supporting large quantities of fish are required to feed growing young (OMNR, 2000). Most nesting sites are located in mixed forest habitat, but nests may also occur in coniferous and deciduous stands (OMNR, 2000). Dead coniferous trees are preferred for nesting and nests are usually at the top of the tree, but occasionally are in crotches and isolated trees are usually selected as opposed to groups of trees (OMNR, 2000). Almost all nests have an unobstructed view, and there is usually a tall perch nearby for the male (OMNR, 2000). Nests are typically used year after year, sometimes for decades (OMNR, 2000).

Based on a review of background information, Ospreys are known to occur in the vicinity of the Project Location. The OBBA (Cadman *et al.*, 2007) clearly shows a strong presence of breeding Osprey throughout the Frontenac Axis and along the northern shore of Lake Ontario and the St. Lawrence River. The Odessa Lake Swamp PSW provides areas of open water and cattail marshes which provide quality foraging habitat and likely provides quality perches via

dead trees along its edges. Given that the Odessa Lake Swamp is greater than 120 m from the Project Location. Based on air photo interpretation, the presence of wetlands potentially supporting suitable dead trees occurring within 120 m of the Project Location suggested the potential presence of candidate significant Osprey nesting, perching and foraging habitat. As such, the presence of candidate significant Osprey nesting, perching, and foraging habitat within 120 m of the Project Location will be confirmed during the SI.

Mineral Licks

Mineral licks are upwellings of sodium rich groundwater that are visited by wildlife to replenish sodium levels which had been depleted from the consumption of plants that are much higher in potassium than sodium in the spring (OMNR, 2000). In Ecoregion 6E, mineral licks are most commonly sought after by white-tailed deer in the spring. These sites are rare, occurring most frequently in areas of sedimentary and volcanic bedrock and rarely in areas of granitic bedrock except where the site is overlain by calcareous glacial till (OMNR, 2000). Based on a review of background information, there are no mineral licks known in the Project Location. The region is also characterized by limited calcareous till and sediments of lacustrine clays, underlain by clay till materials with a minimum of pebbles and boulders. Subsequently, the identification of mineral licks was not carried forward to the SI.

Seeps and Springs

Seeps and springs are areas where groundwater has come to the surface, often within forested headwater areas of coldwater streams (OMNR, 2000). These groundwater seepages may support numerous species, potentially providing habitat for plants, animals (e.g., fish), and/or feeding and drinking areas. Those that occur within forested areas where the canopy maintains cool, shaded conditions are most important (OMNR, 2000).

As described in the SWH Ecoregion 6E Criteria Schedules, White-tailed Deer, Wild Turkey and Ruffed Grouse typically use seeps and springs in Ecoregion 6E (OMNR, 2012). Based on a review of background information, there are no known seeps or springs in the Project Location. The presence of candidate significant seeps and springs within 120 m of the proposed Project Location will be confirmed during the SI.

Marsh Breeding Bird Habitat

Wetlands for marsh bird species are typically productive and fairly rare in southern Ontario landscapes, but are the preferred habitat of many of Ontario's birds (OMNR, 2000). As outlined in the SWH Ecoregion 6E Criteria Schedules, all wetland habitat is to be considered candidate significant marsh breeding bird habitat as long as there is shallow water with emergent aquatic vegetation present (OMNR, 2012).

As described in the SWH Ecoregion 6E Criteria Schedules, 14 species of marsh birds (American Bittern, Virginia Rail, Sora, Common Gallinule, American Coot, Pied-billed Grebe, Marsh Wren, Sedge Wren, Common Loon, Sandhill Crane, Green Heron, Trumpeter Swan,

Black Tern, and Yellow Rail) are identified as listed species (OMNR, 2012). Based on a review of background information, 147 species of birds are known to occur within the Regional Study Area including eight marsh bird species described in the SWH Ecoregion 6E Criteria Schedules (American Bittern, Virginia Rail, Sora, Pied-billed Grebe, Marsh Wren, Common Loon, Green Heron, and Black Tern) have been identified within the Regional Study Area. Based on a review of available resources, no records of candidate significant marsh breeding bird habitats are known within 120 m of the Project Location. Nonetheless, the presence of marsh birds in proximity to the Project Location and the presence of wetlands potentially supporting marsh breeding habitat within 120 m of the Project Location suggests the potential presence of candidate significant marsh breeding habitat. As such, the presence of candidate significant marsh breeding habitat within 120 m of the Project Location will be confirmed during the SI.

Terrestrial Crayfish Habitat

Terrestrial crayfish (*Cambarus diogenes* and *Fallicambarus fodiens*) are burrowers which spend most of their life constructing and living within a network of tunnels (OMNR, 2012). To ensure that their tunnels remain well formed, terrestrial crayfish usually tunnel in soils that are not too dry or moist. Tunnels are therefore created in marshes, mudflats, and meadows where suitable moisture levels exist (OMNR, 2012). In Canada, terrestrial crayfish are only found within southwestern Ontario and their habitat is very rare. Accordingly, *Cambarus diogenes* are considered a rare species (S3 species). Meadow marsh ecosites should be surveyed for terrestrial crayfish (OMNR, 2012).

As the Project Location is not within the habitat range of terrestrial crayfish, the presence of terrestrial crayfish habitat will not be determined during the SI.

Summary for Rare Vegetation Communities or Specialized Habitat for Wildlife

Based on the RR, candidate SWH (specialized habitat for wildlife) that are either known to occur (or that may potentially occur) within 120 m of the Project Location include:

- Alvar;
- Interior Forest Breeding Bird Habitat (Area-Sensitive and Declining Species);
- Open Country Breeding Bird Habitat (Area-Sensitive and Declining Species);
- Old Growth or Mature Forest Stands;
- Foraging Areas with Abundant Mast;
- Amphibian Breeding Habitat (Woodland);
- Amphibian Breeding Habitat (Wetland);
- Turtle Nesting Habitat;
- Woodland Raptor Nesting Habitat;
- Bald Eagle Nesting Habitat and Winter Feeding and Roosting Areas;
- Osprey Nesting, Foraging and Perching Habitat;
- Seeps and Springs; and,
- Marsh Breeding Bird Habitat.

The potential presence of these candidate significant natural features within 120 m of the Project Location will be confirmed during the SI.

2.2.4.3 Animal Movement Corridors

Animal movement corridors are habitats that link two or more wildlife habitats that are critical to the maintenance of a population of a particular species or group of species (particularly in highly fragmented landscapes; OMNR, 2000). These corridor habitats serve a key ecological function to enable wildlife to move between areas of SWH or core natural areas with a minimum of mortality (OMNR, 2012; OMNR, 2011a). Animal movement corridors are elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another (OMNR, 2000). These corridors may include valleylands, dense vegetated riparian buffer areas, and hedgerows, and are potentially used by a variety of wildlife species including migratory and breeding birds, reptiles and amphibians. However, as outlined in the SWHTG (OMNR, 2000), hedgerows should not be considered significant unless they provide the only animal movement corridors in the area.

Given the rarity of shrubby riparian areas and forested river valleys in the vicinity of the Project Location, wider hedgerows composed of dense shrubs and trees likely provide animal movement corridors and thus, candidate SWH. The Central Cataraqui Region Natural Heritage Study for Loyalist Township identifies core habitats within the township and linkages that occur between them. This study shows a habitat linkage to occur between Odessa Lake and habitat areas south of the Project Location that crosses the south-western corner of the Project Location (**Figure 2-1a, Appendix A**). This linkage is shown to consist of habitat of an intermediate value between Unity Road and Highway 401 (Loyalist Township, 2010).

As outlined in Appendix B of the NHAG (OMNR, 2011a), two types of animal movement corridors are recognized, including:

- Deer Migration corridors; and,
- Amphibian Corridors.

Deer Migration Corridors

Deer migration corridors can be extremely important in allowing access to habitats that provide cover and food from harsh winter elements and are important for deer movement between their summer and winter range (OMNR, 2012). However, it is often difficult to observe deer using corridors (OMNR, 2000). Deer migration corridors typically follow riparian areas, woodlots, and/or areas of physical geography (ravines or ridges).

As outlined in the SWH Ecoregion 6E Criteria Schedules, movement corridors must be determined when winter deer yard habitat is confirmed as SWH. However, as outlined in Section 2.2.4.1, no winter deer yard areas (or congregation areas) have been identified by the

OMNR. In addition, the absence of large wooded ravines associated with riparian areas suggests that significant deer migration corridors are absent within the Project Location.

The SWHTG states that hedgerows should not be considered significant natural features unless they provide the only animal movement corridors in the planning area. The SWHTG also states that the presence of large wooded ravines associated with riparian areas justifies exclusion of hedgerows as significant natural features unless they provided connection between winter deer yard areas. No winter deer yards are known within the Project Location, and therefore, it is unlikely that candidate significant deer migration corridors will be identified during the SI.

Amphibian Corridors

Movement corridors for amphibians migrating from their terrestrial habitat to breeding habitat can be extremely important for local populations as they can provide safe movement between the two seasonal habitats (OMNR, 2012). As identified in the SWH Ecoregion 6E Criteria Schedules, amphibian movement corridors must be identified when amphibian breeding habitat is confirmed as SWH. The current RR determined that the presence of amphibian breeding habitat (woodland and wetland) is unknown for the Project Location (see Section 2.2.4.2), and therefore, the presence of amphibian corridors is also unknown. However, woodland and wetland habitat that could potentially support amphibian breeding populations are abundant throughout, or within proximity to, the Project Location and suggest the presence of amphibian movement corridors. The presence of candidate significant amphibian movement corridors within 120 m of the Project Location will be confirmed during the SI.

The SWHTG states that hedgerows should not be considered significant natural features unless they provide the only animal movement corridors in the planning area. The SWHTG also states that the presence of large wooded ravines associated with riparian areas justifies exclusion of hedgerows as significant natural features unless they provided connection between amphibian breeding habitats and terrestrial habitats. The presence of hedgerows within 120 m of the Project Location that may be considered candidate significant amphibian corridors will be confirmed during the SI.

Summary for Animal Movement Corridors

One habitat linkage was documented to occur within the Project Location, though the value of this linkage is undetermined. The presence of a wildlife movement corridor within this habitat linkage area will be examined in the SI to determine whether it fits the description of animal movement corridors as described by the SWHTG. No winter deer yards are known within the Project Location, and therefore, it is unlikely that candidate significant deer migration corridors will be identified during the SI. The presence of amphibian breeding habitat is unknown for the Project Location, and therefore, the presence of amphibian corridors is also unknown. Woodland and wetland habitat that could support amphibian breeding populations are abundant throughout the Project Location and suggest the presence of amphibian movement corridors. The presence of amphibian movement corridors within 120 m of the Project Location will be confirmed during the SI.

2.2.4.4 Habitat of Species of Conservation Concern

The NHAG (OMNR, 2011a) lists five categories of habitat of species of conservation concern which require identification:

- Rare or substantially declining species, or species that have a high percentage of their global population in Ontario and are rare or uncommon in the planning area;
- Species that are rare within the planning area, even though they may not be provincially rare;
- *Special Concern* species listed on the SARO List in Ontario's *ESA*, and which are formally referred to as "*Vulnerable*" in the SWHTG;
- Species that are listed as rare or historical in Ontario based on records kept by the NHIC (S1 is Extremely Rare, S2 is Very Rare, S3 is Rare to Uncommon); and,
- Species identified as nationally *Threatened* or *Endangered* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), which are not protected in regulation under Ontario's *ESA*.

The RR identified 27 species of conservation concern potentially occurring within natural features in, or within 120 m of, the Project Location (**Appendix F**).

Based on Appendix B of the NHAG (OMNR, 2011a), habitats of species of conservation concern are divided into three categories, including:

- *Special Concern* and Provincially Rare - Plant Species;
- *Special Concern* and Provincially Rare - Other Species; and,
- Declining Guilds - Shrubland Birds.

Within the context of O.Reg. 359/09, habitat of species of conservation concern does not include habitats of species that have been designated *Threatened* or *Endangered* under the *ESA*. Information on *Threatened* and *Endangered* species is provided under a separate document as part of the APRD.

Special Concern and Provincially Rare – Plant Species

Of the 27 species of conservation concern identified in the RR to be potentially occurring within the Project Location, six species are plants. Two species are listed as S2 (Brainerd's Hawthorn and Stiff Gentian), two species are listed as S3 (Carolina Whitlow-grass and Smith's Bulrush), one species is listed as SX (Bowman's-root), and one species is listed as SH (Branching Burreed). The habitat requirements and likelihood of observation of these species within the Project Location are summarized in **Table 2-6 (Appendix B)**. None of the six plant species of conservation concern potentially occurring in the Project Location are listed as *Special Concern*.

The exact locations of these plant species are not available through the NHIC database and therefore, it is unknown if these species are present within 120 m of the Project Location. The presence of candidate significant habitat of species of conservation concern (plant species) will be confirmed during the SI.

Special Concern and Provincially Rare – Other Species

Of the 27 species of conservation concern identified in the RR to be potentially occurring within the Project Location, there are six species of birds, four species of mammals, five reptile species, one amphibian species, two odonata and three lepidopteran species. These 21 wildlife species are listed and their preferred habitat and likelihood of observation within the Project Location is summarized in **Table 2-6 (Appendix B)**.

Nine of these species are listed as *Special Concern* and these include: Black Tern, Common Nighthawk, Golden-winged Warbler, Northern Map Turtle, Snapping Turtle, Five-lined Skink (Great Lakes Population), Eastern Ribbonsnake, and Eastern Milksnake. In their RR advisory letter, OMNR indicated that only the Black Tern was expected to occur in the immediate Project Location (OMNR, Letter Dated August 4, 2011; **Appendix C**). Though three additional species of *Special Concern* were expected to occur in the general area: the Short-eared Owl, Northern Map Turtle, and Snapping Turtle. During their winter raptor surveys in March 2011, Stantec (Stantec, 2011) observed a single Short-eared Owl in proximity to the intersection of County Road 19 and Howes Road. The exact locations of Snapping Turtle and Northern Map Turtle are not available through the NHIC database. As a result, it is unknown if these species are present within 120 m of the Project Location.

Eight provincially rare species having an Ontario S-Rank of S1, S2, or S3 were identified in the RR. These species included: Small-footed Myotis, Northern Myotis, Little Brown Myotis, Northern Pipistrelle, Rough-legged Hawk, Wilson's Phalarope, Spring Bluet, Halloween Pennant, Giant Swallowtail, Hickory Hairstreak, and Juniper Hairstreak. In February 2012, Northern Myotis and Little Brown Myotis were listed as *Endangered* under the *Species at Risk Act* (SARA). The OHA indicated that Western Chorus Frog, a federally designated *Threatened* species under SARA, is also a likely resident of the Kingston region.

The presence of candidate significant wildlife habitat of species of conservation concern and provincially rare species (other species) will be confirmed during the SI.

Declining Guilds – Shrub/Successional Breeding Birds

The general decline of avian species associated with shrubland and early successional habitats has been identified as a conservation concern in southern Ontario (Cadman *et al.*, 2007; Ontario Partners in Flight, 2008). As described in the SWH Ecoregion 6E Criteria Schedules, eight species of shrubland/early successional birds (Brown Thrasher, Clay-coloured Sparrow, Field Sparrow, Black-billed Cuckoo, Eastern Towhee, Willow Flycatcher, Yellow-breasted Chat, and Golden-winged Warbler) are listed as potentially occurring in Ecoregion 6E (OMNR, 2012).

The RR indicated that seven of these species (excluding the Yellow-breasted Chat) are known to occur in proximity to the Project Location.

A provincial species of Special Concern, Golden-winged Warblers breed in successional/shrub, or old field habitats surrounded by forests. The Frontenac Axis represents a provincial hot-spot for Golden-winged Warbler density due to the presence of a mosaic of abandoned and marginal farmland, rock barrens, wetlands, and forest. Candidate significant Golden-winged Warbler habitat was considered in conjunction with general shrub/successional breeding bird habitat.

The Project Location is primarily associated with agricultural lands and woodlands, though shrubland/early successional habitat does occur within the Project Location. Nonetheless, the presence of shrubland/early successional species in proximity to the Project Location suggests the potential presence of candidate significant habitat for species of conservation concern (declining guilds - shrubland birds) within 120 m of the Project Location. As such, the presence of candidate significant habitat for species of conservation concern (declining guilds - shrubland birds) within 120 m of the Project Location will be confirmed during the SI.

Summary for Habitat of Species of Conservation Concern

Twenty-seven species of conservation concern and an additional six shrub/successional breeding bird species were identified in the RR to be potentially occurring within the Project Location. The exact locations of these species are not available through the NHIC database and therefore, it is unknown if these species are present within 120 m of the Project Location. The presence of these species and of candidate significant wildlife habitat in the form of habitat of species of conservation concern will be confirmed during the SI.

2.2.5 Areas of Natural and Scientific Interest (ANSI)

Correspondence with the OMNR indicated that no Areas of Natural and Scientific Interest (ANSI), either Life Science or Earth Science, are located within the Project boundary (OMNR, 2011a). A review of the NHIC database (NHIC, 2010) identified the Odessa Lake Life Science Site and the Odessa Lake Swamp International Biological Program Site adjacent to, but outside of, the western Project boundary. The Howe's Road Alvar Life Science Site occurs south of the Project Location.

The Odessa Lake Life Science Site spans 243 ha and provides a representative example of a swamp forest, scrubland, and marshland association that occurs in a poorly drained area. The presence of five different plant communities is an indication of the species richness and diversity at this site (CRCA, 2006; NHIC, 2010). The Odessa Lake Swamp International Biological Program Site spans a total area of 233 ha and is located at the head of Odessa Lake, and consists of a widespread wetland in a broad limestone plain. It demonstrates a well developed transition between open lake aquatics and marshes, to swamps, thickets, and deciduous and mixed forests (a total of ten forest communities; CRCA, 2006; NHIC, 2010).

The SI will confirm that the boundaries of these three areas do not extend into the Project Location or are found within 120 m of the Project Location.

2.2.6 Provincial Parks and Conservation Reserves

A review of the NHIC database (NHIC, 2010) and consultation with the OMNR revealed that there are no provincial parks in the Project Location, or within 120 m of the proposed Project Location.

The proposed Project Location is not located within the Niagara Escarpment Plan, the Oak Ridges Moraine Conservation Plan Area or the Protected Countryside of the Greenbelt Plan.

2.2.7 Summary of the Records Review

The results of the RR indicated that the following natural features occur or may occur within 120 m of the Project Location:

- Woodlands (35 woodlands present);
- Wetlands (24 unevaluated wetlands);
- Wildlife Habitat:
 - Habitats of Seasonal Concentrations of Animals:
 - Colonial Bird Nesting Sites;
 - Waterfowl Stopover and Staging Areas;
 - Waterfowl Nesting Sites;
 - Shorebird Migratory Stopover Areas;
 - Raptor Wintering Areas;
 - Reptile Overwintering Habitat;
 - Bat Hibernacula and Maternal Colonies;
 - Rare Vegetation Communities or Specialized Habitat for Wildlife:
 - Rare Vegetation Communities;
 - Interior Forest Breeding Bird Habitat (Area-Sensitive and Declining Species);
 - Open Country Breeding Bird Habitat (Area-Sensitive and Declining Species);
 - Old Growth or Mature Forest Stands;
 - Foraging Areas with Abundant Mast;
 - Amphibian Breeding Habitat (Woodland);
 - Amphibian Breeding Habitat (Wetland);
 - Turtle Nesting Habitat;
 - Woodland Raptor Nesting Habitat;
 - Bald Eagle Nesting Habitat and Winter Feeding and Roosting Areas;
 - Osprey Nesting, Foraging and Perching Habitat;
 - Seeps and Springs;
 - Marsh Breeding Bird Habitat;
 - Terrestrial Crayfish Habitat;
 - Animal Movement Corridors:
 - Amphibian Corridors;

- Habitat of Species of Conservation Concern:
 - *Special Concern* and Provincially Rare - Plant Species;
 - *Special Concern* and Provincially Rare - Other Species; and,
 - Declining Guilds - Shrubland Birds.

A summary of natural features identified in the RR are presented in **Table 2-7 (Appendix B)**.

All *Threatened* and *Endangered* species (Species at Risk [SAR]) protected under Ontario's *Endangered Species Act* (ESA 2007) are presented and discussed separately from this NHA and EIS. They are instead presented in the REA application to the MOE as a component of the APRD, once a separate SAR Report has been approved by the OMNR.

An SI is required to confirm the presence and boundaries of these features, as well as determine whether any additional natural features exist in, or within 120 m of, the proposed Project Location (see Section 3.0).

3.0 SITE INVESTIGATION

Section 24(2) of O.Reg. 359/09 requires that the proponent of a renewable energy project conduct a Site Investigation (SI), in accordance with Section 26 of the Regulation. As outlined in Section 26(1), the purpose of the SI consists of a "...*physical investigation of the air, land and water within 120 metres of the Project Location*" and includes the following:

- Confirming the accuracy of the assessment made in the RR and identifying any required corrections;
- Determining if there are any additional natural features present within 120 m of a Project Location that were not identified in the RR;
- Determining the boundaries of natural features located within 120 m of a Project Location that were identified during the RR;
- Determining the distance from the Project Location to the boundaries of the natural features identified within 120 m of a Project Location; and,
- The OMNR and EC are to be consulted on proposed work plans for the Project. Feedback and suggested methodologies for the completion of field investigations are to be provided by the OMNR and EC and are subsequently incorporated into the SI's work plan. The Peterborough District OMNR provided comment on the proposed SI work plan during a meeting with AMEC on July 26, 2011. The OMNR continued to provide guidance and clarification throughout the SI process.

Data collected during the RR concerning natural features and species occurrences were used to guide the scope and direction of the SI. AMEC personnel responsible for conducting the SI are listed, with their respective role indicated, in **Table 3-1, Appendix B**. *Curricula vitae* are provided in **Appendix G**.

3.1 Site Investigation Methodology

Site Investigations occurred between June 2011 and February 2012. The SI program involved various surveys conducted to determine what wildlife species and habitat types were present within the Project Location or within 120 m of the Project Location. These surveys focused on identifying various species and wildlife habitat features outlined in the SWHTG (OMNR, 2000). The location of all field investigations was based primarily on the need to assess all natural features found within the Project Location, or within 120 m of the Project Location. The resulting spatial extent of the SI and the diverse habitat types covered by the overall survey program provide a comprehensive description, characterization, and assessment of the various flora and fauna species found in the Project Location.

Non-participating properties that will not be developed by the Proponent and therefore have not been leased the Proponent, but contained natural features that fell within 120 m of the proposed Project Location were surveyed and assessed where possible. However, some of these non-leased properties and natural features were evaluated using Alternative Investigations (in accordance with Section 26(1.1) of O.Reg 359/09) as land access was denied by some non-

participating landowners, or because site conditions were hazardous to field staff. Alternative Investigations are addressed in Section 3.1.9. Survey dates, times, duration, field personnel and weather conditions are presented in **Table 3-2 (Appendix B)**.

3.1.1 Vegetation Community and Vascular Plant Assessment

Field investigations to identify vascular plants, vegetation communities and woodland boundaries located within 120 m of the Project Location were conducted between July and October 2011. A preliminary review of vegetation communities was conducted through aerial photograph interpretation and the review of existing natural features mapping prior to commencement of the SI. The Project Location and associated 120 m was traversed on foot. Vegetation communities were described to community series based on the Ecological Land Classification (ELC) for Southern Ontario (Lee *et al.*, 1998). Polygons not adequately described under Lee *et al.* (1998), particularly cultural lands, were assigned new ELC codes according to a revised ELC Community Table (Lee *et al.*, Unpublished). Common and scientific nomenclature of plant species follows that used in the NHIC database. Common nomenclature is used throughout the text of this report but corresponding scientific nomenclature is presented for every species in the tables found in **Appendix B**.

3.1.2 Woodlands

Information regarding woodlands' size, ecological characteristics and function was collected during ELC surveys and through GIS analysis. Woodlands were defined using the definitions provided in both the O.Reg. 359/09 and the NHAG (OMNR, 2011a): "...a treed area, woodlot or forested area, other than a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees, that is located south and east of the Canadian Shield as shown in Figure 1 in the Provincial Policy Statement issued under section 3 of the Planning Act and approved by the Lieutenant Governor in Council by Order in Council No. 140/2005" and areas containing "...1000 trees of any size, 750 trees over 5 cm in diameter, 500 trees over 12 cm, or 250 trees over 20 cm".

3.1.3 Wetlands

Principles of the *Ontario Wetland Evaluation System (OWES) Southern Manual* (OMNR, 2002) protocol were applied to delineate all wetland features within 120 m of the Project Location. Wetlands extending beyond the 120 m setback were delineated based on aerial photograph interpretation in accordance with the methods also outlined in the *OWES Southern Manual* (OMNR, 2002). The criteria used in delineation of wetland features included: 1) presence of wetland indicator vegetation species, 2) presence of hydric soil conditions, and 3) evidence of water existence at some period(s) of the year. Four wetland types (bog, swamp, marsh and fen) recognized by OWES and the Canadian Wetland Classification system were used to categorize and describe the wetland features identified in the RR and SI. All wetlands were assessed and delineated between November and December 2011 by an OWES certified AMEC biologist. Survey dates, times, and field personnel are summarized in **Table 3-2 (Appendix B)**.

3.1.4 Valleylands

This presence of valleylands was determined during ELC surveys and through GIS analysis. The NHAG (OMNR, 2011a) defines a valleyland as “...a natural area that is south and east of the Canadian Shield and occurs in a valley or other landform depression that has flowing or standing water for some period of the year”. For well-defined valleys, the physical boundary is generally defined by the stable top-of-bank or the predicted top-of-bank (also known as top of slope or top of valley) and for a less well-defined valley or stream corridor, the physical boundary may be defined in a number of ways including the consideration of riparian vegetation, the flooding hazard limit, the meander belt or the highest general level of seasonal inundation (OMNR, 2009). The RR did not identify any valleylands in, or within 120 m of, the Project Location.

3.1.5 Wildlife and Wildlife Habitat

Wildlife species were identified based on visual sightings, unique vocalizations, or other evidence such as tracks, trails, carcasses, scat, nests, burrows, structures, gnawing marks, cocoons, tree damage, and other signs of wildlife activity in the area. Visual searches also included assessing all candidate SWH attributes such as vernal pools, ponds, snags, mast trees, seeps, raptor nests, heronries, marshes, dense conifer stands, mature forests or mineral licks when possible, as well as identifying and delineating suitable habitat for SAR. Field personnel were knowledgeable in the identification of a variety of wildlife and wildlife habitats. Together, all field surveys provided a thorough four-season study (including the winter surveys in Stantec, 2011) of the flora and fauna existing within the Project Location. All species observed over the course of the SI are listed in **Appendix F**. The presence of wildlife species were considered in the assessment of wildlife use of the various habitat types found within the Project Location, and in the determination of candidate SWH.

3.1.5.1 Wildlife Habitat

Wildlife habitat features and evidence of wildlife presence within 120 m of the Project Location were recorded primarily during the ELC surveys in addition to various targeted wildlife habitat surveys, woodland and wetland assessments conducted between June and October 2011. Survey dates, times, weather conditions and field personnel are summarized in **Table 3-2 (Appendix B)**. These surveys focused on identifying the various habitat features outlined in the SWHTG (OMNR, 2000). These wildlife habitat features included, but were not limited to: vernal pools, bat or reptile hibernacula, animal movement corridors, seeps and springs, den sites, stick nests, beaver dams, SWH dead trees (snags), tree cavities, rock piles and downed woody debris (DWD).

3.1.5.2 Bat Maternity Roost and Hibernacula Surveys

Searches for candidate bat maternity roosts and hibernacula were conducted concurrently with ELC surveys and hedgerow, woodland and wetland assessments between July and October 2011. As no current Ontario guidelines for bat inventories exist, bat survey protocols were guided by *Bats and Bat Habitats: Guidelines for Wind Projects* (OMNR, 2010c). Searches for potential maternity roosts focused primarily on cavity-roosting bat species which, in Ontario, include Little Brown Myotis, Northern Myotis, Small-footed Myotis, Big Brown Bat, and Silver-haired Bat. These species roost in cavities or crevices afforded by loose bark, hollow trees, rock faces, and human structures such as attics, walls and bat boxes (OMNR, 2010c). Dying trees and snags having a large diameter at breast height (DBH) were inspected closely for possible roost entrances including woodpecker holes, cracks, and loose bark as well as for evidence of rotting within the trunk. Ontario foliage-roosting bat species, including Red Bat, Hoary Bat, and Eastern Pipistrelle, roost singularly or in small groups high up in the tree canopy and are difficult to observe.

Ontario hibernating bat species include Little Brown Myotis, Northern Myotis, Small-footed Myotis, Big Brown Bat, and Eastern Pipistrelle. Searches for potential bat hibernacula identified by the presence of cave or karst features were conducted within 120 m of the Project Location. Survey dates, times, weather conditions and field personnel are summarized in **Table 3-2 (Appendix B)**.

3.1.5.3 Reptile Surveys

Surveys for potential reptile hibernacula habitat were conducted concurrently with ELC surveys and hedgerow, woodland and wetland assessments between June and October 2011. These surveys were intended to identify the presence of reptile habitat or potential habitat. Potential snake hibernacula consist of features that would provide a route underground, including buried concrete or rock (e.g., old building foundations), rock crevices or animal burrows (OMNR, 2012). Potential turtle overwintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen (OMNR, 2012). Survey dates, times, weather conditions and field personnel are summarized in **Table 3-1 (Appendix B)**.

3.1.5.4 Species of Conservation Concern

Surveys for habitat of species of conservation concern or *Special Concern* were conducted in conjunction with ELC, vegetation surveys, and general wildlife habitat surveys as described in Section 3.1.5.1.

Searches for habitat of species of *Special Concern* included, but were not limited to:

- Short-eared Owl;
- Common Nighthawk; and,
- Monarch.

Searches for habitat of species of conservation concern included, but were not limited to:

- Shrub/successional birds;
- Wilson's Phalarope;
- Giant Swallowtail;
- Hickory Hairstreak; and,
- Juniper Hairstreak.

Critical habitats of Small-footed Myotis, Northern Myotis, and Little Brown Myotis (three cavity-roosting species), and Eastern Pipistrelle (foliage-roosting species) were searched for in concert with general bat maternity roost and hibernacula searches. Critical habitat of these species is not easily distinguished from that of other cavity-roosting and foliage roosting bat species. Further reference to these bat species will occur in the context of these general bat critical habitats.

Habitat for Rough-legged Hawk was identified in conjunction with raptor wintering areas as the species does not breed in southern Ontario, but will overwinter in open country habitats containing steady abundant rodent populations in southern Ontario. Further reference to Rough-legged Hawk will occur in the context of raptor wintering areas.

Western Chorus Frog inhabits wetland areas and ephemeral ponds similar to those inhabited by other frog species. Habitat surveys for this species were undertaken concurrently with amphibian breeding woodland, amphibian breeding wetland, and amphibian movement corridor searches as conducted during ELC, vegetation, wetland, and general wildlife habitat surveys. Further reference to suitable Western Chorus Frog habitat will occur in the context of the three significant amphibian habitats.

Few critical details are known about Vernal Bluet and Halloween Pennant habitat, though these species utilize aquatic habitats that contain expanses of open water as well as vegetation surrounding these aquatic features. Due to the survey efforts required for wetland evaluation and the provincial protection offered to wetland areas, it was assumed that any critical habitats for these odonata species were treated as other candidate SWH types.

Applicable survey dates, times, weather conditions and field personnel are summarized in **Table 3-1 (Appendix B)**.

3.1.6 Areas of Natural and Scientific Interest (ANSI)

Site Investigations were conducted along the eastern boundaries of the Odessa Lake Life Science Site and the Odessa Lake Swamp International Biological Program Site in concert with wetland surveys to confirm that these two areas were indeed located outside of the western Project boundary, as identified in the RR. These surveys consisted of examining the eastern boundaries of these features in the field and on aerial photos.

3.1.7 Alternative Investigations

In accordance with Section 26(1.1) of O.Reg 359/09, Alternative Investigations were conducted in instances where field personnel were unable to physically conduct proper SI to determine the presence of candidate significant natural features within 120 m of the Project Location. Table 7 of the NHAG (OMNR, 2011a) provides a list of instances where conducting an SI would not be reasonable, as well as information which is required to be provided in the SI report to support the decision to use Alternative Investigations. Alternative Investigations were conducted in response to situations hindering the completion of physical SI by field personnel, such as:

- The SI presented a safety hazard to field personnel; and/or,
- Access to land adjacent to the Project Location was not granted by the landowner.

