

**Ministry of
Natural Resources**

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**Ministère des
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GUE-2012-012

April 5, 2012

John Andrews
IPC Energy
2550 Argentia Rd. Suite 105
Mississauga ON L5N 5R1

RE: NHA Confirmation for Wainfleet Wind Energy Project

Dear Mr. Andrews:

In accordance with the Ministry of the Environment's (MOE's) Renewable Energy Approvals (REA) Regulation (O.Reg.359/09), the Ministry of Natural Resources (MNR) has reviewed the natural heritage assessment and environmental impact study for the Wainfleet Wind Energy Project in the Municipality of Wainfleet submitted by IPC Energy on March 31, 2012.

In accordance with Section 28(2) and 38(2)(b) of the REA regulation, MNR provides the following confirmations following review of the natural heritage assessment:

1. The MNR confirms that the determination of the existence of natural features and the boundaries of natural features was made using applicable evaluation criteria or procedures established or accepted by MNR.
2. The MNR confirms that the site investigation and records review were conducted using applicable evaluation criteria or procedures established or accepted by MNR, if no natural features were identified.
3. The MNR confirms that the evaluation of the significance or provincial significance of the natural features was conducted using applicable evaluation criteria or procedures established or accepted by MNR (if required).
4. The MNR confirms that the project location is not in a provincial park or conservation reserve.
5. The MNR confirms that the environmental impact study report has been prepared in accordance with procedures established by the MNR.

In accordance with Section 28(3) (c) and 38(2) (c), MNR also offers the following comments in respect of the project:

- Please address the typos and minor corrections as provided on April 4, 2012 and submit a final clean copy of the reports in digital and hard copy to MNR

In accordance with Appendix D of MNR's NHA Guide, a commitment has been made to complete pre-construction assessment(s) of habitat use for the following candidate significant wildlife habitats:

- **Landbird Migratory Stopover Habitat (Emerson Road Woods/ Burnaby Bush)**
- **Bat Maternity Colony Habitat (Emerson Road Woods/ Burnaby Bush)**

MNR has reviewed and confirmed the assessment methods and the range of mitigative options. Pending completion of the assessments and determination of significance, the appropriate mitigation is expected to be implemented, as committed to in the environmental impact study.

In addition to the NHA, Environmental Effects Monitoring Plans that address post-construction monitoring and mitigation for birds and bats must be prepared and implemented. These post-construction monitoring plans have been prepared in accordance with MNR Guidelines and reviewed and commented on by MNR staff.

This confirmation letter is valid for the project as proposed in the natural heritage assessment and environmental impact study, including those sections describing the Environmental Effects Monitoring Plan and Construction Plan Report. Should any changes be made to the proposed project that would alter the NHA, MNR may need to undertake additional review of the NHA.

Where specific commitments have been made by the applicant in the NHA with respect to project design, construction, rehabilitation, operation, mitigation, or monitoring, MNR expects that these commitments will be considered in MOE's Renewable Energy Approval decision and, if approved, be implemented by the applicant.

In accordance with S.12 (1) of the Renewable Energy Approvals Regulation, this letter must be included as part of your application submitted to the MOE for a Renewable Energy Approval.

Please be aware that your project may be subject to additional legislative approvals as outlined in the Ministry of Natural Resources' *Approvals and Permitting Requirements Document*. These approvals are required prior to the construction of your renewable energy facility.

If you wish to discuss any part of this confirmation or additional comments provided, please contact erin.harkins@ontario.ca or (519) 826-5121.

Sincerely,



Ian Hagman
District Manager
Guelph District MNR

cc. Jim Beal, Renewable Energy Provincial Field Program Coordinator, ROD, MNR
cc. Britney Pringle, Environmental Planner, Morrison Hershfield
cc. Erin Cotnam, S. Region Renewable Energy Coordinator, Regional Operations Division, MNR
cc. Narren Santos, Environmental Assessment and Approvals Branch, MOE



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Project Number: 1104036.00

Project Title: **WAINFLEET WIND ENERGY PROJECT**

Report: 007-R02-1104036

Title: **NATURAL HERITAGE ASSESSMENT REPORT**

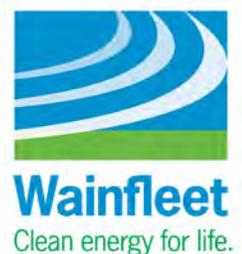
Client: **IPC Energy
2550 Argentia Road Suite 105
Mississauga, Ontario
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Date: **March 2012**

Morrison Hershfield Limited

A handwritten signature in blue ink that reads "Erin McLachlan".

Erin McLachlan
Terrestrial Ecologist and Environmental Planner





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Project Number: 1104036.00

Project Title: WAINFLEET WIND ENERGY PROJECT

Report: 007-R02-1104036

Title: NATURAL HERITAGE ASSESSMENT REPORT
RECORDS REVIEW REPORT- FINAL VERSION

Client: IPC Energy
2550 Argentia Road Suite 105
Mississauga, Ontario
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Attention:

Date: March 2012

Morrison Hershfield Limited

Erin McLachlan
Terrestrial Ecologist and Environmental Planner



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1.0 Project Overview

1.1 Purpose of Natural Heritage Assessment Report

This Natural Heritage Assessment Report has been prepared to document the records review, site investigations and evaluation of significance of the natural features associated with the Wainfleet Wind Energy Project, as per Section 6.3 of the Approval and Permitting Requirements Document for Renewable Energy Projects (MNR, 2009) and Ontario Regulation 359/09 Renewable Energy Approvals, Sections 24-27.

1.2 Renewable Energy Approval Timeline and Commissioning

The project has a COD date of **August, 2013**. To meet this schedule the proponent is working to receive an approved REA for **December, 2012**.

1.3 General Project Site Description

The study area consists of approximately 3400 hectares of primarily agricultural fields. The land inside the study area is mostly flat, with an elevation of 174m to 182m above mean sea level.

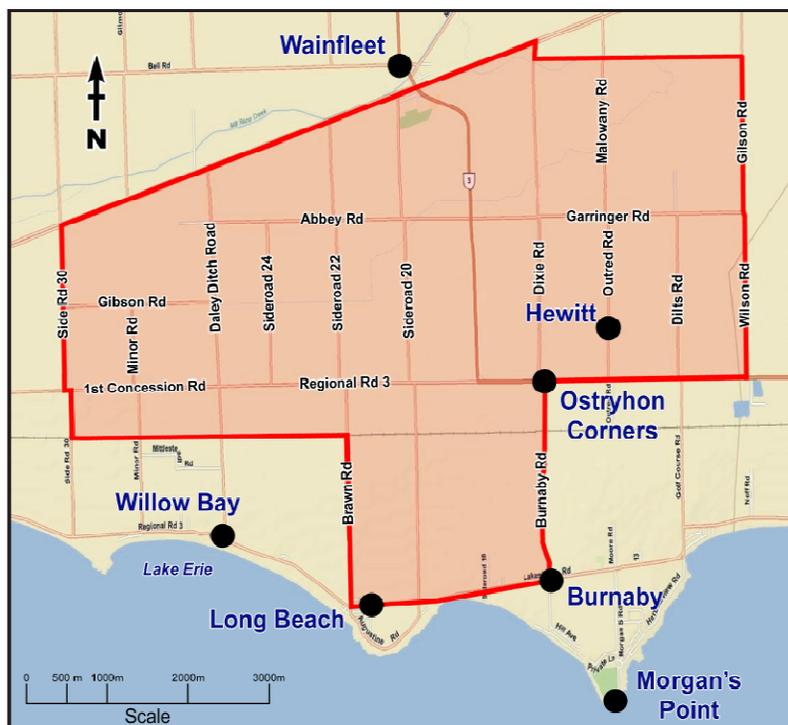


Figure 1. Wainfleet Wind Energy Project Study Area

1.4 Project Location

Based on the REA Regulation requirements, assessments are to be conducted within 120m of the project location. The REA Regulation defines project location as: a part of land and all of part of any building or structure in, on or over which a person is engaging in or

Natural Heritage Assessment Report

proposes to engage in the project and any air space in which a person is engaging in or proposes to engage in the project.

The major project components identified on project mapping throughout the NHA include:

- Five (5) Vestas V-100 1.8 MW Wind Turbines
- An Underground Collector System
- Turbine Access Roads
- Temporary Construction Staging/Laydown Areas for the erection of wind turbines
- A Transformer Substation to connect to the Hydro One distribution system

2.0 Records Review Report

As required in O.Reg 359/09, s.25 the purpose of the records review report is to determine the following:

- Whether the project location is in a provincial park or conservation reserve;
- Whether the project is within 120 m of a provincial park or conservation reserve;
- Whether the project location is:
 - In a nature feature;
 - Within 50 m of an area of natural and scientific interest (earth science);
 - Within 120 m of a natural feature that is not an area of natural and scientific interest (earth science).

2.1 Methodology

Databases

Background information was collected from several databases as part of the Records Review, including:

- Land Information Ontario

This source provided mapping of wooded areas.

- Natural Heritage Information Centre Database (NHIC)

This database provided information on the significant woodlands and the evaluated wetland. It was noted in the historical (1986) NHIC data that Lowbanks Backshore Wetland Complex AKA Emerson Road Woods Wetland once provided an active feeding area for Great Blue Heron. This site will be considered as Candidate Significant Wildlife Habitat (Colonial Nesting Bird Breeding Habitat).

- Atlas of Mammals of Ontario

This database provided detailed information on the ranges and habitat requirements for mammal species.

- Ontario Herpetofaunal Atlas

This database provided detailed information on the ranges and habitat requirements for herpetofaunal species.

- Ontario Breeding Bird Atlas

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This database provided detailed information pertaining to bird sightings within 10km of the project location.

Consultation

Background information was collected from consultation with several agencies as part of the Records Review. (See Table 1.)

Table 1. Consultation Details for Records Review

Organization Contacted	Date(s) Contacted	Contact (s)	Information Received
Ministry of Natural Resources	Multiple dates throughout Feb. 2010 to Sept. 2011	Erin Harkins April Nix Anne Yagi	<ul style="list-style-type: none"> • ANSI data • Wetland mapping • Wetland evaluation for Lowbanks Backshore Wetland Complex AKA Emerson Road Woods Wetland • Candidate Significant Wildlife Habitat (S1-S3 species)
Ministry of Northern Development and Mines	June 22, 2010	Jim Boyd, Information and Marketing Services	<ul style="list-style-type: none"> • Abandoned mines • Karst topography
Niagara Peninsula Conservation Authority	Multiple dates throughout August 2010 to June 2011	Ian Barrett, Aquatic Biologist	<ul style="list-style-type: none"> • Hazard lands mapping • Floodplain information • ELC shape files (See Figure 2.) <p>NPCA's Natural Areas Inventory Study, which outlined:</p> <ul style="list-style-type: none"> • Candidate Significant Wildlife Habitat (Old-growth Forest)
Township of Wainfleet	June 8, 2010	Mr. Charles V. Miller, Manager of Planning	<p>Mapping data for:</p> <ul style="list-style-type: none"> • Areas of High Aquifer Vulnerability • Environmental Features • Groundwater Recharge Areas
Regional Municipality of Niagara	June 15, 2010	Ms. Maria Andersen,	<p>Mapping data for:</p>

Natural Heritage Assessment Report

		Corporate Services Integrated Community Planning	<ul style="list-style-type: none"> • Significant woodlots • Evaluated wetlands
University of Western Ontario Department of Biology	April 8, 2010	Dr. Brock Fenton	Information associated with the collection and interpretation of bat data.
Haldimand Bird Observatory	May 30, 2011	James Smith	No information was available.
Hawk Mountain	May 24, 2011	Dr. Laurie Goodrich	No information was available.

Guidance Documents

Background information was collected from numerous guidance documents which are listed with a brief description of the document below.

- Significant Wildlife Technical Guide (MNR, 2000)

This reference guide provided detailed information on the identification, description and evaluation of significant wildlife habitat.

- Approvals and Permitting Requirements Document for Renewable Energy Projects (MNR, 2009)

This document provided guidelines for permitting and approval requirements for all renewable energy projects in Ontario.

- Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2011)

The guide provided information pertaining to the assessment process for renewable energy projects in Ontario.

- Ontario Regulation 359/09 Renewable Energy Approvals (MNR, 2011)

This is the regulating document that sets the legal requirements for renewable energy projects in Ontario.

- Bats and Bat Habitats- Guideline for Wind Power Projects (MNR, 2011)

This document provided guidance on identifying and addressing potential impacts on bats and bat habitat during the planning, construction and operation of a wind farm.

- Birds and Bird Habitats- Guideline for Wind Power Projects (MNR, 2010)

This document provided guidance on identifying and addressing potential impacts on birds and bird habitat during the planning, construction and operation of a wind farm.

- Natural Heritage Reference Manual (MNR, 2010)

This manual presents the Province's recommended technical criteria and approaches for being consistent in protecting natural heritage features and areas and natural heritage systems in Ontario.

- COSEWIC Reports

These reports provided detailed information from the best available data on the biology of species including; status in Canada, distribution, population sizes, habitat availability, and threats to the population.

- Township of Wainfleet Official Plan

This document provided guidance pertaining to by-laws and zoning requirements from the Township.

2.2 Results

Wetlands

The MNR Guelph office and Niagara Region provided up-to-date mapping showing the boundaries of the evaluated wetlands within the project area. ELC mapping provided by Niagara Region Conservation Authority was used to identify and/or determine if any candidate wetlands were previously unidentified by MNR. Two portions of an evaluated wetland (Lowbanks Backshore Wetland Complex AKA Emerson Road Woods Wetland) are within 120m of the project location. This wetland is provincially significant. **(See Figure 3.)**

Valleylands

No valleylands were identified during the records review.

Woodlands

Two Significant woodlands were identified by Niagara Region: Burnaby Bush and Emerson Road Woods. **(See Figure 4.)**

Niagara Peninsula Conservation Authority provided data on vegetation communities in the project area and provided us with a Natural Areas Inventory Study that outlines woodlots in the region. This document included a discussion of one natural area within 120m of the project: Emerson Road Woods. The Natural Areas Inventory Study noted that Emerson Road Woods is approximately 331 hectares in size. The site is primarily a Deciduous Swamp with a typical slough forest community. The entire area had five Ecological Land Classification communities, including: Deciduous Forest (FOD); Deciduous Thicket (THD); Deciduous Swamp (SWD); Shallow Marsh (MAS); and Thicket Swamp (SWT). No species at Risk were noted; however two provincially rare species were listed in the report; black gum (*Nyssa sylvatica*) and Elm-leaved Goldenrod (*Solidago ulmifolia* var. *ulmifolia*). Also, there are potentially sections of old growth forest within the area. The full Natural Areas Inventory Study document is included as Appendix A.

Areas of Natural and Scientific Interest

No Areas of Natural and Scientific Interest were identified during the records review.

Wildlife Habitat

The MNR Guelph office provided information on known bat hibernacula sites near the project area. The nearest site is a potential (unconfirmed) site in Cayuga, which is more than 1 km from the site.

Ministry of Northern Development, Mines and Forestry provided information on abandoned mines and karst topography that could provide potential bat and reptile habitat. There are no known abandoned mines or karst formations within the study area.

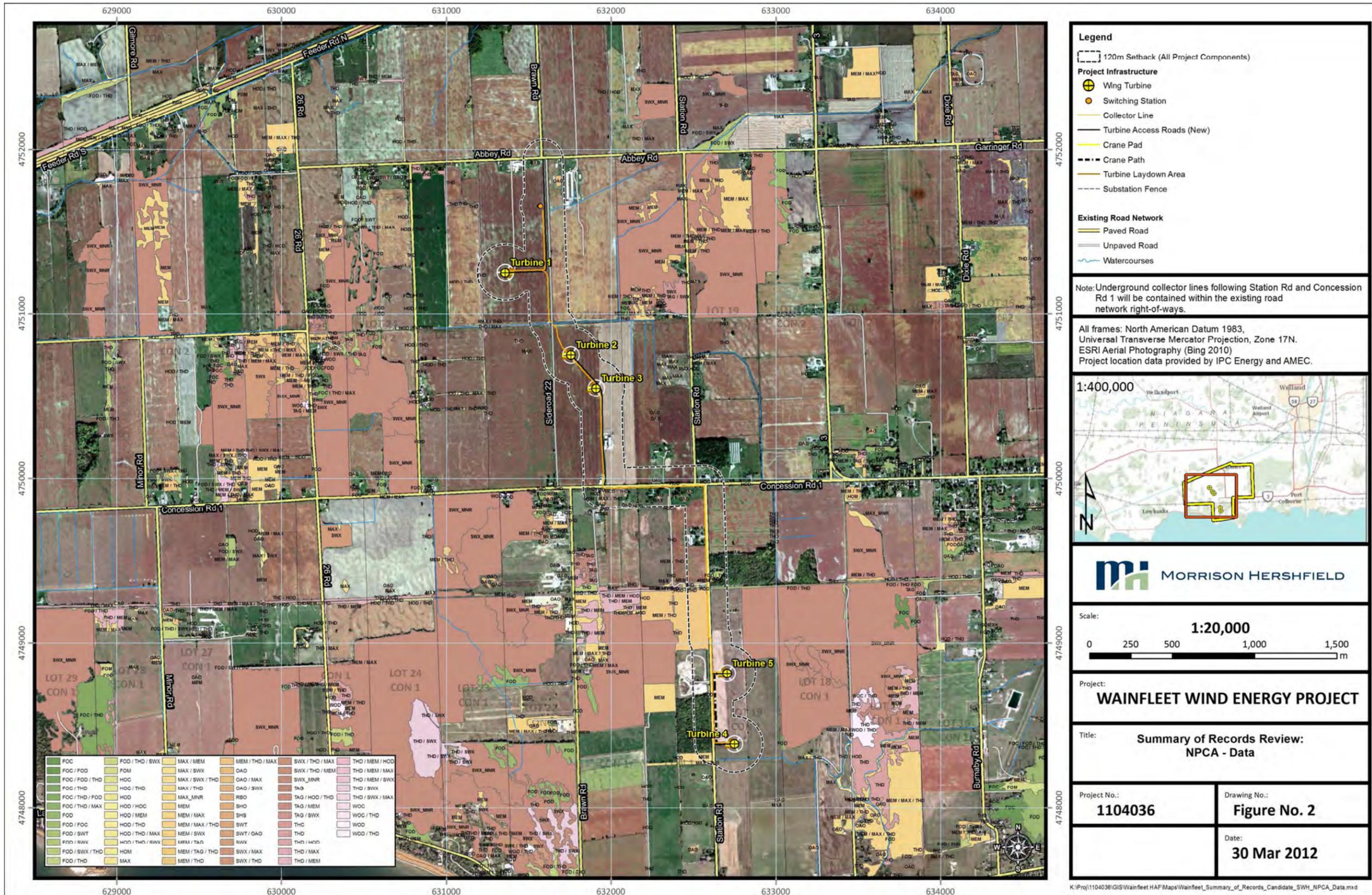
The Natural Areas Inventory Study provided by the Niagara Peninsula Conservation Authority noted that there is candidate old growth forest within the Emerson Road Woods. This site will be considered as Candidate Significant Wildlife Habitat (Old-growth Forest). **(See Figure 5)**

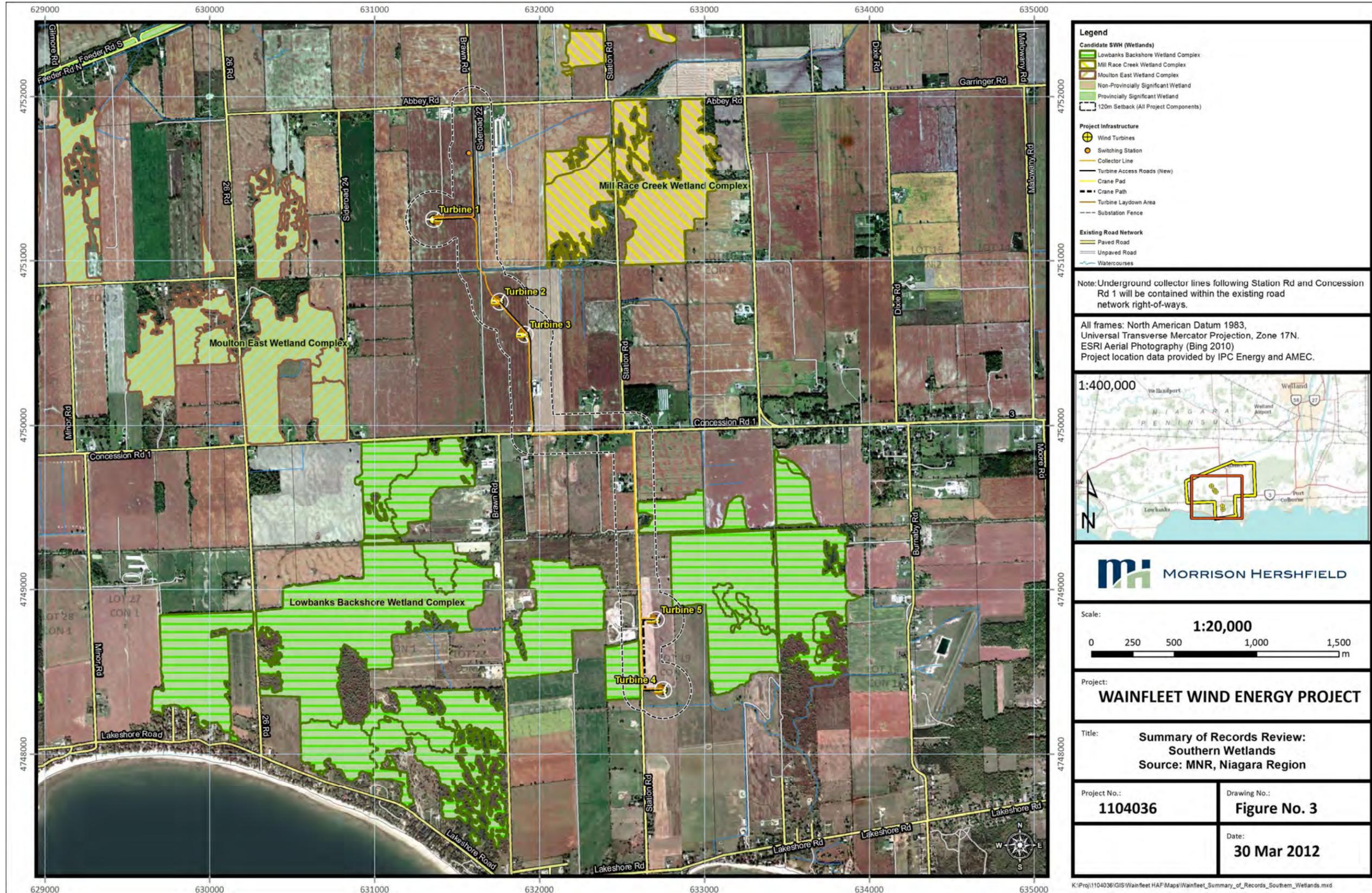
Natural Heritage Assessment Report

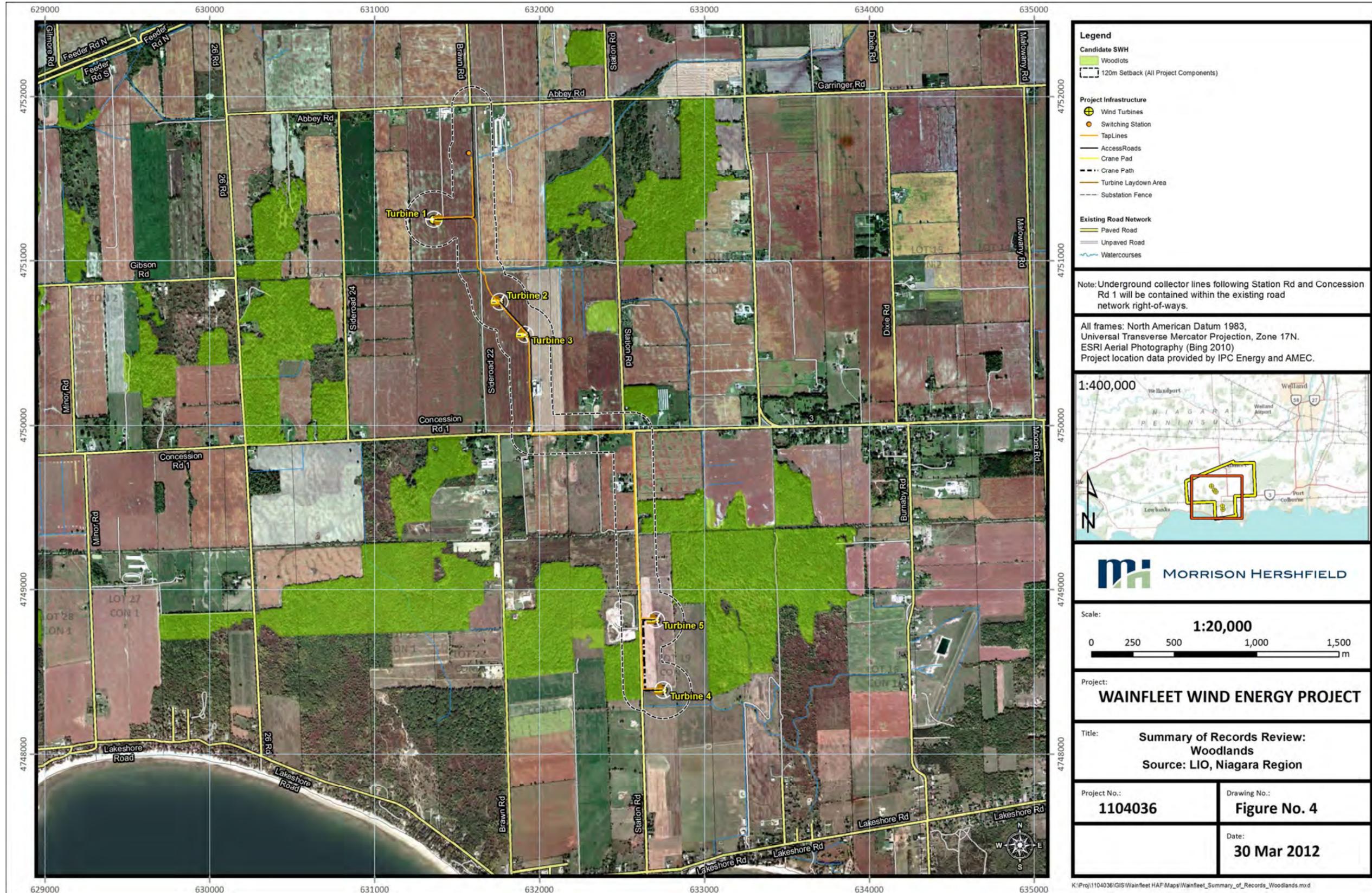
It is noted in the historical (1986) NHIC data that Lowbanks Backshore Wetland Complex AKA Emerson Road Woods Wetland once provided an active feeding area for Great Blue Heron. This site will be considered as Candidate Significant Wildlife Habitat (Colonial Nesting Bird Breeding Habitat). **(See Figure 6.)**

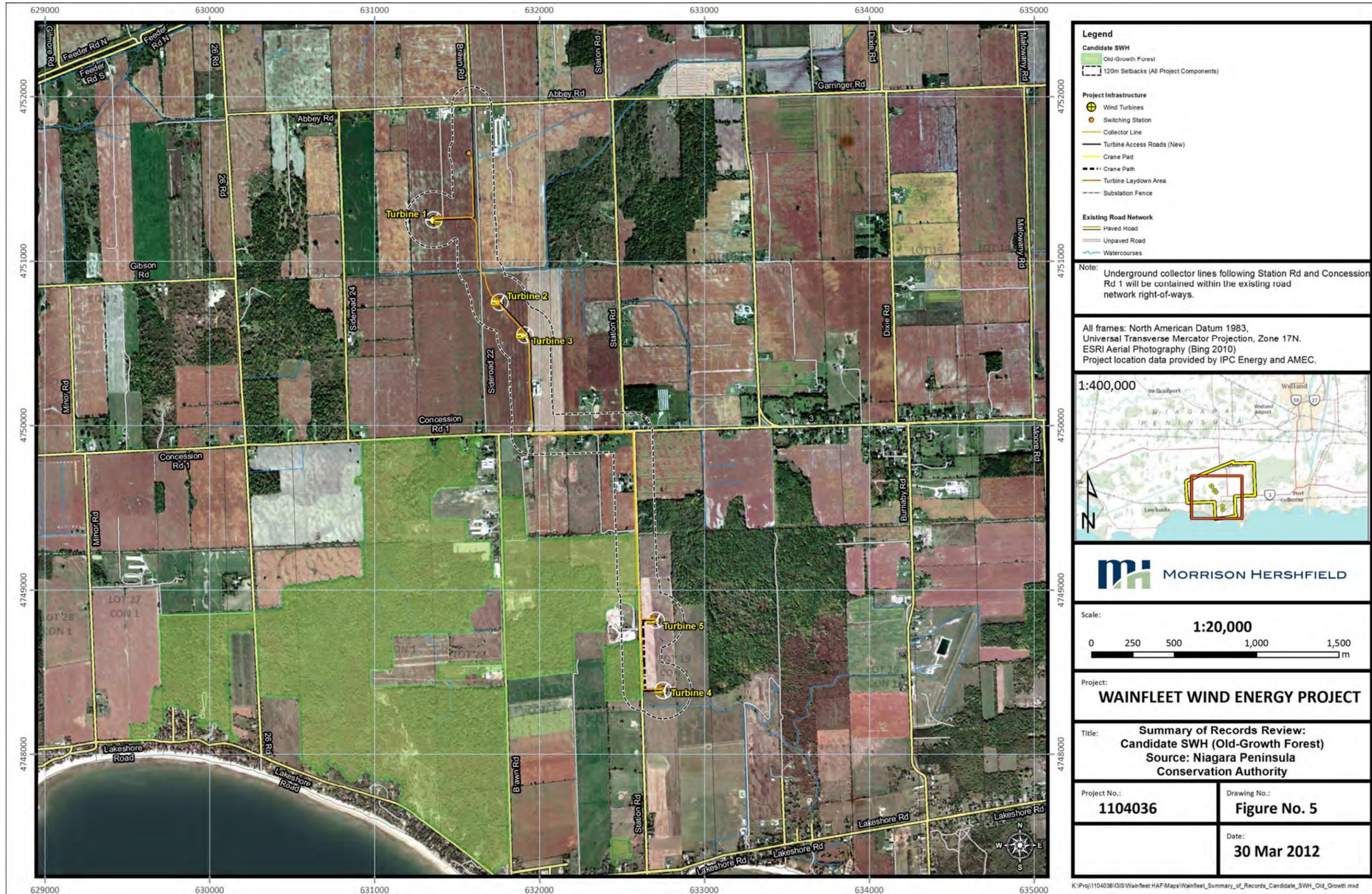
Rare Vegetation Communities or Specialized Habitats

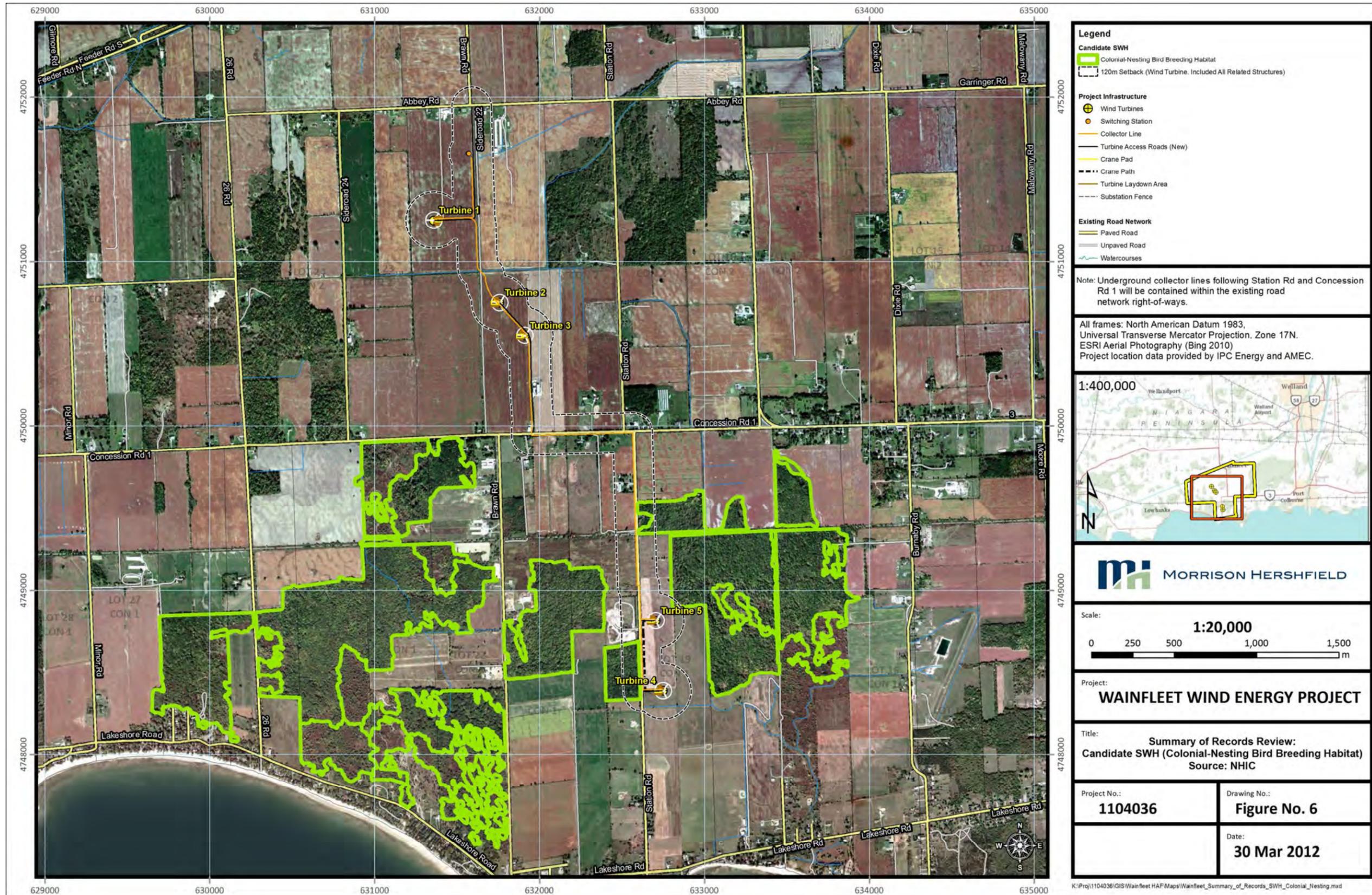
Niagara Peninsula Conservation Authority provided data on vegetation communities in the project area and provided us with a Natural Areas Inventory Study that outlines woodlots in the region. **(See Appendix A.)** It is noted in this report that Emerson Road Woods has potential old growth sections. This site will be considered as Candidate Significant Wildlife Habitat (Old-growth Forest).











Species of Conservation Concern Including Species at Risk Listed as Special Concern

Ministry of Natural Resources (MNR) Guelph office provided a list of potential species at risk (flora and fauna) in the project area. Additional species were located within the NHIC Database **(See Table 1.)**

Table 2. Species of Conservation Concern Including Species at Risk Listed as Special Concern Identified During Records Review

Taxonomy	Common Name	Scientific Name	S-Ranking	National Status	Provincial Status
Herpetofauna	Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	S3	Special Concern	Special Concern
	Milksnake	<i>Lampropeltis triangulum</i>	S3	Special Concern	Special Concern
	Snapping Turtle	<i>Chelydra serpentina</i>	S3	Special Concern	Special Concern
Birds	Yellow-breasted chat	<i>Icteria virens</i>	S2B	Special Concern	Special Concern
	Hooded Warbler	<i>Wilsonia citrina</i>	S3B	Threatened	Special Concern
	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	S4B	Threatened	Special Concern
	Short Eared Owl	<i>Asio flammeus</i>	S2N, S4B	Special Concern	Special Concern
Insects	Monarch Butterfly	<i>Danaus plexippus</i>	S2N, S4B	Special Concern	Special Concern
	Cyrano Darner	<i>Nasiaeschna pentacantha</i>	S3	--	--
	Unicorn Clubtail	<i>Arigomphus villosipes</i>	S2S3	--	--
Plants	Crowned Beggarticks	<i>Bidens trichosperma</i>	S2	--	--
	Emmons' White-tinged Sedge	<i>Carex albicans var. emmonsii</i>	S2	--	--
	Weak Stellate Sedge	<i>Carex seorsa</i>	S2	--	--

Natural Heritage Assessment Report

Taxonomy	Common Name	Scientific Name	S-Ranking	National Status	Provincial Status
	Dwarf Umbrella Sedge	<i>Fuirena pumila</i>	SX	--	--
	Spoon-leaved Purple Everlasting	<i>Gamochaeta purpurea</i>	SX	--	--
	Panicled Hawkweed	<i>Hieracium paniculatum</i>	S2?	--	--
	Sharp-fruited Rush	<i>Juncus acuminatus</i>	S3	--	--
	Many-fruited Primrose-willow	<i>Ludwigia polycarpa</i>	S2S3	--	--
	Torrey's Manna Grass	<i>Torreyochloa pallida</i>	S2	--	--

The Approval and Permitting Requirements Document for Renewable Energy Projects (MNR, 2009) was also used as part of this analysis as it outlines the requirements for associated permits or approvals for renewable energy projects where MNR has a legislative responsibility, including the Endangered Species Act, 2007.

Provincial Parks and Conservation Reserves

No Provincial Parks or Conservation Reserves were identified during the records review.

Planning

This project is not within the planning areas for the Greenbelt Plan, the Oak Ridges Moraine or the Niagara Escarpment Plan.

Additional Information

The MNR Vineland office provided fisheries data for the Water Resources Report.

Dr. Brock Fenton of the University of Western Ontario provided guidance on bat ecology and conducting bat studies. All eight of Ontario's bat species have ranges that include the project area (personal communication, B. Fenton, 2010).

The Township of Wainfleet referred us to their Official Plan for information on natural features.

Table 3. Natural Features Within 120m of Project Location Identified During Records Review

Feature	Source	Distance from Project Works
Wetlands	MNR	2 portions of Lowbanks Backshore Wetland Complex (AKA Emerson Road Woods Wetland) are within 120m of the project location.
Woodlots	Niagara Region, Land Information Ontario, NHIC	A portion of Emerson Road Woods is within 120m of the project location.
	Niagara Region, Land Information Ontario, NHIC	A portion of Burnaby Bush is within 120m of the project location.
Candidate Significant Wildlife Habitat	MNR	
	NHIC	Candidate location of Great Blue Heron colony within the Emerson Road Woods Wetland based on historical records.
	NPCA	Wildlife habitat – old growth forest within Emerson Road Woods.

References

- Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- OMNR 2010b. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Second Edition. Toronto: Queen's Printer for Ontario. 248 pp.
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http://www.mnr.gov.on.ca/STEL02_163859.pdf
- OMNR. 2002. Significant Wildlife Habitat: Decision Support System. Southern Science and Information Centre, Kemptville, ON.
http://www.mnr.gov.on.ca/en/Business/FW/Publication/MNR_E001285P.html
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<http://www.mnr.gov.on.ca/mnr/pubs/wildlife/swhtg.html>
- Ontario Ministry of the Environment (MOE), 2009, Ontario Regulation 359/09 Renewable Energy Approvals Under Part V.1.1 of the Act. O.Reg. 359/09.
- Township of Wainfleet. 2010. Township of Wainfleet Official Plan Review: Recommended Official Plan.
http://www.wainfleet.ca/jdownloads/Government/AdministrativeOffice/Planning-COA/OfficialPlanUpdate/Approved%20OP/bl049-2010_-_recommended_op_text.pdf

Natural Heritage Assessment Report



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Date: March 2012

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Erin McLachlan
Terrestrial Ecologist and Environmental Planner

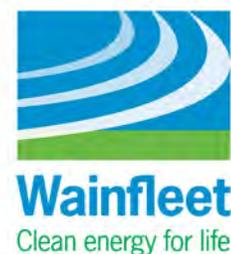


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1.0 Methodology

Preliminary field investigations were completed in fall 2009. These investigations involved observations carried out from the roadway throughout the study area and making notes regarding natural features, including wetlands, woodlands, potential significant wildlife habitat and potential species of conservation concern habitat. These features were then explored later on foot over the course of several weeks during the appropriate field season (See Appendix A for detailed field notes with times and weather conditions of surveys).

The air, land and water within 120m of the project location were investigated in great detail for the purpose of determining:

- Whether the results of the analysis summarized in the records review prepared under subsection 25 (3) of the REA regulation are correct or require correction, and identifying any required corrections;
- Whether any additional natural features exist, other than those that were identified in the report prepared as part of the records review;
- The boundaries, located within 120m of the project location, of any natural feature that was identified in the records review or the site investigation; and,
- The distance from the project location to the boundaries of natural features determined under point 3 above.

Table 1 provides a summary of the field surveys that were conducted as part of the site investigation, for the purposes of identifying natural features (wetlands, woodlands, valleylands, candidate significant wildlife habitat, etc.), and included: Ecological Land Classification (ELC) surveys, candidate significant wildlife habitat surveys, and surveys for valleyland features.

Table 1: Summary of Site Investigations

Survey Type	Date	Method	Times	Duration	Weather	Field Personnel
Ecological Land Classification Survey/Confirmation of Natural Features Identified During Records Review	July 27, 2010 July 28, 2010	50m transects were conducted for all non-crop lands within 120 metres of the project location; croplands within project location were surveyed on foot	July 27 th – 9:30am-5:30pm July 28 th – 10:00am-6:00pm	July 27 th - 8 hours July 28 th - 8 hours	July 27 th – partly cloudy, 24°C July 28 th – cloudy, light wind, 26°C	Bettina Henkelman
Candidate Significant Wildlife (Bird) Habitat Survey	Aug. 11 th , 2010 Aug. 13 th , 2010 Aug. 16 th , 2010 Aug. 18 th , 2010	Searches were conducted for potentially suitable sites throughout the entire project location	Aug. 11 th – 9:30am-3:30pm Aug. 13 th – 10:40am-4:40pm Aug. 16 th – 11:00am-5:00pm Aug. 18 th – 10:00am-4:00pm	Aug. 11 th – 6 hours Aug. 13 th – 6 hours Aug. 16 th – 6 hours Aug. 18 th – 6 hours	Aug. 11 th – sunny, few clouds, 25°C Aug. 13 th – partly cloudy, 24°C Aug. 16 th – sunny, 24°C Aug. 18 th – sunny, no wind, 20°C	Erin McLachlan, Samantha Lawton
Candidate Significant Wildlife (Mammal) Habitat Survey	Sept. 21 st , 2009 Sept. 22 nd 2009 June 7 th , 2010 July 27 th , 2010 July 28 th , 2010	Searches were conducted for potentially suitable sites throughout the entire project location. Forests were	Sept. 21 st - 9:30 am-5:30pm Sept. 22 nd - 10:40am-5:00pm June 7 th - 6:30pm-9:00pm July 27 th - 9:30am-	Sept. 21 st – 8 hours Sept. 22 nd - 6.3 hours June 7 th – 2.5 hours July 27 th – 8.5 hours July 28 th – 7 hours	Sept. 21 st – cloudy, 22°C Sept. 22 nd - cloudy, light rain, 19°C June 7 th – sunny, light winds, 17°C July 27 th – partly cloudy,	Erin McLachlan, Samantha Lawton

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Survey Type	Date	Method	Times	Duration	Weather	Field Personnel
		surveyed for suitability by noting abundance of snags, cavity trees and were visually surveyed for bat activity one evening.	6:00pm July 28 th -10:00am-5:00		24°C July 28 th – cloudy, light wind, 26°C	
Candidate Significant Wildlife (Herpetofauna) Habitat Survey	June 7 th , 2010 June 9 th , 2010 June 11 th , 2010 June 14 th , 2010 Aug. 11 th , 2010 Aug. 13 th , 2010 Aug. 16 th , 2010 Aug. 18 th , 2010	Searches were conducted for potentially suitable sites throughout the entire project location	June 7 th – 10:10am-5:30pm June 9 th – 11:30am-5:00pm June 11 th – 10:30am-4:30pm June 14 th – 11:00am-5:00pm Aug. 11 th – 9:30am-3:30pm Aug. 13 th – 10:40am-4:40pm Aug. 16 th – 11:00am-5:00pm Aug. 18 th – 10:00am-4:00pm	June 7 th – 7.2 hours June 9 th – 5.5 hours June 11 th – 6 hours June 14 th – 6 hours Aug. 11 th – 6 hours Aug. 13 th – 6 hours Aug. 16 th – 6 hours Aug. 18 th – 6 hours	June 7 th – sunny, light wind, 17°C June 9 th – overcast, light rain, 13°C June 11 th – sunny, light wind, 19°C June 14 th – overcast, foggy, 21°C Aug. 11 th – sunny, few clouds, 25°C Aug. 13 th – partly cloudy, 24°C Aug. 16 th – sunny, 24°C Aug. 18 th – sunny, no wind, 20°C	Erin McLachlan and Samantha Lawton
Candidate Significant Wildlife (Insects & Molluscs) Habitat Survey	Aug. 11 th , 2010 Aug. 13 th , 2010 Aug. 16 th , 2010	Searches were conducted for potentially suitable sites	Aug. 11 th – 9:30am-3:30pm Aug. 13 th – 10:40am-	Aug. 11 th – 6 hours Aug. 13 th – 6 hours Aug. 16 th – 6 hours	Aug. 11 th – sunny, few clouds, 25°C Aug. 13 th – partly cloudy,	Erin McLachlan and Samantha Lawton

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Survey Type	Date	Method	Times	Duration	Weather	Field Personnel
	Aug. 18 th , 2010	throughout the entire project location	4:40pm Aug. 16 th – 11:00am-5:00pm Aug. 18 th - 10:00am-4:00pm	Aug. 18 th - 6 hours	24°C Aug. 16 th – sunny, 24°C Aug. 18 th - sunny, no wind, 20°C	
Valleylands/Seeps and Springs Survey	April 28 th , 2010	Searches were conducted for potentially suitable sites throughout the entire project location	April 28 th – 11am – 5:20pm	April 28 th –6.3 hours	April 28 th - clear, no wind, 11°C	Josephine Gilson and Kelly Sadlier
ELC confirmation of vegetation communities within the vicinity of the known landfill site and parkland area	Sept. 22 nd , 2011	Boundaries of several vegetation communities were investigated	Sept. 22 nd - 1:00pm-5:00pm	Sept. 22 nd 4 hours	Sept. 22 nd - clear, 22°C	Erin McLachlan Stephanie Goom

2.0 Results

The following provides a synopsis of the findings for the Site Investigations Report. Natural features including Candidate Significant Wildlife Habitat will be discussed in Sections 2.1-2.10. **Table 3** summarizes the presence of natural features based on the results of the Site Investigations.

2.1 Results of Ecological Land Classification Survey

The vegetation within the study area is primarily agricultural, with small woodlands, larger swamps, and a few scattered marshes. The species within the natural areas are typical of Southern Ontario forests, however in some areas where there was historical disturbance has been heavily invaded by Common Buckthorn (*Rhamnus cathartica*).

Tree species included Freeman Maple (*Acer freemanii*), Red Maple (*Acer rubrum*), Sugar Maple (*Acer saccharum*), Trembling Aspen (*Populus tremuloides*), Eastern Cottonwood (*Populus deltoides*), Bitternut Hickory (*Carya cordiformis*), Shagbark Hickory (*Carya ovata*), American Elm (*Ulmus americana*), American Beech (*Fagus grandifolia*), Black Ash (*Fraxinus nigra*), Green Ash (*Fraxinus pennsylvanica*), Basswood (*Tilia americana*), Red Oak (*Quercus rubra*), Pin Oak (*Quercus palustris*), Swamp White Oak (*Quercus bicolor*), Bur Oak (*Quercus macrocarpa*), Hawthorn (*Crataegus* sp.) and Crack Willow (*Salix fragilis*). Less common trees were Eastern White Pine (*Pinus strobus*), Weeping Willow (*Salix alba* 'Tristis'), Pignut Hickory (*Carya glabra*), Black Walnut (*Juglans nigra*), Balsam Poplar (*Populus balsamifera*), Manitoba Maple (*Acer negundo*), Yellow Birch (*Betula alleghaniensis*), Eastern Red Cedar (*Juniperus virginianus*), and several non-native species which were planted within landscapes or along roadsides such as Norway Spruce (*Picea abies*), Norway Maple (*Acer platanoides*), Colorado Blue Spruce (*Picea glauca*), Southern Catalpa (*Catalpa bignonioides*). The largest trees were up to 25 m high, with a few specimens with diameter breast heights (dbhs) of over 1 m, but less than 1.5 m.

Poison Ivy (*Toxicodendron radicans*), both the climbing and groundcover forms, was prevalent in almost all natural communities. Also common was Raspberry (*Rubus idaeus*), Gray Dogwood (*Cornus racemosa*), Round-leaved Dogwood (*Cornus rugosa*), Staghorn Sumac (*Rhus typhina*), Spicebush (*Lindera benzoin*), Tartarian Honeysuckle (*Lonicera tartarica*), and Pokeweed (*Phytolacca americana*). Less commonly observed was Blue Beech (*Carpinus caroliniana*), Ironwood (*Ostrya virginiana*), Witchhazel (*Hammamelis virginianus*), Chokecherry (*Prunus virginiana*), Serviceberry (*Amelanchier laevis*), Currant sp. (*Ribes* sp.), Winterberry (*Ilex verticillata*), Mountain Holly (*Nemopanthes mucronata*), Bittersweet (*Celastrus scandens*), Burning Bush (*Euonymus atropurpureus*), Running Strawberry Bush (*Euonymus obovatus*), Maple-leaf Viburnum (*Viburnum acerifolium*), Barberry (*Berberis vulgaris*), Common Elderberry (*Sambucus canadensis*), Virginia Creeper (*Parthenocissus vitacea*), Riverbank Grape (*Vitis riparia*), Buttonbush (*Cephalanthus occidentalis*), and Fly Honeysuckle (*Lonicera canadensis*). Shrub Willow (*Salix* sp.) and Narrow-leaved Meadowsweet (*Spiraea alba*), Southern Arrow-wood (*Viburnum recognitum*), Red-osier Dogwood (*Cornus stolonifera*), and Nannyberry (*Viburnum lentago*) were noted in the open marsh areas.

The groundcover was sparse in forested areas with ephemeral ponding, but better-drained and higher areas almost always contained tall enchantment's nightshade (*Circaea alutetiana*),

Jack in the Pulpit (*Arisa ematriphyllum*), Fowl Manna Grass (*Glyceria striata*), and Large-leaf Avens (*Geum macrophyllum*). Other common species included Jewelweed (*Impatiens capensis*), Sensitive Fern (*Onoclea sensibilis*), Sedge sp. (*Carex* sp.), Mayapple (*Podophyllum peltatum*), and calico Aster (*Aster lateriflorus*). A complete plant list can be found in Appendix B.

A targeted survey for rare plant species was conducted and none were found within 120m of the project location. A total of 6 regionally rare plant species were observed in the project area: Soft Agrimony (*Agrimonia pubescens*), Poke Milkweed (*Asclepia sexaltata*), Dropping Woodreed (*Cinna latifolia*), Mountain-holly (*Ilex mucronata*), Wood Lily (*Lilium philadelphicum*), and Giant Ragweed (*Ambrosia trifida*). (See Section 4.0 for a discussion of these plants.)

Ecological Land Classification (ELC) communities within 120m of the project location consist of: Cultural Hedgerow (CUH), Mineral Cultural Meadow (CUM1), Deciduous Forest (FOD) Oak Mineral Deciduous Swamp (SWD1), Ash Mineral Deciduous Swamp (SWD2) and Red Maple Mineral Deciduous Swamp (SWD3-1). **See Table 2 and Figure 1.**

The results of the ELC survey were used to support the identification of natural features including candidate significant wildlife habitat, as per the Significant Wildlife Habitat Technical Guide (2000) and the Draft Ecoregion Criterion Schedule (MNR 2011).

Cliffs and Talus Slopes

Talus slope habitats are characterised by blocks of limestone/dolostone, sandstone, or granite of variable size, found at the base of cliffs of steep slopes. Often substantial amounts of rock rubble accumulate through the formation and weathering of cliffs. These sites have coarse rocky material occupying greater than 50% of the ground surface. Soils are shallow, have little mineral material, and are primarily made up of organic debris. In general, vegetation is sparse and patchy (OMNR, 2000 pg 41). According to the Draft Ecoregion Criteria Schedule (OMNR 2011), candidate cliffs and talus slopes include ELC ecosites such as: CL01, CLS1, CLS2, CLT1, CLT2, TAO1, TAO2, TAS1, TAT1, TAT2. There were no suitable sites within 120 metres of the project location.

Sand Barren

Sand barrens are open (tree cover < 25%) herbaceous communities occurring inland on dry, deep sand deposits. These rare vegetation communities are dominated by species such as bracken fern, hay sedge, deep-green sedge, and New Jersey tea. Mosses and reindeer lichen form a substantial component of the vegetation cover. Vegetation is usually low to the ground, sparse and patchy, and there is much exposed mineral soil. According to the Draft Ecoregion7E Criteria Schedule (OMNR 2011), candidate sand barren communities include ELC ecosites, such as: SBO1, SBS1, SBT1 with tree cover $\leq 60\%$. There were no suitable sites within 120 metres of the project location.

Alvar

Alvars are naturally open areas of thin soil over essentially flat limestone, dolostone or marble rock. They support a sparse vegetation cover of shrubs and herbs, and trees are often absent or scattered. In spring, alvars may have standing water; in summer, soils can become very hot and dry. Vegetation is adapted to these extreme variations in temperature and soil moisture (OMNR 2000, pg 37). According to the Draft Ecoregion Criteria Schedule

(OMNR 2011), candidate alvar communities include ELC ecosites such as: ALO1, ALS1, ALT1 >0.5 ha with 3 or more Alvar indicator species and not dominated by exotic or introduced species. There were no suitable sites within 120 metres of the project location.

Old-growth Forest

According to the Draft Ecoregion Criteria Schedule (OMNR 2011), candidate old-growth forests can include ELC FOD, FOC or FOM communities that are undisturbed, structurally complex and contain a wide variety of trees and shrubs in various age classes. During Records Review, Emerson Road Woods was identified as a candidate site by the Niagara Peninsula Conservation Authority. Site Investigations confirmed the site as a candidate old-growth forest. **See Figure 2.** Generalized Candidate Significant Wildlife Habitat will be treated as significant and discussed in the EIS.

According to Appendix Q of the Significant Wildlife Habitat Technical Guide (OMNR, 2000), old growth or mature forests are characterized based on the current representation of old growth or mature forest stands within the planning area, age of trees, age classes of trees in stand, presence of old-growth characteristics, species diversity, provision of significant wildlife habitat, potential for long-term protection of the site, stand history, size and location of the site, and degree of disturbance.

Candidate Old-growth Forest (Emerson Road Woods)

This 71-hectare Oak Mineral Deciduous Swamp community is dominated by Swamp Red Oak and Pin Oak in the canopy, green ash in the sub-canopy, pokeweed in the understory and touch-me-not in the groundcover. It is structurally complex and contains a variety of trees and shrubs in various age classes including large, old trees (generally older than 120 years). It provides habitat for amphibians, landbirds, woodland birds and raptors. It has historically provided habitat for colonial nesting birds.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Old Growth Forest (Emerson Road Woods)	71 ha	unknown	-swamp dominated by swamp red oak and pin oak - contains 26.68ha of interior forest habitat	SWD-1 - oak mineral deciduous swamp	-large old growth forest that is structurally complex and contains a wide variety of trees and shrubs in various age classes including	15 metres from Underground Collector Line	Yes

					large old trees generally older than 120 years -historically has provided habitat for amphibians, colonial birds, land birds, woodland birds and raptors		
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Savannah

Savannahs are characterised by widely-spaced, open-grown trees producing a cover of 60% or less growing in association with an assortment of grasses and forbs that are characteristic of prairie communities. Soil depth is variable and is usually underlain by limestone bedrock. Soils are often silt loams and Farmington loams. In the spring, they are frequently saturated and internal drainage is restricted due to the underlying bedrock. Conversely, in mid to late summer, soils dry out, often creating drought-like conditions. Fire maintains these communities by controlling the invasion of woody shrubs and non-native species of grasses (OMNR 2000 pg 39). According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate savannah communities include ELC ecosites such as TPS1, TPS2 with 25% < tree cover < 35% or TPW1, TPW2 with 35% < tree cover < 60%. There were no suitable sites within 120 metres of the project location.

Tallgrass Prairie

Tall-grass prairies in Ontario are usually small remnants (< 1 ha) located mainly in the southwestern part of the province. High quality prairies have few trees, non-native plant species, and a large proportion of provincially significant species. A history of burning eliminates or controls invasion by woody shrubs and maintains this rare community. Prairie habitats are very susceptible to natural succession and must be frequently disturbed by such natural processes such as fire in order to be maintained. Many of the prairie remnants that remain have invasive plant species. Indicator species are usually the dominant grasses including big bluestem, Indian grass, switch grass, and tall cord grass. Soil depth is variable; soils are usually fine-textured, ranging from dry-mesic sands to wet-mesic sandy loams, over limestone bedrock (OMNR, 2000). According to the Draft Ecoregion Criteria Schedule (OMNR 2011), candidate tallgrass prairie communities include ELC ecosites such as: TPO1, TPO2 with < 25% tree cover. There were no suitable sites within 120 metres of the project location.

Other Rare Vegetation Communities

According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate provincially rare S1, S2, S3 vegetation communities are listed in Appendix M of the Significant Wildlife Habitat Guide (OMNR, 2000) and also in the Niagara Peninsula Conservation Authority's

Natural Areas Inventory (Niagara Peninsula Conservation Authority 2009). Other information is also available through the Natural Heritage Information Center (NHIC) database. One rare vegetation community was identified within the project location during Site Investigations: an Oak Mineral Deciduous Swamp community, which is an S2S3 community within Ontario **See Figure 3**. This rare vegetation community will be evaluated for significance and discussed in the Evaluation of Significance Report.

According to Appendix Q of the Significant Wildlife Habitat Technical Guide (OMNR, 2000), rare vegetation communities are evaluated based on current representation of community type within the planning area, degree of rarity, diversity of site, condition of community, size and location of site, potential for long-term protection of the site, and provision of significant wildlife habitat.

Rare Vegetation Community (SWD1)

This 7.3-hectare rare vegetation community is a mid-aged deciduous swamp community dominated by Swamp Red Oak and Pin Oak in the canopy, green ash in the sub-canopy, pokeweed in the understory and touch-me-not in the groundcover. It is part of Emerson Road Woods and Lowbanks Backshore Wetland Complex (AKA Emerson Road Woods Wetland) and provides habitat for amphibians, landbirds, woodland birds and raptors. It has historically provided habitat for colonial nesting birds.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Rare Vegetation Community (SWD1)	7.3 ha	unknown	-swamp dominated by swamp red oak and pin oak	SWD-1 - oak mineral deciduous swamp -provincially rare: S-rank of S2S3	-Emerson Road Woods contains a provincially rare vegetation community (Oak Mineral Deciduous Swamp)	15 metres from Underground Collector Line	Yes

2.2 Results of Confirmation of Natural Features Identified During Records Review

Wetlands

There is one southern wetland within 120 metres of the project location: Lowbanks Backshore Wetland Complex (AKA Emerson Road Woods Wetland). **See Figure 4**. This wetland was identified during Records Review and confirmed during Site Investigations. The boundaries were groundtruthed and confirmed to be consistent with the previously mapped boundaries prepared by the MNR. Wetlands were delineated using the Ontario

Wetland Evaluation System (OWES) for Southern Ontario by a certified OWES evaluator (See Appendix D for Staff Resumes and Qualifications).

Lowbanks Backshore Wetland Complex (AKA Emerson Road Woods Wetland)

Lowbanks Backshore Wetland Complex (AKA Emerson Road Woods Wetland) is a 306.5-hectare provincially significant wetland complex with 9 wetland units connected by watercourses, hedgerows, fields and uplands. All wetland units are swamps with a slough forest pattern. The wetland provides habitat for several wildlife species that require movements between the wetland units and the Lake Erie shoreline. The watershed flow from the wetland maintains breeding habitat in the drain outlets at the beaches for Fowler’s toad.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Lowbanks Backshore Wetland	306.5 ha	Provincially significant	-swamp with slough forest pattern	-dominated by overstory of Silver Maple, White Oak and Green Ash -grey dogwood -reed canary grass	-breeding habitat for Fowler’s toad -animal movement corridor for reptile and amphibian species, including Blanding’s turtle, Snapping turtle -contains a provincially rare vegetation community (SWD-1 in Emerson Road Woods)	12metres from Underground Collector Line	Yes

Woodlands

O. Reg 359/09 defines a woodland as land

- a. That is 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,
- b. That has, per hectare, at least,
 - i. 1,000 trees of any size,
 - ii. 750 trees measuring over five centimetres in diameter, measured in accordance with subsection 7

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- iii. 500 trees measuring over 12 centimetres in diameter, measured in accordance with subsection 7
- iv. 250 trees measured over 20 centimetres in diameter, measured in accordance with subsection 7
- c. That does not include a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees.

There are three areas that meet the definition of a woodland within 120 metres of the project location: FOD, Burnaby Bush and Emerson Road Woods. **See Figure 5.** These woodlands were identified during Records Review and confirmed during Site Investigations. These woodlands will be evaluated in the Evaluation of Significance report.