Efforts to obtain permission to access all lands within 120 m of the Project Location were made by mail, phone, and in person. A copy of a registered letter mailed to all participating and non-participating landowners owning land within 120 m of the Project Location, requesting permission to access these lands, is provided in **Appendix H. Table 3-3 (Appendix B)** presents the dates and methods in which attempts were made to contact these landowners and the responses received from them. **Figure 3-1 (Appendix A)** illustrates the properties that required Alternative Investigations and **Table 3-3 (Appendix B)** provides a summary of the rationale for conducting Alternative Investigations for each (as required by Section 5.1 of the NHAG; OMNR, 2011a).

Areas within 120 m of the Project Location that were inaccessible due to factors described above were observed from fencelines, roadsides, or other vantage points providing a view of the area from within lands where access was permissible. Alternative Investigation methods also included various desk-top analyses and aerial photograph interpretations (including rough ELC surveys) in order to better describe and categorize the habitats on inaccessible lands.

3.2 Site Investigation Results

3.2.1 Overview

Detailed results of the SI program conducted for the Project are provided below. For each natural feature located within 120 m of the Project Location, the location, boundaries and the distance from the Project Location are provided. Field notes for each survey conducted as part of the SI are provided in **Appendix I**. Corrections to the RR as a result of the SI are provided in the relevant sections below and are summarized in Section 3.2.9.

The Project Location and lands within 120 m of the Project Location were predominantly comprised of actively cultivated lands, formerly cultivated lands which have undergone various degrees of succession, cultural meadows, cultural thickets, shrublands, woodlands, and wetlands. Croplands in the Project Location consisted of hay, soybeans, corn, sod and grazed pasture and the 5-year agricultural histories of all fields within 120 m of the Project Location are presented in **Appendix J**.

A total of 62 ELC vegetation communities were identified within 120 m of the Project Location through SI and aerial photo interpretation and these consisted of a wide diversity of vegetation types including deciduous, coniferous and mixed-wood forests, deciduous and thicket swamps, woodlands, shallow and meadow marshes, cultural areas (meadow, thickets, savannah and woodlands) and areas of natural regeneration. These 62 ELC communities are described in detail in **Table 3-4 (Appendix B)** and are shown on **Figures 3-2a-f (Appendix A)**. The mixture of vegetation communities identified within the Project Location reflects both the natural history of the area and a continuous disturbance regime caused by various agricultural practices.

The SI confirmed the absence of valleylands within the Project Location.

3.2.2 Vegetation Survey Results

During the SI, 202 species of vascular plants were recorded, of which 161 species (80%) were native and 41 (20%) were exotic (**Appendix K**). Many of the exotic species existed primarily in the anthropogenic communities and along the edges of agricultural fields; however, exotic species were also present in many woodlands. The majority (93%) of the native species observed are ranked S5 (Common and Secure in Ontario) and only 7% are ranked S4 or S4S5 (Apparently Secure in Ontario). No other rare plant species were found within 120 m of the Project Location. A complete list of plant species observed in the Project Location and adjacent lands is provided in **Appendix J**.

All vegetation communities found within the Project Location or within 120 m of the Project Location, are ranked S5 (Common and Secure in Ontario) and are mapped on **Figures 3-2a-f (Appendix A)**.

The RR had identified five rare vegetation communities within or close to the Project Location: 1) Northern Dropseed - Little Bluestem - Scirpus-like Sedge Alvar Grassland Type (ALO1-3; rank S2S3); 2) White Cedar - White Spruce - Philadelphia Panic Grass Treed Alvar Grassland Type (ALO1-4; rank S3); 3) Tufted Hairgrass - Canada Bluegrass - Philadelphia Panic Grass Alvar Grassland Type (ALO1-5; rank S2S3); 4) Red Cedar - Early Buttercup Treed Alvar Grassland Type (ALT1-5; rank S2); and 5) Graminoid Coastal Meadow Marsh Type (MAM4-1; rank S2). None of these communities were identified during the SI.

3.2.3 Woodlands Survey Results

Twenty-six of 35 woodland features identified in the RR were confirmed as woodland features in the SI. However, some of the 35 woodland features were found to be discontinuous features (based on the minimum percent cover criteria outlined in the NHAG; OMNR, 2011a) and were therefore divided. In total, the SI identified 34 woodland features within the Project Location or within 120 m of the Project Location. These 34 candidate significant woodlands are shown on **Figure 3-3 (Appendix A)** and a description of the attributes, composition, functions, and proposed distance to project components for each woodland is presented in **Table 3-5 (Appendix B)**.

As a result of the SI (ELC, vegetation survey and woodland assessment), the following suggested corrections were made to the RR for woodlands:

- Woodlands 11 and 20 did not qualify as woodlands, but rather were hedgerow features;
- Woodland 15 was divided into three woodlands: 15, 40 and 41;
- Woodland 10 was divided into three woodlands, one of which occurred within 120 m of the Project Location;
- Woodland 6 was too small to be considered a woodland as defined by the NHAG;
- The canopy cover provided by woodlands 3, 9, and 21 was less than 60% and was therefore not considered to meet the criteria of a forest as defined in the ELC manual; and,
- Woodland features 36, 37, 38, and 39 were not previously identified as woodlands in the RR. These may not have been previously identified due to minimum size criteria.

All 34 woodland features were considered candidate significant woodlands and will be carried forward to the Evaluation of Significance (EoS; Section 4).

3.2.4 Wetlands Survey Results

A total of 24 unevaluated wetlands were identified during the RR within 120 m of the proposed Project Location. The SI revealed that a total of 16 wetlands were found to occur in and within 120 m of the proposed Project Location. Descriptions of all wetlands are provided in **Table 3-6 (Appendix B)** including the distance from each wetland to the nearest project component.

Wetlands in the Project Location were typically swamps of the deciduous and mixed types, as well as marshes (**Table 3-6, Appendix B**). Deciduous swamps were dominated by soft maples (Red, Silver, Freeman), Green Ash and occasionally Black Ash and Yellow Birch, whereas mixed swamps were dominated by Eastern White Cedar, soft maples and Green Ash. Thicket swamps, consisting of species such as Red-osier Dogwood and willow species (Pussy Willow, Black Willow and Slender Willow) were present, as well as Cattail and/or Reed-canary Grass meadow and shallow marshes. Wetland vegetation communities occurring within 120 m of the Project Location, as identified in the field during the SI, are shown in **Figure 3-4 (Appendix A)**. Functional wetland assessments are provided in EoS (Section 4.0).

No rare species or wetland community types were identified in, or within 120 m of the Project Location. In addition, no unclassified wetlands were hydrologically or directly connected to Odessa Lake Swamp (**Figure 3-4, Appendix A**).

Provincially Significant Wetlands

The SI revealed that no provincially significant wetlands are present in, or within 120 m of the project Location.

Locally Significant Wetlands

No locally significant wetlands were identified in, or within 120 m of, the Project Location as reported in the RR (**Figure 2-1b**).

Other Significant Wetlands

As a result of the SI, 16 wetlands were identified to occur within 120 m of the Project Location (**Figure 3-4, Appendix A**). Corrections made to wetland information gathered in the RR are addressed in Section 3.2.9. Ten features (or part thereof) identified as woodlands in the RR were also identified as wetlands (**Figure 2-1b, Appendix A**).

As outlined in the NHAG (OMNR, 2011a), applicants proposing projects within 120 m of an unevaluated wetland (but not within the wetland itself) can choose to treat the wetland as provincially significant and conduct an EIS, provided the criteria and procedures found in the Wetland Characteristics and Ecological Functions Assessment for Renewable Energy Projects are followed (Appendix C of the NHAG). This assessment tool was used and each of the 16 unevaluated wetlands found within 120 m of the Project Location were treated as significant and proceeded to an EoS (Section 4).

The OWES manual states on page 13 that “wetlands smaller than 2 ha (5 acres) will not be evaluated. However, very small wetlands can sometimes provide important habitat for wildlife or be important for other reasons.” The OWES manual further states on page 28 that “The minimum size of a wetland type for mapping purposes is normally 0.5 ha... small wetland areas often contain regionally or even provincially rare species and should be recognized and included in the wetland map...” Wetland features smaller than 2 ha were included in the EoS to determine whether rare species or other special features were present. Consequently, a full EoS using the OWES methodology will not be undertaken for wetlands 13 and 26 which occur within the Project Location. Both of these wetlands are smaller than 0.3 ha.

3.2.5 Valleylands Survey Results

Site Investigations conducted concurrently with ELC surveys and wildlife habitat assessment surveys confirmed that no valleylands occur in, or within 120 m of the Project Location.

3.2.6 Wildlife Habitat Results

3.2.6.1 Habitats of Seasonal Concentrations of Animals

The 14 types of habitats of seasonal concentrations areas for animals are:

- Winter Deer Yards;
- Moose Late Winter Habitat;
- Colonial Bird Nesting Sites;
- Raptor Wintering Areas;
- Wild Turkey Winter Range;
- Turkey Vulture Summer Roosting Areas;

- Waterfowl Stopover and Staging Areas;
- Waterfowl Nesting Sites;
- Shorebird Migratory Stopover Areas;
- Landbird Migratory Stopover Areas;
- Reptile Overwintering Areas;
- Bat Hibernacula and Maternal Roosts;
- Bullfrog Concentration Areas; and
- Migratory Butterfly Stopover Areas.

Seven candidate habitats of seasonal concentrations of animals were considered to potentially occur within 120 m of the Project Location including: colonial bird nesting sites, waterfowl stopover and staging areas, waterfowl nesting sites, shorebird migratory stopover areas, raptor wintering areas, reptile overwintering areas and bat hibernacula and maternity roosts. The results of the SI were used to confirm the presence of these features within 120 m of the Project Location, as well as to identify additional habitats of seasonal concentrations of animals that might exist within 120 m of the Project Location. The designation of habitats of seasonal concentrations of animals as candidate SWH is largely dependent on the ELC communities found therein. ELC communities found in each candidate significant seasonal concentration area, as well as the distance to the nearest project component, are presented in **Table 3-7 (Appendix B)**. Candidate SWH were carried forward to an EoS (Section 4.0)

Site Investigations confirmed the absence of winter deer yards, moose late winter habitat, land bird migratory stopover areas, Turkey Vulture summer roosting areas, and migratory butterfly stopover areas. As previously stated in Section 2.2.4.1, Wild Turkey winter range was not surveyed during the SI. As stated in the Record Review, Bullfrog breeding habitat was investigated within the context of amphibian breeding habitat (wetland).

Colonial Bird Nesting Sites

Colonial birds are a diverse group including several species of herons, gulls, terns, and swallows. The RR indicated that colonial nesting bird habitat may occur in the Project Location in the form of heronries or swallow colonies. This was attested to the woodland or swamp habitat and a strong cultural presence in the Project Location as seen in aerial photography and LIO mapping.

Great Blue Heron and Green Heron were observed in the Project Location during the SI. Generally, herons nest in trees in swamps and along large bodies of water. Although ELC surveys recorded large tracts of Swamp Maple Deciduous Swamp (SWD3-3) and Green Ash Deciduous Swamp (SWD2-2) partially within the Project Location, no existing heronries were recorded.

Cliff Swallows generally colonize anthropogenic structures including the underside of bridges, barns, and the eaves of buildings while Bank Swallows colonize eroded slopes, embankments, or the walls of ditches or gravel pits. Table 1.1 of the Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) provides criteria for the identification of candidate colonially-nesting bird breeding habitat and recognizes any site with exposed soil banks, undisturbed or disturbed, or naturally eroding that is not a licensed/permitted aggregate site. Candidate significant habitat

does not include man-made structures or recently (two years) disturbed soil area, such as berms, embankments, or soil or aggregate stockpiles. Licensed/permitted mineral aggregate operations are also not considered candidate SWH. No natural or undisturbed embankments suitable for swallow colonization were observed in, or within 120 m of, the Project Location.

Candidate significant colonial nesting bird sites for ground nesting colonial birds is identified as any rocky island or peninsula (natural or artificial) within a lake or large river (OMNR, 2012). Though Ring-billed Gull, Herring Gull and Caspian Tern were observed in the Project Location during the SI, no shoreline or island habitat suitable for gull or tern nesting was observed during the SI.

The SI determined that no colonial bird nesting sites were located within 120 m of the Project Location, and therefore, this wildlife habitat feature will not be carried forward to an EoS.

Waterfowl Stopover and Staging Areas

During migration, waterfowl require stopover areas that supply food to replenish energy reserves, resting areas, and cover. There are two types of waterfowl stopover and staging areas: terrestrial and aquatic. Terrestrial areas can be fields which temporarily flood during spring, providing important habitat for migrating waterfowl. Aquatic areas would be ponds, marshes, lakes and other more permanently wet areas which provide important habitat for both local and migrating waterfowl (OMNR, 2012). Table 1.1 of the Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) states that active agricultural fields are not considered candidate SWH.

The RR indicated that waterfowl stopover habitat was unlikely to occur in the Project Location but could develop due to the presence of agricultural fields which could flood in the spring and summer. Agricultural lands covered much of the Project Location and very little flooding or pooling resulted from rains experienced in the fall. Consequently, no terrestrial waterfowl stopover and staging habitat is considered to occur within the Project Location. Though ponds containing permanent water occurred throughout the Project Location, many such ponds were very small (<20 m in diameter) or occurred in close proximity to rural properties (**Figure 3-4, Appendix A**). None of the ponds occurring in, or within 120 m of the Project Location were considered to be candidate aquatic waterfowl stopover and staging areas.

No candidate waterfowl stopover and staging areas occurred within 120 m of the Project Location, and therefore, waterfowl stopover and staging areas will not be carried forward to an EoS.

Waterfowl Nesting Sites

Waterfowl nesting sites are generally large, undisturbed areas with an abundance of ponds and wetlands. Vegetation is an important component of waterfowl nesting sites as most species nest in grassy cover, shrubby fields adjacent to wetlands, or in tree cavities along shorelines or swamps (OMNR, 2000).

The RR indicated that waterfowl nesting sites were not known to occur in the Project Location, but that a large marsh did occur. Table 1.2.2 of the Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) states that candidate significant waterfowl nesting sites extend 120 m from a wetland (>0.5 ha) or a wetland (>0.5 ha) and any small wetlands (0.5 ha) within 120 m or a cluster of three or more small (<0.5 ha) wetlands within 120 m of each individual wetlands where waterfowl nesting is known to occur.

The large meadow marsh occurring within 120 m of the Project Location did not contain open ponds suitable for feeding and, as a result, no candidate significant waterfowl nesting sites were identified within 120 m of the Project Location. Therefore, waterfowl nesting sites will not be carried forward to an EoS.

Shorebird Migratory Stopover Areas

Migrating shorebirds require productive feeding areas during migration due to the long migration from northern breeding grounds to their southern wintering grounds. Suitable stopover areas are characterized by beach areas, un-vegetated mudflats, and rocky shorelines. Such stopover sites occur within proximity to the shorelines of the Great Lakes due to their location along migration routes and because wave action maintains large and productive beaches (OMNR, 2000). The Lake Ontario shoreline and associated inlets, bays and harbours typically provide the best habitat for migrating shorebirds. The Draft SWH Ecoregion 6E Criteria Schedule (2012) identifies shorelines of riparian wetlands, usually muddy and non-vegetated, as key habitat characteristics of shorebird migratory stopover areas, whereas intensive agricultural fields are not included within these habitat criteria (OMNR, 2012).

As previously mentioned in the RR, no significant shorebird stopover areas are known within the 120 m setback, the Project Area is located approximately 8 km from the Lake Ontario shoreline, and the SWH outlines that only suitable habitats for shorebird stopover areas occurring within 5 km of shoreline can be considered candidate. Though ELC codes listed in the SWH Ecoregion 6E Criteria Schedule as suitable migrating shorebird habitat were present in the Project Location (e.g., MAM1), these areas did not contain open areas providing suitable mudflat, shallow pool, or shoreline habitat for shorebird foraging. As a result, no candidate significant shorebird migratory stopover areas were identified within 120 m of the Project Location and, therefore, this wildlife habitat feature will not be carried forward to an EoS.

Raptor Wintering Areas

The RR indicated that although raptor wintering areas were not known to occur in the Project Location, that suitable habitat may occur due to the presence of old field habitat. Open fields, including hayfields, pastures, and meadows that support large and productive small mammal populations (e.g., mice, voles) are important to the winter survival of many birds of prey (OMNR, 2000). In addition, scattered fence posts or snags for perches, and relatively mature mixed or coniferous woodlots nearby for roosting are important areas for wintering raptors (OMNR, 2000). As the Project Location is dominated by open agricultural areas, suitable

habitat for wintering raptors was observed in the Project Location. The open nature of the area with trees and fence posts for perching provide hunting grounds while conifer stands and more mature woodlands would provide roosting areas.

Table 1.1 of the Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) provides criteria for the identification of candidate significant raptor wintering areas. Candidate SWH is greater than 20 ha with a combination of forest and upland. Undisturbed sites or lightly grazed field/meadow greater than 15 ha with adjacent woodlands may also be included as candidate SWH.

The SI identified six candidate raptor wintering SWH (WR1, WR2, WR3, WR4, WR5 and WR6; **Figure 3-5, Appendix A**). These six natural features provide large roosting and perching areas in the form of cedar stands, mixed and deciduous forest, and hedgerows, and provide a variety of habitat types suitable for foraging (e.g., hayfields, pastures, old field, and bedrock meadow). With the exception of lands cultivated with sod or row crops, much of the Project Location was identified as candidate significant raptor wintering areas. Old field habitats as well as rarely disturbed hay fields occurring within the Project Location extend far beyond the boundaries of the Project Location, creating large patches of raptor habitat. The six candidate raptor wintering SWH identified within 120 m of the Project Location will be carried forward to an EoS (Section 4.0).

Raptor wintering areas in, or within 120 m of, the Project Location were found to contain candidate Short-eared Owl SWH. Because Short-eared Owl habitat in Ontario may consist of both wintering and breeding habitat, habitat of this species will be addressed in Section 3.2.6.4.

Reptile Overwintering Habitat

Reptile hibernacula consist of two categories of habitat, snake and lizard hibernacula and turtle overwintering sites.

Table 1.1 of the Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) provides criteria for the identification of candidate significant reptile hibernacula. Candidate significant snake hibernacula may occur in animal burrows, rock crevices, and other areas that enable the animals to hibernate below the frost line and often in association with water to prevent desiccation (OMNR, 2012). Wetlands may also be used as over-wintering habitat. Frequently, hibernacula are found in rock piles, rubble and old foundations as well, which provide an abundance of suitable subterranean crevices. Though the RR indicated that no snake hibernacula habitat was known within the Project Location, it did indicate that two snake (Eastern Milksnake and Eastern Ribbonsnake) and one lizard (Five-lined Skink- Great Lakes/ St. Lawrence population) species of *Special Concern* occur within the Regional Study Area and may occur in the Project Location.

The Eastern Ribbonsnake is semi-aquatic and most frequently found along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required and adjacent upland areas may be used for nesting (COSEWIC, 2002c). The Eastern Milksnake is best known for occurring in rural areas

and most frequently reported in and around buildings, especially old structures (COSEWIC, 2002a). However, the Milksnake is found in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types. Proximity to water and suitable locations for basking and egg-laying are also important features of Milksnake habitat.

The Great Lakes/St. Lawrence population of the Common Five-lined Skink is associated with rocky outcrops in areas of mixed deciduous and coniferous forest. Temperature-regulating features are important aspects of skink habitat. Long loose rocks on open bedrock areas provide suitable basking habitat. Skink habitat is also associated with local temporary and permanent water features such as ponds, streams, or temporary pools. Five-lined Skink nests underneath rocks that sit atop thin layers of moss or lichens. Skinks in Minnesota have been found deep within bedrock fissures and it is possible that Ontario's South Shield population may do the same.

Shallow soils less than 40 cm cover much of the Project Location and have resulted in the exposure of limestone bedrock in many areas. In southern Ontario, the average winter frost line extends 4 m below the soil surface. As a result, it is expected that rock piles occurring within the Project Location are not suitable snake hibernacula due to the shallow depth of soils that would occur beneath them. Ten features (SH1, SH3, SH4, SH7, SH26, SH27, SH28, SH30, SH33 and SH43) with potential to support snake hibernacula were identified within 120 m of the Project Location (**Figure 3-5, Appendix A, and Table 3-7, Appendix B**).

As they are habitat generalists, no candidate significant Eastern Ribbonsnake or Eastern Milksnake habitat was identified. Fifteen wetlands were identified in, or within 120 m of, the Project Location. It is anticipated that the protection afforded to these natural features will preserve ribbonsnake habitat as described above. Ten candidate significant snake hibernacula features were identified in or within 120 m of the Project Location and will be carried forward to an EoS (Section 4.0).

Despite the presence of exposed bedrock throughout the Project Location, no habitat characteristic of the Great Lakes/St. Lawrence population was identified in, or within 120 m of, the Project Location. Rocky outcrops featuring loose rocks or even sizeable downed woody debris were found in proximity to water. No candidate Common Five-lined Skink SWH will be carried forward to an EoS.

Turtle over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen (OMNR, 2012). These areas may support congregations of turtles if overwintering habitats are limited (OMNR, 2012). The RR indicated that although no turtle overwintering habitat was known within the Project Location, habitat features suitable for these sites may be present.

The presence of Snapping Turtles and Northern Map Turtles in the Regional Study Area, as reported in the RR, indicated that this species may occur within the Project Location. Snapping

Turtles are widespread throughout southern Ontario. Ponds, sloughs, shallow bays or river edges, and slow streams, or areas combining several of these wetland habitats provide suitable habitat for snapping turtles. This species prefers waterbodies that provide a soft muddy bottom and abundant emergent vegetation. Snapping Turtles are tolerant of disturbance and will in habitat man-made ponds, ditches and canals. Northern Map Turtles prefer slow-moving, mud-bottomed river and lakes with abundant emergent vegetation (COSEWIC 2002). In Ontario, this species is linked to larger bodies of water. Suitable habitat contains abundant basking sites exposed to the sun such as rocks and deadheads. Hibernation occurs at the muddy bottom of lakes and rivers.

Four potential turtle over-wintering sites (TOW6, TOW8, TOW11 and TOW14) were identified within 120 m of the Project Location (**Figure 3-5, Appendix A, and Table 3-7, Appendix B**) and were identified as candidate SWH. This candidate SWH feature will be carried forward to an EoS.

Due to the lack of sizeable lakes, rivers, or waterbodies deep enough for map turtle hibernation in, or within 120 m of, the Project Location, no candidate Northern Map Turtle SWH will be carried forward to an EoS.

During the SI, one dead Snapping Turtle was found along the northern edge of Unity Road within 120 m of the Project Location. This carcass was well removed from any proposed panel blocks and suitable wetland habitat. Habitat for Snapping Turtles was identified in two areas (TOW6 and TOW14) within 120 m of the Project Location (**Figure 3-7, Appendix A**). These man-made ponds are sparsely vegetated and do not likely does not support a thriving population of Snapping Turtles. A local landowner reported seeing a large turtle crossing a sod field south of woodland 13. No Snapping Turtles were observed in these ponds during the SI. For this reason, no candidate Snapping Turtle SWH will be carried forward to an EoS.

Bat Hibernacula

Many species of bats overwinter in caves or abandoned mines with remote and restricted openings with sufficient space for entry and with interior air temperatures slightly above freezing, relative humidity levels above 90%, and sufficient space for roosting (OMNR, 2000). Table 1.1 of the Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) provides criteria for the identification of candidate significant bat hibernacula. Candidate bat hibernacula may include caves, mine shafts, underground foundations, and karsts.

In accordance with the results of the RR, no bat hibernacula features (e.g., caves, abandoned mines) were identified within 120 m of the Project Location during the SI.

Bat Maternity Colonies

Loose bark, hollow trees, snags or rock faces may provide maternity roosts, but buildings are most commonly used roosts structures (Fenton, 1970). Large diameter trees (living or dead)

that are relatively open from adjacent vegetation are requirements for important natural roosts of forest-dwelling bats (Kunz and Lumsden, 2003).

Table 1.1 of the Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) provides criteria for the identification of candidate significant bat maternity colonies. Candidate significant bat maternity colonies must be located in mature deciduous or mixed forest stands greater than 10 ha. Candidate roost trees must have a density at breast height (DBH) greater than 25 cm and snags in early stages of decay are preferred.

Five snags or trees with a DBH greater than 25 cm and containing cavities suitable for supporting maternity colonies were observed in or within 120 m of the Project Location. All five occurred in hedgerow features and did not display any evidence of bat habitation such as guano, scratch marks, or animals present.

The SI determined that candidate significant bat maternity roost and hibernaculum habitat does not occur within 120 m of the Project Location, and therefore, no candidate significant bat habitat will be carried forward to an EoS.

Monarch Butterfly

The RR indicated that no critical Monarch Butterfly habitat is expected to occur within the Project Location due to its removal from Great Lakes shoreline. Monarch Butterfly habitat exists primarily wherever milkweed (*Asclepius*) and wildflowers such as goldenrods, asters, and Purple Loosestrife exist, including abandoned farmland, along roadsides, and other open spaces where these plants grow (COSEWIC, 2010). However, significant habitat for monarchs is generally associated with areas of considerably dense patches of Common Milkweed. Though a large percentage of the Project Location consists of cultural meadow, no dense patches of milkweed were observed. In the absence of dense food plants and the great distance from Lake Ontario, candidate SWH for this species was not identified in or within 120 m of the Project Location. Monarch butterflies and their larvae were observed sporadically throughout the Project Location during the late summer migration; however, no area showed a distinct concentration of monarchs.

Summary

Of the seven seasonal concentration habitats considered to potentially occur in, or within 120 m of, the Project Location in the RR, three were confirmed to occur during the SI.

3.2.6.2 Rare Vegetation Communities or Specialized Habitat for Wildlife

Rare Vegetation Communities

Rare vegetation communities are those that are considered rare in the province. Generally, community types with S-Ranks of S1 to S3 (Extremely Rare to Rare – Uncommon in Ontario), as defined by the NHIC, could qualify. These habitats are considered to be at risk and are likely

to support additional wildlife species that are considered significant. The RR indicated the potential presence of seven rare vegetation communities in the Project Location as well as the presence of two alvars.

Upon inspection during the SI, no rare vegetation communities were observed in, or within 120 m of, the Project Location. It was determined that alvar lands, indicated by the OMNR as occurring within the Project Location (**Figure 2-1b, Appendix B**), were currently used as sod fields and high intensity pasture lands (**Figure 3-2c, d, Appendix A**). Cultural and bedrock meadow communities occurred in old pasture lands west of these aforementioned agricultural lands (**Figure 3-2c**). These lands exhibited shallow soil ranging in depth between 15 cm to 35 cm, as well as areas of exposed limestone pavement. No limestone pavement occurred within 120 m of the Project Location. Despite shallow soil depths and areas of limestone pavement, no alvar indicator species as listed in **Appendix N** of the SWHTG (OMNR, 2000) were observed. Vegetation communities in these areas were dominated by cultural species and reflected the cultural usage of these lands in recent history. It is expected that the cultural influence of past grazing cattle or other agricultural practices has taken its toll on native vegetation of this open country habitat. Though vegetation studies were conducted in from August to October, a high proportion of cultural species (>50%) was recorded.

Specialized Habitat for Wildlife

Specialized habitats for wildlife are microhabitats that are critical to some wildlife species. The SWHTG identifies the following 19 potential specialized habitats:

- Habitat for Area-sensitive Species (Interior Forest Breeding Birds);
- Habitat for Area-sensitive Species (Open Country Breeding Birds);
- Old Growth or Mature Forest Stands;
- Forest Areas with Abundant Mast;
- Amphibian Breeding Habitat (Woodland);
- Amphibian Breeding Habitat (Wetland);
- Turtle Nesting Habitat;
- Woodland Raptor Nesting Habitat;
- Bald Eagle Nesting Habitat and Winter Feeding and Roosting Areas;
- Osprey Nesting, Foraging and Perching Habitat;
- Moose Calving Habitat;
- Moose Aquatic Feeding Habitat;
- Mineral Licks;
- Denning Sites;
- Seeps and Springs;
- Marsh Breeding Bird Habitat;
- Wolf Rendezvous Sites;
- Sharp-tailed Grouse Leks; and,
- Terrestrial Crayfish Habitat.

Specialized habitat for wildlife identified in the RR to potentially occur within the Project Location included: habitat for area sensitive species (interior forest breeding birds), habitat for area-

sensitive species (open country breeding birds), old-growth or mature forest stands, amphibian woodland breeding habitat, amphibian wetland breeding habitat, turtle nesting habitat, raptor nesting habitat, Osprey nesting and foraging habitat, seeps and springs, and marsh breeding bird habitat. The results of the SI were used to confirm the presence of these features within 120 m of the Project Location, as well as to identify additional specialized habitat for wildlife that might exist within 120 m of the Project Location.

The designation of specialized habitat for wildlife as candidate SWH is largely dependent on the ELC communities found therein. ELC communities found in each candidate significant specialized habitat for wildlife, as well as the distance to the nearest project component, are presented in **Table 3-8 (Appendix B)**. Candidate SWH were carried forward to an EoS (Section 4.0).

Habitat for Area-sensitive Species (Interior Forest Breeding Birds)

Interior forest breeding birds typically prefer large (>30 ha), mature (>60 yrs old) forest stands that contain at least 10 ha of interior habitat. Interior habitat is defined as forest habitat that occurs at least 200 m from the outside forest edge.

A total of 34 woodlands were present in, or within 120 m of, the Project location, only four (1, 13, 14, and 18) of which are greater in area than 30 ha. The interior habitat was calculated for those four woodlands and it was determined that woodland 18 contained 40.4 ha of interior forest habitat and is the only woodland that contains more than 10 ha of interior habitat (**Table 3-8, Appendix B**) found in, or within 120 m of the Project Location.

Based on the presence of interior forest habitat, woodlands all five woodlands listed above have been identified as candidate SWH in the form of interior forest breeding bird habitat and this candidate SWH feature will be carried forward to the EoS.

Habitat for Area-sensitive Species (Open Country Breeding Birds)

Open country breeding birds prefer larger grasslands including natural and cultural fields and meadows. The decline of grassland birds has been identified as a conservation concern across Ontario (Cadman *et al.*, 2007). Grasslands such as hay fields, active and inactive pastures, old fields, bedrock meadows, and alvar habitat covered 58% of the lands studied.

Though much of the grassland habitat within the Project Location consisted of hay fields, 240.5 ha was comprised of bedrock meadow and old field habitat. Hay fields are considered sub-optimal habitat given that the first removal of hay occurs during the breeding season (mid-late June).

Candidate SWH for open country breeding birds was identified during the SI in conjunction with the vegetation community surveys and assessment, and while collecting information on the agricultural history of the open country fields present in the Project Location. All grassland habitats larger than 30 ha were identified as candidate SWH (**Figure 3-6, Appendix A**). Areas

actively used for agricultural practices such as croplands, hay fields, and sod farms, and areas farmed in the last five years were not included as candidate significant open country breeding bird habitat.

Eight natural features (OCBB1, OCBB2, OCBB3, OCBB4, OCBB6, OCBB7, OCBB8 and OCCB9) supporting open country breeding bird habitats were identified in the Project Location (**Table 3-8, Appendix B**). Five of the nine habitat areas were greater than 30 ha (OCBB2, OCBB3, OCBB4, OCBB7 and OCCB9) and were identified as candidate SWH in the form of open country breeding bird habitat (**Figure 3-6, Appendix A**). These five candidate SWH will be carried forward to the EoS (Section 4.0).

Old Growth or Mature Forest Stands

True old growth, or mature, forest stands in southern Ontario are very rare due to past logging practices and development pressures (OMNR, 2000). Generally these forest sites are characterized by having a large proportion of trees in older age classes, many of them over 120 years old (OMNR, 2000). The undisturbed nature, closed canopy and moist growing conditions of mature forest stands allow environmental conditions to exist that cannot be found within younger wooded areas (OMNR, 2000). Mature forests that do exist provide significant habitat and contain a diversity of features such as various tree heights, species, and ages, tree cavities, fallen logs, fungi, and soil moisture conditions (OMNR, 2000).

The Project is located within the Great Lakes-St. Lawrence Forest Region's (OMNR, 2011a). Due to past settlement and rural development, agriculture, and forestry, the landscape has been, in many areas, fragmented (CRCA, 2006). No candidate SWH in the form of old growth or mature forest stands were identified within 120 m of the Project Location during the SI. This wildlife habitat feature type will not be carried forward to an EoS.

Amphibian Breeding Habitat (Woodland)

Amphibian woodland breeding ponds provide critical habitat for several species of frogs and salamanders. Such water bodies are often small and ephemeral, yet may be important to local amphibian populations if they provide the only suitable habitat in the area. They typically consist of vernal pooling, wetlands or other sources of standing water and are located adjacent to, or within, a woodland (OMNR, 2000). Surveys for candidate SWH in the form of woodland amphibian breeding habitat were conducted during the woodland ELC and vegetation surveys, and during amphibian roadside surveys. The Project Location and 120 m setback areas are composed of a mosaic of agricultural fields, pastures, old fallow fields, early successional meadow, shrublands, and woodlands of various ages (e.g., young regenerating, mid-aged, mature). Amphibian breeding woodland habitat exists primarily as mid-aged mineral deciduous swamps (ELC code: SWD). These communities are generally described as having a tree cover higher than 25%, they experience variable flooding regimes ranging between temporary vernal pooling to standing water, and they are typically fern and sedge rich (Lee *et al.*, 1998). The deciduous swamp ecosites present within 120 of the Project Location, and considered to be candidate SWH in the form of amphibian breeding woodland habitat are primarily green ash

dominated swamps. Black ash, bur oak and swamp maple dominated swamps have also been identified as potential amphibian breeding woodland habitat within 120 of the Project Location. Deciduous and mixed forests (ELC codes: FOD and FOM, respectively), and a deciduous hedgerow are also vegetation communities included as candidate SWH in the form of amphibian breeding woodland habitats.

The Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) states that candidate woodland amphibian breeding habitat consists of a wetlands, lake, or pond within or adjacent (within 120 m) to a woodland (of no minimum size) or woodlands with permanent ponds or those containing water in most years until mid-July.

Nine natural features (ABF1, ABF2, ABF4, ABF5, ABF9, ABF10, ABF14, ABF15 and ABF16; occurring in woodlands 1, 5, 4, 7, 14, 19, 12, n/a and 1 respectively) considered candidate SWH in the form of amphibian breeding woodland habitat were identified. Four of these features (ABF1, ABF2, ABF9, and ABF10) were identified in the RR as being potential amphibian woodland breeding sites. All nine candidate amphibian breeding woodland SWH will be carried forward to an EoS (Section 4.0). These nine candidate SWH natural features are shown in **Figure 3-6 (Appendix A)** and are described in **Table 3-6 (Appendix B)**.

Amphibian Breeding Habitat (Wetland)

Wetland habitats support a high diversity of wildlife species (OMNR, 2000). Wetlands supporting breeding habitat for amphibians are extremely important and fairly rare within southern Ontario (OMNR, 2012). If logs and shrubs are present, the significance of an area increases because these habitat features provide additional shelter, concealment from predators, foraging opportunities and locations to call for mates (OMNR, 2012). Areas supporting amphibian breeding wetland habitat are important within southern Ontario landscapes, and any wetland supporting breeding bullfrog populations (or bullfrog concentration areas) is considered significant.

Surveys for candidate SWH in the form of amphibian breeding wetland habitat were conducted during the wetland evaluations, ELC surveys, vegetation surveys, and during amphibian roadside surveys.

Potential amphibian breeding wetland habitats exist within the Project Location and 120 m setback as a variety of vegetation communities, mainly meadow marshes (ELC code: MAM). These meadow marsh habitats are subject to variable flooding regimes, and are dominated by emergent hydrophytic macrophytes such as rushes, sedges, reed canary grass, as well as woody species such as willows (Lee *et al.*, 1998). Two cattail dominated shallow marshes (ELC code MAS2-1) exist within 120 m of the Project Location as candidate SWH in the form of amphibian breeding wetland habitat. These areas have emergent hydrophytic macrophyte cover greater than 25% and have standing or flowing water for most/all of the growing season (Lee *et al.*, 1998).

Three young deciduous swamps and thicket swamps (ELC codes: SWD and SWT, respectively) dominated by hydrophytic shrub and tree species such as willows and green ash were also identified as candidate SWH in the form of amphibian breeding wetland habitat. Additionally, a number of open water ponds of various sizes (ELC code: OAW) exist within the 120 m setback, and are considered candidate SWH in the form of amphibian breeding wetland habitats. These ponds are part of an anthropogenic landscape, located within a cultural meadow and open pasture (ELC codes: CUM and OAGM, respectively), as well as in active hay fields. Having presumably been dug by previous landowners, these ponds are now serving as potential habitat for breeding amphibians.

Table 1.2.2 of the Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) states that candidate wetland amphibian breeding habitat consists of wetlands and pools 0.05 ha, that are isolated from woodlands (>120 m), and that support high diversity.

The SI has identified ten natural features (ABW1, ABW6, ABW7, ABW8, ABW9, ABW10, ABW11, ABW12, ABW16 and ABW17 (**Figure 3-6, Appendix A**) to be candidate SWH in the form of amphibian breeding wetland habitat and these candidate SWH features will be carried forward to an EoS (Section 4.0). These ten candidate SWH are described in **Table 3-8 (Appendix B)**. The SI did not identify suitable Bullfrog concentration habitat in, or within 120 m of the Project Location.

Turtle Nesting Areas

Turtle nesting areas must provide sand and/or gravel that the turtles can dig their nests in, and are often south to south-west facing to maximize exposure to sunlight for egg incubation (OMNR, 2000). Sand and gravel beaches adjacent to shallow areas of marshes, lakes, and rivers are most frequently used (OMNR, 2012). If the turtle travels from the aquatic environment in search of a suitable nesting area, optimally, safe movement corridors will be present between the nesting and aquatic habitat (OMNR, 2000).

The presence of Snapping Turtles and Northern Map Turtles in the Regional Study Area, as reported in the RR, indicated that this species may occur within the Project Location. Snapping Turtles are widespread throughout southern Ontario and inhabit a wide variety of aquatic habitats including ponds, sloughs, shallow bays or river edges, and slow streams, Snapping Turtles are tolerant of disturbance and will inhabit man-made ponds, ditches and canals. This species nests in sand and gravel banks along waterways and well as within a variety of man-made features. Northern Map Turtles prefer slow-moving, mud-bottomed water bodies and, in Ontario, prefer larger bodies of water. Suitable nesting habitat is well removed from aquatic habitat and must include sand or soil that is easily dug.

Due to the lack of sizeable lakes, rivers, or waterbodies, no Northern Map Turtle SWH was observed. During the SI, one dead Snapping Turtle was found along the northern edge of Unity Road within 120 m of the Project Location. This carcass was well removed from any proposed panel blocks and suitable wetland habitat. General habitat for Snapping Turtles was identified in two areas (TOW6 and TOW14) within 120 m of the Project Location (**Figure 3-7,**

Appendix A) and a local landowner reported seeing a large turtle crossing a sod field south of woodland 13.

ELC soil assessments revealed that sandy soils or gravel were absent in, or within 120 m of, the Project Location. Gravel roadsides are not considered nesting habitat and expose turtles to the risk of injury or death from vehicle collisions. Consequently, no candidate significant turtle nesting habitat was observed in, or within 120 m of, the Project Location.

Woodland Raptor Nesting Habitat

Raptors typically nest in intermediate-aged to mature woodlands that provide large sturdy trees for nesting and perching, and open understory flight and hunting prey (OMNR, 2000). Important factors in woodland nesting habitat selection for several species of raptors are species composition, size, and age of forest stand (OMNR, 2000). Table 1.2.2 of the Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) states that candidate significant woodland raptor nesting habitat includes all natural woodlands or conifer plantations greater than 30 ha in size with greater than 10 ha of interior forest habitat. Interior forest is to be calculated as the woodland area occurring greater than 200 m from the woodland edge.

Four woodlands (1, 13, 14, and 18) greater than 30 ha were present in, or within 120 m of the Project Location (**Figure 3-6, Appendix A, and Table 3-8, Appendix B**). Each of these four met the requirement of large sturdy trees for raptor nesting and all four woodlots were intermediate-aged to mature. Only one woodland, woodland 18 (RN1), contained more than 10 ha of interior forest habitat.

One candidate woodland raptor nesting SWH (RN1) will be carried forward to an EoS (Section 4).

Bald Eagle Nesting Habitat and Winter Feeding and Roosting Areas

Bald Eagles use shoreline habitat associated with lakes and large rivers (rarely small lakes and rivers) for nesting and foraging (OMNR, 2000). As Bald Eagles are predominantly fish-eating birds, productive areas of open water or deep-water marshes supporting large quantities of fish are required to feed growing young. Bald Eagles typically nest in tall trees in old growth/mature forest stands (30% - 50% canopy cover) of deciduous or mixed plant species located 50 to 200 m from the shoreline (OMNR, 2000).

There were no Bald Eagle sightings within the Project Location during the SI bird surveys. There were also no large areas of open water (lakes, rivers) or deep-water marshes supporting large fish quantities within 120 m of the Project Location. It should be noted that Odessa Lake PSW is a large lake and marsh located on the western edge of the Project Location, and may provide the appropriate shoreline habitat required by Bald Eagles. However, no records of possible, probable, or confirmed Bald Eagle breeding have been found for that area (Cadman *et al.*, 2007). In addition, no woodlands identified within 120 m of the Project Location have been classified as candidate SWH in the form of continuous old growth/mature forest stands,

with trees large enough (greater than a DBH of 60 cm) to support the massive nests produced by Bald Eagles. Therefore, candidate SWH in the form of Bald Eagle nesting habitat and winter feeding and roosting areas were not identified within 120 m of the Project Location, and will not be carried forward to an EoS.

Osprey Nesting, Foraging and Perching Habitat

Osprey use shoreline habitat associated with lakes and large rivers (rarely small lakes and rivers) for nesting and foraging (OMNR, 2000). This species forages for fish in areas of open water or deep-water marshes. Most Osprey nesting sites are located in mixed forest habitat, but nests may also occur in coniferous and deciduous stands (OMNR, 2000). Dead coniferous trees are preferred nesting sites, but crotches and isolated trees are also used.

Site Investigations failed to locate any active or abandoned nests as well as any productive open water fish habitat suitable for Osprey foraging within the Project Location. A pair of Osprey was observed flying over the Project Location on multiple occasions during the SI (during and subsequent to the Osprey breeding season). The Odessa Lake Swamp PSW provides areas of open water and cattail marshes which provide quality foraging habitat and likely provides quality perches via dead trees along its edges. This high quality habitat was likely favoured by the pair of Osprey observed flying over the Project Location.

No candidate SWH in the form of Osprey nesting, foraging, and perching habitat were identified within 120 m of the Project Location during the SI, and therefore, this wildlife habitat feature will not be carried forward to an EoS.

Seeps and Springs

Seeps and springs are areas where groundwater has come to the surface, often within forested headwater areas of coldwater streams (OMNR, 2000). These groundwater seepages may provide habitat for numerous species of plants and animals, including feeding and drinking areas. Those seeps and springs that occur within forested areas where the canopy maintains cool, shaded conditions are most important (OMNR, 2000).

No seeps or springs were observed within the Project Location or within 120 m of the Project Location during the SI. As a result, candidate SWH in the form of seeps and springs will not be carried forward to an EoS.

Marsh Breeding Bird Habitat

Ontario marsh birds generally prefer large sizeable (>1 ha) marsh habitats consisting of both areas of dense emergent vegetation (e.g., cattails and bulrushes) and shallow open water. Marshes occurring within the Project Location consisted primarily of meadow marshes and were generally small yet widespread. One large (100 ha) meadow marsh (wetland 18, MB1) occurred along, yet outside of the eastern portion of the Project Location (**Figure 3-6, Appendix A**). A few small areas containing cattails occurred within the Project Location, but

these were mostly limited to the edges of man-made ponds. One small (2.1 ha) organic cattail marsh occurred within 120 m of the Project Location (MB2) and was identified through Alternative Investigations (**Figure 3-6, Appendix A**).

Black Terns prefer marsh habitat having an approximate 1:1 ratio of open water and emergent vegetation. Emergent vegetation forming platforms including floating vegetation mats and upturned cattail roots are important nesting features. Areas of shallow cattail marsh occurred in proximity to the Project Location, yet these areas were densely vegetated and none provided open water for foraging. No marshes in, or within 120 m of, the Project Location are considered significant habitat for Black Tern and thus will not be carried forward to an EoS.

Typical Short-eared Owl nesting habitat includes, in part, wetland habitats such as peat bogs and marshes (COSEWIC, 2008a). Natural feature partially occurs within 120 m of the Project Location and contains a large meadow marsh that could contain suitable Short-eared Owl breeding habitat. Because Short-eared Owl habitat in Ontario may consist of both wintering and breeding habitat, habitat for this species will be addressed in Section 3.2.6.4.

The SI identified two natural features (MB1 and MB2; **Figure 3-6, Appendix A; Table 3-8, Appendix B**) within the 120 m of the Project Location to be candidate SWH in the form of marsh breeding bird habitat, on the basis that these natural features consisted of marsh ecosites and were larger than 1.0 ha.. These candidate SWH feature will be carried forward to an EoS (Section 4.0).

Summary

Of the ten specialized habitats for wildlife indicated to potentially occur within the Project Location in the RR, six were identified as candidate SWH in the SI. These six candidate SWH will be carried forward to an EoS (Section 4.0).

3.2.6.3 Animal Movement Corridors

Animal movement corridors are elongated, vegetated areas used by animals to move from one habitat to another (OMNR, 2000). Significant animal movement corridors are usually wider, without roads, structurally and compositionally diverse, and link two or more important natural features (OMNR, 2000). In southern Ontario, wildlife corridors typically consist of naturally vegetated areas that traverse through more developed and open landscapes and may consist of forested river valleys and shrubby riparian vegetation along smaller watercourses such as creeks, as well as hedgerows and windbreaks.

The designation of animal movement corridors as candidate SWH is largely dependent on the presence of specialized habitat for wildlife or habitats of seasonal concentration of animals, between which animal movement must occur. Feature descriptions as, well as the distance to the nearest project component, for animal movement corridor features are presented in **Table 3-9 (Appendix B)**. Candidate SWH were carried forward to an EoS (Section 4.0).

Deer Migration Corridors

Deer migration corridors consist of sizeable tracts of forested land that link important deer habitat across breaks in forested lands. Valleylands, rather than hedgerows are most often used as such corridors. In the absence of documented deer yards within the Project Location, no deer migration corridors were anticipated to occur. Furthermore, no valleylands were recorded in the Project Location. Consequently, no deer migration corridors were observed in, or within 120 m of, the Project Location, and no such candidate SWH will be carried forward to an EoS.

Amphibian Movement Corridors

To identify amphibian movement corridors, an assessment of vegetation communities, with consideration of the presence of vernal pooling, wetlands or ponds, and connectivity between potential candidate amphibian breeding woodland and/or wetland habitats was used to identify candidate amphibian breeding habitat located within 120 m of the Project Location (**Figure 3-6, Appendix A, and Table 3-9, Appendix B**).

Areas identified as potential amphibian movement corridors primarily consist of wet drains running through cultural meadow and/or open agricultural lands (ELC codes: CUM and OAGM, respectively). Table 1.4.1 of the Draft SWH Ecoregion 6E Criterion Schedule (OMNR, 2012) states that candidate significant amphibian movement corridors connect significant amphibian breeding woodland and wetland habitats. Potential movement corridors are also identified in less anthropogenic landscapes such as broad-leaved sedge and reed canary grass dominated mineral meadow marshes, a cattail dominated shallow marsh, a mixed forest containing vernal pools, and a cultural woodland (ELC codes: MAM, MAS, FOM and CUW, respectively). A hedgerow adjacent to the cultural meadow was also identified as contributing to a potential amphibian movement corridor.

Five features (AMC1, AMC4, AMC5, AMC6, and AMC8; **Figure 3-6, Appendix A**) were identified and considered to be candidate significant amphibian movement corridors, requiring an EoS (**Figure 3-6, Appendix A, and Table 3-9, Appendix B**).

The RR indicated a habitat linkage to occur between Odessa Lake and woodland habitat south of Highway 401 that passes through the westernmost corner of the Project Location. The SI revealed that this tract of land is composed of cultural thicket and cultural meadow habitat that is continuous between Unity Road and Highway 401. This tract of land does not qualify as an animal movement corridor as it does not appear to contiguously link two ecologically significant habitat features for deer, amphibians, or any other wildlife taxa. Unity Road and adjacent rural properties act as break in the linkage between Odessa Lake and natural areas south of Unity Road while Highway 401 can be considered impassable for many land-bound wildlife. Any wildlife crossing Unity Road or Highway 401 is at great risk of mortality from collisions with passing vehicles.

3.2.6.4 Habitat of Species of Conservation Concern

Many species of conservation concern do not normally exhibit high population densities (OMNR, 2000). Other species that have a narrow tolerance or resilience for survival and fairly specialized habitat requirements are poorly understood. Subsequently, seemingly minor alterations to their habitats may result in the local or regional decline of the species (OMNR, 2000).

The availability of suitable habitat for species identified in the RR (**Table 2-6, Appendix B**) was determined based on the result of the SI. Species of conservation concern observed in, or within 120 m of, the Project Location included species of *Special Concern* (excluding *Threatened* or *Endangered* species), species with low S-Ranks, and Ontario Partners in Flight priority species.

Declining Guilds – Shrub/Successional Breeding Birds

Shrub and early successional habitat was found to be extensive in or within 120 m of the Project Location given the large area of old field and juniper, red cedar, and dogwood thicket habitat. Based on a minimum habitat size of 10 ha, five areas of candidate SWH for shrub/successional breeding bird species were located in, or within 120 m of, the Project Location (**Figure 3-7, Appendix A**). These five candidate SWH areas are described in **Table 3-10 (Appendix B)** and were carried forward to an EoS (Section 4.0).

Species of Special Concern

Nine species of *Special Concern* were identified in the RR. These included: Short-eared Owl, Black Tern, Common Nighthawk, Golden-winged Warbler, Northern Map Turtle, Snapping Turtle, Five-lined Skink (Great Lakes Population), Eastern Ribbonsnake, and Eastern Milksnake. The presence of candidate habitat for Special Concern species not used as indicator species for other significant habitat types, as identified during the SI, is presented below.

Short-eared Owl

Typical Short-eared Owl nesting habitat includes dense grasslands, peat bogs, marshes, sand-sage concentrations, arctic tundra and old pastures (COSEWIC, 2008a). Natural feature SOB1 (**Figure 3-7, Appendix A, and Table 3-10, Appendix B**) partially occurs within 120 m of the Project Location and contains a large meadow marsh that could contain suitable Short-eared Owl breeding habitat. It is unlikely that any other suitable Short-eared Owl breeding habitat occurs in or within 120 m of the Project Location. Raptor wintering areas WR2, WR3, WR4, WR5 and WR6 (**Figure 3-5, Appendix A**) contain large areas of old field habitat suitable as summer and winter Short-eared Owl hunting grounds and pockets of Eastern White Cedar which may be used as roosting sites. Natural features SO1, SO3, SO4, SO5 and SO6; (**Figure 3-7, Appendix A**) are considered candidate SWH for species of *Special Concern* and will be carried forward to an EoS (Section 4.0).

Common Nighthawk

Common Nighthawks utilize a wide variety of natural open country habitats including sand dunes, cutovers, burns, rocky outcrops, bogs, short-grass prairies, open forests, marshes, lakeshores, rock barrens, and forest clearings. This species has also adapted to anthropogenically modified habitats including mine tailings, quarries, urban parks, airports, gravel roads, and flat-topped buildings. Despite this species' tolerance of disturbed lands, it prefers natural habitats. This assumption was taken into account when identifying candidate Common Nighthawk SWH within 120 m of the Project Location. Three relatively undisturbed nesting habitats were identified, each providing suitable bare ground microhabitats for nesting (**Figure 3-7, Appendix A**). These habitats were composed of bedrock meadow, open forest and open woodlands exhibiting patches of exposed bedrock and short vegetation as identified during ELC surveys (**Figures 3-2a-f, Appendix A**). The Project Location and surrounding lands contain an abundance of suitable nighthawk foraging habitat and each of the three candidate SWH contained or were located adjacent to such foraging habitat. Three candidate Common Nighthawk SWH (CN1, CN2 and CN3) were carried forward to an EoS.

Low S-Ranks (S1, S2, or S3)

Plants

Upon review of the potential presence of species of conservation concern (**Table 2-6, Appendix B**) it was determined that there are six plant species that have a very low to high potential of occurring in, or within 120 m of, the Project Location. These six species are:

Brainerd's Hawthorn

Brainerd's Hawthorn grows in open savannas, riverbanks, fields, pastures, thickets and woodland borders (Riznicek *et al.* 2011). It grows best in well-drained, loamy soil types (Lorenzo, 2006). This type of habitat and soil type is abundant within the Project Location and therefore, the likelihood of this plant existing in the Project Location is high. Due to the difficulty of distinguishing between different hawthorns, no hawthorn encountered during Site Investigations was identified to specific species. Therefore, it is not possible to reject the possibility that Brainerd's Hawthorn may be present in the Project Location. Two areas of low hawthorn concentration were identified during Site Investigations and include: a hedgerow at the north end of ELC polygon 6B-19, half a hedgerow in the sod fields of ELC polygon 14B-C.

Hawthorns are known to occur in low concentrations outside of the Project Location across the local landscape. It is not anticipated that the unidentified hawthorns present in the Project Location represent a significant regional concentration of the any hawthorn species. No candidate significant Brainerd's Hawthorn habitat will be carried forward to an EoS.

Stiff Gentian

Stiff Gentian grows along stream and river banks, marshy meadows, bluffs, and forested hillsides and is usually associated with calcareous sites (Riznicek *et al.* 2011). Flowering occurs between the months of August and October (CBS, 2005). Based on habitat requirements, the probability of this plant occurring in the Project Location is moderate. Site Investigations were conducted in these habitats in the late summer/fall months and this species was not identified. No candidate significant Stiff Gentian habitat will be carried forward to an EoS.

Carolina Whitlow-grass

Carolina Whitlow-grass grows in dry, sandy, open areas, and alvar pavements (NHIC, 2011), and flowers in the spring (Muma, 2011). Based on habitat requirements, the probability of this plant occurring in the Project Location is moderate. Site Investigations were not conducted in the spring months when flowers are in bloom; however, the basal leaves of this plant are very distinctive and could be used to identify this plant throughout the growing season. Site Investigations conducted in the relevant habitat types did not discover this species in, or within 120 m of, the Project Location. No candidate significant Carolina Whitlow-grass habitat will be carried forward to an EoS.

Smith's Bulrush

Smith's Bulrush grows in moist, sandy, or muddy shorelines (NHIC, 2011). Ontario populations are restricted to wet shores and beaches along the Great Lakes system (Argus *et al.* 1987). Given the distance of the Project Location to the Great Lakes, the potential for this species to exist within the Project Location is very low. Site Investigations conducted within, and in proximity to, the Project Location did not identify any bulrush from the genus *Schoenoplectus*, only the genus *Scirpus*, which is distinctly different, was identified. No candidate significant Smith's Bulrush habitat will be carried forward to an EoS.

Bowman's-root

Bowman's-root grows in open sandy woods and edges (NHIC, 2011), and flowers from April to June (LBJWC, 2011). The probability of this plant occurring within the Project Location is very low based on habitat requirements, as sandy soils are uncommon. Site Investigations were not conducted in the season when this plant blooms; however, any plants encountered during vegetation surveys which did not have any flowers were identified through other characteristics such as leaves, plant form and fruits. Bowman's-root has distinctive leaves and leaf pattern and none were encountered in, or within 120 m of, the Project Location during the SI. No candidate significant Bowman's-root habitat will be carried forward to an EoS.

Branching Burreed

Branching Burreed grows in shallow or muddy water of ponds and swamps (Favorite, 2003), and flowers from April to July (LBJWC, 2011). Based on habitat requirements, the probability of

this plant occurring in the Project Location is moderate. Site Investigations were not conducted in the season when this plant blooms; however, any plants encountered during vegetation surveys which did not have any flowers were identified through other characteristics such as leaves, plant form and fruits. The Branching Burreed has fairly distinctive fruit which remain on the plant once it has finished flowering. No Branching Burreed were encountered in, or within 120 m of, the Project Location during the SI and no candidate significant Branching Burreed habitat will be carried forward to an EoS.

Wildlife

Wilson's Phalarope

Wilson's Phalaropes breed in shallow wetlands, wet meadows, and upland grasslands consisting of areas of open water, emergent vegetation, and open shoreline (Dechant *et al*, 2003). This species largely avoids wetlands containing thick-stemmed emergent vegetation as well as vegetation over 40 cm in height (Dechant *et al*, 2003). There is evidence that Wilson's Phalarope prefers large wetlands. No large wetlands containing short emergent vegetation, open water, or open shoreline were present in, or within 120 m of, the Project Location. No candidate Wilson's Phalarope SWH will be carried forward to an EoS.

Caspian Tern

One Caspian Tern was observed flying over the Project Location during a breeding bird survey on June 4, 2011. Caspian Terns nest on elevated areas of islands, usually along the shores of the Great Lakes. The Project Location occurs far (>8 km) from Great Lake shoreline and thus cannot contain island habitat. Two known Caspian Tern colonies numbering between 1 and 200 pairs occur on Lake Ontario north of Amherst Island and west of Wolfe Island (Cadman *et al*, 2007). These colonies are both situated greater than 8 km away from the Project Location. Adult Caspian terns will forage far distances from nesting colonies, and have been observed foraging in ploughed fields. It is expected that adults will also visit large wetlands in search of fish such as Odessa Lake. Due to absence of shoreline or island habitat in or within 120 m of the project Location, no candidate significant Caspian Tern breeding habitat occurs in, or within 120 m of, the Project Location, negating the need for an EoS.

Giant Swallowtail

Giant Swallowtails were observed at multiple locations within the Project Location on various dates. Giant Swallowtail larva are known to feed on Hop Tree (*Ptelea trifoliata*) and Northern Prickly-ash (Laybery *et al.*, 2002). Though no Hop Trees were found in the Project Location, Northern Prickly-ash was found sporadically throughout the site. Adults are known to utilize open forests and open field habitats. Based on ELC data, two areas (GS1 and GS2) containing considerable Northern Prickly-ash shrubs occur within the Project Location (**Figures 3-2 and 3-7, Appendix A**). These candidate species of conservation concern SWH will be carried forward to an EoS.

Hickory Hairstreak

Hickory Hairstreak requires deciduous woodlands containing suitable food plants. Caterpillars of this species will feed on Bitternut Hickory, Butternut, Red Oak, White Ash, and *Crataegus* (Hawthorn) species (Layberry *et al.*, 1998). Adults will nectar on milkweed, Sweet-white Clover and other meadow species (Layberry *et al.*, 1998). No woodlands containing notable densities of larval food plants were present in, or within 120 m, of the Project Location. Similar butterfly species including Coral Hairstreak, Banded Hairstreak, and Eastern Tailed Blue were observed in the Project Location. Layberry *et al.* (1998) note that this species is rare in Ontario, though local populations may explode unexpectedly and sporadically. No candidate significant Hickory Hairstreak SWH was carried forward to the EoS.

Juniper Hairstreak

Juniper Hairstreak is closely associated with Eastern Red Cedar. Eastern Red Cedar is found across the Project Location, though ELC data identified four areas where this species is the dominant tree species. No Juniper Hairstreaks were observed during the SI. Despite widespread occurrence of Eastern Red Cedar in the Project Location and adjacent lands, and the occurrence of Red Cedar Cultural Woodland and Red Cedar Cultural Alvar communities, no dense patches of Red Cedar woodland occurred within the Project Location. Much larger tracts of cedar-dominated woodland are known to occur across the Napanee Limestone Plain, perhaps leaving those in the Project Location undesirable. Similar butterfly species including Coral Hairstreak, Banded Hairstreak, and Eastern Tailed Blue were observed in the Project Location. It is not expected that candidate Juniper Hairstreak SWH occurs in, or within 120 m of, the Project Location and, consequently, no candidate significant Juniper Hairstreak SWH was carried forward to the EoS.

3.2.7 Areas of Natural and Scientific Interest (ANSI) Results

ANSI are defined as areas with life or earth science values. The OMNR identifies ANSI as important natural features found outside provincial parks and conservation reserves, based on scientific surveys of the province's eco-districts.

Two ANSI, the Odessa Lake Swamp International Biological Program Site and the Odessa Lake Life Science Site, were identified to the west of the Project Location. During the SI it was confirmed that these features are not within the Project Location or within 120 m of the Project Location (50 m for Earth Science ANSI). There are also rural residential properties and roadways that separate these ANSI's from the Project Location and 120 m setback areas.

Thus, no ANSI were identified within 120 m of the Project Location (50 m for Earth Science ANSI) during the SI, and therefore, this wildlife habitat feature will not be carried forward to an EIS.

3.2.8 Summary of the Site Investigations Results

Based on SI, 119 candidate significant natural features that require an EoS have been identified within the Project Location or within 120 m of the Project Location. These 119 candidate significant natural features include:

- 34 Woodlands;
- 16 Wetlands;
- Wildlife Habitat:
 - Habitats of Seasonal Concentrations of Animals:
 - 6 Raptor Wintering Areas; and,
 - 14 Reptile Overwintering Areas (4 Turtle Overwintering sites and 10 Snake Hibernacula).
 - Specialized Habitat for Wildlife:
 - 1 Habitat for Area-sensitive Species (Interior Forest Breeding Birds) area;
 - 5 Habitat for Area-sensitive Species (Open Country Breeding Birds) areas;
 - 9 Amphibian Breeding Habitat (Woodland) areas;
 - 10 Amphibian Breeding Habitat (Wetland) areas;
 - 1 Woodland Raptor Nesting Habitat area; and,
 - 2 Marsh Breeding Bird Habitat area.
 - Animal Movement Corridors:
 - 5 Amphibian Movement Corridors.
 - Habitat of Species of Conservation Concern:
 - 10 Special Concern Species Habitat areas; and,
 - 5 Declining Species Habitat areas (Shrub/Successional Breeding Bird Habitat areas).

Project components within 120 m of candidate significant natural features include: solar panels, collector lines, access roads, lay down areas, and construction pads (**Figures 3-3, 3-4, 3-5, 3-6, and 3-7; Appendix A**). The switchyard area was not identified within 120 m of a significant natural feature. All of these project components and their identified potential impacts to significant natural features are discussed in detail in the EIS (Section 5).

3.2.9 Corrections to the Records Review

A summary of corrections to the RR based on the results of the SI is provided in **Table 3-11 (Appendix B)**. Natural heritage mapping provided by the OMNR (e.g., LIO mapping) and other sources (e.g., the CRCA) underestimates the number of natural features located in, or within 120 m of, the Project Location (e.g., wetlands and woodlands are more abundant), and in some cases, underestimate the size of the natural features. **Table 3-12 (Appendix B)** lists additional natural features identified during the SI which were not encountered during the RR.

3.3 Qualifications

AMEC personnel responsible for conducting the SI include:

- Matt Evans (Senior Biologist);
- Jeff Balsdon (Terrestrial Biologist);
- Jon Pleizier (Terrestrial Biologist);
- Izabela Kalkowski (Botanist);
- Erin Donkers (Botanist);
- Said Mohamed (Botanist and Wetland Biologist); and,
- Tracy Wolowidnek (Environmental Scientist)

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

4.0 EVALUATION OF SIGNIFICANCE

4.1 Approach to Evaluating Significance

All 119 features identified as candidate significant natural features identified within the Project Location or within 120 m of the Project Location during the SI (Section 3) were evaluated for significance, as per Section 27.2 of O.Reg. 359/09, unless these features had already been evaluated by the province (e.g., Parks, ANSI's, Provincially Significant Wetlands). Evaluation criteria and procedures outlined in the NHRM (OMNR, 2009), NHAG (OMNR, 2011a), and the SWHTG (OMNR, 2000) were used during this evaluation process.

Guidance documents used the EoS of natural features within 120 m of the Project Location included:

- Natural Heritage Assessment Guide (NHAG; OMNR, 2011a);
- Natural Heritage Reference Manual (NHRM; OMNR, 2010a);
- Ontario Wetland Evaluation System (OWES; OMNR, 2002a);
- Significant Wildlife Habitat Technical Guide (SWHTG) and its Significant Wildlife Habitat;
- Decision Support System (SWH Decision Support System; OMNR 2000); and,
- Draft Significant Wildlife Habitat Ecoregion Criterion Schedules (OMNR, 2012);

As established through the RR and SI, candidate significant natural features present within 120 m of the Project Location requiring evaluation of significance accordance with S. 27 of O.Reg 359/09 include:

- Woodlands;
- Wetlands;
- Valleylands;
- Candidate Significant Wildlife Habitat, including:
 - Habitats of Seasonal Concentration of Animals;
 - Raptor Wintering Areas; and,
 - Reptile Overwintering Areas.
 - Specialized Habitat for Wildlife:
 - Habitat for Area-sensitive Species (Interior Forest Breeding Birds);
 - Habitat for Area-sensitive Species (Open Country Breeding Birds);
 - Amphibian Woodland Breeding Habitat;
 - Amphibian Wetland Breeding Habitat; and
 - Marsh Breeding Bird Habitat,
 - Habitat of Species of Conservation Concern:
 - Special Concern and Provincially Rare – Other Species,
 - Declining Species Habitat areas (Shrub/Successional Breeding Bird Habitat areas)
 - Animal Movement Corridors:
 - Amphibian Corridor.