FOD

This 3.3-hectare woodland is comprised of a deciduous forest community along the edge and a deciduous forest community with deciduous swamp inclusions within its interior. The deciduous forest community did not have hydric soils and had less than 50% wetland species. It was dominated by green ash and basswood in the canopy, green ash and white elm in the sub-canopy, green ash in the understory and poison ivy in the groundlayer.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Woodland (FOD)	3.3 ha	Unknown	-woodland comprised of deciduous trees	-FOD -deciduous forest (green ash, basswood, red oak, white elm)	- woodland with regionally rare plant species	118m from Underground Collector Line	Yes

Burnaby Bush

This 59-hectare significant woodland is a deciduous swamp dominated by red maple in the canopy, with a moderately dense understory, sparse groundcover and fresh-moist soil. It contains 17.68 hectares of interior forest and provides potential habitat for landbirds, woodland birds, raptors and bats.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Burnaby Bush (significant woodland)	59 ha	Significant	-deciduous swamp dominated by red maple with fresh moist	SWD (Deciduous Swamp), SWD3-1 (Red Maple Mineral)	-large mature forest -potential habitat for land birds,	12metres from Underground Collector Line	Yes

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			soil - contains 17.68ha of interior forest habitat	Deciduous Swamp)	wood land birds, raptors and bats		
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Emerson Road Woods

This 71-hectare significant woodland is a deciduous swamp dominated by red oak and pin oak in the canopy with moderate groundcover. It contains a rare vegetation community (SWD1) and old-growth characteristics. It is part of a Provincially Significant Wetland and provides habitat for amphibians, landbirds, woodland birds and raptors. It has historically provided habitat for colonial nesting birds. Evidence of forest management was observed within 100 metres of the forest edge.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Emerson Road Woods (significant woodland)	71 ha	Significant	-swamp dominated by red oak and pin oak - contains 26.68ha of interior forest habitat	SWD (Deciduous Swamp), SWD-1 (Oak Mineral Deciduous Swamp)	-old growth forest with interior forest habitat - provincially rare vegetation community -potential part of a Provincially Significant Wetland -habitat for amphibians, colonial birds (historical), land birds, woodland birds and raptors	15 metres from Underground Collector Line	Yes

Changes to Vegetation Communities

The ELC data received from Niagara Peninsula Conservation Authority during Records Review was ground-truthed during Site Investigations and a few changes were made:

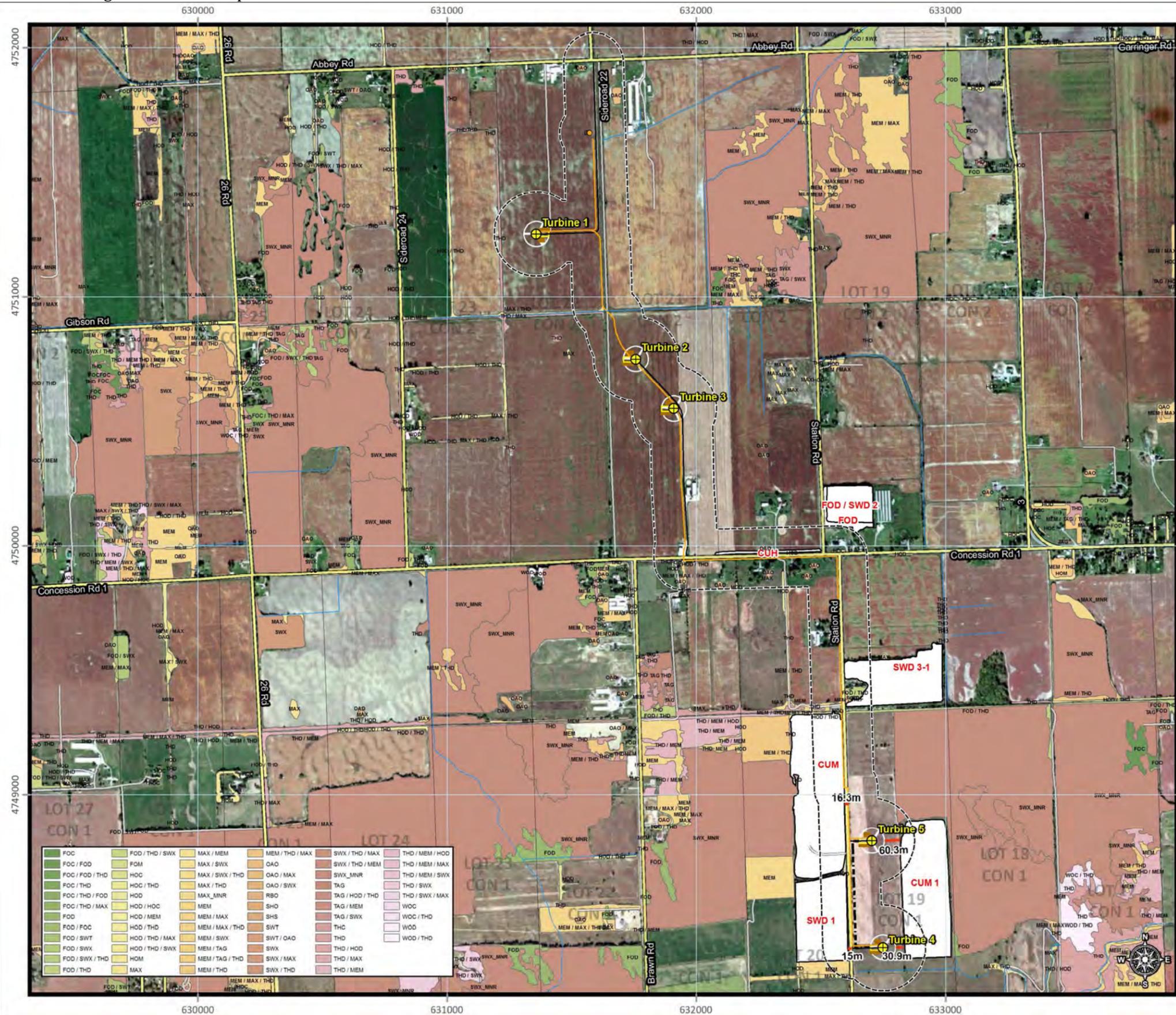
Natural Heritage Assessment Report

- The unknown swamp communities (SWX) were identified as Oak Mineral Deciduous Swamp (SWD1) and Red Maple Mineral Deciduous Swamp (SWD 3-1);
- The community identified as Deciduous Forest with Thicket Swamp inclusions (FOD/SWT) was corrected to be Deciduous Forest with Ash Mineral Deciduous Swamp inclusions (FOD/SWD2). The FOD was found to be within 120m of the underground collector line at the intersection of Concession Road 1 and Station Road;
- 3 additional communities were noted: 1 Cultural Hedgerow (CUH) community and 2 Mineral Cultural Meadow (CUM1) communities.

Changes to the ELC data received from Niagara Peninsula Conservation Authority during Records Review are shown as white polygons with red text. **See Figure 1.**

Table 2. Summary of Vegetation Communities

Community Series	ELC Code	Description
Cultural Hedgerow	CUH	Tree cover and shrub cover are ≥60% in an area ≤50 m. The community is resulting from or maintained by cultural or anthropogenic-based disturbances. American elm, green ash, red maple, Norway maple, Freeman maple, hawthorn, Norway spruce, staghorn sumac, Manitoba maple, common apple
Mineral Cultural Meadow	CUM1	Tree cover and shrub cover are ≤25%. The community is resulting from or maintained by cultural or anthropogenic-based disturbances. Often with a large proportion of non-native species. Opportunistic herbaceous and woody species common to disturbed open habitats such as smooth brome, timothy, Canada goldenrod, Canada thistle, green ash, common buckthorn
Deciduous Forest	FOD	Deciduous tree cover is ≥60%. There are small un-mappable (<0.5 ha) pockets of communities or a mix of tree types which can not be categorized to Ecosite or Type level due to lack of dominance of a particular group of species. Species include maple, ash, elm, oak, hickory, walnut, basswood, poplar, willow, birch, and beech. In this area, spicebush, common buckthorn, raspberry, and blue beech are common understory species.
Oak Mineral Deciduous Swamp	SWD1	Tree cover is >25%. >5 m in height. Dominated by hydrophytic vegetation. Deciduous tree cover is ≥75% of canopy. Dominated by black and red oak, white oak, bur oak, and also includes mix of freeman maple, white elm, sugar maple, red maple, and less commonly basswood, and bitternut hickory. Variable flooding regimes. Water depth <2m. Standing water or vernal pooling >20% ground coverage. This is a provincially rare vegetation community.
Ash Mineral Deciduous Swamp	SWD2	Tree cover is >25%. >5 m in height. Dominated by hydrophytic vegetation. Deciduous tree cover is ≥75% of canopy. Dominated by black ash, green ash with red maple, white elm, swamp maple and silver maple. Substrate is mineral and peaty phase mineral (organic accumulations 20-40cm). Flooding duration is short and substrate is aerated by early to mid-summer.
Red Maple Mineral Deciduous Swamp	SWD3-1	Tree cover is >25%. >5 m in height. Dominated by hydrophytic vegetation. Deciduous tree cover is ≥75% of canopy. Dominated by red maple. Substrate is mineral and peaty phase mineral (organic accumulation 20-40cm). Flooding duration is short and substrate is aerated by early to mid-summer.



FOC	FOD / THD / SWX	MAX / MEM	MEM / THD / MAX	SWX / THD / MAX	THD / MEM / HOD
FOD / FOD	FOM	MAX / SWX	OAO	SWX / THD / MEM	THD / MEM / MAX
FOD / FOD / THD	HOC	MAX / SWX / THD	OAO / MAX	SWX_MNR	THD / MEM / SWX
FOD / THD	HOC / THD	MAX / THD	OAO / SWX	TAG	THD / SWX
FOD / THD / FOD	HOD	MAX_MNR	RBO	TAG / HOD / THD	THD / SWX / MAX
FOD / THD / MAX	HOD / HOC	MEM	SHO	TAG / MEM	WOC
FOD	HOD / MEM	MEM / MAX	SHS	TAG / SWX	WOC / THD
FOD / FOC	HOD / THD	MEM / MAX / THD	SWT	THC	WOD
FOD / SWT	HOD / THD / MAX	MEM / SWX	SWT / OAO	THD	WOD / THD
FOD / SWX	HOD / THD / SWX	MEM / TAG	SWX	THD / HOD	
FOD / SWX / THD	HOM	MEM / TAG / THD	SWX / MAX	THD / MAX	
FOD / THD	MAX	MEM / THD	SWX / THD	THD / MEM	

Legend

Candidate SWH

- Vegetation Communities
- 120m Setback (All Project Components)
- Distances to Natural Features

Project Infrastructure

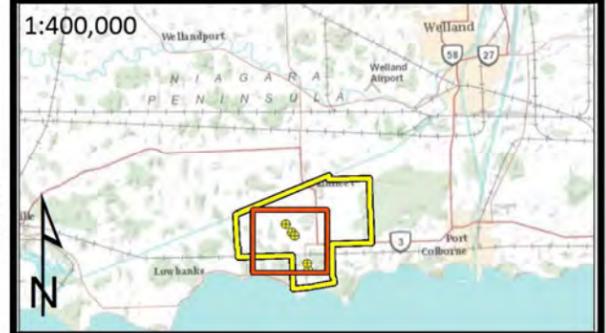
- Wing Turbine
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.



MORRISON HERSHFIELD

Scale: **1:15,000**

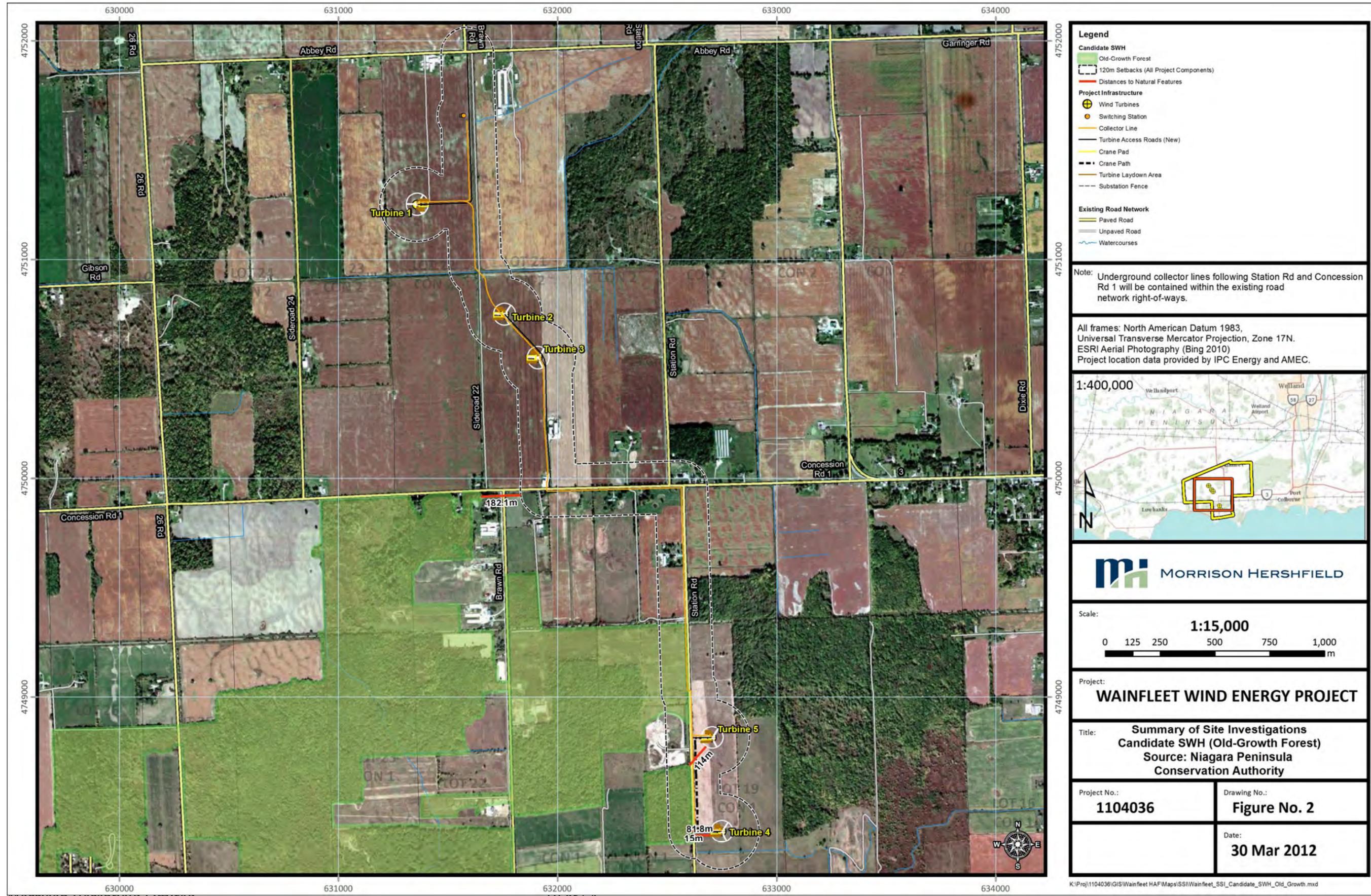
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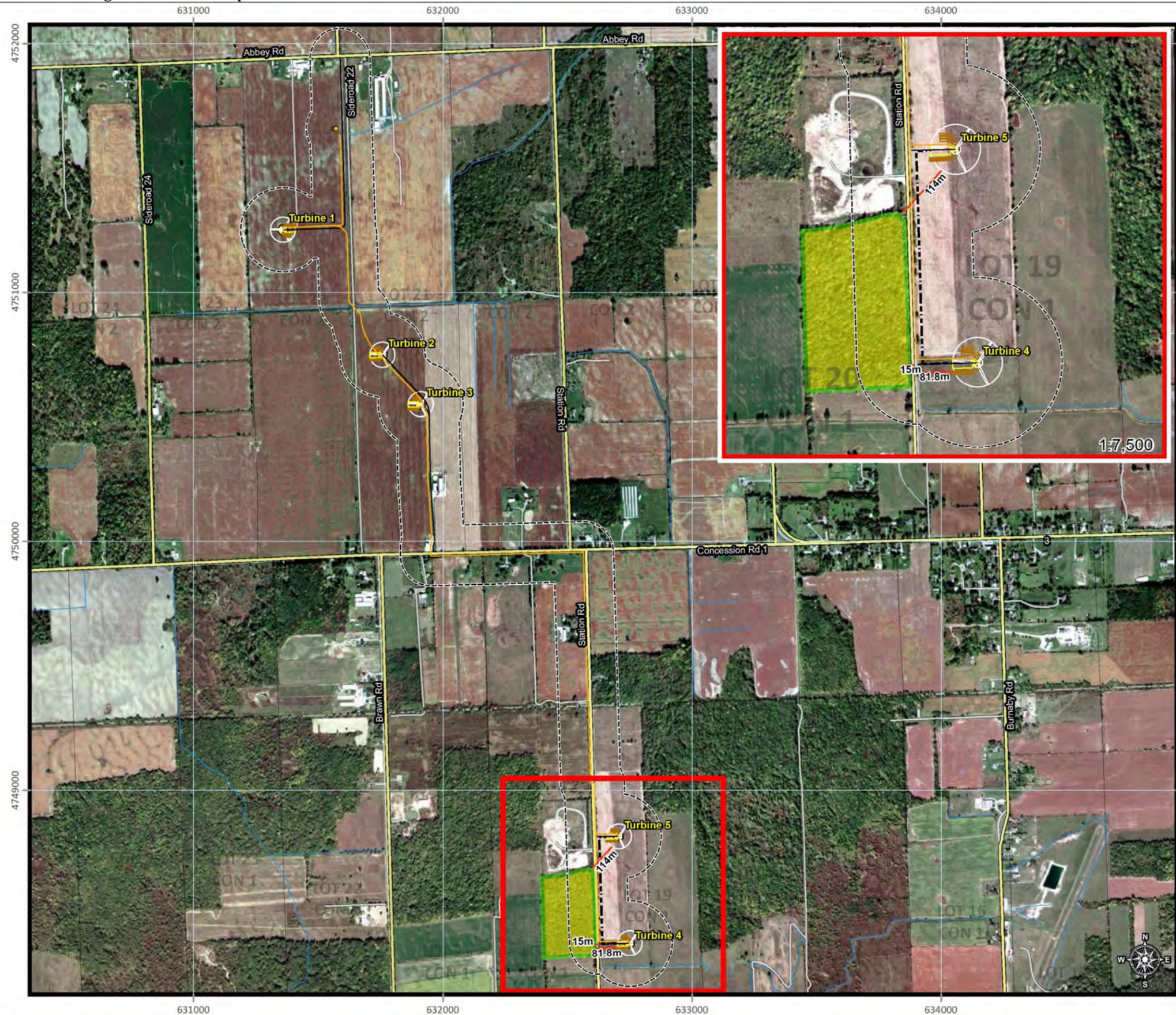
Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Summary of Site Investigations: Candidate SWH (Vegetation Communities) Source: NPCA - Data**

Project No.: 1104036	Drawing No.: Figure No. 1
Date: 30 Mar 2012	

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Legend

Candidate SWH

- Other Rare Vegetation Communities
- 120m Setback (All Project Components)
- Distances to Natural Features

Project Infrastructure

- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.

1:400,000

MORRISON HERSHFIELD

Scale: **1:15,000**

0 125 250 500 750 1,000 m

Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Summary of Site Investigations: Candidate SWH (Other Rare Vegetation Communities)**

Project No.: 1104036	Drawing No.: Figure No. 3
Date: 30 Mar 2012	

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Legend

Candidate SWH (Wetlands)

- Lowbanks Backshore Wetland Complex
- Mill Race Creek Wetland Complex
- Moulton East Wetland Complex
- Non-Provinceally Significant Wetland
- Provinceally Significant Wetland
- 120m Setback (All Project Components)
- Distances to Natural Features

Project Infrastructure

- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983,
 Universal Transverse Mercator Projection, Zone 17N.
 ESRI Aerial Photography (Bing 2010)
 Project location data provided by IPC Energy and AMEC.

1:400,000

MORRISON HERSHFIELD

Scale: **1:15,000**

0 125 250 500 750 1,000 m

Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Summary of Site Investigations:
 Southern Wetlands
 Source: MNR, Niagara Region**

Project No.: 1104036	Drawing No.: Figure No. 4
Date: 30 Mar 2012	

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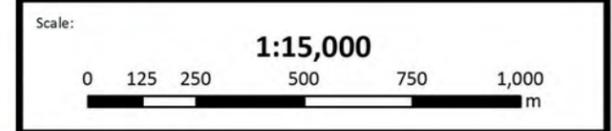


Legend

- Candidate SWH**
 - Woodlots
 - 120m Setback (All Project Components)
 - Distances to Natural Features
 - Tap Lines
 - Access Roads
- Project Infrastructure**
 - Wind Turbines
 - Switching Station
 - Crane Pad
 - Crane Path
 - Turbine Laydown Area
 - Substation Fence
- Existing Road Network**
 - Paved Road
 - Unpaved Road
 - Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983,
 Universal Transverse Mercator Projection, Zone 17N.
 ESRI Aerial Photography (Bing 2010)
 Project location data provided by IPC Energy and AMEC.



Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Summary of Site Investigations:
 WoodLands
 Source: LIO, Niagara Region**

Project No.: **1104036**

Drawing No.: **Figure No. 5**

Date: **30 Mar 2012**

Date: **30 Mar 2012**

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2.6 Results of Candidate Significant Wildlife (Bird) Habitat Survey

Waterfowl Stopover and Staging Areas (terrestrial + aquatic)

During spring and fall migration, waterfowl require habitat that supplies adequate food to replenish energy reserves, resting areas, and cover from predators and adverse weather conditions. Migrating waterfowl usually prefer larger wetlands, especially those adjacent to large bodies of water, and relatively undisturbed shorelines with vegetation (OMNR 2000). Marsh and swamp wetland communities are more important than bogs and fens. Wetland size and wetland groups or complexes, rather than isolated wetlands should also be considered when identifying candidate habitats. Seasonally flooded locations, such as sheetwater or meltwater areas and poorly drained fields/meadows may also provide seasonally important staging habitat (OMNR 2000, Appendix M p. 308)

According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate terrestrial waterfowl stopover areas can include ELC ecosites such as: CUM1 or CUM2 communities with evidence of annual spring flooding within these ecosites. Aquatic waterfowl stopover areas can include ELC ecosites such as: MAM1 to MAM6, MAS1, MAS2, MAS3, SAF1, SAM1, SAS1, SWD1 or SWD3 communities with abundant food supply (OMNR, 2011). There were no suitable sites within 120 metres of the project location.

Shorebird Migratory Stopover Areas

Migrating shorebirds often follow shorelines of the Great Lakes in their movements between winter and summer ranges. Traditionally used areas provide safe places to rest and feed to replenish energy reserves needed to continue migration. Large numbers of shorebirds may accumulate in stopover areas during poor flying weather. Important areas must provide relatively undisturbed shorelines that produce abundant food (insects, clams, snails, and worms) for many birds of a variety of species. Great Lakes shorelines provide some of the best shorebird migratory stopover habitat because of their location along migration routes and because wave action maintains large and productive beaches (OMNR 2000).

According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate shorebird stopover areas can include ELC ecosites, such as: BBO, BBO2, BBS1, BBS2, BBT1, BBT2, SDO1, SDS2, SDT1, MAM1 – MAM5 communities adjacent to a shoreline of a lake, river or wetland that is usually muddy and unvegetated. There were no suitable sites within 120 metres of the project location.

Raptor Winter Feeding and Roosting Areas

Open fields, including hayfields, pastures, and meadows that support large and productive small mammal populations (mice, voles) are important to the winter survival of many birds of prey. Such fields usually have a diversity of herbaceous vegetation that provides food for mammals. Scattered trees and fence posts provide perches for hunting birds. Windswept fields in more open areas that are not covered by deep snow are preferred by raptors because hunting prey is easier. The best roosting sites will likely be found in relatively mature mixed or coniferous woodlands that abut these windswept fields (OMNR, 2000).

According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate raptor winter feeding and roosting areas are defined as sites that are greater than 20 hectares with a

combination ELC forest (FOC, FOD, FOM), swamp (SWD, SWM) and upland (CUM, CUT, CUS, CUW) communities. During Site Investigations, 1 candidate raptor wintering area was identified within 120 metres of the project location. **See Figure 6.** This site will be evaluated for significance in the Evaluation of Significance Report.

According to Appendix Q of the Significant Wildlife Habitat Technical Guide (OMNR, 2000), raptor winter feeding and roosting areas are evaluated based on relative importance of the site, presence of species of conservation concern, species diversity, abundance, size of site, level of disturbance, location of site, habitat quality, and historical use of area.

Candidate Raptor Winter Feeding and Roosting Area

This 155.6-hectare candidate raptor winter feeding and roosting area encompasses Emerson Road Woods, Burnaby Bush, 2 CUM1 communities and several agricultural fields.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Raptor Winter Feeding and Roosting Area (SWD + CUM1)	155.60 ha	Unknown	-swamp dominated by red oak and pin oak -cultural meadow dominated by Canada goldenrod with fresh moist soil	SWD deciduous swamp CUM1 Cultural meadow dominated by smooth brome, Canada goldenrod	-large forest for protection -old growth forest provides potential winter feeding and roosting areas for raptors -cultural meadow provides potential winter feeding and roosting areas for raptors	30.9 metres from Turbine 4 & 5	Yes

Colonial Nesting Bird Breeding Habitat (bank/cliff, tree/shrub, ground)

Colonial birds are a diverse group including several species of herons, gulls, terns, and swallows. Generally, herons nest in trees in swamps and along large bodies of water. Gulls and terns prefer to nest on the ground, and colonies are frequently found on islands in the Great Lakes and large rivers such as the St. Lawrence River and Ottawa River. Birds often

show considerable nesting site fidelity, returning year after year. Different species of swallows congregate on specific habitat types such as cliffs, banks, and artificial structures (OMNR 2000).

According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate bank/cliff colonial nesting bird breeding habitat (swallows) includes ELC ecosites, such as: CUM1, CUT1, CUS1, BLO1, BLS1, BLT1, CLO1, CLT1 or CLS1 communities with exposed banks, undisturbed or naturally eroding for 10 or more years. There were no suitable sites within 120 metres of the project location.

According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate tree/shrub colonial nesting bird breeding habitat (herons) includes ELC ecosites, such as: SWM2, SWM3, SWM, SWM6, SWD1 –SWD7 or FET1. During Records Review, Lowbanks Backshore Wetland Complex (AKA Emerson Road Woods Wetland) was identified as a Candidate site because of historical records of this site supporting an active heron colony. Field investigations of the potential colonial nesting habitat were conducted on August 11th, August 13th, August 16th and August 18th, 2010. During these investigations no active colonial bird nests were observed; therefore the site was eliminated as a candidate tree/shrub colonial nesting bird breeding habitat.

According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate ground colonial nesting bird breeding habitat (terns) can include any rocky island or peninsula within a lake or large river. There were no suitable sites within 120m the project location.

Landbird Migratory Stopover Habitat

During migration, large numbers of birds move along Great Lakes shorelines and stop at traditionally-used sites to feed, rest, and/or wait out periods of bad flying weather. Stopover areas must provide a variety of different habitat types ranging from open fields to large woodlands, to provide abundant food and cover for the diversity of different species during migration. In addition, raptors will use updrafts along cliff faces to assist in migration during spring and fall (OMNR 2000).

According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate landbird migratory stopover areas should also have a diversity of habitats including; forest, grassland and wetland complexes, and include a woodland (such as ELC communities FOC, FOM, FOD, SWC, SWM and SWD) that is greater than 5 hectares in size. The habitat needs to be located within 5 km of Lake Ontario or Lake Erie. During Site Investigations, 2 candidate sites (Emerson Roads Woods and Burnaby Bush) were identified within 120 metres of the project location. **See Figure 7.** These 2 candidate landbird migratory stopover areas will be treated as significant and carried forward to the EIS. Pre-construction monitoring will be outlined in the EIS.

According to Appendix Q of the Significant Wildlife Habitat Technical Guide (OMNR, 2000), landbird migratory stopover areas are evaluated based on the relative importance of the site, presence of species of conservation concern, species diversity, abundance, size of site, habitat diversity, historical use of site and location of site.

Candidate Landbird Migratory Stopover Area #1 (Emerson Road Woods)

This 71-hectare woodland is within 5km of Lake Erie and may provide forest habitat for migrating songbirds.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Landbird Migratory Stopover Area #1 (Emerson Road Woods)	71 ha	Unknown	-swamp dominated by red oak and pin oak	SWD-1 - oak mineral deciduous swamp -Tufted titmouse observed	-potential stopover area for landbirds that are migrating, due to size of woodland and proximity to Lake Erie	85 metres from Turbine 4	No – assumed significant and carried forward to EIS (Pre-construction monitoring will be outlined in the EIS.)

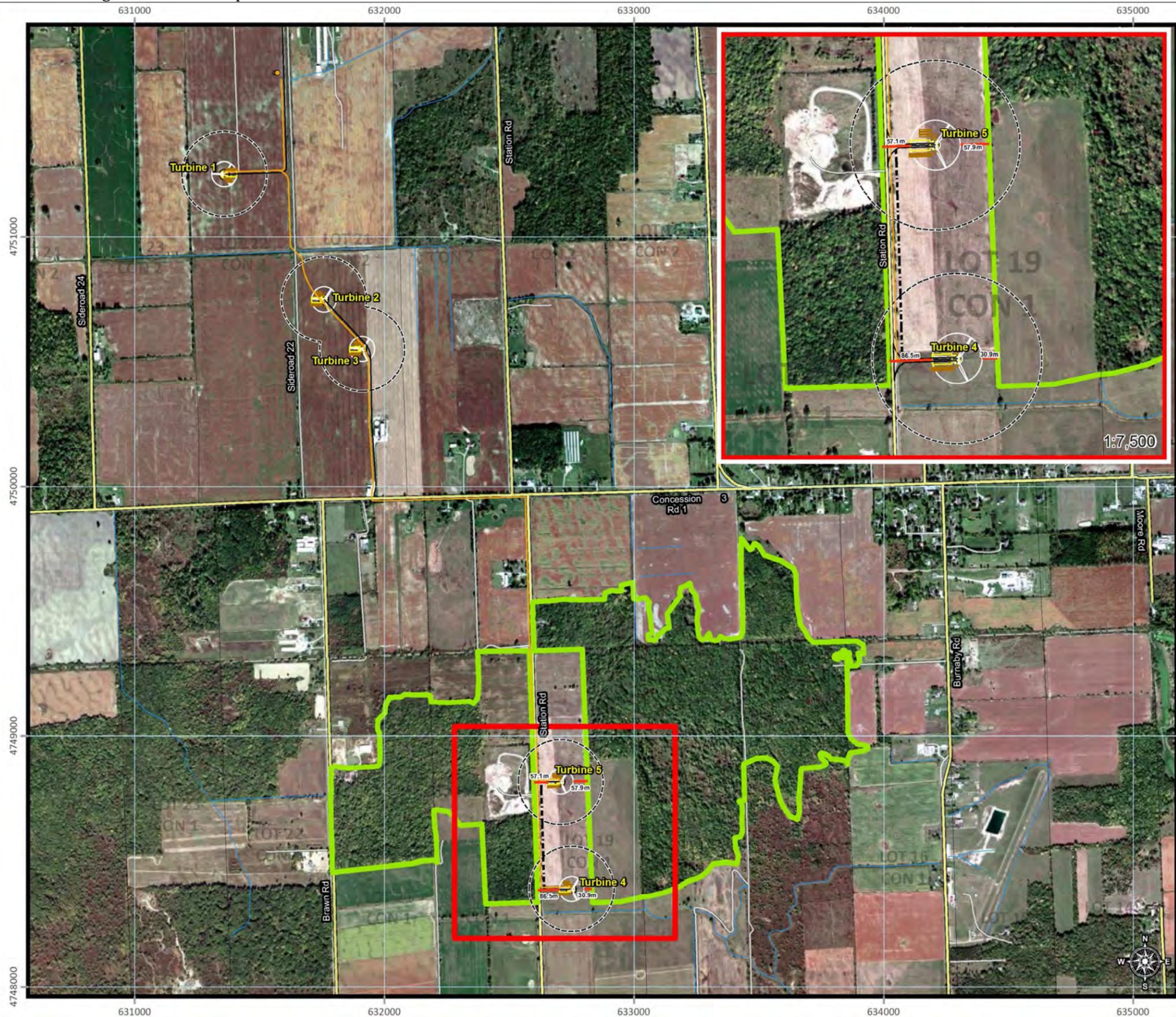
Candidate Landbird Migratory Stopover Area #2 (Burnaby Bush)

This 59-hectare woodland is within 5km of Lake Erie and may provide forest habitat for migrating songbirds.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Landbird Migratory Stopover Area #2 (Burnaby Bush)	59 ha	Unknown	-deciduous swamp dominated by red maple with fresh moist soil	SWD3-1 - red maple mineral deciduous swamp	-potential stopover area for landbirds that are migrating, due to size of woodland and proximity to Lake Erie	91 metres from Turbine 5	No – assumed significant and carried forward to EIS (Pre-construction monitoring will be outlined in the EIS.)

Bald Eagle Winter Feeding and Roosting Areas

According to Appendix Q of the SWHTG and the Draft the Ecoregion Criteria Schedule (OMNR 2011), candidate bald eagle winter feeding and roosting areas are large, continuous mixed or deciduous woods with large trees and snags around the shores of large rivers and lakes. There were no suitable sites within 120 metres of the project location.



Legend

Candidate SWH

- Raptor Wintering Area
- 120m Setback (Wind Turbine, Included All Related Structures)
- Distances to Natural Features

Project Infrastructure

- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.

1:400,000

MORRISON HERSHFIELD

Scale: **1:15,000**

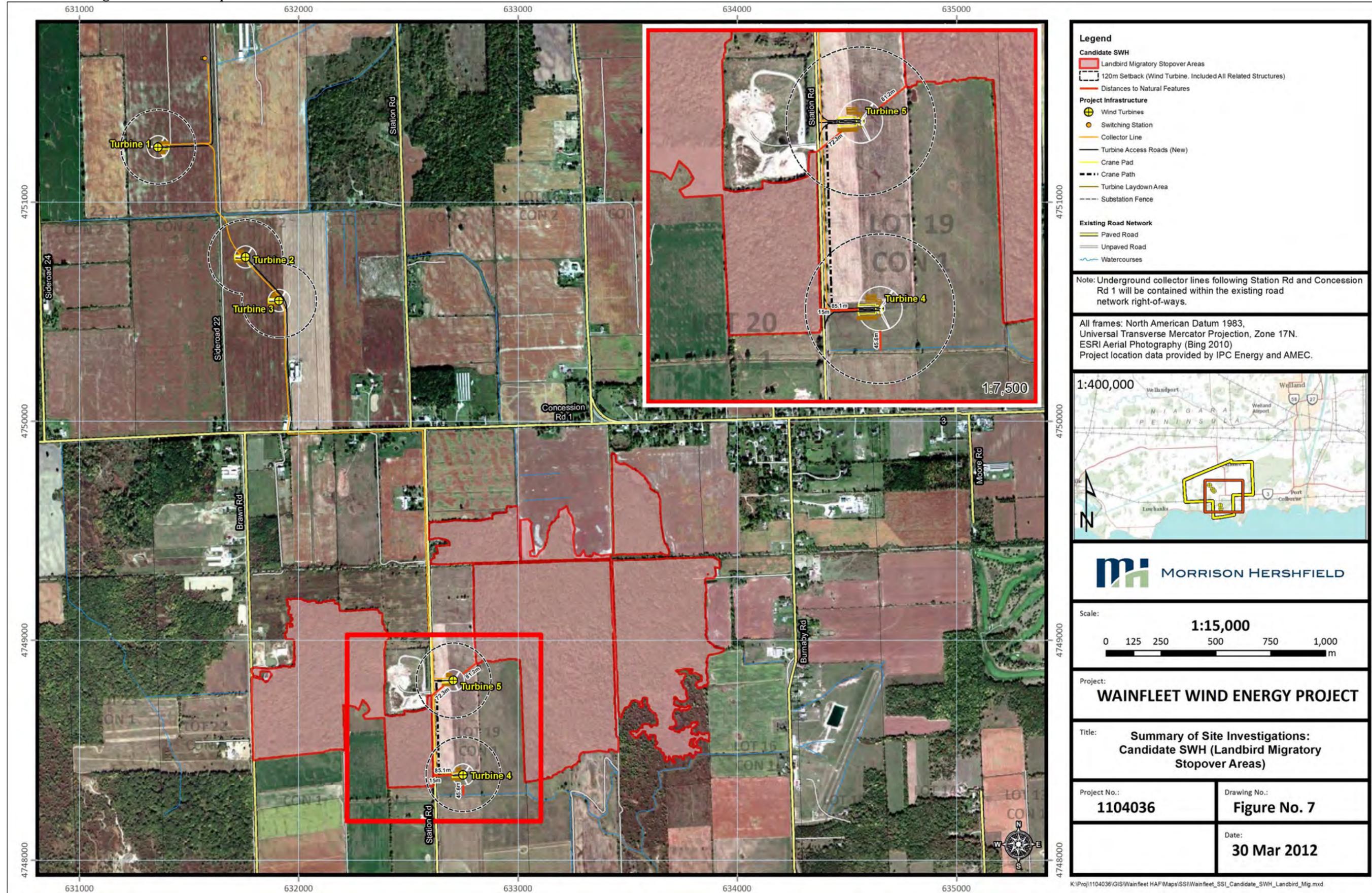
0 125 250 500 750 1,000 m

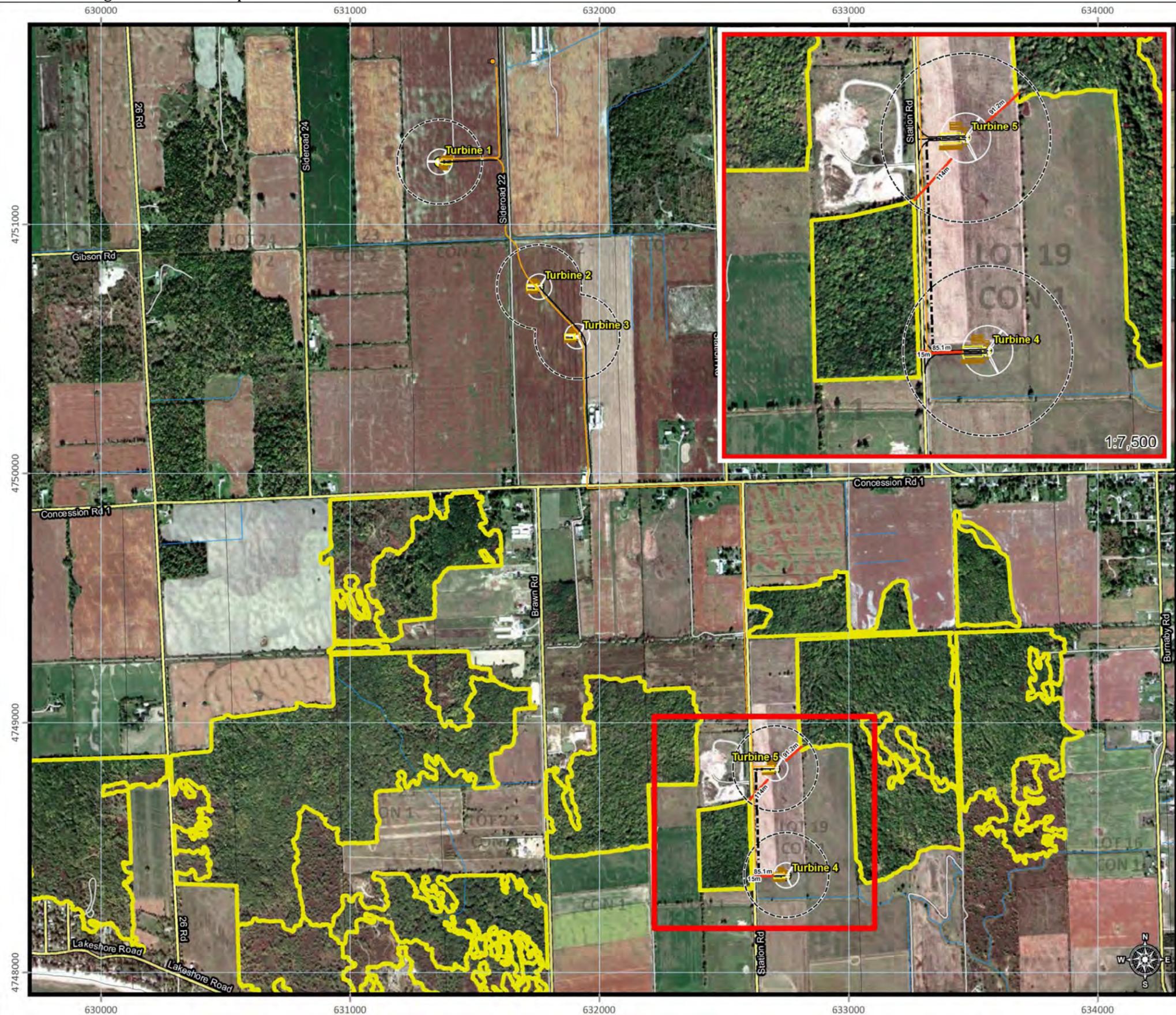
Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Summary of Site Investigations: Raptor Wintering Areas**

Project No.: 1104036	Drawing No.: Figure No. 6
Date: 30 Mar 2012	

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Legend

- Candidate SWH**
 - Woodland Raptor Nesting Habitat
 - 120m Setback (Wind Turbine, Included All Related Structures)
 - Distances to Natural Features
- Project Infrastructure**
 - Wind Turbines
 - Switching Station
 - Collector Line
 - Turbine Access Roads (New)
 - Crane Pad
 - Crane Path
 - Turbine Laydown Area
 - Substation Fence
- Existing Road Network**
 - Paved Road
 - Unpaved Road
 - Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.

1:400,000

MORRISON HERSHFIELD

Scale: **1:15,000**

0 125 250 500 750 1,000 m

Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Summary of Site Investigations: Candidate SWH (Woodland Raptor Nesting Habitat) Source: NHIC**

Project No.: 1104036	Drawing No.: Figure No. 8
Date: 30 Mar 2012	

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Waterfowl Nesting Habitat

According to the SWHTG (MNR, 2000) Marshes and swamps have greater value to nesting waterfowl than bogs and fens because they are more productive and have more permanent open water. Bogs and fens however may still be important to certain waterfowl species. Large wetlands and clusters of small wetlands located close to one another usually support greater waterfowl production than single small wetlands (OMNR 2000). The Draft Ecoregion Criteria Schedule (OMNR 2011), states that candidate waterfowl nesting areas are large (120m wide) upland habitats located adjacent to a wetland community (including ELC ecosites such as MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4). There were no suitable sites within 120 metres of the project location.

Bald Eagle and Osprey Nesting, Foraging & Perching Habitat

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate bald Eagle and Osprey nesting, foraging and perching habitat is a forest community directly adjacent to riparian areas (rivers, lakes, ponds, wetlands). Appendix Q of the SWHTG also includes habitat based criteria for identifying sites including: access to foraging areas, presence of perching habitat in proximity to shorelines, degree of disturbance and evidence of use (OMNR 2000). There were no suitable sites within 120 metres of the project location.

Marsh Breeding Bird Habitat

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate marsh breeding bird habitat is defined as wetland habitat (MAM1 – MAM6, SAS1, SAF1, SAM1, FE01, and BO01) with shallow water and emergent vegetation. There were no suitable sites within 120 metres of a wind turbine.

Open Country Breeding Bird Habitat

According to the SWHTG for area-sensitive grassland bird species, large grassland areas are required 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). The SWHTG and the Draft Ecoregion Criteria Schedule (OMNR 2011) include criteria for identifying candidate open country bird breeding habitat is defined as large (greater than 10 hectares) of grassland areas, including natural and cultural fields (CUM1) that are not actively being used for farming within the last 5 years. There were no suitable sites within 120 metres of the project location.

Shrub & Early Successional Breeding Bird Habitat

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate shrub and early successional breeding bird habitat is defined as large (greater than 10 hectares) older fields or shrub thickets (CUT1 or CUS1) that have not actively been used for farming within the past 5 years (OMNR, 2011). There were no suitable sites within 120 metres of the project location.

Special Concern & S1-S3 Species and Communities: Red-headed Woodpecker

Red-headed woodpeckers are found in open, deciduous forest with little understory, fields or pasture lands with scattered large trees, wooded swamps, orchards, small woodlands or forest edges, groves of dead or dying trees (OMNR, 2000a). There were no suitable sites within 120 metres of the project location.

Special Concern & S1-S3 Species and Communities: Short-eared Owl

Short-eared Owls prefer 75 – 100 hectares of contiguous open habitat including grasslands, open areas or meadows that are grassy or bushy (OMNR, 2011). There were no suitable sites within 120 metres of the project location.

Special Concern & S1-S3 Species and Communities: Yellow-breasted Chat

Yellow-breasted Chats are found in thickets, tall tangles of shrubbery beside streams, ponds, overgrown bushy clearings with deciduous thickets. They nest above ground in bush or vines (OMNR, 2000a). There were no suitable sites within 120 metres of the project location.

Special Concern & S1-S3 Species and Communities: Hooded Warbler

This species is an area-sensitive species (OMNR 2000b). Woodland area sensitive breeding bird habitat is large (greater than 10 hectares), mature forest stands (FOC, FOM, FOD, SWC, SWM, and SWD) within an interior forest at least 100m from the edge (OMNR, 2011). During Site Investigations, 2 candidate sites (Emerson Roads Woods and Burnaby Bush) were identified within 120 metres of the project location. Generalized candidate significant wildlife habitat will be treated as significant and discussed in the EIS.

Woodland Raptor Nesting Habitat (Generalized Candidate Significant Wildlife Habitat)

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate significant wildlife habitat for woodland raptor nesting is intermediate-aged to mature woodlands or conifer plantations (FOC, FOM, FOD, SWC, SWM, SWD and CUP3). During Site Investigations, 2 candidate sites (Emerson Roads Woods and Burnaby Bush) were identified within 120 metres of the project location. See Figure 8. Generalized candidate significant wildlife habitat will be treated as significant and discussed in the EIS.

Woodland Raptor Nesting Habitat #1 (Emerson Road Woods)

This 71- hectare forest contains 26.68 hectares of interior habitat and may provide nesting habitat for woodland raptors. No stick nests were observed during site investigations.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Woodland Raptor Nesting Habitat #1 (Emerson Road Woods)	71 ha	unknown	-swamp dominated by red oak and pin oak - contains 26.68ha of interior forest habitat	SWD-1 - oak mineral deciduous swamp	-large forest for protection -old growth forest provides woodland nesting areas for raptors	15 metres from Underground Collector Line	No – assumed significant and carried forward in EIS

Woodland Raptor Nesting Habitat #2 (Burnaby Bush)

This 59- hectare forest contains 17.68 hectares of interior habitat and may provide nesting habitat for woodland raptors. No stick nests were observed during site investigations.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Woodland Raptor Nesting Habitat #2 (Burnaby Bush)	59 ha	unknown	-deciduous swamp dominated by red maple with fresh moist soil - contains 17.68ha of interior forest habitat	SWD3-1 - red maple mineral deciduous swamp	-large forest for protection -mature forest provides woodland nesting areas for raptors	12metres from Underground Collector Line	No – assumed significant and carried forward in EIS

Woodland Area-sensitive Breeding Bird Habitat (Generalized Candidate Significant Wildlife Habitat)

Appendix Q of the SWHTG includes criteria for the identification of candidate interior forest area sensitive breeding bird habitats including: forest patches should consist of large blocks; patches should have at least 4 ha forest interior; sites should have contiguous canopy cover, and gaps should be < 20 m including roads and rights-of-way. Other considerations can include the overall area of site, age and tree composition of forest stand, amount of vertical stratification of site, degree of disturbance on site, amount of adjacent residential development, current representation of specialized habitat in planning area,

provision of significant wildlife habitat, and potential for long-term protection of the site (OMNR 2000).

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate woodland area sensitive breeding bird habitat is large (greater than 10 hectares) of mature forest stands (including ELC communities such as azoic, FOM, FOD, SWC, SWM, and SWD) within an interior forest at least 100m from the edge. During Site Investigations, 2 candidate sites (Emerson Roads Woods and Burnaby Bush) were identified within 120 metres of the project location. **See Figure 9.** Generalized candidate significant wildlife habitat will be treated as significant and discussed in the EIS.

According to Appendix Q of the Significant Wildlife Habitat Technical Guide (OMNR, 2000), sites supporting area-sensitive species are evaluated based on the presence of rare, uncommon or declining species, overall area of site, area of forest interior contained within the forest stand, age and tree composition of forest stand, amount of vertical stratification of site, amount of contiguous closed-canopy/open areas in forest stand, degree of disturbance on site, amount of adjacent residential development, current representation of specialized habitat in planning area, provision of significant wildlife habitat, and potential for long-term protection of the site.

Woodland Area-sensitive Breeding Bird Habitat #1 (Emerson Road Woods)

This 71- hectare forest contains 26.68 hectares of interior habitat and may provide nesting habitat for area-sensitive breeding birds.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Woodland Area-sensitive Breeding Bird Habitat #1 (Emerson Road Woods)	71 ha	unknown	-swamp dominated by red oak and pin oak - contains 26.68ha of interior forest habitat	SWD-1 - oak mineral deciduous swamp	-large, old growth forested area with abundance of interior forest required for breeding	15 metres from Underground Collector Line	No – assumed significant and carried forward in EIS

Woodland Area-sensitive Breeding Bird Habitat #2 (Burnaby Bush)

This 59- hectare forest contains 17.68 hectares of interior habitat and may provide nesting habitat for area-sensitive breeding birds.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Woodland Area-sensitive Breeding Bird Habitat #2 (Burnaby Bush)	59 ha	unknown	-deciduous swamp dominated by red maple with fresh moist soil - contains 17.68ha of interior forest habitat	SWD3-1 - red maple mineral deciduous swamp	-large, mature forested area with abundance of interior forest required for breeding	12metres from Underground Collector Line	No – assumed significant and carried forward in EIS

2.7 Results of Candidate Significant Wildlife (Mammal) Habitat Survey

Bat Hibernacula

According to the Bat and Bat Habitats: Guidelines for Wind Power Projects, SWHTG (OMNR, 2000) and Draft Ecoregion Criteria Schedule (OMNR 2011), candidate bat hibernacula are caves, abandoned mine shafts, underground foundations and these ecosites: CCR1, CCR2, CCA1 or CCA2. There were no suitable sites within 120 metres of the project location.

According to Appendix Q of the Significant Wildlife Habitat Technical Guide (OMNR, 2000), bat hibernacula are evaluated based on relative importance of the site, presence of species of conservation concern, species diversity, abundance, habitat quality, location of site and level of disturbance.

Bat Maternity Colonies

According to the Bat and Bat Habitats: Guidelines for Wind Power Projects candidate bat maternity colonies are found in mixed or deciduous forest with ≥ 10 snags/cavity trees per hectare of trees ≥ 25 cm dbh. The forests within 120 metres of the project location were surveyed for an abundance of snags and cavity trees and Burnaby Bush was identified as a candidate site. **See Figure 10.** It will be treated as significant and carried forward to the EIS. Pre-construction monitoring will be outlined in the EIS.

According to Bats and Bat Habitats: Guidelines for Wind Power Projects (OMNR, 2011), candidate bat maternity roosts are mixed or deciduous forests with ≥ 10 snags per hectare of trees ≥ 25 cm dbh.

Candidate Bat Maternity Colony (Burnaby Bush)

This 59-hectare deciduous swamp has abundant snags and cavity trees that make it suitable for a bat maternity colony site. The candidate site was investigated for bat activity (i.e. bat droppings below a hole, smell of ammonia near a hole, grease marks, urine stains or actual bats) during the day and at dusk (9:00pm) and bat activity was observed.

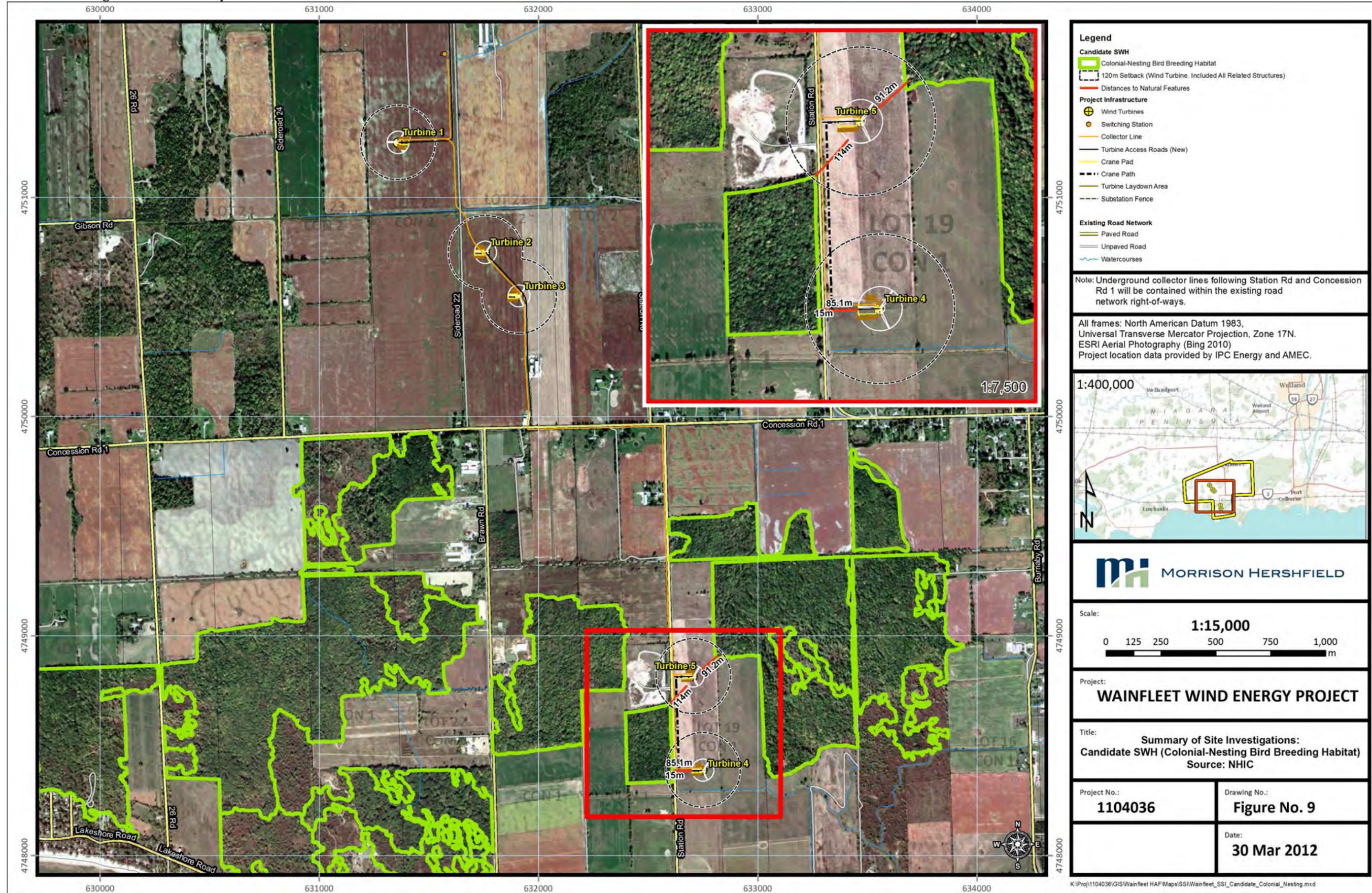
Natural Heritage Assessment Report

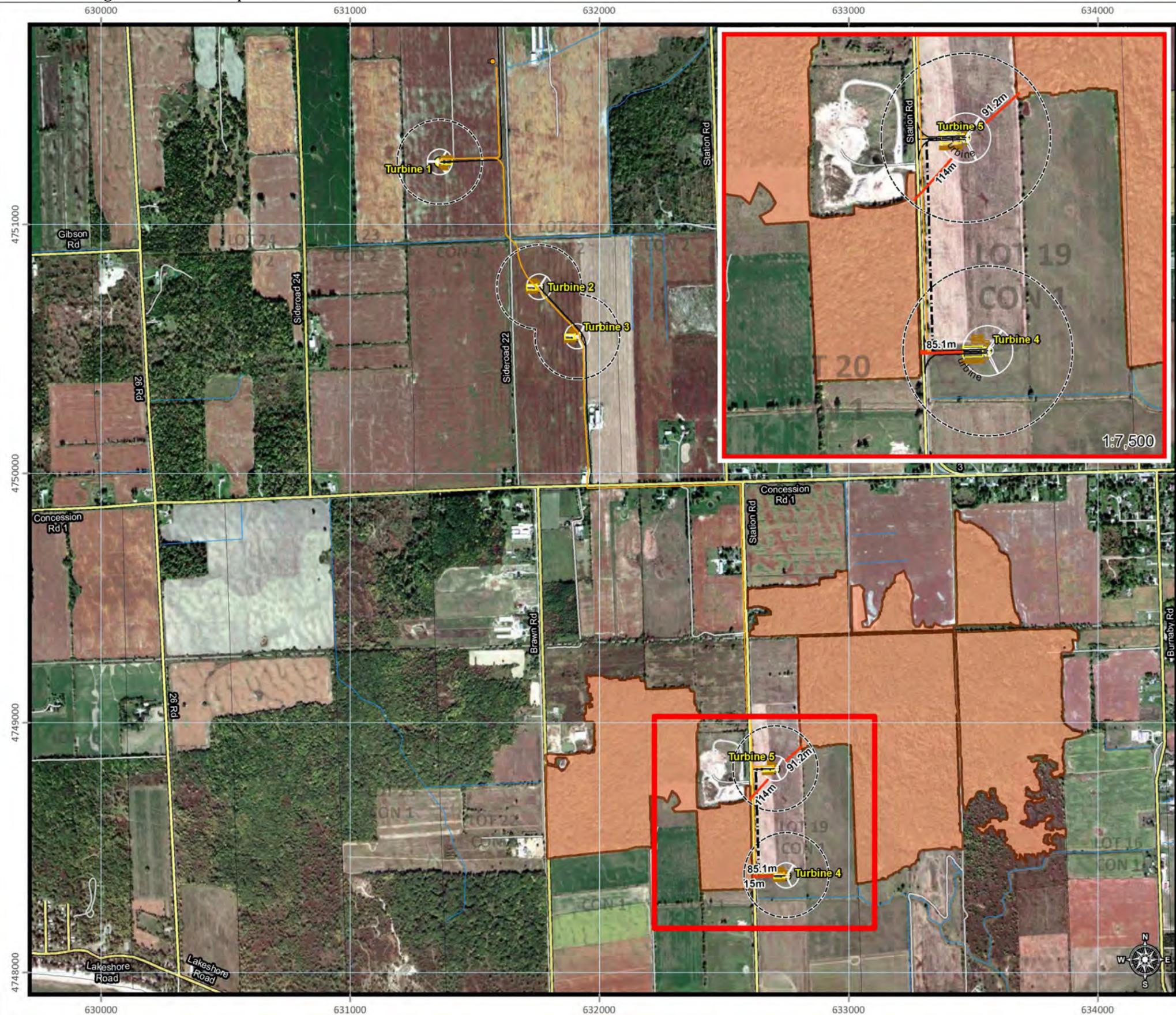
Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Bat Maternity Colony (Burnaby Bush)	59 ha	Unknown	-deciduous swamp dominated by red maple with fresh moist soil	SWD3-1 - red maple mineral deciduous swamp	-large forest for protection - abundance of snag and cavity trees suitable for bat maternity colony sites	91 metres from Turbine 5	No – assumed significant and carried forward to EIS (Pre-construction monitoring will be outlined in the EIS.)

Candidate Bat Maternity Colony (Emerson Road Woods)

This 7.3-hectare portion of Emerson Road Woods is a mid-aged deciduous swamp community dominated by Swamp Red Oak and Pin Oak in the canopy, green ash in the sub-canopy, pokeweed in the understory and touch-me-not in the groundcover. Evidence of forest management was observed within 100 metres of the forest edge, reducing the number of snags and cavity trees required for a candidate bat maternity colony site.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Bat Maternity Colony (Emerson Road Woods)	7.3 ha	unknown	-swamp dominated by red oak and pin oak	SWD-1 - oak mineral deciduous swamp	- very few snag and cavity trees	85 metres from Turbine 4	No – assumed significant and carried forward to EIS (Pre-construction monitoring will be outlined in the EIS.)





Legend

Candidate SWH

- Bat Maternity Colonies
- 120m Setbacks (Wind Turbine, Included All Related Structures)
- Distances to Natural Features

Project Infrastructure

- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.

1:400,000

MORRISON HERSHFIELD

Scale: **1:15,000**

0 125 250 500 750 1,000 m

Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Summary of Site Investigations: Candidate SWH (Bat Maternity Colonies)**

Project No.: 1104036	Drawing No.: Figure No. 10
Date: 30 Mar 2012	

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2.8 Results of Candidate Significant Wildlife (Herpetofauna) Habitat Survey

Turtle Wintering Areas

According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate turtle wintering areas are permanent water bodies, large wetlands, bogs and fens with adequate dissolved oxygen. There were no suitable sites within 120 metres of the project location.

Snake Hibernaculum

Some species of snakes overwinter in sizeable concentrations in sites known as hibernacula. These sites are often 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. Frequently hibernacula are found among broken rocks at the base of cliffs or in karst areas because these landforms provide an abundance of suitable subterranean crevices (OMNR 2000). According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate snake hibernaculum areas are rock piles slopes, stone fences and crumbling foundations. There were no suitable sites within 120 metres of the project location.