Table 4-1 (Appendix B) presents the details of EoS efforts for each significant natural feature. The EoS for these 119 natural features are presented in the following sections.

4.2 Woodlands

Habitat Description

The SI identified the presence of 34 woodlands in, or within 120 m of, the Project Location. Woodland areas covered 10% of the Project Location and 120 m setback. Many woodlands consisted of both swamp and upland portions and contained a mixture of deciduous, coniferous, and mixed ecotypes. The criteria for woodland evaluation and the results of the EoS for woodlands in, or within 120 m of, the Project Location are presented in this section.

Criteria for Significance

The Cataraqui Region Conservation Authority, in their Natural Heritage Study (CRCA, 2006), identifies significant woodlands as those greater than 40 ha in size, in accordance with criteria published by the OMNR in 1999 (**Table 2-3, Appendix B**) (OMNR, 1999). Since the NHAG (OMNR, 2011a) is more recently published, criteria presented therein were used to evaluate the significance of woodlands located within 120 m of the Project Location

Woodlands were evaluated for significance based on the following criteria listed in the NHRM:

Woodland Size Criterion

- **Woodland Size:** Refers to the spatial extent of the woodland, even if intersected by narrow gaps 20 m or less in width. Size value is related to the scarcity of woodland in the landscape. The City of Kingston possesses an average forest cover of 34% (Beach, 2010) while the forest cover in rural and urban areas for Loyalist Township ranges between 14% - 32% (CRCA, 2006). The General Project Area possesses approximately 32% forest cover. Based on significant woodland size criteria outlined in the NHAG for landscapes with 31% - 60% forest cover, woodlands 50 ha in size or large are considered significant in the City of Kingston. For the purpose of this study, Loyalist Township was considered to possess a landscape with 16% - 30% forest cover. Consequently, woodlands greater than 20 ha would be considered significant considering the criteria.

Ecological Functions Criteria

- **Woodland Interior:** Interior habitat is within the woodland and constitutes areas more than 100 m from the edge. As per the NHAG, a maintained public road would create an edge even if the opening was not wider than 20 m and did not create separate woodlands. Similar to the size criterion above, the City of Kingston possesses approximately 34% forest cover while Loyalist Township possesses approximately 14% -

- 32% (Riley and Mohr, 1994). The General Project Area possesses approximately 32% forest cover; therefore, any forest interior habitats greater than 8 ha in the City of Kingston and 2 ha in Loyalist Township are considered significant;
- Proximity to other woodlands or habitats: Woodlands are considered significant if a portion of the woodland is located within 30 m of a significant natural feature or fish habitat and the entire woodland meets the area threshold according to the woodland cover in the municipality:
 - Linkages: Woodlands are considered significant if they are located between two other significant features, each of which is within 120 m, and the woodland meets the area threshold according to the woodland cover in the municipality;
 - Water protection: Woodlands are considered significant if they are located within 50 m (or top of valley bank if greater) of a sensitive groundwater discharge, sensitive recharge, sensitive headwater area, watercourse or fish habitat and the woodland within this distance meets the minimum area threshold according to the woodland cover in the municipality; and,
 - Woodland diversity: Woodlands are considered significant if they have an area dominated, singly or in combination, by native naturally occurring (not planted) Sugar Maple, Black Maple, Silver Maple, Red Maple, Yellow Birch, hickory, beech, Black Ash, Walnut, tamarack, spruce, pine, oak, basswood or hemlock which meets the minimum area threshold according to the woodland cover in the municipality.
 - Uncommon Characteristics Criteria:
 - Woodlands that contain rare or uncommon community types (e.g., provincial rating of S1, S2, or S3) and are 0.5 ha or more in size; habitat of a rare, uncommon or restricted woodland plant species (natural, not planted), including vascular plant species for which the NHIC's Southern Ontario Coefficient of Conservatism is 8, 9 or 10, tree species of restricted distributions, or species existing in only a limited number of sites within the planning area, and are 0.5 ha or more in size; or has characteristics of older woodlands or woodlands with larger tree size structure in native species, including older woodlands having ten or more trees per hectare greater than 100 years old, or larger trees size structure including ten or more trees per hectare at least 50 cm in diameter, or a basal area of 8 m²/ha that are at least 40 cm in diameter meeting the minimum area threshold according to the woodland cover in the municipality. As stated above, Huron County planning authorities have not established protocols for designating woodlands as significant; therefore, as per the NHAG, woodlands that meet a minimum standard for any one of the criteria listed above are considered significant. The evaluation of candidate significant woodlands is provided in Section 4.2.1.

Evaluation of Significance

Based on the data collected as a part of the ELC surveys conducted during the SI, an EoS was undertaken for each of the 32 woodlands identified to occur within 120 m of the Project Location. The EoS for each of the 32 candidate significant woodland features is presented in **Table 4-2 (Appendix B)**.

Significant Features

Of the 34 woodlands located within 120 m of the Project Location, eight (1, 2, 5, 13, 14, 18, 19, and 30) were considered to be significant and progressed to an EIS (**Figure 4-1, Appendix A**).

The majority of woodlands were determined not to be significant because they did not meet minimum size requirements for either the woodland size criterion or for the secondary size requirements under the ecological function criteria (see footnotes of **Table 4-2 in Appendix B**).

While woodland 7 did meet the secondary size requirement of some of the ecological function criteria, it was not in close proximity to water features and did not meet uncommon characteristic criteria necessary in order to be deemed significant.

4.3 Wetlands

Habitat Description

The SI identified 16 wetlands within 120 m of the Project Location. The OMNR is responsible for determining the significance of wetlands using methods outlined in the OWES (OMNR, 2002). Evaluated wetlands are determined to be provincially or locally significant. Locally significant wetlands are those that have been evaluated, but did not receive a sufficient score to be considered provincially significant. Unevaluated or 'other' wetlands are those yet to be evaluated by the OMNR. As described in the NHAG (OMNR, 2011a), wetlands previously identified and confirmed by OMNR as provincially significant or locally significant are considered to meet the requirements for a determination of significance. Unless Site Investigations provided support to challenge these assessments, the designation as assigned by the OMNR is used.

Criteria for Significance

In order to complete the evaluation of significance and determine the identification of potential negative environmental effects and mitigation as required for the EIS Report, the "unevaluated" wetlands were evaluated following the Wetland Characteristics and Ecological Functions Assessment for Renewable Energy Projects - Appendix C of the NHAG (OMNR, 2011a). This assessment does provide procedures where significance of wetlands can be assumed and their functions assessed based on criteria within the OWES manual. Wetland characteristics and ecological functions assessed following the Wetland Characteristics and Ecological Functions Assessment for Renewable Energy Projects include:

- **Biological Components:**
 - **Wetland type:** Assists in understanding whether changes in hydrology will impact wetland function. Provides a gauge for the presence of Species at Risk or provincially significant species;
 - **Site type:** Assists in understanding if changes in hydrology will impact wetland function;
 - **Vegetation communities:** Assists in establishing wetland types. Can be used to predict faunal types and provides a gauge for the presence of Species at Risk and special features;
 - **Proximity to other wetlands:** Provides hydrological connections in order to estimate downstream impacts;
 - **Interspersion:** Interspersion can be estimated once vegetation communities are known; and,
 - **Open water type:** Assists in understanding whether changes in hydrology will impact wetland function. There are eight open water types (page 52 of the OWES manual) which represent varying percentages of open water, with type 1 being the least (less than 5%) and type 8 being the most (more than 95%).
- **Hydrological Components:**
 - **Flood attenuation:** Flood attenuation is used to assess the efficiency of a wetland in attenuating flood peaks. A wetland's flood attenuation potential receives a designation of High, Moderate, or Low based on its type and relative position. Isolated wetlands would have high flood retention, other wetland types would have moderate, and wetlands associated with rivers would have low;
 - **Water quality improvement:** Provides information to determine whether activities will change components of the wetlands water budget. Assists in understanding whether changes in hydrology will impact wetland function. Water quality improvement is based on connectivity/isolation to other wetland habitats, adjacent land use, and pollutant uptake factor (based on most dominant vegetation form);
 - **Shoreline erosion control:** Shoreline wetlands provide a measure of protection from shoreline erosion caused by flowing water or waves. High shoreline erosion control would be designated to wetlands with shoreline vegetation dominated by trees and shrubs. Wetlands with medium shoreline erosion control would have shoreline vegetation dominated by emergent or submergent vegetation, and low erosion control wetlands would be dominated by other, or no, shoreline vegetation, or is entirely isolated or palustrine; and,
 - **Groundwater recharge:** Important to understanding effects of alterations to topography and water flow, and whether changes in hydrology would impact wetland function. Wetlands are rated as high ground water recharge (isolated or palustrine wetland), moderate (riverine wetland), or low (lacustrine wetland).
- **Special Features Components:**
 - **Species rarity:** All species observed during field surveys and documentation of species known to be present;

- Significant features and habitats: Essential to determining whether fundamental changes to habitat would occur. Significant features and habitats of interest include those listed in the SWHTG and OWES. Data was obtained through field surveys, background data and correspondence with agencies when possible; and,
- Fish habitat: Provides understanding necessary to devise strategies for ensuring that discharges and concentration of sediments do not affect fish habitat. Field and background data gathered for the project was reviewed to determine presence/absence of fish habitat.

The OWES manual states on page 13 that “wetlands smaller than 2 ha (5 acres) will not be evaluated. However, very small wetlands can sometimes provide important habitat for wildlife or be important for other reasons.” The OWES manual further states on page 28 that “*The minimum size of a wetland type for mapping purposes is normally 0.5 ha... small wetland areas often contain regionally or even provincially rare species and should be recognized and included in the wetland map...*” Wetland features smaller than 2 ha were included in the EoS to determine whether rare species or other special features were present.

Evaluation of Significance

Wetland evaluation concluded that wetlands 3, 13, 25, 26, 27, 28, and 29 were smaller than 2 ha and did not contain any rare species or special features. As a result, though wetlands 13 and 26 occur wholly within 120 m of the Project Location, these features will not need to be evaluated using OWES evaluation methods prior to construction. Wetlands 13 and 26, along with the 14 remaining wetland features not occurring within the Project Location were evaluated following the Wetland Characteristics and Ecological Functions Assessment in Appendix C of the NHAG (OMNR, 2011a) and are presented in **Table 4-3 (Appendix B)**. Ranking was calculated for one wetland feature (wetland 32) east of the Project Location and north of Unity Road (**Figure 4-1, Appendix A**) due to location of some of the proposed project components within the 30 m proposed buffer and/or the wetland habitat.

Significant Features

Wetland evaluations concluded that wetlands 3, 13, 25, 26, 27, 28, and 29 were smaller than 2 ha and did not contain any rare species or special features. As previously discussed, wetlands 13 and 26 occur wholly within 120 m of the Project Location but will not need to be evaluated using OWES evaluation methods prior to construction as they are both less than 0.5 ha in size. However, both wetlands were evaluated for potential SWH and are discussed further in Section 4.4. Wetlands 13 and 26 both occur in culturally influenced lands, are smaller than 0.3 ha, and are not hydrologically linked to any other wetland features. Wetlands 13 and 26 contained no rare species, wetland special features, social values and aboriginal values.

As per the NHAG (OMNR, 2011a), all remaining 14 unevaluated wetlands occurring within 120 m of the Project Location were treated as provincially significant (see **Figure 4-1, Appendix A**).

4.4 Wildlife Habitat

An analysis of the results of the SI determined that the following candidate SWH features are present within 120 m of the Project Location, thus requiring an EoS:

- Habitats of Seasonal Concentrations of Animals (raptor wintering areas, and reptile overwintering habitat);
- Specialized Habitat for Wildlife (Habitat for Area-sensitive species (Interior Forest Breeding Bird and Open Country Breeding Bird, Amphibian Woodland Breeding Habitat, Amphibian Wetland Breeding Habitat, Turtle Nesting, and Marsh Breeding Bird Habitat areas);
- Animal Movement Corridors (Amphibian Movement Corridors); and,
- Habitat of Species of Conservation Concern (*Special Concern* species, and declining species habitat areas).

Following the identification and delineation of candidate SWH in the Site Investigation, criteria provided in the SWHTG (OMNR, 2000) and its SWHDSS were used to assist in determining which natural features were significant SWH (Section 3.2.5).

When required, habitat specific studies additional to the SI were undertaken in order to satisfy the data requirements for applicable criteria throughout the EoS. It should be noted that in some cases, targeted wildlife studies were undertaken prior to establishing the location or boundaries of candidate significant wildlife habitat. This occurred in cases where the survey window for the targeted species was limited and delaying the survey to the following year would be detrimental to the Project timeline.

4.4.1 Habitats of Seasonal Concentrations of Animals

4.4.1.1 Raptor Wintering Areas

Habitat Description

Raptor wintering habitat consists of a combination of fields and woodlands that provide roosting, foraging, and resting habitats for wintering raptors. The Site Investigation identified six candidate significant raptor wintering areas (WR1, WR2, WR3, WR4, WR5 and WR6). Candidate significant raptor winter habitat was identified by mapping ELC community codes indicating suitable foraging and roosting habitat (FOC, FOD, FOM, CUM, CUT, CUS, CUW) (**Figure 3-5, Appendix A**). Patches of suitable habitat patches were subsequently scoped by area, where patches at least 20 ha in size were considered candidate SWH. Candidate significant raptor wintering areas were evaluated for significance using criteria described below.

Criteria for Significance

Evaluation criteria and guidance provided in (Table 1.1) of the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) and Appendix Q (Table Q-1) of the SWHTG (OMNR, 2000) were applied in the evaluation of significance of candidate significant raptor wintering habitat. Habitat descriptions provided in Index #8 and #10 of the SWH Decision Support System (OMNR, 2000) were considered in the evaluation.

Evaluation criteria outlined in Table 1.1 of the Draft SWH Ecoregion 6E Criteria Schedules include:

- Relative importance of the site: Significant sites are generally the only known sites in the planning area; significant sites may be one of only a few in the area; and,
- Raptor wintering habitat must be used by one or more Short-eared Owls or by two or more raptor species which include Rough-legged Hawk, Red-tailed Hawk, Northern Harriers and/or American Kestrel and ten or more individuals for a minimum of 20 days per season.

Evaluation criteria outlined in Appendix Q of the SWHTG include:

- Relative importance of the site: Significant sites are generally the only known sites in the planning area; significant sites may be one of only a few in the area;
- Presence of species of conservation concern: Most significant sites support several species of concern; significant sites support one species;
- Species diversity: Sites with the greatest number of listed species (Red-tailed Hawk, Rough-legged Hawk, Northern Harrier, American Kestrel, and Snowy Owl) are more significant;
- Abundance: Sites with the highest number of individuals are more significant;
- Size of site: Large sites (e.g., at least 20 ha) are more significant than smaller sites;
- Level of disturbance: Least disturbed sites may be more significant;
- Location of site: Sites located near other open field areas, with adjacent woods are more significant;
- Habitat quality: Sites with better habitat (e.g., abundant prey and perches; a tendency toward less snow accumulation due to exposure to strong prevailing winds) are probably more significant, and,
- Historical use of area: Significant sites may have been used for several years and/or at least 60% of winters.

Evaluation of Significance

In response to the presence of six candidate significant raptor wintering areas within the Project Location, winter raptor surveys were conducted in February 2012. Three rounds of surveys were undertaken February 8-9, 17-18, and 27-28, 2012. Surveys consisted of ten-minute point counts positioned at 18 point count stations positioned within or at the edge of each of the six

candidate raptor wintering areas (**Figure 4-2, Appendix A**). Raptor location, abundance, behaviour, and habitat utilization were recorded during the study to provide information regarding raptor use of the Project Location. Surveys were conducted, when possible, during clear weather conditions where wind was below level 5 on the Beaufort Scale.

To account for the crepuscular nature of Short-eared Owls, Short-eared Owl surveys were conducted in the evening, following general raptor point counts. Short-eared Owl consisted of ten-minute point counts positioned within or on the edge of suitable Short-eared Owl hunting habitat. Surveys commenced one half hour before sunset and ended when total darkness occurred. The distance between each point count station was driven.

The EoS for each of the six candidate significant raptor wintering areas is presented in **Table 4-4 (Appendix B)**.

Significant Features

Of the six candidate significant raptor wintering areas, one was identified as SWH based on the evaluation criteria described above. No candidate significant raptor wintering areas were found to be significant due to high raptor abundance, rather a Short-eared Owl was observed in feature WR3 during a March 2011 targeted survey (**Table 4-4, Appendix B**). This was the only occurrence of Short-eared Owl within 120 m of the Project Location recorded during NHA-related studies. When observations from winter raptor surveys of all six candidate winter raptor features were considered, all five common raptor species were observed within the Project Location. In accordance with data from the Amherst Island CBC, Red-tailed Hawk was the most commonly observed species.

Feature WR3 was proceeded to an EIS.

4.4.1.2 Reptile Overwintering Habitat

Habitat Description

Reptiles require overwintering habitat that extend down below the frost line and provides protects them from freezing temperatures (Konze And McLaren, 1997). Only natural features identified in the Site Investigation as having the potential to extend below the frost line (1.5 m) were considered candidate reptile overwintering SWH. Reptile overwintering habitat can be divided into two categories: 1) snake hibernacula and 2) turtle overwintering habitat. Potential snake hibernacula consist of features that would provide a route underground, including buried concrete or rock (e.g., old building foundations), rock crevices or animal burrows (OMNR, 2012). Potential turtle overwintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen (OMNR, 2012).

Fourteen candidate reptile overwintering habitats (ten snake hibernacula and four turtle overwintering areas) were identified during the SI (**Figure 3-5, Appendix A**).

Criteria for Significance

Evaluation criteria and guidance provided in Appendix Q (Table Q-1) of the SWHTG (OMNR, 2000) and Table 1.1 of the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2009) were applied in the evaluation of significance of candidate significant reptile hibernacula. Habitat descriptions provided in Index #4 of the SWH Decision Support System (OMNR, 2000) were considered in the evaluation.

Evaluation criteria outlined in Appendix Q of the SWHTG include:

- Relative importance of the site: Significant sites are generally the only known sites in the planning area; significant sites may be one of only a few in the area;
- Presence of species of conservation concern (Eastern Milksnake and Northern Ribbonsnake): Most significant sites support two or more species of concern; significant sites may support one species;
- Species diversity and abundance: Sites with the greatest number of species are more significant (Eastern Gartersnake, Northern Brown Snake, Smooth Green Snake, Northern Ring-necked Snake, Northern Watersnake, and Northern Red-bellied Snake). Sites with the highest number of individuals are more significant;
- Habitat quality: Sites with better habitat are probably more significant;
- Location of site: Sites found in areas with good movement corridors are more significant; and,
- Level of disturbance: Least disturbed sites are more significant.

Evaluation criteria outlined in the Draft SWH Ecoregion 6E Criterion Schedules further states that snake hibernacula used by five or more individuals or two or more species of snakes, or congregations of five or more individuals or two or more species of snakes near potential hibernacula (e.g., foundation or rocky slope) on sunny warm days in spring (Apr/May) and fall (Sept/Oct) should be considered significant. If there are species of *Special Concern* present, the site is considered significant.

Evaluation of Significance

Surveys for reptiles in proximity to reptile overwintering features were conducted concurrently with ELC surveys and hedgerow, woodland and wetland assessments between August and November 2011. These surveys were intended to identify the presence and abundance of reptile species in proximity to candidate SWH. When appropriate, rocks and fallen logs near candidate hibernacula were lifted to see if reptile species were present underneath them. Aquatic features were surveyed using binoculars for the presence of turtles. Snake species in southern Ontario move to overwintering site in late fall (mid-September and early November) (Konze And McLaren, 1997).

Degree of disturbance was recorded as a standard item of ELC assessment. Survey dates, times, weather conditions and field personnel are summarized in **Table 4-1 (Appendix B)**. The

EoS for each of the 14 candidate reptile overwintering SWH is presented in **Table 4-5 (Appendix B)**.

Significant Features

Based on the evaluation criteria above, none of the natural features identified as candidate significant reptile overwintering habitat (snake hibernacula; **Figure 4-3, (Appendix A)**) were deemed to be SWH and proceeded to an EIS. The majority of these natural features are cracks and fissures within exposed bedrock of old field or bedrock cultural meadows and two are small mammal burrows. Eastern Gartersnake and Northern Watersnake were the only snake species observed in, or in proximity to, the Project Location. No snake species of *Special Concern* were observed. A low frequency of snake observations were made within 120 m of the Project Location and no aggregations of basking snakes in proximity to candidate snake hibernacula features were observed. Due to the secretive nature of snakes and the possibility that snake presence in proximity to candidate hibernacula features was missed, five candidate snake hibernacula SWH occurring within the Project Location will be treated as significant (**Table 4-5, Appendix B**). These sites were identified as SWH for the potential that they hold for providing suitable habitat and will be addressed in the EIS.

None of the four natural features identified as candidate reptile overwintering SWH in the form of turtle overwintering habitat were identified as SWH (**Table 4-5, Appendix B**). Midland Painted Turtle was the only live species of turtle observed in proximity to the Project Location. A dead Snapping Turtle was observed north of Unity Road along the Hydro One corridor.

4.4.1.3 Specialized Habitat for Wildlife

Habitat of Areas Sensitive Species (Interior Forest Breeding Birds)

Habitat Description

The habitat requirements of area-sensitive breeding birds are extremely variable and complex and are often dependent on the total amount of woodland in the regional landscape or the size of the forest fragment selected for nesting (OMNR, 2000). Shape and size of woodlots are critical to many species and woodlots with irregular edges and openings within the forest have a lower potential to support species that prefer forest interior. Features supporting area-sensitive species of birds that are rare or uncommon and features supporting continuous forest interior habitat were considered SWH.

The SI revealed that a total of 32 woodlands were present in, or within 120 m of, the Project Location. It was determined, through GIS analysis, that five woodlands (18, 13, 19, 14 and 1) contained interior habitat (**Figure 3-6, Appendix A**). An EoS was carried out for these five candidate SWH using criteria for significance outlined below.

Criteria for Significance

Evaluation criteria to determine significant interior forest breeding bird habitat are provided in Appendix Q (Table Q-2) of the SWHTG (OMNR, 2000) and Index #41 of the SWHDSS. These criteria were used in the determination of significance candidate habitat for area-sensitive species.

Evaluation criteria outlined in Appendix Q of the SWHTG include:

- Presence of rare, uncommon or declining species: Sites supporting area-sensitive species of birds that are rare or uncommon, and/or exhibiting population declines provincially are most significant.
- Overall area of site: Largest natural forest stands in the municipality are likely most significant with those >30 ha being most likely to support and sustain a diversity of these birds.
- Area of forest interior habitat: Most significant forest stands should contain at least 10 ha of forest interior excluding at least a 100 m buffer around the forest interior. Smaller interior habitats may still be significant where no larger examples exist.
- Age and tree composition of the forest stand: Sites with an abundance of large (e.g., >40 cm DBH, >25 m tall), mature trees are more significant for certain nesting raptor species as well a number of songbird species;
- Amount of vertical stratification: Forests with a variety of different layers of vegetation at different heights likely provide more habitats and support more bird species and are consequently more significant. Uneven-aged forests are generally more significant than even-aged forests because they provide more forest structure;
- Amount of contiguous closed-canopy/open area in the forest stand: Sites with largest contiguous canopy cover and fewest gaps in the canopy are likely most significant. Natural gaps (e.g., windthrown trees, woodland ponds) are preferred to man-made gaps (e.g., roads). Gaps should be <20 m including roads and rights-of-way;
- Degree of disturbance (e.g., roads, forestry): Roadless, relatively undisturbed sites with no history of disturbance from forestry operations during the last 20 years are most significant. Uneven-aged forest stands are often more significant than even-aged forest stands because they may be less intensively managed, and generally contain a natural representation of species. Forest stands with a history of little or no forest management may be most significant;
- Current representation of specialized habitat in planning area: Sites that could be lost or severely degraded and cannot be replaced by similar sites in the planning area, are highly significant. Specialized habitats with the poorest current representation within the planning area are significant;
- Amount of adjacent: Residential development Sites with the least amount of adjacent residential development are more significant;
- Provision of significant wildlife habitat: Sites providing several identified significant wildlife habitats (e.g., raptor nest sites, rare vegetation community, and habitat for species of conservation concern) are most significant; and,

- Potential for long-term protection of the site: Sites that provide the best opportunity for long-term protection are usually more significant than similar sites with little opportunity for protection or facing an uncertain future due to potential threats (e.g., site in a large natural area versus an isolated site close to an expanding residential development). Habitats threatened with degradation or loss are more significant than similar, but currently unthreatened habitats, if they can be protected.

Evaluation of Significance

Data regarding woodland age, stand composition, vertical stratification, canopy cover, degree of adjacent residential development, and degree disturbance was collected as required during ELC assessment.

In order to determine the presence of rare, uncommon, or declining interior forest bird species, 17 breeding bird point count surveys were conducted by AMEC near to or within candidate woodlots (**Figure 4-2, Appendix A**). These surveys occurred on June 15-18 and 21, 2011 and were repeated on July 4-6, 2011 by qualified biologists skilled in bird identification by sight and sound. Point count methodology was based on a review of the most current inventory methodology, discussions with OMNR, and the widely used inventory protocols outlined in *Bird and Bird Habitat: Guidelines for Wind Power Projects* (OMNR, 2011). Point count stations were located 300 m apart within woodlands. A hand-held GPS unit was used to geo-reference each point count station and a description of the habitat found at each station was recorded. Surveys were conducted for ten minutes at each listening post and consisted of recording the diversity and density of bird species at four distance regimes: 1) within a 50 m radius, 2) 50 to 100 m, 3) outside the 100 m radius, and 4) flyovers (birds seen flying overhead). Surveys were initiated one half hour prior to sunrise and typically ended at 10:30 A.M., depending on the weather conditions. The start time of each point count survey was recorded. Point counts were aborted or postponed if weather conditions were not optimal (e.g., high winds or rain). Survey dates, times, weather conditions and field personnel are summarized in **Table 3-2, (Appendix B)**.

The results of EoS studies completed on candidate interior forest breeding bird SWH are presented in **Table 4-6 (Appendix B)** while bird species observed at each point count station are presented in **Figure 4-4g (Appendix A)**.

Significance Habitat

The EoS concluded that no candidate area sensitive forest bird SWH features for species was identified as SWH based on the evaluation criteria noted above. As a result, no area sensitive forest bird SWH was proceeded to an EIS.

4.4.1.4 Habitat of Area –sensitive Species (Open Country Breeding Birds)

Habitat Description

Open country breeding birds prefer larger grasslands including natural and cultural fields and meadows. Grassland areas with a minimum size of 30 ha candidate SWH. The SI identified five candidate open country breeding bird SWH areas within the Project Location (**Figure 3-6, Appendix A**). These habitat areas were scoped using the CUM ELC community class over 30 ha.

Criteria for Significance

Evaluation criteria to determine significant interior forest breeding bird habitat are provided in Appendix Q (Table Q-2) of the SWHTG (OMNR, 2000) and Index #41 of the SWHDSS. These criteria were used in the determination of significance candidate habitat for area-sensitive species.

Evaluation criteria outlined in Appendix Q of the SWHTG include:

- Presence of rare, uncommon or declining species: Sites supporting area-sensitive species of birds that are rare or uncommon, and/or exhibiting population declines provincially are most significant;
- Overall area of site: Largest grasslands in the municipality are likely most significant with those >30 ha most likely to support and sustain diversity of these species;
- Degree of disturbance (e.g., roads, grazing, crop production) Roadless, relatively undisturbed sites with no history of disturbance from grazing during the last 20 years are most significant. In general, early successional grasslands that are not being used for agricultural production are more significant than similar grasslands that are used for agriculture (e.g., crops, cattle grazing);
- Current representation of specialized habitat in planning area: Sites that could be lost or severely degraded and cannot be replaced by similar sites in the planning area, are highly significant. Specialized habitats with the poorest current representation within the planning area are significant;
- Amount of adjacent residential development: Sites with the least amount of adjacent residential development are more significant;
- Provision of significant wildlife habitat: Sites providing several identified significant wildlife habitats (e.g., rare vegetation community, habitat for species of conservation concern) are most significant; and,
- Potential for long-term protection of the site: Sites that provide the best opportunity for long-term protection are usually more significant than similar sites with little opportunity for protection or facing an uncertain future due to potential threats (e.g., site in a large natural area versus an isolated site close to an expanding residential development). Habitats threatened with degradation or loss are more significant than similar, but currently unthreatened habitats, if they can be protected.

Evaluation of Significance

Land-use history for candidate SWH was collected from landowners within the Project Location and is presented in **Appendix J**. The level of habitat disturbance for these lands was recorded as part of routine ELC assessments.

To determine species diversity and the presence of rare or declining grassland bird species at candidate open country breeding bird areas, breeding bird point count surveys were conducted by AMEC within the five open country features (**Figure 4-2, Appendix A**). These surveys were undertaken June 15-18 and 21, 2012 by qualified biologists skilled in bird identification by sight and sound. Point counts were repeated on July 4-6 and, to the greatest extent possible, the order in which the survey stations were visited was reversed to prevent temporal sampling bias. Point count methodology was based on a review of the most current inventory methodology, discussions with OMNR, and the widely used inventory protocols outlined in Bird and Bird Habitat: Guidelines for Wind Power Projects (OMNR, 2011b). A total of 34 point count stations were surveyed and located 300 m apart within the open country features (**Figure 4-2**). A hand-held GPS unit was used to geo-reference each point count station and a description of the habitat found at each station was recorded. Surveys were conducted for ten minutes at each listening post and consisted of recording the diversity and density of bird species at four distance regimes: 1) within a 50 m radius, 2) 50 to 100 m, 3) outside the 100 m radius, and 4) flyovers (birds seen flying overhead). Surveys were initiated one half hour prior to sunrise and typically ended at 10:30 A.M., depending on the weather conditions. The start time of each point count survey was recorded. Point counts were aborted or postponed if weather conditions were not optimal (e.g., high winds or rain). Survey dates, times, weather conditions and field personnel are summarized in **Table 4-1, (Appendix B)**.

The results of EoS studies completed on candidate open country breeding bird SWH are presented in **Table 4-5 (Appendix B)** while the bird species recorded at each point count station are provided in **Figures 4-4a-h (Appendix A)**.

Significant Features

Four candidate significant open country breeding bird habitats (OCBB2, OCBB3, OCBB4 and OCBB9) were identified as SWH based on the criteria noted above, and proceeded to an EIS (**Table 4-7, Appendix B**). Areas designated as SWH are illustrated in **Figure 4-5 (Appendix A)**.

4.4.1.5 Amphibian Breeding Habitat (Woodland)

Habitat Description

Woodlands with permanent ponds or those containing water in most years until mid-July are likely to be used as amphibian woodland breeding habitat. The SI identified nine candidate significant amphibian woodland breeding areas (**Figure 3-6, Appendix A**).

Criteria for Significance

Evaluation criteria and guidelines provided in Appendix Q (Table Q-2) of the SWHTG and Index #40 of the SWH Decision Support System (OMNR, 2000), and Schedule 2 (Table 1.1) of the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) were applied in the evaluation of significance of candidate significant amphibian woodland breeding habitat.

Evaluation criteria provided in the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) included:

- Presence of a wetland, lake, or pond within or adjacent (within 120 m) to a woodland (no minimum size);
- Presence of breeding population of one or more of the listed species (Eastern Newt, Blue-spotted Salamander, Spotted Salamander, Gray Treefrog, Spring Peeper, Western Chorus Frog, and Wood Frog) with at least 20 breeding individuals (adults, juveniles, eggs/larval masses); and,
- An observational study to provide breeding/larval stages will be required during the spring (April-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland.

Evaluation criteria outlined in Appendix Q of the SWHTG include:

- Provision of significant wildlife habitat: Woodlands providing several significant wildlife habitats (e.g., forest interior habitat, raptor nesting, abundant tree cavities and down woody debris) are most significant;
- Degree of permanence: Woodlands with permanent ponds or those containing water in most years until at least mid July are most significant;
- Species diversity of pond: Ponds supporting high species diversity are more significant;
- Presence of rare species: Ponds supporting rare amphibian species are more significant than ponds supporting only common species;
- Size and number of ponds: In general, woodlands with larger and/or several ponds are more significant;
- Diversity of submergent and emergent vegetation: Ponds with a good diversity of emergent and submergent aquatic vegetation are most significant;
- Presence of shrubs, logs at edge of pond: Presence of shrubs and logs increase significance of pond for some amphibian species because of increased structure for calling, foraging, and escape and concealment from predators;
- Adjacent forest habitat: More significant areas will have closed canopy forest providing shaded, moist understory and abundance of down woody debris for cover habitat. Breeding ponds with shortest distance to forest habitat are more significant because of reduced risk to moving amphibians and are more likely to be used;
- Water quality: Prefer unpolluted waters; and,
- Level of disturbance: Woodlands with little or no disturbance (e.g., forest management, roads between breeding pond and forest habitat) are more significant.

Information from the SI was used to evaluate the candidate habitat in relation to the evaluation criteria provided above and the essential components of woodland breeding habitat as described in the SWH Decision Support System (OMNR, 2000), including:

- 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.

•
Amphibian breeding woodland habitat includes habitat used for breeding by Western Chorus Frog. As this species is designated as federally *Threatened*, features hosting this species will be treated as significant.

Evaluation of Significance

Data regarding size and number of ponds, degree of permanence, level of disturbance, diversity of submergent and emergent vegetation, presence of shrubs, and presence of adjacent forest habitat was collected during ELC and general wildlife surveys.

Studies to determine amphibian diversity within candidate amphibian woodland breeding SWH included night call surveys. These stations are shown in **Figure 4-2 (Appendix A)**. The surveys followed protocols outlined in the OMNR's Amphibian Road Call Count Program (Konze and McLaren, 1997). Two rounds of amphibian surveys were conducted on June 15 and July 4, 2011, and began one half hour after sunset and ended at midnight, as recommended by Konze and McLaren (1997). No early or late spring surveys (April and May) could be completed due to the date at which the project was awarded. Surveys at each station lasted for three minutes. Amphibians heard at all distances were recorded and all calling activity was ranked using one of the following three abundance categories:

- Level 1: Indicates that each calling individual can be counted separately and calls are not simultaneous;
- Level 2: Indicates that there are some simultaneous calling but individual calls are still distinguishable: and,
- Level 3: Indicates a full chorus of continuous and overlapping calls and individual animals cannot be counted accurately.

Results from amphibian call count surveys are presented in the 2011 *AMEC Wildlife Baseline Studies Summary Report (Appendix L)*. Survey dates, times, weather conditions and field personnel are summarized in **Table 4-1 (Appendix B)**.

Call surveys were conducted prior the identification amphibian woodland habitat due to the seasonal nature of amphibian breeding, which precluded the establishment of a final Project Location. Amphibian call surveys were conducted from roadside stations and targeted known

wetland features occurring within lands anticipated to be included within the Project Location. Comprehensive roadside coverage was surveyed and a total of five stations were surveyed in proximity to candidate amphibian woodland breeding features.

No formal targeted salamander surveys were conducted in natural features occurring within the Project Location as AMEC began its field studies after salamander breeding had occurred for 2011. No rare Ontario salamander species were anticipated to occur within the Project Location and SI further revealed that very limited salamander habitat was present within 120 m of the Project Location. When suitable, logs and rocks in salamander habitat were lifted gently to check for salamanders or other wildlife. All checked logs and rocks were replaced to preserve the integrity of the habitat.

Significant Features

None of the nine candidate significant amphibian woodland breeding ponds were identified as woodland amphibian breeding SWH based on the evaluation criteria noted above (**Table 4-8, Appendix B**). Because feature-specific amphibian call surveys could not be completed, candidate woodland amphibian breeding SWH features occurring within the Project Location or known to host Western Chorus Frogs (ABF1, ABF5, and ABF14) will be assumed to be significant and proceeded to an EIS. Amphibian call surveys targeting the assumed amphibian breeding woodland SWH will be conducted pre-construction during appropriate amphibian breeding season (late March-June). Areas assumed to be SWH are illustrated in **Figure 4-5 (Appendix A)**.

4.4.1.6 Amphibian Breeding Habitat (Wetland)

Habitat Description

Amphibian wetland breeding pools may be permanent, seasonal, ephemeral, and large or small in size. Ten candidate amphibian wetland SWH were identified in the SI (**Figure 3-6, Appendix A**).

Evaluation of Significance

Evaluation criteria and guidelines provided in Appendix Q (Table Q-2) of the SWHTG and Index #40 of the SWH Decision Support System (OMNR, 2000), and Schedule 2 (Table 1.1) of the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) were applied in the EoS for candidate significant amphibian woodland breeding habitat.

No evaluation criteria or guidelines for amphibian wetland breeding habitat are provided in Appendix Q (Table Q-2) of the SWHTG and Index #40 of the SWH Decision Support System (OMNR, 2000). Schedule 2 (Table 1.1) of the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) provides the following criteria.

- Wetlands and pools (vernal pools included) greater than 500 m² (0.05 ha) isolated from woodlands (greater than 120 m);
 - Presence of breeding population of one or more of the listed salamander species (Eastern Newt, Spotted Salamander, Four-toed Salamander, Blue-spotted Salamander) or three or more of the listed frog species (American Toad, Gray Treefrog, Western Chorus Frog, Northern Leopard Frog, Pickerel Frog, Green Frog, Mink Frog, and American Bullfrog) with at least 20 breeding individuals (adults, juveniles, eggs/larval masses);
 -
 - Appendix Q (Table Q-2) of the SWHTG provides the following criteria for significant Bullfrog habitat;
 -
 - Significant sites are generally the only known sites in the planning area; significant sites may be one of only a few in the area;
 - Sites with the highest number of individuals are more significant;
 - Large sites with suitable habitat are more significant than smaller sites;
 - In the absence of additional wetland specific criteria, additional criteria and guidelines provided for amphibian woodland breeding habitat in Appendix Q (Table Q-2) of the SWHTG and Index #40 of the SWH Decision Support System (OMNR, 2000), and Schedule 2 (Table 1.1) of the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) were applied in the evaluation of significance of candidate significant amphibian wetland breeding habitat;
 -
- Amphibian breeding wetland habitat includes habitat used for breeding by Western Chorus Frog. As this species is designated as federally *Threatened*, features hosting this species will be treated as significant.

Evaluation of Significance

Data regarding depth and permanency, distance to permanent waterbody, diversity of submergent and emergent vegetation, presence of shoreline vegetation, and level of disturbance was collected during ELC and general wildlife surveys.

Further studies to determine amphibian diversity within candidate amphibian breeding wetland SWH included night call surveys. Due to safety hazards associated with conducting night surveys on foot (including tripping and falling hazards) amphibian call surveys were conducted from roadside stations and targeted candidate amphibian woodland breeding SWH. A total of three stations were surveyed for calling amphibians and these are shown in **Figure 4-2 (Appendix A)**. The surveys followed protocols outlined in the OMNR's Amphibian Road Call Count Program (Konze and McLaren, 1997). Surveys were conducted on June 15 and July 4, 2011, and began one half hour after sunset and ended at midnight, as recommended by Konze and McLaren (1997). No early or late spring surveys (April and May) could be completed due to the date at which the project was awarded. Surveys at each station lasted for three

minutes. Amphibians heard at all distances were recorded and all calling activity was ranked using one of the following three abundance categories:

- Level 1: Indicates that each calling individual can be counted separately and calls are not simultaneous;
- Level 2: Indicates that there are some simultaneous calling but individual calls are still distinguishable; and,
- Level 3: Indicates a full chorus of continuous and overlapping calls and individual animals cannot be counted accurately.

Results from amphibian call count surveys are presented in the 2011 *AMEC Wildlife Baseline Studies Summary Report (Appendix L)*. Survey dates, times, weather conditions and field personnel are summarized in **Table 4-1 (Appendix B)**. The evaluation of candidate significant amphibian woodland breeding habitat is provided in **Table 4-9**.

Call surveys were conducted prior the identification amphibian wetland habitat due to the seasonal nature of amphibian breeding, which precluded the establishment of a final Project Location. Amphibian call surveys were conducted from roadside stations and targeted known wetland features occurring within lands anticipated to be included within the Project Location. Comprehensive roadside coverage was surveyed and a total of five stations were surveyed in proximity to candidate amphibian wetland breeding features.

No formal targeted salamander surveys were conducted within natural features occurring within the Project Location as AMEC began its field studies after salamander breeding had occurred for 2011. No rare Ontario salamander species were anticipated to occur in proximity to the Project Location and SI further revealed that very limited salamander habitat was present in, or within 120 m of, the Project Location. When suitable, logs and rocks in salamander habitat were lifted gently to check for salamanders or other wildlife. All checked logs and rocks were replaced to preserve the integrity of the habitat.

Significant Features

None of the ten candidate significant amphibian wetland breeding ponds were identified as wetland amphibian breeding SWH based on the evaluation criteria noted above (**Table 4-9, Appendix B**). Because feature-specific amphibian call surveys could not be completed, four candidate wetland amphibian breeding SWH features occurring within the Project Location or known to host Western Chorus Frogs (ABW6, ABW8, ABW9 and ABW17) will be assumed to be significant and proceeded to an EIS. Amphibian call surveys targeting the assumed amphibian breeding wetland SWH will be conducted pre-construction during appropriate amphibian breeding season (late March-June). Areas assumed to be SWH are illustrated in **Figure 4-5 (Appendix A)**.

4.4.1.7 Woodland Raptor Nesting Habitat

Habitat Description

Raptors prefer to nest in sizeable woodlands that provide large, sturdy trees in which nests may be constructed. The SI identified only one woodland (18) that met the woodland criteria of 30 ha with an interior habitat area of 10 ha based on a 200 m buffer from the woodland edge for candidate woodland raptor nest SWH (**Figure 3-6, Appendix A**).

Criteria for Significance

No evaluation criteria or guidelines for woodland raptor nesting habitat are provided in Appendix Q (Table Q-2) of the SWHTG. Index #45 of the SWH Decision Support System (OMNR, 2000) and Schedule 2 (Table 1.1) of the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) provide the following criteria.

- Overall area of site: Natural or conifer plantation forests greater than 5 ha;
- Amount of contiguous closed-canopy/open area in the forest stand: Sites with largest contiguous canopy cover and fewest gaps in the canopy are likely most significant;
- Degree of disturbance (e.g., roads, forestry): Roadless, relatively undisturbed sites with no history of disturbance from forestry operations during the last 20 years are most significant;
- Amount of adjacent: Residential development Sites with the least amount of adjacent residential development are more significant; and,
- Presence of one or more active nests from species list (Broad-winged Hawk, Northern Goshawk, Cooper's hawk, Sharp-shinned hawk, Long-eared Owl, Merlin, Red-shouldered Hawk).

Evaluation of Significance

Breeding bird surveys were conducted by AMEC within woodland feature 18 (RN1). These surveys occurred on June 15-18, 21, and on July 4-6, 2011 by qualified biologists skilled in bird identification by sight and sound. Point count methodology was based on a review of the most current inventory methodology, discussions with OMNR, and the widely used inventory protocols outlined in Bird and Bird Habitat: Guidelines for Wind Power Projects (OMNR, 2011b). Two point count stations were located 300 m apart within or adjacent to the woodland features. A hand-held GPS unit was used to geo-reference each point count station and a description of the habitat found at each station was recorded. Surveys were conducted for ten minutes at each listening post and consisted of recording the diversity and density of bird species at four distance regimes: 1) within a 50 m radius, 2) 50 to 100 m, 3) outside the 100 m radius, and 4) flyovers (birds seen flying overhead). Surveys were initiated one half hour prior to sunrise and typically ended at 10:30 A.M., depending on the weather conditions. The start time of each point count survey was recorded. Point counts were aborted or postponed if weather conditions were not optimal (e.g., high winds or rain).

The results of EoS studies completed on candidate raptor nesting SWH are presented in **Table 4-10 (Appendix B)** while the bird species recorded at each point count station are provided in **Figure 4-4g (Appendix A)**.

Significant Features

Feature RN1 was not identified as significant woodland raptor nesting habitat. The absence of active raptor nests or stick nest suggesting recent raptor breeding in the candidate habitats suggested that this woodland was not being used for breeding purposes by woodland raptors inhabiting the vicinity of the Project Location.

4.4.1.8 Marsh Breeding Bird Habitat

Habitat Description

Ontario marsh birds generally prefer large sizeable (>1 ha) marsh habitats consisting of both areas of dense emergent vegetation (e.g., cattails and bulrushes) and shallow open water. Marshes occurring within the Project Location consisted primarily of meadow marshes and were generally small yet widespread. One large (100 ha) meadow marsh (ELC code: MB1; **Figure 3-6, Appendix A**) occurred along the eastern portion of the Project Location. A few small areas containing cattails occurred within the Project Location, but these were mostly limited to the edges of man-made ponds. One small organic cattail marsh (MB2) covering 2.1 ha occurred within 120 m of the Project Location and was identified through Alternative Investigations.

The SI identified two candidate marsh breeding bird SWH areas within 120 m of the Project Location. These habitat areas were scoped using the MAS and MAM ELC community class over 1 ha.

Criteria for Significance

No evaluation criteria or guidelines for marsh breeding bird habitat are provided in Appendix Q (Table Q-2) of the SWHTG or the SWH Decision Support System (OMNR, 2000). Schedule 2 (Table 1.1) of the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) provide the following criteria.

- Presence of five or more pairs of Sedge Wren or Marsh Wren or four pairs of any other listed; or breeding by any combination of five or more of the listed species (American Bittern, Virginia Rail, Sora, Common Moorhen, American Coot, Pied-billed Grebe, Common Loon, Green Heron); and,
- Any wetland with breeding Black Terns or Yellow Rail is to be considered SWH.

Evaluation of Significance

Breeding bird surveys were conducted by AMEC within or near marsh features MB1 and MB2. These surveys occurred on June 21, and on July 6, 2011 by qualified biologists skilled in bird identification by sight and sound. Point count methodology was based on a review of the most current inventory methodology, discussions with OMNR, and the widely used inventory protocols outlined in *Bird and Bird Habitat: Guidelines for Wind Power Projects* (OMNR, 2011b). Seven point count stations were located 300 m apart within or adjacent to the marsh features. A hand-held GPS unit was used to geo-reference each point count station and a description of the habitat found at each station was recorded. Surveys were conducted for ten minutes at each listening post and consisted of recording the diversity and density of bird species at four distance regimes: 1) within a 50 m radius, 2) 50 to 100 m, 3) outside the 100 m radius, and 4) flyovers (birds seen flying overhead). Surveys were initiated one half hour prior to sunrise and typically ended at 10:30 A.M., depending on the weather conditions. The start time of each point count survey was recorded. Point counts were aborted or postponed if weather conditions were not optimal (e.g., high winds or rain). Survey dates, times, weather conditions and field personnel are summarized in **Table 3-2, (Appendix B)**.

The results of EoS studies completed on candidate marsh breeding bird SWH are presented in **Table 4-11 (Appendix B)** while the bird species recorded at each point count station are provided in **Figures 4-4d, e (Appendix A)**.

Significant Features

One candidate significant marsh breeding bird habitat was identified as SWH based on the criteria noted above (**Table 4-11, Appendix B**) and proceeded to an EIS Areas designated as SWH are illustrated in **Figure 4-2c (Appendix A)**.

4.4.2 Animal Movement Corridors

4.4.2.1 Amphibian Movement Corridors

Habitat Description

Significant amphibian movement corridors link significant breeding habitats and provide similar moist conditions to breeding habitat. The SI identified five candidate amphibian movement corridor SWH areas (AMC1, AMC4, AMC5, AMEC6, and AMC8).

For the purpose of identifying candidate significant amphibian corridors, corridors were assessed as linkages between significant breeding habitats and summer habitats. Corridor habitats were not considered to occur within features (e.g., within Feature 48), but were only considered in areas where amphibians may potentially leave breeding areas (and the feature) in search of summer habitats. Active agricultural fields were not considered “safe” movement corridors; therefore, only areas providing safe movements such as vegetated watercourses and hedgerows that link significant woodland and wetland breeding habitats with other woodlands

and/or wetlands were considered in the determination of candidate significant amphibian corridors. Watercourses and hedgerows that do not link woodlands and/or wetlands (i.e., end in an agricultural field or continue without entering a woodland and/or wetland feature) were not considered candidate significant amphibian corridors.

Criteria for Significance

Evaluation criteria provided in Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) and Appendix Q (Table Q-4) of the SWHTG (OMNR, 2000) was used in the determination of significance candidate amphibian corridor habitat.

Evaluation criteria provided in Table 1.4.1 of the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) included:

- Movement corridors occur between breeding habitat and summer habitat
- Movement corridors must be determined when amphibian breeding habitat is confirmed as SWH.
- Corridors should consist of native vegetation, roadless area, no gaps such as fields, waterways or bodies, and underdeveloped areas are most significant.
- Corridors should be at least 200 m wide with gaps less than 20 m and if following riparian area with at least 15 m of vegetation on both sides of waterway.
-
- Additional evaluation criteria provided in Appendix Q (Table Q-4) of the SWHTG (OMNR, 2000) included:
 -
 - Importance of corridor to survival of target species: Corridors linking most significant or critical identified amphibian habitats are most significant;
 - Habitat and habitat structure of corridor: Corridors with several layers of vegetation (e.g., mature tall trees, understory trees, shrubs, herbaceous ground cover) are generally more significant than corridors with few vegetation layers. Corridors with variety of ground cover (living low vegetation, down woody debris, stumps, rock piles) are usually more significant than corridors consisting of sparsely covered ground;
 - Species found in corridor or presumed to be using corridor: Corridors containing high overall species diversity or rare species are more significant than corridors with less species diversity. Corridors used for movement by many species are usually more significant than corridors;
 - Risk of mortality for species using corridor: Corridors providing safest passage for wildlife moving across the landscape are most significant. Best corridors will have the lowest risk of mortality associated with them;
 - Opportunity for protection: Corridors with the best opportunity for protection are significant; and,
 - Provision of other related values: Numerous and/or large corridors that could effectively increase the overall area of the existing system of protected natural areas in the

planning area are significant. Corridors that may permit the future expansion of wildlife populations into an area are significant.

Evaluation of Significance

The suitability of candidate significant amphibian movement corridors was evaluated using data collected during ELC surveys and, habitat characteristics noted during area searches, the presence of adjacent significant amphibian breeding habitat, and aerial photo interpretation. Results from amphibian call count surveys are presented in the 2011 *AMEC Wildlife Baseline Studies Summary Report (Appendix L)*.

The EoS of each candidate amphibian movement corridor is presented in **Table 4-12 (Appendix B)**.

Significant Features

No candidate significant amphibian movement corridors were identified based on the evaluation criteria noted above (**Table 4-11, Appendix B**). Consequently, no amphibian movement corridors were proceeded to an EIS. All candidate corridors were not wide enough to be considered significant and many passed through open fields.

4.4.3 Habitat for Species of Conservation Concern

4.4.3.1 Declining Species – Shrub/Successional Breeding Bird Species

Habitat Description

The SI identified five candidate significant shrub/successional breeding bird habitat areas in, or within 120 m of, the Project Location (**Figure 3-7**). Shrub/successional habitat overlapping the Project Location consisted largely of dogwood thicket, Red Cedar woodland and young lowland ash deciduous forest. The five candidate habitat areas were created by regeneration of shrubs following land clearing for agriculture. These five features were evaluated for significance in conjunction with shrub/successional breeding bird habitat.

Criteria for Significance

No evaluation criteria or guidelines for shrub/successional breeding bird habitat are provided in Appendix Q (Table Q-2) of the SWHTG or the SWH Decision Support System (OMNR, 2000). Schedule 2 (Table 1.1) of the Draft SWH Ecoregion 6E Criteria Schedules (OMNR, 2012) provide the following criteria.

- Shrubland and successional fields 10 ha or larger in size, not class 1 or 2 agricultural lands, not being actively used for farming (i.e., no row cropping in the last five years;
- Presence of nesting or breeding of one or more indicator (Brown Thrasher and Clay-coloured Sparrow) or special concern species (Yellow-breasted Chat and Golden-

- winged Warbler) and at least two of the common species (Field Sparrow, Black-billed Cuckoo, Eastern Towhee, and Willow Flycatcher); and,
- A field with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as SWH.

Appendix Q (Table Q-2) of the SWHTG provides the following criteria for evaluation of significance of candidate significant habitats open country breeding birds which may also be applied to shrub/successional breeding bird habitat.

- Degree of disturbance (e.g., roads, grazing, crop production): roadless, relatively undisturbed sites with no history of disturbance from grazing during the last 20 years are most significant;
- Current representation of specialized habitat in planning area: Sites that could be lost or severely degraded and cannot be replaced by similar sites in the planning area are highly significant. Specialized habitats with the poorest current representation within the planning area are significant;
- Amount of adjacent residential development: Sites with the least amount of adjacent residential development are more significant;
- Provision of significant wildlife habitat: Sites providing several identified significant wildlife habitats (e.g., rare vegetation community, habitat for species of conservation concern) are most significant; and,
- Potential for long-term protection of the site: Sites that provide the best opportunity for long-term protection are usually more significant than similar sites with little opportunity for protection or facing an uncertain future due to potential threats (e.g., site in a large natural area versus an isolated site close to an expanding residential development). Habitats threatened with degradation or loss are more significant than similar, but currently unthreatened habitats, if they can be protected.

Evaluation of Significance

To determine the presence or absence of avian species of conservation concern, breeding bird point count surveys were conducted in suitable shrub/ successional breeding bird (SBB1, SBB2, SBB3, SBB4 and SBB5) (**Figure 4-6, Appendix A**). A total of 24 point count stations were positioned within candidate SWH. Point count surveys were completed by qualified biologists skilled in bird identification by sight and sound. Surveys were undertaken June 15, 16 and 21, 2012. Point counts were repeated on July 4-6 and, to the greatest extent possible, the order in which the survey stations were visited was reversed to prevent temporal sampling bias.

Point count methodology was based on a review of the most current inventory methodology, discussions with OMNR, and the widely used inventory protocols outlined in Bird and Bird Habitat: Guidelines for Wind Power Projects (OMNR, 2011b). Point count stations were located 300 m apart within the open country. A hand-held GPS unit was used to geo-reference each point count station and a description of the habitat found at each station was recorded. Surveys were conducted for ten minutes at each listening post and consisted of recording the diversity

and density of bird species at four distance regimes: 1) within a 50 m radius, 2) 50 to 100 m, 3) outside the 100 m radius, and 4) flyovers (birds seen flying overhead). Surveys were initiated one half hour prior to sunrise and typically ended at 10:30 A.M., depending on the weather conditions. The start time of each point count survey was recorded. Point counts were aborted or postponed if weather conditions were not optimal (e.g., high winds or rain).

The results of EoS studies completed on candidate shrub/successional breeding bird SWH are presented in **Table 4-13 (Appendix B)**.

Significant Features

- Of the five candidate significant habitat for shrub/successional breeding bird species, all (SBB1 SBB2, SBB3, SBB4 and SBB5) were identified as SWH based on the evaluation criteria noted above (**Table 4-13, Appendix B**). Areas designated as SWH are illustrated in **Figure 4-6 (Appendix A)**. In the case of SBB1, Golden-winged Warbler breeding in the area could not be confirmed as access to the land was not granted. In SBB1, a Blue-winged Warbler was heard during a breeding bird point count, yet the identity of the signing bird could also not be confirmed because of limited land access to the area in question. Golden-winged Warblers may sing a Blue-winged Warbler song and these two species commonly hybridize. A hybrid may sign a Blue-winged or Golden-winged song. In absence of conclusive evidence that the bird in question was not a Golden-winged Warbler, a designation of significance was made under the assumption that a) a Golden-winged Warbler was present and b) the bird was breeding in that habitat.
-
- Five significant habitat features for shrub/successional breeding bird species (SBB1 SBB2, SBB3, SBB4 and SBB5) were proceeded to an EIS.

4.4.3.2 Special Concern and Provincially Rare Species

As identified in the Site Investigation Report (see Section 3.2.4.3), three categories of candidate significant habitat of species of conservation concern (Special Concern Species and Provincially Rare species) were identified during SI within the 120 m Zone of Investigation. These candidate significant natural features include habitat for Common Nighthawk, Short-eared Owl and Giant Swallowtail.

Habitat Descriptions

- Common Nighthawk requires suitable nesting substrate consisting of areas of bare ground and the presence of open foraging habitat. The SI identified three candidate Common Nighthawk SWH (CN1, CN2, CN3) considered candidate SWH for species of *Special Concern (Figure 3-7, Appendix A)*;
- Short-eared Owl nesting habitat includes open country habitats which provide tall vegetative cover while wintering areas contain large areas of old field habitat suitable as hunting grounds and with neighbouring coniferous woodlands which may be used as

roosting sites. The SI identified five natural features (SO1, SO3, SO4, SO5 and SO6) considered candidate SWH for species of *Special Concern* (**Figure 3-7, Appendix A**); and,

- Giant Swallowtails require open woodlands and shrublands where suitable larval and nectaring plants abound. In the Kingston region, the most readily available larval food plant is Northern Prickly-ash. Habitat areas providing an abundance of Northern Prickly-ash and meadow flowers for nectaring were considered candidate significant Giant Swallowtail habitat. Two such habitat features (GS1 and GS2) were identified during the SI (**Figure 3-7, Appendix A**).

Criteria for Significance

Evaluation criteria and guidelines provided in Appendix Q (Table Q-3) of the SWHTG (OMNR, 2000) were applied in the evaluation of significance of candidate significant habitats of species of conservation concern. Evaluation criteria outlined in the SWHTG include:

- Degree of rarity of *species found at site*: Habitats for species ranked S1 and S2 should be considered more significant than habitats for species ranked S3. Habitats with species ranked as Special Concern by the OMNR should also be considered significant;
- Documented significant decline in a species and/or its critical habitat: Habitat for species experiencing the greatest declines is most significant. The habitat for declining species that has the lowest representation in the planning area is more significant. Habitats that provide the best opportunity for the long-term sustainability are most significant;
- Species whose range is solely or primarily found in Ontario: Species and their habitats are significant even if well represented in the planning area, due to high provincial responsibility for their protection. Habitats that provide the best opportunities for the long-term sustainability of the species are most significant;
- Condition of existing habitat at site: Sites that provide habitat that best meets the survival requirements of the target species and that also include a natural buffer zone are most significant. Undisturbed or least-disturbed habitats (e.g., no/few deleterious impacts from roads, human activities) are significant. Highly diverse sites that support one or more species of conservation concern are most significant;
- Size of species population at site: Habitat supporting large populations of a several species of conservation concern is most significant. Habitat supporting large populations of a single species is significant;
- Size and location of habitat: Large sites supporting large populations of several species of conservation concern are most significant. Sites large enough to ensure long-term support and viability of species of conservation concern are significant. Sites with large areas of suitable habitat that are also connected to other potentially suitable habitat and/or natural areas are most significant;
- Potential for long-term protection of the habitat: Habitats that provide the best opportunity for long-term protection are usually more significant than similar habitats with little opportunity for protection. Habitats of species currently experiencing severe

- population declines in Ontario due to habitat loss are most significant. Habitats of species currently experiencing significant population declines are significant;
- Representation of species/habitat within the municipality: Poorly represented habitats for species of conservation concern are significant. Habitats that could be lost or severely degraded and cannot be replaced by similar habitats are highly significant; and,
 - Evidence of use of the habitat: Sites with documented traditional use by species are most significant.

Evaluation of Significance

Short-eared Owl surveys were conducted in the evening, following general raptor point counts. Short-eared Owl consisted of ten-minute point counts positioned within or on the edge of suitable Short-eared Owl hunting habitat. Surveys commenced one half hour before sunset and ended when total darkness occurred. The distance between each point count station was driven. The results of EoS studies completed on candidate Short-eared Owl SWH are presented in **Table 4-14 (Appendix B)**.

Due to the presence of suitable Common Nighthawk nesting habitat (CN1, CN2, CN3), a focused survey based on Nightjar Survey Protocols and Instructions (developed by The Center for Conservation Biology: www.ccb-wm.org/nightjar/protocols.htm) was conducted on June 15, 16 and July 4, 2011. Surveys were undertaken concurrently with roadside amphibian surveys (described below in Section 3.1.5.5) at 27 survey stations positioned near suitable Common Nighthawk nesting and foraging habitat in, or within 120 m of, the Project Location. Surveys were conducted 30 minutes after sunset and continued until midnight. When possible, surveys were conducted during nights with little cloud cover, low wind and no precipitation and during full moon conditions. The June 15 survey coincided with a full moon occurring the same evening. Surveys were conducted for six minutes at each listening post and consisted of recording species heard or seen. The results of EoS studies completed on candidate Common Nighthawk SWH are presented in **Table 4-15 (Appendix B)**.

No formal survey methodology for surveying Giant Swallowtails exists in Ontario. Incidental sightings of adults and caterpillars of this species were noted when encountered during other natural heritage studies. The results of EoS studies completed on candidate Giant Swallowtail SWH are presented in **Table 4-16 (Appendix B)**.

Species of conservation concern surveys locations are provided in **Figure 4-2 (Appendix A)** and survey dates, times, weather conditions and field personnel are summarized in **Table 4-1 (Appendix B)**.

Significant Features

- Of five candidate significant Short-eared Owl habitat features, one was considered significant. Short-eared Owl was not recorded during 2011 breeding bird point counts, though one was recorded by Stantec during 2011 targeted surveys. Winter raptor

surveys and Short-eared Owl surveys during the winter of 2011/2012 did not record the presence of overwintering owls in, or within 120 m of, the Project Location;

- Common Nighthawk was not recorded during crepuscular bird surveys within the candidate habitat areas, nor at any other point in proximity to the Project Location. Of three candidate significant Common Nighthawk habitat features, none were deemed significant as a result of the EoS; and,
- Of two candidate significant Giant Swallowtail habitat features, one (GS1) was deemed significant (**Figure 4-6, Appendix A**). In addition to a concentration of Northern Prickly-ash larval food plants and the presence of nectaring species such as goldenrod, four Giant Swallowtail observations were made in proximity to the feature during 2011 field surveys. No Giant Swallowtail observations were made in proximity to natural feature GS2.

4.4.3.3 Summary of Significant Wildlife Habitat

Various forms of SWH are present within 120 m of the Project Location including:

- Habitats of Seasonal Concentrations of Animals (reptile hibernacula);
- Specialized Habitat for Wildlife (open country breeding bird areas, amphibian woodland breeding habitat, amphibian wetland breeding habitat, and marsh breeding bird habitat areas); and
- Habitat of Species of Conservation Concern (*Special Concern* species and declining species habitat areas).

4.5 Summary of the Evaluation of Significance

Based on the RR (Section 2) and SI (Section 3), 119 natural features were identified as being candidate significant natural features using the criteria and guidelines in the NHRM (OMNR, 2009) and the NHAG (OMNR, 2010). Of these 119 candidate significant natural features, 48 were deemed to be significant in the EoS (Section 4) and proceeded to the EIS (Section 5). These 48 significant natural features included the following:

- 8 Woodlands;
- 16 Wetlands;
- Wildlife Habitat:
 - Habitat of Seasonal Concentrations of Animals:
 - 1 Raptor Wintering Area;
 - 5 Reptile Overwintering areas (5 Snake Hibernacula);
 - Specialized Habitat for Wildlife:
 - 4 Open Country Breeding Bird Habitat areas;
 - 3 Amphibian Breeding Habitat (Woodland) areas;
 - 4 Amphibian Breeding Habitat (Wetland) areas;
 - 1 Marsh Breeding Bird Habitat area;
 - Habitat of Species of Conservation Concern:

- 2 Special Concern Species Habitat areas (1 Short-eared Owl and 1 Giant Swallowtail) ; and,
- 5 Declining Species Habitat areas (Shrub/Successional Species Habitat areas).

4.6 Qualifications

AMEC personnel responsible for conducting the EoS include:

- Matt Evans (Senior Biologist);
- Jeff Balsdon (Terrestrial Biologist);
- Jon Pleizier (Terrestrial Biologist);
- Izabela Kalkowski (Botanist);
- Erin Donkers (Botanist);
- Said Mohamed (Botanist and Wetland Biologist); and,
- Tracy Wolowidnek (Environmental Scientist).

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

5.0 ENVIRONMENTAL IMPACT STUDY

Section 38 of O.Reg. 359/09 states that an EIS must be conducted for all significant natural heritage features, provincial parks, or conservation areas that are located in or within 120 m of Project Location (50 m for an Earth Science ANSI). The purpose of this EIS is to identify and assess any potential negative environmental effects to significant natural features during the construction, operation, and decommissioning phases of the proposed Project. This EIS also provides effective mitigation measures to eliminate or minimize potential negative environmental effects. Detailed mitigation measures and a Post-construction Wildlife Monitoring Plan are also provided in this section.