Special Concern & S1-S3 Species and Communities: Milksnake Habitat

Milksnakes are habitat generalists and are found in a variety of habitats: farmlands, meadows, hardwood or aspen stands, pine forest with brushy or woody cover, river bottoms or bog woods (OMNR, 2000a). During site investigations, there were no milksnakes, hibernacula or areas of critical habitat observed within 120 metres of the project location.

Special Concern & S1-S3 Species and Communities: Eastern Ribbonsnake

Eastern Ribbonsnakes are found in sunny, grassy areas with low dense vegetation near bodies of shallow, permanent, quiet water, in wet meadows, grassy marshes or sphagnum bogs, along borders of ponds, lakes or streams (OMNR, 2000a). During site investigations, there were no Eastern Ribbonsnakes, hibernacula or areas of critical habitat observed within 120 metres of the project location.

Special Concern & S1-S3 Species and Communities: Snapping Turtle

Snapping turtles are found in permanent or semi-permanent fresh water, marshes, swamps or bogs, rivers and streams with soft, muddy banks or bottoms. They often use soft soil or clean, dry sand on south-facing slopes for nest sites (OMNR 2000a). There were no suitable sites within 120 metres of the project location.

Animal Movement Corridors

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate amphibian movement corridors are those corridors between aquatic breeding habitat and terrestrial summer habitat of terrestrial salamanders and frogs as well as deer. During Site Investigation, 1 candidate animal movement corridors were observed within 120 metres of the project location: amphibian movement corridor. See Figure 11. This site will be evaluated for significance in the Evaluation of Significance Report.

According to Appendix Q of the Significant Wildlife Habitat Technical Guide (OMNR, 2000), animal movement corridors are evaluated based on importance of areas to be linked by corridor, importance of corridor to survival of target species, dimensions of corridor, continuity of corridor, habitat and habitat structure of corridor, species found in corridor or presumed to be using corridor, risk of mortality for species using corridor, opportunity for protection, and provision of other related values.

Amphibian Movement Corridor

This 3.9-hectare corridor is a permanent watercourse that flows through agricultural fields and connects Burnaby Bush and Lowbanks Backshore Wetland Complex across the road. It provides a potential amphibian movement corridor between these two habitats.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Animal Movement Corridor for Amphibians (Casey Drain)	3.9 ha	Unknown	-permanent watercourse flowing through agricultural fields; channelized by agricultural practices	-low sensitivity watercourse (channelized)	-watercourse provides a potential animal movement corridor for frogs and toads to the shores of Lake Erie and Lowbanks Backshore Wetland/Burnaby Bush	45.6metres from Turbine 4 and Access Road	No – assumed significant and carried forward to EIS

Turtle Nesting Habitat

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate turtle nesting areas are within MAM1-MAM6, SAS1, SAF1, SAM1, BOO1, FEO1 communities with sand or gravel adjacent to a marsh, lake or river. There were no suitable sites within 120 metres of the project location.

Amphibian Breeding Habitat (woodland + wetland)

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate amphibian breeding habitat within woodland communities require breeding pools within or adjacent (within 120 m) to a woodland community that is FOC, FOM, FOD, SWC, SWM, or SWD. During Site Investigations, 1 candidate site (Emerson Roads Woods) was identified within 120 metres of the project location. **See Figure 12.** This candidate amphibian breeding habitat area will be evaluated for significance in the Evaluation of Significance report.

According to Appendix Q of the Significant Wildlife Habitat Technical Guide (OMNR, 2000), woodlands supporting amphibian breeding ponds are evaluated based on provision of

Natural Heritage Assessment Report

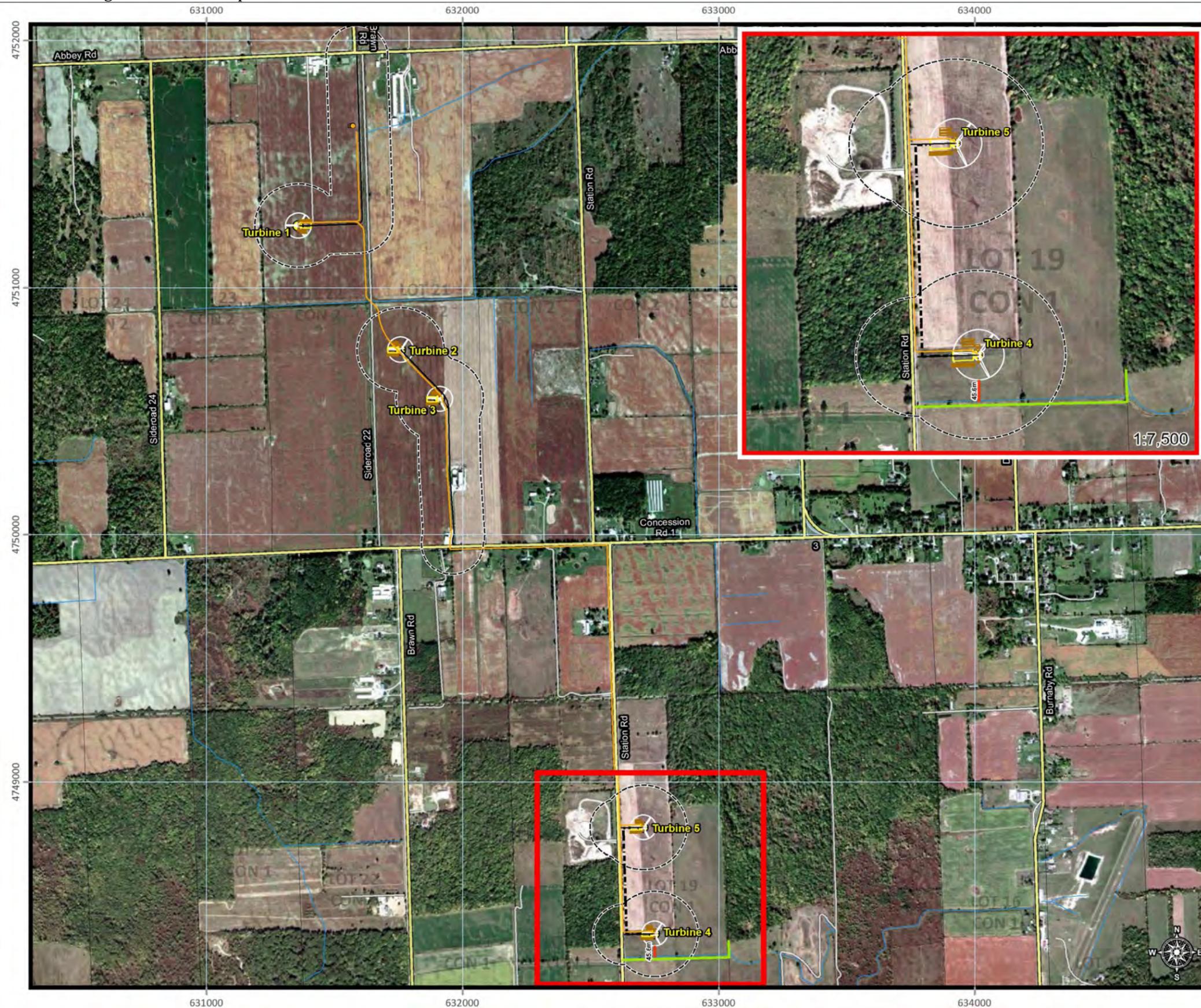
significant wildlife habitat, degree of permanence, species diversity of pond, presence of rare species, size and number of ponds, diversity of submergent and emergent vegetation, presence of shrubs and logs at edge of pond, adjacent forest habitat, water quality and level of disturbance.

Candidate Amphibian Breeding Habitat (Emerson Road Woods)

This 7.3-hectare candidate amphibian breeding habitat consists of the SWD1 community, the Oak Mineral Deciduous Swamp dominated by Swamp Red Oak and Pin Oak in the canopy, green ash in the sub-canopy, pokeweed in the understory and touch-me-not in the groundcover. It is part of Emerson Road Woods and Lowbanks Backshore Wetland Complex (AKA Emerson Road Woods Wetland) and provides potential habitat for amphibians.

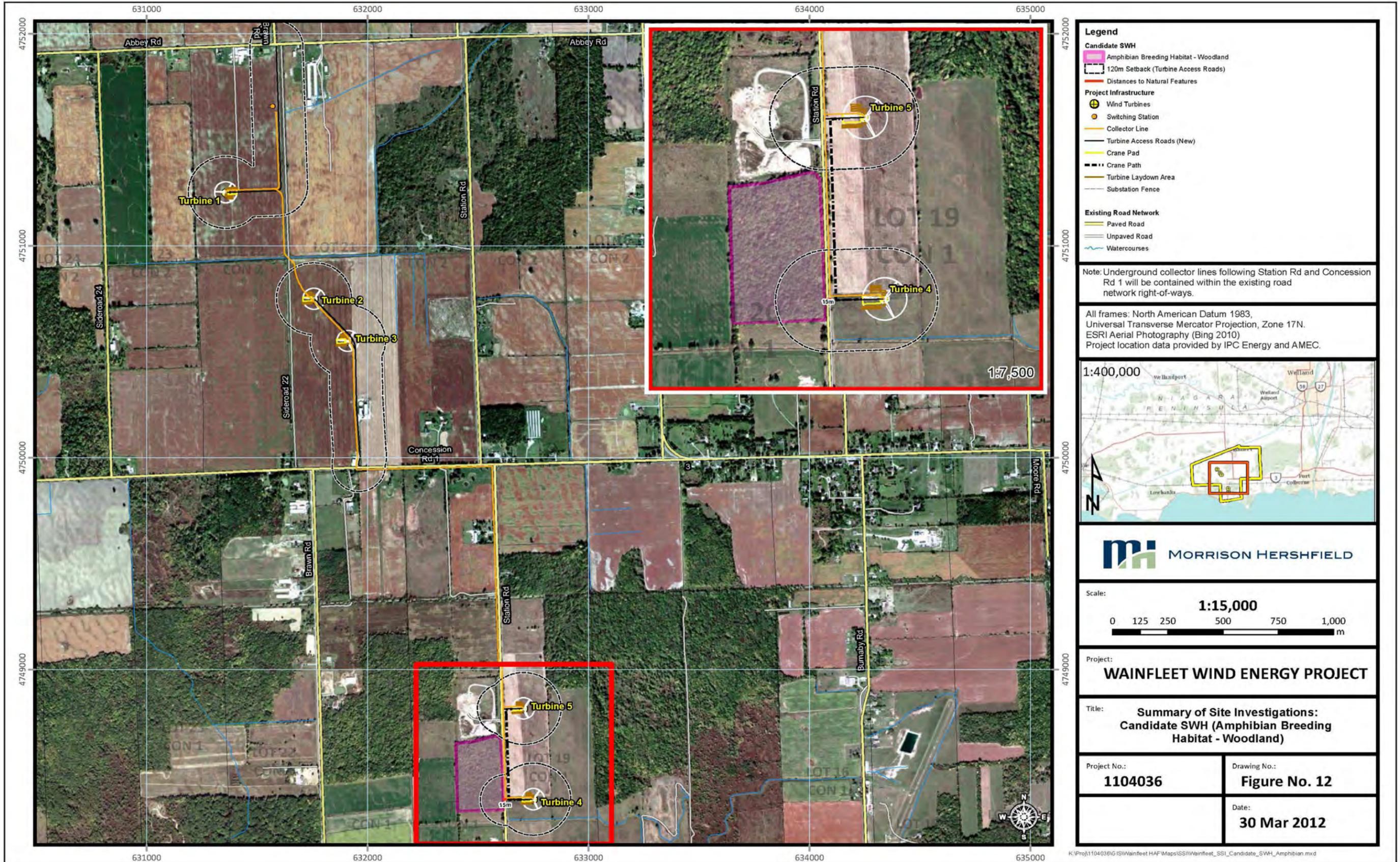
Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Amphibian Breeding Habitat (Emerson Road Woods)	7.3 ha	Unknown	-swamp dominated by swamp red oak and pin oak	SWD1 - oak mineral deciduous swamp -wood frog and spring peeper identified	-swamp provides potential breeding habitat for frogs and toads	15 metres from Turbine 4 Access Road	Yes

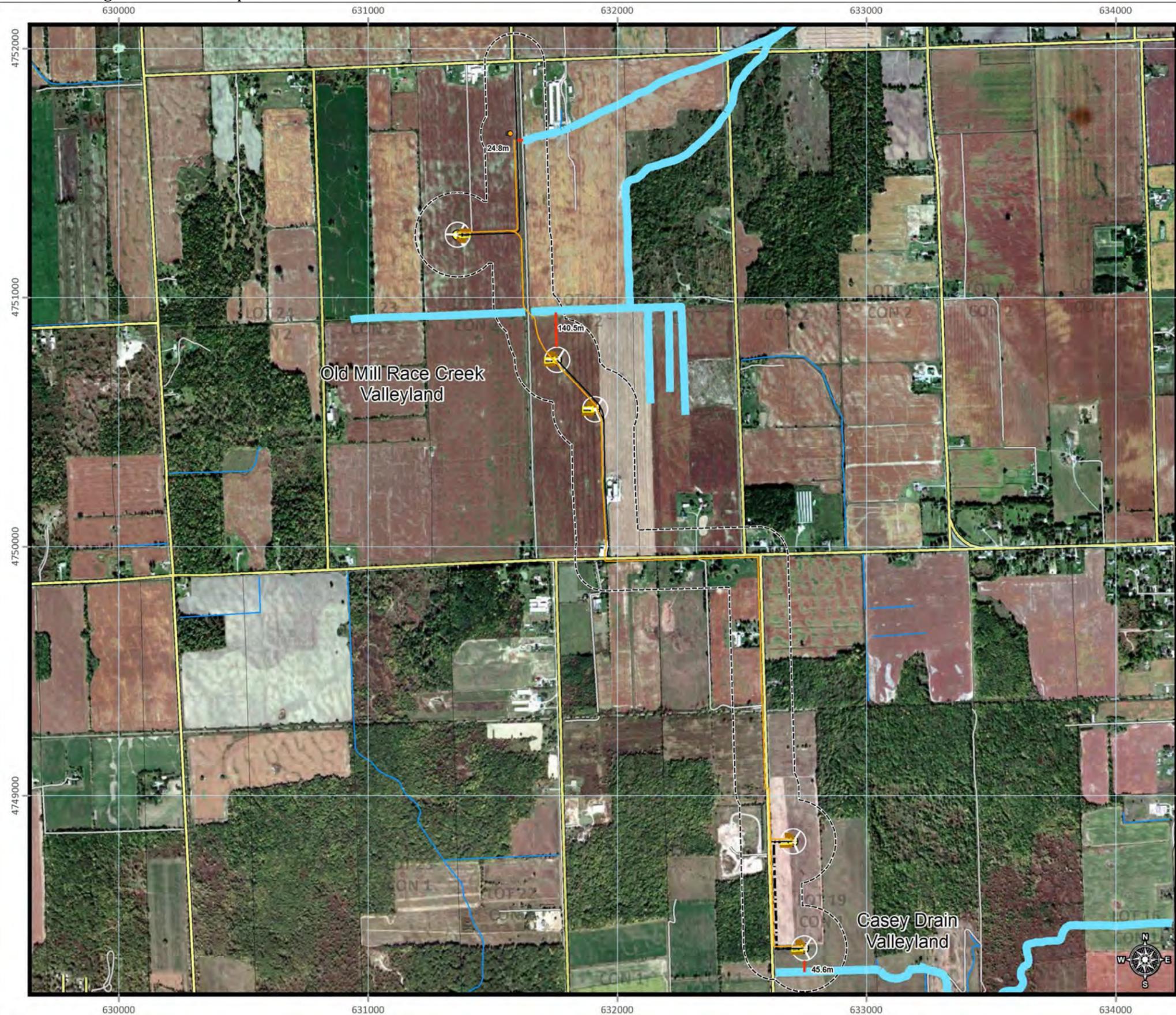
According to the Ecoregion Criteria Schedule (OMNR 2011), candidate amphibian breeding habitat within a wetland requires breeding pools within a MAM1 – MAM6, SAS1, SAM1, SAF1 or SWT1 community. There were no suitable sites within 120 metres of the project location.



<p>Legend</p> <p>Candidate SWH</p> <ul style="list-style-type: none"> Amphibian Movement Corridor 120m Setback (Turbine and Access Roads) Distances to Natural Features <p>Project Infrastructure</p> <ul style="list-style-type: none"> Wind Turbines Switching Station Collector Line Turbine Access Roads (New) Crane Pad Crane Path Turbine Laydown Area Substation Fence <p>Existing Road Network</p> <ul style="list-style-type: none"> Paved Road Unpaved Road Watercourses 	
<p>Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.</p>	
<p>All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.</p>	
<p>1:400,000</p>	
<p>MH MORRISON HERSHFIELD</p>	
<p>Scale: 1:15,000</p>	
<p>Project: WAINFLEET WIND ENERGY PROJECT</p>	
<p>Title: Summary of Site Investigations: Animal Movement Corridors</p>	
<p>Project No.: 1104036</p>	<p>Drawing No.: Figure No. 11</p>
<p>Date: 30 Mar 2012</p>	

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<p>Legend</p> <p>Candidate SWH</p> <ul style="list-style-type: none"> Valleylands 120m Setback (All Project Components) Distances to Natural Features <p>Project Infrastructure</p> <ul style="list-style-type: none"> Wind Turbines Switching Station Collector Line Turbine Access Roads (New) Crane Pad Crane Path Turbine Laydown Area Substation Fence <p>Existing Road Network</p> <ul style="list-style-type: none"> Paved Road Unpaved Road Watercourses 	
<p>Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.</p>	
<p>All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.</p>	
<p>1:400,000</p>	
<p>MORRISON HERSHFIELD</p>	
<p>Scale: 1:15,000</p>	
<p>Project: WAINFLEET WIND ENERGY PROJECT</p>	
<p>Title: Summary of Site Investigations: Valleylands</p>	
<p>Project No.: 1104036</p>	<p>Drawing No.: Figure No. 13</p>
<p>Date: 30 Mar 2012</p>	

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2.9 Results of Candidate Significant Wildlife (Insects & Molluscs) Habitat Survey

Migratory Butterfly Stopover Areas

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate migratory butterfly stopover areas are sites >10 hectares with a combination of field (CUM, CUT, CUS) and forest (FOC, FOM, FOD, CUP) within 5km of Lake Erie. There were no suitable sites within 120 metres of the project location.

Special Concern & S1-S3 Species and Communities: Monarch Butterfly

Monarch butterflies in Canada are found on abandoned farmland, along roadsides and other open spaces where milkweed and wildflowers grow (Environment Canada, 2011). Candidate breeding and feeding habitats for monarch include patches of grasslands including natural and cultural meadows where milkweed is present in high densities. There were no suitable sites within 120 metres of the project location.

Special Concern & S1-S3 Species and Communities: Cyrano Darner

Cyrano Darners are found on sheltered forest ponds, streams and lake covers (Abbott 2007). There were no suitable sites within 120 metres of the project location.

Special Concern & S1-S3 Species and Communities: Unicorn Clubtail

Unicorn Clubtail are found on semi-permanent ponds, lakes and slow areas of small streams with muddy bottoms (Abbott 2007). There were no suitable sites within 120 metres of the project location.

Terrestrial Crayfish (Generalized Candidate Significant Wildlife Habitat)

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate terrestrial crayfish habitat are MAM1 to MAM6 or MAS1 to MAS3 communities. There were no suitable sites within 120 metres of the project location.

2.10 Results of Valleylands/Seeps and Springs Survey

Two valleylands were identified within 120 metres of the project location during Site Investigations: Old Mill Race Creek valleyland and Casey Drain valleyland. **See Figure 13.** These 2 valleylands will be evaluated for significance in the Evaluation of Significance report.

Old Mill Race Creek Valleyland

This 5.8-hectare valleyland is a channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to downstream flows and has historically provided fish habitat. There is potential for this watercourse to provide habitat for sensitive species during certain times of the year.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Old Mill Race Creek Valleyland	5.8 ha	Unknown	-permanent watercourse flowing through agricultural fields; channelized by agricultural practices	-moderately sensitivity watercourse; potential presence of sensitive species during certain times of year (channelized) -historical records of fish species observed	-landform depression that has flowing water contributing to downstream flows	0 metres Underground collector lines are within feature	Yes

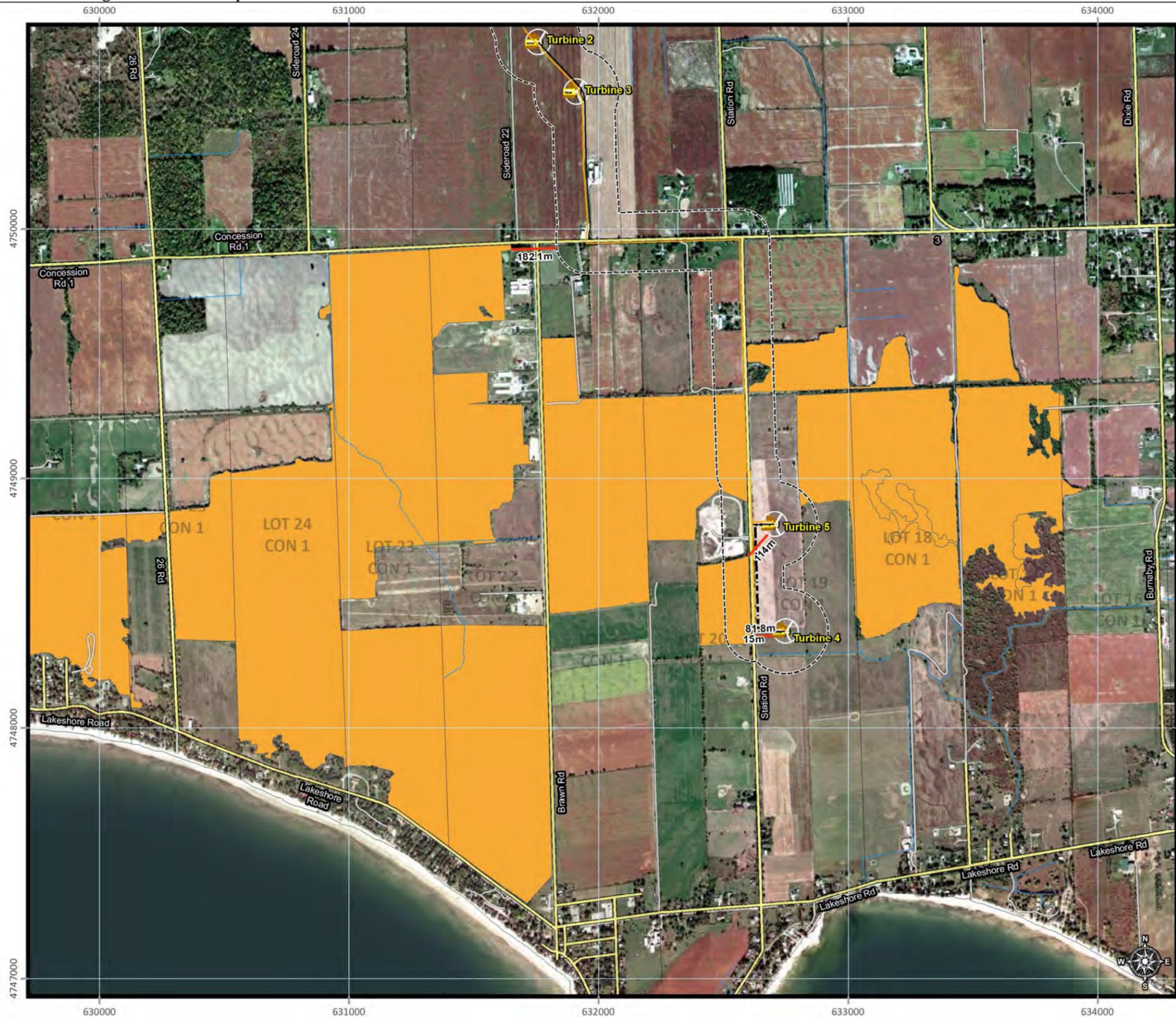
Casey Drain Valleyland

This 3.9-hectare valleyland is a channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Lake Erie and has historically provided fish habitat.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Casey Drain Valleyland	3.9 ha	Unknown	-permanent watercourse flowing through agricultural fields; channelized by agricultural practices	-low sensitivity watercourse (channelized) -historical records of fish species observed	-landform depression that has flowing water contributing to Lake Erie	45.6 metres from Turbine 4 and Access Road	Yes

Seeps and Springs (Generalized Candidate Significant Wildlife Habitat)

According to the Ecoregion Criteria Schedule (OMNR 2011), Candidate Seeps and springs can be found in any forested ecosite within the headwater areas of a stream or river system. No seeps or springs were identified within 120 metres of the project location during Site Investigations.



Legend

Candidate SWH

- Generalized Significant Wildlife Habitat
- 120m Setbacks (All Project Components)
- Distances to Natural Features

Project Infrastructure

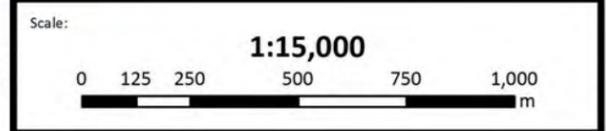
- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.



Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Summary of Records Review: Generalized Candidate Significant Wildlife Habitat**

Project No.: **1104036**

Drawing No.: **Figure No. 14**

Date: **30 Mar 2012**

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Table 3. Summary of Natural Features within the Project Location

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
Natural Features				
Area of Natural and Scientific Interest (Earth Science)	An area that has earth science values related to protection, scientific study or education (Ontario Ministry of the Environment 2011.)	No	No	N/A
Area of Natural and Scientific Interest (Life Science)	An area that has life science values related to protection, scientific study or education (Ontario Ministry of the Environment 2011.)	No	No	N/A
Coastal wetland	A wetland that is located, (a) on Lake Ontario, Lake Erie, Lake Huron, Lake Superior or Lake St. Clair, (b) on the St. Mary's, St. Clair, Detroit, Niagara or St. Lawrence River, or (c) subject to subsection (3), on a tributary to any water body mentioned in clause (a) or (b) and, either in whole or in part, downstream of a line located 2km upstream of the 1:100 year floodline of the water body (Ontario Ministry of the Environment 2011.)	No	No	N/A
Southern wetland	A wetland located south of the northern limit of Ecoregions 5E, 6E and 7E (Ontario Ministry of the Environment 2011.)	Yes – 1 southern wetland (Emerson Road Woods Provincially Significant Wetland) was identified during Records Review (Source: MNR, Niagara Region)	Confirmed.	This feature is being treated as provincially significant. It will be discussed in the EIS.
Valleyland	A natural area, (a) that is 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 (b) that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year (Ontario Ministry of the Environment 2011.)	No	Identified – 2 valleylands were identified during Site Investigations: Old Mill Race Creek valleyland and Casey Drain valleyland.	Casey Drain valleyland will be evaluated for significance and discussed in the Evaluation of Significance Report. Old Mill Race Creek valleyland will be treated as significant. Mitigation measures to minimize impacts to this feature will be outlined in the EIS.
Woodland	A treed area, woodland 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	Yes - 2 woodlands (Burnaby Bush and Emerson Road Woods) were identified during Records Review (Source: LIO, NHIC, Niagara Region).	Confirmed. One additional woodland was identified (FOD).	These features will be evaluated for significance. They will be discussed in the Evaluation of Significance Report.

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
	Statement issued under section 3 of the Planning Act and approved by the Lieutenant Governor in Council by Order in Council No. 140/2005 (Ontario Ministry of the Environment 2011.)			
Provincial Park	“Provincial park” means a provincial park within the meaning of the Provincial Parks and Conservation Reserves Act, 2006 (Ontario Ministry of the Environment 2011.)	No	No	N/A
Conservation Reserve	“Conservation reserve” means a conservation reserve within the meaning of the Provincial Parks and Conservation Reserves Act, 2006 (Ontario Ministry of the Environment 2011.)	No	No	N/A
Seasonal Concentration Areas for Wildlife Species Considered Candidate Significant Wildlife Habitat				
Waterfowl Stopover & Staging Area (terrestrial)	CUM1 or CUT1 community with evidence of annual spring flooding within these ecosites. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Waterfowl Stopover & Staging Area (aquatic)	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3, SAF1, SAM1, SAS1, SWD1 or SWD3 community with abundant food supply (aquatic invertebrates and vegetation in shallow water). (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Shorebird Migratory Stopover Area	BBO, BBO2, BBS1, BBS2, BBT1, BBT2, SDO1, SDS2, SDT1, MAM1, MAM2, MAM3, MAM4 or MAM5 community along a shoreline of a lake, river or wetland, usually muddy and unvegetated. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Raptor Wintering Area	Site >20ha with a combination of forest (FOC, FOD, FOM) and upland (CUM, CUT, CUS, CUW) community. (Ontario Ministry of Natural Resources 2011.)	No	Identified - 1 Candidate Raptor Wintering Area was identified during Site Investigations.	Yes
Bat Hibernacula	Caves, abandoned mine shafts, underground foundations, and these ecosites: CCR1, CCR2, CCA1 or CCA2. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Bat Maternity Colony	Mixed forest or Deciduous Forest with >10 snags/cavity trees per hectare of trees >25cm dbh (Ontario Ministry of Natural Resources 2011.)	No	Identified – 2Candidate Bat Maternity Colonies(Burnaby Bush and Emerson Road Woods) were identified during Site Investigations	These features will be treated as significant. A pre-construction monitoring plan will be outlined in the EIS.
Bat Migratory Stopover Area	Long Point is the only known stopover area (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Turtle Wintering Area	Permanent water bodies, large wetlands, and bogs or	No	No	N/A

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
	fens with adequate Dissolved Oxygen (Ontario Ministry of Natural Resources 2011.)			
Snake Hibernacula	Rock piles or slopes, stone fences and crumbling foundations. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Colonial Nesting Bird Breeding Habitat (bank & cliff)	CUM1, CUT1, CUS1, BLO1, BLS1, BLT1, CLO1, CLT1 or CLS1 community with exposed banks, undisturbed or naturally eroding for 10 years+. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Colonial-Nesting Bird Breeding Habitat (tree/shrub)	SWM2, SWM3, SWM, SWM6, SWD1, SWD2, SWD3, SWD4, SWD5, SWD6, SWD7 or FET1. (Ontario Ministry of Natural Resources 2011.)	Yes- 1 Candidate Colonial Nesting Bird Breeding Habitat (tree/shrub) was identified during Records Review (Lowbanks Backshore Wetland Complex AKA Emerson Road Woods Wetland). (Source: NHIC)	Eliminated. Site Investigations were conducted and there were no active colonial bird nests observed. This site was eliminated as a Candidate site.	N/A
Colonial-Nesting Bird Breeding Habitat (ground)	Any rocky island or peninsula within a lake or large river (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Migratory Butterfly Stopover Area	Site >10 ha with a combination of field (CUM, CUT, CUS) and forest (FOC, FOM, FOD, CUP) within 5km of Lake Erie. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Landbird Migratory Stopover Area	Woodlands (FOC, FOM, FOD, SWC, SWM, SWD) >5ha in size within 5km of Lake Ontario or Lake Erie (Ontario Ministry of Natural Resources 2011)	No	Identified- 2 Candidate Landbird Migratory Stopover Areas (Emerson Road Woods and Burnaby Bush) were identified during Site Investigations.	These features will be treated as significant. A pre-construction monitoring plan will be outlined in the EIS.
Bald Eagle Winter Feeding and Roosting Areas	Large continuous areas of mixed or deciduous woods with large trees and snags around the shores of large rivers or lakes (Ontario Ministry of Natural Resources 2000).	No	No	N/A
Rare Vegetation Communities Considered Candidate Significant Wildlife Habitat				
Cliffs and Talus Slopes	CLO1, CLS1, CLS2, CLT1, CLT2, TAO1, TAO2, TAS1, TAT1, TAT2 (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Sand Barren	SBO1, SBS1, SBT1 with tree cover < 60% (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Alvar	ALO1, ALS1, ALT1 > 0.5ha with 3 or more Alvar indicator species and not dominated by exotic or	No	No	N/A

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
	introduced species (Ontario Ministry of Natural Resources 2011.)			
Old-growth Forest	FOD, FOC, FOM that is undisturbed, structurally complex and contain a wide variety of trees and shrubs in various age classes (Ontario Ministry of Natural Resources 2011.)	Yes- 1 Candidate Old-growth Forest (Emerson Road Woods) was identified during Records Review (Source: Niagara Peninsula Conservation Authority)	Confirmed.	This feature will be evaluated for significance. It will be discussed in the Evaluation of Significance Report.
Savannah	TPS1, TPS2 with 25%<tree cover<35% or TPW1, TPW2 with 35%<tree cover<60% (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Tallgrass Prairie	TPO1, TPO2 with <25% tree cover (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Other Rare Vegetation Communities	Provincially rare S1, S2, S3 vegetation communities as listed in Appendix M of the SWHTG (Ontario Ministry of Natural Resources 2011). Rare vegetation communities are also outlined in the Niagara Peninsula Conservation Authority's Natural Areas Inventory (Niagara Peninsula Conservation Authority 2009).	No	Identified -1 site (a portion of Emerson Road Woods) was classified as SWD1 (a provincially rare vegetation community) during Site Investigations	This feature will be evaluated for significance. It will be discussed in the Evaluation of Significance Report.
Specialized Wildlife Habitats Considered Candidate Significant Wildlife Habitat				
Waterfowl Nesting Areas	Large (120m wide) upland habitats located adjacent to a wetland community (MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4) (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Bald Eagle and Osprey Nesting, Foraging, Perching Habitat	Forest community directly adjacent to riparian areas (rivers, lakes, ponds, wetlands). (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Turtle Nesting Areas	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAF1, SAM1, BOO1 or FEO1 community with sand or gravel adjacent to marsh, lake or river. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Amphibian Breeding Habitat (woodland)	Breeding pools within or adjacent (within 120m) to a woodland (FOC, FOM, FOD, SWC, SWM or SWD community) (Ontario Ministry of Natural Resources 2011.)	No	Identified- 1 Candidate Amphibian Breeding Habitat (Emerson Road Woods) was identified during Site Investigations	This feature will be evaluated for significance. It will be discussed in the Evaluation of Significance Report.
Amphibian Breeding Habitat (wetland)	Breeding pools within MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1 or SWT1 community. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
Habitats of Species of Conservation Concern Considered Candidate Significant Wildlife Habitat				
Marsh Breeding Bird Habitat	Wetland habitat (MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAF1, SAM1, FEO1, BOO1) with shallow water and emergent vegetation (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Open Country Bird Breeding Habitat	Large (>30ha) grasslands (CUM1) not actively being used for farming (i.e. in the last 5 years). (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Shrub/Early Successional Breeding Bird Habitat	Large (>10ha), older fields or shrub thickets (CUT1, CUS1) not actively being used for farming (i.e. in the last 5 years). (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Special Concern & S1-S3 Species and Communities: Milksnake	Farmlands, meadows, hardwood or aspen stands; pine forest with brushy or woody cover; river bottoms or bog woods; hides under logs, stones, or boards or in outbuildings; often uses communal nest sites (Ontario Ministry of Natural Resources 2000a.)	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and Communities: Eastern Ribbonsnake	Sunny grassy areas with low dense vegetation near bodies of shallow permanent quiet water; wet meadows, grassy marshes or sphagnum bogs; borders of ponds, lakes or streams; hibernates in groups (Ontario Ministry of Natural Resources 2000a.)	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and Communities: Snapping Turtle	Permanent, semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddy banks or bottoms; often uses soft soil or clean dry sand on south-facing slopes for nest sites; may nest at some distance from water; often hibernate together in groups in mud under water; home range size ~28 ha (Ontario Ministry of Natural Resources 2000a.)	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and Communities: Red-headed Woodpecker	Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlands or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory (Ontario Ministry of Natural Resources 2000a.)	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3	Grasslands, open areas or meadows that are grassy or	Yes- this species was identified during	Eliminated.	N/A

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
Species and Communities: Short-eared Owl	bushy; marshes, bogs or tundra; both diurnal and nocturnal habits; ground nester; destruction of wetlands by drainage for agriculture is an important factor in the decline of this species; home range 25 - 125 ha; requires 75-100 ha of contiguous open habitat (Ontario Ministry of Natural Resources 2000a.)	Records Review in MNR's list of potential S1-S3 species in the area		
Special Concern & S1-S3 Species and Communities: Yellow-breasted Chat	Thickets, tall tangles of shrubbery beside streams, ponds; overgrown bushy clearings with deciduous thickets; nests above ground in bush, vines etc. (Ontario Ministry of Natural Resources 2000a.)	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and Communities: Hooded Warbler	This species as an area-sensitive species. (Ontario Ministry of Natural Resources 2000b). See page 8 for a discussion of Woodland Area-sensitive Breeding Bird Habitat.	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Confirmed. This species is an area-sensitive species (Ontario Ministry of Natural Resources 2000b). 2 Candidate Woodland Area-sensitive Breeding Bird Habitat (Emerson Roads Woods and Burnaby Bush) were identified during Site Investigations	These features will be treated as significant. Generalized Candidate Significant Wildlife Habitat will be discussed in the EIS.
Special Concern & S1-S3 Species and Communities: Monarch Butterfly	Monarchs in Canada exist primarily wherever milkweed (Asclepius) and wildflowers (such as Goldenrod, asters, and Purple Loosestrife) exist. This includes abandoned farmland, along roadsides, and other open spaces where these plants grow. (Environment Canada 2011).	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and Communities: Cyrano Darner	Sheltered forest ponds, streams and lake coves (Abbott 2007).	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and Communities: Unicorn Clubtail	Semi-permanent ponds, lakes and slow areas of small streams with muddy bottoms (Abbott 2007).	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Animal Movement Corridors Considered Candidate Significant Wildlife Habitat				
Amphibian Movement Corridors	Movement corridors between breeding habitat and summer habitat (Ministry of Natural Resources 2011).	No	Identified. 1 Candidate Animal movement corridor was identified during Site Investigations.	This feature will be evaluated for significance. It will be discussed in the Evaluation of Significance Report.
Generalized Candidate Significant Wildlife Habitat				
Woodland Raptor Nesting Habitat	Intermediate-aged to mature woodlands or conifer plantations (FOC, FOM, FOD, SWC, SWM, SWD, CUP3).	No	Identified- 2 Candidate Woodland Raptor Nesting Habitat (Emerson Roads Woods and Burnaby Bush) were identified during	These features will be treated as significant. Generalized Candidate Significant Wildlife Habitat will be

Natural Heritage Assessment Report

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
	(Ontario Ministry of Natural Resources 2011.)		Site Investigations.	discussed in the EIS.
Seeps and Springs	Any forested ecosite within the headwater areas of a stream or river system. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Woodland Area-sensitive Breeding Bird Habitat	Large (>10ha), mature (>60 years old) forest stands (FOC, FOM, FOD, SWC, SWM, SWD) with interior forest (at least 100m from the edge) where interior forest birds are breeding. (Ontario Ministry of Natural Resources 2011.)	No	Identified – 2 Candidate Woodland Area-sensitive Breeding Bird Habitat (Emerson Roads Woods and Burnaby Bush) were identified during Site Investigations	These features will be treated as significant. Generalized Candidate Significant Wildlife Habitat will be discussed in the EIS.

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APPENDIX A
Field Notes

IPC Turbine Number & Location:	Environmental Feature	Dist.(m) to Turbine	GPS Co-ord of Feature
WAINFLEET #1	Groundwater Evidence (120m)		
Date: APRIL 28 / 10	<input type="checkbox"/> Watercress		
Time: 11:20 AM	<input type="checkbox"/> Iron Staining		
GPS Co-ordinates:	<input type="checkbox"/> Seepage		
Comments:	<input type="checkbox"/> Forest Stand (30m)		
	<input type="checkbox"/> Waterway (30m)		
<p>#1 - Waterway is 270m from turbine</p> <p>#2 Shrubs + some trees along drainage ditch some H₂O in ditch. 17T 0631224 4751172</p> <p>#3 Watercourse crosses the rd. - GPS + photo's taken for Turbine #3 (north of Turb. #3)</p>	Radius of Detailed Site Survey: <input type="checkbox"/> 200m <input type="checkbox"/> 300m <input type="checkbox"/> 350m		
	Detailed Map of Environmental Fetures:		

GPS Co-ords from #3 (N. of turbine)

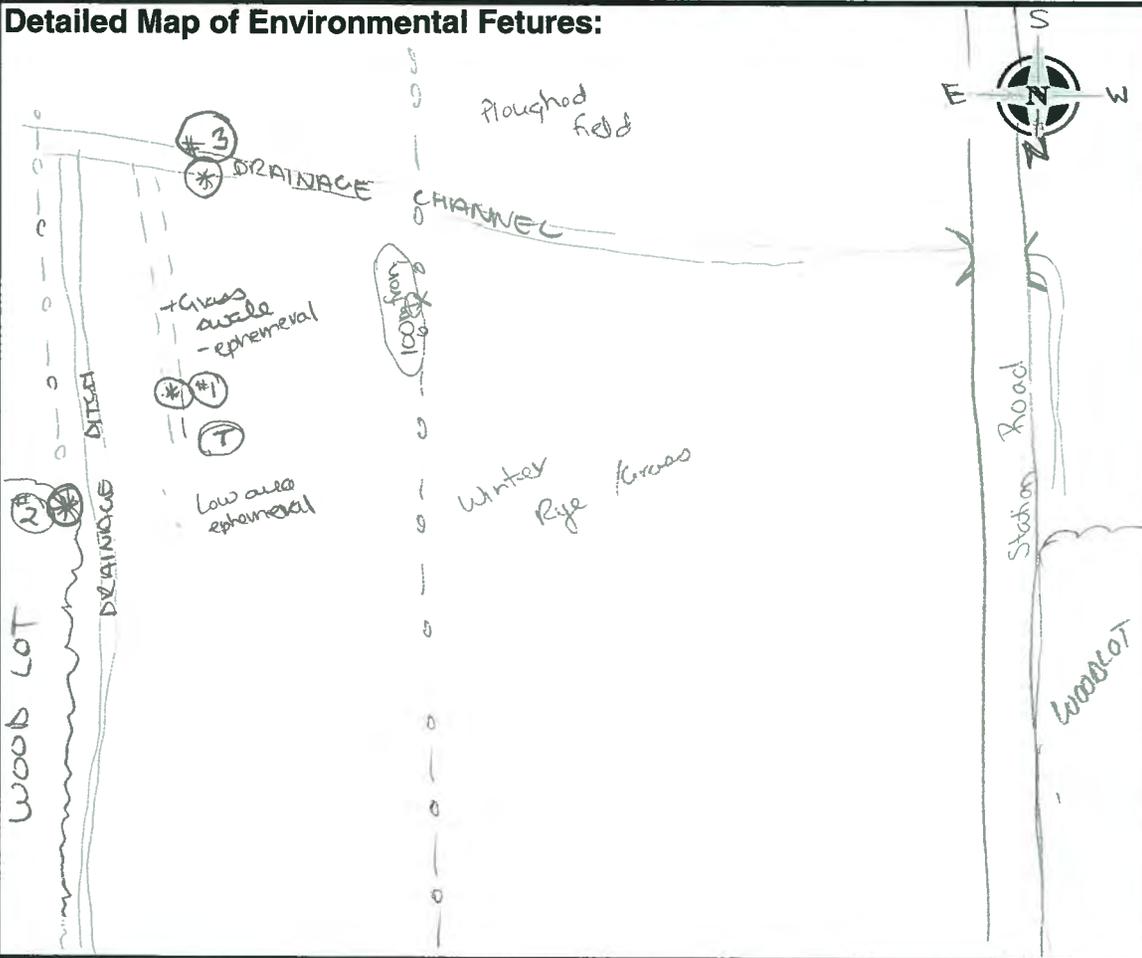
IPC Turbine Number & Location:	Environmental Feature	Dist.(m) to Turbine	GPS Co-ord of Feature
WAINFLEET #2i*3	Groundwater Evidence (120m)		
Date: APRIL 28 /10	<input type="checkbox"/> Watercress		
Time: 11:00 AM	<input type="checkbox"/> Iron Staining		
GPS Co-ordinates:	<input type="checkbox"/> Seepage		
Comments: <i>cattails lined (south) Hill 11.0/mic flow</i> ① watercourse flows parallel to side Rd 22. - 1100 present little riparian community - high influence of agricultural activity. agricultural swale ② side Rd 22 - not accessible common traffic - farm use 118m from proposed site IRT 0631646 4750665 ③ testing site (standing) ④ IRT 0631639 4750943 cross section of water side Rd. 22 + watercourse meets approx. 351m from site ④ watercourse flowing - channelized 2m width - grasses + cattails lined. silt substrate in algae Recommendations - also move east + north + south	<input type="checkbox"/> Forest Stand (30m)		
	<input type="checkbox"/> Waterway (30m)		
	Radius of Detailed Site Survey: <input type="checkbox"/> 200m <input type="checkbox"/> 300m <input type="checkbox"/> 350m		
	Detailed Map of Environmental Features:		

Core. #1

IPC Turbine Number & Location:	Environmental Feature	Dist.(m) to Turbine	GPS Co-ord of Feature
WAINFLEET #5	Groundwater Evidence (120m)		
Date: APRIL 28/10	<input type="checkbox"/> Watercress		
Time: 1:00 pm	<input type="checkbox"/> Iron Staining		
GPS Co-ordinates:	<input type="checkbox"/> Seepage		
Comments: SD.RD. #20 is 170m from the turbine	<input type="checkbox"/> Forest Stand (30m)		
	<input type="checkbox"/> Waterway (30m)		
#1 - Woodlot NE of turbine 187m. from turbine loc'n. FFT 0632816 4748890	Radius of Detailed Site Survey: <input type="checkbox"/> 200m <input type="checkbox"/> 300m <input type="checkbox"/> 350m		
	Detailed Map of Environmental Fetures:		
#2 Field is quite wet - many low lying areas - drainage swale from pond			

IPC Turbine Number & Location:	Environmental Feature	Dist.(m) to Turbine	GPS Co-ord of Feature
WAINFLEET #4	Groundwater Evidence (120m)		
Date: APRIL 28/10	<input type="checkbox"/> Watercress		
Time: 1:20 PM	<input type="checkbox"/> Iron Staining		
GPS Co-ordinates:	<input type="checkbox"/> Seepage		
	<input type="checkbox"/> Forest Stand (30m)		
Comments:			
Rd. is 310m from Turbine #1	<input type="checkbox"/> Waterway (30m)		
#1 - GPS Cord. of grass swale			
11m S. of (T)			
17T 0632939			
4748355			
#2 - Edge of woodlot			
closest to turbine 105m.			
17T 0633031			
4748369			
#3 Drainage channel E/W			
closest is 80m			
GPS 17T 0632991			
4748296			

Radius of Detailed Site Survey: 200m 300m 350m



ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: WAINFLEET		POLYGON: SWD-1	
	SURVEYOR(S): BH		DATE: July 28/10	TIME: start _____ finish _____
	UTMZ:	UTMZ:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input type="checkbox"/> TERRESTRIAL <input checked="" type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL. UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input checked="" type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE			COVER		
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK			<input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input checked="" type="checkbox"/> TREED		

STAND DESCRIPTION

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	1	4	Swamp Red Oak = Pin Oak > Red Maple > W Elm
2 SUB-CANOPY			Green Ash > Black Cherry > Willow > Beech
3 UNDERSTOREY			Pokeweed > Poison Ivy > Raspberry
4 GRD. LAYER			Touch Me Not > Poison Ivy > Vine > Garlic Mustard

HT CODES: 1 => 25 m 2 = 10 < HT < 25 m 3 = 2 < HT < 10 m 4 = 1 < HT < 2 m 5 = 0.5 < HT < 1 m 6 = 0.2 < HT < 0.5 m 7 = HT < 0.2 m
 CVR CODES 0 = NONE 1 = 0% < CVR < 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:	BA:
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SIZE CLASS ANALYSIS:	R	< 10	O	10 - 24	A	25 - 50	N	> 50
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STANDING SNAGS:	A	< 10	R	10 - 24	R	25 - 50	N	> 50
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DEADFALL / LOGS:	A	< 10	R	10 - 24	N	25 - 50	N	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE:	PIONEER	YOUNG	(MID-AGE)	MATURE	OLD GROWTH
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SOIL ANALYSIS:

TEXTURE: Heavy clay	DEPTH TO MOTTLES / GLEY	g = 40	G =
MOISTURE: Wet Moist	DEPTH OF ORGANICS: 14	(cm)	
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: > 150 cm	(cm)	

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	Swamp	SW
COMMUNITY SERIES:	Deciduous Swamp	SWD
ECOSITE:	Oak Mineral Deciduous Swamp	SWD-1
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes:

ELC PLANT SPECIES LIST	SITE: WAIN FLEET
	POLYGON: SWD-1
	DATE: July 28/10
	SURVEYOR(S): BH

LAYERS: 1= CANOPY 2= SUB-CANOPY 3= UNDERSTOREY 4= GROUND (GRD.) LAYER
 ABUNDANCE CODES: R= RARE O= OCCASIONAL A= ABUNDANT D= DOMINANT

SPECIES CODE	LAYER				COL.
	1	2	3	4	
Burr Oak	O				
Swamp W. Oak	A				
Pin Oak	A				
Green Ash	O	A			
Shagbark Hickory	R				
Red Maple	A				
White Elm	A				
Black Oak	A				
Red Oak	A				
Freeman Maple	R	R			
Sugar Maple	O				
Basswood	R				
Poplar	R				
Willow		R	R		
W. Birch	O				
American Beech	R	R			
Spicebush			A		
Common Buckthorn			O		
Bitternut Hickory	R				
Poison Ivy			A	A	
Black cherry	R	R			
Canada Anemone			R		
Jack in the pulpit			R		
Blue Beech		R			
Spotted Touch Me Not			A		
Wood Fern			R		
Red Raspberry			A		
Multi-flora Rose			R		
Wild Currant			R		

SPECIES CODE	LAYER				COL.
	1	2	3	4	
Wild Leek				R	
Violet				A	
Garlic Mustard				A	
Large Leaved Aster				R	
Moss				D	
Aborted Buttercup				R	
Badder Sedge				R	
Sensitive Fern				A	
Black Ash	O	R	O		
Red currant			R		
Hog Peanut				O	
May apple				R	
Wool Grass				R	
Serviceberry			R		
Christmas Fern				R	
Wood Strawberry				A	
Poison Parsnip				O	
Black Snakeroot				R	
Tall Enchanters Nightshade				A	
Pokeweed			A		
Rough Goldenrod				A	
Heal All				R	
Japanese Barberry				R	
Tartarian Honeysuckle				R	
Tall Agrimony				O	
Pennsylvania Sedge				A	
Fowl Manna Grass				A	
Elecampagne				R	
Wood Nettle				O	
Rice Cut Grass				R	
False Solomon's Seal				R	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>WAINFLEET</u>		POLYGON: <u>FOD</u>	
	SURVEYOR(S): <u>BH</u>	DATE: <u>July 28/10</u>	TIME: start	finish
	UTMZ:	UTMZ:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input checked="" type="checkbox"/> TERRESTRIAL <input type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL COVER <input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input checked="" type="checkbox"/> TREED	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input checked="" type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE					
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input checked="" type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK					

STAND DESCRIPTION

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	1	4	Green Ash = Basswood > Red Oak = W Elm
2 SUB-CANOPY			Green Ash = W Elm < Chokecherry > A. Beech
3 UNDERSTOREY			Green Ash > Mountain Holly > Ironwood > Wild hazel
4 GRD. LAYER			Poison Ivy > Thicket Creeper > Jewelweed > Senec. Fern

HT CODES: 1 = >25m 2 = 10<HT<25m 3 = 2<HT<10m 4 = 1<HT<2m 5 = 0.5<HT<1m 6 = 0.2<HT<0.5m 7 = HT<0.2m

CVR CODES 0 = NONE 1 = 0% < CVR < 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:	BA:
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SIZE CLASS ANALYSIS:	O	< 10	A	10 - 24	A	25 - 50	N	> 50
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STANDING SNAGS:	R	< 10	R	10 - 24	N	25 - 50	N	> 50
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DEADFALL / LOGS:	A	< 10	R	10 - 24	N	25 - 50	N	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE:	PIONEER	<u>YOUNG</u>	MID-AGE	MATURE	OLD GROWTH
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SOIL ANALYSIS

TEXTURE: <u>Loam over clay</u>	DEPTH TO MOTTLES / GLEY	g = <u>50</u>	G = <u>NA</u>
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MOISTURE: <u>Fresh Moist</u>	DEPTH OF ORGANICS: <u>3</u>	(cm)
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HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: <u>2150 cm</u>	(cm)
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COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	<u>FOREST</u>	<u>FO</u>
COMMUNITY SERIES:	<u>Deciduous Forest</u>	<u>FOD</u>
ECOSITE:		
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes:

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: WAINFLEET		POLYGON: SWD 3-1	
	SURVEYOR(S): BH		DATE: July 28/10	TIME: start finish
	UTMZ:	UTMZ:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input type="checkbox"/> TERRESTRIAL <input checked="" type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN <input type="checkbox"/> ACIDIC BEDRK <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL. UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input checked="" type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE		COVER			
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input checked="" type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK		<input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input checked="" type="checkbox"/> TREE			

STAND DESCRIPTION

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	1	4	Red Maple = Swamp Red Oak > Swamp White Oak > Freeman Maple
2 SUB-CANOPY			Yellow Birch = Blue Birch = Black Ash
3 UNDERSTOREY			Spice bush & Corn on Elderberry > Tartarian Honeyuckle
4 GRD. LAYER			Spotted Jewelweed > Wood Strawberry

HT CODES: 1 = >25 m 2 = 10 < HT < 25 m 3 = 2 < HT < 10 m 4 = 1 < HT < 2 m 5 = 0.5 < HT < 1 m 6 = 0.2 < HT < 0.5 m 7 = HT < 0.2 m
 CVR CODES 0 = NONE 1 = 0% < CVR < 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:	BA:
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SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	A	25 - 50	R	> 50
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STANDING SNAGS:	O	< 10	O	10 - 24	R	25 - 50	N	> 50
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DEADFALL / LOGS:	R	< 10	O	10 - 24	R	25 - 50	N	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE:	PIONEER	YOUNG	(MID-AGE)	MATURE	OLD GROWTH
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SOIL ANALYSIS

TEXTURE: heavy clay	DEPTH TO MOTTLES / GLEY	g = 40	G = N/A
MOISTURE: Fresh Moist	DEPTH OF ORGANICS:	1 cm	(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:	> 150 cm	(cm)

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	Swamp	SW
COMMUNITY SERIES:	Deciduous Swamp	SWD
ECOSITE:	Maple Mineral Deciduous Swamp	SWD3
VEGETATION TYPE:	Red Maple Mineral Deciduous Swamp	SWD3-1
INCLUSION		
COMPLEX		

Notes:

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: WAINFLEET	POLYGON: CUM1	
	SURVEYOR(S): BH	DATE: July 28/10	TIME: start _____ finish _____
	UTMZ: _____	UTMZ: _____	UTMN: _____

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input checked="" type="checkbox"/> TERRESTRIAL <input type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN <input type="checkbox"/> ACIDIC BEDRK <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input type="checkbox"/> NATURAL <input checked="" type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input checked="" type="checkbox"/> GRAMINOID <input checked="" type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input checked="" type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE			COVER		
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input checked="" type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK			<input checked="" type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input type="checkbox"/> TREE		

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	4	2	Smooth Bromc = Canada Goldenrod
2 SUB-CANOPY	5	4	Spotted St. John's Wort > Bird's Foot Trefoil > NE Aster
3 UNDERSTOREY	6	3	Black Medic > Dandelion = Cow Vetch = W. Clover
4 GRD. LAYER	7	2	Common Strawberry > Bull Thistle

HT CODES: 1 = >25m 2 = 10 < HT < 25m 3 = 2 < HT < 10m 4 = 1 < HT < 2m 5 = 0.5 < HT < 1m 6 = 0.2 < HT < 0.5m 7 = HT < 0.2m
 CVR CODES 0 = NONE 1 = 0% < CVR < 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:	BA:
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SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50
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STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50
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DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH
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SOIL ANALYSIS:

TEXTURE: heavy clay	DEPTH TO MOTTLES / GLEY: g = 40	G = N/A
MOISTURE: Fresh Moist	DEPTH OF ORGANICS: 1 cm	(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: > 150 cm	(cm)

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS:	CULTURAL	ELC CODE
COMMUNITY SERIES:	Cultural Meadow	CUM
ECOSITE:		
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes:

- * Community revisited September 22, 2011
- Characteristics consistent with original findings
- Community extends further north than what was originally found/mapped.
- Boundary adjusted.
- Survey completed by EM w/ assist from SG.

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>WAINFLEET</u>		POLYGON: <u>CUH</u>	
	SURVEYOR(S): <u>BH</u>		DATE: <u>July 28/10</u>	TIME: start finish
	UTMZ:	UTMZ:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input checked="" type="checkbox"/> TERRESTRIAL <input type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL. UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input type="checkbox"/> NATURAL <input checked="" type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE <input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input checked="" type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK			COVER <input type="checkbox"/> OPEN <input checked="" type="checkbox"/> SHRUB <input checked="" type="checkbox"/> TREED		

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	2	2	Silver Maple
2 SUB-CANOPY			Common Buckthorn > N. Maple = F. Maple > chokecherry
3 UNDERSTOREY			Red Raspberry > climbing Poison Ivy > Amer. Elm
4 GRD. LAYER			strawberry > garlic mustard > Bluegrass

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES 0 = NONE 1 = 0% < CVR < 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION:	BA:
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SIZE CLASS ANALYSIS:	0	< 10	A	10 - 24	N	25 - 50	N	> 50
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STANDING SNAGS:	N	< 10	N	10 - 24	N	25 - 50	N	> 50
-----------------	---	------	---	---------	---	---------	---	------

DEADFALL / LOGS:	N	< 10	N	10 - 24	N	25 - 50	N	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE:	<input checked="" type="checkbox"/> PIONEER	<input type="checkbox"/> YOUNG	<input type="checkbox"/> MID-AGE	<input type="checkbox"/> MATURE	<input type="checkbox"/> OLD GROWTH
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SOIL ANALYSIS:

TEXTURE: <u>heavy clay</u>	DEPTH TO MOTTLES / GLEY	g = 40	G = N/A
MOISTURE: <u>fresh moist</u>	DEPTH OF ORGANICS:	4 cm	(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:	> 150	(cm)

COMMUNITY CLASSIFICATION:		ELC CODE
COMMUNITY CLASS:	<u>Cultural</u>	<u>CU</u>
COMMUNITY SERIES:	<u>Cultural Hedgerow</u>	<u>CUH</u>
ECOSITE:		
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes:

Wainfleet - March 17, 2010

- ① Ring-billed Gull - 210 - feeding (wet field)
- ② " " - 60 - feeding (" ")
- " Mallard - 2 - feeding (puddle)
- " Black Duck - 2 - " (")
- " Green-w Teal - 4 - " (")
- ③ Ring-billed Gull - 160 - feeding (wet field)
- ④ C Goose - 8 - flying "high" going N
- ⑤ Ring-billed Gull - 105 - feeding (wet field)
- ⑥ Turkey Vulture - 2 (breeding pair) copulating (wood edge)
- ⑦ Ring-b. Gull - 60 - feeding (wet field)
- ⑧ Tundra Swan - 3 (family group) - feeding (old soybean field)
- ⑨ Canada Goose - 25 - feeding (field pond)
- ⑩ " - 24 - " (")
- ⑪ Ring-b. Gull - 105 - " (wet field)

- ⑫ {
- | | | | | | |
|--------------|---|----|---|---------|-----------------|
| Tundra Swan | - | 60 | - | feeding | (Flooded field) |
| Canada Goose | - | 28 | - | " | (") |
| N Pintail | - | 12 | - | " | (") |
| Mallard | - | 40 | - | " | (") |
| Am Wigeon | - | 2 | - | " | (") |
| Black Duck | - | 4 | - | " | (") |
| Gadwall | - | 2 | - | " | (") |
| Ring-b. Gull | - | 90 | - | " | (") |
| Green-w Teal | - | 2 | - | " | (") |

⑫ Slightly outside study area, but worthy of recording since daily routine could have the birds flying over.