The overall goal of this EIS is to eliminate or minimize Project related residual impacts to all natural heritage features, flora and fauna found within the Project Location. Given that the proposed Project Location is largely comprised of cultural fields (hay fields, pastures, old fields, and bedrock meadows covered 58% of the Project Location and 120 m setback), direct effects to significant natural features will be minimal. However, some significant natural features are located within the Project Location and/or within the 120 m REA setbacks (**Figures 4-1, 4-3, 4 5, and 4-6, Appendix A**). This section presents the EIS results for these significant natural features and presents proposed mitigation measures to avoid or minimize negative Project-related environmental effects. No provincial parks, conservation reserves, ANSI's, sand barrens, savannahs or tall grass prairies are located within 120 m of the Project Location and the Project is not located within the Oak Ridges Moraine or Niagara Escarpment planning areas and as such, their further consideration is not applicable in this EIS report.

A conservative approach has been used when proposing mitigation measures in order to minimize or eliminate, to the extent practical, potential negative Project effects on the area's natural features. The NHRM (OMNR, 2009), NHAG (OMNR, 2011b), and the SWHTG (OMNR, 2000) were used in the EoS for natural features and in the assessment of potential negative effects from this Project. The primary mitigation measure employed to reduce impacts to natural features and functions was avoidance: 1) the Project is sited predominately within actively cultivated agricultural land, 2) modifications to the site plan were made to avoid placing the Project in natural features identified as significant through the SI and EoS for this Project, and 3) micro-siting decisions made during the development of the Project layout considered minimizing impacts to natural features, wildlife and wildlife habitat. A summary of potential environmental effects and proposed mitigation measures for each significant natural feature, as described in the subsections below, is provided in **Table 5.1 (Appendix B)**.

All *Threatened* and *Endangered* species (SAR) protected under Ontario's Endangered Species Act (ESA 2007) are presented and discussed separately from this NHA and EIS. They are instead presented as a component of the APRD, once a separate SAR Report has been approved by the OMNR.

5.1 Overview of Project Footprint

As outlined in Section 1.1 of this report, the Project consists of approximately 426,000 PV panels to generate up to 100 MWac of power, an inverter station consisting of two 500 kVA inverters and transformers, a substation and an adjacent switchyard, a 34.5 kV collector system of underground and overhead power lines, access roads, culverts, and temporary construction and laydown areas (**Figures 1-2a-f in Appendix A**).

The location of the Project components in relation to significant natural features is shown on **Figures 4-1, 4-3, 4-5 and 4-6 (Appendix A)**.

The generation equipment will consist of fixed ground mounted PV panels. Approximately 426,000 PV panels will be arranged in 1 MW blocks consisting of 4,260 PV panels. Arrangement and electrical connection of panels is described above. Security fencing would be erected around the site perimeter prior to construction and would consist of 1.8 m high chain link fencing. Since the environmental impacts posed by solar panels and fences are considered to be relatively equivalent, only the distance to fenceline, the closer of the two components, is presented when discussing impacts on significant natural features in the following section.

The construction phase of the Project is expected to commence in the fall of 2013 with completion in 2014, and would be spread across an area of approximately 261 ha. The construction of PV panels and ancillary facilities would take place in agricultural lands and would have little destruction or fragmentation of natural habitats. Each solar PV panel will be mounted on structural aluminum or galvanized steel racks arranged in rows. In locations of poor soil conditions, concrete pads will be poured for racking attachment. Solar arrays will be arranged in approximately 1 MW blocks with each block terminating at an inverter station, for which concrete pads would be poured.

Contractor trailers will be brought to each solar site, and would be used for temporary storage of materials required at that site. A central location would be selected for overall Project management and laydown for solar farm development. This area will be used temporarily for construction offices, parking, equipment, and materials storage. Temporary laydown areas (**Figures 1-2a-f in Appendix A**) will be removed at the end of the construction phase and restored to pre-existing condition as soon as possible once assembly of the solar panels is complete.

Permanent gravel access roads, approximately 4 m wide will be installed from the edge of the municipal road to within the solar panel sites. Access roads will be prepared by excavation of surface soils. Topsoil from site development would be stockpiled for reuse on-site. Gravel fill would be added as necessary to allow construction equipment access. The access roads will initially permit access by construction vehicles, but would be required throughout the life of the Project for maintenance purposes. During construction, the movement of cranes between solar panel sites would take place primarily along access roads and municipal roads. Lanes between the rows of panels required for initial construction will not be paved, but allowed to re-vegetate following project completion.

Considerable effort has been made to avoid intrusions by access roads into natural areas and to minimize the number of water crossings required to access the solar panel sites. However, in locations where it is necessary for access roads to cross water, permanent culverts may be placed on geotextile material and would be countersunk a minimum of 10% of culvert diameter and they would then be backfilled with gravel to match the final grade of the access road. Permits will be required from the Cataraqui Region Conservation Authority for each of the water crossings. All installation activities would conform to *Ontario Provincial Standard Specification 421 (OPSS) – Construction Specification for Pipe Culvert Installation in Open Cut*.

Each row of PV panels (within 1 MW blocks) would be connected together in series forming a string, and the DC power from each block would be brought to an inverter station, via underground or overhead cabling (depending on site conditions) where it will be converted to AC power and stepped up to 34.5 kV. The 34.5 kV power lines leaving each inverter station would follow the road allowance. Underground cables would be installed in trenches between the property line and the travelled portion of the roadway within the road allowance. Trenches would be excavated using backhoes or tracked excavators for placement of the cables. The cables would be bedded in sand and the trench would be backfilled with the excavated material.

If the installation of underground cables requires them to be installed by use of directional drilling to cross roads or other obstacles, they would be installed in conduits. Streams would either be crossed using directional drilling or the cables would be carried overhead on utility poles, as necessary. Where cables cross permanent water courses, these would be either directionally drilled beneath the stream bed or installed overhead, as appropriate and in consultation with the Cataraqui Region Conservation Authority.

Overhead power lines would be placed on existing poles where possible. Existing poles that cannot accommodate the additional power lines will be replaced with new poles and the existing cables would be transferred. Following installation of poles and hardware the new cabling will be strung to complete the connection to the substation.

The collector system will carry the electricity to the TS or the substation/switchyard, where there will be a step-up of power to 230 kV (nominal), which is the operating voltage of the adjacent Hydro One transmission line. The site would include an adjacent switchyard to interconnect with the provincial power grid that would be operated by Hydro One. The substation would be the base for operations of the solar facilities and would include an operations and maintenance building. Excavation of the yard will be required for the construction of concrete foundations and installation the electrical grounding grid and gravel. Excavations would be backfilled using construction fill and excavated materials. The operations and maintenance building would be used to provide warehouse and storage space, workshop spaces, administrative office space, and washroom facilities. The construction of the substation facility including the operations and maintenance building would last approximately 12-15 months

A temporary laydown area will be included on the substation site for contractor offices and parking. The laydown area would also be used for the storage of supplies and equipment such as electrical cabling, steel structures, outdoor breakers, as well as resources and general construction materials such as gravel, wood and steel. Major equipment such as PV panels would not be stored at the laydown area as these would be delivered directly to the solar array sites. The construction management offices and laydown area will be used for the duration of the construction contract. Following construction, the temporary facilities will be removed and the site rehabilitated.

As described in Section 1.1, inverter stations are required for the proposed Project and would be installed for use during the operation phase of the Project. DC current from each 1 MW block of PV panels will report to one inverter station via underground or overhead transmission cables. The inverter stations would be installed on concrete pads and footings. Access for installation and maintenance of the inverter stations is required.

Operation of the solar power development would involve periodic use of the access roads for maintenance servicing of the PV panels, underground collector lines and poles with overhead collector lines.

5.1.1 Construction Phase

The proposed Project's construction phase consists of the following work:

- Staking of site work area and installation of erosion and runoff controls;
- Construction of temporary access roads;
- Delineation of temporary work areas and installation of temporary construction facilities;
- Completion of necessary site grading;
- Installation of racking for solar panels;
- Installation of solar panels; Connection of solar farm to electrical collector system;
- Restoration of temporary work areas;
- Installation of underground and/or overhead collector lines on leased lands;
- Installation of collector lines either underground and/or overhead on transmission line poles along municipal right-of-way;
- Tree trimming and right-of-way clearing as required and approved by Municipality and/or Hydro One;
- Installation of hydro poles within existing municipal right-of-ways;
- Installation of hydro poles for stream crossings;
- Stringing and installation of the collector line conductors;
- Completion of permanent access roads; and,
- Landscaping (final grading, topsoil replacement, re-vegetation, fence installation, etc.).

Vegetation has been identified for removal during the construction phase; however, this vegetation removal will not result in any significant impacts to wildlife or habitat. Minor, indirect impacts such as emissions or leaks/spills from construction vehicles, dust, erosion, short term

hydrological changes, and disturbance to wildlife and habitat are anticipated. Impacts and mitigation measures are described in **Tables 5-1 and 5-2 (Appendix B)**. No net effects due to the construction phase are anticipated and, as such, no future monitoring plans are proposed.

Timing of Project Construction

Clearing activities associated with Project construction will begin in the first half 2013 and will take place outside of the breeding bird season:

- For open country breeding bird habitat clearing restrictions will be imposed between May and September; and,
- For all other areas clearing restrictions will be imposed between May and August.

Clearing during the winter months will allow other construction activities (i.e., placement of the pilings and solar panels, road building) to occur in areas of removed habitat during the summer months of 2014 as it is expected that no birds will be nesting in these cleared areas.

Clearing activities will also avoid significant amphibian breeding areas (ABF5, ABF9) during the amphibian breeding season (April – July), and will avoid significant snake hibernacula (SH3, SH4, SH7, SH33, SH43; **Figure 4-3**) when snakes are known to congregate in these areas (September – October and April – May).

5.1.2 Operating Phase

The proposed Project's operation phase consists of the following work:

- Periodic truck access for routine operational checks and maintenance;
- Routine maintenance and repairs;
- Grading and snow removal, as required;
- Inspection and maintenance of collector lines and poles;
- Tree trimming along collector lines as required and approved by Municipality;
- Testing and maintenance;
- Meter calibrations; and,
- Grounds keeping.

The aspects of operation and the noise associated with the presence of panel inverters and a transformer station are not expected to result in any negative impacts within 120 m of the Project Location. Some minor, indirect impacts from maintenance activities such as emissions or leaks/spills from maintenance vehicles, dust, and disturbance to wildlife and habitat are anticipated. Impacts and mitigation measures are described in **Table 5-1 (Appendix B)**. No net effects due to the construction phase are anticipated and, as such, no future monitoring plans are proposed.

Timing of Project Operation

Operation will occur throughout the year and additional construction or disturbance activities are anticipated until project decommissioning.

5.1.3 Decommissioning Phase

The proposed Project's decommissioning phase consists of the following work:

- Removal of all above-ground structures such as solar panels, supporting racks and infrastructure;
- Removal of below-ground structures such as foundations as agreed to or as necessary in accordance with the land lease agreement;
- Removal of granular material and geotextile materials below the road by dump truck (unless otherwise specified by the property owner);
- Collector line excavation and removal as necessary in accordance with the land lease agreement;
- Removal of interconnection lines and poles;
- Site grading (dependent upon new proposed use); and,
- Site restoration (may include soil de-compaction, addition of topsoil, and re-vegetation).

The impacts of the decommissioning phase are similar to those posed by the construction phase and the same mitigation measures will be implemented (**Table 5-1, Appendix B**). No net effects due to the decommissioning phase are anticipated and, as such, no future monitoring is proposed. Minor, indirect impacts such as emissions or leaks/spills from construction vehicles, dust, erosion, short term hydrological changes, and disturbance to habitat and wildlife are anticipated. Impacts and mitigation measures are described in **Table 5-1 (Appendix B)**. No net effects due to the construction phase are anticipated and, as such, no future monitoring plans are proposed.

Timing of Project Decommissioning

The months in which decommissioning activities will occur will be similar to those described above for construction in order to avoid sensitive wildlife windows. Decommissioning activities will take place outside of the breeding bird season:

- For open country breeding bird habitat clearing restrictions will be imposed between May and September; and,
- For all other areas clearing restrictions will be imposed between May and August.

Decommissioning activities will also avoid significant amphibian breeding areas (ABF5, ABF9) during the amphibian breeding season (April – July), and will avoid significant snake hibernacula (SH3, SH4, SH7, SH33, SH43; **Figure 4-3**) when snakes are known to congregate in these areas (September – October and April – May).

5.2 Impacts of Project Activities to Natural Features

5.2.1 Overview

The Project Location footprint has been cited in active agricultural land, rural land or cleared municipal road allowances. All components of the Project, and the associated 120 m zone of investigation in relation to significant natural features, are shown in **Figures 4-1, 4-3, 4-5 and 4-6 (Appendix A)**. As noted in the Section 4.0 summary, the following significant features occur in or within 120 m of the Project Location:

- Significant Woodlands;
- Significant Wetlands; and,
- Significant Wildlife Habitats.

There are 48 significant natural features within the proposed fenceline boundaries, or within 120 m of the fenceline boundaries (listed at the end of Section 4). Construction and installation of a renewable energy facility may be permitted within significant woodlands or wildlife habitat, or within 120 m of these natural features as well as within 120 m of a provincially significant southern wetland or provincially significant coastal wetland, subject to the completion of an EIS (O.Reg. 359/09, Section 38 (1)).

- Approximately 8.1 ha of woodland features and 47.5 ha of other natural features such as cultural thickets and regenerating patches have also been identified for removal (**Table 5-1, Appendix B**), as described below; and
- 44 hedgerows covering 8.9 ha have been identified for removal (**Table 5-2, Appendix B**).

The environmental impacts on all natural features will be discussed by focusing on the following categories of impacts:

- Directly caused by land clearing, construction and decommissioning; and,
- Indirect as a result of construction, operation, and decommissioning.

5.2.2 Significant Woodlands

Approximately 8.1 ha of woodland features will be removed for the construction of solar panels and associated fencelines, access roads, and underground and overhead collector lines. Clearing will occur in woodlands 1, 15, 16, 19, 36, 37, 40, 41, and 42. Woodlands 1 and 19 are the only significant woodlands to be directly impacted by clearing activities. A total of 4.3 ha is scheduled for removal from these two significant features.

Woodland 1 will experience a total area loss 3.4 ha, leaving a total area of 47.9 ha and 4.44 ha of interior habitat. Despite the loss of area, woodland 1 will remain a significant woodland as few of its ecological characteristics will be changed. The connection between woodland 1 and wetland 2 will remain intact, and significant natural feature ABF16 will be preserved. Anticipated

negative ecological impacts to woodland 1 include loss of edge habitat and loss of connection to shrub/successional breeding bird habitat. The losses of such habitat connections will most likely impact habitat generalists which will make use of the forest, forest edge habitat, and adjacent thicket habitat as well as shrub/successional species that may use the forest edge as perching habitat. Despite the removal of forested areas to be cleared extend as fingers and their removal does not greatly reduce interior forest area. The total reduction of interior forest habitat, as a result of clearing activities, was 0.12 ha or 2.6%. No negative impacts arising from vegetation loss are expected for the few area-sensitive breeding bird species known to occur in woodland 1. It is not anticipated that removal of vegetation from woodland 1 will greatly impact the forest community contained therein and, consequently, no net residual effects are expected. Other indirect impacts to significant woodlands include emissions from construction and maintenance vehicles, dust, erosion, short term hydrological changes, and disturbance to habitat and wildlife may occur.

Woodland 19 will experience a loss of total area loss of 0.9 ha. Vegetation communities to be removed include fresh-moist white cedar coniferous forest and dry-fresh calcareous bedrock deciduous thicket. Evidence of disturbance exists in the area in the form of rubble and garbage litter on the ground. The remaining woodland area will cover 21.9 ha and is largely comprised of maple mineral deciduous swamp located adjacent to active agricultural fields. No species of conservation concern have been identified within woodland 19, though amphibian woodland breeding habitat (ABF10) is contained within the feature. Vegetation removal will not occur within this amphibian breeding habitat, and as a result, is not expected to significantly compromise the ecological characteristics of the woodland. Vegetation clearing will not compromise the connection between this woodland and wetland 18 will not change. The most notable anticipated negative ecological impact is the removal of edge habitat and a vegetated linkage between woodlands 19 and 29. This strip of vegetated last can provide a passage for local wildlife, though it does not meet the criteria required to be considered to be a wildlife movement corridor. These forested areas will nonetheless continue to be linked by wetland 18 and woodland 30 which are continuous with woodlands 19 and 29. Forested areas to be cleared extend as fingers and their removal does not reduce interior forest area (2.69 ha). This polygon contains plant species commonly encountered within the Project Location. No SWH or species of conservation concern have been identified here. Indirect impacts to significant woodlands include emissions from construction and maintenance vehicles, dust, erosion, short term hydrological changes, and disturbance to habitat and wildlife are anticipated. Consequently, it is not expected that vegetation removal from woodland 1 will greatly impact the functionality of significant woodland 19 and no net residual impact is anticipated.

Post-construction wildlife monitoring of breeding birds and amphibians to establish the ecological consequences of vegetation removal of significant woodlands 1 and 19 are proposed in the Post-construction Wildlife Monitoring Plan (PWMP) provided in Section 5.4.

Small (<1.0 ha) woodlands 15, 16, 36, 37, and 41 will be removed completely for the installation of solar panels and fencelines. Woodlands 40 and 42 are also small (1.1 ha and 0.2 ha respectively) and will be partially removed. Woodlands 15, 16, 36, 37, 40, and 42 are situated

within a larger cultural areas consisting of shrub/successional or open meadow habitat. Woodlands 36 and 37 will be removed along with 39.2 ha of regenerating habitat representing significant shrub/successional breeding bird habitat. Woodland 26 was found to contain amphibian breeding habitat during the SI, resulting from seasonal flooding and pooling. Removal of woodland 36 will reduce available amphibian breeding habitat, though this feature is quite small and lacks significant amphibians corridors to larger wetlands. Woodlands 15, 16, 40, and 41 will be removed along with 58.4 ha of open country breeding bird habitat. These treed communities comprised of White Cedar coniferous forest and moist poplar mixed forest are interspersed among regenerating cultural lands and some wet meadow areas. These woodlands would have provided perches or nesting habitat for bird species preferring woodland edges as well as cover for other fauna using or passing through the habitat.

No vegetation removal is associated with significant woodlands 13, 14 and 18. However, no setback is available and, as such, Project activities may occur directly adjacent to these features. Indirect impacts to significant woodlands include emissions from construction and maintenance vehicles, dust, erosion, short term hydrological changes, and disturbance to habitat and wildlife are anticipated.

There will be no encroachment on the remaining identified significant woodland (woodland 5).

Mitigation measures for direct impacts caused by vegetation clearing and construction and indirect impacts resulting from emissions, dust, erosion, short term hydrological changes, and sensory disturbance to habitat and wildlife as a result of Project activities occurring within or adjacent to woodland features are described in Section 5.3. Mitigation and contingencies specific to Project activities impacting significant woodlands are provided in **Table 5-1 (Appendix B)**.

5.2.3 Significant Wetlands

The Project site layout has been designed to minimize environmental impacts and disturbance to wetlands in, or within 120 m of, the Project Location. A total of 16 significant wetlands are located within 120 m of the Project Location. Efforts were made to locate Project components outside wetland boundaries to the greatest extent possible; however, wetland features 13 and 26 will be completely removed for panel installation and ten wetland features are located less than 30 m from the Project Location.

The complete removal of Wetland 13 for the construction of solar panels will result in the loss of 0.07 ha of wetland area. The small area of this feature falls well below the 2 ha standard for evaluation. This wetland feature is comprised of a wet, sedge-filled depression surrounded by old pasture and is not hydrologically connected to other wetlands. No rare vegetation or provincially rare wildlife habitat was observed in this feature. This combination of attributes exempts wetland 13 from protection afforded larger, significant wetlands. This feature will be treated as significant amphibian wetland breeding habitat. The removal of this small patch of habitat represents a loss of less than 1% of the available amphibian breeding habitat that overlaps with lands occurring within 120 m of the Project Location. It is not anticipated that the

loss of this small features will result in a net residual loss of amphibian wetland breeding habitat. Nearby amphibian breeding habitat features include ABF9 and ABW7, which provide a total habitat area of 37.9 ha.

The complete removal of Wetland 26 for the construction of solar panels will result in the loss of 0.29 ha of wetland area. The small area of this feature falls well below the 2 ha standard for evaluation. This wetland feature is essentially a wet, vegetated depression surrounded by agricultural lands and is not hydrologically connected to other wetlands. No rare vegetation or provincially rare wildlife habitat was observed in this feature. This combination of attributes exempts wetland 13 from protection afforded larger, significant wetlands. This feature will be treated as significant amphibian wetland breeding habitat. The removal of this small patch of habitat represents a loss of less than 1% of the available amphibian breeding habitat that overlaps with lands occurring within 120 m of the Project Location. It is not anticipated that the loss of this small features will result in a net residual loss of amphibian wetland breeding habitat. Nearby amphibian breeding habitat features include ABF14 and ABW16 which occur within significant woodland 13. These features provide approximately 2.16 ha of amphibian breeding habitat.

Overhead collector lines will be strung from existing poles and will follow the road allowance afforded by Unity Road. These collector lines will skirt wetland 32, but will not leave lasting hydrological impacts to the natural feature, nor will any vegetation require removal. Indirect impacts to this wetland feature may include emissions from construction and maintenance vehicles, dust, erosion, short term hydrological changes. This wetland is part of significant marsh breeding bird habitat feature MB1. This anticipated negative impacts to this feature are described in greater detail in Section 5.2.4. No net effects due to the Project activities are anticipated, though future post-construction wildlife monitoring of breeding birds and amphibians to establish the ecological consequences of anthropogenic disturbances to MB1 are proposed in the PWMP provided in Section 5.4.

Mitigation measures for direct impacts caused by vegetation clearing and construction and indirect impacts resulting from emissions, dust, erosion, short term hydrological changes, and sensory disturbance to habitat and wildlife as a result of Project activities occurring within or adjacent to wetland features are described in Section 5.3. Detailed Project impacts and mitigation measures for all 16 wetlands located within 120 m of the Project Location are described in **Table 5-1 (Appendix B)**.

5.2.4 Significant Wildlife Habitat Features

Raptor Wintering Areas

The EoS identified one significant Short-eared Owl habitat feature (SO3) within 120 m of the Project Location, which occurs within a raptor wintering area (WR3). Feature WR3 was assigned significance due to the observation of a Short-eared Owl within the feature, rather than a significant abundance of wintering diurnal raptor species. Impacts to Short-eared Owl wintering habitat will be discussed in its respective section below.

Reptile Overwintering Habitat

The construction of solar panels and associated fencelines, access roads, and underground and overhead collector lines will result in the direct loss of reptile overwintering habitat (SH3, SH4, SH7, SH30, and SH33). The reptile overwintering habitat features consist of cracks in fissures within exposed bedrock. The use of these suitable snake hibernacula sites by snakes was uncertain and as a result, these features will be treated as significant. It is not anticipated that the loss of these five snake habitat features will result in a net residual habitat loss, due to alternative suitable habitat within and surrounding the Project Location. An additional five known candidate snake hibernacula features are known to occur within 120 m of the Project Location while a high frequency of rock piles within or adjacent to old field cultural meadows, cracks and fissures within exposed bedrock within cultural meadows, and several small mammal burrows which function as suitable alternatives were observed within proximity to the Project Location. Since bedrock communities are widespread within the municipal boundaries of both the City of Kingston and the Loyalist Township, it is reasonable to assume that suitable snake hibernacula alternatives are also widespread. No net effects to the local snake population due to the Project activities are anticipated.

Mitigation measures for direct impacts caused by vegetation clearing and construction and indirect impacts resulting from emissions, dust, erosion, short term hydrological changes, and sensory disturbance to habitat and wildlife as a result of Project activities occurring within or adjacent to reptile overwintering features are described in Section 5.3. Detailed Project impacts and mitigation measures for all five significant snake hibernacula features located within 120 m of the Project Location are described in **Table 5-1 (Appendix B)**.

Area-sensitive Breeding Bird Habitat (Open Country Breeding Bird Habitat)

Although the Project will result in direct loss of significant open country breeding bird habitat within natural features OCBB3, and OCBB9, much of the significant open country breeding habitat features occurring within 120 m of the Project Location will remain viable for breeding birds. OCBB4 and OCBB9 represent the areas of greatest importance to open country breeding birds found within the Project Location and will remain largely intact.

OCBB2 occurs within 120 m of the Project Location, yet will not experience any direct vegetation clearing as a result of the construction of solar panels, fencelines, or access roads. Overhead collector lines will be installed along the roadside allowance of Unity Road which represents the northern boundary of this natural feature. No direct effects are anticipated to be felt within the open country breeding bird habitat from the installation of overhead collector lines as they will be situated within the roadside allowance and will likely not extend beyond the existing agricultural fenceline. It is anticipated that indirect impacts arising from noise and visual disturbances caused during the construction phase of Project components adjacent to this feature may negatively affect the significant open country habitat. At 34.9 ha in size, it is anticipated that any displacement of breeding activities caused by indirect impacts will be absorbed by the large size of the feature.

OCBB3 will experience direct negative impacts resulting from clearing and the construction of solar panels, fencelines, access roads, and both overhead and underground collector lines. It is scheduled that 20.4 ha of OCBB3 will be removed, leaving 13.5 ha of available habitat. The remaining patches of habitat will no longer meet the criteria for SWH based on minimum size requirements. Due to the shape of feature OCBB3, the remaining open country habitat will be split between 3 separate patches. The removal of habitat from feature OCBB3 will result in a 4.7% decline in significant open country breeding bird habitat overlapping land within 120 m of the Project Location. Remaining tracts of significant habitat occurring within 120 m of the Project Location that may be used by open country species include OCBB2, OCBB4, and OCBB9.

OCBB4 occurs within 120 m of the Project Location, yet will not experience any direct vegetation clearing as a result of the construction of solar panels, fencelines, access roads, or underground collector lines. Overhead collector lines will be installed along the roadside allowances of Howes Road and Unity Road which represent the western and northern boundaries of this natural feature. No direct effects are anticipated to be felt within the open country breeding bird habitat from the installation of overhead collector lines as they will be situated within the roadside allowance. It is anticipated that indirect impacts arising from noise and visual disturbances caused during the construction phase of Project components adjacent to this feature may negatively affect the significant open country habitat. At 77.9 ha in size, it is anticipated that any displacement of breeding activities caused by indirect impacts will be absorbed by the large size of the feature.

The largest patch of open country breeding bird habitat overlapping the Project Location, OCBB9 will experience a loss of 21.3 ha of habitat due to land clearing and the construction of solar panels and associated fencelines, access roads, and underground and overhead collector lines. Despite this loss of habitat, a single block of 270.2 ha of open country breeding bird habitat will remain intact. The removal of the habitat translates to a 4.9% decline in available significant open country breeding bird habitat overlapping lands within 120 m of the Project Location. Due to the large size of this feature, it is not anticipated that the removal of vegetation for panel and fenceline construction will have a significant impact on breeding bird habitat availability within the feature. Much of the remaining habitat of this feature is positioned well away from roadways or anthropogenic structures.

Mitigation measures for direct impacts caused by vegetation clearing and construction and indirect impacts resulting from emissions, dust, erosion, short term hydrological changes, and sensory disturbance to habitat and wildlife as a result of Project activities occurring within or adjacent to open country breeding bird habitat features are described in Section 5.3. Detailed Project impacts and mitigation measures for all four significant open country breeding bird features located within 120 m of the Project Location are described in **Table 5-1 (Appendix B)**.

Post-construction wildlife monitoring of open country breeding birds to establish the ecological consequences of vegetation removal of significant open country breeding bird habitat features OCCB2, OCCB3, OCBB4, and OCBB9 are proposed in the PWMP provided in Section 5.4.

Amphibian Breeding Habitat (Woodland)

Amphibian woodland breeding habitat will experience negative impacts due to the Project activities associated with the installation of solar panels and associated fencelines, access roads, and underground and overhead collector lines. One significant amphibian natural feature, ABF1, will be removed due to Project activities, while eight other features occur within 120 m of the Project Location.

ABF1 will be completely removed as a result of the construction of solar panels. Removal of this natural features represents a loss of 0.8 ha of amphibian woodland breeding habitat which equates 1.2% of the total area that amphibian woodland breeding habitat overlaps with lands occurring within 120 m of the Project Location. This feature is quite small and lacks significant amphibians corridors to larger wetlands.

No vegetation removal is associated with significant features ABF5 and ABF 14, in which Western Chorus Frogs were recorded and occur within 120 m of the Project Location. No 30 m setback is available for either of these features and, as such, Project activities may occur directly adjacent to them. While these features will not experience any direct negative impacts associated with clearing for construction, impacts resulting from construction activities may include indirect impacts due to emissions or leaks/spills from construction and maintenance vehicles, dust, erosion, short term hydrological changes, and disturbance to habitat and wildlife are anticipated.

Should negative impacts displace woodland breeding amphibians from significant features ABF5 and ABF14, six (ABF2, ABF4, ABF9, ABF10, ABF15 and ABF16) additional woodland habitat features covering 59.7 ha are available within 120 m of the Project Location. Amphibian breeding habitat ABW16 also occurs in close proximity to ABF14 (**Figure 3-6**), though impacts causing displacement from ABF14 may also impact ABW16.

Tree removal within woodland areas will not be necessary; however, some pruning in features ABF4, ABF5, and ABF9 may be required. Minor, indirect impacts due to emissions or leaks/spills from construction and maintenance vehicles, dust, erosion, short term hydrological changes, and disturbance to habitat and wildlife are anticipated. Impacts and mitigation measures are described in **Table 5-1 (Appendix B)**.

Mitigation measures for direct impacts caused by vegetation clearing and construction and indirect impacts resulting from emissions, dust, erosion, short term hydrological changes, and sensory disturbance to habitat and wildlife as a result of Project activities occurring within or adjacent to amphibian woodland breeding habitat features are described in Section 5.3. Detailed Project impacts and mitigation measures for all three significant amphibian woodland

breeding habitat features located within 120 m of the Project Location are described in **Table 5-1 (Appendix B)**.

Post-construction wildlife amphibians to establish the ecological consequences of vegetation removal of significant amphibian woodland breeding habitat features ABF1 as well as the indirect effects of anthropogenic disturbance on significant wetland features ABW9 and MB1 other amphibian breeding habitat within 120 m of the Project Location are proposed in the PWMP provided in Section 5.4.

Amphibian Breeding Habitat (Wetland)

Clearing of lands for construction of solar panels and associated fencelines, access roads, and underground and overhead collector wires will result in the direct loss of amphibian wetland breeding habitat features that have been treated as significant.

The complete removal of amphibian breeding wetland ABW8 for the construction of solar panels will result in the loss of 0.07 ha of suitable amphibian breeding habitat. The removal of this small patch of narrow-leaved sedge meadow marsh represents a loss of less than 1% of the available amphibian breeding habitat that overlaps with lands occurring within 120 m of the Project Location. It is not anticipated that the loss of this small feature will result in a net residual loss of amphibian wetland breeding habitat. Nearby amphibian breeding habitat features include ABF9 and ABW7, which provide a total habitat area of 37.9 ha.

ABW17 is a small (0.44 ha), isolated patch of amphibian breeding habitat, which was treated as significant, and occurs in a wet depression within an agricultural field. This feature is hydrologically isolated from other wetlands and migration of amphibians between this feature and nearby woodlands (significant woodland 13) would present a great risk of mortality. Risks would primarily include predation and mortality from agricultural activities. The removal of this feature for the construction of solar panels and associated access roads would represent a loss of less than 1% of amphibian breeding wetland habitat occurring within 120 m of the Project Location. Nearby amphibian breeding habitat features include ABF14 and ABW16 which occur within significant woodland 13. These features provide approximately 2.16 ha of amphibian breeding habitat.

No vegetation removal is associated with ABW9 resulting from the clearing of lands for construction of solar panels and associated fencelines, access roads, and underground collector wires; however, there will be some modification of this feature due to overhead collector line installation. Overhead collector lines will be strung across existing poles along Unity Road. Consequently, no invasive impacts will occur outside of the existing road allowance. This wetland is part of significant marsh breeding bird habitat feature MB1 and anticipated impacts to marsh breeding birds are described in the appropriate section.

No vegetation removal is associated with ABW10 and ABW12; however, no setback is available and, as such, Project activities may occur directly adjacent to this feature. Indirect impacts to this feature resulting from Project activities may include disturbances caused by noise and

extensive human presence, emissions or leaks/spills from construction and maintenance vehicles, dust, erosion, short term hydrological changes.

Additionally, there are six alternate significant amphibian wetland breeding habitats which will not be directly impacted by Project activities and can be utilized.

Mitigation measures for direct impacts caused by vegetation clearing and construction and indirect impacts resulting from emissions, dust, erosion, short term hydrological changes, and sensory disturbance to habitat and wildlife as a result of Project activities occurring within or adjacent to amphibian wetland breeding habitat features are described in Section 5.3. Detailed Project impacts and mitigation measures for all four significant amphibian wetland breeding habitat features located within 120 m of the Project Location are described in **Table 5-1 (Appendix B)**.

Post-construction wildlife amphibian surveys to establish the ecological consequences of vegetation removal of significant amphibian wetland breeding habitat features ABW8 and ABW17 as well as the indirect effects of anthropogenic disturbance on other amphibian breeding habitat within 120 m of the Project Location are proposed in the PWMP provided in Section 5.4.

Marsh Breeding Bird Habitat

One significant marsh breeding bird habitat feature (MB1) is present within 120 m of the Project Location. No loss of habitat is anticipated for this feature due to the construction of solar panels and associated fencelines, access roads, and underground collector lines. Overhead collector lines are scheduled to be installed along the Unity Road allowance. These lines will be strung along existing poles within the road allowance and no encroachment into the marsh feature is anticipated as work may be completed from the road. No net effects resulting from these Project activities are anticipated as the breeding population of Marsh Wrens inhabiting this feature occur in the interior habitat of the marsh, well away from Unity Road.

Mitigation measures for indirect impacts resulting from emissions, dust, erosion, short term hydrological changes, and sensory disturbance to habitat and wildlife as a result of Project activities occurring within or adjacent to open country breeding bird habitat features are described in Section 5.3. Detailed Project impacts and mitigation measures for marsh breeding bird habitat feature MB1 are described in **Table 5-1 (Appendix B)**.

Post-construction wildlife monitoring of breeding birds and amphibians to establish the ecological consequences of anthropogenic disturbances to MB1 are proposed in the PWMP provided in Section 5.4.

Special Concern and Provincially Rare Species

There will be no encroachment onto any portion of significant Giant Swallowtail habitat (GS1) and there is no requirement for vegetation removal within these natural features for the clearing

of lands for the purpose of construction of solar panels and associated fencelines, access roads, or underground and overhead collector lines. No vegetation removal is associated with GS1, however, no 30 m setback is available and, as such, Project activities may occur directly adjacent to this feature.. Where the separation distance is less than 30 m, feature boundaries should be well demarcated using clearly visible material (e.g., flagging tape and painted stakes) such that all construction activities and personnel are excluded from these areas. Minor, indirect impacts due to emissions or leaks/spills from construction and maintenance vehicles, dust, erosion, short term hydrological changes, and disturbance to habitat and wildlife are anticipated. Impacts and mitigation measures are described in **Table 5-1 (Appendix B)**. As a result, no net effects to the local Giant Swallowtail populations due to the Project activities are anticipated and, as such, no future monitoring plans are proposed.

The EoS identified one significant Short-eared Owl habitat feature (SO3) within 120 m of the Project Location, which occurs within a raptor wintering area (WR3). Feature WR3 was assigned significance due to the observation of a Short-eared Owl within the feature, rather than a significant abundance of wintering diurnal raptor species. Significant Short-eared Owl habitat feature SO3 occurs within 120 m of the Project Location yet will not experience any direct vegetation clearing as a result of the construction of solar panels, fencelines, access roads, or underground collector lines. Overhead collector lines will be installed along the roadside allowances of Howes Road and Unity Road which represent the western and northern boundaries of this natural feature. No direct effects are anticipated to be felt within this Short-eared Owl overwintering and hunting habitat from the installation of overhead collector lines as they will be situated within the roadside allowance. It is anticipated that indirect impacts arising from noise and visual disturbances caused during the construction phase of Project components adjacent to this feature may negatively affect the likelihood of Short-eared Owl use of this habitat during the construction phase.

Minor, indirect impacts due to emissions or leaks/spills from construction and maintenance vehicles, dust, erosion, short term hydrological changes are anticipated, though is not anticipated that such impacts in and of themselves will deter Short-eared Owl use of the habitat. Impacts of spills and small scale erosion may negatively impact local rodent populations, which may in turn reduce the quality of SO3 as a hunting area for owls.

Mitigation measures for direct impacts caused by vegetation clearing and construction and indirect impacts resulting from emissions, dust, erosion, short term hydrological changes, and sensory disturbance to habitat and wildlife as a result of Project activities occurring within or adjacent features SO3 and GS1 are described in Section 5.3. Detailed Project impacts and mitigation measures both of these significant natural features are further described in **Table 5-1 (Appendix B)**.

Post-construction wildlife monitoring of Short-eared Owls and Giant Swallowtails to establish the ecological consequences of anthropogenic disturbances to natural features SO3 and GS1 are proposed in the PWMP provided in Section 5.4.

Declining and Rare Species Habitat

Clearing of lands for construction of solar panels and associated fencelines, access roads, and underground and overhead collector wires will result in the direct loss of shrub/successional breeding bird habitat features that have been treated as significant.

SBB1 will not experience any direct impacts as a result of clearing for the construction of solar panels and associated fencelines, access roads, and underground collector lines. This significant feature is 13.2 ha in size and is known to provide breeding habitat to Golden-winged Warbler, a species of *Special Concern*, in addition to other shrub/successional breeding bird species. Indirect negative impacts to this habitat arising from construction, operational phases and decommissioning may include emissions or leaks/spills from construction and maintenance vehicles, dust, erosion, short term hydrological changes, and visual and sound disturbance to wildlife. The greatest impact on the suitability of this habitat to Golden-winged Warbler may be noise and human presence which will be elevated during the construction and decommissioning phases.

SBB2 will experience the removal of 39.2 ha (75.5%) of its habitat size for the construction of solar panels and associated fencelines, access roads, and underground collector lines. The removal of this shrub/successional habitat will account for 17.5% of the available significant habitat of this type across lands occurring within 120 m of the Project Location. Though 12.7 ha of shrub/successional habitat will remain, this area will be divided among five smaller patches. Two other significant habitat features, AMF1 and part of woodland 1, shall be removed along within SBB1. No habitat of *Special Concern* of provincially rare species are known to occur in this feature, though adult Giant Swallowtail has been observed flying therein. No notable patches of Northern Prickly-ash, the Giant Swallowtail caterpillar foodplant, were noted within this feature. Much of this feature consisted of dogwood and regenerating ash species. As shown in **Figure 3-2 (Appendix A)**, portions of this feature have been cut by landowners and have been used for hay. Numerous hunting stands were also noted on remaining trees within the feature.

SBB3 will experience the removal of 0.75 ha, or 2.1% of its total area for the construction of solar panels and associated fencelines, access roads, and underground collector lines. As a result, 35.8 ha of SBB3 will remain, and this feature will maintain its significant status. The small section of SBB3 to be removed will occur in proximity to rural homes situated along Unity Road. Construction of solar panels and associated fencelines, access roads, and underground collector lines will occur along the eastern border of this feature. Indirect negative impacts to this habitat arising from construction, operational phases and decommissioning may include emissions or leaks/spills from construction and maintenance vehicles, dust, erosion, short term hydrological changes, and visual and sound disturbance to wildlife. A *Vermivora* warbler was recorded in this feature during the EoS. This observation was made well removed from the area of direct impact. The greatest impact on the suitability of this habitat to Golden-winged Warbler may be noise and human presence which will be elevated during the construction and decommissioning phases. No other SWH was recorded within the natural feature. Due to the

restricted removal of vegetation and the limited duration of construction activities prior to the operational phase, it is anticipated that no net residual impact to this feature will occur.

SBB4 is a very large feature that covers 97.7 ha. Bedrock and cultural meadow containing adequate woody vegetation comprises a large portion of this habitat and consists of the Hydro One corridor and privately-owned old field habitat. Clearing of 17.2 ha of this feature is scheduled for the construction of solar panels and associated fencelines, access roads, and underground collector lines. This vegetation removal will largely occur in bedrock meadow habitat and will represent a 17.6% reduction in feature size. Despite the removal of vegetation for Project infrastructure, remnants of this natural feature will include two tracts of shrub/successional habitat covering 16.2 ha and >60 ha. Both remaining tracts will maintain significance based on size and vegetation composition. It is not expected that lasting effects of heightened disturbance caused by construction will persist as agricultural activities and rural residences already occur adjacent to this feature.

SBB5 will not experience any direct impacts as a result of clearing for the construction of solar panels and associated fencelines, access roads, and underground collector lines. Unity Road provided the northern boundary of this feature, where overhead collector wires will be strung along existing poles. Indirect negative impacts to this habitat arising from construction, operational phases and decommissioning may include emissions or leaks/spills from construction and maintenance vehicles, dust, erosion, short term hydrological changes, and visual and sound disturbance to wildlife. This feature is 24.5 ha in size and despite abutting Unity Road, it is continuous with a great expanse of natural areas including wetland 18 and significant woodland 19. It is not anticipated that any net residual impact to this feature will occur.

Mitigation measures for indirect impacts resulting from emissions, dust, erosion, short term hydrological changes, and sensory disturbance to habitat and wildlife as a result of Project activities occurring within or adjacent to open country breeding bird habitat features are described in Section 5.3. Detailed Project impacts and mitigation measures for marsh breeding bird habitat feature MB1 are described in **Table 5-1 (Appendix B)**.

Post-construction wildlife monitoring of shrub/successional breeding bird habitat to establish the ecological consequences of anthropogenic disturbances to natural features SBB1, SBB2, SBB3, SBB4, and SBB5 are proposed in the PWMP provided in Section 5.4.

5.2.5 Net Effects of Project Activities

Considerable effort has been made to avoid intrusions by access roads into natural areas and to minimize the number of water crossings required to access the solar panel sites. Permanent culvert installations would be required along access roads and associated underground electrical collector lines that cross watercourses. All crossings will require approval from the Cataraqui Region Conservation Authority.

With the implementation of effective mitigation plans summarized in Section 5.2.1 and periodic monitoring and inspection of standard site control measures, the net residual effects of the construction, operation and decommissioning of proposed access roads within 120 m of significant natural features would be low to none.

With the implementation of effective mitigation plans and periodic monitoring and inspection of standard site control measures, the net residual effects of the construction, operation and decommissioning phases of proposed Project on significant natural features within 120 m of the Project Location are expected to be low to none.

While the removal of vegetation in areas discussed above will result in the loss of some natural features (including some SWH), there are suitable alternatives for any displaced wildlife within and surrounding the Project Location, as illustrated in **Figures 5-1 and 5-2 (Appendix A)**. At minimum, a total of 463 ha of Open Country Breeding Bird Habitat and 266 ha of Shrub/Successional Breeding Bird Habitat remains in close proximity to the Project Location. Aerial photographs of nearby areas indicate even more habitat located in other areas not surveyed for the purposes of this Project. There is an abundance of woodland habitat in surrounding areas as well (see **Figure 3-4, Appendix A**). Site Investigations have shown that the SWH observed in the immediate vicinity of the Project Location is not saturated by other individuals and would be able to accommodate the immigration of displaced animals. A habitat management plan will be developed in consultation with the OMNR that also sets aside and protects some local habitat areas that have already been leased by the Proponent but will not have solar panels installed. The exact location of these areas has yet to be determined.

5.3 General Project Mitigation and Contingency Measures

The primary mitigation measure employed to reduce impacts to natural features and functions was avoidance; decisions made during the development of the Project layout considered minimizing impacts to, and encroachment on, natural features. The Project is sited predominately within fallow or cultivated agricultural land. Modifications to the site plan were made to avoid placing the Project in features identified as significant through the site investigation and evaluation of significance for this Project.

Overall, the potential effects of the construction, operation and decommissioning of the Project include potential short-term, localized dust generation, soil erosion and sedimentation, and disturbance to wildlife. The impacts resulting are expected to be short term, temporary in duration and can be mitigated through the use of general mitigation measures and best management practices (see **Table 5-1**). During construction, there will be increased traffic and the potential for accidental spills.

No potential negative effects are expected from the installation of collector lines along road allowances. Construction and decommissioning activities for collector lines will be short-term, localized, and will remain confined to areas already cleared for road allowances. During the operations phase, some periodic maintenance activities will occur, but these will have no impact

on nearby significant natural features or wildlife. Maintenance of collector lines may include some pruning of trees, where necessary.

The following mitigation measures and best management practices are intended to minimize or mitigate potential adverse impacts on adjacent significant natural features and will be implemented during the construction, operation and decommissioning of the Project's components (panels and fences, access roads, collector lines).

5.3.1 Air Quality/Noise - Exhaust and Dust Emissions

Construction activities rely on the use of a wide range of mobile equipment. The engine exhaust from these vehicles represents a source of emissions from the construction site. Traffic delays also result in increased emissions from vehicles traveling slowly through construction zones. To reduce emissions from equipment and vehicles, several mitigation measures will be employed:

- Multi-passenger vehicles will be utilized to the extent practical;
- Company and construction personnel will avoid idling of vehicles when not necessary for construction activities;
- Equipment and vehicles will be turned off when not in use unless required for construction activities and/or effective operation;
- Equipment and vehicles will be maintained in good working order with functioning mufflers and emission control systems as available;
- All vehicles will be fitted with catalytic converters as required;
- All activities will be conducted in accordance with "*Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities*" (Environment Canada, 2005) to further minimize adverse air quality impacts due to project implementation;
- When appropriate, contractors will be required to provide properly working machinery and equipment with adequate noise suppression devices that meet current government requirements;
- As appropriate, cover or otherwise contain loose materials that have potential to release airborne particulates during their transport, installation or removal;
- As necessary, suppress releases of dust using water mist or calcium chloride dust suppressant on the work sites as required (calcium chloride will not be used on agricultural fields) to control during construction and decommissioning activities;
- As appropriate, records of vehicle maintenance will be retained and made available for periodic review by the Construction Contractor; and,
- All vehicles identified through the monitoring program that fail to meet the minimum emission standards will be repaired immediately or replaced as soon as practicable.

A Construction Traffic Management Plan will be developed by the Construction Contractor and will include protocols for the management of traffic and for the delivery of materials to the site.

Air quality effects will be primarily due to dust emissions from overburden disturbances during excavation and backfill, soil exposure and stockpiling, and placement of gravel on access roads. During dry conditions, excessive dust may be generated from the work sites and access roads. The mitigation includes best management practices which are common to the construction industry. The following procedures will be implemented to ensure the potential impacts from excessive dust are minimized:

- Apply dust suppressants such as water mist;
- Maintain adequate control of dust at sites that are in close proximity to residences;
- Enforce low speed limits for trucks on site as appropriate;
- Re-vegetate exposed soils as soon as possible;
- As appropriate, protect stockpiles of friable material with a barrier or windscreen in the event of dry conditions and/or excessive dust; and,
- Ensure dust generation is monitored and controlled in areas of sensitive land use.

Should these measures fail to reduce excessive dust generation, the Contractor may be required to temporarily suspend construction activities in affected areas until dust emissions have been controlled.

5.3.2 Fuel and Chemical Materials

In terms of accidental spills or releases to the environment, undesirable materials on-site are limited to fuel, lubricating oils, and other fluids associated with construction. The potential exists for spills during any construction activity. By implementing proper handling of fuels and lubricants during construction, the likelihood of accidental events that result in adverse effects to the environment will be prevented or greatly reduced. The following procedures will be implemented to prevent spills and protect natural features:

- Construction equipment will be stored in an area not subject to water erosion and secured in using silt fencing to contain dust/silt that may be contaminated due to incidental leakage;
- All trucks or other road vehicles will be refuelled and maintained off site, where practicable;
- Refuelling and maintenance of vehicles will not be allowed within 30 m of a natural feature – woodland, waterway, wetland, or drainage systems;
- Regular inspections of hydraulic and fuel systems on machinery will be done;
- Leaks will be repaired immediately upon detection or the equipment removed from site;
- Ensure proper storage of materials in storage containers;
- Spill kits containing absorbent materials will be kept on hand; and,
- Implement best management practices and develop an emergency spill response plan.

In terms of accidental spills or releases to the environment, standard containment facilities and emergency response materials will be maintained on-site as required. Refuelling, equipment maintenance, and other potentially contaminating activities will occur in designated areas, and

as appropriate spills will be reported immediately to the MOE Spills Action Centre. Following containment and clean-up of a spill, the procedures followed will be evaluated for effectiveness and, if as a result of the evaluation, areas of improvement are identified changes to the procedures/response will be implemented.

5.3.3 Vegetation Removal

Based on the approach taken to site Project components outside of significant natural features, impacts to existing natural vegetation communities have been minimized and the majority of lands impacted by the Project consist of agricultural fields. However, the removal of small parts of woodlands and hedgerow vegetation is proposed. As appropriate, and in consultation with the relevant parties (government, conservation authority, adjacent landowner), the Proponent will replace trees removed with tree species native to the ecoregion in an alternate location. As well, a habitat management plan that provides and protects other areas as a source of compensation for lost habitat due to Project construction will be developed in consultation with the OMNR. This habitat compensation program will set aside and protect some local habitat areas that have already been leased by the Proponent but will not have solar panels installed within them. The exact location of these areas has yet to be determined.

For all areas where vegetation removal or trimming is required, the following mitigation measures will be implemented:

- Prior to construction, the limits of vegetation clearing within the agricultural fields will be staked and flagged in the field;
- The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and regular monitoring of the clearing will be employed to ensure minimal disturbance;
- Should monitoring reveal that clearing occurred beyond defined limits, mitigation measures will be taken that will include rehabilitation of the disturbed area to pre-disturbance conditions at the direction of a qualified ecologist;
- The boundaries of all wetlands and woodlands within 30 m of the proposed construction area will be staked and flagged in consultation with a qualified ecologist prior to construction to assist with the demarcation of the construction area, to ensure construction activities avoid significant wetlands, woodlands and wildlife habitats and to assist with the proper field installation of erosion and sediment controls measures;
- All disturbed areas of the construction site will be re-vegetated as soon as practicable;
- Excavated soil will be re-used on site as feasible and the excavated soil removed for installation of infrastructure will be stockpiled and re-used on-site as feasible;
- Where this is not feasible, the soil will be disposed of at an MOE-approved off-site facility to be determined by the Construction Contractor;
- Temporary laydown areas will be returned to pre-construction conditions as soon as practical. The pre-existing conditions at each Project site are primarily agricultural and thus will be converted back into agricultural production;

- The areas cleared for construction but not being returned to agricultural production after completion of construction (i.e., buffer areas), will be reseeded with species native to Ecoregion 6E or the local area; and,
- Areas where vegetation is removed and soils excavated for the purpose of collector system installation within municipal road allowances will be re-seeded following construction as soon as practical with vegetation native to ecoregion 6E.
- All vegetation and habitat management plans for the operations phase of the Project will be developed in consultation with the relevant parties (government, conservation authority, adjacent landowner) but will involve the following two components:
 - Any vegetation management (i.e. mowing) required within the immediate area of the solar panels during Project operations, will take place prior to the arrival of migratory birds in the spring in order to discourage birds from nesting under the panels. Mowing activities will occur regularly in order to continue to discourage birds from nesting in these area and allowing vegetation management activities to continue throughout the summer growing season.
 - Any vegetation management (i.e. mowing) required within the road allowances during Project operations, will be completed in accordance with Municipal and/or Hydro One requirements and will avoid the breeding bird season for Open Country Breeding Bird Habitats (May 1 – September 1).

5.3.4 Sediment and Erosion Control

In order to minimize erosion potential and the introduction of sediment into the natural features during grading and construction activities, a number of erosion and sediment control measures will be implemented. Erosion susceptibility within the 'buildable areas' is relatively low due to the generally flat topography of most agricultural fields; however, some areas may be more susceptible than other areas. All erosion and sediment controls will be installed prior to construction to minimize potential impacts and will be maintained during and following construction, until soils in the construction area are stabilized with vegetation, to ensure their effectiveness at protecting adjacent natural features. Silt barriers will be removed after this has been achieved.

The proximity and sensitivity of adjacent natural features increases the risk of erosion and sedimentation within a construction area. As such, all natural features identified within 30 m of any proposed construction area are at higher risk of erosion from grading and topsoil removal and sediment transfer. Erosion and sedimentation control measures will be installed to minimize erosion impacts adjacent to natural features, as appropriate.

Generically, erosion and sediment control measures will include the application of structures such as:

- Runoff Controls – diversion berms, cross trenches, chutes, check dams, interceptor swales;

- Erosion Control – diversion ditch and dispersion aprons, gravel sheeting, mulch, erosion control blankets; and,
- Sediment Control – sediment fence, straw bale barriers, filter berms, sediment traps, settling ponds.

The following points and definitions comprise the basic principles of erosion and sediment control. These measures are to be implemented, as appropriate, where there is a risk of surficial erosion and loss of soil:

- All sediment and erosion control measures will be installed, maintained and removed in accordance with the Ontario Provincial Standard Specification (OPSS) standards for Temporary Erosion and Sediment Control Measures (OPSS 805);
- Areas where soil or subsoil has been exposed will be stabilized by:
 - Grading exposed areas to a slope which minimizes the potential for erosion;
 - Applying appropriate erosion and sediment control measures;
 - Seeding, mulching or covering with erosion control matting where deemed appropriate by the Site Engineer;
- Sediment and erosion control structures will be installed prior to site disturbance and meet the quality standards outlined in the construction or manufacturers specifications. These measures will only be removed when the disturbed area is stabilized;
- Traffic during construction and follow-up activities will be limited to existing and designated roadways, and must not detour through fields or natural areas; and,
- Where possible, the fields surrounding the construction areas will be re-vegetated following the completion of the construction activities.

Specific mitigation measures to be applied will be as follows:

- Minimize disturbance of existing vegetation outside ditching and grassed slopes where grading is required;
- Where there is a risk of soil migration into a nearby watercourse, excavated soils will be stockpiled, stabilized and silt-fencing will be installed as appropriate to prevent erosion and sediment run-off;
- As appropriate, use of in-line erosion control measures such as erosion blanket, straw bale, rock flow checks and vegetated buffers, thereby mitigating high flow velocities and excessive erosion/sedimentation. Erosion control measures will be inspected regularly to ensure proper function, particularly during heavy rainfall events;
- Silt barriers (e.g., fencing) will be erected along wetland, woodland, and wildlife habitat boundaries located within 30 m of construction work areas (access roads, laydown areas) to minimize potential sediment transport to the natural features. These barriers will be regularly monitored and properly maintained during and following construction until soils in the construction area (i.e., side slopes of access roads, realigned grassed swales) are re-stabilized with vegetation or the area has been returned to pre-disturbance conditions, after which they will be removed;

- Top of bank barriers (e.g., silt fencing) will to be put in place for any construction activity that is in proximity to watercourses. Silt fencing will be inspected regularly to ensure proper function, particularly during and following heavy rainfall events. Any evidence of stream bank erosion will be stabilized and restored to their pre-construction condition as soon as possible;
- Where culverts are proposed within 30 m of a significant natural feature, enhanced sediment and erosion control measures (i.e., straw bales, double rows of sediment fencing) 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;
- The exposure of un-vegetated and exposed soils will be minimized to the greatest extent possible;
- Minimize vehicle traffic on exposed soils and stabilize high traffic areas with a clean gravel surface layer or other suitable cover material;
- Steep slopes will be left undisturbed to the greatest extent possible;
- Maximize length of overland flow through to points where stormwater leaves the site;
- Complete an erosion assessment on all new and existing ditches to determine the need for additional erosion protection;
- Any stockpiled materials will be stored and stabilized away from watercourses;
- Sediment and erosion control measures will be left in place until all disturbed areas have been stabilized; and,
- All disturbed areas at the construction site will be re-vegetated as soon as practical. Excavated soil will be re-used on site as feasible. If not feasible, the soil will be disposed of at an MOE approved off-site facility. Temporary laydown areas will be returned to pre-construction conditions as soon as practical. The pre-existing conditions at each site are primarily agricultural and thus will be converted back into agricultural production. The areas cleared for construction but not being returned to agricultural production after completion of construction (i.e., buffer areas), will be reseeded with species native to Ecoregion 6E or the local area.

Sediment and erosion protection measures will be regularly maintained and inspected to confirm continued effectiveness. Even with properly installed erosion and sedimentation control measures, extreme runoff events could result in collapse of silt fencing, slope or trench failures and other problems which could lead to siltation of watercourses. If siltation to a watercourse occurs, activities will cease immediately until sedimentation control measures have been repaired.

5.3.5 General Wildlife Mitigation

The potential negative effects to wildlife during Project construction 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) or directly through mortality. Mitigation measures to be implemented for dust, chemical or fuel spills and erosion/sedimentation have been addressed above.

During construction of the Project, the access roads will experience some traffic, which will vary in intensity as the construction phase progresses. Amphibians and turtles are at an increased risk from vehicle collisions in spring, particularly on cool rainy nights as they move towards warmer road surface and when nesting.

Specific wildlife mitigation measures include the following:

- Where the separation distance between significant wildlife areas and the Project site perimeter is 30 m or less, the significant wildlife areas will be well demarcated with fencing such that all construction activities and personnel are excluded from these areas to minimize any disturbance to existing vegetation around the Project site perimeter (excluding potential tree pruning requirements);
- Vegetation clearing will be completed prior to or after the breeding season for migratory birds (May - August).
- As practical, adjust timing of construction and decommissioning activities to minimize impacts to wildlife;
- After the solar panels have been assembled, the temporary construction laydown area will be restored to pre-existing conditions as soon as practical. The pre-existing conditions at each site are primarily agricultural and thus will be converted back into agricultural production;
- Any wildlife found within the 'buildable areas' during construction and decommissioning activities will be safely relocated, as appropriate, in consultation with a qualified biologist to the nearest appropriate habitat. Construction will not continue until the species has been relocated or the species has left the area on its own accord. Wildlife will be transported by staff trained in proper handling procedures and using means that puts the animal at least risk for injury. Clean pails, crates, carriers, bags should be used if movement by hand is dangerous to the animal or the handler. Bird, turtle, mammal, or snake nests should not be touched as eggs may be damaged; OMNR will be contacted if turtle nests are identified in the construction area. Turtles should not be picked up by their tail, as it can fracture their spine;
- During construction/decommissioning and operation, vehicle traffic will primarily be restricted to daytime hours. Speed limit signage will be erected and will be restricted to 30 km/h or less, where appropriate;
- Best management practices such as silt fencing, will be employed to minimize negative impacts on wildlife habitats and species that use them. Silt fencing will occur where buildable area is located within 30 m of significant wildlife habitat (see Table 5-1 for feature-specific distances and mitigation measures);
- When appropriate, contractors will be required to provide properly working machinery and equipment with adequate noise suppression devices that meet current government requirements;
- Implement a minimum three-year post-construction monitoring plan on targeted species and natural features where avoidance behaviour of significant wildlife habitat has been identified as a potential effect; and,

- Implement post-construction monitoring on targeted species and natural features for disturbance, declines in species diversity and density and individual mortality, where applicable.

Specific mitigation measures relative to each significant wildlife habitat feature are discussed further below and are presented in **Table 5-1**. With the implementation of effective mitigation plans, monitoring during and after construction, and inspection of standard site control measures described above, the net residual effects of the construction, operation and decommissioning of the proposed Project are predicted to be low.

5.3.6 Pre-construction Monitoring

Feature-specific amphibian call surveys could not be completed during the evaluation of significance, and therefore, pre-construction amphibian surveys will be conducted in all candidate amphibian woodland breeding habitat identified in Figure 3-6. These surveys will take place in April and May of 2013. Approximately 0.4 ha of ABF1 will be removed. If this feature is deemed to be significant after the 2013 pre-construction surveys then this habitat will be artificially replaced in the immediate vicinity (as close to the original habitat area as possible).

Pre-construction surveys will also be conducted at all five of the significant snake hibernacula identified in Figure 4-3. These surveys will take place in September and October of 2012 and will consist of visual searches and the placement of snake boards.

5.3.7 Construction Monitoring

During construction, best management practices pertaining to dust generation, soil erosion and sedimentation, chemical/fuel spills and soil contamination, noise and air emission pollution, habitat and disturbance to wildlife, and short-term hydrological changes have been recommended for significant woodlands, wetlands and significant wildlife habitat. To ensure these measures are properly employed, the following monitoring measures are recommended:

- Weekly visual inspections of silt barriers and dust suppression controls (and following major storm events) to ensure proper maintenance and functioning; rectify any discrepancies immediately;
- Weekly visual inspections to ensure proper storage of fuel or other potential contaminants to minimize potential for on-site spills; rectify any discrepancies immediately;
- Weekly monitoring of equipment and vehicle condition to ensure proper functioning; rectify any discrepancies immediately;
- Weekly monitoring of silt fences to prevent encroachment of sediments into adjacent natural features; rectify any discrepancies immediately; and,
- Weekly inspection of drainage ditches, culverts and general flow patterns to ensure proper site drainage.

5.4 Post-construction Wildlife Monitoring Plan (PWMP)

In order to quantify the net residual effects experienced by wildlife species and significant wildlife habitat features impacted by the implementation of the Project, a post-construction wildlife monitoring plan has been created and will be implemented following the construction phase. The objectives of the post-construction wildlife monitoring plan will include the following:

1. Monitor the presence and abundance of wildlife in significant wildlife habitat features following Project construction.
2. Compare data between pre-construction surveys and post-construction monitoring to establish a net residual effect of Project activities on wildlife presence and abundance in significant natural features impacted directly or indirectly by the Project
3. Improve mitigation measures where necessary and develop contingency plans for unexpected disturbances experienced by wildlife during the operation and decommissioning of the Project.

The proposed post-construction monitoring plan described below will assess the accuracy of the predictions made in this EIS regarding potential impacts and will verify compliance of the Project with applicable provincial and federal legislation and guidelines. Any unanticipated potentially significant adverse environmental effects discovered during the post-construction monitoring program will be further mitigated using contingency plans described in **Table 5-1**.

Species diversity and density will be compared between pre-construction and post-construction conditions. **Figure 5-3** shows several proposed post-construction survey stations located both inside and outside the Project Location. Survey stations located outside the Project Location will be used as 'control' sites (provided that access is granted by landowners) to document potential changes in species diversity and density compared to potential 'impacted' sites (within 120 m of the Project Location). This approach allows for a Before-After-Control-Impact design where post-construction data will be statistically compared to pre-construction data. Consistency in the survey methods will allow for reliable comparisons of the post-construction disturbance effects. This will allow yearly comparisons of potential post-construction effects while statistically controlling for external factors such as weather, disease and depredation.

The scope of the Post-construction Wildlife Monitoring Plan (PWMP) will encompass those natural features that are significant and were partially removed for Project activities, as well as select features that are significant and overlap with the 120 m Project Setback. The PWMP will thus include studies that monitor the following natural features:

- Significant Woodlands;
- Open Country Breeding Bird Habitat areas;
- Marsh Breeding Bird Habitat area;
- Shrub/Successional Species Habitat areas;
- Amphibian Breeding Habitat (Woodland) areas;
- Amphibian Breeding Habitat (Wetland) areas;

- Short-eared Owl Habitat;
- Reptile Hibernacula Habitat; and,
- Giant Swallowtail Habitat.

Breeding Bird Habitat

The EIS identified three breeding bird SWH types (open country, marsh, and shrub/successional) that may be impacted either directly or indirectly by Project activities. Two significant woodlands (1 and 19) have also been directly impacted due to clearing of vegetation. In order to provide a meaningful comparison between avian pre-construction and post-construction abundances, breeding bird point count locations occurring outside the Project Location (impacted lands) will be used for post-construction monitoring.

These breeding bird monitoring surveys will be undertaken between May 24 and July 10 by qualified biologists skilled in bird identification by sight and sound. Point counts will be repeated no less than ten days following the initial survey date. To the greatest extent possible, the order in which the survey stations were visited should be reversed to prevent temporal sampling bias. Similar to pre-construction surveys undertaken in the EoS, point count methodology will be based on a review of the most current inventory methodology, discussions with OMNR, and the widely used inventory protocols outlined in *Bird and Bird Habitat: Guidelines for Wind Power Projects* (OMNR, 2011b). A total of 46 point count stations occurring within or adjacent to significant open country, marsh, and shrub/successional habitats have been identified as possible post-construction bird monitoring stations (**Figure 5-3, Appendix A**). These stations are located 300 m apart. Surveys will be conducted for ten minutes at each listening post and consisted of recording the diversity and density of bird species at four distance regimes: 1) within a 50 m radius, 2) 50 to 100 m, 3) outside the 100 m radius, and 4) flyovers (birds seen flying overhead). Surveys will be initiated one half hour prior to sunrise and typically ended at 10:30 A.M., depending on the weather conditions. The start time of each point count survey should be recorded. Point counts should not be conducted during rain or high winds (>Level 3 on Beaufort Scale).

Amphibians Breeding Habitat

The EIS identified two amphibian breeding habitat types (woodland and wetland) that may be impacted either directly or indirectly by Project activities. In order to provide a meaningful comparison between amphibian pre-construction and post-construction abundances, amphibian call counts undertaken in significant amphibian breeding habitat will be monitored following the construction phase.