Wainfleet - March 17, 2010

DAY LIST

Am Robin
C Grackle
Eur Starling
Ring-billed Gull
Song Sparrow
House Finch
Am Crow
Red-w Blackbird
Am Kestrel
Canada Goose
Mallard
Black Duck
Green-w. Teal
Red-tailed Hawk

Killdeer
Mourning Dove
Blue Jay
Downy Woodpecker
T. Vulture
Horned Lark
N Cardinal
Tundra Swan
House Sparrow
House Finch
Herring Gull
N Pintail
Am Wigeon
Gadwall
E Bluebird

(29) species

Clear/calm
temp 15°C

Wainfleet - March 18, 2010

- ① Ring-billed Gull - 60 - feeding (Wet field)
- ② Mallard - 4 - " (")
- " Black Duck - 2 - " (")
- " G.W. Teal - 2 - " (")
- ③ Ring-b. Gull - 240 - " (")
- ④ Tundra Swan - 28 - flying W @ "medium" height
- ⑤ " " - 3 - flying SW @ " "
- ⑥ " " - 4 - flying NW @ " "
- ⑦ " " - 15 - feeding (puddle in old soybean field)
- ⑧ Canada Goose - 17 - flying N @ "medium" height

- ⑨ {
- | | | | |
|-------------|---------|---------|-----------------|
| Tundra Swan | - 250 - | feeding | (flooded field) |
| N Pintail | - 56 - | " | (") |
| Am Wigeon | - 12 - | " | (") |
| Black Duck | - 4 - | " | (") |
| Mallard | - 20 - | " | (") |
| G.W. Teal | - 2 - | " | (") |
| Ring-b Gull | - 20 - | " | (") |

- slightly outside the study area, but worthy of recording since birds during their daily routine may be flying over

- ⑩ N Shrike - 1 - hunting (hedgerow)

Wainfleet - March 18, 2010

DAY LIST

Common Grackle
Red-w Blackbird
Am Robin
Eur Starling
House Sparrow
House Finch
Red-tailed Hawk
Ring-b Gull
Mourning Dove
Am Crow
Canada Goose
Hooded Merganser
Mallard
Black Duck
Green-w Teal
Herring Gull
Song Sparrow

Horned Lark
Tundra Swan
N Pintail
N Cardinal
Am Tree Sparrow
Red-bellied Woodp.
Blue Jay
Rock Pigeon
Dark-eyed Junco
Am Wigeon
N Shrike

(28) species

partly cloudy
light W wind
temp 5°C

WAINFLEET - March 31, 2010

①	Ring-billed Gull	- 150 -	feeding	(wet field)
"	Tundra Swan	- 4 -	"	(")
"	C Goose	- 25 -	"	(")
"	Mallard	- 2 -	"	(")
②	Ring-billed Gull	- 170 -	"	(")
③	Canada Goose	- 280 -	"	(grass field)
④	"	- 14 -	resting	(pond)
⑤	T. Vulture	- 8 -	circling	(over wood lot - nesting?)
⑥	Green-w Teal	- 65 -	feeding	(puddle in corn field)
"	Canada Goose	- 8 -	"	(" " ")
"	Mallard	- 2 -	"	(" " ")

WAINFLEET - March 31, 2010

DAY LIST

Eur Starling	Am Tree Sparrow
House Finch	E Bluebird
Wood Duck	Am Goldfinch
Am Crow	Blue Jay
Am Robin	White-breasted Nuthatch
Red-w B Bird	T. Vulture
C Grackle	Red-tailed Hawk
Killdeer	N cardinal
Song Sparrow	Mourning Dove
Mallard	N Harrier
Tundra Swan	Green-w. Teal
Canada Goose	
Rock Pigeon	
Ring-billed Gull	
Red-tailed Hawk	

(26) species

- mostly clear
- light SW wind
- temp 10°C

WAINFLEET - April 1, 2010

Ring-billed Gull
Am Robin
Eur Starling
Killdeer
Song Sparrow
Red-w Blackbird
C Grackle
Mourning Dove
Am Crow
Horned Lark
Canada Goose
House Finch
E Bluebird
T_c Vulture

Am Tree Sparrow
Brown-headed Cowbird
E Meadowlark
Red-bellied Woodpecker
N. Shovel
House Sparrow
Dark-eyed Junco
Rock Pigeon
N Cardinal
Red-tailed Hawk
Black-capped Chickadee
White-br. Nuthatch

(26) species

-light ~~S~~ wind
-partly clouds
-10°C.

Wainfleet - April 12, 2012

①	Ring-billed Gull	- 40 -	feeding	(wet plowed field)
"	Bonapartes Gull	- 1 -	"	(" " ")
"	Am Wigeon	- 1 -	"	(" " ")
②	Ring-billed Gull	- 130 -	"	(corn / soybean)
③	"	- 230 -	"	(plowed field)
④	Canada Goose	- 410 -	resting	(field / pond)
⑤	R b Gull	- 220 -	feeding	(field)
⑥	Canada Goose	- 270 -	feeding	(pond in corn field)
"	N Pintail	- 20 -	"	(" " " ")
"	Green-w Teal	- 30 -	"	(" " " ")
"	Am Wigeon	- 12 -	"	(" " " ")
"	Mallard	- 6 -	"	(" " " ")
⑦	Am Wigeon	- 26 -	feeding	(flooded field)
"	Mallard	- 12 -	"	(" " ")
"	N Pintail	- 36 -	"	(" " " ")
"	Ring-billed Gull	- 440 -	"	(" " " ")

⑦ Technically outside the area, but worthy of recording since these birds may routinely fly over the study site.

Wainfleet - April 12, 2012

Am Wigeon
Ring-billed Gull
Bonaparte's Gull
Turkey Vulture
Red-w Blackbird
C Grackle
Am Robin
Killdeer
Song Sparrow
Am Crow
N Cardinal
Brown-h-Cowbird
Wood Duck
Canada Goose

Mourning Dove
Mallard
Chipping Sparrow
Wild Turkey
Tree Swallow
Blue Jay
Am Goldfinch
House Sparrow
Horned Lark
Dark-eyed Junco
Green-w-Teal
N Pintail
Red-tailed Hawk
Savannah Sparrow

(28) species

- light SW wind
- mostly clear
- 10°C.

Wainfleet - April 13, 2010

- ① Ring-billed Gull - 180 - feeding (old soybean field)
- ② " " " - 150 - " (wet field)
- ③ C Loon - 1 - flying @ H → ENE
- ④ Ring-billed Gull - 130 - feeding (old soybean field)
- ⑤ " " " - 140 - " (" " ")
- ⑥ " " " - 120 - " (soccer field)
- ⑦ " " " - 90 - " (old soybean field)
- ⑧ Mallard - 8 - flying SE @ M height
- ⑨ " " - 6 - flying SE @ M height
- ⑩ Ring-b Gull - 190 - feeding (old soybean field - wet)
- ⑪ C Goose - 390 - feeding (old corn field with wet area)
- " N Pintail - 6 - " (" " " " ")
- " Am Wigeon - 3 - " (" " " " ")
- " Mallard - 8 - " (" " " " ")
- ⑫ puddle ducks - 120 - flying @ M height
- ⑬ Am Black Duck - 3 - feeding (wet field)
- " Green-w Teal - 3 - " (" ")
- ⑭ Tufted Titmouse - 2 - pair (woods)

Wainfleet - April 13, 2010

Am Robin	N. Cardinal
Red-w Blackbird	Blue Jay
C Grackle	Wild Turkey
B h Cowbird	Savannah Sparrow
Song Sparrow	Chipping Sparrow
Killdeer	C Goose
Ring-billed Gull	Am Wigeon
M Dove	N Pintail
N Cardinal	Tree Swallow
White-br. Nuthatch	House Sparrow
Am Crow	E Bluebird
N Flicker	Dark-eyed Junco
Mallard	Green-w Teal
Horned Lark	Am Black Duck
Common Loon	Rusty Blackbird
E Bluebird	Am Goldfinch
Red-tailed Hawk	Great Blue Heron
T. Vulture	Red-tailed Hawk
Tufted Titmouse	

(37) species

- mostly cloudy
- 6°C
- calm

Waiafleeet - April 28, 2010

①	Ring-billed Gull	- 110 -	feeding	(plowed field)
②	"	- 600 -	"	(")
③	Canada Goose	- 410 -	resting	(field & pond)
④	Ring-billed Gull	- 140 -	feeding	(plowed field)
⑤	"	- 800 -	"	(")
⑥	"	- 700 -	"	(")
⑦	"	- 400 -	"	(")
⑧	"	- 220 -	"	(")

Wainfleet - April 28, 2010

House Finch	E Bluebird
House Sparrow	N Flicker
Tree Swallow	Red-tailed Hawk
Am Robin	White-thr. Sparrow
Killdeer	Am Crow
Song Sparrow	N Rough-w. Swallow
C Grackle	Bonaparte's Gull
Red-w Blackbird	Canada Goose
Mourning Dove	Savannah Sparrow
Am Kestrel	Mallard
Barn Swallow	Purple Martin
Vesper Sparrow	
Ring-billed Gull	
Black-capped Chickadee	
T Vulture	

(26) species

- partly cloudy
- temp 10°C
- wind stiff WNW

Waintket - April 29, 2010

①	Ring-billed Gull	- 180 -	feeding	(plowed field)
②	" " "	- 600 -	"	(old corn field)
③	" " "	- 350 -	"	(plowed field)
④		- 270 -	"	(old corn field + puddle)
4	Mallard	- 6 -	"	(" " " + ")
4	Green-W Teal	- 6 -	"	(" " " + ")

Wainfleet - April 29, 2010

House Sparrow
Song Sparrow
Am Robin
Red-w Blackbird
C Grackle
Killdeer
Mallard
Brown-h. Cowbird
Horned Lark
T. Vulture
Ring-billed Gull
Chipping Sparrow
Am Crow
Red-tailed Hawk
Vesper Sparrow

Downy Woodpecker
Wood Duck
Savannah Sparrow
Barn Swallow
Red-tailed Hawk
Field Sparrow
Savannah Sparrow
Rough-w Swallow
Green-w Teal
House Finch
Tree Swallow
E Bluebird
Blue Jay
Swamp Sparrow

(29) species

- light W wind
- clear
- temp 8° C.

Wainfleet Roadside Survey
May 5, 2010

0200
~~0200~~
Start ~~165~~ Finish 0445
2.75

~~Key start 165~~ ~~End finish 2.75~~
~~Total 2.60 km~~

Weather - Sun, Pt, cldg, SW 40
Temp 18°C

- ① 350 RBGU following plow
- ② 25 CAGO in grassy field
- ③ 10 CAGO / 5 MALL in wet cornfield
- ④ 90 RBGU following plow
- ⑤ 3500 RBGU following plow & loafing + 10 MALL
- ⑥ 8 CAGO in cut cornfield
- ⑦ 17 CAGO in cut cornfield

Wainfleet Roadside Survey / May 5 / 10

Species List

BAOR	M600	TUVU
KILL	ROPI	RTHA
HOSP	EUST	HOLA
FWBL	CAGO	NOFL
BHCO	MALL	SACR - f/0 en route to Port Colborne
COGR	BOBU	
YWAR	SASP	
RBGR	EATU	41 sp.
SOSP	COYE	
RBGU	RBWB	
HERG	DOWO	
GBBG	AMCR	
NOMO	HOWR	
BARS	CHSP	
TRES	BLJA	
NRWS	COTE	
PUMA	BOGU	
GRCA	RBME	

Butterflies - CAWH
CLSU - 2
READ - 25.
AMLA - 1

Wainfleet Roadside Survey / May 6/10

Weather - Clear, west wind
cool to start 10°C

Start time - 6⁵⁰ Stop - 9¹⁰

Start Km 288 Stop Km 285
Total 57

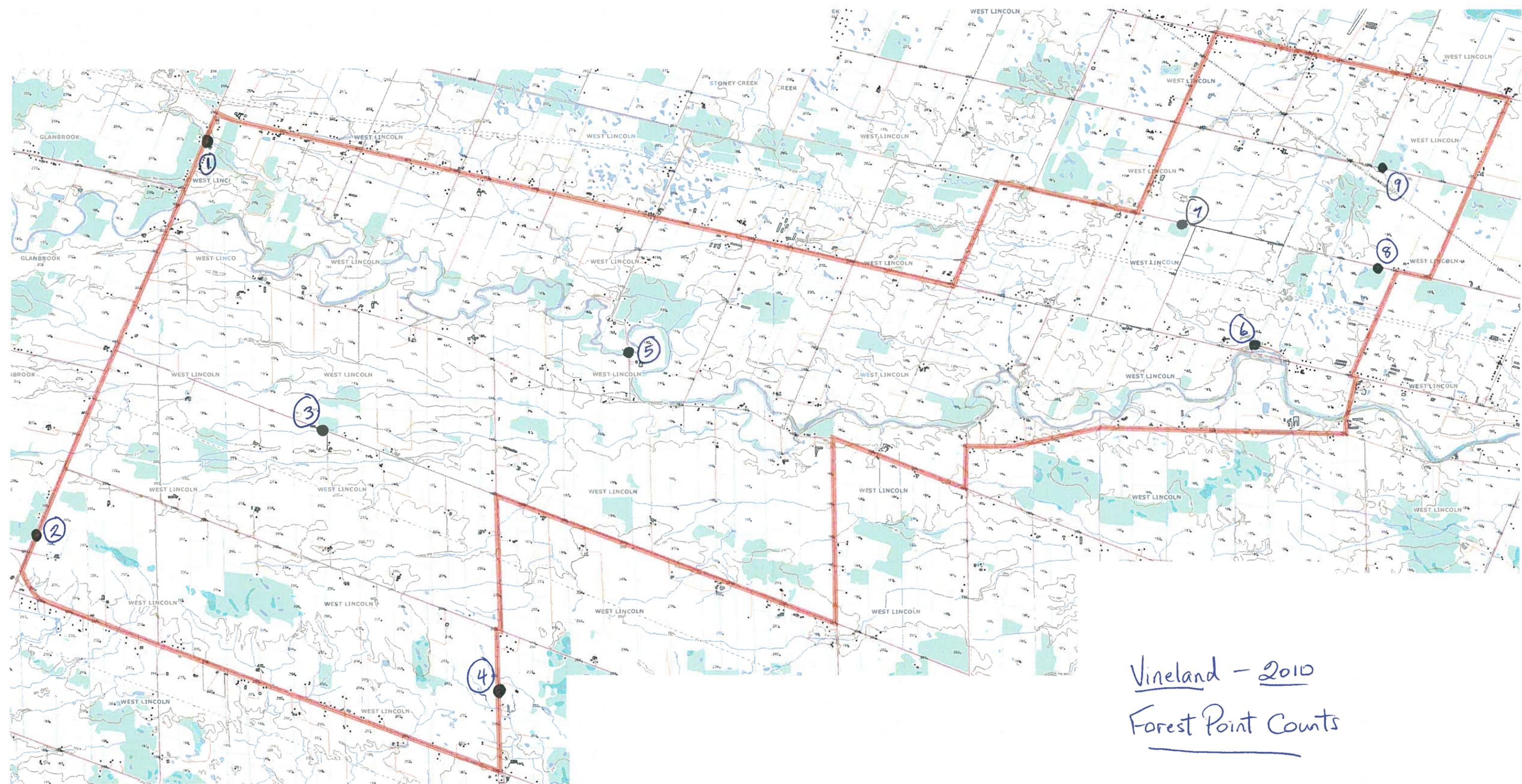
- ① 240 RBGU Feeding in cut bean field
- ② 130 RBGU / 5 CAGO in winter wheat
Canada Goose
- ③ 11 LEYE / 1 PESA in flooded field
lesser yellowlegs pectoral sandpiper
- ④ 4 LEYE / 4 PESA / 1 SEPL in damp field (+270 RBGU)
sparrow & partridge plover
- ⑤ 220 RBGU in damp field

Wainfleet / May 6/10 Species

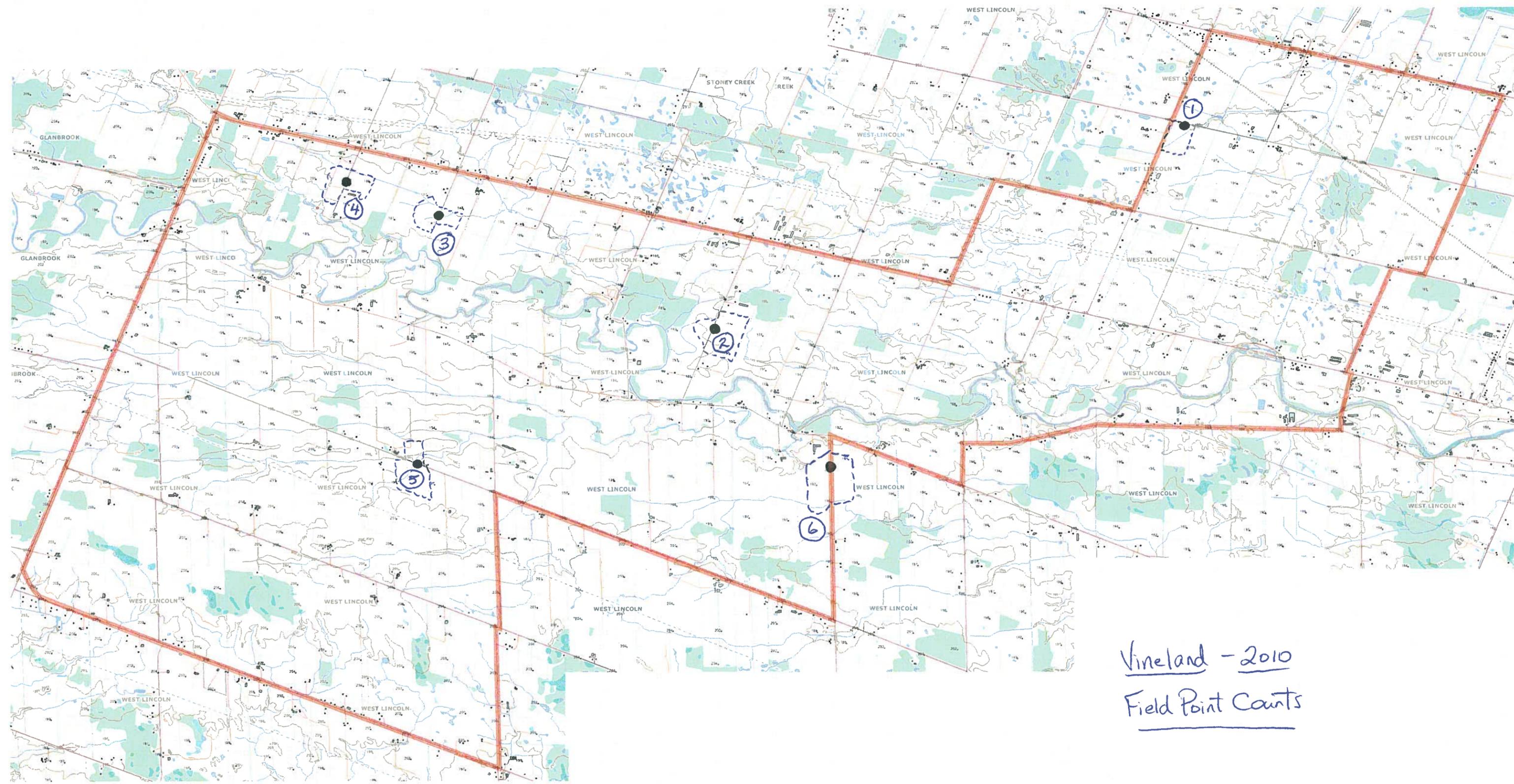
WAVI	FBGR	LEFL
BHVI	VESP	AMCR
YWAR	MODU	KILL
AMRE	ROPI	WLSP
AMRO	COYE	NOCA
HOLA	MALL	TUVU
AMCR	WOODU	PESA
COGR	SWSP	LEYE
BTGreen W.	HOWR	SEPL
EUST	CAGO	EAME
RWBL	FBGR	CATE
BAOR	BGGN	GBBG
SOSP	SWTH	HEBG
CHSP	BARS	DCCO
SASP	TRES	BCCH
AMGO	BTBlue W.	GROR
GRCA	WOTH	NAWA
EAPH	BETH	WITU
PUMA		55 sp.

Butterflies - CAWH

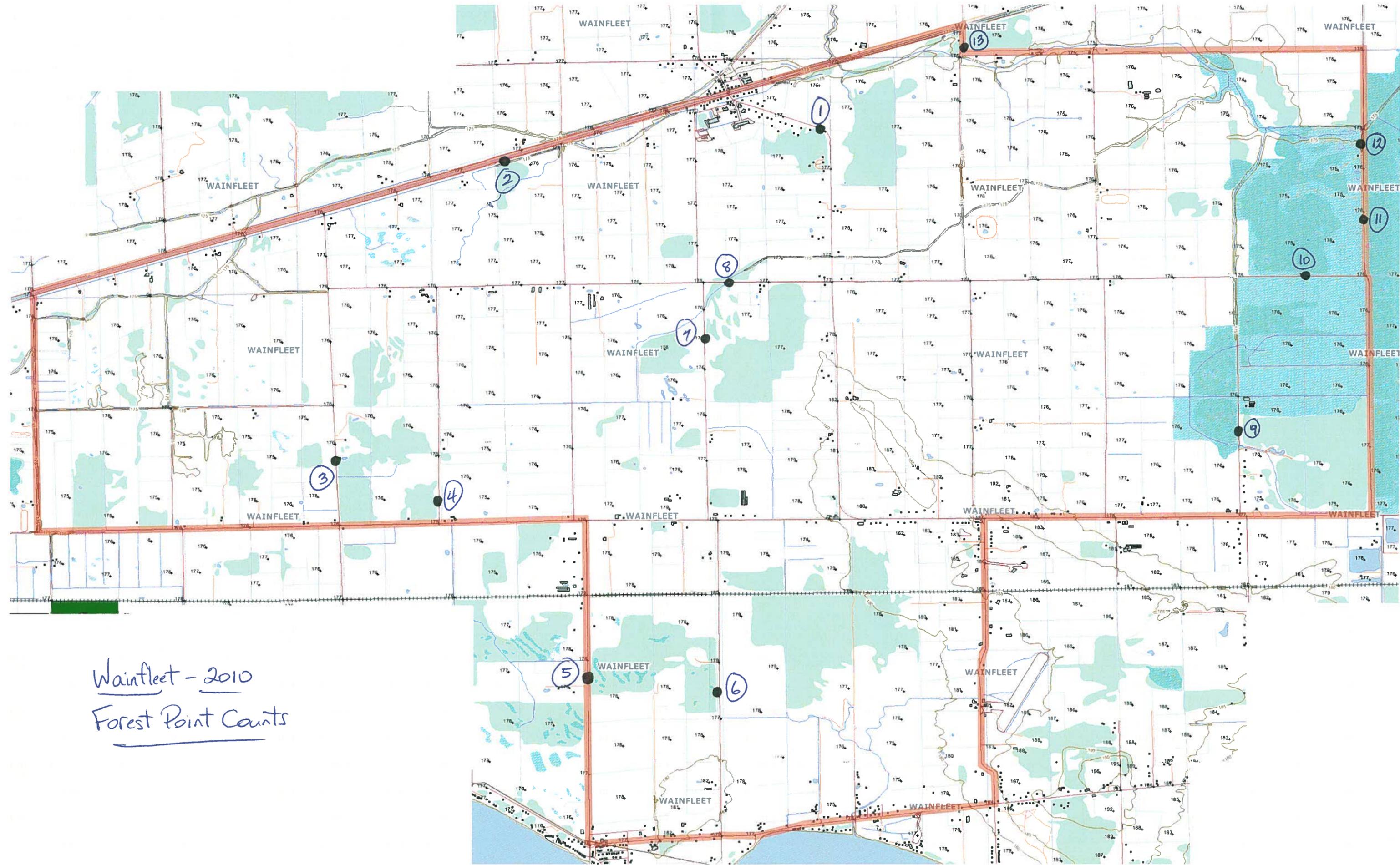
READ - 40+



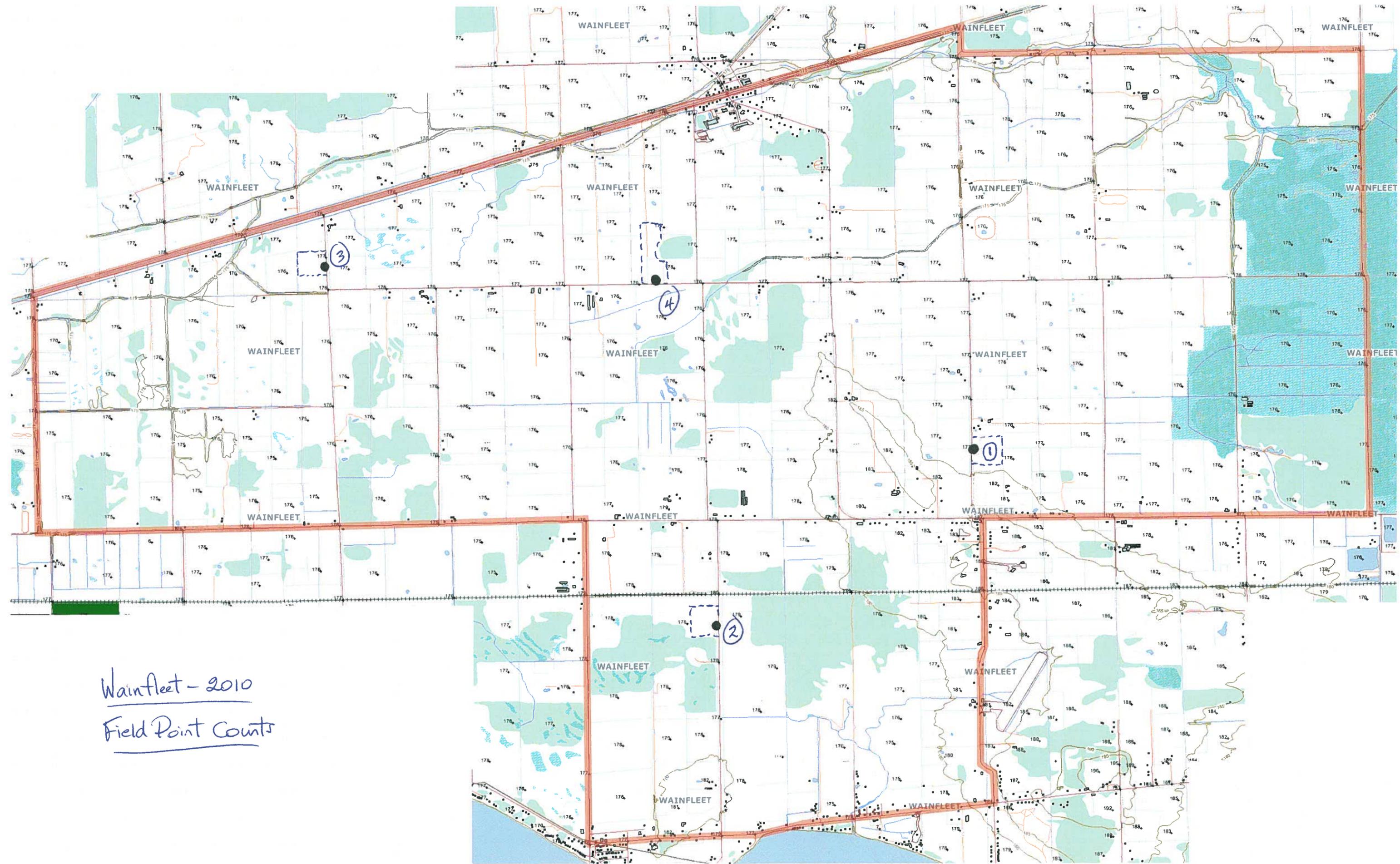
Vineland - 2010
Forest Point Counts



Vineland - 2010
Field Point Counts



Wainfleet - 2010
Forest Point Counts



Wainfleet - 2010
Field Point Counts

Amphibian Call Survey

Date/Time: April 8 8:10 Weather: 6°, foggy.
Observers: EM, SL
Job Name & Number: Wainfleet 1104036

SPECIES	STATION 1		STATION 2		STATION 3	
	Code	Est. #	Code	Est. #	Code	Est. #
WOFO- Wood Frog	2	8	2	9		
CHFR- Chorus Frog						
SPPE- Spring Peeper	2	10	2	10	2	10
AMTO- American Toad						
NLFR- Northern Leopard Frog	1	1			1	1
PIFR- Pickerel Frog						
GRTF- Gray Treefrog						
MIFR- Mink Frog						
GRFR- Green Frog						
BULL- Bullfrog						
FOTO- Fowlers Toad						
BCFR- Blanchard's Cricket Frog						

Comments: _____

Amphibian Call Survey

Date/Time: April 25 8:15 Weather: 10°, sprinkling

Observers: EM, SL

Job Name & Number: Wainfleet 1104036

SPECIES	STATION 1		STATION 2		STATION 3	
	Code	Est. #	Code	Est. #	Code	Est. #
WOFO- Wood Frog						
CHFR- Chorus Frog						
SPPE- Spring Peeper	2	8	2	8	2	10
AMTO- American Toad	2	10				
NLFR- Northern Leopard Frog						
PIFR- Pickerel Frog						
GRTF- Gray Treefrog						
MIFR- Mink Frog						
GRFR- Green Frog						
BULL- Bullfrog						
FOTO- Fowlers Toad						
BCFR- Blanchard's Cricket Frog						

Comments:

Amphibian Call Survey

Date/Time: May 22 9:00

Weather: 17° raining

Observers: EM, SL

Job Name & Number: Wainfleet 1104036.00

SPECIES	STATION 1		STATION 2		STATION 3	
	Code	Est. #	Code	Est. #	Code	Est. #
WOFO- Wood Frog						
CHFR- Chorus Frog						
SPPE- Spring Peeper						
AMTO- American Toad						
NLFR- Northern Leopard Frog						
PIFR- Pickerel Frog						
GRTF- Gray Treefrog						
MIFR- Mink Frog						
GRFR- Green Frog						
BULL- Bullfrog						
FOTO- Fowlers Toad						
BCFR- Blanchard's Cricket Frog						

Comments: _____

Field Work Collection Form

Date/Time: June 7, 10:10am Weather: 17°, sunny, light winds.

Observers: EM, SL Location: _____

Job Name & Number: Wainfleet

Goal of Field Study: search entire site for potential reptile hibernacula

Methods: - look for turtles or congregations of snakes.
- look for rock piles, rock crevices, muskrat/beaver lodges.
rodent burrows, etc.

Results: - no suitable hab found

Goal of Field Study: search ~~forested~~ ^{wetlands.} areas for bullfrog concentration areas.

Methods: - look for permanent water bodies
- look for bullfrog tadpoles or adult frogs.

Results: ponds in forests/swamps: ① 17T 630279
4750783 ② 17T 631308 4750139 ③ 17T 632453

4571448 *check back later in summer to see if these ponds are permanent.

Field Work Collection Form

Date/Time: June 7, 6:30pm Weather: 17°, sunny, light winds.

Observers: EM, SL Location: _____

Job Name & Number: Wainfleet

Goal of Field Study: investigate pot. bat maternity colony

Methods: - look for ^{trees w/} woodpecker holes, rot holes, cracks, etc. - look for evidence of bats near holes (grease marks, urine stains, droppings)
- look for actual bats at dusk

Results: _____
- found suitable roosting trees throughout forest.
- saw 1 bat. (~ 8:30pm; near watercourse.)

Goal of Field Study: _____

Methods: _____

Results: _____

Field Work Collection Form

Date/Time: June 9, 11:30am Weather: 13°, overcast, sprinkling

Observers: EM, SL Location: _____

Job Name & Number: Wainfleet

Goal of Field Study: search for pot. reptile hibernacula

Methods: look for turtles or congregations of snakes.
- look for rock piles, rock crevices, muskrat/beaver lodges,
rodent burrows, etc.

Results: - no suitable hab found

Goal of Field Study: search wetlands for bullfrog conc. areas

Methods: look for permanent waterbodies.
- look for bullfrog tadpoles or adult frogs.

Results: - some ditches have standing water
(check back later in summer)

- marsh w/ standing water: 17T 632876 47S1691
(no evidence of bullfrogs)

Field Work Collection Form

Date/Time: June 11, 10:40am Weather: 19°, sunny, very light winds.

Observers: EM, SL Location: _____

Job Name & Number: Wainfleet 1104036

Goal of Field Study: search for pot. reptile hibernacula

Methods: - look for turtles, snake congregations.

- look for rodent burrows, muskrat or beaver lodges, rock piles, rock crevices, etc.

Results: - no suitable habitat found.

* turkey vultures (5 or 6) flying over forest at 17T 632453 4751448

Goal of Field Study: Search wetlands for bull frog concentration areas.

Methods: look for ^{permanent} ~~potential~~ water bodies; look for bullfrog tadpoles or adult frogs.

Results: - no additional areas found.

Field Work Collection Form

Date/Time: June 14, 11:00am, Weather: 21°, overcast/foggy.

Observers: EM & SL, Location: _____

Job Name & Number: Main fleet

Goal of Field Study: Search for pot. reptile hibernacula.

Methods: - look for turtles, snake congregations.

- look for rock piles, rock crevices, muskrat/beaver lodges, rodent burrows, etc.

Results: _____

Goal of Field Study: search wetlands ~~for~~ aquatic areas for bullfrog conc. areas

Methods: look for permanent water bodies.

- look for bullfrog tadpoles or adult frogs.

Results: = permanent (man-made) pond at:
17T 631746 4749946

Field Work Collection Form

Date/Time: July 27. 9:30 Weather: 24° sunny/partly cloudy.

Observers: EM & SL Location: _____

Job Name & Number: Wainfleet Wind Energy 110403600

Goal of Field Study: search for potential deer wintering areas

Methods: - core area of forest w/ 60% canopy cover, abundant conifers & understory shrubs & small trees

Results: - no suitable hab found. (note: conifers are quite rare throughout project area)

Goal of Field Study: _____

Methods: _____

Results: _____

Field Work Collection Form

Date/Time: July 28 10:00am Weather: 26°, cloudy, light wind

Observers: EM & SL Location: _____

Job Name & Number: Wainfleet

Goal of Field Study: Search for pot. deer wintering areas

Methods: - core area of forest w/ 60% canopy cover, abundant conifers & understory shrubs & small trees.

Results: no suitable habitat found.

*4 wild turkeys were observed at 17T 632949
4749467.

Goal of Field Study: _____

Methods: _____

Results: _____

Field Work Collection Form

Date/Time: Aug 11 9:30am Weather: 25° sunny, few clouds.

Observers: EM, SL. Location: _____

Job Name & Number: WAINFLEET.

Goal of Field Study: search wetland/aquatic areas for:

- ① Blandings / Snapper halibut
- ② Waterfowl stopover / staging areas.

Methods: ① shallow, slow-moving water w/ soft bottom,
② large wetland w/ undisturbed veg. shoreline ^{dense veg.}
(adj to large water body)

Results: -one large area was found that may be
suitable waterfowl habitat: 17T 632627 4748278

Goal of Field Study: search open areas for SWH features.
- search for milksnake, monarch halibut.

Methods: see attached.

Results: _____

Field Work Collection Form

Date/Time: Aug 13. 10:40am Weather: 24° sunny, partly cloudy.

Observers: SL & EM Location: _____

Job Name & Number: Wainfleet.

Goal of Field Study: Search wetlands for:

① Blandings / Snapper hab.

② Waterfowl stopover / staging areas.

Methods: ① shallow, slow-moving water w/ soft bottom,

dense veg. ② large wetland w/ undisturbed vegetated shoreline (adj to large waterbody)

Results: _____

Goal of Field Study: Search open areas for SWH features.
- Search for milksnake, monarch hab.

Methods: see attached.

Results: _____

Field Work Collection Form

Date/Time: Aug 16, 11:00am · Weather: 24° sunny

Observers: SL & EM · Location: _____

Job Name & Number: Wainfleet

Goal of Field Study: Search wetlands for:

① Blandings / Snapper hab

② Waterfowl stopover / staging hab

Methods: ① shallow, slow-moving water w/ soft bottom & dense veg. ② large wetland w/ undisturbed vegetated shoreline (adj. to large water body)

Results: _____

Goal of Field Study: ① search open areas for SWH features.

② search for milksnake, monarch hab.

Methods: see attached.

Results: (milksnake)

- old field habitat at IRT 632613 4748737

(note: temporary habitat as it could/will be used for agriculture in future)

Significant Wildlife Habitat Features: OPEN AREA

Date/Time: Aug 16. 11:00am Weather: 24° sunny.

Observers: _____ Location: _____

Job Name & Number: Wainfleet.

WATERFOWL NESTING HABITAT (i.e. large, undisturbed grassy/shrubby fields with abundant ponds and wetlands, adjacent to wetlands)

American Black Ducks

Gadwall

Northern Shoveler

Green-winged Teal

Northern Pintail

American Wigeon

RAPTOR WINTER FEEDING AND ROOSTING AREAS (i.e. open fields and meadows with diverse herbaceous groundcover and scattered trees or fence posts)

WILD TURKEY WINTER RANGE (i.e. fields near dense forest with many conifers, oaks)

TURKEY VULTURE SUMMER ROOSTING AREAS (i.e. large dead or partially dead trees in open areas, particularly near water)

REPTILE HIBERNACULA (i.e. rock piles, rock crevices, karst features, soft substrate)

MIGRATORY STOPOVER AREAS (i.e. old fields with nectar-bearing plants within 5km of a Great Lake shoreline)

RARE VEGETATION COMMUNITY (i.e. alvars, tall-grass prairies, savannahs, talus slopes, rock barrens, sand barrens, great lakes dunes)

Indicator Species: _____

TURTLE NESTING HABITAT (i.e. open, sunny areas with soft substrate near water and away from roads)

Site Description: _____

(small) old fields (w/ small amount of milkweed) at:

17T 630822 4750508.

17T 632589 4749258

Field Work Collection Form

Date/Time: Aug 18. 10:00am Weather: 20° sunny (no wind)

Observers: SL & EM. Location: _____

Job Name & Number: Wainfleet.

Goal of Field Study: Search wetlands for:

① Blandings / Snapper hab.

② waterfowl stopover / staging areas.

Methods: ① shallow, slow-moving water w/ soft bottom & dense veg. ② large wetlands w/ undisturbed vegetated shoreline (adj. to large water body)

Results: note: ponds identified in June have since dried up (∴ not bullfrog hab)

Goal of Field Study: Search open areas for SWH features.
- search for milksnake, monarch hab.

Methods: See attached.

Results: - saw 2 red-tailed hawks at 17T 632443
4751981

- found additional milksnake hab at

* found a wild turkey feather at 17T 633340 4749991

Significant Wildlife Habitat Features: OPEN AREA

Date/Time: Aug 18. 10:00am Weather: 20° sunny (no wind)

Observers: _____ Location: _____

Job Name & Number: Wainfleet

WATERFOWL NESTING HABITAT (i.e. large, undisturbed grassy/shrubby fields with abundant ponds and wetlands, adjacent to wetlands)

American Black Ducks

Gadwall

Northern Shoveler

Green-winged Teal

Northern Pintail

American Wigeon

RAPTOR WINTER FEEDING AND ROOSTING AREAS (i.e. open fields and meadows with diverse herbaceous groundcover and scattered trees or fence posts)

WILD TURKEY WINTER RANGE (i.e. fields near dense forest with many conifers, oaks)

TURKEY VULTURE SUMMER ROOSTING AREAS (i.e. large dead or partially dead trees in open areas, particularly near water)

REPTILE HIBERNACULA (i.e. rock piles, rock crevices, karst features, soft substrate)

MIGRATORY STOPOVER AREAS (i.e. old fields with nectar-bearing plants within 5km of a Great Lake shoreline)

RARE VEGETATION COMMUNITY (i.e. alvars, tall-grass prairies, savannahs, talus slopes, rock barrens, sand barrens, great lakes dunes)

Indicator Species: _____

TURTLE NESTING HABITAT (i.e. open, sunny areas with soft substrate near water and away from roads)

Site Description: _____

large forest identified as a potential wild

turkey winter range: 17T 632949 4749467

- lots of oak trees.

- small stands of conifers

- adjacent to a corn field

Stationary Survey

Sat

Forest

Date June 5, 2010

Location Wainfleet #1

Observer AW

Start Time 619

End Time 629

Weather Temperature 20 Wind Speed Light

Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Precipitation	None		Fog		Drizzle		Lt Rain		Hvy Rain		Cloud Cover (%) 100					
Visibility	✓															

Species	Number of Birds	Behaviour	Height	Direction	Notes
Song sp.	♂♂♂				
RB B	♂				
Crow	1				
RB GRN	15, 5, 5				
Am Goldfinch	♂				
T Titmouse	♂				
M Dove	♂				
Am Robin	1				
cowbird	6				
Killdeer	1				
Gr. cr Flycatcher	♂				
Willow Fly	1				
C Waxwing	5				
STOP - N side, end of rail					
S Side - Mature deciduous forest					
N side - scattered trees, shrubs					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

FOREST

Sat

Date June 5, 2010

Location Wainfleet #3

Observer AW

Start Time 0648

End Time 0658

Weather Temperature 20 Wind Speed Moderate

Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	W	WNW	NW	NNW
----------------	---	-----	----	-----	---	-----	----	-----	---	-----	-----------	-----	--------------	-----	----	-----

Precipitation None Fog Drizzle Lt Rain Hvy Rain Cloud Cover (%)

Visibility

Species	Number of Birds	Behaviour	Height	Direction	Notes
C Yellowthroat	♂				
Song Sp	♂, ♂				
Am Robin	♂, 1, 1				
Alder Flycatcher	♂				
Chipping Sp	1				
Cowbird	♂, ♂				
N Oriole	♂, ♂				
Blue Jay	1				
Wild Turkey	1				
Am Crow	1				
Am Goldfinch	1				
Wood Thrush	♂				
STARTS → just S of old lane (E side)					
E side: deciduous forest (immature)					
W side " " (" ")					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Forest

Sat

Date June 5, 2010

Location Wainfleet #5

Observer AW

Start Time 718

End Time 728

Weather	Temperature <u>20</u>	Wind Speed <u>Mod</u>																
Wind Direction	<table border="1"> <tr> <td>N</td> <td>NNE</td> <td>NE</td> <td>ENE</td> <td>E</td> <td>ESE</td> <td>SE</td> <td>SSE</td> <td>S</td> <td>SSW</td> <td><u>SW</u></td> <td>WSW</td> <td>W</td> <td>WNW</td> <td>NW</td> <td>NNW</td> </tr> </table>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	W	WNW	NW	NNW	
N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	W	WNW	NW	NNW			
Precipitation	<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%) <u>75</u>												
Visibility	<u>✓</u>																	

Species	Number of Birds	Behaviour	Height	Direction	Notes
Red-eyed Vireo	♂, ♂				
Star Jay Oriole	♂				
Yellow Warbler	♂				
Song Sparrow	♂, ♂				
Am Goldfinch	1				
Cowbird	1, ♂				
crow	1				
Purple Martin	♂				
Gr Flyc.	1				
House Wren	♂				
M Dove	1				
Rose-br Grosb	♂				
STOP → bare, N of laneway					
E side mature deciduous forest (mostly oak)					
W side planted crop, hedgerows					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Set Forest
 Date June 5, 2010 Location Wainfleet #7
 Observer AW Start Time 0751 End Time 801

Weather	Temperature	<u>20</u>		Wind Speed	<u>Light</u>											
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Precipitation	None		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u>60</u>								
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
Yellow W	♂, ♂, 1	#	Baltimore ♂		
Am Robin	♂, ♂, 1, 1		Cowbird 3		
Alder Flyc	♂		Am Goldfinch 1		
West Thrush	♂		Rose-br. Grosbeak		♀
N Cardinal	♂		Gray Catbird		♂
C Grackl	1, 2				
RW BB	♂, 1				
Song Sp	♂				
House Wren	♂♂				
Rb Gull	1, 1				
Chickadee	♂				
Red-eyed Vireo	♂				
START → corner of woods, single pine tree (at east side)					
W side — dense deciduous forest (immature)					
E side — " " " (" ")					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Sat

Date June 5, 2010

Location Forest
Wainfleet #8

Observer AW Start Time 0808 End Time 0818

Weather	Temperature	<u>20</u>		Wind Speed	<u>Light</u>											
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	W	WNW	NW	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u>60</u>								
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
Yellow W	♂, ♂, ♂				
M Dove	2				
House Wren	♂, ♂				
Rb Gull	1, 1				
Am Goldfinch	1, 1				
cowbird	♂, ♂				
C Grackle	1				
Am Robin	1				
Red-bellied W	1 1				
Red-eyed V	♂				
Gray Catbird	♂				
Blue Jay	1				
Tree Swallow	1				
STOP → ditch					
Both sides → open deciduous forest (poplar, ash, willow)					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Forest

Sat

Date June 5, 2010

Location Wainfleet #9

Observer AW

Start Time 0835

End Time 0845

Weather	Temperature	<u>20</u>	Wind Speed	<u>Light</u>												
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	W	WNW	NW	NNW
Precipitation	<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u>50</u>									
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
Least Fly	♂				R b Gull 3, 3, 3
Warbling Vireo	♂, ♂				Cowbird ♂
Rose-br Grosb	♂				
Yellow W	♂, ♂, ♂				
Red-bellied	1				
Gray Catbird	♂				
Oriole	♂, ♂				
Great cr Fly	1				
Am Robin	1, ♂, ♂				
N Flicker	1				
C Gnatcatcher	2, 1, 1				
Chickadee	1				
Song Sp	♂, 1				
M Dove	1, 1				
stop → mid way					
E - mature deciduous forest					
W - " " "					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Sat.

Date June 5, 2010

Location Forest Wainfleet #10

Observer AW Start Time 0850 End Time 0900

Weather	Temperature	<u>20</u>		Wind Speed	<u>light Moderate</u>											
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	W	WNW	NW	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u>30</u>								
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
Ovenbird	♂				Rb Gull 1, 3
Rose-br Grosb	♂				Rw Blackbird ♂, 1
Wild Turkey	1				Am Goldfinch 1
Scarlet Tanager	♂				C Grackle 1
Am Robin	♂, ♂				Song Sparrow ♂
Red-eyed Vireo	♂				
M Dove	♂				
Yellow Warbler	♂, ♂				
Wood Thrush	♂				
Oriole	♂, ♂				
START → midway - large poplar on N side					
N side - dense deciduous forest, poplar (immature)					
S side - "					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Sat.

Forest

Date June 5, 2010

Location Wainfleet #11

Observer AW

Start Time 0905

End Time 0915

Weather	Temperature	<u>22</u>		Wind Speed	<u>Moderat</u>											
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	<u>W</u>	WNW	NW	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u>60</u>								
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
House Wren	♂				Ring-b. Gull 2
Song Sparrow	♂, 1				Am Goldfinch 1, 1
Yellow Warbler	♂, ♂, ♂				C Yellowthroat ♂
Greater Flyc.	♂				
Red-w B Bird	♂, ♂, 1, ♂, 1				
N Oriole	♂				
M Dove	♂				
Least Flyc.	♂				
cowbird	1, 1				
Chickadee	1				
Rose-br. Grosbeak	♂				
STOP → s of laneway, also where willow shrubs very close to road					
East - deciduous shrub swamp (willows)					
West - dense deciduous immature forest (p-plars)					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Forest
Wainfleet #12

Date June 5, 2010

Location _____

Observer AW

Start Time 0918

End Time 0928

Weather	Temperature <u>22</u>	Wind Speed <u>Moderate</u>																
Wind Direction	<table border="1"> <tr> <td>N</td><td>NNE</td><td>NE</td><td>ENE</td><td>E</td><td>ESE</td><td>SE</td><td>SSE</td><td>S</td><td>SSW</td><td>SW</td><td>WSW</td><td>W</td><td>WNW</td><td>NW</td><td>NNW</td> </tr> </table>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW			
Precipitation	<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%) <u>60</u>												
Visibility	<u>✓</u>																	

Species	Number of Birds	Behaviour	Height	Direction	Notes
Yellow Warbler	♂, ♂, 1				
C Grackles	3				
Warbling Vireo	♂				
C Yellowthroat	♂, ♂				
Gray Catbird	♂				
Least Flycatcher	♂				
Song Sparrow	♂				
White-thr. Sparrow	♂				
Chickadee	♂, ♂				
crow	1, 1				
B Oriole	♂, ♂, ♂				
Am Robin	♂				
Am Goldfinch	1				
stop → Beagle Club sign / laneway (North South west of 2 similar laneways)					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Date July 3/10 Location Forest Wainfleet #1
 Observer AW Start Time 0632 End Time 0642

Weather	Temperature	12 12	Wind Speed	Calm																
Wind Direction	<table border="1" style="width: 100%; text-align: center; font-size: small;"> <tr> <td>N</td><td>NNE</td><td>NE</td><td>ENE</td><td>E</td><td>ESE</td><td>SE</td><td>SSE</td><td>S</td><td>SSW</td><td>SW</td><td>WSW</td><td>W</td><td>WNW</td><td>NW</td><td>NNW</td> </tr> </table>				N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW					
Precipitation	None		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	0												
Visibility																				

Species	Number of Birds	Behaviour	Height	Direction	Notes
Chipping Sp	♂				
Am Robin	♂, ♂, 1				
Chickadee	♂, 1, 1				
Rose-br. Grosb.	♂				
M Dove	♂, 1				
Great cr Flyc.	♂				
T Titmouse	♂				
Downy Woodp	1				
Red-eyed Vireo	♂				
R b. Gull	1				
N Cardinal	♂				
Am Goldfinch	1, ♂				
Song Sp	♂				
C Waxwing	1				
Starling	1				
C Grackle	111				

Behaviour	
F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height	
L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Date July 3 / 10

Location Forest Wainfleet #2

Observer AW

Start Time 0648

End Time 0658

Weather Temperature 12 Wind Speed Calm

Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
----------------	---	-----	----	-----	---	-----	----	-----	---	-----	----	-----	---	-----	----	-----

Precipitation None Fog Drizzle Lt Rain Hvy Rain Cloud Cover (%) 0

Visibility ✓

Species	Number of Birds	Behaviour	Height	Direction	Notes
WB Nuthatch	1				
Chickadees					
Red-w B Bird	♂, ♂, ♂				
Song Sp	♂				
Chipping Sp	♂				
Rose-br. G	♂				
N Cardinal	1				
N Flicker	♂				
cowbird					
C Grackle	1				
Downy Woodp	1				
Am Robin	1				
Ring-b Gull					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Date July 3/10 Location Forest Wainfleet #3
 Observer AW Start Time 0703 End Time 0713

Weather	Temperature <u>12</u>	Wind Speed <u>Calm</u>														
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Precipitation	<input checked="" type="radio"/> None	<input type="radio"/> Fog	<input type="radio"/> Drizzle	<input type="radio"/> Lt Rain	<input type="radio"/> Hvy Rain	Cloud Cover (%)	<u>0</u>									
Visibility	<input checked="" type="checkbox"/>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
Yellow Warbler	♂				
Rose-br Grosb	♂, ♂				
C Yellowthroat	♂				
Am Redstart	♂				
House Wren	♂				
M Dove	♂				
Song Sparrow	♂, 1				
Am Robin	♂				
Gray Catbird	♂				
Starling	11				
C Grackle	11				
N Cardinal	1				
Cowbird	11				
Chipping Sp	11				
C Waxwing	1				
Veery	♂				
E Wood-Pewee	♂				
Rb Gull	1				

Behaviour	
F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height	
L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Date July 3/10

Location Forest
Wainfleet #4

Observer AW

Start Time 0717

End Time 0727

Weather Temperature 12 Wind Speed Calm

Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Precipitation	None		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)			0						
Visibility	✓															

Species	Number of Birds	Behaviour	Height	Direction	Notes
Cowbird	11				
Rose-br. Grosb	♂				
Hairy Woodp	1				
Yellow Warbler	♂, 1				
C Yellowthroat	♂				
Red-eyed Vireo	♂				
Song Sp	♂, ♂				
Gray Catbird	♂				
Purple Martin	1				
Am Redstart	♂				
House Wren	♂				
Barn Swallow	1				
Am Goldfinch	♂				
B Oriole	1				
Am Crow	1				

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Forest

Date July 3/10

Location Wainfleet #5

Observer AW

Start Time 0732

End Time 0742

Weather Temperature _____ Wind Speed Light

Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Precipitation	None		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)			0						
Visibility	✓															

Species	Number of Birds	Behaviour	Height	Direction	Notes
Red-eyed Vireo	♂				
Am Crow	1				
C Grackles	11				
Am Goldfinch	1, ♂				
Wood Thrush	♂				
cowbird	1				
Red-w B Bird	♂				
Red-w B Bird					
T Titmouse	♂				
Gray Catbird	♂				
Am Robin	11, ♂				
Barn Swallow	111				
Song Sparrow	♂				
Chipping Sp	♂				
B Oriole	1				
Yellow Warbler	11				

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Forest

Date July 3/10

Location Wainfleet #7

Observer AW

Start Time 0802

End Time 0812

Weather	Temperature	<u>15</u>		Wind Speed	<u>Light</u>											
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	W	WNW	NW	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u>0</u>								
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
House Wren	♂				
C Grackle	###; 115, 4				
Wood Thrush	♂				
C Waxwing	11				
Am Robin	### 1				
Yellow Warbler	♂, ♂				
Gray Catbird	♂				
Rose-br Grosb	♂				
N Flicker	♂				
M Dove	♂				
Am Goldfinch	♂, 11				
Purple Martin	1				
Coonbird	11				

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Date July 3/10 Location Forest Wainfleet #9
 Observer AW Start Time 0838 End Time 0848

Weather	Temperature <u>17</u>	Wind Speed <u>Light</u>														
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	W	WNW	NW	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)			<u>0</u>						
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
Rose-br Grosbeak	♂				
Warbling Vireo	♂, ♂				
Am Robin					
N Cardinal	♂, 1				
Least Flycatcher	♂				
Song Sparrow	♂, 1, ♂				
Yellow Warbler	♂, ♂, 1				
Am Goldfinch	♂, ♂				
M Dove	♂				
Purple Martin	1				
Veery	1				
Wood Thrush	♂				
N Flicker	♂				
Starling	1				
R-thr Hummer	2 (♀)				

Behaviour	
F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height	
L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Date July 3/10 Location Forest Wainfleet #12
 Observer AW Start Time 0921 End Time 0931

Weather Temperature 20 Wind Speed Light

Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	W	WNW	NW	NNW
----------------	---	-----	----	-----	---	-----	----	-----	---	-----	-----------	-----	---	-----	----	-----

Precipitation None Fog Drizzle Lt Rain Hvy Rain Cloud Cover (%) 0

Visibility ✓

Species	Number of Birds	Behaviour	Height	Direction	Notes
C Yellowthroat	♂, ♂				
Warbling Vireo	♂				
Least Flycatcher	♂				
M Dove	♂				
B Oriole	1				
Gray Catbird	1				
cowbird	11				
C Grackle	1				
Am Goldfinch	111				
T Vulture	1	(overhead)			
Am Robin	♂				

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Date July 3/10

Location Forest Wainfleet #13

Observer AW

Start Time 0938

End Time 0948

Weather Temperature 20 Wind Speed Light

Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	<u>SW</u>	WSW	W	WNW	NW	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%) <u>0</u>									
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
E Wood-Pewee	1				
Great-cr. Flyc	0 ² ; 1				
Song Sparrow	♂				
Am Crow					
N Cardinal	0 [♂]				
House Wren	♂				
cowbird					
T Vulture	1	(overhead)			
Am Goldfinch					
Red-eyed Vireo	♂				
Chickadee	0 [♂]				
Starling	1				
Am Robin	1				
M Dove	1				

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Field

Date June 5, 2010

Location Wainfleet #1

Observer AW Start Time 1001 End Time 1011

Weather Temperature 22 Wind Speed M

Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	<u>SSW</u>	SW	WSW	WNW	NW	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%) <u>30</u>								
Visibility															

Species	Number of Birds	Behaviour	Height	Direction	Notes
RWB Bird	8 ♂, 4 ♀				
Barn Swallow	1, 1				
Starling	5				
Song Sparrow	1, ♂				
Am Goldfinch	1				
C Waxwing	1				
Savannah Sparrow	1, 1				
C Grackle	1, 3				
H Lark	♂				
Grassy field with herbaceous plants, with scattered shrubs.					
Stop → isolated bush / ditch				<u>C Grackle</u>	
Surrounded by open agricultural land (planted crops)					

Behaviour

F	Flying; purposeful flight
L	Loafing

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

∅ No Direction

Stationary Survey

Date June 5, 2010

Location Field
Wainfleet #2

Observer AW Start Time 1016 End Time 1026

Weather	Temperature <u>22</u>	Wind Speed <u>Moderate +</u>																
Wind Direction	<table border="1" style="width: 100%; text-align: center; font-size: small;"> <tr> <td>N</td><td>NNE</td><td>NE</td><td>ENE</td><td>E</td><td>ESE</td><td>SE</td><td>SSE</td><td>S</td><td>SSW</td><td>SW</td><td>WSW</td><td>W</td><td>WNW</td><td>NW</td><td>NNW</td> </tr> </table>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW			
Precipitation	<table border="1" style="width: 100%; text-align: center; font-size: small;"> <tr> <td>None</td><td>Fog</td><td>Drizzle</td><td>Lt Rain</td><td>Hvy Rain</td> </tr> </table>	None	Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%) <u>30</u>											
None	Fog	Drizzle	Lt Rain	Hvy Rain														
Visibility	<u>✓</u>																	

Species	Number of Birds	Behaviour	Height	Direction	Notes
Yellow Warbler	♂, ♂, ♂				
Red-w B Bird	3 ♂				
Bank Swallow	1				
Cowbird	♂				
Song Sparrow	♂				
C Yellowthroat	♂				
Starling	1				
Am Goldfinch	1				
T Vulture	4	(overhead)			
site is staked out for development					
Stop → gap between trees along road					
grassy field with extensive scattered shrubs; not a good example of open field meadow habitat (too many shrubs)					
surrounded by forest (50%) → agricultural crops (50%)					

Behaviour

F	Flying; purposeful flight
L	Loafing

∅ No Direction

Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Date July 3/10 Location Fields Wainfleet #2
 Observer AW Start Time 1012 End Time 1022

Weather	Temperature <u>22</u>	Wind Speed <u>Moderate</u>														
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%) <u>0</u>									
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
Barn Swallow	III				
Song Sparrow	♂				
Red-w B Bird	♂, III, ♂				
C Yellowthroat	♂, ♂				
Starling	II				
Am Goldfinch	NI				
House Sparrow	I				
R b Gull	I				
Tree Swallow	I				
Cowbird	I				
Killdeer	I				
Yellow Warbler	♂				
Development has started — some land scraped w/ heavy machinery.					