Studies to determine amphibian diversity within candidate amphibian woodland breeding SWH will include night call surveys stationed within or at the edge of remaining significant amphibian breeding woodlands and wetlands occurring within 120 m of the Project Location. These stations are shown in **Figure 5-3 (Appendix A)**. The surveys should follow protocols outlined in the OMNR's Amphibian Road Call Count Program (Konze and McLaren, 1997). Surveys should be repeated three times annually to account for early and late-breeding frog species.

Amphibians heard at all distances will be recorded and all calling activity will be ranked using one of the following three abundance categories:

- Level 1: Indicates that each calling individual can be counted separately and calls are not simultaneous;
- Level 2: Indicates that there are some simultaneous calling but individual calls are still distinguishable; and,
- Level 3: Indicates a full chorus of continuous and overlapping calls and individual animals cannot be counted accurately.

Short-eared Owl Wintering Habitat

The EIS identified one significant Short-eared Owl habitat feature (SO3) within 120 m of the Project Location, which occurs within a raptor wintering area (WR3). Feature WR3 was assigned significance due to the observation of a Short-eared Owl within the feature, rather than a significance abundance of wintering diurnal raptor species. Project activities occurring within or inside this feature includes the installation of the overhead collector lines along Unity Road and Howes Road and solar panel and fenceline installation adjacent to the eastern boundary of the feature. As a result, little habitat modification is expected to occur within this feature. Indirect impacts stemming from construction occurring west of Howes Road may cause the most disturbances to this habitat feature.

Wintering Short-eared Owl surveys will be conducted in December, January, February and May to determine whether this species will persist in the proximity to the Project Location. Surveys will be undertaken in the evening and consist of extended point counts positioned within or on the edge of feature SO3. Surveys will commence one half hour before sunset and end when total darkness occurs. OMNR will be consulted prior to undertaking Short-eared Owl surveys for further advice on survey methodology and effort requirements.

Reptile Hibernacula Habitat

The EIS identified ten significant reptile hibernacula habitat features (SH1, SH3, SH4, SH7, SH27, SH28, SH30, SH33, SH43) within 120 m of the Project Location. Post-construction monitoring of these features will include a search for emerging snakes in these areas in April and May, and for congregating snakes in September and October. The spring and fall surveys correspond to seasons in which snakes are most likely to be observed in these areas.

Giant Swallowtail Habitat

The EIS identified one significant Giant Swallowtail habitat feature (GS1) within 120 m of the Project Location. Post-construction monitoring of this species will include a search of host plants (Northern Prickly-ash) within GS1 for caterpillars. Searches for Giant Swallowtail larva should occur in September to most definitely correspond with the end of the flight schedule of this species in Ontario. In Ontario, two generations of Giant Swallowtails occur between May until

September (Layberry *et al.*, 2002). OMNR will be consulted prior to undertaking Giant Swallowtail surveys for further advice on survey methodology and efforts.

Reporting and Reviewing Results of Post-construction Monitoring

Contingency measures outlined in **Table 5-1** allow certain remedial measures to be employed in the event that unanticipated adverse environmental effects are observed. The following sections describe the procedures for notifications, reporting, and adaptive management for post-construction wildlife monitoring. An annual post-construction monitoring report will summarize all findings of wildlife surveys and will include estimates in the annual densities of the targeted species at each survey station (or within each targeted SWH feature), particularly for all species of conservation concern or priority species. Any noticeable declines in population numbers or observations of mortality of SAR will be reported immediately to the OMNR.

The MOE and the OMNR, along with the Proponent and other relevant agencies, will collectively review the results of the post-construction monitoring annually to determine if a negative environmental effect is occurring, and whether such an effect is attributable to the Project and not external factors. These discussions will determine if and when contingency measures (presented in **Table 5-1**) will be undertaken. The best available science and information will be considered when determining appropriate mitigation and will be determined in consultation with the MOE and OMNR based on post-construction monitoring results. Pending the re-assessment results, the program methods, frequencies, and duration may be reasonably modified to reflect the findings.

6.0 CONCLUSIONS

This NHA has revealed that there are many significant natural heritage features within the proposed Project Location, and within the 120 m REA setbacks. These significant natural features include eight significant woodlands, 16 significant wetlands, and eight categories of SWH. Although the majority of the Project has been planned to occupy previously disturbed agricultural cropland and avoid natural heritage features, portions of the development are located within the 120 m REA setbacks of significant natural features, and some vegetation removal is proposed. Therefore, a comprehensive EIS was prepared and concluded that through the application of best management practices and the prescribed mitigation measures and management plans, adverse residual effects resulting from the Project's construction, operation, and decommissioning would not be significant.

7.0 CLOSURE

This document was prepared exclusively for The Proponent, by AMEC Americas Limited. The quality of information contained herein is consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions and qualifications set forth in this document. This document is intended to be used by The Proponent, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance upon this document by any third party for any other purpose will be at that party's sole risk.

8.0 REFERENCES

- AMEC. 2011. Wildlife Baseline Studies Summary Report for Summer 2011. Surveys for the Samsung Sol-luce Kingston Solar PV Energy Project.
- Bakowsky, W.D. 1997. Natural Heritage Resources Inventory of Ontario: S-ranks for Communities in Site Regions 6 and 7. Ontario Natural History Information Centre. Ministry of Natural Resources, Peterborough, Ontario.
- Beach, C. 2011. City of Kingston Information Report to Planning Committee, Report No. PC-10-064. City of Kingston, Ontario.
- Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier (Eds.) 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto.
- Cataraqui Region Conservation Authority (CRCA). 2006. Central Cataraqui Region Natural Heritage Study Final Report.
- City of Kingston Official Plan. 2010a. County of Frontenac, City of Kingston Official Plan Schedule 7-B, Natural Heritage Area A. approved January 27, 2010; Consolidated August 1, 2011.
- City of Kingston Official Plan. 2010b. County of Frontenac, City of Kingston Official Plan Schedule 8-B, Natural Heritage Area B. Approved January 27, 2010; Consolidated August 1, 2011.
- Connecticut Botanical Society (CBS). 2005. Connecticut Wildflowers: Stiff Gentian. <http://www.ct-botanical-society.org/galleries/gentianellaquin.html>. Accessed November 2011.
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2002a. COSEWIC Assessment and Update Status Report on the Eastern Milksnake (*Lampropeltis triangulum*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2002b. COSEWIC Assessment and Update Status Report on the Northern Map Turtle (*Graptemys geographica*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2002c. COSEWIC Assessment and Update Status Report on the Eastern Ribbon Snake (*Thamnophis*

sauritus) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2007a. COSEWIC Assessment and Update Status Report on the Five-lined Skink Carolinian Population, Great Lakes/St. Lawrence Population (*Eumeces fasciatus*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2007b. COSEWIC Assessment and Update Status Report on the Milksnake (*Lampropeltis triangulum*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2008a. COSEWIC Assessment and Update Status Report on the Short-eared Owl (*Asio flammeus*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2008b. COSEWIC Assessment and Update Status Report on the Snapping Turtle (*Chelydra serpentina*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2008c. COSEWIC assessment and update status report on the Western Chorus Frog *Pseudacris triseriata* Carolinian population and Great Lakes/St. Lawrence – Canadian Shield population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Dechant, J.A., D.H. Johnson, L.D. Igl, C.M. Goldade, A.L. Zimmerman, and B.R. Euliss. 2003. Effects of Management Practices on grassland birds: Wilson's Phalarope. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center. Online.
<http://www.npwrc.usgs.gov/resource/literatr/grasbird/wiph/wiph.htm>
(Version 12DEC2003).

Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists. Don Mills, Ontario.

Dunkle, S.A. 2000. Dragonflies Through Binoculars: A Field Guide to Dragonflies of North America. Oxford Press.

Environment Canada. 2007a. Wind Turbines and Birds: A Guidance Document for Environmental Assessment. Prepared by the Canadian Wildlife Service. Interim Report. July, 2005.

- Environment Canada. 2007b. Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds. Prepared by the Canadian Wildlife Service. Final Report, February, 2007.
- Favorite, J. 2003. Branched Burreed (*Sparganium androcladum*) Plant Guide. USDA, NRCS, National Plant Data Centre, Louisiana.
http://plants.usda.gov/plantguide/pdf/cs_span.pdf. Accessed November 2011.
- Fenton, M.B. 1970. Population Studies of *Myotis lucifugus* (Chiroptera: Vespertilionidae) in Ontario. Life Science Contributions, Royal Ontario Museum, 77:1-34.
- Hanson, A., Swanson, L., Ewing, D., Grabas G., Myer, S., Ross L, Watmough, M. and Kirkby, J. 2008. Wetland Ecological Functions and Assessment: An overview Approaches. Canadian Wildlife Service Technical Report Series Number 497. Atlantic Region. 59 pp.
- Holmes, A.M., R.R. Tasker, Q.F. Hess, A.J. Hanks. 1991. Ontario Butterfly Atlas. Toronto Entomologists' Association. Toronto, Ontario. 167 pp.
- Important Bird Areas (IBA) Canada. 2010. <http://www.ibacanada.com>. Accessed November 2011.
- Jones C.D., Kingsley, A., Burke, P., and M. Holder. 2008. Field Guide to the Dragonflies and Damselflies of Algonquin Provincial Park and Surrounding Area. The Friends of Algonquin Park. Whitney, Ontario.
- Konze, K. and M. McLaren. 1997. Wildlife Monitoring Programs and Inventory Techniques for Ontario. Ontario Ministry of Natural Resources. Northeast Science and Technology. Technical Manual TM-009.
- Kunz, T.H., and L.F. Lumsden. 2003. Ecology of Cavity and Foliage Roosting Bats. Pp. 3-89, in Bat Ecology (T.H. Kunz and M.B. Fenton, Eds.). The University of Chicago Press, Chicago.
- Layberry R.A., Hall, P.W., and J.D. Lafontaine. 2002. The Butterflies of Canada. University of Toronto Press. Retrieved January 2012 from
http://www.cbif.gc.ca/spp_pages/butterflies/species/JuniperHairstreak_e.php.
- Lady Bird Johnson Wildflower Center (LBJWC). 2011. Native Plant Database – *Gellenia trofoliata*, Bowman's Root. The University of Texas at Austin.
http://www.wildflower.org/plants/result.php?id_plant=GITR6. Accessed November 2011.

- Lady Bird Johnson Wildflower Center (LBJWC). 2011. Native Plant Database – *Sparganium androcladum*, Branched Burreed. The University of Texas at Austin. http://www.wildflower.org/plants/result.php?id_plant=SPAN. Accessed November 2011.
- Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. Ecological Land Classification (ELC) for Southern Ontario: First Approximation and its Application. Ontario Ministry of Natural Resources, Southern Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- Lorenzo, A.B. 2006. Brainerd's Hawthorn (*Crataegus brainerdii*) Plant Guide. USDA, NRCS, National Plant Data Centre, Louisiana. http://plants.usda.gov/plantguide/pdf/pg_crbr3.pdf. Accessed November 2011
- Muma, W. 2011. Carolina Whitlow Grass (*Draba reptans*). Ontario Wildflowers. <http://ontariowildflowers.com/main/species.php?id=807>. Accessed November 2011.
- Oldham, M.J., and W.F. Weller. 2000. Ontario Herpetofaunal Atlas. Natural Heritage Information Centre, Ontario Ministry of Natural Resources. Updated 15-01-2010. Cited online: <http://nhic.mnr.gov.on.ca/MNR/nhic/herps/ohs.html>. Accessed May, June, July, 2011.
- Ontario Partners in Flight (PIF). 2008. Ontario Landbird Conservation Plan: Lower Great Lakes/St. Lawrence Plain, North American Bird Conservation Region 13. Ontario Ministry of Natural Resources, Bird Studies Canada, Environment Canada.
- Ontario Natural Heritage Information Centre (NHIC). 2010. Element Occurrence Search. Cited online: <http://www.mnr.gov.on.ca/MNR/nhic/queries/geographic.cfm>. Accessed April, May, June, July, 2011.
- Ontario Ministry of Natural Resources (OMNR). 1999. Natural Heritage Reference Manual (NHRM) for Policy 2.3 of the Provincial Policy Statement.
- Ontario Ministry of Natural Resources (OMNR). 2000. Significant Wildlife Habitat Technical Guide (SWHTG).
- Ontario Ministry of Natural Resources (OMNR). 2000. Significant Wildlife Habitat Decision Support System, Ver. 1.0. Ontario OMNR South-central Science and Information. Accessed November 2011.
- Ontario Ministry of Natural Resources (OMNR). 2002. Ontario Wetland Evaluation System (OWES) Southern Manual.

- Ontario Ministry of Natural Resources. 2005. Ontario Odonata Atlas. Natural Heritage Information Centre. <http://www.OMNR.gov.on.ca/OMNR/nhic/odonates/ohs.html> (updated 15-02-2005).
- Ontario Ministry of Natural Resources (OMNR). 2007. Guideline to Assist in the Review of Wind Power Proposals: Potential Impacts to Birds and Bird Habitat. August 2007. Developed by Wildlife Section, Ministry of Natural Resources and Renewable Energy Section, Ministry of Natural Resources.
- Ontario Ministry of Natural Resources (OMNR). 2009. Natural Heritage Reference Manual (NHRM) for Natural Heritage Policies of the Provincial Policy Statement, 2005. Working Draft for Environmental Registry. Second Edition, May 21, 2009.
- Ontario Ministry of Natural Resources (OMNR). 2010a. Land Information Ontario (LIO). http://www.mnr.gov.on.ca/en/Business/LIO/2ColumnSubPage/STEL02_167954.html. Accessed June, July, August 2011.
- Ontario Ministry of Natural Resources (OMNR). 2010b. Ontario Renewable Energy Atlas. <http://www.mnr.gov.on.ca/en/Business/Renewable/2ColumnSubPage/276957.html>.
- Ontario Ministry of Natural Resources (OMNR). 2010c. Bats and Bat Habitats. Guidelines for Wind Power Projects. Draft, March, 2010.
- Ontario Ministry of Natural Resources (OMNR). 2011a. Natural Heritage Assessment Guide (NHAG) for Renewable Energy Projects. July, 2011.
- Ontario Ministry of Natural Resources (OMNR). 2011b. Bird and Bird Habitats: Guidelines for Wind Power Projects. First Edition. December, 2011.
- Ontario Ministry of Natural Resources (OMNR). 2012. Significant Wildlife Habitat Ecoregion 6E Criteria Schedules (Draft).
- Prevost, E. 2011. Ontario Ministry of Natural Resources (OMNR). *Personal Communication*.
- Reznicek, A.A., E.G. Voss, and B.S. Walters. February 2011. Michigan Flora Online. University of Michigan. Web. <http://michiganflora.net/species.aspx?id=2435>. Accessed November 2011.
- Roche, B. 2002. COSEWIC Status Report on the Northern Map Turtle *Graptemys geographica* in Canada, in COSEWIC assessment and status report on the northern map turtle *Graptemys geographica* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Sibley, D.A. 2001. *The Sibley Guide to Bird Life and Behaviour*. National Audubon Society. Published by Alfred A. Knopf, Inc. and Chanticleer Press, Inc.

Seburn, D.C. 2010. *Recovery Strategy for the Common Five-lined Skink (Plestiodon fasciatus) – Carolinian and Southern Shield Populations in Ontario*. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario.

Stantec Consulting Ltd. 2011. *Field Survey Summary and Recommended Workplan for Samsung Renewable Energy Inc. Solar PV Energy Project – Phase II (Kingston)*.

APPENDIX A
FIGURES

LIST OF FIGURES

- Figure 1-1 Regional Study Area
- Figure 1-2 Project Location
- Figure 1-2a-f Project Location Showing Laydown Areas
- Figure 2-1a Records Review: Woodlands/Wooded Areas and Other Habitat Linkage and Wildlife Sighting Overview Map
- Figure 2-1b Records Review Wetlands Areas and Other MNR-CRCA Data Overview Map
- Figure 3-1 Property Access Summary
- Figure 3-2a-f ELC Vegetation Communities and Features
- Figure 3-3 Natural Features: Woodlands
- Figure 3-4 Natural Features: Wetlands
- Figure 3-5 Natural Features: Candidate Significant Wildlife Seasonal Concentration Habitat
- Figure 3-6 Natural Features: Candidate Significant Specialized Wildlife Habitat and Amphibian Movement Corridors
- Figure 3-7 Natural Features: Candidate Significant Habitats for Species of Conservation Concern
- Figure 4-1 Significant Natural Features: Woodlands and Wetlands
- Figure 4-2 Wildlife Survey Stations
- Figure 4-3 Significant Habitat of Seasonal Concentration of Animals
- Figure 4-4 Breeding Bird Point Count Survey Stations Overview Map
- Figure 4-4a-h Breeding Bird Point Count Stations Summary
- Figure 4-5 Significant Specialized Wildlife Habitat
- Figure 4-6 Significant Habitats for Species of Conservation Concern
- Figure 5-1 Suitable Open Country Breeding Bird Habitat Remaining in Close Proximity to the Project Location After Development.
- Figure 5-2 Suitable Shrub/Successional Breeding Bird Habitat Remaining in Close Proximity to the Project Location After Development.
- Figure 5-3 Pre-construction and Post-construction Wildlife Monitoring Stations

355000

360000

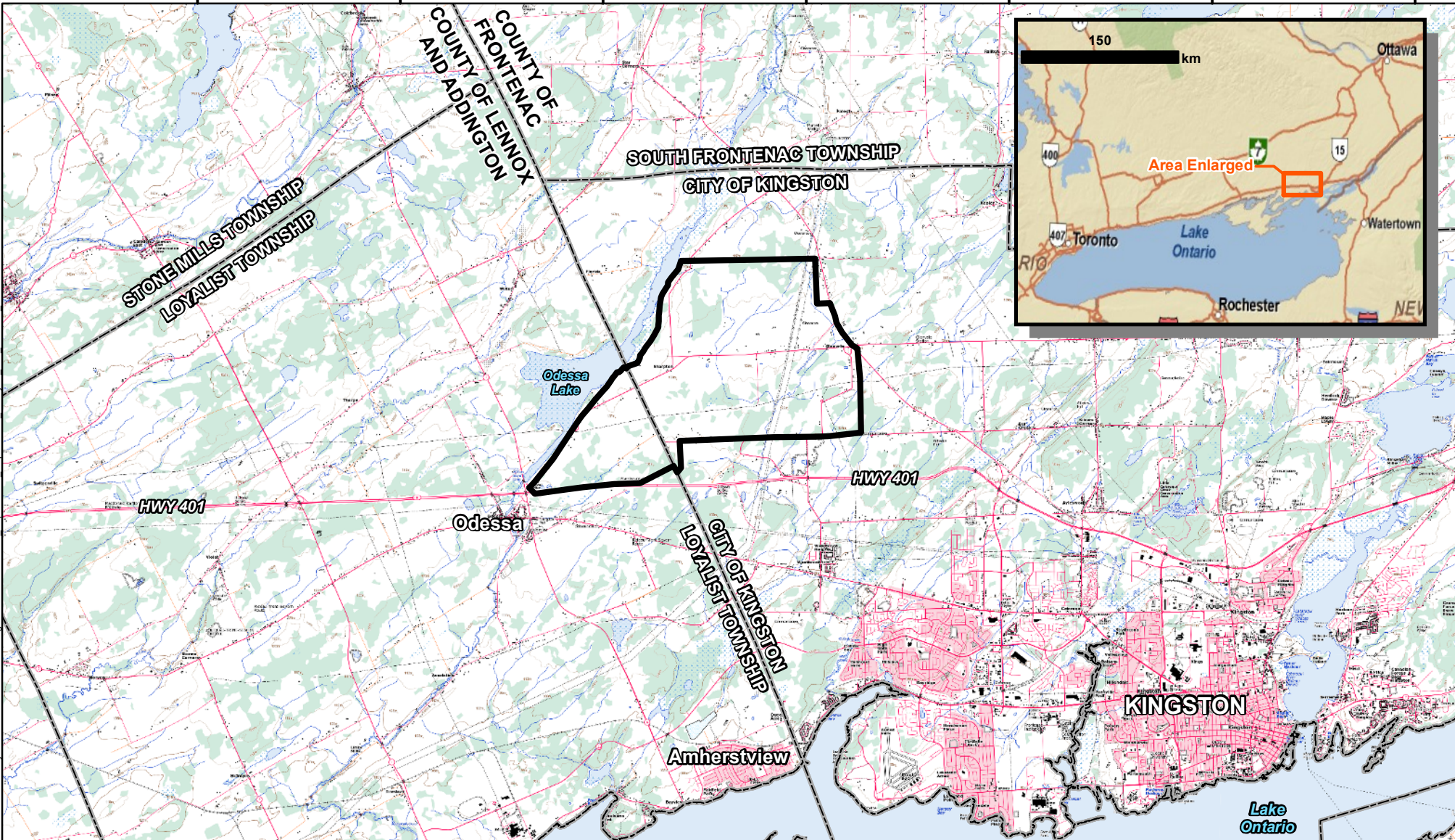
365000

370000

375000

380000

385000



P:\EIP\Projects\2011\TC121406 Samsung Solar REAC\SINHA_Report\MXD_Maps\FINAL_4\Project_Site_Location_8.mxd


LEGEND

Project Area

Municipal / County Boundary

NOTES:
 - Background topographic DRG map extracted from Geogratis.ca, 1:50k NTS

KINGSTON SOLAR LP



SOL-LUCE KINGSTON SOLAR PV ENERGY PROJECT

Regional Study Area

Datum: NAD83
 Projection: UTM Zone 18N



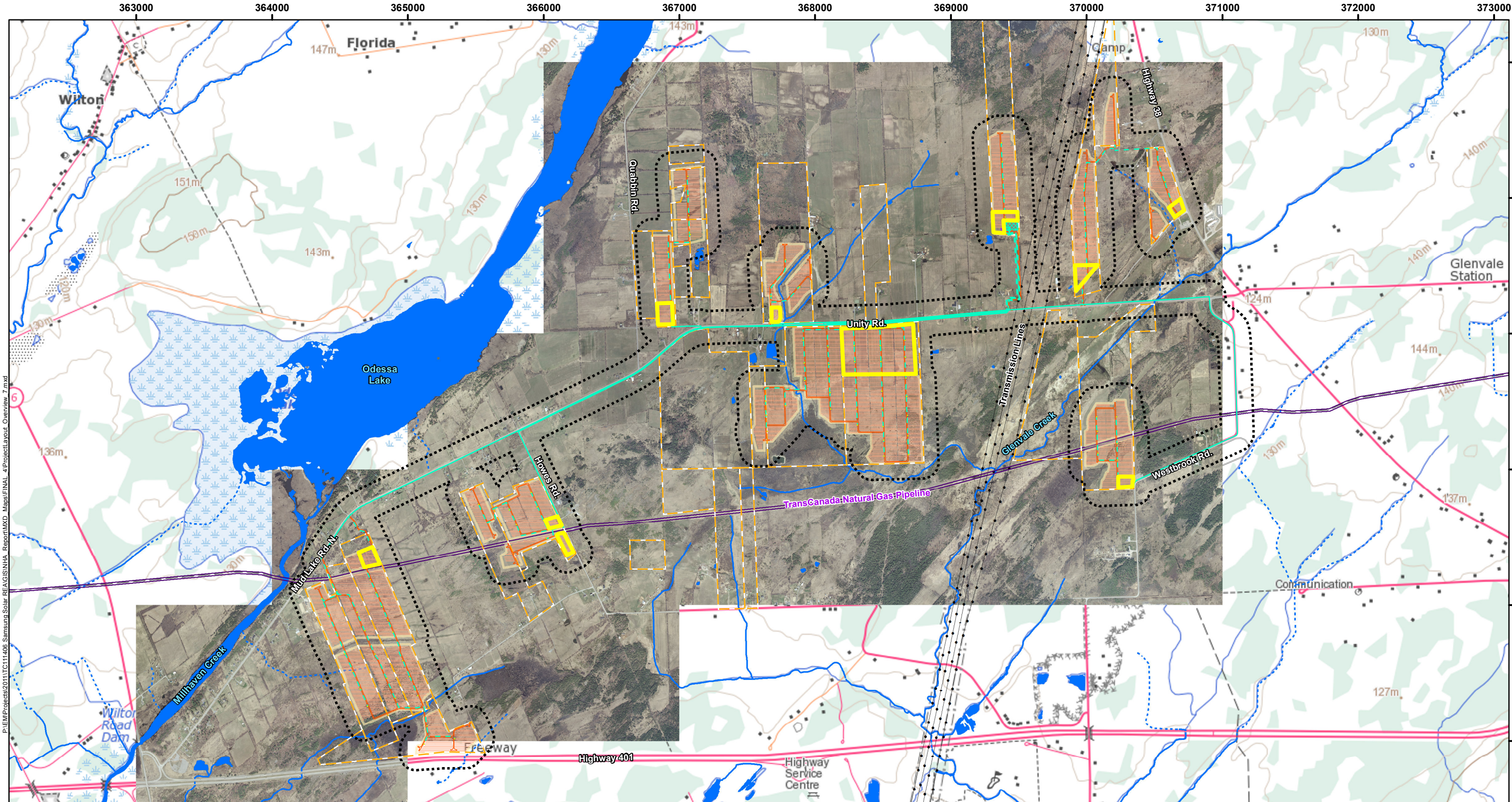
PROJECT N^o: TC121402

FIGURE: 1-1



SCALE: 1:135,000

DATE: June 2012



LEGEND

Layout Features	Substation Location
Property Area that is Potentially Eligible for Development	Operations and Maintenance Building
Development Area (Solar Panels)	Laydown Area
Inverter Station	Project Location, 120 m Setback Investigation Area *
Collector Line (Overhead)	
Collector Line (Underground)	
Access Road	
Other Features	
TransCanada Natural Gas Pipeline ROW (Approx.)	
Transmission Lines	
Waterbody (LIO-MNR)	
Watercourse/Waterbody (LIO-MNR)	
Intermittent (CRCA-warm water stream)	
Permanent (CRCA-warm water stream)	

NOTES:
 - Background topographic DRG map extracted from Geogratis.ca, 1:50k NTS, Natural Resources Canada
 - Watercourse and Waterbody data extracted from Land Information Ontario, Ministry of Natural Resources, 2011
 - Watercourse classification provided by Catewaqui Region Conservation Authority (CRCA) watercourse data, 2011
 * Investigation area includes the 120m buffer from the proposed fence line for development sites, overhead and underground collector lines and access roads (Site Plan April 26, 2012)

Datum: NAD83
 Projection: UTM Zone 18N

KINGSTON SOLAR LP	
SOL-LUCE KINGSTON SOLAR PV ENERGY PROJECT	
Project Location	
PROJECT N ^o : TC121402	FIGURE: 1-2
SCALE: 1:27,000	DATE: June 2012



P:\E\Projects\2011\TC121406_Samsung Solar REA\GIS\NHA_Report\MXD_Maps\FINAL_4\ProjectLayout_Overview_7.mxd

364500

364600

364700

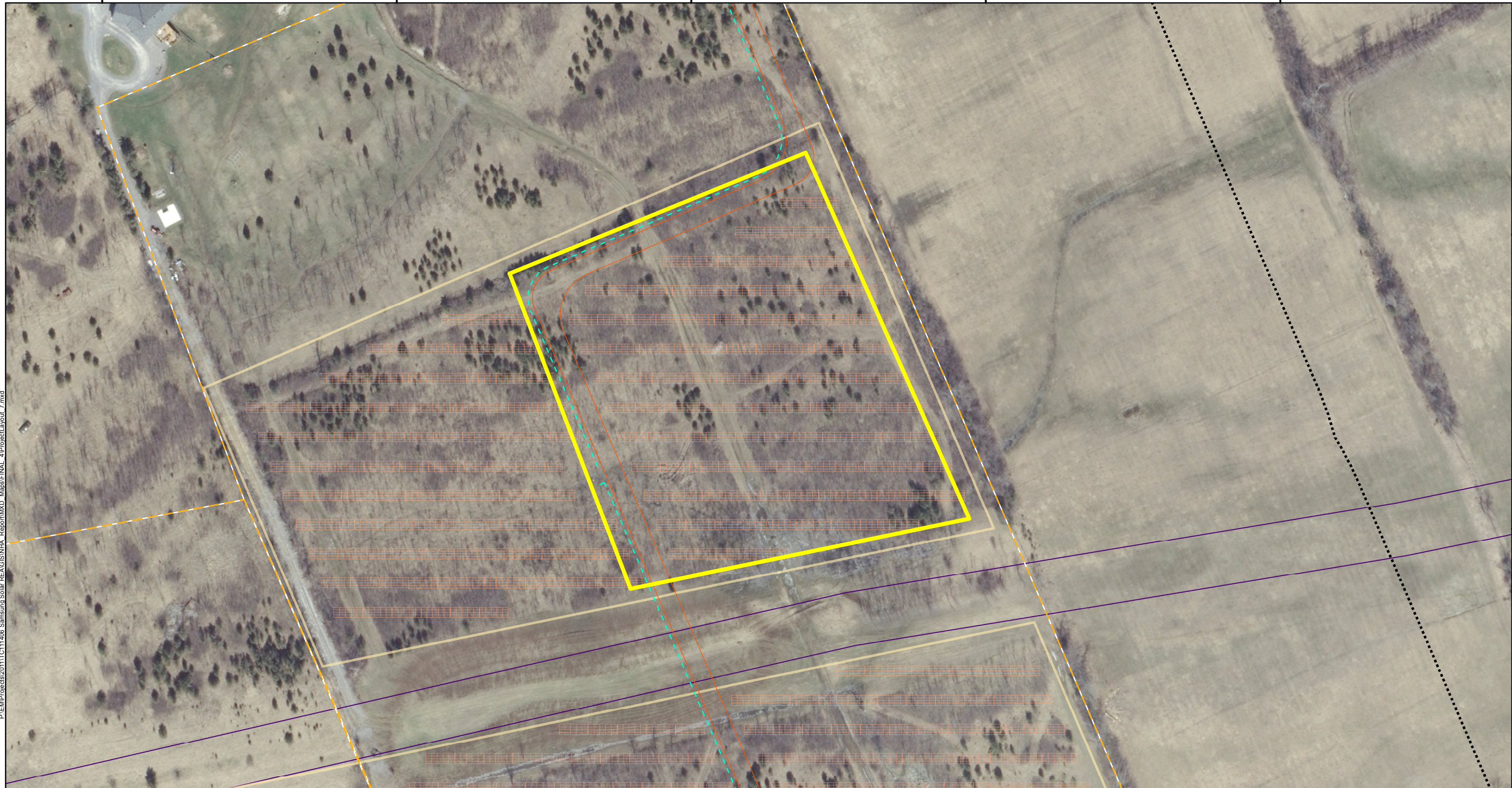
364800

364900

4906400

4906300

P:\EMP\Projects\2011\TC1211406 Samsung Solar REA\GIS\NHA_Report\MXD_Maps\FINAL_4\ProjectLayout_7.mxd



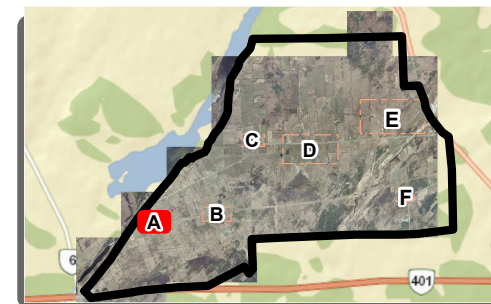
LEGEND

Layout Features

- Property Area that is Potentially Eligible for Development
- Development Area Fence Line (Solar Panels)
- Inverter Station
- Collector Line (Overhead)
- Collector Line (Underground)
- Access Road
- Substation Location
- Operations and Maintenance Building
- Laydown Area
- Project Location, 120 m Setback Investigation Area *

Other Features

- TransCanada Natural Gas Pipeline ROW (Approx.)
- Transmission Lines
- Waterbody (LIO-MNR)
- Watercourse/Waterbody (LIO-MNR)
- Intermittent (CRCA-warm water stream)
- Permanent (CRCA-warm water stream)



NOTES:
 - Background topographic DRG map extracted from Geogratis.ca, 1:50k NTS, Natural Resources Canada
 - Watercourse and Waterbody data extracted from Land Information Ontario, Ministry of Natural Resources, 2011
 - Watercourse classification provided by Cataraqui Region Conservation Authority (CRCA) watercourse data, 2011
 * Investigation area includes the 120m buffer from the proposed fence line for development sites, overhead and underground collector lines and access roads (Site Plan April 20, 2012)

Datum: NAD83
 Projection: UTM Zone 18N



KINGSTON SOLAR LP



SOL-LUCE KINGSTON SOLAR PV ENERGY PROJECT

Project Location

PROJECT N^o: TC121402

FIGURE: 1-2a

SCALE: 1:1,250

DATE: June 2012