Behaviour

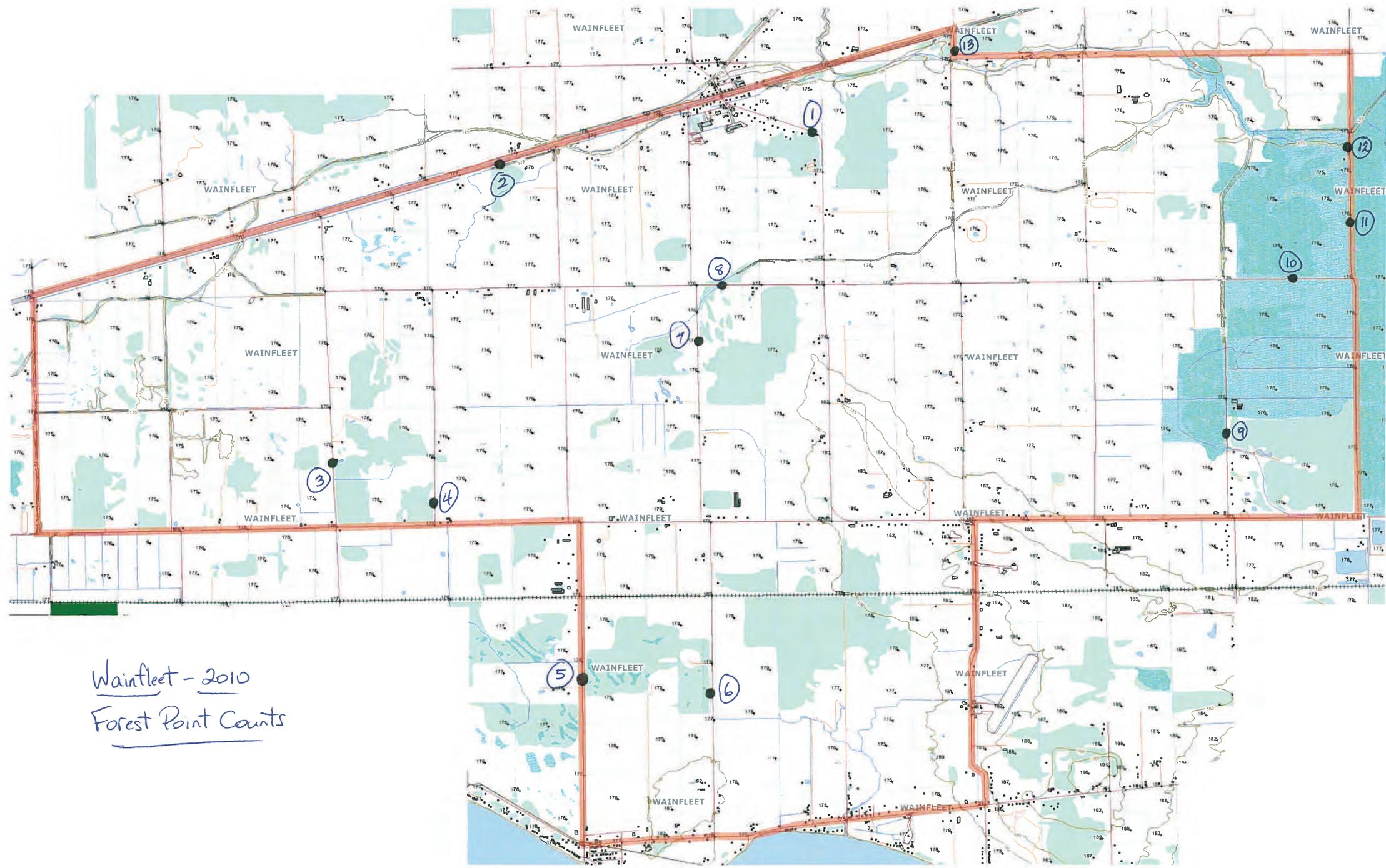
F	Flying; purposeful flight
L	Loafing

∅ No Direction

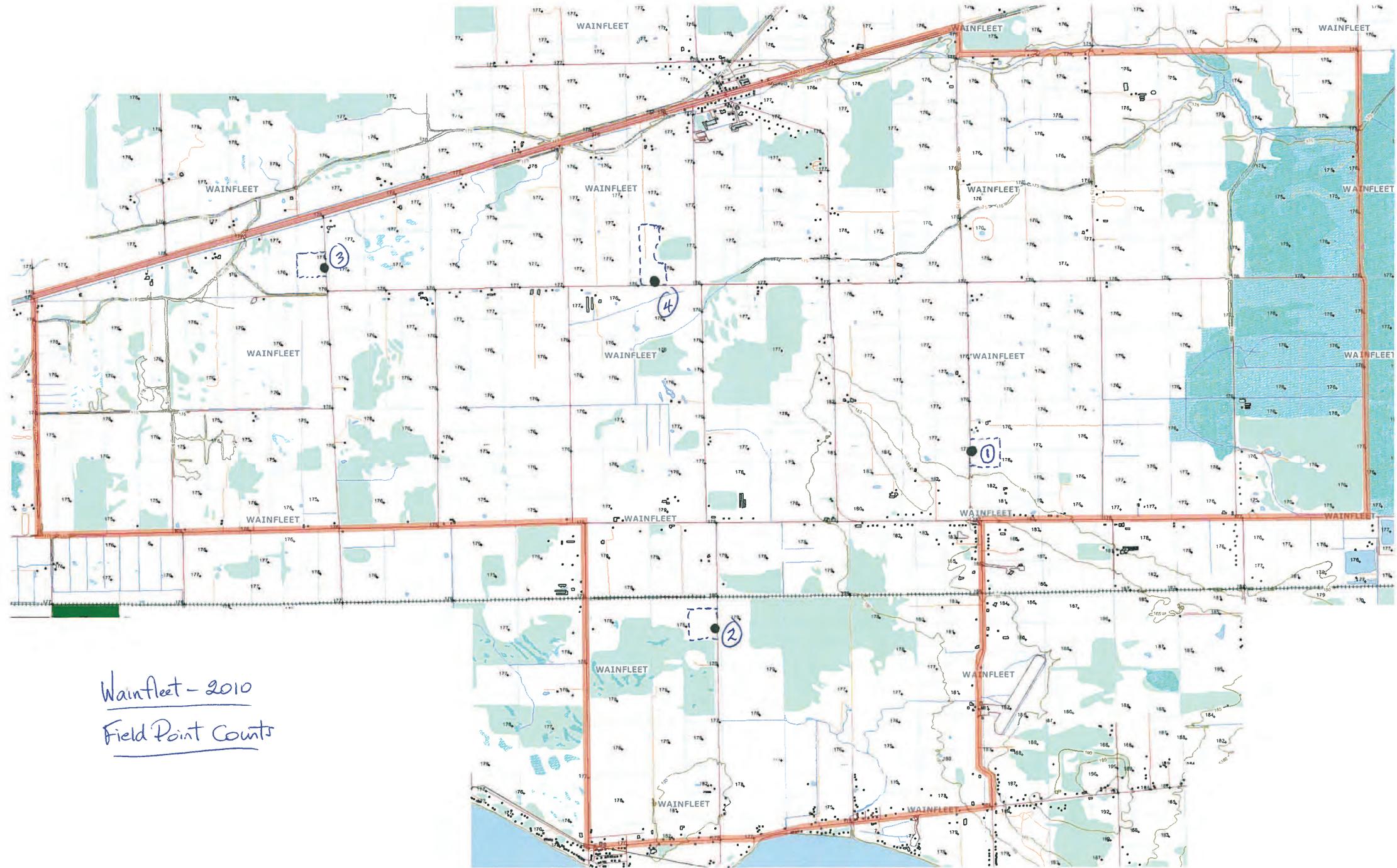
Height

L	Low (< 130 feet)
M	Medium (130 to 410 feet)
H	High (> 410 feet)

Wainfleet - 2010
Forest Point Counts



Wainfleet - 2010
Field Point Counts



~~Area~~

December 7, 2009

WAINFLEET

- ① Red-tailed Hawk - 1 ad (perched/trees)
- ② " " - 1 (" (trees)
- ③ N Shrike - 1 (" / hedgerow)
- ④ Canada Goose - 7 (flying SW @ "M" height)
- ⑤ Snowy Owl - 1 juv. (sitting on ground/grass strip between 2 harvested soybean fields)
- ⑥ Tundra Swan - ~~17~~ 17 (feeding / cut corn field)
- ⑦ Red-tailed Hawk - 1 (perched/trees)
- ⑧ Herring Gull - 370 (resting / plowed field)
- " G B B Gull - 1 (" " ")
- " Ring-b. Gull - 170 (" / " ")
- ⑨ Tundra Swan - ~~6~~ 6 (feeding / harvested soybean field)
- " Mallard - 16 (" / " ")
- ⑩ Eur Starling - 450 (" / " ")
- ⑪ Red-tailed Hawk - 2 (ad. pair) (perched / isolated trees)
- ⑫ Rough-legged Hawk - 1 (" (hedgerow)
- ⑬ Snowy Owl - 1 juv. (" / fencepost)
- ⑭ Red-tailed Hawk - 1 ad (" / hedgerow)
- ⑮ " " " - 1 (" / trees)
- ⑯ N Harrier - 1 ad. ♂ (hunting / meadow)
- ⑰ Red-tailed Hawk - 1 (perched / trees)
- ⑱ Canada Goose - 23 (flying S @ "M" height)
- ⑲ N Harrier - 1 juv. (hunting / fields)
- " Am Kestrel - 1 ♂ (perched / isolated tree)
- ⑳ Red-tailed Hawk - 1 (" / wire)
- ㉑ C Goose - ~~85~~ 85 (feeding / cut corn)
- ㉒ Sharp-sh Hawk - 1 juv. (perched / hedgerow)

Max

December 7, 2009

1300 - 1545
2.75 hrs (72 km) WAIN FLEET ~~FIELD ROAD~~ DAY LIST

Red-tailed Hawk
Am Crow
N Shrike
Canada Goose
Snowy Owl
Rock Pigeon
Tundra Swan
House Sparrow
N Mockingbird
Am Kestrel
Am Tree Sparrow

N- Cardinal
Mallard
Ring-b. Gull
Herring Gull
Great BB Gull
Rough-legged Hawk
Blue Jay
Mourning Dove
N Harrier

(20) species.

WEATHER

100% overcast — occasional very light snow

Light SW winds

Temp about 0°C.

3/4

December 8, 2008

WAINFLEET

~~Time~~

- ① Snowy Owl - 1 juv. (sitting / fence post) - same as yesterday
- ② Herring Gull - 340 (resting / plowed field)
- " Ring-billed Gull - 60 (" / " ")
- ③ ~~Red-tailed Hawk~~ Rough-legged - 1 (perched / edge of woodlot)
- ④ Red-tailed Hawk - 1 ad. (" / inside woodlot)
- ⑤ " " " - 1 ad. (" / ~~edge~~ " woodlot)
- ⑥ " " " - 1 ad. (" / " ")
- ⑦ Am Kestrel - 1 ♂ (" / wire)
- ⑧ Red-tailed Hawk - 1 juv. (perched / isolated tree)
- ⑨ " " " - 1 (" / hedgerow)
- ⑩ Tundra Swan - 24 (feeding / harvested soybean field)
- ⑪ Canada Goose - 80 (flying S @ "H" height)
- ⑫ Red-tailed Hawk - 1 ad. (perched / isolated tree)
- ⑬ " " " - 1 (" / " ")

0845 - 1115
2.5 hrs - 69 km

WAINFLEET - DAY LIST
December 8, 2009

Blue Jay
Snowy Owl
Rock Pigeon
Mourning Dove
Am Crow
Eur. Starling
N. Cardinal
Red-tailed Hawk
Herring Gull
Ring-billed Gull

Rough-legged Hawk
Black-capped Chickadee
Am. Kestrel
Am. Goldfinch
Tundra Swan
Canada Goose
Am Tree Sparrow

(17) species

WEATHER

Wind Light

Cloud - Partly Cloudy

Temp - 0°C.

Wainfleet
January 31, 2010

- ① Red-tailed Hawk - 2 adults (pair) ^{perched} (edge of small woodlot)
- ② " " " - 1 adult perched (forest)
- ③ " " " - 1 adult perched (")
- ④ " " " - 1 adult flying (wood edge)
- ⑤ " " " - 1 flying (wood edge)
- ⑥ N Shrike - 1 perched (hedgerow)
- ⑦ Horned Lark - 9 feeding (road)
- ⑧ Snow Bunting - 320 feeding (soybean stubble)
- ⑨ N Cardinal - 12 (hedgerow)
- " White-crowned Sparrow - 3 (")

2.5 hrs (61 km)

Wainfleet - Day List
January 31, 2010

Eur. Starling
Am Crow
Am Tree Sparrow
Red-tailed Hawk
Blue Jay
Mourning Dove
Dark-eyed Junco
Mourning Dove
Rock Pigeon
Black-capped Chickadee

Horned Lark
N. Cardinal
House Finch
White-throated Sparrow
N. Shrike
Snow Bunting
White-crowned Sparrow

(17) species

WEATHER

partly cloudy - occasional very light snow

light W wind

Temp: -8°C .

minimum snow cover

Wainfleet
Feb 21, 2010

- | | | | | |
|---|-------------------|------|-------------|-------------------------------|
| ① | Am Kestrel | x 1 | ♂ | (sitting / wire) |
| ② | Cooper's Hawk | x 1 | ad. ♂ | (hunting / brushpile) |
| ③ | Red-tailed | x 1 | ad | (flying / woods) |
| ④ | Am Kestrel | x 1 | | (sitting / hedgerow) |
| ⑤ | Bald Eagle | x 1 | ad | (flying high, going NE to SW) |
| ⑥ | Red-tailed | x 1 | | (sitting / trees) |
| ⑦ | " " | x 1 | | (" / isolated tree) |
| ⑧ | " " | x 2 | | (" / trees) |
| ⑨ | " " | x 1 | | (" / shrub) |
| ⑩ | Wild Turkey | x 55 | | (feeding / corn stubble) |
| ⑪ | Red-tailed | x 2 | ad (pair) | (sitting / woodlot) |
| ⑫ | Rough-legged Hawk | x 1 | light morph | (" / isolated tree) |
| ⑬ | Red-tailed | x 1 | | (" / creek edge) |
| ⑭ | " " | x 1 | | (" / woodlot edge) |
| ⑮ | Am Kestrel | x 1 | ♂ | (" / wire) |

Note: At and post-sunset, numerous flocks of Canada Geese were flying over the study area at various heights, heading northwest. There were 10+ flocks, with each flock containing 20 to 150 birds each.

2.6 hrs. (62 km.)

Wainfleet
Feb. 21, 2010

N. Cardinal
Am Crow
Am Kestrel
Horned Lark (^{spring} migrants)
Blue Jay
Cooper's Hawk
Bald Eagle
Black-capped Chickadee
Eur. Starling
Rock Pigeon
Red-bellied Woodpecker
American Robin
Canada Goose

Am Tree Sparrow
Mourning Dove
Wild Turkey
House Sparrow
Rough-legged Hawk

~~26~~ species
(18)

- clear
- light SW wind
- temp +1°C

snow cover 1"-3" (many bare patches)

APPENDIX B
Plant List

Ontario Plant List, Newmaster 1998							Coefficient Conservation	Coefficient Wetness	COSEWIC	COSSARO	SRank	NPCA Rare	Introduced
Common Names	Cultural	FOD9-2	FOD9-3	SWD	MAS2-1	MAS2							
Manitoba Maple	x						0	-2			S5		
Norway Maple							0	5			SE5		I
Red Maple		x					4	0			S5		
Sugar Maple	x		x	x			4	3			S5		
Freeman's Maple	x										S5		
Horse Chestnut	x						0	5			SE2		I
Garlic Mustard	x		x	x			0	0			SE5		I
Common Ragweed				x			0	3			S5		
Smooth Serviceberry			x				5	5			S5		
Hog Peanut				x			4	0			S5		
Canada Anemone				x			3	-3			S5		
Indian Hemp		x					3	0			S5		
Common Burdock				x			0	5			SE5		I
Jack-in-the-pulpit		x	x				5	-2			S5		
Poke Milkweed				x			8	5			S4	r	
Swamp Milkweed					x		6	-5			S5		
Common Milkweed				x			0	5			S5		
White Wood Aster				x			10	5	THR	THR	S1	r	
Calico Aster		x	x				3	-2			S4?		
Large-leaved Aster		x	x				5	5			S5		
New England Aster				x			2	-3			S5		
Yellow Birch							6	0			S5		
Devil's Beggar-ticks		x		x			3	-3			S5		
False Nettle				x			4	-5			S5		
Common Wood Sedge		x					3	0			S5		
Oval-headed Sedge		x					5	3			S5		
Bristly Sedge		x					5	-5			S5		
Graceful Sedge				x			4	3			S5		
Bladder Sedge				x			6	-4			S5		
Pennsylvania Sedge		x	x				5	5			S5		
Cypress-like Sedge		x					6	-5			S5		
Sedge Species		x		x									
Awl-fruited Sedge		x					3	-5			S5		
Inflated Sedge				x			7	-5			S5	r	
Blue Beech		x	x				6	0			S5		
Bitternut Hickory	x	x		x			6	0			S5		
Pignut Hickory	x						9	3			S3	r	
Shagbark Hickory	x	x	x				6	3			S5		
Northern Catalpa	x						0	3			SE1		I
Knapweed Species	x			x									
Chicory	x						0	5			SE5		I
Canada Enchanter's Nightshade		x	x	x			3	3			S5		
Canada Thistle				x			0	3			SE5		I
Bull Thistle				x			0	4			SE5		I
Grey Dogwood	x			x	x		2	-2			S5		
Rough-leaved Dogwood			x				6	5			S5		
Red-osier Dogwood				x	x		2	-3			S5		
Hawthorn Species	x												
Wild Carrot	x			x			0	5			SE5		I
Common Teasel	x						0	5			SE5		I
Wild Cucumber				x			3	-2			S5		
Bottlebrush Grass		x					5	5			S5		
Field Horsetail		x					0	0			S5		
Daisy Fleabane				x			0	1			S5		
Philadelphia Fleabane							1	-3			S5		
Running Strawberry-bush		x	x				6	5			S5		
Common Boneset				x			2	-4			S5		
Grass-leaved Goldenrod					x		2	-2			S5		
American Beech		x					6	3			S5		
Fescue Species	x												
Woodland Strawberry		x	x				4	4			S5		
Common Strawberry		x	x				2	1			S5		
White Ash	x		x				4	3			S5		
Black Ash		x					7	-4			S5		
Red Ash	x	x	x				3	-3			S5		
Blunt-leaved Bedstraw		x					6	-5			S4S5		
Spotted Crane's-bill		x	x				6	3			S5		
Herb Robert		x					0	5			SE5		I
Large-leaved Avens		x	x				9	-4			S5		
Honey Locust	x						3	0			S2	r	

Ontario Plant List, Newmaster 1998							Coefficient Conservation	Coefficient Wetness	COSEWIC	COSSARO	SRank	NPCA Rare	Introduced
Common Names	Cultural	FOD9-2	FOD9-3	SWD	MAS2-1	MAS2							
Eastern Manna Grass		x					8	-5			S4		
Fowl Manna Grass		x	x				3	-5			S5		
Dame's Rocket				x			0	5			SE5		I
Spotted St. John's-wort		x					5	-1			S5		
Winterberry							5	-4			S5		
Spotted Touch-me-not		x		x			4	-3			S5		
Black Walnut	x	x					5	3			S4		
Rush Species		x											
Eastern Red Cedar	x						4	3			S5		
Rice Cut Grass		x		x			3	-5			S5		
Common Privet	x		x				0	1			SE5		I
Spicebush			x				6	-2			S5		
Tartarian Honeysuckle	x						0	3			SE5		I
European Water-horehound		x					0	-5			SE5		I
Fringed Loosestrife				x			4	-3			S5		
False Solomon's Seal		x					4	3			S5		
Common Apple	x						0	5			SE5		I
Alfalfa	x						0	5			SE5		I
White Sweet-clover	x						0	3			SE5		I
Yellow Sweet-clover	x						0	3			SE5		I
Sensitive Fern			x				4	-3			S5		
Hop Hornbeam		x	x				4	4			S5		
Thicket Creeper		x	x	x			3	3			S5		
Reed Canary Grass	x			x		x	0	-4			S5		
Pokeweed				x			3	1			S4		
Norway Spruce	x						0	5			SE3		I
White Spruce	x						6	3			S5	r	
Common Clearweed				x			5	-3			S5		
Eastern White Pine		x					4	3			S5		
Canada Blue Grass	x						0	2			S5		
Mayapple		x	x				5	3			S5		
Christmas Fern		x	x				5	5			S5		
Balsam Poplar	x						4	-3			S5		
Eastern Cottonwood	x						4	-1			S5		
Trembling Aspen	x	x					2	0			S5		
Common Cinquefoil		x					3	4			S5		
Selfheal		x					0	0			SE3		I
Black Cherry							3	3			S5		
Choke Cherry		x	x				2	1			S5		
Eastern Bracken Fern	x						2	3			S5		
Common Pear	x						0	5			SE4		I
Swamp White Oak	x	x		x			8	-4			S4		
Bur Oak	x		x				5	1			S5		
Pin Oak	x	x					9	-3			S3		
Red Oak	x		x				6	3			S5		
Kidney-leaf Buttercup		x					2	-2			S5		
Early Buttercup	x						9	3			S4		
Common Buckthorn	x			x			0	3			SE5		I
Staghorn Sumac	x				x		1	5			S5		
Currant Species			x										
Black Locust		x					0	4			SE5		I
Red Raspberry			x				0	5			SE1		I
Black Raspberry		x					2	5			S5		
Dwarf Raspberry		x					4	-4			S5		
White Willow	x						0	-3			SE4		I
Crack Willow				x	x		0	-1			SE5		I
Willow Species		x											
Canada Goldenrod		x	x	x			1	3			S5		
Rough Goldenrod		x					4	-1			S5		
Marsh Fern		x					5	-4			S5		
Basswood	x		x				4	3			S5		
Climbing Poison-ivy		x	x				5	-1			S5		
Western Poison-ivy		x	x				0	0			S5		
Red Trillium		x					6	1			S5		
Narrow-leaved Cattail		x			x	x	3	-5			S5		
Broad-leaved Cattail					x	x	3	-5			S5		
Hybrid Cattail					x	x	3	-5			S4?		
White Elm	x	x	x	x			3	-2			S5		
White Vervain		x					4	-1			S5		
Violet Species			x										

Ontario Plant List, Newmaster 1998													
Common Names							Coefficient Conservation	Coefficient Wetness	COSEWIC	COSSARO	SRank	NPCA Rare	Introduced
	Cultural	FOD9-2	FOD9-3	SWD	MAS2-1	MAS2							
Riverbank Grape		x					0	-2			S5		
							AVERAGE	4.8	1.0				
							TOTAL			1	1	6	27

10.0 List of Regionally Rare Plants as taken from Oldham 2010

Common Names	Scientific Name
Sweetflag	<i>Acorus americanus</i>
Yellow Giant Hyssop	<i>Agastache nepetoides</i>
Small-flowered Agrimony	<i>Agrimonia parviflora</i>
Soft Agrimony	<i>Agrimonia pubescens</i>
Rough Hair Grass	<i>Agrostis scabra</i>
Narrow-leaved Water-plantain	<i>Alisma gramineum</i>
Short-awned Foxtail	<i>Alopecurus aequalis</i>
Water-hemp	<i>Amaranthus tuberculatus</i>
Giant Ragweed	<i>Ambrosia trifida</i>
Round-leaved Serviceberry	<i>Amelanchier sanguinea</i>
Low Serviceberry	<i>Amelanchier spicata</i>
Beach Grass	<i>Ammophila breviligulata</i>
Pearly Everlasting	<i>Anaphalis margaritacea</i>
White Thimbleweed	<i>Anemone virginiana</i> var. <i>alba</i>
Purple-stem Angelica	<i>Angelica atropurpurea</i>
Sicklepod	<i>Arabis canadensis</i>
Drummond's Rock Cress	<i>Arabis drummondii</i>
Tower Mustard	<i>Arabis glabra</i>
Lyre-leaved Rock Cress	<i>Arabis lyrata</i>
Bristly Sarsaparilla	<i>Aralia hispida</i>
Green Dragon	<i>Arisaema dracontium</i>
Sagewort Wormwood	<i>Artemisia campestris</i> ssp. <i>caudata</i>
Poke Milkweed	<i>Asclepias exaltata</i>
Butterfly Weed	<i>Asclepias tuberosa</i>
Pawpaw	<i>Asimina triloba</i>
Ebony Spleenwort	<i>Asplenium platyneuron</i>
Walking Fern	<i>Asplenium rhizophyllum</i>
Calcic Maidenhair Spleenwort	<i>Asplenium trichomanes</i> ssp. <i>quadrivalens</i>
Schreber's Aster	<i>Aster schreberi</i>
Smooth False Foxglove	<i>Aureolaria flava</i>
Mosquito Fern	<i>Azolla caroliniana</i>
Yellow Indigo	<i>Baptisia tinctoria</i>
Yellow Bartonias	<i>Bartonia virginica</i>
Cherry Birch	<i>Betula lenta</i>
Tall Swamp Beggar-ticks	<i>Bidens coronata</i>
Small Beggar-ticks	<i>Bidens discoidea</i>
Leathery Grape Fern	<i>Botrychium multifidum</i>
Long-awned Wood Grass	<i>Brachyelytrum erectum</i>
Water-shield	<i>Brasenia schreberi</i>
Tall Brome	<i>Bromus latiglumis</i>
Sea-rocket	<i>Cakile edentula</i>
Tall Bellflower	<i>Campanula americana</i>
Marsh Bellflower	<i>Campanula aparinoides</i>
White Spring Cress	<i>Cardamine bulbosa</i>
Pink Spring Cress	<i>Cardamine douglassii</i>

Common Names	Scientific Name
Hybrid Toothwort	Cardamine x maxima
Sharp-scaled Oak Sedge	Carex albicans var. albicans
Blunt-scaled Oak Sedge	Carex albicans var. emmonsii
Brown-headed Fox Sedge	Carex alopecoidea
Appalachian Sedge	Carex appalachica
Water Sedge	Carex aquatilis
Drooping Wood Sedge	Carex arctata
Back's Sedge	Carex backii
Early Fen Sedge	Carex crawei
Clustered Sedge	Carex cumulata
Awned Graceful Sedge	Carex davisii
Lesser Panicked Sedge	Carex diandra
Two-seeded Sedge	Carex disperma
False Golden Sedge	Carex garberi
Slender Wood Sedge	Carex gracilescens
Common Bur Sedge	Carex grayi
Nodding Sedge	Carex gynandra
James' Sedge	Carex jamesii
Smooth-sheathed Sedge	Carex laevivaginata
Spreading Wood Sedge	Carex laxiculmis var. copulata
Few-nerved Wood Sedge	Carex leptoneuria
Mud Sedge	Carex limosa
Distant Sedge	Carex lucorum
Sallow Sedge	Carex lurida
Stunted Sedge	Carex magellanica ssp. irrigua
Larger Straw Sedge	Carex normalis
Few-fruited Sedge	Carex oligocarpa
Few-seeded Sedge	Carex oligosperma
Necklace-like Spiked Sedge	Carex ormostachya
Pale Sedge	Carex pallescens
Peck's Sedge	Carex peckii
Broad-leaved Wolly Sedge	Carex pellita
Drooping Sedge	Carex prasina
Necklace Sedge	Carex projecta
Reflexed Sedge	Carex retroflexa
Rough Sedge	Carex scabrata
Swamp Star Sedge	Carex seorsa
Long-beaked Sedge	Carex sprengei
Fen Star Sedge	Carex sterilis
Three-seeded Sedge	Carex trisperma
Early Oak Sedge	Carex umbellata
Beaked Sedge	Carex utriculata
Inflated Sedge	Carex vesicaria
Ribbed Sedge	Carex virescens
Purple-tinged Sedge	Carex woodii
Pignut Hickory	Carya glabra

Common Names	Scientific Name
Big Shellbark Hickory	<i>Carya laciniosa</i>
American Chestnut	<i>Castanea dentata</i>
Indian Paintbrush	<i>Castilleja coccinea</i>
Hackberry	<i>Celtis occidentalis</i>
Sandbur	<i>Cenchrus longispinus</i>
Common Coontail	<i>Ceratophyllum demersum</i>
Leatherleaf	<i>Chamaedaphne calyculata</i>
Little Ground Rose	<i>Chamaesyce nutans</i>
Seaside Spurge	<i>Chamaesyce polygonifolia</i>
Strawberry Blite	<i>Chenopodium capitatum</i>
Maple-leaved Goosefoot	<i>Chenopodium simplex</i>
Golden Saxifrage	<i>Chrysosplenium americanum</i>
Drooping Woodreed	<i>Cinna latifolia</i>
Dwarf Enchanter's Nightshade	<i>Circaea alpina</i>
Field Thistle	<i>Cirsium discolor</i>
Swamp Thistle	<i>Cirsium muticum</i>
Twig-rush	<i>Cladium mariscoides</i>
Carolina Spring Beauty	<i>Claytonia caroliniana</i>
Hemlock-parsley	<i>Conioselinum chinense</i>
Squawroot	<i>Conopholis americana</i>
Pallas Bugseed	<i>Corispermum pallasii</i>
Bunchberry	<i>Cornus canadensis</i>
Eastern Flowering Dogwood	<i>Cornus florida</i>
Pale Corydalis	<i>Corydalis flavula</i>
American Hazelnut	<i>Corylus americana</i>
Fireberry Hawthorn	<i>Crataegus chrysocarpa</i>
Hawthorn	<i>Crataegus conspecta</i>
Cockspur Hawthorn	<i>Crataegus crus-galli</i>
Broad-leaf Hawthorn	<i>Crataegus dilatata</i>
Long-spined Hawthorn	<i>Crataegus macracantha</i>
Downy Hawthorn	<i>Crataegus mollis</i>
Pedicelled Hawthorn	<i>Crataegus pedicellata</i>
Emerson's Hawthorn	<i>Crataegus submollis</i>
Winged Pigweed	<i>Cycloloma atriplicifolium</i>
Brook Nut Sedge	<i>Cyperus bipartitus</i>
Red-rooted Nut Sedge	<i>Cyperus erythrorhizos</i>
Pink Moccasin Flower	<i>Cyripedium acaule</i>
Flat-stem Oat Grass	<i>Danthonia compressa</i>
Swamp Loosestrife	<i>Decodon verticillatus</i>
Silvery Spleenwort	<i>Deparia acrostichoides</i>
Common Hairgrass	<i>Deschampsia flexuosa</i>
Panicled Tick-trefoil	<i>Desmodium paniculatum</i> var. <i>paniculatum</i>
Leatherwood	<i>Dirca palustris</i>
Yellow Mandarin	<i>Disporum lanuginosum</i>
Round-leaved Sundew	<i>Drosera rotundifolia</i>
Clinton's Wood Fern	<i>Dryopteris clintoniana</i>

Common Names	Scientific Name
Goldie's Wood Fern	<i>Dryopteris goldiana</i>
Three-way Sedge	<i>Dulichium arundinaceum</i>
Needle Spike-rush	<i>Eleocharis acicularis</i>
Elliptic Spike-rush	<i>Eleocharis elliptica</i>
Few-flowered Spike-rush	<i>Eleocharis pauciflora</i>
Small's Spike-rush	<i>Eleocharis smallii</i>
Canada Wild Rye	<i>Elymus canadensis</i>
Riverbank Wild Rye	<i>Elymus riparius</i>
Slender Wheat Grass	<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>
Downy Wild Rye	<i>Elymus villosus</i>
Fireweed	<i>Epilobium angustifolium</i>
Narrow-leaved Willow-herb	<i>Epilobium leptophyllum</i>
Water Horsetail	<i>Equisetum fluviatile</i>
Meadow Horsetail	<i>Equisetum pratense</i>
Sandbar Love Grass	<i>Eragrostis frankii</i>
Pilewort	<i>Erechtites hieracifolia</i>
Lesser Daisy Fleabane	<i>Erigeron strigosus</i>
Sheathed Cottongrass	<i>Eriophorum vaginatum</i> ssp. <i>spissum</i>
Virginia Cottongrass	<i>Eriophorum virginicum</i>
Thin-leaved Cottongrass	<i>Eriophorum viridi-carinatum</i>
Burning Bush	<i>Euonymus atropurpurea</i> var. <i>atropurpurea</i>
Purple Joe-pye-weed	<i>Eupatorium purpureum</i> var. <i>purpureum</i>
False Mermaid	<i>Floerkea proserpinacoides</i>
Pumpkin Ash	<i>Fraxinus profunda</i>
Stiff Marsh Bedstraw	<i>Galium tinctorium</i>
Biennial Gaura	<i>Gaura biennis</i>
Black Huckleberry	<i>Gaylussacia baccata</i>
Fringed Gentian	<i>Gentianopsis crinita</i>
Spring Avens	<i>Geum vernum</i>
Honey Locust	<i>Gleditsia triacanthos</i>
Rattlesnake Manna Grass	<i>Glyceria canadensis</i>
Fragrant Cudweed	<i>Gnaphalium obtusifolium</i>
Sneezeweed	<i>Helenium autumnale</i>
Thin-leaved Sunflower	<i>Helianthus decapetalus</i>
Sweet Ox-eye	<i>Heliopsis helianthoides</i>
Cow-parsnip	<i>Heracleum lanatum</i>
Water Star-grass	<i>Heteranthera dubia</i>
Swamp Rose-mallow	<i>Hibiscus moscheutos</i> ssp. <i>moscheutos</i>
Panicled Hawkweed	<i>Hieracium paniculatum</i>
Shining Clubmoss	<i>Huperzia lucidula</i>
Golden Seal	<i>Hydrastis canadensis</i>
Pale St. John's-wort	<i>Hypericum ellipticum</i>
Larger Canadian St. John's-wort	<i>Hypericum majus</i>
Dwarf St. John's-wort	<i>Hypericum mutilum</i> ssp. <i>mutilum</i>
Southern Blue-flag	<i>Iris virginica</i>
Twinleaf	<i>Jeffersonia diphylla</i>

Common Names	Scientific Name
Butternut	<i>Juglans cinerea</i>
Sharp-fruited Rush	<i>Juncus acuminatus</i>
Alpine Rush	<i>Juncus alpinoarticulatus</i>
Wire Rush	<i>Juncus balticus</i>
Canada Rush	<i>Juncus canadensis</i>
Water Willow	<i>Justicia americana</i>
Bog Laurel	<i>Kalmia polifolia</i>
Tamarack	<i>Larix laricina</i>
Beach Pea	<i>Lathyrus japonicus</i>
Pale Vetchling	<i>Lathyrus ochroleucus</i>
Marsh Vetchling	<i>Lathyrus palustris</i>
Labrador Tea	<i>Ledum groenlandicum</i>
Virginia Pepper-grass	<i>Lepidium virginicum</i>
Round-headed Bush-clover	<i>Lespedeza capitata</i>
Hairy Bush-clover	<i>Lespedeza hirta</i>
Violet Bush-clover	<i>Lespedeza violacea</i>
Wood Lily	<i>Lilium philadelphicum</i>
Blue Toadflax	<i>Linaria canadensis</i>
Slender Yellow Flax	<i>Linum virginianum</i>
Loesel's Twayblade	<i>Liparis loeselii</i>
Tulip Tree	<i>Liriodendron tulipifera</i>
Kalm's Lobelia	<i>Lobelia kalmii</i>
Hairy Honeysuckle	<i>Lonicera hirsuta</i>
Many-fruited Ludwigia	<i>Ludwigia polycarpa</i>
Common Clubmoss	<i>Lycopodium clavatum</i>
Prickly Tree Clubmoss	<i>Lycopodium dendroideum</i>
Virginia Water-horehound	<i>Lycopus virginicus</i>
Linear-leaved Loosestrife	<i>Lysimachia quadriflora</i>
Swamp Candles	<i>Lysimachia terrestris</i>
Cucumber Magnolia	<i>Magnolia acuminata</i>
Three-leaved Solomon's Seal	<i>Maianthemum trifolium</i>
White Adder's-mouth	<i>Malaxis monophyllos ssp. brachypoda</i>
Cow-wheat	<i>Melampyrum lineare</i>
Common Bogbean	<i>Menyanthes trifoliata</i>
Virginia Bluebells	<i>Mertensia virginica</i>
Wood Millet	<i>Milium effusum</i>
Naked Mitrewort	<i>Mitella nuda</i>
Red Mulberry	<i>Morus rubra</i>
Niblewill	<i>Muhlenbergia schreberi</i>
Slender Naiad	<i>Najas flexilis</i>
Mountain-holly	<i>Nemopanthus mucronatus</i>
Large Yellow Pond-lily	<i>Nuphar advena</i>
Small Yellow Pond-lily	<i>Nuphar microphylla</i>
Black Gum	<i>Nyssa sylvatica</i>
Prairie Evening-primrose	<i>Oenothera pilosella ssp. pilosella</i>
One-flowered Cancer Root	<i>Orobanche uniflora</i>

Common Names	Scientific Name
Ginseng	<i>Panax quinquefolius</i>
Narrow-leaved Panic Grass	<i>Panicum linearifolium</i>
Switch Grass	<i>Panicum virgatum</i>
Wood-betony	<i>Pedicularis canadensis</i>
Swamp Lousewort	<i>Pedicularis lanceolata</i>
Purple-stem Cliff-brake	<i>Pellaea atropurpurea</i>
Smooth Cliff-brake	<i>Pellaea glabella</i> ssp. <i>glabella</i>
Sweet Coltsfoot	<i>Petasites frigidus</i>
Broad Beech Fern	<i>Phegopteris hexagonoptera</i>
Clammy Ground-cherry	<i>Physalis heterophylla</i>
Virginia False Dragonhead	<i>Physostegia virginiana</i>
White Spruce	<i>Picea glauca</i>
Black Spruce	<i>Picea mariana</i>
Sycamore	<i>Platanus occidentalis</i>
Grove Blue Grass	<i>Poa alsodes</i>
Rose Pogonia	<i>Pogonia ophioglossoides</i>
Fringed Polygala	<i>Polygala paucifolia</i>
Field Milkwort	<i>Polygala sanguinea</i>
Seneca Snakeroot	<i>Polygala senega</i>
Whorled Milkwort	<i>Polygala verticillata</i>
Smooth Solomon's Seal	<i>Polygonatum biflorum</i>
Striate Knotweed	<i>Polygonum achoreum</i>
Halberd-leaved Tearthumb	<i>Polygonum arifolium</i>
Mild Water Pepper	<i>Polygonum hydropiperoides</i>
Climbing False Buckwheat	<i>Polygonum scandens</i>
Small-flowered Leaf-cup	<i>Polymnia canadensis</i>
Rock Polypody	<i>Polypodium virginianum</i>
Pickerel-weed	<i>Pontederia cordata</i>
Ribbon-leaf Pondweed	<i>Potamogeton epihydrus</i>
Illinois Pondweed	<i>Potamogeton illinoensis</i>
Long-leaved Pondweed	<i>Potamogeton nodosus</i>
Sago Pondweed	<i>Potamogeton pectinatus</i>
Richardson's Pondweed	<i>Potamogeton richardsonii</i>
Flat-stem Pondweed	<i>Potamogeton zosteriformis</i>
Marsh Cinquefoil	<i>Potentilla palustris</i>
Marsh Mermaid-weed	<i>Proserpinaca palustris</i>
American Plum	<i>Prunus americana</i>
Sand Cherry	<i>Prunus pumila</i> var. <i>pumila</i>
Shumard Oak	<i>Quercus shumardii</i>
White Water Crowfoot	<i>Ranunculus aquatilis</i> var. <i>diffusus</i>
Yellow Water Buttercup	<i>Ranunculus flabellaris</i>
Hairy Buttercup	<i>Ranunculus hispidus</i> var. <i>hispidus</i>
Poison Sumac	<i>Rhus vernix</i>
Smooth Gooseberry	<i>Ribes hirtellum</i>
Swamp Red Currant	<i>Ribes triste</i>
Northern Dewberry	<i>Rubus flagellaris</i>

Common Names	Scientific Name
Bristly Raspberry	<i>Rubus setosus</i>
Great Water Dock	<i>Rumex orbiculatus</i>
Swamp Dock	<i>Rumex verticillatus</i>
Sessile-fruited Arrowhead	<i>Sagittaria rigida</i>
Sage-leaved Willow	<i>Salix candida</i>
Upland Willow	<i>Salix humilis</i>
Shining Willow	<i>Salix lucida</i>
Autumn Willow	<i>Salix serissima</i>
Water Pimpernel	<i>Samolus valerandi</i> ssp. <i>parviflorus</i>
Short-styled Snakeroot	<i>Sanicula canadensis</i> var. <i>canadensis</i>
Large-fruited Snakeroot	<i>Sanicula trifoliata</i>
Lizard's Tail	<i>Saururus cernuus</i>
Little Bluestem	<i>Schizachyrium scoparium</i>
Hardstem Bulrush	<i>Scirpus acutus</i>
River Bulrush	<i>Scirpus fluviatilis</i>
Mosquito Bulrush	<i>Scirpus hattorianus</i>
Small-fruited Bulrush	<i>Scirpus microcarpus</i>
Common Three-square	<i>Scirpus pungens</i>
Carpenter's Square	<i>Scrophularia marilandica</i>
Golden Ragwort	<i>Senecio aureus</i>
Balsam Ragwort	<i>Senecio pauperculus</i>
Buffalo Berry	<i>Shepherdia canadensis</i>
One-seeded Bur Cucumber	<i>Sicyos angulatus</i>
Slender Blue-eyed Grass	<i>Sisyrinchium mucronatum</i>
Hairy-nerved Carrion Flower	<i>Smilax lasioneura</i>
Common Greenbrier	<i>Smilax rotundifolia</i>
Sharp-leaved Goldenrod	<i>Solidago arguta</i> var. <i>arguta</i>
American Mountain-ash	<i>Sorbus americana</i>
Nuttall's Bur-reed	<i>Sparganium americanum</i>
Freshwater Cord Grass	<i>Spartina pectinata</i>
Nodding Ladies' Tresses	<i>Spiranthes cernua</i>
Great Plains Ladies' Tresses	<i>Spiranthes magnicamporum</i>
Hooded Ladies' Tresses	<i>Spiranthes romanzoffiana</i>
Sand Dropseed	<i>Sporobolus cryptandrus</i>
Small Rush Grass	<i>Sporobolus neglectus</i>
Rough Hedge-nettle	<i>Stachys hispida</i>
Rose Twisted Stalk	<i>Streptopus roseus</i>
Trailing Wild Bean	<i>Strophostyles helvula</i>
Yellow Pimpernel	<i>Taenidia integerrima</i>
Fraser's St. John's-wort	<i>Triadenum fraseri</i>
Marsh St. Johnswort	<i>Triadenum virginicum</i>
False Pennyroyal	<i>Trichostema brachiatum</i>
Clasping Bellwort	<i>Triodanis perfoliata</i>
Sand Grass	<i>Triplasis purpurea</i>
Rock Elm	<i>Ulmus thomasii</i>
Perfoliate Bellwort	<i>Uvularia perfoliata</i>

Common Names	Scientific Name
Sessile-leaved Bellwort	<i>Uvularia sessilifolia</i>
Velvetleaf Blueberry	<i>Vaccinium myrtilloides</i>
Tape-grass	<i>Vallisneria americana</i>
Narrow-leaved Vervain	<i>Verbena simplex</i>
Hoary Vervain	<i>Verbena stricta</i>
American Speedwell	<i>Veronica americana</i>
Wild Raisin	<i>Viburnum cassinoides</i>
Purple Vetch	<i>Vicia americana</i>
Carolina Vetch	<i>Vicia caroliniana</i>
Le Conte's Violet	<i>Viola affinis</i>
Lance-leaved Violet	<i>Viola lanceolata</i>
Smooth White Violet	<i>Viola macloskeyi</i> ssp. <i>pallens</i>
Kidney-leaf Violet	<i>Viola renifolia</i>
Round-leaved Violet	<i>Viola rotundifolia</i>
Dotted Water Meal	<i>Wolffia borealis</i>
Columbia Water Meal	<i>Wolffia columbiana</i>
Virginia Chain Fern	<i>Woodwardia virginica</i>
Horned Pondweed	<i>Zannichellia palustris</i>
White Camass	<i>Zigadenus elegans</i> ssp. <i>glaucus</i>

Study Site WL-02

Mill Creek – Inverary Woods

Municipality Township of West Lincoln

Formerly Inverary Woods (Brady, et al. 1980)

Approximate Area 363 hectares

Watershed The majority of this study site drains to the Mill Creek subwatershed with a small portion in the south/east draining to Moores Creek.

Ownership Mostly private

General Summary This study site is located near the boundary of the Niagara Region and the City of Hamilton within the Township of West Lincoln. It is between Sixteen Road in the north and Bismark Road in the south. It extends from Westborok Road in the west to Caistor Centre Road in the east.

Physical Description

This natural area is situated on the flat, poorly drained clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Guelph Formation.

A small finger of well drained, sand and gravel of a till moraine feature associated with a Fort Erie Moraine is found in the far north west of this study site.

Soils

Soil Type	Percentage of Study Site
BEVERLY	4.82
HALDIMAND	8.13
LINCOLN	55.17
TOLEDO	30.54
WATER	0.00
NOT MAPPED	1.34
Total %	100.00

Ecological Land Classification

Summary

A small portion of this study site was visited. The dominate community noted was Deciduous Swamp consisting of Red Maple (*Acer rubrum*), Bur Oak (*Quercus macrocarpa*), White Swamp Oak (*Quercus bicolor*), and Shagbark Hickory (*Carya ovata*) in the canopy.

The understory was largely regenerating canopy species with Blue Beech (*Carpinus caroliniana*), Highbush Blueberry (*Vaccinium corybosum*), Selfheal (*Prunella vulgaris* ssp. *vulgaris*), and Winterberry (*Ilex verticillata*).

The ground layer was a mix of Spotted Touch-me-nots (*Impatiens capensis*), Aster species (*Aster sp.*), Fowl Manna Grass (*Glyceria striata*), and Rough Goldenrod (*Solidago rugosa ssp. rugosa*).

A slightly drier community noted was dominated by Red Oak (*Quercus rubra*), Sugar Maple (*Acer saccharum ssp. saccharum*) and White Ash (*Fraxinus americana*).

The understory was characterized by Hop Hornbeam (*Ostrya virginiana*), Black Cherry (*Prunus serotina*), and Serviceberry (*Amelanchier sp.*).

The herbaceous layer was a mix of Large-leaved Aster (*Aster macrophyllus*), Canada Blue Grass (*Poa compressa*), and Sedges (*Carex sp.*).

Vegetation Communities

There are a total of 84 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Swamp (SWD)

Deciduous Forest (FOD)

Shallow Marsh (MAS)

Vegetation Type

Beggar-ticks Mineral Shallow Marsh Type (MASM2-2)

Fresh-Moist Oak-Sugar Maple Deciduous Forest Type (FODM9-1)

Red Maple Mineral Deciduous Swamp Type (SWDM3-1)

Significant Flora

Species at Risk

Cornus florida (Eastern Flowering Dogwood) (NPCA, 2006-2009) – Endangered

Provincially Rare Species – None noted.

Points of Interest

Faunal Records:

2 – Mammals

1 – Reptiles & Amphibians

Site Visits

September 1, 1980

Brady, et al.

October 31, 2008

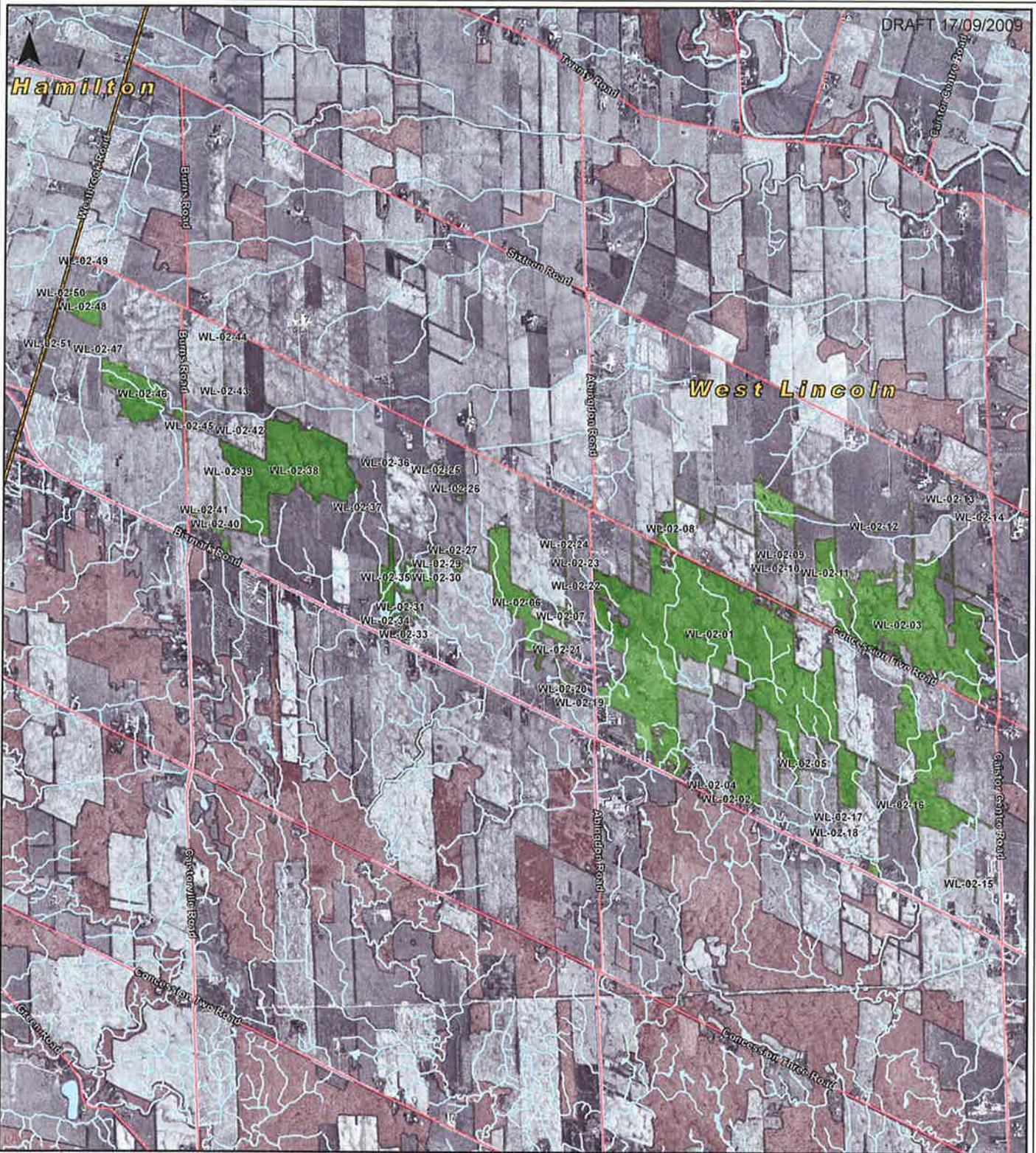
T. Staton, S. Mohamed

% of site visited

6.73 % of the total study site was visited by NAI teams.

References Cited

- Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.
- Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>
- Natural Heritage Areas Inventory 2006-2009. Unpublished database, Niagara Peninsula Conservation Authority, Welland, Ontario.
- Oldham, M. J., & Brinker, S. R. 2009. *Rare Vascular Plants of Ontario (Fourth Edition ed.)*. Peterborough, Ontario: Natural Heritage Information Centre, Ontario Ministry of Natural Resources.
- Ontario Ministry of Agriculture and Food. 1989. *The Soils of The Regional Municipality of Niagara*, Report No. 60 of the Ontario Institute of Pedology, Guelph, Ontario.



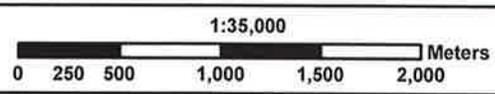
Legend

- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-02



Natural Areas Inventory

Study Site WL-02



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There are a total of 84 recorded taxa (unique plant records) for this study site.
Community Series:
 Deciduous Swamp (SWD)

Study Site WL-05

McCready's Bush

Municipality Township of West Lincoln

Formerly McCready's Bush (Brady, et al., 1980)

Approximate Area 358 hectares

Watershed This study site is basically split in half with the western portion flowing into Moores creek and the eastern portion flowing into Welland River West.

Ownership Mostly private

General Summary

This study site is located between Caistor Centre Road to the west and Smithville Road to the east. It extends from Bismark Road to the north and Concession Two Road to the south.

Physical Description

This natural area is situated on the flat, poorly drained clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Guelph Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	0.15
HALDIMAND	13.57
LINCOLN	85.34
SMITHVILLE	0.15
WATER	0.00
NOT MAPPED	0.79
Total %	100.00

Ecological Land Classification

Summary

The most common community noted for this study site was the Deciduous Swamp dominated by Red Maple (*Acer rubrum*) with Swamp White Oak (*Quercus bicolor*), Green Ash (*Fraxinus pennsylvanica*), and the occasional White Elm (*Ulmus americana*).

The understory was a mix of Green Ash, Blue Beech (*Carpinus caroliniana*), and Winterberry (*Ilex verticillata*).

The herbaceous layer was characterized by Common Cinquefoil (*Potentilla simplex*), Spotted Touch-me-not (*Impatiens capensis*), and Sedges (*Carex sp.*).

The drier areas within the Deciduous Swamps and upland areas of the study site were classified as Deciduous Forests. These forests were dominated by Red Oak (*Quercus rubra*) and White Oak (*Quercus alba*) with Sugar Maple (*Acer saccharum ssp.*

saccharum), Serviceberry (*Amelanchier sp.*), Black Cherry (*Prunus serotina*), Witch-hazel (*Hamamelis virginiana*), and Hop Hornbeam (*Ostrya virginiana*) as understory associates.

The herbaceous layer was a mix of Pennsylvania Sedge (*Carex pennsylvanica*), Black Raspberry (*Rubus allegheniensis*), and Hawkweed (*Hieracium sp.*).

The Thicket Swamp community noted was dominated by Narrow-leaved Meadowsweet (*Spirea alba*) and Three-lobed Beggar-ticks (*Bidens tripartita*).

Vegetation Communities

There are a total of 190 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Forest (FOD)
Deciduous Swamp (SWD)
Mixed Meadow (MEM)
Thicket Swamp (SWT)
Coniferous Forest (FOC)
Floating-leaved Shallow Aquatic (SAF)
Meadow Marsh (MAM)
Thicket Swamp (SWT)
Shallow Marsh (MAS)

Vegetation Type

Buttonbush Mineral Deciduous Thicket Swamp Type (SWTM5-1)
Buttonbush Organic Deciduous Thicket Swamp Type (SWTO5-1)
Dry-Fresh White Pine Naturalized Coniferous Plantation Type (FOCM6-1)
Duckweed Floating-leaved Shallow Aquatic Type (SAF_1-3)
Fresh-Moist Oak-Maple Deciduous Forest Type (FODM9-2)
Fresh-Moist Oak-Sugar Maple Deciduous Forest Type (FODM9-1)
Fresh-Moist Sugar Maple-Hardwood Deciduous Forest Type (FODM6-5)
Gray Dogwood Mineral Deciduous Thicket Swamp Type (SWTM2-3)
Jewelweed Forb Mineral Meadow Marsh Type (MAMM2-1)
Meadowsweet Mineral Deciduous Thicket Swamp Type (SWTM5-7)
Mixed Mineral Meadow Marsh Type (MAMM3-1)
Red Maple Mineral Deciduous Swamp Type (SWDM3-1)
Rice Cut-grass Mineral Shallow Marsh Type (MASM1-10)
Swamp White Oak Mineral Deciduous Swamp Type (SWDM1-1)

Significant Flora

Species at Risk – None noted.

Provincially Rare Species

Carya glabra (Pignut Hickory) (NPCA, 2006-2009) – S3
Silphium perfoliatum (Cup-plant) (NPCA, 2006-2009) – S2

Points of Interest

Faunal Records:

11 – Birds
6 – Reptiles & Amphibians

5 – Mammals

Site Visits

September 1, 1980
Brady, et al.

September 18, 2008
T. Staton, S. Mohamed

September 25, 2008
T. Staton, S. Mohamed

October 2, 2008
T. Staton, S. Mohamed

October 15, 2008
T. Staton, S. Mohamed

% of site visited

4.71 % of the total study site was visited by NAI teams.

References Cited

Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

Natural Heritage Areas Inventory 2006-2009. Unpublished database, Niagara Peninsula Conservation Authority, Welland, Ontario.

Oldham, M. J., & Brinker, S. R. 2009. *Rare Vascular Plants of Ontario (Fourth Edition ed.)*. Peterborough, Ontario: Natural Heritage Information Centre, Ontario Ministry of Natural Resources.

Ontario Ministry of Agriculture and Food. 1989. *The Soils of The Regional Municipality of Niagara*, Report No. 60 of the Ontario Institute of Pedology, Guelph, Ontario.



Legend

- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-05



Natural Areas Inventory

Study Site WL-05

1:18,000

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There are a total of 190 recorded taxa (unique plant records) for this study site.

Community Series:	
Deciduous Forest (FOD)	Mixed Meadow (MEM)
Deciduous Swamp (SWD)	Thicket Swamp (SWT)

Study Site WL-06

Ruigrok Tract – Caistor Canborough Slough Forest

Municipality Township of West Lincoln

Formerly Ruigrok Tract (Brady, et al., 1980)

Approximate Area 1605 hectares

Watershed The drainage for this study site is split almost in half with the northern drainage going to the Welland River West subwatershed and the south draining to Oswego creek.

Ownership Mostly private with some area owned publicly by the Niagara Peninsula Conservation Authority.

General Summary The study site is located along the boundary between the Region of Niagara and the County of Haldimand so that about two thirds falls within Niagara and about one third in Haldimand. The northern boundary is York Road/ South Chippawa Road and the southern boundary is Regional Road 2/ Regional Road 63. It extends from just east of Turnbull Road in the west to, Caistor-Gainsborough Townline Road in the east.

Physical Description

This natural area is situated on the flat, poorly drained clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone and shale of the Salina Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	0.61
ALLUVIUM 1	0.04
BEVERLY	3.64
BRANTFORD	0.24
HALDIMAND	39.06
HALDIMAND - COARSE PHASE	0.33
LINCOLN	52.04
NOT MAPPED	0.09
SENECA	0.18
SMITHVILLE	3.65
TOLEDO	0.12
WATER	0.00
NOT MAPPED	0.00
Total %	100.00

Ecological Land Classification

Summary

This study site is part of what could potentially be a globally rare community of slough forest. These Deciduous Swamps were dominated by Red Maple (*Acer rubrum*),

Swamp Maple (*Acer freemanii*), and Swamp White Oak (*Quercus bicolor*). Associates included White Elm (*Ulmus americana*), White Ash (*Fraxinus americana*), Basswood (*Tilia americana*), and Shagbark Hickory (*Carya ovata*).

The understory was regenerating canopy species with Blue Beech (*Carpinus caroliniana*), Black Raspberry (*Rubus occidentalis*), Highbush Blueberry (*Vaccinium corymbosum*), Royal Fern (*Osmunda regalis* var. *spectabilis*), Gray Dogwood (*Cornu foemina* ssp. *racemosa*), and Silky Dogwood (*Cornus amomum* ssp. *obliqua*).

The ground layer was a mix of Asters (*Aster* sp.), Sedges (*Carex* sp.), Arrow-leaved tearthumb (*Polygonum sagittatum*), Common Boneset (*Eupatorium perfoliatum*), False Nettle (*Boehmeria cylindrica*), and Rice Cut Grass (*Leersia oryzoides*).

The most common community documented by field teams was the Thicket Swamp. These communities were dominated by Swamp Maple, Swamp White Oak, Red Maple, with Winterberry (*Ilex verticillata*), Buttonbush (*Cephalanthus occidentalis*), Narrow-leaved Meadowsweet (*Spiraea alba*), or Poison Sumac (*Rhus vernix*).

The understory was largely Black Chokeberry (*Aronia melanocarpa*), Highbush Blueberry, Speckled Alder (*Alnus incana* ssp. *rugosa*), and Gray Dogwood.

The ground cover was a mix of Eastern Manna Grass (*Glyceria septentrionalis*), Canada Blue-joint (*Calamagrostis canadensis*), Cinnamon Fern (*Osmunda cinnamomea*), Swamp Rose (*Rosa palustris*), Arrow-leaved Tearthumb (*Polygonum sagittatum*), Devil's Beggar-ticks (*Bidens frondosa*), Spotted Touch-me-nots (*Impatiens capensis*), and Sedges such as, Lakebank Sedge (*Carex lacustris*).

The Deciduous Forests were dominated by White Oak, Red Oak (*Quercus rubra*), Shagbark Hickory, White Ash, and Sugar Maple (*Acer saccharum* ssp. *saccharum*).

Maple-leaved Viburnum (*Viburnum acerifolium*), Choke Cherry (*Prunus virginiana* ssp. *virginiana*), Gray Dogwood, Common Blackberry (*Rubus allegheniensis*), and Narrow-leaved Meadowsweet were common in the understory.

The herbaceous layer was characterized by Large-leaved Aster (*Aster macrophyllus*), Pennsylvania Sedge (*Carex pennsylvanica*), Grass-leaved Goldenrod (*Euthamia graminifolia*), New England Aster (*Aster novae-anglais*), and Eastern Bracken Fern (*Pteridium aquilinum* var. *latiusculum*).

Successional communities of Meadow Marshes and Forb Meadows were also documented for this site. The Meadow Marshes were largely Winterberry and Highbush Cranberry with the occasional White Swamp Oak or Swamp Maple. Very wet depressions supported small inclusions of Narrow-leaved Cattails (*Typha angustifolia*).

The Forb Meadows were mostly Asters and Goldenrods with a ground layer of Mosses (*Moss* sp.) and Common Strawberry (*Fragaria virginiana* ssp. *virginiana*).

The Shallow Marsh communities noted were dominated by Lakebank Sedge and Common Hop Sedge (*Carex lupulina*) with Three-lobed Beggar-ticks (*Bidens tripartita*),

Northern Water-horehound (*Lycopus uniflorus*), Lady's Thumb (*Polygonum persicaria*), Rice Cut Grass, and Fowl Manna Grass (*Glyceria striata*).

Vegetation Communities

There are a total of 313 recorded taxa (unique plant records) for this study site.

Community Series

Coniferous Forest (FOC)
Deciduous Forest (FOD)
Deciduous Swamp (SWD)
Deciduous Thicket (THD)
Forb Meadow (MEF)
Meadow Marsh (MAM)
Shallow Marsh (MAS)
Shrub Bluff (BLS)
Thicket Swamp (SWT)

Vegetation Type

Aster Forb Meadow Type (MEFM1-2)
Beggarticks Organic Shallow Marsh Type (MASO2-4)
Broad-leaved Sedge Mineral Shallow Marsh Type (MASM1-5)
Broad-leaved Sedge Organic Shallow Marsh Type (MASO1-6)
Buttonbush Mineral Deciduous Thicket Swamp Type (SWTM5-1)
Buttonbush Organic Deciduous Thicket Swamp Type (SWTO5-1)
Cattail Graminoid Mineral Meadow Marsh Type (MAMM1-2)
Dry-Fresh Sugar Maple-Oak Deciduous Forest Type (FODM5-3)
Dry-Fresh White Oak Deciduous Forest Type (FODM1-2)
Dry-Fresh White Pine Naturalized Coniferous Plantation Type (FOCM6-1)
Forb Mineral Shallow Marsh Type (MASM2-1)
Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest Type (FODM7-2)
Fresh-Moist Oak-Hardwood Deciduous Forest Type (FODM9-6)
Fresh-Moist Oak-Maple Deciduous Forest Type (FODM9-2)
Fresh-Moist Shagbark Hickory Deciduous Forest Type (FODM9-4)
Goldenrod Forb Meadow Type (MEFM1-1)
Gray Dogwood Deciduous Shrub Thicket Type (THDM2-4)
Gray Dogwood Mineral Deciduous Thicket Swamp Type (SWTM2-3)
Meadowsweet Mineral Deciduous Thicket Swamp Type (SWTM5-7)
Mixed Forb Organic Meadow Marsh Type (MAMO2-3)
Mixed Graminoid Graminoid Mineral Meadow Marsh Type (MAMM1-16)
Narrow-leaved Sedge Graminoid Mineral Meadow Marsh Type (MAMM1-9)
Poison Sumac Organic Deciduous Thicket Swamp Type (SWTO5-8)
Poplar Mineral Deciduous Swamp Type (SWDM4-5)
Raspberry Low Shrub Bluff Type (BLSM1-5)
Red Maple Mineral Deciduous Swamp Type (SWDM3-1)
Rice Cut-grass Graminoid Mineral Meadow Marsh Type (MAMM1-14)
Sedge Graminoid Organic Meadow Marsh Type (MAMO1-6)
Swamp Maple Mineral Deciduous Swamp Type (SWDM3-3)
Swamp White Oak Mineral Deciduous Swamp Type (SWDM1-1)
Winterberry Mineral Deciduous Thicket Swamp Type (SWTM5-6)
Winterberry Organic Deciduous Thicket Swamp Type (SWTO5-3)

Significant Flora

Species at Risk

Cornus florida (Eastern Flowering Dogwood) (Brady, et al., 1980) – Endangered

Juglans cinerea (Butternut) (NPCA, 2006-2009) - Endangered

Provincially Rare Species

Nyssa sylvatica (Black Gum) (NPCA, 2006-2009) – S3

Points of Interest

Faunal Records:

17 – Birds

6 – Mammals

5 – Reptiles & Amphibians

Site Visits

September 1, 1980

Brady, et al.

August 9, 2007

K. White, R. Ng-Rozema

August 30, 2007

K. White, R. Ng-Rozema

September 15, 2007

B. Wilson, R. Ng-Rozema

October 3, 2008

R. Kitchen, B. Porter

October 15, 2008

R. Kitchen, B. Porter

November 3, 2008

R. Kitchen, B. Porter

% of site visited

8.74 % of the total study site was visited by NAI teams.

References Cited

Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from

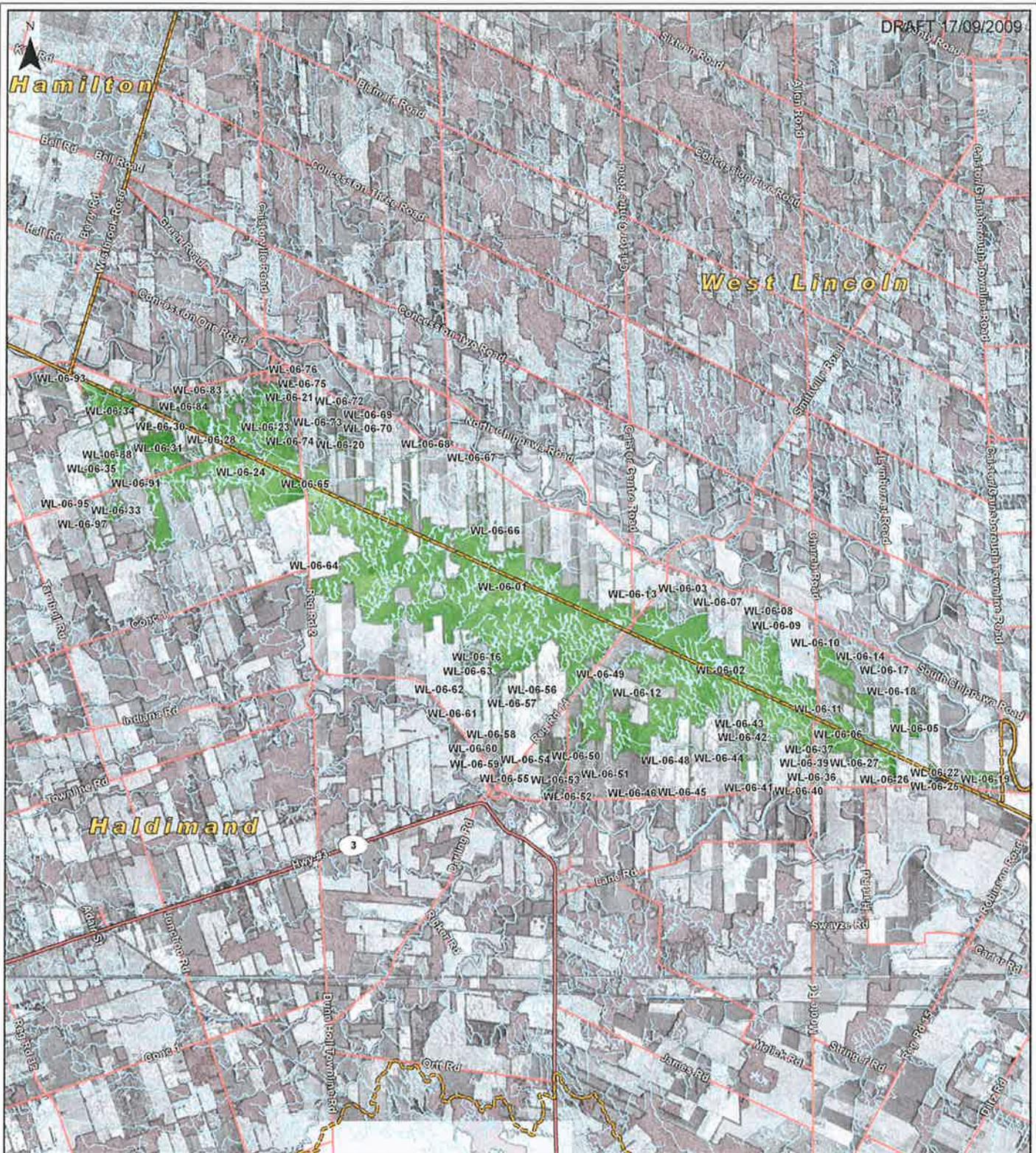
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Ontario Ministry of Agriculture and Food. 1989. *The Soils of The Regional Municipality of Niagara*, Report No. 60 of the Ontario Institute of Pedology, Guelph, Ontario.



- Legend**
- Major Highways
 - Regional Highways
 - Roads
 - Watercourses
 - Waterbodies
 - Municipal Boundaries
 - Study Sites
 - Study Site WL-06



Natural Areas Inventory

Study Site WL-06

1:78,000

0 500 1,000 2,000 3,000 4,000 Meters

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There are a total of 313 recorded taxa (unique plant records) for this study site.

Community Series:	
Coniferous Forest (FOC)	Forb Meadow (MEF)
Deciduous Forest (FOD)	Meadow Marsh (MAM)
Deciduous Swamp (SWD)	Shallow Marsh (MAS)
Deciduous Thicket (THD)	Thicket Swamp (SWT)

Study Site WL-08

Silverdale Woods – South St. Anne's Slough Forest

Municipality Township of West Lincoln

Formerly Silverdale Woodlot (Brady et al., 1980)

Approximate Area 440 hectares

Watershed This study site is split into three parts. The south/west drains to an unnamed creek while the south/east drains to Sucker Creek. The northern section drains to Sixteen Mile Creek and eventually they all flow to the Welland River.

Ownership Mostly private

General Summary

This study site is located between the east-west rail line to the north and Highway 20 to the south. It extends from Wellandport Road in the west to Silverdale Road/ Schram Road in the east.

Physical Description

This natural area is situated on the flat, poorly drained, clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Guelph Formation.

Soils

Soil Type	Percentage of Study Site
HALDIMAND	27.52
HALDIMAND - LOAMY PHASE	12.94
LINCOLN	55.94
SMITHVILLE	1.68
WATER	0.00
NOT MAPPED	1.93
Total %	100.00

Ecological Land Classification

Summary

A small portion of this study site was visited by field crews. The most common community noted was Deciduous Swamp dominated by Red Maple (*Acer rubrum*) with White Elm (*Ulmus americana*), Swamp White Oak (*Quercus bicolor*), Green Ash (*Fraxinus pennsylvanica*), and Black Gum (*Nyssa sylvatica*).

The understory was characterized by Winterberry (*Ilex verticillata*), Swamp Dewberry (*Rubus hispidus*), and Blue Beech (*Carpinus caroliniana*) with a ground layer of Spotted Touch-me-not (*Impatiens capensis*), Asters (*Aster sp.*), Canada Mayflower (*Maianthemum canadense*), and Sessile-leaved Bellwort (*Uvularia sessilifolia*).

The higher ground between the sloughs was a drier community of American Beech (*Fagus grandifolia*), Birch (*Betula sp.*), Black Cherry (*Prunus serotina*), and Trembling Aspen (*Populus tremuloides*).

The understory was largely regenerating canopy species with Witch-hazel (*Hamamelis virginiana*), and a ground layer of Canada Mayflower and Wintergreen (*Galtheria procumbens*).

Vegetation Communities

There are a total of 133 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Swamp (SWD)
Deciduous Forest (FOD)
Deciduous Swamp (SWD)
Meadow Marsh (MAM)
Shallow Marsh (MAS)
Shallow Marsh (MAS)
Thicket Swamp (SWT)

Vegetation Type

Bur Oak Mineral Deciduous Swamp Type (SWDM1-2)
Bur-reed Mineral Shallow Marsh Type (MASM1-8)
Buttonbush Mineral Deciduous Thicket Swamp Type (SWTM5-1)
Forb Mineral Shallow Marsh Type (MASM2-1)
Fresh-Moist Oak-Hardwood Deciduous Forest Type (FODM9-6)
Fresh-Moist Oak-Sugar Maple Deciduous Forest Type (FODM9-1)
Fresh-Moist Sugar Maple-Hardwood Deciduous Forest Type (FODM6-5)
Red Maple Mineral Deciduous Swamp Type (SWDM3-1)
Reed-canary Grass Graminoid Mineral Meadow Marsh Type (MAMM1-3)
Winterberry Mineral Deciduous Thicket Swamp Type (SWTM5-6)

Significant Flora

Species at Risk

Cornus florida (Eastern Flowering Dogwood) (NPCA, 2006-2009) – Endangered
Nyssa sylvatica (Black Gum) (NPCA, 2006-2009) – Endangered

Provincially Rare Species – None noted.

Points of Interest

Faunal Records:

10 – Birds
5 – Reptiles & Amphibians
2 – Mammals
1 – Moths & Butterflies

Site Visits

September 1, 1980
Brady, et al.

July 15, 2008
T. Staton, S. Mohamed

August 20, 2008
T. Staton, S. Mohamed

% of site visited

2.82 % of the total study site was visited by NAI teams.

References Cited

Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

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Oldham, M. J., & Brinker, S. R. 2009. *Rare Vascular Plants of Ontario (Fourth Edition ed.)*. Peterborough, Ontario: Natural Heritage Information Centre, Ontario Ministry of Natural Resources.

Ontario Ministry of Agriculture and Food. 1989. *The Soils of The Regional Municipality of Niagara*, Report No. 60 of the Ontario Institute of Pedology, Guelph, Ontario.



Legend

- == Major Highways
- == Regional Highways
- Roads
- ~ Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Sites WL-08



Natural Areas Inventory

Study Site WL-08

1:24,000

0 175 350 700 1,050 1,400 Meters

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 All Frames North American Datum 1983, Universal Transverse Mercator 6° Projection, Zone 17N, Central Meridian 81° West



There are a total of 133 recorded taxa (unique plant records) for this study site.
Community Series:
 Deciduous Swamp (SWD)

Study Site WL-09

Sucker Creek

Municipality Township of West Lincoln

Formerly Sucker Creek (Brady, et al., 1980)

Approximate Area 79 hectares

Watershed The drainage for this study site is split into three parts. The entire eastern portion drains via Fifteen Mile Creek while the western portion is split between Sixteen Mile creek in the north and Sucker creek in the south.

Ownership Mostly private

General Summary

This study site is located near the West Lincoln and Pelham border between Silverdale Road in the west and Rosedene Road in the east. The northern boundary is Fifteen Road while Highway 20 makes up the southern boundary.

Physical Description

This natural area is situated on the flat, poorly drained, clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Guelph Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	0.03
BEVERLY	0.05
BRANTFORD	0.07
HALDIMAND	11.70
HALDIMAND - LOAMY PHASE	14.93
LINCOLN	71.82
SMITHVILLE	1.17
SMITHVILLE - LOAMY PHASE	0.11
TOLEDO	0.02
WATER	0.00
NOT MAPPED	0.10
Total %	100.00

Ecological Land Classification

Summary

A small percentage of this study site was visited by project field crews. The sites visited were characterized by complex microtopography where the drier knolls supported Deciduous Forests while the lower lying areas were classic Deciduous Swamps.

The Deciduous Forests were dominated by Red Oak (*Quercus rubra*), Sugar Maple (*Acer saccharum* ssp. *saccharum*), Eastern White Pine (*Pinus strobus*), and Basswood (*Tilia americana*). Occasionally, Hop Hornbeam (*Ostrya virginiana*), Green Ash

(*Fraxinus pennsylvanica*), and Choke Cherry (*Prunus virginiana* ssp. *virginiana*) were noted for the understory.

The herbaceous layer was a mix of Large-leaved Aster (*Aster macrophyllus*), Mayapple (*Podophyllum peltatum*), and Rough Goldenrod (*Solidago rugosa* ssp. *rugosa*).

The Deciduous Swamps were largely Red Maple (*Acer rubrum*) and White Swamp Oak (*Quercus bicolor*), with Green Ash and White Elm (*Ulmus americana*).

The understory was Blue Beech (*Carpinus caroliniana*) and Highbush Blueberry (*Vaccinium corymbosum*), with Canada Mayflower (*Maianthemum canadense*), Swamp Dewberry (*Rubus hispidus*), and Rough Goldenrod.

A naturalized Eastern White Pine plantation was also noted for this site.

Vegetation Communities

There are a total of 120 recorded taxa (unique plant records) for this study site.

Community Series

Coniferous Forest (FOC)
Deciduous Forest (FOD)
Deciduous Swamp (SWD)
Shallow Marsh (MAS)
Thicket Swamp (SWT)

Vegetation Type

Broad-leaved Sedge Organic Shallow Marsh Type (MASO1-6)
Buttonbush Mineral Deciduous Thicket Swamp Type (SWTM5-1)
Cattail Mineral Shallow Marsh Type (MASM1-1)
Dry-Fresh White Pine Naturalized Coniferous Plantation Type (FOCM6-1)
Fresh-Moist Exotic Lowland Deciduous Forest Type (FODM7-9)
Fresh-Moist Oak-Maple Deciduous Forest Type (FODM9-2)
Fresh-Moist Oak-Sugar Maple Deciduous Forest Type (FODM9-1)
Green Ash Mineral Deciduous Swamp Type (SWDM2-2)
Meadowsweet Mineral Deciduous Thicket Swamp Type (SWTM5-7)
Mixed Willow Mineral Deciduous Thicket Swamp Type (SWTM3-6)
Red Maple Mineral Deciduous Swamp Type (SWDM3-1)
Silky Dogwood Mineral Deciduous Thicket Swamp Type (SWTM2-2)
Winterberry Mineral Deciduous Thicket Swamp Type (SWTM5-6)

Significant Flora

Species at Risk – None noted.

Provincially Rare Species – None noted.

Points of Interest

Faunal Records:

13 – Birds
7 – Reptiles & Amphibians
3 – Mammals
1 – Moths & Butterflies

Site Visits

September 1, 1980

Brady, et al.

July 22, 2008

T. Staton, S. Mohamed

August 5, 2008

T. Staton, S. Mohamed

% of site visited

3.78 % of the total study site was visited by NAI teams.

References Cited

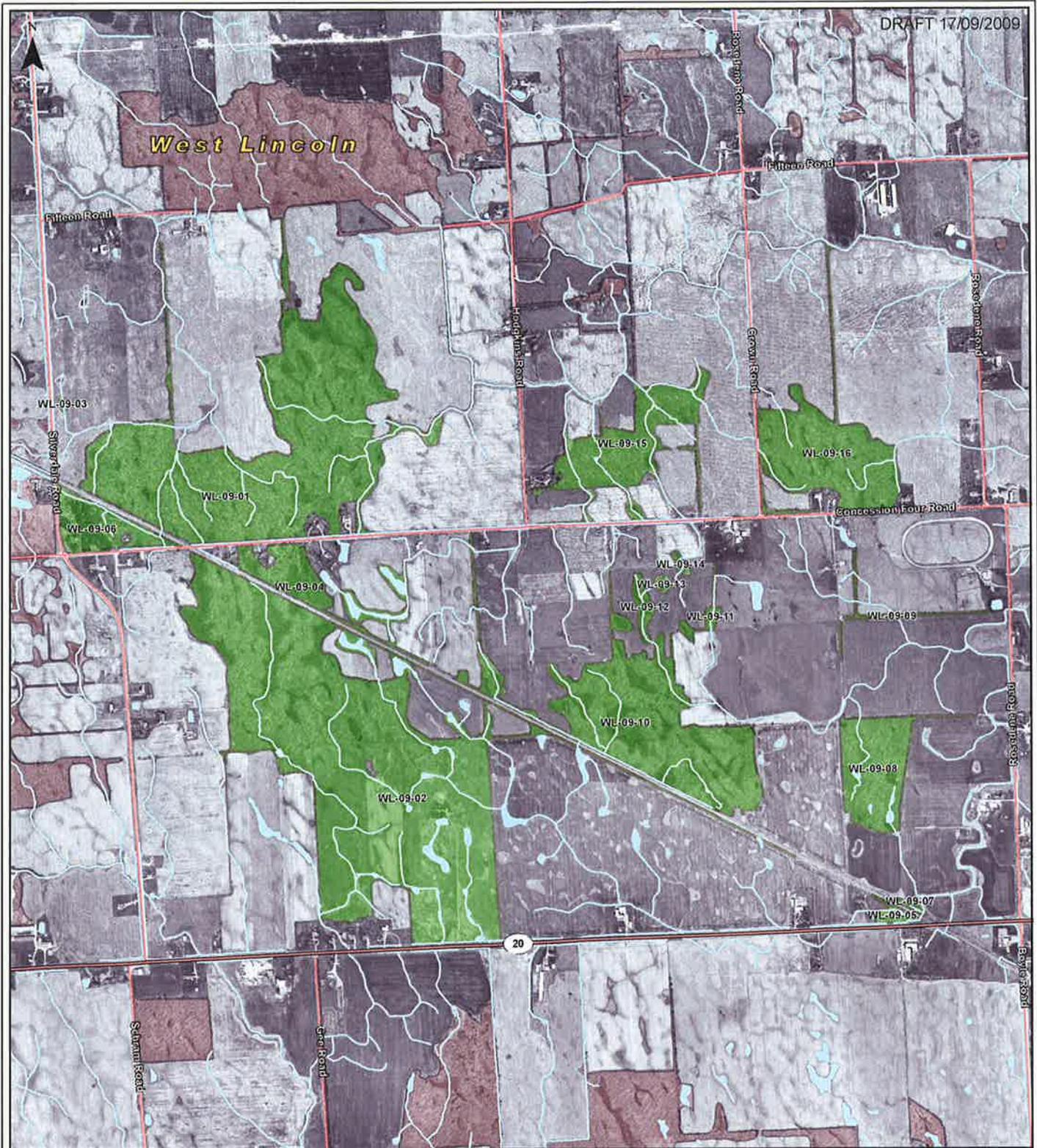
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

Natural Heritage Areas Inventory 2006-2009. Unpublished database, Niagara Peninsula Conservation Authority, Welland, Ontario.

Oldham, M. J., & Brinker, S. R. 2009. *Rare Vascular Plants of Ontario (Fourth Edition ed.)*. Peterborough, Ontario: Natural Heritage Information Centre, Ontario Ministry of Natural Resources.

Ontario Ministry of Agriculture and Food. 1989. *The Soils of The Regional Municipality of Niagara*, Report No. 60 of the Ontario Institute of Pedology, Guelph, Ontario.



Legend

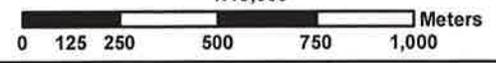
- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-09



Natural Areas Inventory

Study Site WL-09

1:18,000



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There are a total of 120 recorded taxa (unique plant records) for this study site.
Community Series:
 Coniferous Forest (FOC)
 Deciduous Forest (FOD)
 Deciduous Swamp (SWD)

Study Site WL-10

Hafeman's Bush

Municipality Township of West Lincoln

Formerly Hafeman's Bush (Brady, et al., 1980)

Approximate Area 169 hectares

Watershed This study site is divided almost in half between the Sixteen Mile Creek subwatershed that drains the north/west portion, and the Fifteen Mile Creek that drains the south/east portion.

Ownership Mostly private

General Summary

This study site is located between the Twenty Mile Creek corridor to the north and Fifteen Road to the south. The western boundary is Silverdale Road and the eastern boundary is just west of Vineland Townline Road.

Physical Description

This natural area is situated on the flat, poorly drained, clay and silty clay soils of the Haldimand Clay Plain. The northern half is underlain by the dolostone of the Lockport Formation, and the southern half is underlain by the dolostone of the Guelph Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	0.08
BEVERLY	0.16
BRANTFORD	4.65
HALDIMAND	18.01
HALDIMAND - LOAMY PHASE	3.76
LINCOLN	72.50
SMITHVILLE	0.37
WATER	0.00
NOT MAPPED	0.48
Total %	100.00

Ecological Land Classification

Summary

This study site was a mix of Deciduous Swamps with Deciduous Forests on the drier knolls.

The Deciduous Swamp communities noted were dominated by Red Maple (*Acer rubrum*) with White Swamp Oak (*Quercus bicolor*), Shagbark Hickory (*Carya ovata*), and Green Ash (*Fraxinus pennsylvanica*).

The ground cover was a mix of Spotted Touch-me-not (*Impatiens capensis*), Spotted Crane's-bill (*Geranium maculatum*), and Canada Mayflower (*Maianthemum canadense*).

The Deciduous Forests were characterized by Red Oak (*Quercus rubra*), Sugar Maple (*Acer saccharum* ssp. *saccharum*), White Oak (*Quercus alba*), and Red Maple.

The understory included Black Cherry (*Prunus serotina*), American Beech (*Fagus grandifolia*), Serviceberry (*Amelanchier* sp.), and Hop Hornbeam (*Ostrya virginiana*).

The herbaceous layer was a mix of Large-leaved Aster (*Aster macrophyllus*), Avens (*Geum* sp.), and Common Strawberry (*Fragaria virginiana* ssp. *virginiana*).

One area of successional Graminoid Meadow was also recorded for this study site. It was dominated by Blue Grass species (*Poa* sp.), Timothy (*Phleum pratense*) and Asters (*Aster* sp.), with Cow Vetch (*Vicia cracca*), Bird's-foot Trefoil (*Lotus corniculatus*), and Rough-fruited Cinquefoil (*Potentilla recta*).

Vegetation Communities

There are a total of 183 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Forest (FOD)
Deciduous Swamp (SWD)
Graminoid Meadow (MEG)
Thicket Swamp (SWT)
Floating-leaved Shallow Aquatic (SAF)
Deciduous Thicket (THD)
Shallow Marsh (MAS)

Vegetation Type

Buttonbush Mineral Deciduous Thicket Swamp Type (SWTM5-1)
Duckweed Floating-leaved Shallow Aquatic Type (SAF_1-3)
Fresh-Moist Oak-Sugar Maple Deciduous Forest Type (FODM9-1)
Gray Dogwood Deciduous Thicket Swamp Type (THDM2-4)
Manna Grass Mineral Shallow Marsh Type (MASM1-17)
Meadowsweet Mineral Deciduous Thicket Swamp Type (SWTM5-7)
Mixed Willow Mineral Deciduous Thicket Swamp Type (SWTM3-6)
Open Graminoid Meadow Type (MEGM4-1)
Red Maple Mineral Deciduous Swamp Type (SWDM3-1)
Timothy Graminoid Meadow Type (MEGM3-7)
Winterberry Mineral Deciduous Thicket Swamp Type (SWTM5-6)

Significant Flora

Species at Risk

Cornus florida (Eastern Flowering Dogwood) (NPCA, 2006-2009) – Endangered

Provincially Rare Species

Carya glabra (Pignut Hickory) (Brady, et al., 1980) – S3

Points of Interest

Faunal Records:

20 – Birds

2 – Reptiles & Amphibians

2 – Moths & Butterflies

1 – Mammal

Site Visits

September 1, 1980

Brady, et al.

July 1, 2008

R. Young, J. Damude, P. Foebel, J. Potter, M. Potter

July 2, 2008

T. Staton, S. Mohamed

July 18, 2008

R. Young, J. Damude, J. Kellam, J. Potter, M. Potter

% of site visited

10.31 % of the total study site was visited by NAI teams.

References Cited

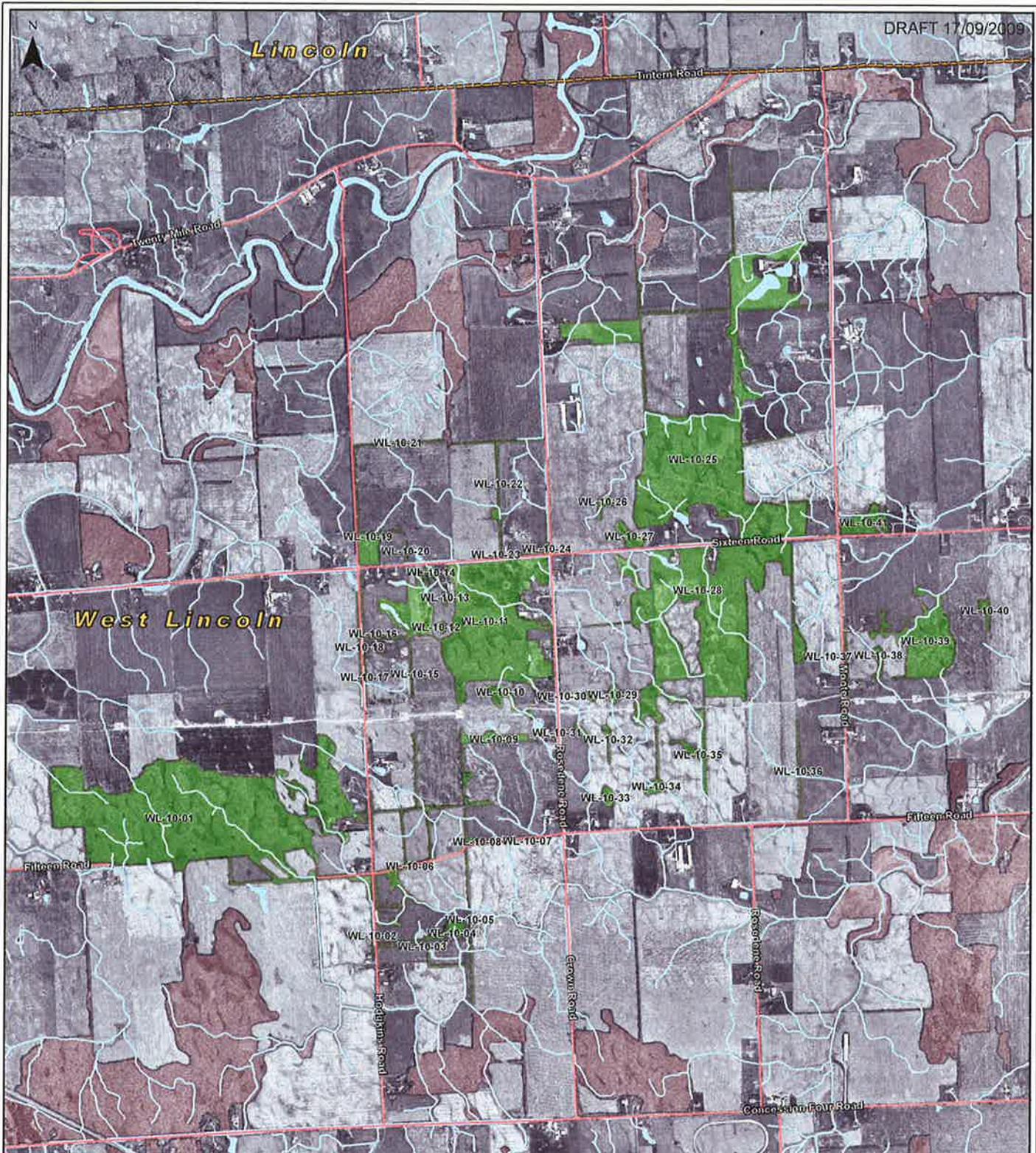
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

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Oldham, M. J., & Brinker, S. R. 2009. *Rare Vascular Plants of Ontario (Fourth Edition ed.)*. Peterborough, Ontario: Natural Heritage Information Centre, Ontario Ministry of Natural Resources.

Ontario Ministry of Agriculture and Food. 1989. *The Soils of The Regional Municipality of Niagara*, Report No. 60 of the Ontario Institute of Pedology, Guelph, Ontario.



- Legend**
- Major Highways
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 - Watercourses
 - Waterbodies
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Natural Areas Inventory

Study Site WL-10

1:22,000



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There are a total of 183 recorded taxa (unique plant records) for this study site.
Community Series:
 Deciduous Forest (FOD) Graminoid Meadow (MEG)
 Deciduous Swamp (SWD) Thicket Swamp (SWT)

Study Site WL-12

Vaughan Forest

Municipality Township of West Lincoln

Formerly Vaughan Forest (Brady, et al., 1980)

Approximate Area 117 hectares

Watershed The majority of this study site drains to the Beaver Creek subwatershed with a portion in the east that drains to Black Ash Creek.

Ownership Mostly private

General Summary

This study site extends from Bismark Road in the north to just south of Vaughan Road in the south. Its western boundary is Caistor/ Gainsborough Townline Road and the eastern boundary is Port Davidson Road.

Physical Description

This natural area is situated on the flat, poorly drained, clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Guelph Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	0.02
HALDIMAND	11.08
LINCOLN	88.74
WATER	0.00
NOT MAPPED	0.39
Total %	100.00

Ecological Land Classification

Summary

Field crews visited a small portion of this study site.

Drier areas were noted as Deciduous Forests dominated by White Oak (*Quercus alba*), Sugar Maple (*Acer saccharum ssp. saccharum*), Red Oak (*Quercus rubra*), and White Ash (*Fraxinus americana*).

The understory was largely regenerating canopy species with Hop Hornbeam (*Ostrya virginiana*), and Maple-leaved Viburnum (*Viburnum acerifolium*).

The herbaceous layer was characterized by Large-leaved Aster (*Aster macrophyllus*), Grasses (*Poa sp.*), and Goldenrod (*Solidago sp.*).

The wetter communities noted were classified as Deciduous Swamps and Thicket Swamps. The Deciduous Swamps were largely Green Ash (*Fraxinus pennsylvanica*)

and Red Maple (*Acer rubrum*), with Shagbark Hickory (*Carya ovata*) and White Elm (*Ulmus americana*).

The understory was mostly regenerating Green Ash with some Blue Beech (*Carpinus caroliniana*). The ground layer was a mix of Spotted Touch-me-nots (*Impatiens capensis*), Asters (*Aster sp.*), and Goldenrod (*Solidago sp.*).

The Thicket Swamp communities were dominated by Buttonbush (*Cephalanthus occidentalis*) and Winterberry (*Ilex verticillata*) with occasional White Elm, Green Ash and Swamp White Oak (*Quercus bicolor*).

The understory was Devil's Beggar-ticks (*Bidens frondosa*) and Narrow-leaved Meadowsweet (*Spirea alba*) with a ground layer of Liverwort (*Riccia fluitans*), and Mosses (*Moss sp.*).

Vegetation Communities

There are a total of 126 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Forest (FOD)
Deciduous Swamp (SWD)
Thicket Swamp (SWT)

Vegetation Type

Buttonbush Mineral Deciduous Thicket Swamp Type (SWTM5-1)
Fresh-Moist Oak-Sugar Maple Deciduous Forest Type (FODM9-1)
Green Ash Mineral Deciduous Swamp Type (SWDM2-2)

Significant Flora

Species at Risk – None noted.

Provincially Rare Species – None noted.

Points of Interest

Faunal Records:

3 – Birds
2 – Reptiles & Amphibians
2 – Mammals

Site Visits

September 1, 1980
Brady, et al.

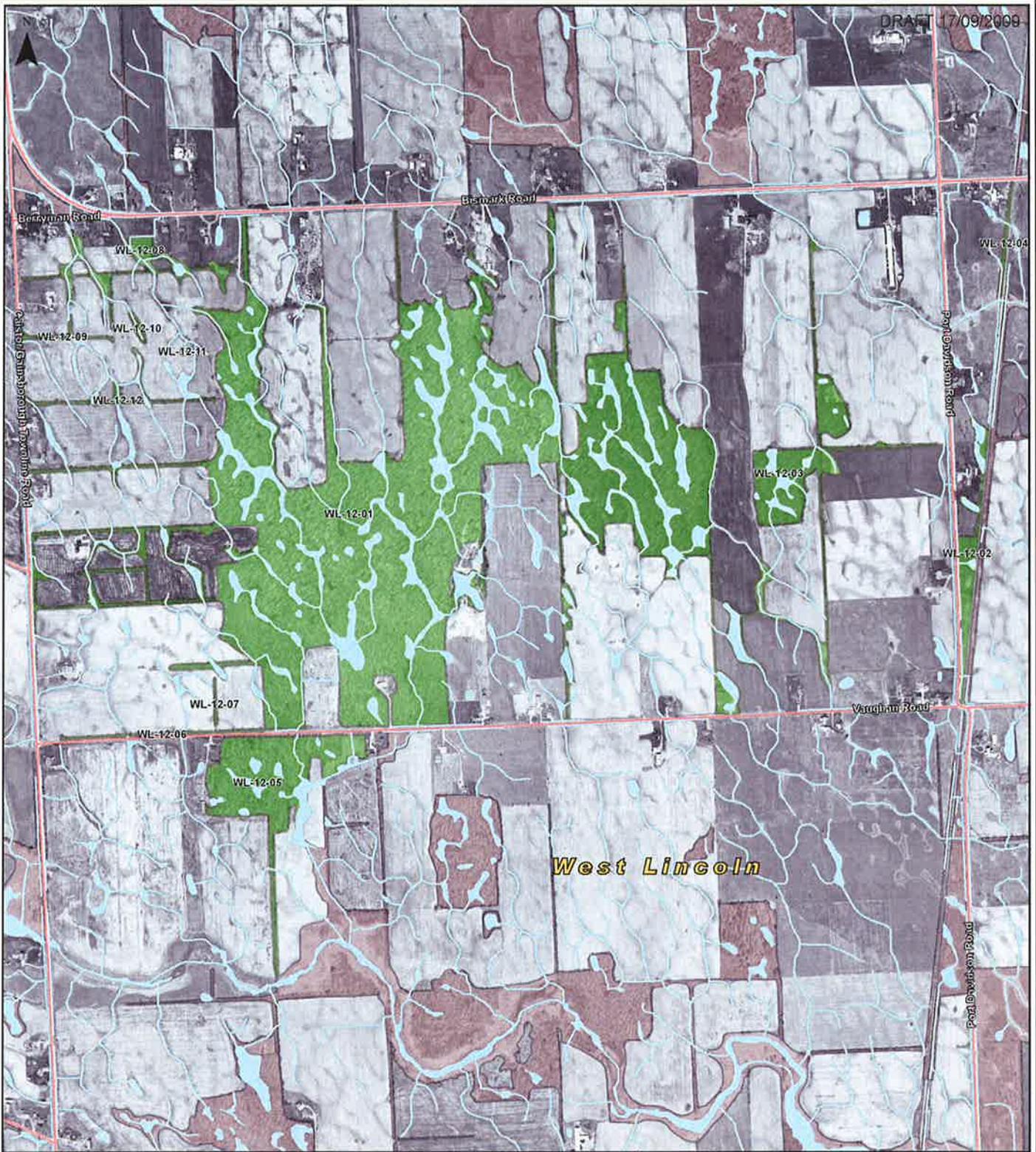
September 5, 2008
T. Staton, S. Mohamed

% of site visited

3.30 % of the total study site was visited by NAI teams.

References Cited

- Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.
- Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>
- Natural Heritage Areas Inventory 2006-2009. Unpublished database, Niagara Peninsula Conservation Authority, Welland, Ontario.
- Oldham, M. J., & Brinker, S. R. 2009. *Rare Vascular Plants of Ontario (Fourth Edition ed.)*. Peterborough, Ontario: Natural Heritage Information Centre, Ontario Ministry of Natural Resources.
- Ontario Ministry of Agriculture and Food. 1989. *The Soils of The Regional Municipality of Niagara*, Report No. 60 of the Ontario Institute of Pedology, Guelph, Ontario.



Legend

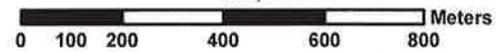
- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-12



Natural Areas Inventory

Study Site WL-12

1:14,000



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There are a total of 126 recorded taxa (unique plant records) for this study site
Community Series:
 Deciduous Forest (FOD)
 Deciduous Swamp (SWD)
 Thicket Swamp (SWT)

Study Site WL-15

Garber's Grove

Municipality Township of West Lincoln

Formerly Garber's Grove (Brady, et al., 1980)

Approximate Area 291 hectares

Watershed The northern portion of this study site drains to North Creek and the southern portion flows to Black Ash Creek. There are small slivers of this site that flow east to Parkers Creek and west to Beaver Creek.

Ownership Mostly private

General Summary

This study site is located between Townline Road to the north and Concession Four Road to the south. It extends from Caistor/ Gainsborough Townline Road in the west to Port Davidson Road in the east.

Physical Description

This natural area is situated on the flat, poorly drained, clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Guelph Formation.

Soils

Soil Type	Percentage of Study Site
BEVERLY	0.07
HALDIMAND	7.94
LINCOLN	91.60
SMITHVILLE	0.01
TOLEDO	0.07
WATER	0.00
NOT MAPPED	0.31
Total %	100.00

Ecological Land Classification

Summary

The most common community noted for this study site was Deciduous Swamp dominated by Red Maple (*Acer rubrum*) or Swamp White Oak (*Quercus bicolor*). Associated species included Green Ash (*Fraxinus pennsylvanica*), White Elm (*Ulmus americana*), and Shagbark Hickory (*Carya ovata*).

The understory was a mix of regenerating canopy species with Blue Beech (*Carpinus caroliniana*), Highbush Blueberry (*Vaccinium corymbosum*), Winterberry (*Ilex verticillata*), and Serviceberry (*Amelanchier sp.*).

The herbaceous layer consisted of Spotted Touch-me-not (*Impatiens capensis*), Sedges (*Carex sp.*), Asters (*Aster sp.*), Swamp Dewberry (*Rubus hispidus*), and Woodrush species (*Cinna sp.*).

The drier knolls and the upland communities within this study site were classified as Deciduous Forests dominated by Red Oak (*Quercus rubra*) and White Oak (*Quercus alba*), with American Beech (*Fagus grandifolia*), Sugar Maple (*Acer saccharum* ssp. *saccharum*), and the occasional Hop Hornbeam (*Ostrya virginiana*).

The understory was largely regenerating canopy species with Grey Dogwood (*Cornus foemina* ssp. *racemosa*).

The ground layer was dominated by Large-leaved Aster (*Aster marcophyllus*), Pennsylvania Sedge (*Carex pennsylvanica*), and Goldenrod species (*Solidago* sp.).

Vegetation Communities

There are a total of 221 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Forest (FOD)
Deciduous Swamp (SWD)
Meadow Marsh (MAM)
Shallow Marsh (MAS)
Thicket Swamp (SWT)

Vegetation Type

Broad-leaved Sedge Mineral Shallow Marsh Type (MASM1-5)
Buttonbush Mineral Deciduous Thicket Swamp Type (SWTM5-1)
Fresh-Moist Oak-Maple Deciduous Forest Type (FODM9-2)
Fresh-Moist Oak-Sugar Maple Deciduous Forest Type (FODM9-1)
Fresh-Moist Sugar Maple-Hardwood Deciduous Forest Type (FODM6-5)
Red Maple Mineral Deciduous Swamp Type (SWDM3-1)
Reed-canary Grass Graminoid Mineral Meadow Marsh Type (MAMM1-3)
Rice Cut-grass Mineral Shallow Marsh Type (MASM1-10)
Swamp White Oak Mineral Deciduous Swamp Type (SWDM1-1)

Significant Flora

Species at Risk – None noted.

Provincially Rare Species

Nyssa sylvatica (Black Gum) (NPCA 2006-2009, volunteer crew) – S3

Points of Interest

Faunal Records:

9 – Birds
7 – Reptiles & Amphibians
4 – Mammals

Site Visits

September 1, 1980
Brady, et al.

June 12, 2008
D. Young, R. Young, J. Kellam, J. Potter, M. Potter

October 1, 2008
T. Staton, S. Mohamed

October 2, 2008
T. Staton, S. Mohamed

October 16, 2008
T. Staton, S. Mohamed

October 20, 2008
T. Staton, S. Mohamed

% of site visited

14.86 % of the total study site was visited by NAI teams.

References Cited

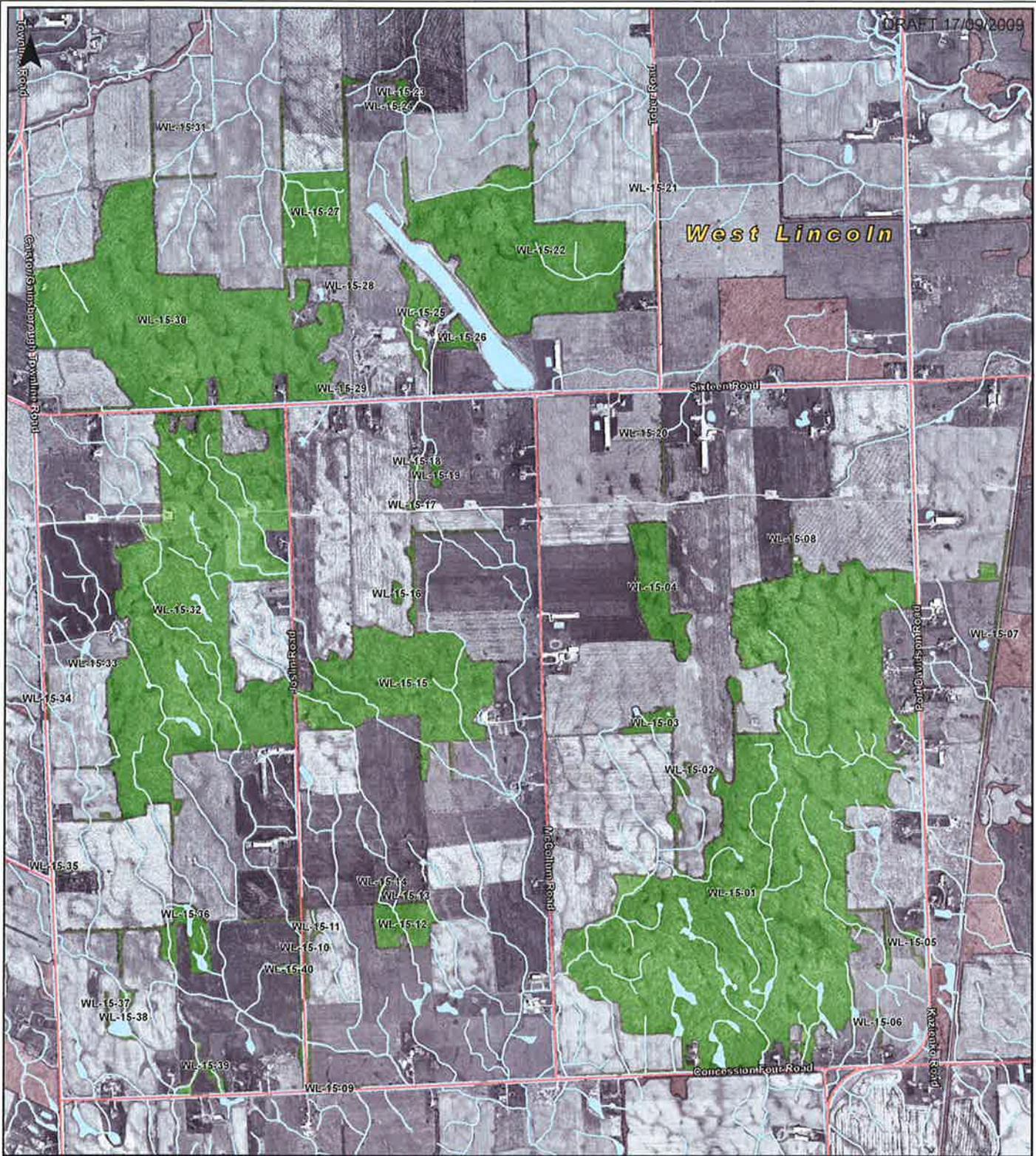
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

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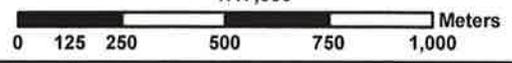
- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-15



Natural Areas Inventory

Study Site WL-15

1:17,000



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There are a total of 221 recorded taxa (unique plant records) for this study site
Community Series:
 Deciduous Forest (FOD)
 Deciduous Swamp (SWD)

Study Site WL-16

East Smithville Slough Forest

Municipality Township of West Lincoln

Formerly Spring Creek Bush (Brady, et al., 1980)

Approximate Area 450 hectares

Watershed Drainage of this study site is split nearly in half between Spring Creek in the north and Twenty Mile Creek to the south.

Ownership Mostly private

General Summary

This study site is located between Young Street in the north and Highway 20/Twenty Mile Road in the south. It extends from South Grimsby Road Six in the west to Mountain Road in the east.

Physical Description

This natural area is situated on the flat, poorly drained, clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Lockport Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	1.17
BEVERLY	19.08
BRANTFORD	1.46
CHINGUACOUSY	0.50
HALDIMAND	0.09
JEDDO	0.50
LINCOLN	2.71
SMITHVILLE	0.76
TOLEDO	71.75
WATER	0.00
NOT MAPPED	1.98
Total %	100.00

Ecological Land Classification

Summary

The most common community recorded for this study site was Shallow Marsh dominated by Reed Canary Grass (*Phalaris arundinacea*) with Asters (*Aster sp.*), Goldenrod (*Solidago sp.*), and the occasional Swamp Maple (*Acer fremanii*).

The Deciduous Swamp communities recorded for this study site were largely Swamp Maple, Swamp White Oak (*Quercus bicolor*), and Red Maple (*Acer rubrum*).

The understory was a mix of regenerating canopy species with Blue Beech (*Carpinus caroliniana*), Serviceberry (*Amelanchier sp.*) and Green Ash (*Fraxinus pennsylvanica*).

The ground layer was Sedges (*Carex sp.*), Spotted Touch-me-not (*Impatiens capensis*), and Mosses (*Moss sp.*).

The Thicket Swamp recorded was dominated by Narrow-leaved Meadowsweet (*Spirea alba*) with Grey Dogwood (*Cornus foemina ssp. racemosa*) and Southern Arrow-wood (*Viburnum recognitum*). Scattered throughout the Thicket Swamp were Green Ash and Sugar Maple (*Acer saccharum ssp. saccharum*) trees.

The ground layer was a mix of Goldenrods, Asters, Reed Canary Grass, and Mosses.

Vegetation Communities

There are a total of 192 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Swamp (SWD)
Deciduous Forest (FOD)
Forb Meadow (MEF)
Meadow Marsh (MAM)
Shallow Marsh (MAS)
Thicket Swamp (SWT)

Vegetation Type

Aster Forb Meadow Type (MEFM1-2)
Fresh-Moist Sugar Maple-Hardwood Deciduous Forest Type (FODM6-5)
Meadowsweet Mineral Deciduous Thicket Swamp Type (SWTM5-7)
Poplar Mineral Deciduous Swamp Type (SWDM4-5)
Reed-canary Grass Graminoid Mineral Meadow Marsh Type (MAMM1-3)
Reed Canary Grass Mineral Shallow Marsh Type (MASM1-14)
Swamp Maple Mineral Deciduous Swamp Type (SWDM3-3)

Significant Flora

Species at Risk – None noted.

Provincially Rare Species

Carex careyana (Carey's Wood Sedge) (Trow Consulting Engineers Ltd., 2000) – S2

Points of Interest

Faunal Records:

57 – Birds
9 – Mammals
8 – Reptiles & Amphibians
2 – Moths & Butterflies

Site Visits

September 1, 1980
Brady, et al.

May 31, 2000
Trow Consulting Engineers Ltd.

July 1, 2008
R. Kitchen, B. Porter

September 19, 2008
T. Staton, S. Mohamed

% of site visited

2.07 % of the total study site was visited by NAI teams.

References Cited

Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

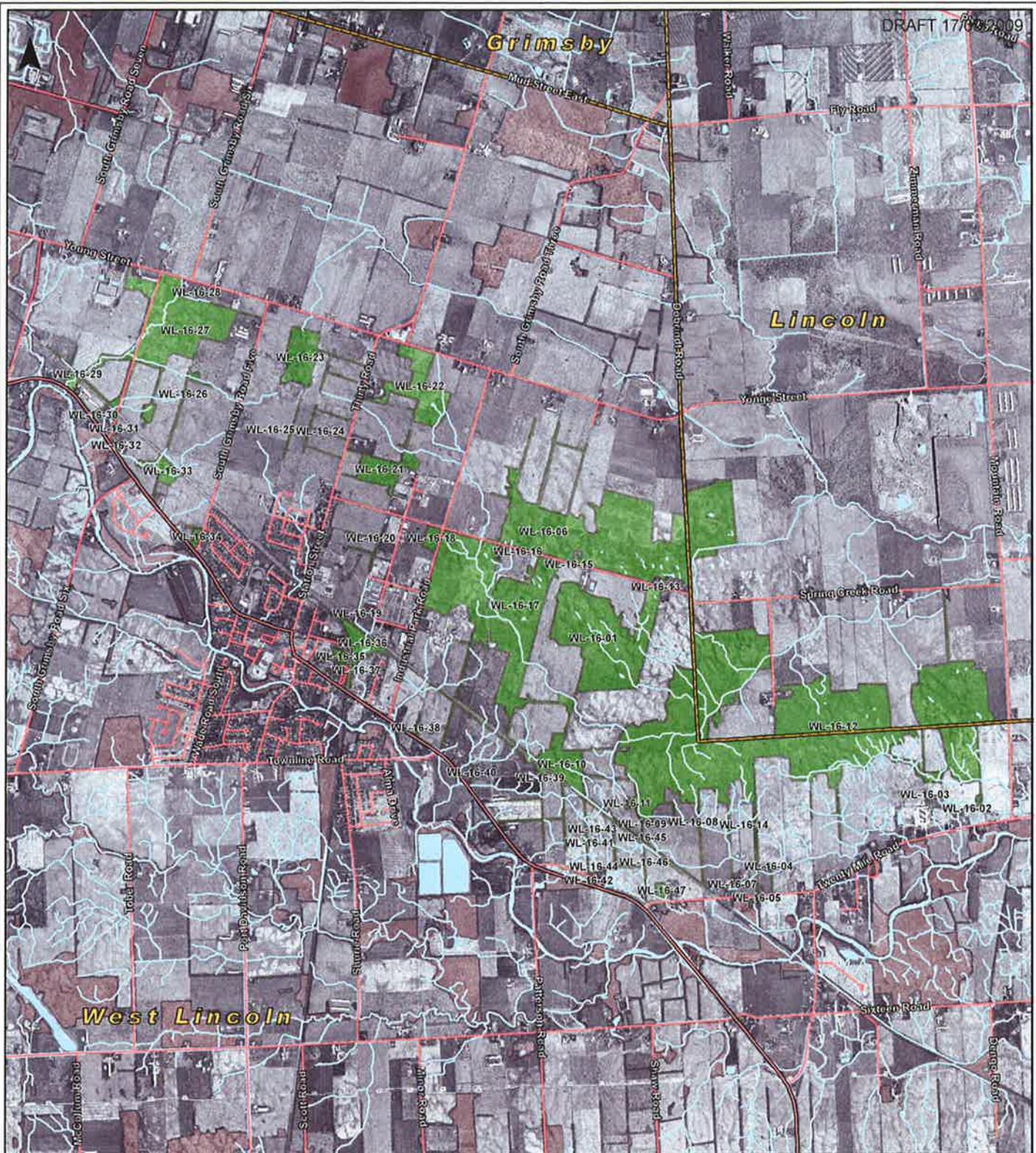
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Trow Consulting Engineers Ltd. 2000. "St. Ann's North Slough Woodlot, DynaStart Facility – Industrial Park Drive, West Lincoln, Ontario." *Draft Environmental Impact Statement*. Stoney Creek, Ontario: Mr. D. Kirkwood, DynaStart Inc.



Legend

- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-16



Natural Areas Inventory

Study Site WL-16

1:38,000

0 250 500 1,000 1,500 2,000 Meters

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There are a total of 192 recorded taxa (unique plant records) for this study site.

Community Series:
 Deciduous Swamp (SWD)
 Meadow Marsh (MAM)
 Shallow Marsh (MAS)
 Thicket Swamp (SWT)

Study Site WL-20

Comfort's Bush

Municipality Township of West Lincoln

Formerly Comfort's Bush (Brady, et al., 1980)

Approximate Area 447 hectares

Watershed The majority of this study site flows to the Fifteen Mile Creek subwatershed with a very small portion draining south to Welland River West.

Ownership Mostly private with a portion in public ownership (Gainsborough Conservation Area, Niagara Peninsula Conservation Authority).

General Summary

This study site is located between Sixteen Road to the north and Canborough Road to the south. It extends from Boyle Road/ Rosedene Road/ Moote Road in the west to Vineland Townline Road in the east.

Physical Description

This natural area is situated on the flat, poorly drained, clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Guelph Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	5.12
BEVERLY	0.25
BEVERLY - LOAMY PHASE	0.43
BRANTFORD	0.01
HALDIMAND	10.86
HALDIMAND - LOAMY PHASE	0.52
LINCOLN	22.25
SMITHVILLE	13.00
SMITHVILLE - LOAMY PHASE	0.02
TOLEDO	46.35
TOLEDO - LOAMY PHASE	0.26
WATER	0.00
NOT MAPPED	0.93
Total %	100.00

Ecological Land Classification

Summary

The most common community noted for this study site was the Deciduous Swamp dominated by Red Maple (*Acer rubrum*), Swamp White Oak (*Quercus bicolor*), Green Ash (*Fraxinus pennsylvanica*), and Pin Oak (*Quercus palustris*).

The understory was characterized by Blue Beech (*Carpinus caroliniana*), Serviceberry (*Amelanchier sp.*), Winterberry (*Ilex verticillata*), and Highbush Blueberry (*Vaccinium corymbosum*).

The herbaceous layer was a mix of Spotted Touch-me-not (*Impatiens capensis*), Reed Canary Grass (*Phalaris arundinacea*), Canada Mayflower (*Maianthemum canadense*), Swamp Dewberry (*Rubus hispidus*), Sessile-leaved Bellwort (*Uvularia sessilifolia*), Eastern Bracken Fern (*Pteridium aquilinum var. latiusculum*), and Large-leaved Aster (*Aster macrophyllus*).

The upland communities were Deciduous Forests dominated by White Oak (*Quercus alba*), Red Oak (*Quercus rubra*), Red Maple, and Shagbark Hickory (*Carya ovata*).

The understory was characterized by Highbush Blueberry (*Carpinus caroliniana*), Hawthorn (*Crataegus sp.*), and Witch-hazel (*Hamamelis virginiana*).

The ground layer was a mix of Large-leaved Aster and Rough Goldenrod (*Solidago rugosa ssp. rugosa*).

Vegetation Communities

There are a total of 156 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Forest (FOD)
Deciduous Swamp (SWD)
Thicket Swamp (SWT)
Shallow Marsh (MAS)

Vegetation Type

Buttonbush Mineral Deciduous Thicket Swamp Type (SWTM5-1)
Buttonbush Organic Deciduous Thicket Swamp Type (SWTO5-1)
Forb Mineral Shallow Marsh Type (MASM2-1)
Fresh-Moist Oak-Maple Deciduous Forest Type (FODM9-2)
Green Ash mineral Deciduous Swamp Type (SWDM2-2)
Pin Oak Mineral Deciduous Swamp Type (SWDM1-3)
Red Maple Mineral Deciduous Swamp Type (SWDM3-1)
Swamp Maple Mineral Deciduous Swamp Type (SWDM3-3)
Swamp White Oak Mineral Deciduous Swamp Type (SWDM1-1)

Significant Flora

Species at Risk

Castanea dentata (American Chestnut) (NPCA, 2006-2009) – Endangered
Cornus florida (Eastern Flowering Dogwood) (Brady, et al., 1980) – Endangered

Provincially Rare Species

Carex seorsa (Swamp Star Sedge) (NPCA, 2006-2009) – S2
Nyssa sylvatica (Black Gum) (Brady, et al., 1980) – S3

Points of Interest

Faunal Records:

30 – Birds

18 – Moths & Butterflies

7 – Reptiles & Amphibians

4 – Mammals

Site Visits

September 1, 1980

Brady, et al.

July 6, 2007

B. Curry

July 10, 2008

T. Staton, S. Mohamed

July 21, 2008

T. Staton, S. Mohamed, M. Nikitczuk

% of site visited

5.48 % of the total study site was visited by NAI teams.

References Cited

Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

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Oldham, M. J., & Brinker, S. R. 2009. *Rare Vascular Plants of Ontario (Fourth Edition ed.)*. Peterborough, Ontario: Natural Heritage Information Centre, Ontario Ministry of Natural Resources.

Ontario Ministry of Agriculture and Food. 1989. *The Soils of The Regional Municipality of Niagara*, Report No. 60 of the Ontario Institute of Pedology, Guelph, Ontario.



Legend

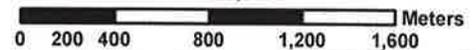
- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-20



Natural Areas Inventory

Study Site WL-20

1:30,000



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There are a total of 156 recorded taxa (unique plant records) for this study site.
Community Series:
 Deciduous Forest (FOD)
 Deciduous Swamp (SWD)

Study Site WL-22

Twenty Mile Creek

Municipality Township of West Lincoln

Formerly Twenty Mile Creek (Brady, et al., 1980)

Approximate Area 584 hectares

Watershed Twenty Mile Creek

Ownership Mix of private and public

General Summary

This study site follows the Twenty Mile Creek from the watershed boundary at Westbrook Road to Tintern Road near the Pelham border. The northern boundary is Highway 20/ Range Road 1/ Twenty Mile Road. The southern boundary is Twenty Road/ Sixteen Road.

Physical Description

This natural area is situated on the flat, poorly drained, clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Lockport Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	34.21
ALLUVIUM - VERY SHALLOW PHASE	0.26
BEVERLY	9.33
BEVERLY - LOAMY PHASE	1.50
BRANTFORD	16.12
HALDIMAND	7.54
LINCOLN	7.13
SMITHVILLE	7.91
SMITHVILLE - LOAMY PHASE	0.56
TOLEDO	4.32
WATER	8.34
NOT MAPPED	2.78
Total %	100.00

Ecological Land Classification

Summary

A very small portion of this study site was visited by NAI teams. This study site includes the floodplain and associated upland communities of the Twenty Mile Creek corridor.

The communities noted were what would be expected for a floodplain situation. Meadow Marshes dominated by Reed-canary Grass (*Phalaris arundinacea*) were commonly noted along with Graminoid Meadows of Fescue Grass (*Festuca sp.*), Common Teasel (*Dipsacus fullonum ssp. sylvestris*), Reed-canary Grass, and Gray

Dogwood (*Cornus foemina* ssp. *racemosa*) with occasional Green Ash (*Fraxinus pennsylvanica*) trees.

The Deciduous Forests progressed up the floodplain slope from Green Ash sominated to more upland stands dominated by Shagbark Hickory (*Carya ovata*), Sugar Maple (*Acer saccharum* ssp. *saccharum*), Red Oak (*Quercus rubra*), and White Ash (*Fraxinus americana*).

The understory for these communities was mostly Hop Hornbeam (*Ostrya virginiana*) along with Gray Dogwood, and Choke Cherry (*Prunus virginiana* ssp. *virginiana*).

The herbaceous layer was a mix of Grasses (*Grass* sp.), Asters (*Aster* sp.), and Moneywort (*Lysimachia nummularia*).

The Open Water communities recorded were dominated by Water-lily species (*Nymphaea* sp.) and Bullhead Lilies (*Nuphar* sp.).

Vegetation Communities

There are a total of 93 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Forest (FOD)
Deciduous Thicket (THD)
Graminoid Meadow (MEG)
Meadow Marsh (MAM)
Mixed Shallow Aquatic (SAM)
Open Water (OAW)
Shallow Marsh (MAS)

Vegetation Type

Dry-Fresh Sugar Maple-Red Maple Deciduous Forest Type (FODM5-9)
Forb Mineral Shallow Marsh Type (MASM2-1)
Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest Type (FODM7-2)
Native Shrub Deciduous Hedgerow Thicket Type (THDM3-2)
Open Graminoid Meadow Type (MEGM4-1)
Reed-canary Grass Graminoid Mineral Meadow Marsh Type (MAMM1-3)
Water-lily-Bullhead Lily Mixed Shallow Aquatic Type (SAM_1-8)

Significant Flora

Species at Risk

Juglans cinerea (Butternut) (Brady, et al., 1980) – Endangered

Provincially Rare Species

Gleditsia triacanthos (Honey Locust) (Brady, et al., 1980) – S2

Points of Interest

Faunal Records:

10 – Birds
3 – Moths & Butterflies
1 – Reptiles & Amphibians

1 – Mammals

Site Visits

September 1, 1980

Brady, et al.

June 13, 2007

B. Curry

July 24, 2008

T. Staton, S. Mohamed

July 25, 2008

T. Staton, S. Mohamed

July 29, 2008

T. Staton, S. Mohamed

% of site visited

0.45 % of the total study site was visited by NAI teams.

References Cited

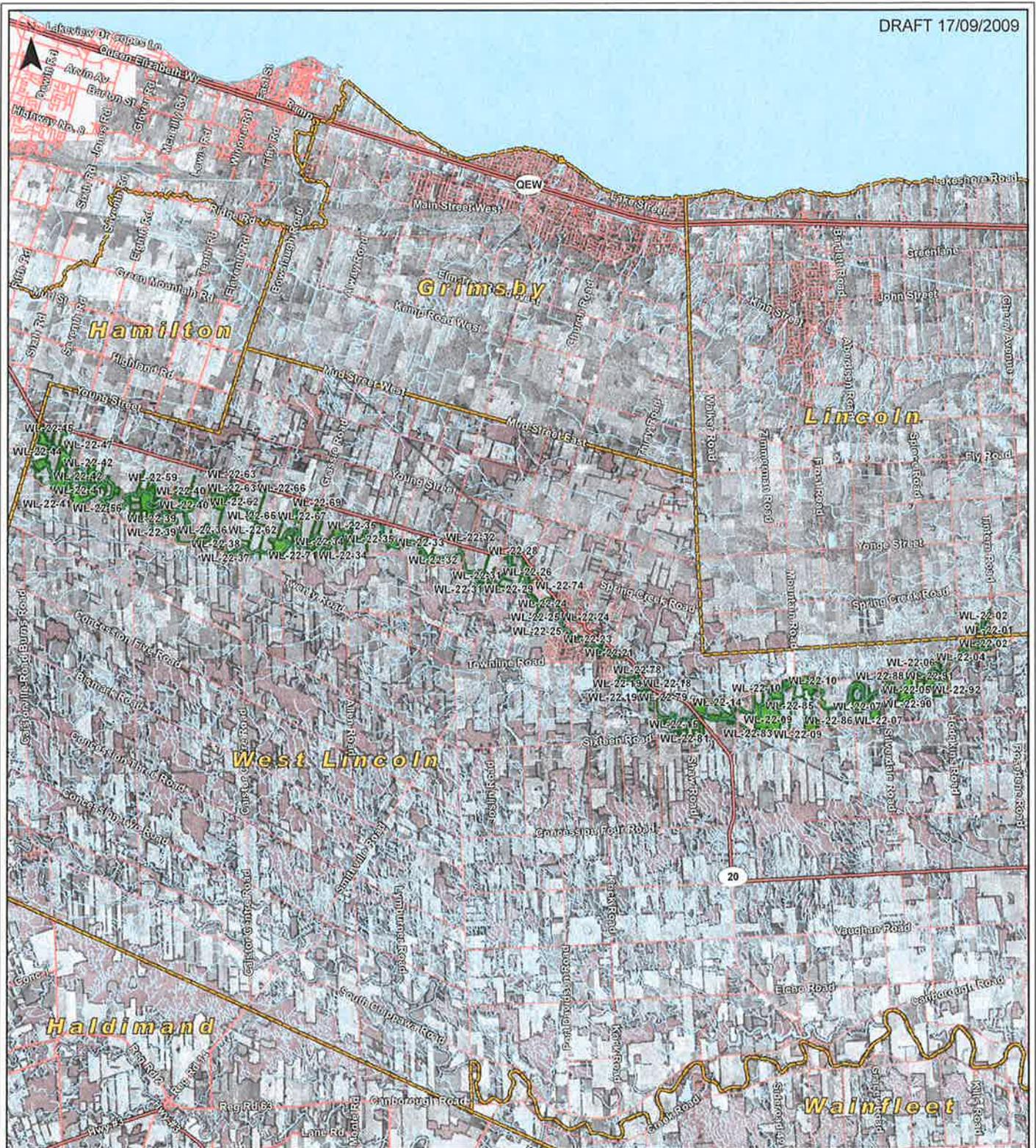
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Legend

- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-22



Natural Areas Inventory

Study Site WL-22

1:130,000



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There are a total of 93 recorded taxa (unique plant records) for this study site
Community Series:
 Deciduous Forest (FOD) Meadow Marsh (MAM)
 Deciduous Thicket (THD) Open Water (OAW)
 Graminoid Meadow (MEG)

Study Site WL-23

Stewart's Woods

Municipality Township of West Lincoln

Formerly Stewart's Wood (Brady, et al., 1980)

Approximate Area 298 hectares

Watershed The drainage for this study site is split nearly in half between Twenty Mile Creek to the south and Forty Mile Creek to the north.

Ownership Mostly private

General Summary

This study site is located between Mud Street East to the north and Highway 20 to the south. It extends from Grassie Road in the west to South Grimsby Road Six in the east.

Physical Description

The northern portion of this natural area is situated on the well drained, sand and gravel deposits of the till, moraine feature associated with the remnant Niagara Falls Moraine. The southern portion of this area is characterized by the flat, poorly drained, clay and silty clay soils of the Haldimand Clay Plain.

The entire study site is underlain by the dolostone of the Lockport Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	1.99
BEVERLY	8.53
BRANTFORD	1.71
HALDIMAND	11.37
LINCOLN	44.86
MALTON	0.11
PEEL	0.25
SMITHVILLE	0.06
TOLEDO	30.31
WATER	0.00
NOT MAPPED	0.81
Total %	100.00

Ecological Land Classification

Summary

A very small portion of this study site was visited by NAI teams.

The most common community recorded was a dry Deciduous Forest dominated by White Oak (*Quercus alba*) and Red Oak (*Quercus rubra*), with Shagbark Hickory (*Carya ovata*), and Sugar Maple (*Acer saccharum ssp. saccharum*).

The understory was characterized by Hop Hornbeam (*Ostrya virginiana*), Sugar Maple, Serviceberry (*Amelanchier sp.*), and Black Cherry (*Prunus serotina*).

The ground cover was mostly regenerating canopy trees with Maple-leaved Viburnum (*Viburnum acerifolium*), Large-leaved Aster (*Aster macrophyllus*), and Goldenrod (*Solidago sp.*).

Vegetation Communities

There are a total of 50 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Forest (FOD)

Deciduous Swamp (SWD)

Vegetation Type

Fresh-Moist Oak-Sugar Maple Deciduous Forest Type (FODM9-1)

Swamp White Oak Mineral Deciduous Swamp Type (SWDM1-1)

Significant Flora

Species at Risk - None noted.

Provincially Rare Species – None noted.

Points of Interest

Faunal Records:

3 – Reptiles & Amphibians

2 – Birds

1 – Mammal

Site Visits

September 1, 1980

Brady, et al.

October 31, 2008

T. Staton, S. Mohamed

% of site visited

1.50 % of the total study site was visited by NAI teams.

References Cited

Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

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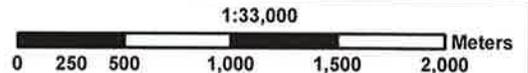


- Legend**
- Major Highways
 - Regional Highways
 - Roads
 - Watercourses
 - Waterbodies
 - Municipal Boundaries
 - Study Sites
 - Study Site WL-23



Natural Areas Inventory

Study Site WL-23



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There are a total of 50 recorded taxa (unique plant records) for this study site.
Community Series:
 Deciduous Forest (FOD)

Study Site WL-26

Beaver Creek

Municipality Township of West Lincoln

Formerly N/A

Approximate Area 387 hectares

Watershed The majority of this study site drains to the Beaver Creek subwatershed. There is a very small portion that drains north to an unnamed creek, and south to Welland River West.

Ownership Mostly private.

General Summary

This study site closely follows Beaver Creek between Vaughn Road in the north and Canborough Road in the south. It extends from Caistor/Canborough Townline Road in the west to Wellandport Road in the east.

Physical Description

This natural area is situated on the flat, poorly drained clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone and shale of the Salina Formation.

In the far north west of this study site there is a small area that is underlain by the dolostone of the Guelph Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	23.28
BEVERLY	0.02
BRANTFORD	0.33
HALDIMAND	27.98
HALDIMAND - LOAMY PHASE	0.87
LINCOLN	38.66
SMITHVILLE	6.49
TOLEDO	0.03
WATER	1.44
NOT MAPPED	0.90
Total %	100.00

Ecological Land Classification

Summary

This study site is characterized by Deciduous Swamps that are associated with the floodplain of Beaver Creek. These swamp communities were dominated by Swamp White Oak (*Quercus bicolor*), Swamp Maple (*Acer fremanii*), and Green Ash (*Fraxinus pennsylvanica*) with some White Elm (*Ulmus americana*).

The understory was a mix of Hawthorn (*Crataegus sp.*), Gray Dogwood (*Cornus foemina ssp. racemosa*), Buttonbush (*Cephalanthus occidentalis*), Winterberry (*Ilex verticillata*), Narrow-leaved Meadowsweet (*Spirea alba*), Blue Beech (*Carpinus caroliniana*), and Willow (*Salix sp.*).

The herbaceous layer was mostly Spotted Touch-me-not (*Impatiens capensis*), Asters (*Aster sp.*), Avens (*Geum sp.*), and Reed-canary Grass (*Phalaris arundinacea*).

The transition zones between the swamp communities and the drier Deciduous Forests were classified as Meadow Marshes dominated by Reed-canary Grass.

The Deciduous Forests were largely dominated by Green Ash and White Elm with the same basic understory of Gray Dogwood, Hawthorn and Tartarian Honeysuckle (*Lonicera tatarica*).

The ground cover was a mix of Avens and Goldenrod, with Garlic Mustard (*Allaria petiolata*).

Vegetation Communities

There are a total of 74 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Forest (FOD)
Deciduous Swamp (SWD)
Meadow Marsh (MAM)
Shallow Marsh (MAS)
Thicket Swamp (SWT)
Floating-leaved Shallow Aquatic (SAF)

Vegetation Type

Broad-leaved Sedge Mineral Shallow Marsh Type (MASM1-5)
Buttonbush Mineral Deciduous Thicket Swamp Type (SWTM5-1)
Buttonbush Organic Deciduous Thicket Swamp Type (SWTO5-1)
Duckweed Floating-leaved Shallow Aquatic Type (SAF_1-3)
Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest Type (FODM7-2)
Fresh-Moist Oak-Sugar Maple Deciduous Forest Type (FODM9-1)
Green Ash Mineral Deciduous Swamp Type (SWDM2-2)
Reed-canary Grass Graminoid Mineral Meadow Marsh Type (MAMM1-3)
Swamp Maple Mineral Deciduous Swamp Type (SWDM3-3)
Swamp White Oak Mineral Deciduous Swamp Type (SWDM1-1)
Winterberry Mineral Deciduous Thicket Swamp Type (SWTM5-6)

Significant Flora

Species at Risk – None noted.

Provincially Rare Species – None noted.

Points of Interest

Faunal Records:

8 – Birds

4 – Reptiles & Amphibians

1 – Moths & Butterflies
1 – Mammals

Site Visits

September 4, 2008
T. Staton, S. Mohamed

September 8, 2008
T. Staton, S. Mohamed

% of site visited

3.21 % of the total study site was visited by NAI teams.

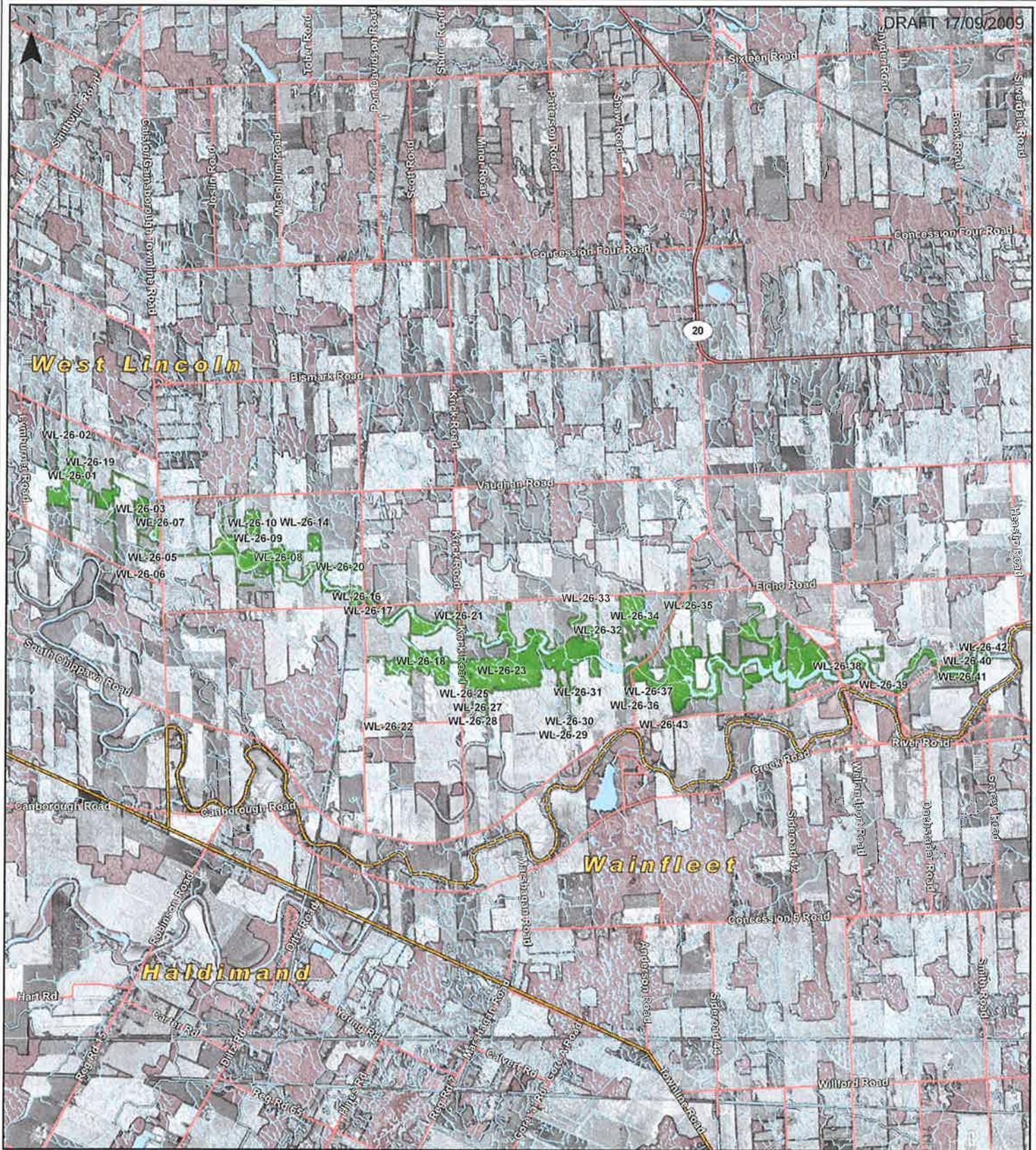
References Cited

Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

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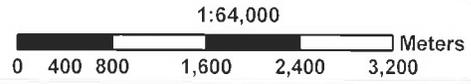
Legend

- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-26



Natural Areas Inventory

Study Site WL-26



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There are a total of 74 recorded taxa (unique plant records) for this study site.
Community Series:
 Deciduous Forest (FOD)
 Deciduous Swamp (SWD)
 Meadow Marsh (MAM)

Study Site WL-27

Beaver Creek Headwaters

Municipality Township of West Lincoln

Formerly N/A

Approximate Area 153 hectares

Watershed This study site drains to an unnamed creek.

Ownership Mostly private

General Summary

The northern boundary of this study site is Vaughan Road and the southern boundary is Canborough Road. It extends from just west of Wellandport Road in the west to Heaslip Road in the east.

Physical Description

This natural area is situated on the flat, poorly drained, clay and silty clay soils of the Haldimand Clay Plain.

The northern portion is underlain by the dolostone of the Guelph Formation. The southern portion is underlain by the dolostone and shale of the Salina Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	7.24
HALDIMAND	30.29
LINCOLN	46.99
NIAGARA	0.54
SMITHVILLE	14.94
WATER	0.00
NOT MAPPED	0.00
Total %	100.00

Ecological Land Classification

Summary

A very small portion of this study site was visited by NAI teams.

The most common community noted was Deciduous Swamp dominated by Red Maple (*Acer rubrum*), Basswood (*Tilia americana*), Shagbark Hickory (*Carya ovata*), and Green Ash (*Fraxinus pennsylvanica*).

The understory was characterized by regenerating canopy species with Blue Beech (*Carpinus caroliniana*).

The herbaceous layer was a mix of Fowl Manna Grass (*Glyceria striata*), Asters (*Aster sp.*), Spotted Touch-me-not (*Impatiens capensis*), and Spotted Crane's-bill (*Geranium maculatum*).

Other communities of note were Thicket Swamps dominated by Buttonbush (*Cephalanthus occidentalis*), and Shallow Marsh communities dominated by Beggar-ticks (*Bidens sp.*).

Vegetation Communities

There are a total of 151 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Swamp (SWD)
Deciduous Forest (FOD)
Shallow Marsh (MAS)
Thicket Swamp (SWT)

Vegetation Type

Beggar-ticks Mineral Shallow Marsh Type (MASM2-2)
Buttonbush Mineral Deciduous Thicket Swamp Type (SWTM5-1)
Fresh-Moist Sugar maple-Hardwood Deciduous Forest Type (FODM6-5)
Red Maple Mineral Deciduous Swamp Type (SWDM3-1)

Significant Flora

Species at Risk –None noted.

Provincially Rare Species

Nyssa sylvatica (Black Gum) (NPCA, 2006-2009) – S3

Points of Interest

Faunal Records:

14- Birds
5 – Moths & Butterflies
4 – Reptiles & Amphibians
2 – Mammals

Site Visits

August 1, 2008

R. Young, J. Damude, J. Kellam, J. Potter, M. Potter

August 14, 2008

T. Staton, S. Mohamed

% of site visited

2.16 % of the total study site was visited by NAI teams.

References Cited

Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

Natural Heritage Areas Inventory 2006-2009. Unpublished database, Niagara Peninsula Conservation Authority, Welland, Ontario.

Oldham, M. J., & Brinker, S. R. 2009. *Rare Vascular Plants of Ontario (Fourth Edition ed.)*. Peterborough, Ontario: Natural Heritage Information Centre, Ontario Ministry of Natural Resources.

Ontario Ministry of Agriculture and Food. 1989. *The Soils of The Regional Municipality of Niagara*, Report No. 60 of the Ontario Institute of Pedology, Guelph, Ontario.



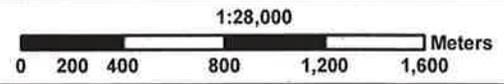
Legend

- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-27



Natural Areas Inventory

Study Site WL-27



Produced by the Niagara Peninsula Conservation Authority, 2009.
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 All Frames: North American Datum 1983, Universal Transverse Mercator 6° Projection, Zone 17N, Central Meridian 81° West



There are a total of 151 recorded taxa (unique plant records) for this study site.
Community Series:
 Deciduous Swamp (SWD)

Study Site WL-32

Little Wolf Creek

Municipality Township of West Lincoln

Formerly N/A

Approximate Area 197 hectares

Watershed The drainage for this study site is divided nearly in half with the western portion draining to Little Wolf Creek and the eastern portion draining to Wolf Creek.

Ownership Mostly private.

General Summary

This study site is located along the Hamilton border between Westbrook Road to the west and Caistorville Road in the east. The northern boundary is Concession Three Road and the southern boundary is Concession one Road.

Physical Description

This natural area is situated on the flat, poorly drained clay and silty clay soils of the Haldimand Clay Plain. It is underlain by the dolostone of the Guelph Formation.

Soils

Soil Type	Percentage of Study Site
ALLUVIUM	21.99
HALDIMAND	16.66
LINCOLN	41.04
SMITHVILLE	19.96
WATER	0.00
NOT MAPPED	0.35
Total %	100.00

Ecological Land Classification

Summary

A very small portion of this study site was visited by NAI teams.

The dominant community noted was a Deciduous Swamp characterized by Red Maple (*Acer rubrum*), Red Oak (*Quercus rubra*), Green Ash (*Fraxinus pennsylvanica*), with the occasional White Oak (*Quercus alba*).

The understory was a mix of Sugar Maple (*Acer saccharum ssp. saccharum*), American Beech (*Fagus grandifolia*), Blue Beech (*Carpinus caroliniana*), and Smooth Serviceberry (*Amelanchier laevis*).

The herbaceous layer was mostly Sedges (*Carex sp.*), Asters (*Aster sp.*), Beggar-ticks (*Bidens sp.*), and Spotted Touch-me-nots (*Impatiens capensis*).

The Shallow Aquatic community noted was dominated by Lesser Duckweed (*Lemna minor*).

Vegetation Communities

There are a total of 82 recorded taxa (unique plant records) for this study site.

Community Series

Deciduous Swamp (SWD)

Deciduous Forest (FOD)

Floating-leaved Shallow Aquatic (SAF)

Vegetation Type

Duckweed Floating-leaved Shallow Aquatic Type (SAF_1-3)

Fresh-Moist Oak-Hardwood Deciduous Forest Type (FODM9-6)

Red Maple Mineral Deciduous Swamp Type (SWDM3-1)

Significant Flora

Species at Risk

Carex lupuliformis (Knobbed Hop Sedge) (NPCA, 2006-2009) – Endangered

Provincially Rare Species

Nyssa sylvatica (Black Gum) (NPCA, 2006-2009)-S3

Points of Interest

Faunal Records:

2 – Birds

2 – Reptiles & Amphibians

Site Visits

August 1, 2008

R. Kitchen, B. Porter

% of site visited

2.09 % of the total study site was visited by NAI teams.

References Cited

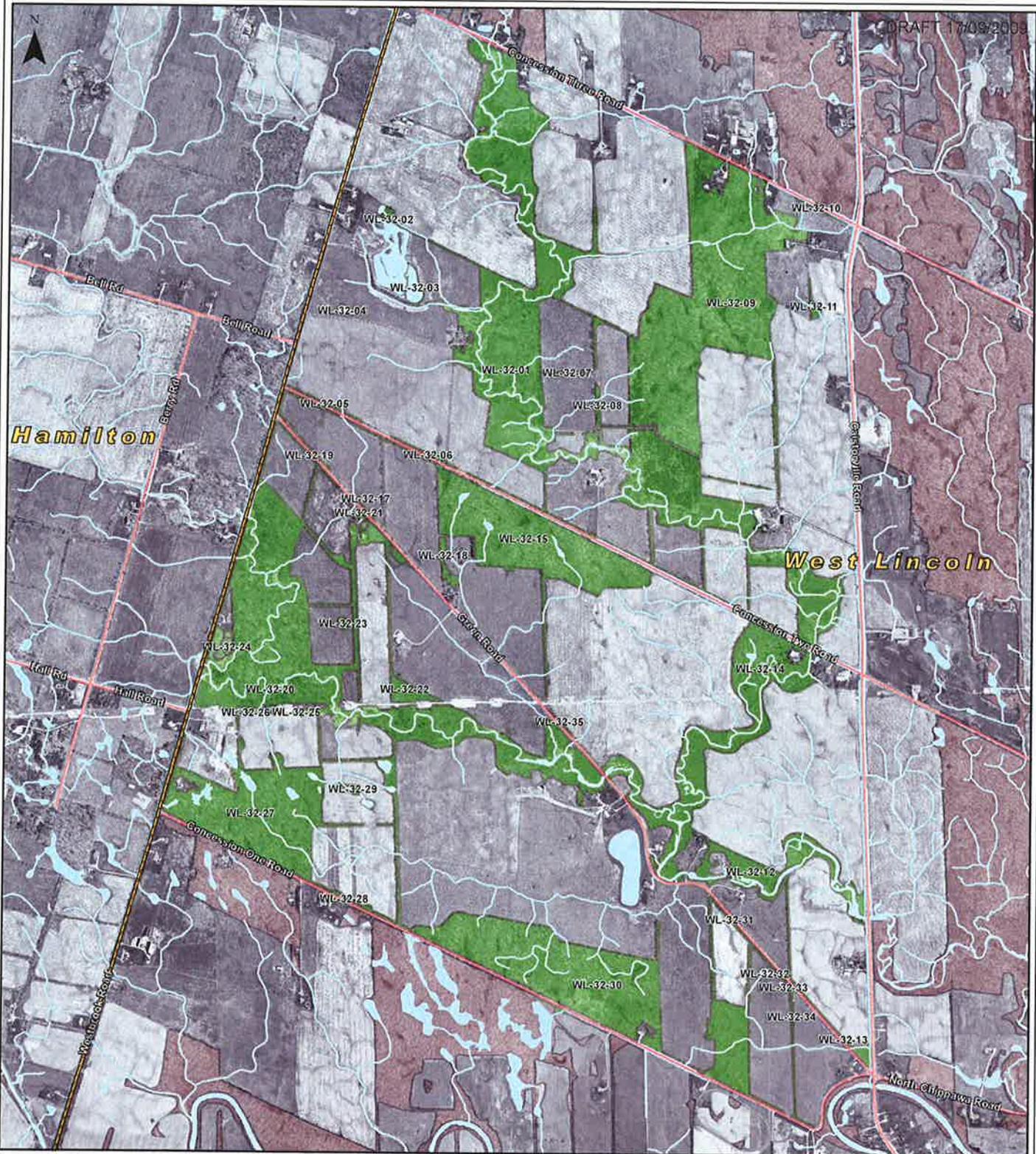
Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from

<http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

Natural Heritage Areas Inventory 2006-2009. Unpublished database, Niagara Peninsula Conservation Authority, Welland, Ontario.

Oldham, M. J., & Brinker, S. R. 2009. *Rare Vascular Plants of Ontario (Fourth Edition ed.)*. Peterborough, Ontario: Natural Heritage Information Centre, Ontario Ministry of Natural Resources.

Ontario Ministry of Agriculture and Food. 1989. *The Soils of The Regional Municipality of Niagara*, Report No. 60 of the Ontario Institute of Pedology, Guelph, Ontario.



Legend

- Major Highways
- Regional Highways
- Roads
- Watercourses
- Waterbodies
- Municipal Boundaries
- Study Sites
- Study Site WL-32



Natural Areas Inventory

Study Site WL-32

1:18,000



Produced by the Niagara Peninsula Conservation Authority, 2009
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 All Frames: North American Datum 1983, Universal Transverse Mercator 6* Projection, Zone 17N, Central Meridian 81° West



There are a total of 82 recorded taxa (unique plant records) for this study site.
Community Series:
 Deciduous Swamp (SWD)

APPENDIX C
Photographic Record



Crossing 5 - agricultural swale looking east to Station Road (winter)



Crossing 5 - agricultural swale looking south to Station Road (winter)



Crossing 5 - agricultural swale attached to drainage ditch along Abbey Road
(winter)



Crossing 6 – Feeder of Old Mill Race Creek at Station Road looking downstream
(summer)



Crossing 6 – Feeder of Old Mill Race Creek at Station Road looking downstream
(summer)



Crossing 6 – Feeder of Old Mill Race Creek at Station Road looking upstream
(summer)



Crossing 6 – Feeder of Old Mill Race Creek along Station Road looking north towards Abbey Road (winter)



Crossing 6 – Feeder of Old Mill Race Creek along Station Road looking south (winter)



Turbine 1 proposed location (spring)



Crossing 10 – Feeder of Old Mill Race Creek looking west; south of Turbine 1 (summer)



Crossing 10 – Feeder of Old Mill Race Creek looking west; south of Turbine 1
(spring)



Crossing 10 – Feeder of Old Mill Race Creek looking east; south of Turbine 1
(summer)



Crossing 10 – Feeder of Old Mill Race Creek looking east; south of Turbine 1
(spring)



Turbine 2 – Met Tower (winter)



Turbine 2 – Met Tower (spring)



Near Crossing 10 - Feeder of Old Mill Race Creek along Side Road 22 immediately west of Turbine 2 (winter)



Near Crossing 10 - Feeder of Old Mill Race Creek along Side Road 22 immediately west of Turbine 2 (spring)



Turbine 5 location- no associated watercourse; looking east (spring)



Turbine 4 – looking east (winter)



Turbine 4 – looking east (Spring)



Casey Drain – south of Turbine 4 looking towards Station Road (winter)



Casey Drain – south of Turbine 4 looking towards Station Road (spring)



Casey Drain – south of Turbine 4 looking east (spring)

APPENDIX D
Staff Resumes



Erin McLachlan

B.Sc., CEPIT

Terrestrial Ecologist and Environmental Planner

Experience

Ms. Erin McLachlan is the Terrestrial Ecologist/Environmental Planner with Morrison Hershfield. She has considerable experience in Environmental Protection and Management, Aquatic and Terrestrial Ecosystems, and Environmental Regulatory Legislation.

Ms. McLachlan has over 7 years of experience working on many multi-disciplinary engineering, environmental assessment, natural habitat inventory and impact assessment projects across Ontario in the transportation, mining, industrial and land development sectors.

Aquatic Biology

- Aquatic Ecosystems Scientific Retainer comprising extensive habitat inventory and impact assessment assignments for the Ontario Ministry of Transportation Central Region
- Natural Sciences Scientific Retainer comprising numerous habitat inventory and impact assessment assignments for the Ontario Ministry of Transportation Central Region
- Limnological studies and impact assessment on acidified lakes within Sudbury District for the Freshwater Ecology Unit
- Aquatic habitat inventory and assessment on the Grand River for the Argyle Street Heritage Bridge Replacement Detail Design Project for the Ontario Ministry of Transportation West Region
- Aquatic habitat inventory and assessment on several watercourses for the Highway 518 reconstruction Detail Design Project for the Ontario Ministry of Transportation Northeastern Region

Terrestrial Ecology

- Jefferson Salamander Species at Risk Study design and implementation on the Meadowvale Station Woods for the Ontario Ministry of Transportation Central Region

Education

- B.Sc., Env., University of Guelph
 - Class 1 Electrofishing Crew Leader
 - MTO/DFO Fisheries Protocol Training Course
 - Ecological Land Classification of Southern Ontario Training Course
 - Freshwater Mussel Identification Course
 - Ontario Wetland Evaluation System
-
- Terrestrial inventories and impact assessments on over 40 transportation projects for the Ontario Ministry of Transportation West, Central, Eastern, and Northeastern Regions and the Regional Municipalities of York, Peel, Halton and Durham
 - Natural Sciences Scientific Retainer comprising terrestrial inventory and impact assessment assignments for the Ontario Ministry of Transportation Central Region
 - Coordinated and implemented wetland identification, vegetation and herptofauna assessments for the North Bay-Mattawa Conservation Authority
 - Environmentally Sensitive Area and terrestrial ecology assessment on 28 Km of Highway 101 for the Ontario Ministry of Transportation Northeastern Region
 - Terrestrial inventory and assessment on a 12 hectare tract of Carolinian Forest for Earthquest Canada

Environmental Planning and Regulatory

- Environmental Impact Assessment and Statement Proposed Subdivision Development, Town of Wasaga Beach for Westbury Homes Inc.
- Natural Environment Level I and Level II Assessments under the *Mining Act* for 13 Pits and Quarries in northern Ontario for the Ontario Ministry of Transportation, Northeastern Region
- Approvals under the Conservation Authorities Act, Navigable Waters Protection Act and the Niagara Escarpment Planning and Development Act for 8 bridge rehabilitation projects for the Region of Peel



Kelly Sadlier

B.Sc.

Aquatic and Terrestrial Ecosystems Biologist

Experience

Ms. Kelly Sadlier is an Aquatic and Terrestrial Ecosystems Biologist with Morrison Hershfield. She has considerable experience in Environmental Protection and Management, Aquatic and Terrestrial Ecosystems, and Environmental Regulatory Legislation.

Ms. Sadlier has several years of experience working on many multi-disciplinary engineering, environmental assessment, natural habitat inventory and impact assessment projects across Ontario in the transportation, tourism, government, industrial and land development sectors.

Aquatic Biology

- Aquatic Ecosystems Scientific Retainer comprising extensive Habitat Inventory and Impact Assessment assignments for MTO Central Region
- Aquatic Habitat Inventory and Limnological Assessment on several warmwater lakes for the Loon Lake Hunt Club
- Aquatic Habitat Inventory and Assessment on 50 watercourses on Highway 11 between Highway 400 and the Severn River, Highway Assessment Project for MTO Central Region
- Aquatic Habitat and Species at Risk Inventory and Assessment on several headwaters watercourses for the Expansion and Realignment of Winston Churchill Boulevard for the Region of Peel
- Aquatic Habitat Inventory and Assessment on 7 large rivers for the Highway 101 Reconstruction Detail Design project for MTO Northeastern Region
- Post-Construction Aquatic Monitoring to meet the requirements of a Fisheries Act Authorization for the Realignment of Fourteen Mile Creek for MTO Central Region
- Aquatic Habitat and Species at Risk Inventory and Assessment on the Credit River for the Rehabilitation of Britannia Road for the Region of Peel
- Aquatic and Terrestrial Habitat and Species at Risk Inventory and Assessment on a Provincially Significant Wetland for the Rehabilitation of Cundles Road for the City of Barrie

Education

- B.Sc., Trent University
- Fish & Wildlife Technologist, Sir Sanford Fleming College of Applied Arts and Technology
- Class II Electrofishing Crew Leader
- MTO/DFO Fisheries Protocol Training Course

- Post-Construction Aquatic Monitoring to meet the requirements of a Fisheries Act Authorization for the Realignment of Sandplant Hill for MTO Central Region

Terrestrial Ecology

- Species at Risk Biologist conducting SARA Herptofauna Inventories and Habitat Assessments throughout the Trent-Severn Waterway for Parks Canada
- Terrestrial Inventories and Impact Assessments on numerous transportation projects for MTO Central, Eastern, and Northeastern Regions and the Regional Municipalities of York, Peel, Halton and Durham
- Natural Sciences Scientific Retainer comprising Terrestrial Inventory and Impact Assessment assignments MTO Central Region

Environmental Management and Regulatory

- Mosquito Larvae Surveillance Program 2008, for MTO Central Region
- Approvals under the *Fisheries Act*, *Navigable Waters Protection Act* and the *Niagara Escarpment Planning and Development Act* for 8 Bridge Rehabilitation projects for the Region of Peel



Bettina Henkelman

B.Sc., Environmental Science

Terrestrial Ecologist, Arborist, Community Sustainability Specialist

Experience

Bettina brings over 10 years of experience to her position of Terrestrial Ecologist and Sustainability Specialist at MH. She has a rich history of experience in various environmental fields. The following is a summary of varied skills.

Terrestrial Ecology

- Managed and conducted Environmental Impact Studies (EIS) for residential and commercial developments, MTO projects, landfill development, Municipal and Federal projects.
- Compiled expert, accurate plant inventories using GPS, ArcMap and windows based programs.
- Carried out amphibian and ungulate surveys and evaluation of natural heritage features and functions based on wildlife surveys.
- Performed arborist assessments and Tree Retention Reports for hazard analysis and restoration plans.
- Determined the ecological sensitivity and significance of a site to verify the site-specific constraints and opportunities for development.
- Interpreted and applied natural heritage policy within an EIS context including the Nutrient Management Act, Environmental Assessment Act, Conservation Authorities Act, and Provincial Policy Act, as well as County and Municipal Official Plans.

Habitat Restoration

- Designed and authored mitigation and restoration plans for wetlands, streams, and terrestrial systems based on specific site requirements and local ecosystems, restoring natural function and creating self-sustaining habitats, while fulfilling the objectives of planning authorities and clients.
- Authored training manual on best management practices for shoreline landscaping.
- Project Leader and on the Advisory Committee for Audubon Certification with the Cooperative Sanctuary Program.
- Monitored environmental damage and remediated areas within provincial parks and Alpine areas.

Education

- B.Sc. Environmental Science Carleton University
- Landscaping/Horticulture, Capilano College
- Forestry, Sir Sandford Fleming College

Memberships and Licenses

- Field Botanists of Ontario & Ecological Society of America
- Society for Ecological Restoration & Ontario Field Naturalists
- Nepean Horticultural Society

- Organized, coordinated, carried out, and documented the Chrysler-Finch Esker Characterization Study; to determine the extent of interaction between groundwater within the esker aquifer and surface water.
- Tidal and freshwater fisheries assessments.

Community Sustainability

- Implemented the City of Ottawa "Take-it-Back" program (the 1st of its kind) and established over 60 new local business partnerships in the program.
- Implemented the Compost+ program in the City of Ottawa
- Researched, developed and implemented Contest to determine effects of bi-weekly waste and compost program for the City of Ottawa.

Research

- Identified and transect sampled rare and uncommon fen species to correlate with pH, nutrients, and groundwater levels for Carleton University.
- Carried out research, statistical analysis, and maintained plants in Greenhouse and growth chambers for experiments.
- Co-authored "Germinating wild plant species for phytotoxicity testing" for Pest Management Science.



Josephine Gilson

B.Sc.

Aquatic and Terrestrial Ecosystems Biologist

Experience

Ms. Josephine Gilson is an Aquatic and Terrestrial Ecosystems Biologist with Morrison Hershfield. She has considerable experience in Environmental Protection and Management, Aquatic and Terrestrial Ecosystems, and Environmental Regulatory Legislation.

Ms. Gilson has several years of experience working on many multi-disciplinary engineering, environmental assessment, natural habitat inventory and impact assessment projects across Ontario and British Columbia in the transportation, tourism, government, industrial and land development sectors.

Ecosystem Biologist

As an Aquatic and Terrestrial Ecosystem Biologist at Morrison Hershfield, Ms. Gilson has been involved in a variety of projects including:

- Fisheries Existing Conditions and Environmental Impact Assessment for the Ministry of Transportation (MTO), Northern Region. The study area included the section of Highway 101 between Wawa and Chalpeau, and involved field fish and fish habitat investigation, as well as documentation of the findings.
- Collection and organization of fishery data, as well as the creation of a database for MTO Central Region. The project provides the ability to link fishery data and graphic representation for all the drainage ditches associated with major highways within the MTO Central Region.
- Fisheries Investigation and Summary Report for an international crossing over the Detroit River for the Border Transportation Partnership, which included the MTO, Transport Canada, the Michigan Department of Transportation (MDOT), and the U.S. Federal Highway Administration (FHWA). The technical report considered impacts resulting from the construction of the bridge and ancillary features, including a potential docking facility.

Education

- B.Sc., Royal Roads University, Victoria, British Columbia
- Environmental Technology Program, Fleming College, Lindsay, Ontario
- Class II Electrofishing Crew Leader
- MTO/DFO Fisheries Protocol Training Course

- Fisheries Existing Conditions and Environmental Impact Assessment for MTO Central Region. The study was the result of rehabilitation of Highway 400 north of the Highway 11/400 split, including the rehabilitation of multiple overpass structures. The study included field fish and fish habitat investigation, as well as documentation of the findings.

Environmental Technician

Ms. Gilson worked as an Environmental Technician for Ecofish Research Limited, in Courtenay, British Columbia. Her skills included:

- Wading in swift waters, drift net benthic invertebrate sampling, riparian vegetation assessments, stream habitat assessments and processing fish (scale samples, weight, species identification).

With Terraprobe Limited, in Brampton, Ontario, Ms. Gilson's skills included:

- Extensive field experience including; installation and sampling ground water monitoring wells, soil sampling and identification, surface water and sediment sampling, storm water sampling, site remediation and surveying.

Sub-Watershed Assessment Technician

Ms. Gilson worked as a Sub-Watershed Assessment Technician for Grand River Conservation Authority, in Cambridge, Ontario. Her skills included:

- Organization and completion of a field sampling program. Field data collection; electrofishing, benthic invertebrate and water quality sampling.



Stephanie Goom

B.E.S.

Fisheries Biologist and Environmental Planner

Experience

Ms. Stephanie Goom is a Fisheries Biologist and Environmental Planner with Morrison Hershfield. She has considerable expertise in Environmental Assessment, Aquatic Sciences and Restoration Ecology.

Ms. Goom has extensive experience in reviewing planning applications and development proposals for compliance with Municipal, Provincial and Federal legislation. She has experience conducting environmental assessments for impacts to natural features and negotiating mitigation and compensation strategies under the *Fisheries Act* for a number of aquatic projects throughout Canada.

Aquatic Biology

- Aquatic habitat inventory and assessment on the road improvements to Bathurst Street and Keele Avenue for the Regional Municipality of York.
- Aquatic Habitat Inventory and Assessment of watercourses for improvements on Highway 65, Highway 35, Highway 518 for the Ontario Ministry of Transportation Northeastern Region.
- Fish Compensation Plan and Post-Construction Monitoring for residential developer, Tartan Homes in the City of Ottawa, for compliance with *Fisheries Act* and *Conservation Authorities Act*.
- Environmental inspection and reporting of environmental protection measures for construction of municipal road and bridge over the Nottawasaga River for the Township of Essa.
- Aquatic Impact Assessment for March Road Widening and Culvert Installation for the City of Ottawa.

Terrestrial Biology

- Design of Riparian Planting Plan And Post-Construction Monitoring of plantings and bioengineering in a newly created watercourse to meet the requirements of the *Fisheries Act* and *Conservation Authorities Act*, for a landfill expansion for Waste Services, Inc. in Ottawa.
- Terrestrial inventories and impact assessments on for transportation projects for the Ontario Ministry of

Education

- B.E.S., University of Waterloo, 2007
- Environmental Assessment Diploma, University of Waterloo, 2007

Memberships and Licenses

- Class II Electrofishing Crew Leader
- Ecological Land Classification of Southern Ontario Training Course
- Freshwater Mussel Identification Course
- DFO Risk Management Training Course
- American Fisheries Society – Ontario Chapter
- Society for Ecological Restoration – Ontario Chapter

Transportation Eastern, and Northeastern Regions and the Regional Municipalities of York and Peel.

- Field surveys to identify potential habitat for terrestrial and aquatic species at risk throughout the National Capitol Region for Public Works and Government Services Canada (PWGSC).

Environmental Planning and Regulatory

- Environmental Impact Studies (EIS) and Environmental Assessments (EA) for residential and commercial developments, oil and gas development, mining, landfill development, Municipal and Federal projects.
- Natural Environmental Level 1 and Level II Assessments under to support the *Aggregate Resources Act* license application for a proposed quarry for private developer in the City of Ottawa.
- Project approvals including No HADD and HADD authorizations using DFO's Risk Management Framework.
- Approvals under the *Fisheries Act*, *Conservation Authorities Act*, *Environmental Assessment Act*, *Species at Risk Act*, *Endangered Species Act*, *Ontario Water Resources Act* and *Provincial Policy Statement* as it relates to the *Planning Act*.

Alan Wormington

Ornithologist & Terrestrial Ecologist

Experience

Mr. Alan Wormington is an Ornithologist and avian habitat specialist with Morrison Hershfield and brings over 25 years of experience. He is a recognized expert in other terrestrial disciplines including butterflies, moths, terrestrial ecology and habitat inventory and impact assessment.

Alan is a regular contributor to the Breeding Bird Atlas of Ontario and the author of many ornithological reports and studies. Alan's extensive knowledge of Southern, Central and Northern Ontario habitats enables an accurate inventory and assessment of the significance of any breeding bird activity and habitats for species at risk. Alan has provided expert avian biological services in the transportation, mining, industrial and land development sectors.

Ornithological and SAR Studies

- Natural Sciences Scientific Retainer comprising numerous avian and SAR habitat inventory and impact assessment assignments, for MTO Central Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 5 km of Highway 8, for MTO Southwestern Region
- Project Ornithologist for the Zeiss Search for the Ivory-billed Woodpecker, for the Louisiana Department of Natural Resources
- Resident and Breeding Bird Species, Nesting Assessment and Protection, and Mitigation Plans for over 40 bridge structures including the Grand River Argyle Street Bridge, Bayfield River Bridge, Scugog River Bridge, and the Ausable River Bridge MTO Southwestern, Central, Eastern and Northeastern Regions
- Resident and Migratory Breeding Bird Species and Nesting Assessment and Protection and Mitigation Plans for over 20 resource extraction and land development sites in the Northwest Territories, for LGL Limited
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 15 km of Highway 518 for MTO Northeastern Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 8 km of Kennedy Road and on 8 km of McCowan Road, for the Regional Municipality of York
- Resident and Migratory Waterfowl Species and Habitat Assessment on the Ferry Docks at Leamington, Kingsville, and Pelee Island, MTO Southwestern Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 49 km of Highway 11 for MTO Central Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 29 km of Highway 101 for MTO Northeastern Region

Terrestrial Ecology

- Park Naturalist at Rondeau Provincial Park, Quetico Provincial Park, Point Pelee National Park
- Wetlands Evaluation and Inventories on over 50 wetlands for the Ontario Ministry of Natural Resources
- Project Biologist for the Environmentally Sensitive Areas Inventory and Classification Study for North Wellington County, Kent-Elgin County, Regional Municipality of Halton and Hamilton-Wentworth County

Education

- Historical/Natural Interpretive Services, Seneca College
- Applied Photography, Sheridan College of Applied Arts and Technology
- Ontario Wetland Evaluation Course

Memberships

- Ontario Field Ornithologists - Founding Life Member



Samantha Lawton

B.Sc. Student (3rd Year), Wildlife Biology and Zoology, University of Toronto

Student Field Monitoring Biologist

Experience

Samantha Lawton, for the past year has been working in the Environmental Division's Toronto office part time, while continuing her degree work at the University of Toronto in Wildlife Biology and Zoology. Her main focus of study includes Environmental Biology, Organisms in their Environment, Animal Physiology, Calculus, Organic and Physical Chemistry.

Samantha has worked and assisted the Environmental Field Team on projects that include:

- 2010 Spring Monitoring of Wood Turtle Habitat, an Ontario Endangered Species, to Support Development of Highway Crossing Mitigation, for MTO Northeastern Region
- 2010 Monitoring of Blanding's Turtles, an Ontario Endangered Species, to Support Development of Highway Crossing Mitigation, for MTO Northeastern Region
- 2010 Highway 10 Turtle Crossing and Nesting Habitat Design and Post-Construction Monitoring Study, for MTO Central Region

Samantha also worked as a Construction Administrator Assistant with Morrison Hershfield in 2009, where she was responsible for keeping finances of many projects up to date, compiled payment packages and compared to budgets, and prepared reports and updated legal documentation.

Other work that Samantha has been involved in outside Morrison Hershfield include:

- University of Toronto, Gross Lab, as a Research Student, Researched effect of diseases on Canada's endangered species, and worked with Masters and Ph.D. Students designing a lab plan, 2010 to present
- University of Toronto International Health Program, as a Seminar Leader, researched diseases and condensed into interesting form, and organized event structure and personnel, 2009-2010

Education

- B.Sc. Student (3rd Year), Wildlife Biology and Zoology, University of Toronto

Memberships and Licenses

- Victoria College In-Course Scholarship for Academic Achievement, November 2009
- Pacific Coast Terminals Scholarship for Leadership and Academic Excellence, June 2008
- District Scholarship for Business Studies, June 2008
- Provincial Scholarship for Academic Achievement, June 2008
- 2nd at Bruce-Lockhart Debate Tournament, January 2008



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Project Number: 1104036.00

Project Title: **WAINFLEET WIND ENERGY PROJECT**

Report: 007-R02-1104036

Title: **NATURAL HERITAGE ASSESSMENT REPORT**
EVALUATION OF SIGNIFICANCE REPORT- FINAL
VERSION

Client: IPC Energy
2550 Argentia Road Suite 105
Mississauga, Ontario
L5N 5R1

Date: March 2012

Morrison Hershfield Limited

Erin McLachlan
Terrestrial Ecologist and Environmental Planner

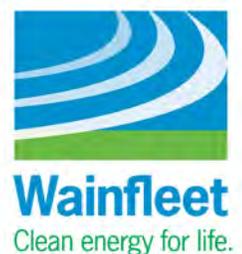


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1.0 Introduction

This report evaluates the significance of Natural features within 120m of the project location. The purpose is to determine if any natural features identified during the records review and/or site investigation are significant or provincially significant and thus subject to development prohibitions and setbacks outlined in section 38 of the REA regulation. The evaluation is based on information obtained during the Records Review, the Site Investigations, and in consultation with the relevant agencies as outlined in Section 27 of the *Ontario Regulation 359/09*, made under the *Environmental Protection Act, Renewable Energy Approvals* under part V.0.1 of the Act (hence forth referred to as 'the REA rules') and Section 6.3.3 of the *MNR Approval and Permitting Requirements Document for Renewable Energy Projects (APRD)*.

Section 27 of the REA Regulation requires an evaluation of significance report for natural features identified during the records review and site investigation that sets out:

- A summary of the evaluation criteria or procedures used to make the determinations;
- The name and qualifications of evaluators;
- The dates of the beginning and completion of the evaluation;
- A determination of whether each natural feature shown on the site investigation map is significant or not (or provincially significant, as in the case of wetlands and ANSIs).

2.0 Methodology

The natural heritage features were evaluated using the following guidance documents:

- Significant Wildlife Habitat Technical Guide (SWHTG) (OMNR 2000),
- Ecoregion7E Criteria Schedule (OMNR 2011);
- Ministry of Natural Resources protocols for terrestrial and aquatic evaluations:
 - Ontario Wetland Evaluation System for Southern Ontario (MNR, 2002)
 - Ecological Land Classification for Southern Ontario (Lee et al., 1998)
 - Wetland Characteristics and Ecological Functions Assessment for Renewable Energy Projects (MNR, 2010)
 - Birds and Bird Habitats: Guidelines for Windpower Projects (MNR, 2010)
 - Bats and Bat Habitats: Guidelines for Windpower Projects (MNR, 2011)
 - Marsh Monitoring Program Protocol (Bird Studies Canada)
- Natural Heritage Assessment: Guide for Renewable Energy Projects (MNR 2011)

All natural features identified during records review and site investigations within the proposed location and all adjacent lands within 120 metres were evaluated for significance. Appendix A provides a summary of the site investigations for the evaluation of significance for each natural feature. Natural features were identified during several different surveys and therefore the evaluation of significance was based on information from more than one survey.

Natural heritage features were evaluated together by a team of experts, including: Alan Wormington, Erin McLachlan, Samantha Lawton, Kelly Sadlier, Deborah Crawford, Bettina Henkelman and Stephanie Goom (See Appendix B for Staff Resumes and Qualifications). The evaluation of natural features began in December 2009 and was finalized with the completion and revision of this report in March 2012. Table 1 provides a summary of the evaluation of significance received from the Records Review report. Table 2 provides a summary of the evaluation of significance methods.

Table 1: Summary of Evaluation of Significance received from Records Review

Feature Type/ID	Distance from Project Location	Source of Evaluation Information	Evaluation of Significance & Procedures Used (if known)	Evaluation Result
Southern Wetland: Lowbanks Backshore Wetland Complex (AKA Emerson Road Woods Wetland)	12 metres from Underground Collector Line	MNR	OWES	Provincially Significant
Woodlot: Emerson Road Woods	15 metres from Underground Collector Line	NPCA/MNR	NPCA Natural Areas Inventory Study and Township of Wainfleet Official Plan Schedule B	Significant
Woodlot: Burnaby Bush	12 metres from Underground Collector Line	NPCA/MNR	NPCA Natural Areas Inventory Study and Township of Wainfleet Official Plan Schedule B	Significant

Table 2: Summary of Significance Methods

Feature Type/ID	Distance from Project Location	Evaluation of Significance Criteria & Procedures Used	Dates, Times & Duration of Evaluation	Names and qualifications of evaluators
Natural Features				
Southern Wetland (Lowbanks Backshore Wetland Complex AKA Emerson Road Woods Provincially Significant Wetland)	12 metres from Underground Collector Line	A provincially significant wetland designated by the MNR using the Ontario Wetland Evaluation System (OWES).	See Appendix A	Bettina Henkelman, Erin McLachlan, Samantha Lawson, Stephanie Goom See Appendix B
Valleyland: Old Mill Creek	0 metres Underground collector lines are within feature	A natural feature is considered a valleyland: (a) that is 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 (b) that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year (Ontario Ministry of the Environment 2011.) Procedures used included aquatic field surveys to determine stream geomorphology, flows and ecological features in the identified valleyland	See Appendix A	Josephine Gilson, Kelly Sadlier, Stephanie Goom See Appendix B
Valleyland: Casey Drain	45.6metres from Turbine 4 and Access Road	A natural feature is considered a valleyland: (a) that is south and east of the Canadian	See Appendix A	Josephine Gilson, Kelly Sadlier, Stephanie

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Feature Type/ID	Distance from Project Location	Evaluation of Significance Criteria & Procedures Used	Dates, Times & Duration of Evaluation	Names and qualifications of evaluators
		<p>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</p> <p>(b) that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year (Ontario Ministry of the Environment 2011.)</p> <p>Procedures used included aquatic field surveys to determine stream geomorphology, flows and ecological features in the identified valleyland.</p>		<p>Goom</p> <p>See Appendix B</p>
Woodland: Burnaby Bush	12 metres from Underground Collector Line	<p>Significance confirmed by NPCA during Natural Areas Inventory Study and Township of Wainfleet Official Plan Schedule B.</p> <p>Other criteria: Provision of significant wildlife habitat, size of site, age and condition of trees, vegetation composition and diversity of site, abundance, size and location of cavities, and history of forest management (MNR, 2000).</p> <p>Significance confirmed with Ecological Land Classification during growing season.</p>	See Appendix A	<p>Bettina Henkelman, Erin McLachlan, Samantha Lawson, Stephanie Goom</p> <p>See Appendix B</p>
Woodland: Emerson Road Woods	15 metres from Underground Collector Line	<p>Significance confirmed by NPCA during Natural Areas Inventory Study and Township of Wainfleet Official Plan Schedule B</p> <p>Other criteria: Provision of significant wildlife habitat, size of site, age and condition of trees,</p>	See Appendix A	<p>Bettina Henkelman, Erin McLachlan, Samantha Lawson, Stephanie Goom</p>

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Feature Type/ID	Distance from Project Location	Evaluation of Significance Criteria & Procedures Used	Dates, Times & Duration of Evaluation	Names and qualifications of evaluators
		<p>vegetation composition and diversity of site, abundance, size and location of cavities, and history of forest management (MNR, 2000)</p> <p>Significance confirmed with Ecological Land Classification during growing season.</p>		See Appendix B
Woodland: FOD/SWD2	118 metres from Underground Collector Line	<p>Other criteria: Provision of significant wildlife habitat, size of site, age and condition of trees, vegetation composition and diversity of site, abundance, size and location of cavities, and history of forest management (MNR, 2000).</p> <p>Significance confirmed with Ecological Land Classification during growing season.</p>	See Appendix A	<p>Bettina Henkelman, Erin McLachlan, Samantha Lawson, Stephanie Goom</p> <p>See Appendix B</p>
Seasonal Concentration Areas for Wildlife Species Considered Candidate Significant Wildlife Habitat				
Candidate Raptor Winter Feeding and Roosting Area (SWD + CUM1)	30.9 metres from Turbines 4 & 5	<p>Criteria: relative importance of the site, presence of species of conservation concern, species diversity, abundance, size of site, level of disturbance, location of site, habitat quality, and historical use of area (MNR, 2000).</p> <p>Criteria: confirmation of: one or more short-eared owls; at least 10 individuals and two listed species including Rough-legged Hawk, Red-tailed Hawk, Northern Harrier, American Kestrel, and Snowy Owl; and site used regularly (3 in 5 years) for a minimum of 20 days by the above listed species (MNR, 2011).</p> <p>Significance confirmed with a pre-construction monitoring study during the winter season.</p>	See Appendix A	Alan Wormington,

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Feature Type/ID	Distance from Project Location	Evaluation of Significance Criteria & Procedures Used	Dates, Times & Duration of Evaluation	Names and qualifications of evaluators
		See Appendix D.		
Candidate Bat Maternity Colony (Burnaby Bush)	91 metres from Turbine 5	See pre-construction monitoring plan in EIS	-	-
Candidate Bat Maternity Colony (Emerson Road Woods)	85 metres from Turbine 4; 73 metres from Turbine 5; 15 metres from Underground Collector Line	See Pre-construction monitoring plan in EIS	-	-
Candidate Landbird Migratory Stopover Area #1 (Emerson Road Woods)	85 metres from Turbine 4; 73 metres from Turbine 5; 15 metres from Underground Collector Line	See Pre-construction monitoring plan in EIS	-	-
Candidate Landbird Migratory Stopover Area #2 (Burnaby Bush)	91 metres from Turbine 5	See pre-construction monitoring plan in EIS	-	-
Rare Vegetation Communities Considered Candidate Significant Wildlife Habitat				
Candidate SWH: Other Rare Vegetation Communities (SWD1 in Emerson Road Woods)	15 metres from Underground Collector Line	<p>Criteria: Provincially rare S1, S2, S3 vegetation communities as listed in Appendix M of the SWHTG (Ontario Ministry of Natural Resources 2011).</p> <p>Criteria: Rare vegetation communities are also outlined in the Niagara Peninsula Conservation Authority’s Natural Areas Inventory (Niagara Peninsula Conservation Authority 2009).</p> <p>Procedures: significance confirmed with</p>	See Appendix A	<p>Bettina Henkelman, Erin McLachlan, Samantha Lawson, Stephanie Goom</p> <p>See Appendix B</p>

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Feature Type/ID	Distance from Project Location	Evaluation of Significance Criteria & Procedures Used	Dates, Times & Duration of Evaluation	Names and qualifications of evaluators
		Ecological Land Classification surveys		
Candidate SWH: Old Growth Forest (Emerson Road Woods)	15 metres from Underground Collector Line	<p>Criteria: current representation of old growth or mature forest stands within the planning area, age of trees, age classes of trees in stand, presence of old growth characteristics, species diversity, provision of significant wildlife habitat, stand history, size and location of site and degree of disturbance (MNR, 2000).</p> <p>Criteria: dominant species greater than 140 years old (MNR, 2011).</p> <p>Procedures: significance confirmed with Ecological Land Classification surveys</p>	See Appendix A	<p>Bettina Henkelman, Erin McLachlan, Samantha Lawson, Stephanie Goom</p> <p>See Appendix B</p>
Specialized Wildlife Habitats Considered Candidate Significant Wildlife Habitat				
Candidate SWH: Amphibian Breeding Habitat (woodland) (Emerson Road Woods)	15 metres from Turbine 4 Access Road	<p>Criteria: provision of significant wildlife habitat, degree of permanence of ponds, species diversity of pond, presence of rare species, size and number of ponds, diversity of submergent and emergent vegetation, presence of shrubs, logs at edge of pond, adjacent forest habitat, water quality, level of disturbance (MNR, 2000).</p> <p>Criteria: presence of breeding population of 1 or more of the of the listed species with at least 20 individuals (adults, juveniles eggs/larval masses) including Eastern Newt, Blue Spotted Salamander, Gray Tree Frog, Spring Peeper, Western Chorus Frog and Wood Frog; a travel corridor connecting the</p>	See Appendix A	<p>Erin McLachlan, Samantha Lawson, Stephanie Goom</p> <p>See Appendix B</p>

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Feature Type/ID	Distance from Project Location	Evaluation of Significance Criteria & Procedures Used	Dates, Times & Duration of Evaluation	Names and qualifications of evaluators
		woodland and wetland (MNR, 2011). Procedures: call counts survey following the Marsh Monitoring Program Protocol and area searches for live/dead adults, larval and egg masses within woodland and vernal pools		
Animal Movement Corridors Considered Candidate Significant Wildlife Habitat				
Candidate SWH: Corridor Amphibians (Casey Drain)	45.6 metres from Turbine 4 and access road	Treated as Significant and mitigation provided in EIS	-	-

3.0 Results

The following provides a synopsis of the findings from the Records Review Report and Site Investigations Report and evaluates the significance of each natural feature that is within 120m of the project location.

Natural Features

Wetlands

There is one wetland within 120m of the project location: (Lowbanks Backshore Wetland Complex AKA Emerson Road Woods Wetland) **(See Figure 1)**. It is designated Provincially Significant by the MNR and as such is considered to be Provincially Significant for the purposes of this evaluation. The boundaries were groundtruthed and confirmed to be consistent with the previously mapped boundaries. The wetland was delineated using the Ontario Wetland Evaluation System (OWES) for Southern Ontario by a certified OWES evaluator (See Appendix A for Staff Resumes and Qualifications).

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Lowbanks Backshore Wetland	306.5 ha	Provincially significant	-swamp with slough forest pattern	-dominated by overstory of Silver Maple, White Oak and Green Ash -grey dogwood -reed canary grass	-animal movement corridor for reptile and amphibian species -contains a provincially rare vegetation community (SWD-1 in Emerson Road Woods)

Lowbanks Backshore Wetland Complex (AKA Emerson Road Woods Wetland) is a 306.5-hectare provincially significant wetland complex with 9 wetland units connected by watercourses, hedgerows, fields and uplands. All wetland units are swamps with a slough forest pattern. The wetland provides habitat for several wildlife species that require movements between the wetland units and the Lake Erie shoreline. The watershed flow from the wetland maintains breeding habitat in the drain outlets at the beaches for amphibian species. This feature is being treated as Provincially Significant and will be discussed in the Environmental Impact Study (EIS).

Valleylands

Two valleyland areas were identified within the project location: Old Mill Race Creek Valleyland and Casey Drain Valleyland **(See Figure 2)**. These areas were evaluated against the criteria set out in Section 5.5 of the Natural Heritage Reference Manual (MNR, 2011) and were assessed in terms of the following: surface water functions, groundwater functions, landform prominence, distinctive geomorphic landforms, degree of naturalness, community and species diversity, unique communities and species, habitat value, linkage

function, and restoration value. The physical boundaries of valleylands are determined as follows (MNR, 2011):

- 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.

Old Mill Race Creek Valleyland

Old Mill Race Creek Valleyland is intersected by the crossing of the underground collector line within the road right-of-way along Side Road 22. This 5.8-hectare valleyland is a channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to downstream flows and has historically provided fish habitat. There is potential for this watercourse to provide habitat for sensitive species during certain times of the year. It has no riparian vegetation or valleyland morphological features such as slopes, meanders, substrate, seepages or springs.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Old Mill Race Creek Valleyland	5.8 ha	Unknown	-permanent watercourse flowing through agricultural fields; channelized by agricultural practices	-moderately sensitivity watercourse; potential presence of sensitive species during certain times of year (channelized) -historical records of fish species observed	-landform depression that has flowing water contributing to downstream flows

Analysis based on Section 5.5 of the Natural Heritage Reference Manual (MNR, 2011):

Old Mill Race Creek Valleyland has marginal surface water functions, and no groundwater functions. It does not have distinct landform prominence or geomorphic landforms. It is heavily impacted by agricultural practices and has been channelized. It has no riparian vegetation, unique communities or species. It has marginal habitat value, although there are historical records of fish species being observed and it may support fish species during certain times of the year, including Grass Pickerel, a species of special concern. It does have a linkage function as it contributes to downstream flows.

Evaluation Result:

This site is considered significant and is carried forward to the Environmental Impact Study report.

Casey Drain Valleyland

This 3.9-hectare valleyland is a channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Lake Erie and has historically provided fish habitat.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Casey Drain Valleyland	3.9 ha	Unknown	-permanent watercourse flowing through agricultural fields; channelized by agricultural practices	-low sensitivity watercourse (channelized) -historical records of fish species observed	-landform depression that has flowing water contributing to Lake Erie

Analysis based on Section 5.5 of the Natural Heritage Reference Manual (MNR, 2011):

Casey Drain Valleyland has marginal surface water functions, and no groundwater functions. It does not have distinct landform prominence or geomorphic landforms. It is heavily impacted by agricultural practices and has been channelized. It has no riparian vegetation, unique communities or species. It has marginal habitat value, although there are historical records of fish species being observed. It does have a linkage function as it contributes to downstream flows into Lake Erie.

Evaluation Result:

This site is not considered significant.

Woodlands

A woodland is 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 (MNR 2011). There were three woodlands identified within 120m of the project location: FOD/SWD2, Burnaby Bush and Emerson Road Woods (**See Figure 3**). They were evaluated against the terms set out in Section 3.2.2.4 of the Township of Wainfleet Official Plan (Township of Wainfleet 2010) which state that significant woodlands shall include features that meet one or more of the following criteria: contain one or more threatened or endangered species or species of concern, in size, be equal to or greater than 10 hectares, contain interior woodland habitat at least 100m in from woodland boundaries, contain older growth forest and be 2 hectares or greater in area, overlap or contain one or more of the other significant natural heritage features which comprise an Environmental Protection Area or an Environmental Conservation Area, or abut or be crossed by a watercourse or water body and be 2 or more hectares in area.

FOD/SWD2

This woodlot is not classified as significant in the Township of Wainfleet Official Plan (Township of Wainfleet 2010). The FOD/SWD2 is 3.3-hectare woodlot is comprised of a deciduous forest community with deciduous swamp inclusions. The deciduous forest

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community did not have hydric soils and had less than 50% wetland species. It was dominated by green ash and basswood in the canopy, green ash and white elm in the sub-canopy, green ash in the understory and poison ivy in the groundlayer.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Woodlot (FOD/SWD2)	3.3 ha	Unknown	-woodlot comprised of deciduous trees	-FOD/SWD2 -deciduous forest (green ash, basswood, red oak, white elm) with SWD2 inclusions	- woodlot with regionally rare plant species

Analysis based on Section 3.2.2.4 of the Township of Wainfleet Official Plan (Township of Wainfleet 2010):

The FOD/SWD2 does not support any threatened, endangered species or species of concern, is less than 10 hectares, does not contain interior woodland habitat at least 100m in from woodland boundaries, does not contain older growth forest, does not overlap or contain one or more of the other significant natural heritage features which comprise an Environmental Protection Area or an Environmental Conservation Area, or abut or be crossed by a watercourse or water body and be 2 or more hectares in area.

Evaluation Result:

This site is not considered significant.

Burnaby Bush

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Burnaby Bush	59 ha	Significant	-deciduous swamp dominated by red maple with fresh moist soil	SWD (Deciduous Swamp), SWD3-1 (Red Maple Mineral Deciduous Swamp)	-large mature forest -potential habitat for land birds, woodland birds, raptors and bats

Burnaby Bush is a deciduous swamp dominated by red maple in the canopy, with a moderately dense understory, sparse groundcover and fresh-moist soil. It contains 17.68 hectares of interior forest and provides potential habitat for landbirds, woodland birds, raptors and bats. It contains 4 regionally rare vegetation species (pignut hickory, drooping woodreed, mountain holly, wood lily). This site contains cavity trees, standing dead trees, vertical stratification, organic ground structure, cavity trees, and standing dead trees. Burnaby Bush is 59 hectares in size and contains interior woodland habitat. Burnaby Bush is classified as both an Environmental Protection Area and an Environmental Conservation Area on the Township of Wainfleet Official Plan Schedule B (Township of Wainfleet 2010).

Evaluation Result:

It is considered significant and is carried forward to the Environmental Impact Study report.

Emerson Road Woods

Emerson Road Woods is 71 hectares in area and contains interior woodland habitat and older growth forest. It is classified as both an Environmental Protection Area and an Environmental Conservation Area on the Township of Wainfleet Official Plan Schedule B (Township of Wainfleet 2010). It is considered significant.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Emerson Road Woods	71 ha	Significant	-swamp dominated by red oak and pin oak	SWD (Deciduous Swamp), SWD-1 (Oak Mineral Deciduous Swamp)	-old growth forest -provincially rare vegetation community -potential -part of a Provincially Significant Wetland -habitat for amphibians, colonial birds (historical), land birds, woodland birds and raptors

Emerson Road Woods is a deciduous swamp dominated by red oak and pin oak in the canopy with moderate groundcover. It contains a rare vegetation community (SWD1) and old-growth characteristics. It is part of a Provincially Significant Wetland and provides habitat for amphibians, landbirds, woodland birds and raptors. It has historically provided habitat for colonial nesting birds. The portion of Emerson Road Woods that is within 120m of the project location is 8 hectares in area and does not contain interior woodland habitat. This site contains cavity trees, standing dead trees, vertical stratification, and organic ground structure. It has moist soil conditions.

Evaluation Result:

It is considered significant and is carried forward to the Environmental Impact Study report.

Seasonal Concentration Areas for Wildlife Species Considered Candidate Significant Wildlife Habitat

Raptor Winter Feeding and Roosting Area

A candidate raptor winter feeding and roosting area was identified within 120m of the Wainfleet Wind Energy project location in the Site Investigation Report. This 177.3-hectare candidate raptor winter feeding and roosting area encompasses Emerson Road Woods (SWD), Burnaby Bush (SWD), and 2 CUM1 communities(See Figure 7.).

It was evaluated against the criteria set out in Table Q-2 of Appendix Q of the Significant Wildlife Habitat Technical Guide (MNR 2000) and was assessed in terms of the following: relative importance of the site, species diversity and abundance, presence of species of conservation concern, size of site, level of disturbance and habitat quality.

It has also been evaluated against the Ecoregion7E Criteria Schedule (OMNR 2011) and assessed in terms of the following: one or more Short-eared Owls, at least 10 individuals and 2 listed species (Rough-legged Hawk, Red-tailed Hawk, Northern Harrier, American Kestrel, Snowy Owl, Short-eared Owl), used regularly (3 in 5 years) for a minimum of 20 days.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Candidate Raptor Winter Feeding and Roosting Area (SWD + CUM1)	155.60 ha	Unknown	-swamp dominated by red oak and pin oak -cultural meadow dominated by Canada goldenrod with fresh moist soil	SWD deciduous swamp CUM1 Cultural meadow dominated by smooth brome, Canada goldenrod	-large forest for protection -old growth forest provides potential winter feeding and roosting areas for raptors -cultural meadow provides potential winter feeding and roosting areas for raptors

Analysis based on Table Q-2 of Appendix Q of the Significant Wildlife Habitat Technical Guide (MNR 2000):

The relative importance of this site is unknown. The results of the pre-construction monitoring study indicated use of the site by 8 individual raptors of 2 species (Red-tailed Hawk, Coopers Hawk), which is low species diversity and abundance. This site does not support any species of conservation concern. This is a large site with low disturbance. The forested portion of this site is of high quality but the meadow portion of this site is of low quality.

Analysis based on Ecoregion7E Criteria Schedule (OMNR 2011):

This site did not support any Short-eared Owls. The results of the pre-construction monitoring study did not show use by 10 individuals of 2 listed species. It is not known if this site is used regularly (3 in 5 years) for 20 days.

Evaluation Result:

This site is not significant.

Rare Vegetation Communities Considered Candidate Significant Wildlife Habitat

Old-Growth Forest

One candidate old-growth forest, identified by Niagara Peninsula Conservation Authority and confirmed during site investigations, was identified within 120m of the project location: Emerson Road Woods(See Figure 4).It was evaluated against the criteria set out in Table Q-2 of Appendix Q of the Significant Wildlife Habitat Technical Guide (MNR 2000) and was assessed in terms of the following: current representation of old growth or mature forest stands within the planning area, age of trees, age classes of trees in stand, presence of old growth characteristics, species diversity, provision of significant wildlife habitat, stand history, size and location of site and degree of disturbance.

The candidate old growth forest has also been evaluated against the Ecoregion 7E Criteria Schedule (OMNR 2011)as assessed in terms of having dominant species greater than 140 years old, with no recognizable forestry activities.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Candidate Old Growth Forest (Emerson Road Woods)	71 ha	unknown	-swamp dominated by swamp red oak and pin oak	SWD-1 - oak mineral deciduous swamp	-large old growth forest that is undisturbed, structurally complex and contains a wide variety of trees and shrubs in various age classes including large old trees generally older than 120 years -historically has provided habitat for amphibians, colonial birds, land birds, woodland birds and raptors

Emerson Road Woods is 71 hectare Oak Mineral Deciduous Swamp community dominated by Swamp Red Oak and Pin Oak in the canopy, green ash in the sub-canopy, pokeweed in the understory and touch-me-not in the groundcover. It contains interior woodland habitat, and a provincially rare vegetation community (Oak Mineral Deciduous Swamp- SWD1).

Analysis based on Table Q-2 of Appendix Q of the Significant Wildlife Habitat Technical Guide (MNR 2000):

This site represents one of few old growth or mature forest stands within the planning area. It is structurally complex and contains a variety of trees and shrubs in various age classes including large, old trees (generally older than 140 years). This site has trees of varied age classes and contains old growth characteristics. This site provides significant wildlife habitat (deer wintering area) and supports a high diversity of wildlife species. It is

a large site at 71 hectares. It does have some disturbance as it is adjacent to a closed landfill site and has evidence of management at the forest edges.

Analysis based on Ecoregion 7E Criteria Schedule (OMNR 2011):

The candidate old growth forest does have dominant species greater than 140 years old. Some forestry activities were observed (management at the forest edges).

Evaluation Result:

This site is significant and will be discussed in the Environmental Impact Study.

Other Rare Vegetation Community

One potential rare vegetation community was identified within 120m of the project location: Oak Mineral Deciduous Swamp (**See Figure 5**). It was evaluated against the criteria set out in Table Q-2 of Appendix Q of the Significant Wildlife Habitat Technical Guide (MNR 2000) and was assessed in terms of the following: current representation of community type within the planning area, degree of rarity, diversity of site, condition of community, size and location of site, potential for the long-term protection of the site and provision of significant wildlife habitat.

It was also evaluated against the Ecoregion 7E Criteria Schedule (OMNR 2011), which refers to Appendix M of the SWHTG (MNR, 2000).

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Rare Vegetation Community (SWD1)	7.3 ha	unknown	-swamp dominated by swamp red oak and pin oak	SWD-1 - oak mineral deciduous swamp -provincially rare: S-rank of S2S3	-Emerson Road Woods contains a provincially rare vegetation community (Oak Mineral Deciduous Swamp)

Analysis based on Table Q-2 of Appendix Q of the Significant Wildlife Habitat Technical Guide (MNR 2000):

The NHIC has 4 listings of this community for the province. It is classified as an S2S3 community within Ontario. This 7.3-hectare rare vegetation community is a mid-aged deciduous swamp community dominated by Swamp Red Oak and Pin Oak in the canopy, green ash in the sub-canopy, pokeweed in the understory and touch-me-not in the groundcover. It is part of Emerson Road Woods and Lowbanks Backshore Wetland Complex (AKA Emerson Road Woods Wetland) and provides habitat for amphibians, landbirds, woodland birds and raptors. It has historically provided habitat for colonial nesting birds. There is potential for the long-term protection of the site as it is located within a provincially significant wetland.

Analysis based on Ecoregion 7E Criteria Schedule (OMNR 2011):

This vegetation community is listed in Appendix M of the SWHTG (MNR, 2000).

Evaluation Result:

This site is significant and will be discussed in the Environmental Impact Study report.

Specialized Wildlife Habitats Considered Candidate Significant Wildlife Habitat

Amphibian Breeding Habitat (Woodland)

According to the Ecoregion Criteria Schedule (OMNR 2011), candidate amphibian breeding habitat within woodland communities require breeding pools within or adjacent (within 120 m) to a woodland community that is FOC, FOM, FOD, SWC, SWM, or SWD. One candidate site (Emerson Roads Woods) was identified within the project location. (See Figure 6.)

Emerson Road Woods (AKA Emerson Road Woodlot PSW) is a large, segmented wetland complex, of which a portion is within 120m of the project location. It is made up of marsh and swamp communities with ephemeral and permanent ponds, some of which contained mature adult frogs and toads during the mid-summer field investigations. This potential amphibian woodland breeding habitat was evaluated against the criteria set out in Table Q-2 of Appendix Q of the Significant Wildlife Habitat Technical Guide (MNR 2000) and was assessed in terms of the following: provision of significant wildlife habitat, degree of permanence of ponds, species diversity of pond, presence of rare species, size and number of ponds, diversity of submergent and emergent vegetation, presence of shrubs, logs at edge of pond, adjacent forest habitat, water quality, level of disturbance.

The amphibian breeding habitat (woodland) has also been evaluated against the Ecoregion 7E Criteria Schedule (OMNR 2011) in terms of: presence of breeding population of 1 or more of the of the listed species with at least 20 individuals (adults, juveniles eggs/larval masses) including Eastern Newt, Blue Spotted Salamander, Gray Tree Frog, Spring Peeper, Western Chorus Frog and Wood Frog; a travel corridor connecting the woodland and wetland.

Amphibian breeding surveys were conducted in the spring (April-June) using standard amphibian breeding surveys (Marsh Monitoring Program Protocol).

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Candidate Amphibian Breeding Habitat (Emerson Road Woods)	7.3 ha	Unknown	-swamp dominated by swamp red oak and pin oak	SWD1 - oak mineral deciduous swamp -wood frog and spring peeper identified	-swamp provides potential breeding habitat for frogs and toads

Analysis based on Table Q-2 of Appendix Q of the Significant Wildlife Habitat Technical Guide (MNR 2000):

Emerson Road Woods contains significant wildlife habitat (rare vegetation community, old-growth forest). The entire wetland is 71 hectares, and the portion of the wetland that is within 120m of the project location is 7 hectares. The entire wetland contains several small

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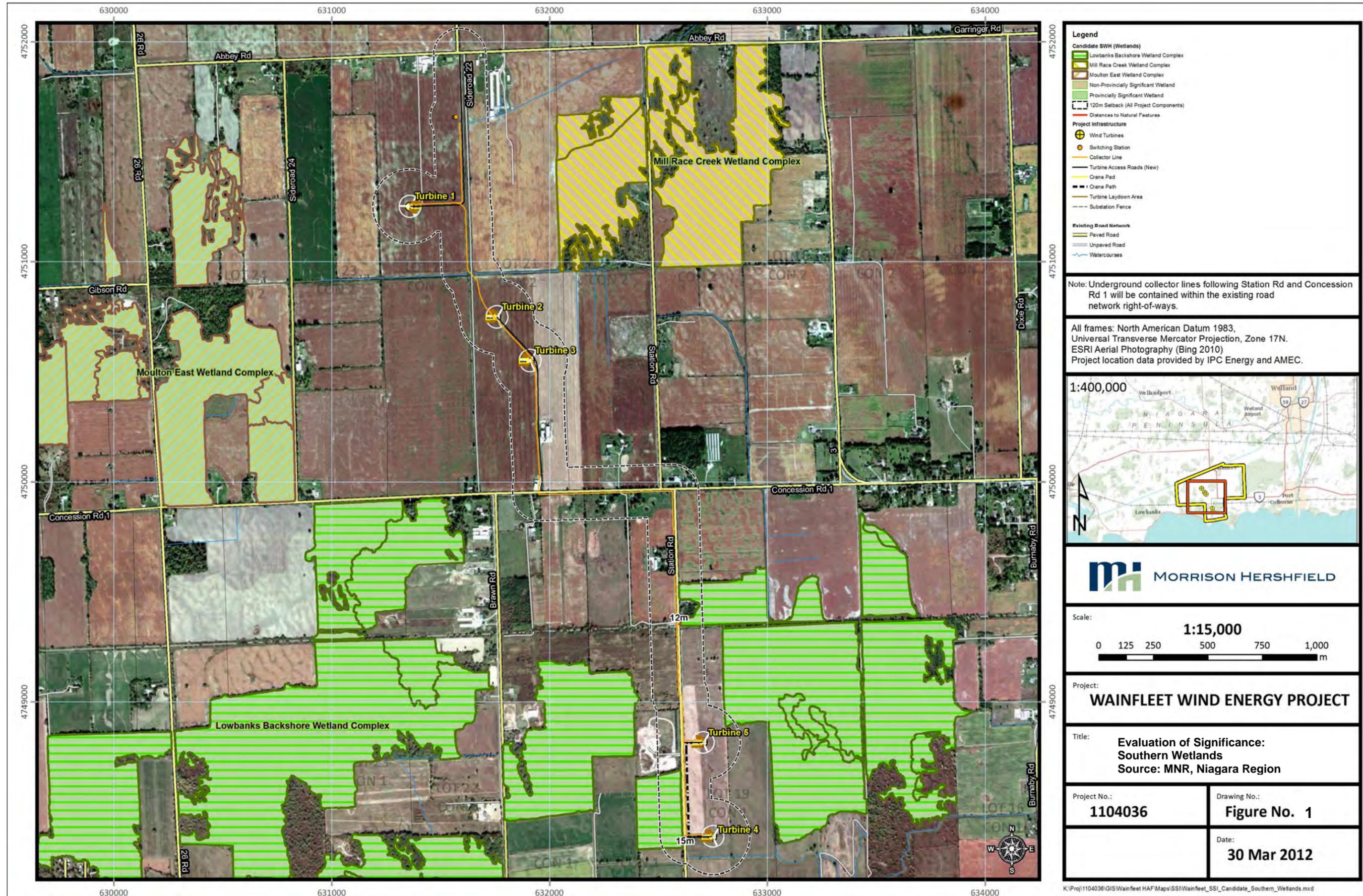
to medium-sized ponds (ephemeral and permanent) with 1 pond within 120m of the project location. This pond is not permanent and supports 2 species (wood frog, spring peeper). There are no rare species. The pond has both submergent and emergent vegetation but has no shrubs, or logs at the edge of the pond. This site does have some disturbance as it is adjacent to a closed landfill site and has evidence of management at the forest edges.

Analysis based on Ecoregion 7E Criteria Schedule (OMNR 2011):

This site does support a breeding population of 1 or more Wood Frog. It also contains an amphibian corridor connecting the woodland and wetland.

Evaluation Result:

This site is significant and will be discussed in the Environmental Impact Study.

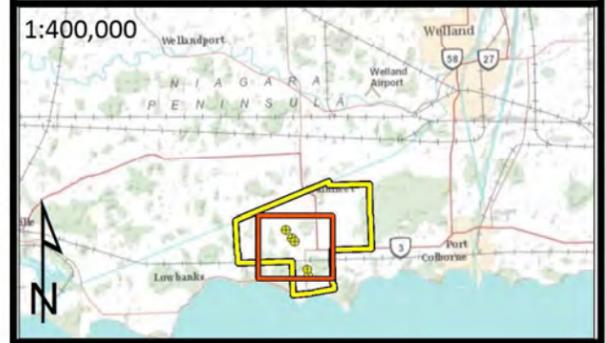


Legend

- Candidate SWH (Wetlands)**
 - Lowbanks Backshore Wetland Complex
 - Mill Race Creek Wetland Complex
 - Moulton East Wetland Complex
 - Non-Provincially Significant Wetland
 - Provincially Significant Wetland
 - 120m Setback (All Project Components)
 - Distances to Natural Features
- Project Infrastructure**
 - Wind Turbines
 - Switching Station
 - Collector Line
 - Turbine Access Roads (New)
 - Crane Pad
 - Crane Path
 - Turbine Laydown Area
 - Substation Fence
- Existing Road Network**
 - Paved Road
 - Unpaved Road
 - Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.



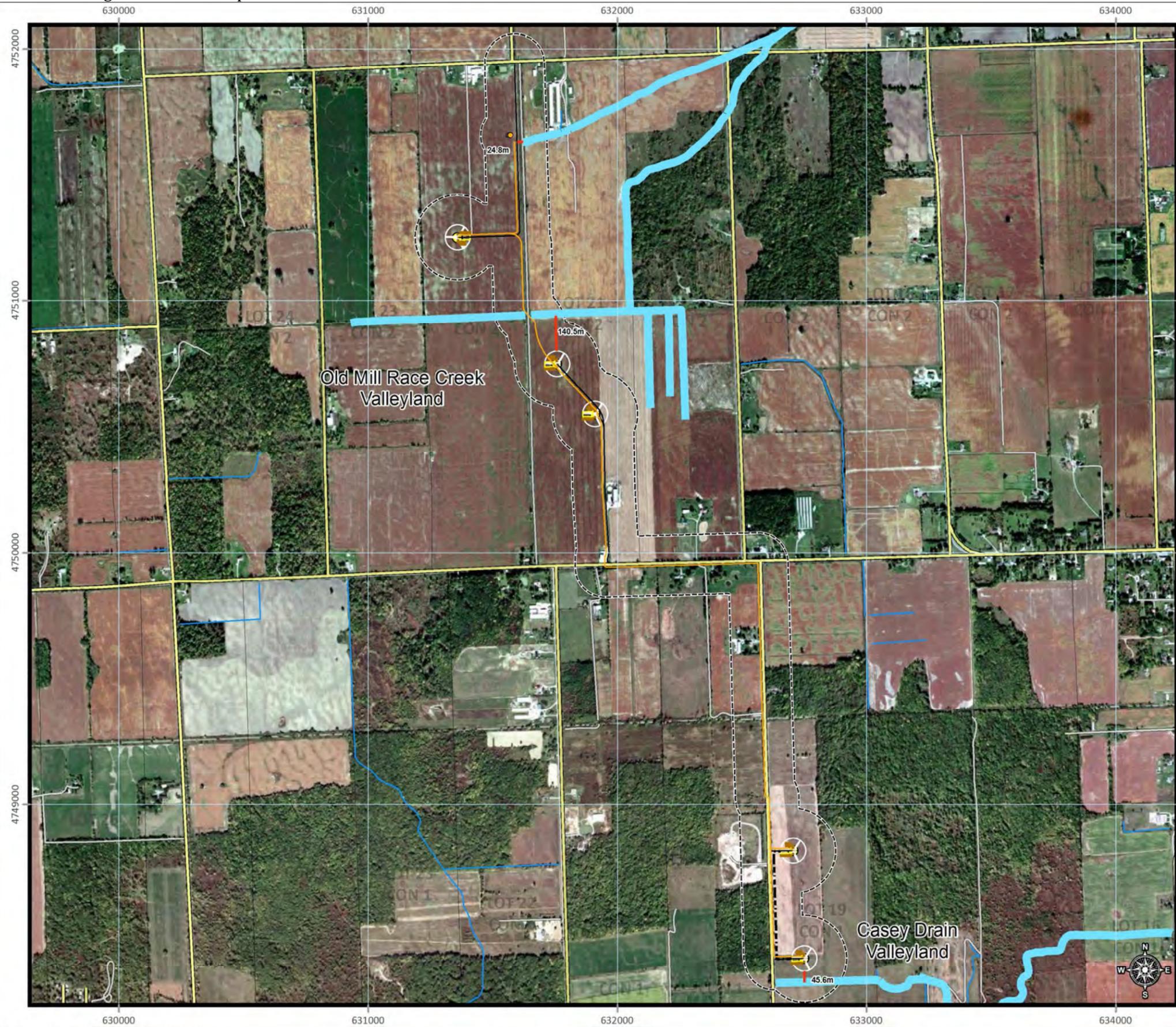
Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Evaluation of Significance: Southern Wetlands**
Source: MNR, Niagara Region

Project No.: **1104036**

Drawing No.: **Figure No. 1**

Date: **30 Mar 2012**



Legend

Candidate SWH

- Valleylands
- 120m Setback (All Project Components)
- Distances to Natural Features

Project Infrastructure

- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.

1:400,000

MORRISON HERSHFIELD

Scale: **1:15,000**

0 125 250 500 750 1,000 m

Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Evaluation of Significance: Valleylands**

Project No.: 1104036	Drawing No.: Figure No. 2
Date: 30 Mar 2012	

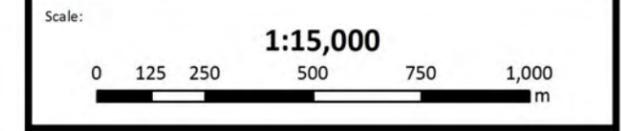


Legend

- Candidate SWH**
 - Woodlots
 - 120m Setback (All Project Components)
 - Distances to Natural Features
 - Tap Lines
 - Access Roads
- Project Infrastructure**
 - Wind Turbines
 - Switching Station
 - Crane Pad
 - Crane Path
 - Turbine Laydown Area
 - Substation Fence
- Existing Road Network**
 - Paved Road
 - Unpaved Road
 - Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.



Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Evaluation of Significance: Woodlands**
Source: LIO, Niagara Region

Project No.: 1104036	Drawing No.: Figure No. 3
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Date: 30 Mar 2012

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Legend

Candidate SWH

- Old-Growth Forest
- 120m Setbacks (All Project Components)
- Distances to Natural Features

Project Infrastructure

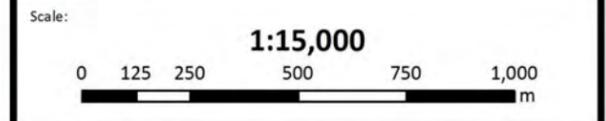
- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983,
 Universal Transverse Mercator Projection, Zone 17N.
 ESRI Aerial Photography (Bing 2010)
 Project location data provided by IPC Energy and AMEC.



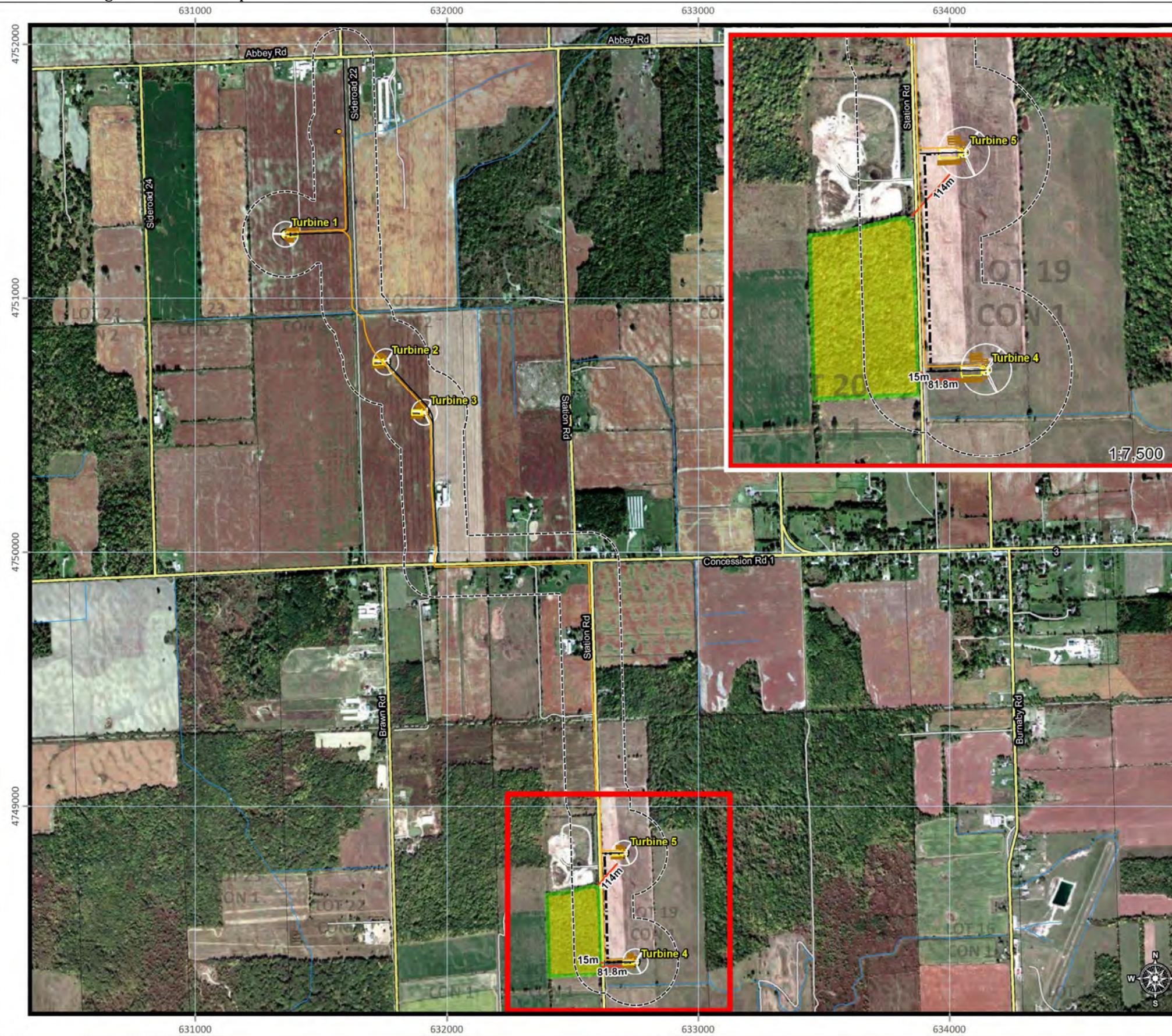
Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Evaluation of Significance:
 Candidate SWH (Old-Growth Forest)
 Source: NPCA**

Project No.: 1104036	Drawing No.: Figure No. 4
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Date: 30 Mar 2012

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Legend

Candidate SWH

- Other Rare Vegetation Communities
- 120m Setback (All Project Components)
- Distances to Natural Features

Project Infrastructure

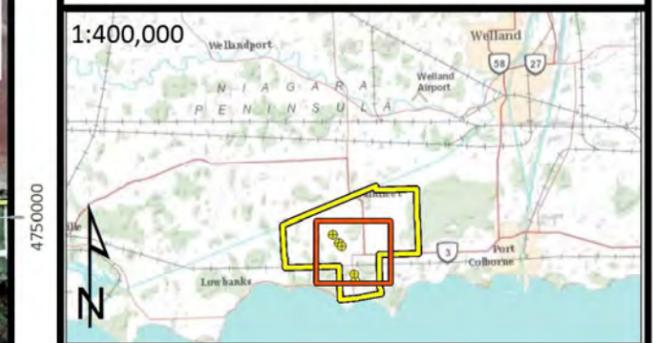
- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

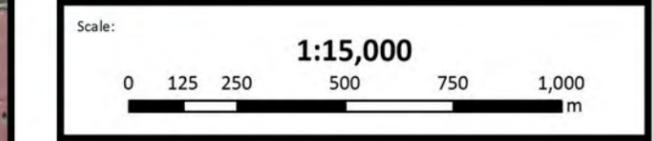
- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.



MORRISON HERSHFIELD

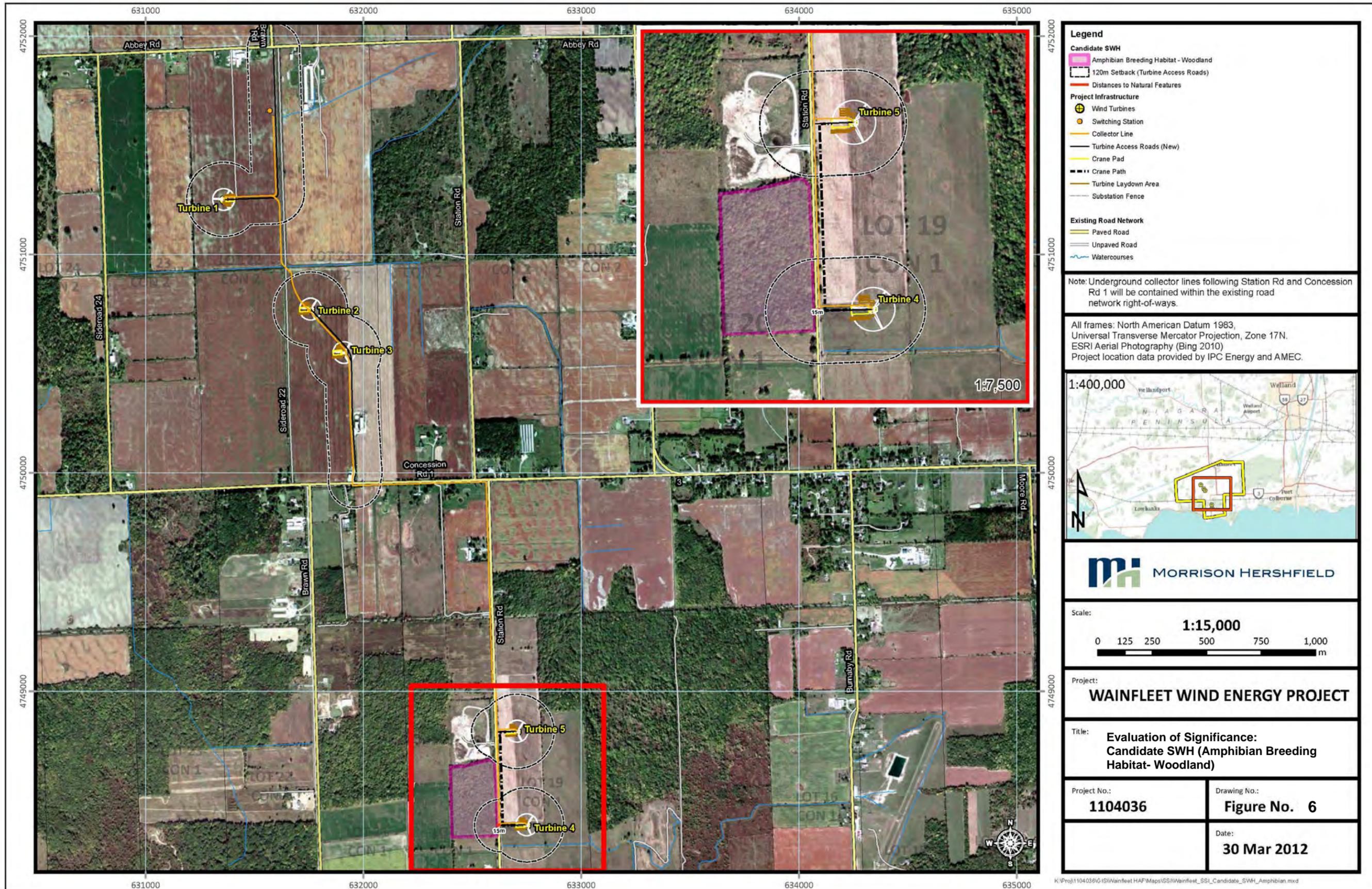


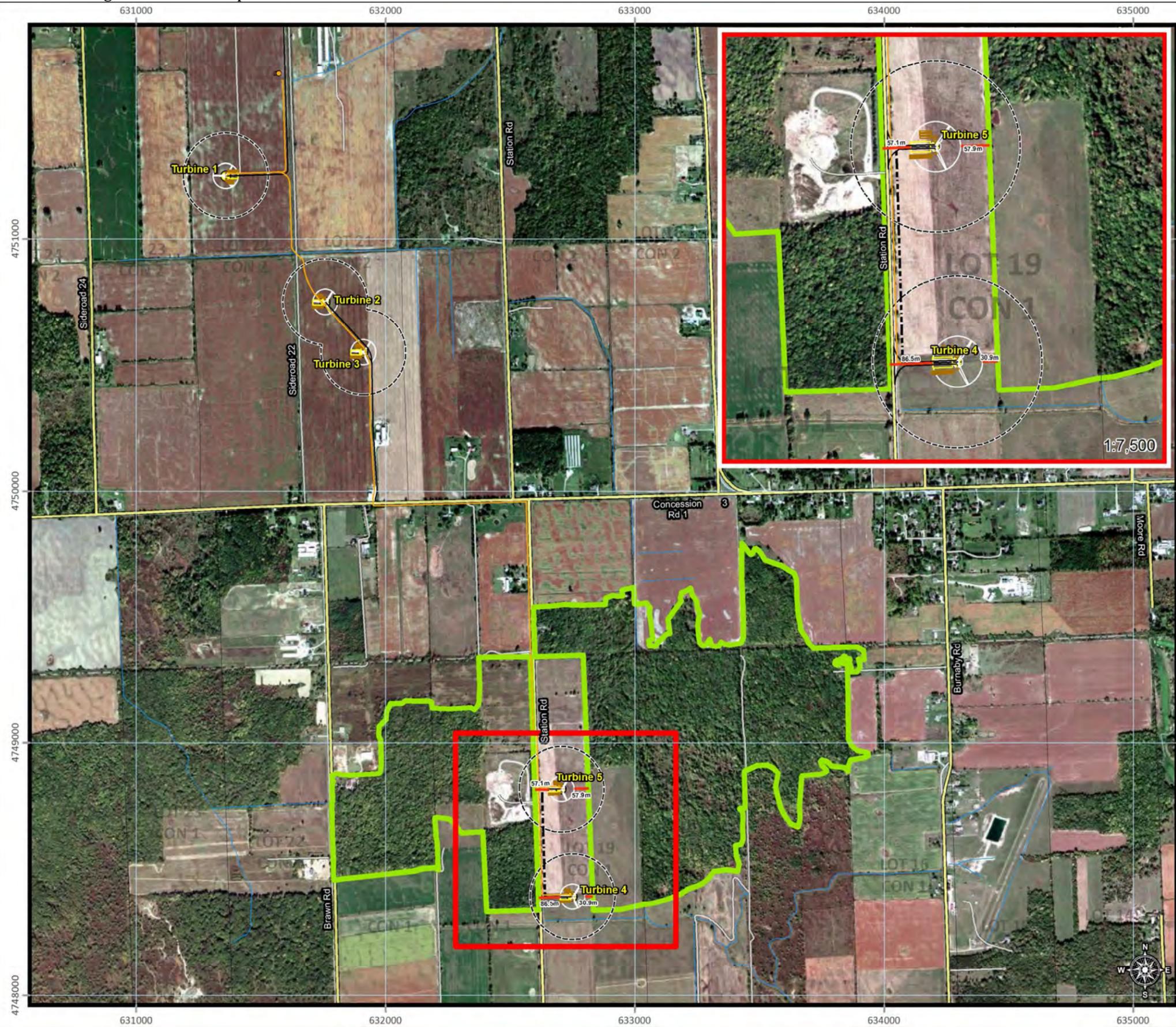
Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Evaluation of Significance: Candidate SWH (Other Rare Vegetation Communities)**

Project No.: 1104036	Drawing No.: Figure No. 5
Date: 30 Mar 2012	

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Legend

Candidate SWH

- Raptor Wintering Area
- 120m Setback (Wind Turbine, Included All Related Structures)
- Distances to Natural Features

Project Infrastructure

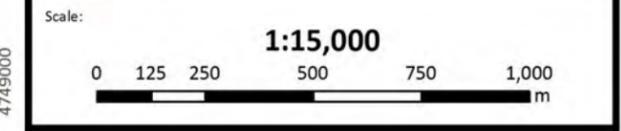
- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.



Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Evaluation of Significance: Candidate SWH (Raptor Winter Feeding and Roosting Areas)**

Project No.: 1104036	Drawing No.: Figure No. 7
Date: 30 Mar 2012	

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Table 3: Evaluation of Significance Results Summary

Feature Type/ID	Minimum Distance Between Feature and Project Location	Evaluation Results	Significant/provincially significant feature or treated as Significant (y/n)
Southern Wetland (Lowbanks Backshore Wetland Complex AKA Emerson Road Woods Provincially Significant Wetland)	12 metres from Underground Collector Line	This feature is provincially significant and will be discussed in the EIS.	Y
Valleyland: Old Mill Race Creek	0 metres Underground collector lines are within feature	This feature was deemed significant.	Y
Valleyland: Casey Drain	45.6 metres from Turbine 4	This feature was deemed not significant.	N
Woodland: Burnaby Bush	12 metres from Underground Collector Line	This feature was deemed significant and will be discussed in the EIS.	Y
Woodland: Emerson Road Woods	15 metres from Underground Collector Line	This feature was deemed significant and will be discussed in the EIS.	Y
Woodland: FOD/SWD2	95.4m from Underground Collector Line	This feature was deemed not significant.	N
SWH: Candidate Bat Maternity Colony (Burnaby Bush)	91 metres from Turbine 5	This feature is treated as significant; See pre-construction monitoring plan in EIS.	Y
SWH: Candidate Bat Maternity Colony (Emerson Road Woods)	85 metres from Turbine 4; 73 metres from Turbine 5; 15 metres from Underground Collector Line	This feature is treated as significant; See pre-construction monitoring plan in EIS.	Y
SWH: Candidate Landbird Migratory Stopover Area #1 (Emerson Road Woods)	85 metres from Turbine 4; 73 metres from Turbine 5; 15 metres from Underground Collector Line	This feature is treated as significant; See pre-construction monitoring plan in EIS.	Y
SWH: Candidate Landbird Migratory Stopover Area #2 (Burnaby Bush)	91 metres from Turbine 5	This feature is treated as significant; See pre-construction monitoring plan in EIS.	Y
SWH: Candidate Raptor Winter Feeding and Roosting Area (SWD + CUM1)	30.9 metres from Turbines 4 & 5	This feature was deemed not significant.	N
Candidate SWH: Other Rare Vegetation Communities (SWD1 in Emerson Road Woods)	15 metres from Underground Collector Line	This feature was deemed significant and will be discussed in the EIS.	Y
Candidate SWH: Old Growth Forest (Emerson Road Woods)	15 metres from Underground Collector Line	This feature was deemed significant and will be discussed in the EIS.	Y
Candidate SWH: Amphibian Breeding Habitat (woodland) (Emerson Road	15 metres from Turbine 4 Access Road	This feature was deemed significant and will be discussed in the EIS.	Y

Natural Heritage Assessment Report

Woods)			
Candidate SWH: Amphibian Movement Corridor (Casey Drain)	45.6 metres from Turbines 4 and associated access road	This feature is treated as significant; and will be discussed in the EIS.	Y

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APPENDIX A

Summary of Site Investigations for Evaluation of Significance

Natural Heritage Assessment Report

Feature Type/ID	Survey Type	Date	Method	Times	Duration	Weather	Field Personnel
<ul style="list-style-type: none"> - Southern Wetland (Lowbanks Backshore Wetland Complex AKA Emerson Road Woods Provincially Significant Wetland) - Woodland: Burnaby Bush - Woodland: Emerson Road Woods -Woodland: FOD/SWD2 - Other Rare Vegetation Communities (SWD1 in Emerson Road Woods) - Old Growth Forest (Emerson Road Woods) - Amphibian Breeding Habitat (woodland) (Emerson Road Woods) - Amphibian Movement Corridors 	Ecological Land Classification Survey	<ul style="list-style-type: none"> July 27, 2010 July 28, 2010 	50m transects were conducted for all non-crop lands within project location; croplands within project location were surveyed on foot	<ul style="list-style-type: none"> July 27th – 9:30am-5:30pm July 28th – 10:00am-6:00pm 	<ul style="list-style-type: none"> July 27th- 8 hours July 28th- 8 hours 	<ul style="list-style-type: none"> July 27th – partly cloudy, 24°C July 28th – cloudy, light wind, 26°C 	Bettina Henkelman
<ul style="list-style-type: none"> - Valleyland: Old Mill Creek - Valleyland: Casey Drain 	Valleylands/Seeps and Springs Survey	April 28 th , 2010	Searches were conducted for potentially suitable sites throughout the entire project location	April 28 th – 11am – 5:20pm	April 28 th –6.3 hours	April 28 th – clear, no wind, 11°C	Josephine Gilson and Kelly Sadlier
Candidate Raptor Winter Feeding and Roosting Area	Pre-construction monitoring study	<ul style="list-style-type: none"> January 30th, 2012 February 13th, 2012 February 26th, 2012 	Standard 10-minute point counts were conducted at 6 locations within the feature	<ul style="list-style-type: none"> January 30th 9:48am-11:40am February 13th 12:20pm- 2:05pm February 26th 9:50am- 11:30am 	<ul style="list-style-type: none"> January 30th 2 hours February 13th 1.5 hours February 26th1.5 hours 	<ul style="list-style-type: none"> January 30th-5C, light westerly wind, no precipitation, 20% cloud cover, 3 inches fresh snow, excellent visibility February 13th0C, stiff southwest wind, no precipitation, 0% cloud cover, 1 inch fresh snow with some bare patches, excellent visibility February 26th-2C, light northwest wind, no precipitation, 50% cloud cover, trace snow cover, excellent visibility 	Alan Wormington

APPENDIX B
Staff Resumes and Qualifications



Erin McLachlan

B.Sc., CEPIT

Terrestrial Ecologist and Environmental Planner

Experience

Ms. Erin McLachlan is the Terrestrial Ecologist/Environmental Planner with Morrison Hershfield. She has considerable experience in Environmental Protection and Management, Aquatic and Terrestrial Ecosystems, and Environmental Regulatory Legislation.

Ms. McLachlan has over 7 years of experience working on many multi-disciplinary engineering, environmental assessment, natural habitat inventory and impact assessment projects across Ontario in the transportation, mining, industrial and land development sectors.

Aquatic Biology

- Aquatic Ecosystems Scientific Retainer comprising extensive habitat inventory and impact assessment assignments for the Ontario Ministry of Transportation Central Region
- Natural Sciences Scientific Retainer comprising numerous habitat inventory and impact assessment assignments for the Ontario Ministry of Transportation Central Region
- Limnological studies and impact assessment on acidified lakes within Sudbury District for the Freshwater Ecology Unit
- Aquatic habitat inventory and assessment on the Grand River for the Argyle Street Heritage Bridge Replacement Detail Design Project for the Ontario Ministry of Transportation West Region
- Aquatic habitat inventory and assessment on several watercourses for the Highway 518 reconstruction Detail Design Project for the Ontario Ministry of Transportation Northeastern Region

Terrestrial Ecology

- Jefferson Salamander Species at Risk Study design and implementation on the Meadowvale Station Woods for the Ontario Ministry of Transportation Central Region

Education

- B.Sc., Env., University of Guelph
 - Class 1 Electrofishing Crew Leader
 - MTO/DFO Fisheries Protocol Training Course
 - Ecological Land Classification of Southern Ontario Training Course
 - Freshwater Mussel Identification Course
 - Ontario Wetland Evaluation System
-
- Terrestrial inventories and impact assessments on over 40 transportation projects for the Ontario Ministry of Transportation West, Central, Eastern, and Northeastern Regions and the Regional Municipalities of York, Peel, Halton and Durham
 - Natural Sciences Scientific Retainer comprising terrestrial inventory and impact assessment assignments for the Ontario Ministry of Transportation Central Region
 - Coordinated and implemented wetland identification, vegetation and herptofauna assessments for the North Bay-Mattawa Conservation Authority
 - Environmentally Sensitive Area and terrestrial ecology assessment on 28 Km of Highway 101 for the Ontario Ministry of Transportation Northeastern Region
 - Terrestrial inventory and assessment on a 12 hectare tract of Carolinian Forest for Earthquest Canada

Environmental Planning and Regulatory

- Environmental Impact Assessment and Statement Proposed Subdivision Development, Town of Wasaga Beach for Westbury Homes Inc.
- Natural Environment Level I and Level II Assessments under the *Mining Act* for 13 Pits and Quarries in northern Ontario for the Ontario Ministry of Transportation, Northeastern Region
- Approvals under the Conservation Authorities Act, Navigable Waters Protection Act and the Niagara Escarpment Planning and Development Act for 8 bridge rehabilitation projects for the Region of Peel



Kelly Sadlier

B.Sc.

Aquatic and Terrestrial Ecosystems Biologist

Experience

Ms. Kelly Sadlier is an Aquatic and Terrestrial Ecosystems Biologist with Morrison Hershfield. She has considerable experience in Environmental Protection and Management, Aquatic and Terrestrial Ecosystems, and Environmental Regulatory Legislation.

Ms. Sadlier has several years of experience working on many multi-disciplinary engineering, environmental assessment, natural habitat inventory and impact assessment projects across Ontario in the transportation, tourism, government, industrial and land development sectors.

Aquatic Biology

- Aquatic Ecosystems Scientific Retainer comprising extensive Habitat Inventory and Impact Assessment assignments for MTO Central Region
- Aquatic Habitat Inventory and Limnological Assessment on several warmwater lakes for the Loon Lake Hunt Club
- Aquatic Habitat Inventory and Assessment on 50 watercourses on Highway 11 between Highway 400 and the Severn River, Highway Assessment Project for MTO Central Region
- Aquatic Habitat and Species at Risk Inventory and Assessment on several headwaters watercourses for the Expansion and Realignment of Winston Churchill Boulevard for the Region of Peel
- Aquatic Habitat Inventory and Assessment on 7 large rivers for the Highway 101 Reconstruction Detail Design project for MTO Northeastern Region
- Post-Construction Aquatic Monitoring to meet the requirements of a Fisheries Act Authorization for the Realignment of Fourteen Mile Creek for MTO Central Region
- Aquatic Habitat and Species at Risk Inventory and Assessment on the Credit River for the Rehabilitation of Britannia Road for the Region of Peel
- Aquatic and Terrestrial Habitat and Species at Risk Inventory and Assessment on a Provincially Significant Wetland for the Rehabilitation of Cundles Road for the City of Barrie

Education

- B.Sc., Trent University
- Fish & Wildlife Technologist, Sir Sanford Fleming College of Applied Arts and Technology
- Class II Electrofishing Crew Leader
- MTO/DFO Fisheries Protocol Training Course

- Post-Construction Aquatic Monitoring to meet the requirements of a Fisheries Act Authorization for the Realignment of Sandplant Hill for MTO Central Region

Terrestrial Ecology

- Species at Risk Biologist conducting SARA Herptofauna Inventories and Habitat Assessments throughout the Trent-Severn Waterway for Parks Canada
- Terrestrial Inventories and Impact Assessments on numerous transportation projects for MTO Central, Eastern, and Northeastern Regions and the Regional Municipalities of York, Peel, Halton and Durham
- Natural Sciences Scientific Retainer comprising Terrestrial Inventory and Impact Assessment assignments MTO Central Region

Environmental Management and Regulatory

- Mosquito Larvae Surveillance Program 2008, for MTO Central Region
- Approvals under the *Fisheries Act*, *Navigable Waters Protection Act* and the *Niagara Escarpment Planning and Development Act* for 8 Bridge Rehabilitation projects for the Region of Peel



Bettina Henkelman

B.Sc., Environmental Science

Terrestrial Ecologist, Arborist, Community Sustainability Specialist

Experience

Bettina brings over 10 years of experience to her position of Terrestrial Ecologist and Sustainability Specialist at MH. She has a rich history of experience in various environmental fields. The following is a summary of varied skills.

Terrestrial Ecology

- Managed and conducted Environmental Impact Studies (EIS) for residential and commercial developments, MTO projects, landfill development, Municipal and Federal projects.
- Compiled expert, accurate plant inventories using GPS, ArcMap and windows based programs.
- Carried out amphibian and ungulate surveys and evaluation of natural heritage features and functions based on wildlife surveys.
- Performed arborist assessments and Tree Retention Reports for hazard analysis and restoration plans.
- Determined the ecological sensitivity and significance of a site to verify the site-specific constraints and opportunities for development.
- Interpreted and applied natural heritage policy within an EIS context including the Nutrient Management Act, Environmental Assessment Act, Conservation Authorities Act, and Provincial Policy Act, as well as County and Municipal Official Plans.

Habitat Restoration

- Designed and authored mitigation and restoration plans for wetlands, streams, and terrestrial systems based on specific site requirements and local ecosystems, restoring natural function and creating self-sustaining habitats, while fulfilling the objectives of planning authorities and clients.
- Authored training manual on best management practices for shoreline landscaping.
- Project Leader and on the Advisory Committee for Audubon Certification with the Cooperative Sanctuary Program.
- Monitored environmental damage and remediated areas within provincial parks and Alpine areas.

Education

- B.Sc. Environmental Science Carleton University
- Landscaping/Horticulture, Capilano College
- Forestry, Sir Sandford Fleming College

Memberships and Licenses

- Field Botanists of Ontario & Ecological Society of America
- Society for Ecological Restoration & Ontario Field Naturalists
- Nepean Horticultural Society

- Organized, coordinated, carried out, and documented the Chrysler-Finch Esker Characterization Study; to determine the extent of interaction between groundwater within the esker aquifer and surface water.
- Tidal and freshwater fisheries assessments.

Community Sustainability

- Implemented the City of Ottawa "Take-it-Back" program (the 1st of its kind) and established over 60 new local business partnerships in the program.
- Implemented the Compost+ program in the City of Ottawa
- Researched, developed and implemented Contest to determine effects of bi-weekly waste and compost program for the City of Ottawa.

Research

- Identified and transect sampled rare and uncommon fen species to correlate with pH, nutrients, and groundwater levels for Carleton University.
- Carried out research, statistical analysis, and maintained plants in Greenhouse and growth chambers for experiments.
- Co-authored "Germinating wild plant species for phytotoxicity testing" for Pest Management Science.



Josephine Gilson

B.Sc.

Aquatic and Terrestrial Ecosystems Biologist

Experience

Ms. Josephine Gilson is an Aquatic and Terrestrial Ecosystems Biologist with Morrison Hershfield. She has considerable experience in Environmental Protection and Management, Aquatic and Terrestrial Ecosystems, and Environmental Regulatory Legislation.

Ms. Gilson has several years of experience working on many multi-disciplinary engineering, environmental assessment, natural habitat inventory and impact assessment projects across Ontario and British Columbia in the transportation, tourism, government, industrial and land development sectors.

Ecosystem Biologist

As an Aquatic and Terrestrial Ecosystem Biologist at Morrison Hershfield, Ms. Gilson has been involved in a variety of projects including:

- Fisheries Existing Conditions and Environmental Impact Assessment for the Ministry of Transportation (MTO), Northern Region. The study area included the section of Highway 101 between Wawa and Chalpeau, and involved field fish and fish habitat investigation, as well as documentation of the findings.
- Collection and organization of fishery data, as well as the creation of a database for MTO Central Region. The project provides the ability to link fishery data and graphic representation for all the drainage ditches associated with major highways within the MTO Central Region.
- Fisheries Investigation and Summary Report for an international crossing over the Detroit River for the Border Transportation Partnership, which included the MTO, Transport Canada, the Michigan Department of Transportation (MDOT), and the U.S. Federal Highway Administration (FHWA). The technical report considered impacts resulting from the construction of the bridge and ancillary features, including a potential docking facility.

Education

- B.Sc., Royal Roads University, Victoria, British Columbia
- Environmental Technology Program, Fleming College, Lindsay, Ontario
- Class II Electrofishing Crew Leader
- MTO/DFO Fisheries Protocol Training Course

- Fisheries Existing Conditions and Environmental Impact Assessment for MTO Central Region. The study was the result of rehabilitation of Highway 400 north of the Highway 11/400 split, including the rehabilitation of multiple overpass structures. The study included field fish and fish habitat investigation, as well as documentation of the findings.

Environmental Technician

Ms. Gilson worked as an Environmental Technician for Ecofish Research Limited, in Courtenay, British Columbia. Her skills included:

- Wading in swift waters, drift net benthic invertebrate sampling, riparian vegetation assessments, stream habitat assessments and processing fish (scale samples, weight, species identification).

With Terraprobe Limited, in Brampton, Ontario, Ms. Gilson's skills included:

- Extensive field experience including; installation and sampling ground water monitoring wells, soil sampling and identification, surface water and sediment sampling, storm water sampling, site remediation and surveying.

Sub-Watershed Assessment Technician

Ms. Gilson worked as a Sub-Watershed Assessment Technician for Grand River Conservation Authority, in Cambridge, Ontario. Her skills included:

- Organization and completion of a field sampling program. Field data collection; electrofishing, benthic invertebrate and water quality sampling.



Stephanie Goom

B.E.S.

Fisheries Biologist and Environmental Planner

Experience

Ms. Stephanie Goom is a Fisheries Biologist and Environmental Planner with Morrison Hershfield. She has considerable expertise in Environmental Assessment, Aquatic Sciences and Restoration Ecology.

Ms. Goom has extensive experience in reviewing planning applications and development proposals for compliance with Municipal, Provincial and Federal legislation. She has experience conducting environmental assessments for impacts to natural features and negotiating mitigation and compensation strategies under the *Fisheries Act* for a number of aquatic projects throughout Canada.

Aquatic Biology

- Aquatic habitat inventory and assessment on the road improvements to Bathurst Street and Keele Avenue for the Regional Municipality of York.
- Aquatic Habitat Inventory and Assessment of watercourses for improvements on Highway 65, Highway 35, Highway 518 for the Ontario Ministry of Transportation Northeastern Region.
- Fish Compensation Plan and Post-Construction Monitoring for residential developer, Tartan Homes in the City of Ottawa, for compliance with *Fisheries Act* and *Conservation Authorities Act*.
- Environmental inspection and reporting of environmental protection measures for construction of municipal road and bridge over the Nottawasaga River for the Township of Essa.
- Aquatic Impact Assessment for March Road Widening and Culvert Installation for the City of Ottawa.

Terrestrial Biology

- Design of Riparian Planting Plan And Post-Construction Monitoring of plantings and bioengineering in a newly created watercourse to meet the requirements of the *Fisheries Act* and *Conservation Authorities Act*, for a landfill expansion for Waste Services, Inc. in Ottawa.
- Terrestrial inventories and impact assessments on for transportation projects for the Ontario Ministry of

Education

- B.E.S., University of Waterloo, 2007
- Environmental Assessment Diploma, University of Waterloo, 2007

Memberships and Licenses

- Class II Electrofishing Crew Leader
- Ecological Land Classification of Southern Ontario Training Course
- Freshwater Mussel Identification Course
- DFO Risk Management Training Course
- American Fisheries Society – Ontario Chapter
- Society for Ecological Restoration – Ontario Chapter

Transportation Eastern, and Northeastern Regions and the Regional Municipalities of York and Peel.

- Field surveys to identify potential habitat for terrestrial and aquatic species at risk throughout the National Capitol Region for Public Works and Government Services Canada (PWGSC).

Environmental Planning and Regulatory

- Environmental Impact Studies (EIS) and Environmental Assessments (EA) for residential and commercial developments, oil and gas development, mining, landfill development, Municipal and Federal projects.
- Natural Environmental Level 1 and Level II Assessments under to support the *Aggregate Resources Act* license application for a proposed quarry for private developer in the City of Ottawa.
- Project approvals including No HADD and HADD authorizations using DFO's Risk Management Framework.
- Approvals under the *Fisheries Act*, *Conservation Authorities Act*, *Environmental Assessment Act*, *Species at Risk Act*, *Endangered Species Act*, *Ontario Water Resources Act* and *Provincial Policy Statement* as it relates to the *Planning Act*.

Alan Wormington

Ornithologist & Terrestrial Ecologist

Experience

Mr. Alan Wormington is an Ornithologist and avian habitat specialist with Morrison Hershfield and brings over 25 years of experience. He is a recognized expert in other terrestrial disciplines including butterflies, moths, terrestrial ecology and habitat inventory and impact assessment.

Alan is a regular contributor to the Breeding Bird Atlas of Ontario and the author of many ornithological reports and studies. Alan's extensive knowledge of Southern, Central and Northern Ontario habitats enables an accurate inventory and assessment of the significance of any breeding bird activity and habitats for species at risk. Alan has provided expert avian biological services in the transportation, mining, industrial and land development sectors.

Ornithological and SAR Studies

- Natural Sciences Scientific Retainer comprising numerous avian and SAR habitat inventory and impact assessment assignments, for MTO Central Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 5 km of Highway 8, for MTO Southwestern Region
- Project Ornithologist for the Zeiss Search for the Ivory-billed Woodpecker, for the Louisiana Department of Natural Resources
- Resident and Breeding Bird Species, Nesting Assessment and Protection, and Mitigation Plans for over 40 bridge structures including the Grand River Argyle Street Bridge, Bayfield River Bridge, Scugog River Bridge, and the Ausable River Bridge MTO Southwestern, Central, Eastern and Northeastern Regions
- Resident and Migratory Breeding Bird Species and Nesting Assessment and Protection and Mitigation Plans for over 20 resource extraction and land development sites in the Northwest Territories, for LGL Limited
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 15 km of Highway 518 for MTO Northeastern Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 8 km of Kennedy Road and on 8 km of McCowan Road, for the Regional Municipality of York
- Resident and Migratory Waterfowl Species and Habitat Assessment on the Ferry Docks at Leamington, Kingsville, and Pelee Island, MTO Southwestern Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 49 km of Highway 11 for MTO Central Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 29 km of Highway 101 for MTO Northeastern Region

Terrestrial Ecology

- Park Naturalist at Rondeau Provincial Park, Quetico Provincial Park, Point Pelee National Park
- Wetlands Evaluation and Inventories on over 50 wetlands for the Ontario Ministry of Natural Resources
- Project Biologist for the Environmentally Sensitive Areas Inventory and Classification Study for North Wellington County, Kent-Elgin County, Regional Municipality of Halton and Hamilton-Wentworth County

Education

- Historical/Natural Interpretive Services, Seneca College
- Applied Photography, Sheridan College of Applied Arts and Technology
- Ontario Wetland Evaluation Course

Memberships

- Ontario Field Ornithologists - Founding Life Member



Samantha Lawton

B.Sc. Student (3rd Year), Wildlife Biology and Zoology, University of Toronto

Student Field Monitoring Biologist

Experience

Samantha Lawton, for the past year has been working in the Environmental Division's Toronto office part time, while continuing her degree work at the University of Toronto in Wildlife Biology and Zoology. Her main focus of study includes Environmental Biology, Organisms in their Environment, Animal Physiology, Calculus, Organic and Physical Chemistry.

Samantha has worked and assisted the Environmental Field Team on projects that include:

- 2010 Spring Monitoring of Wood Turtle Habitat, an Ontario Endangered Species, to Support Development of Highway Crossing Mitigation, for MTO Northeastern Region
- 2010 Monitoring of Blanding's Turtles, an Ontario Endangered Species, to Support Development of Highway Crossing Mitigation, for MTO Northeastern Region
- 2010 Highway 10 Turtle Crossing and Nesting Habitat Design and Post-Construction Monitoring Study, for MTO Central Region

Samantha also worked as a Construction Administrator Assistant with Morrison Hershfield in 2009, where she was responsible for keeping finances of many projects up to date, compiled payment packages and compared to budgets, and prepared reports and updated legal documentation.

Other work that Samantha has been involved in outside Morrison Hershfield include:

- University of Toronto, Gross Lab, as a Research Student, Researched effect of diseases on Canada's endangered species, and worked with Masters and Ph.D. Students designing a lab plan, 2010 to present
- University of Toronto International Health Program, as a Seminar Leader, researched diseases and condensed into interesting form, and organized event structure and personnel, 2009-2010

Education

- B.Sc. Student (3rd Year), Wildlife Biology and Zoology, University of Toronto

Memberships and Licenses

- Victoria College In-Course Scholarship for Academic Achievement, November 2009
- Pacific Coast Terminals Scholarship for Leadership and Academic Excellence, June 2008
- District Scholarship for Business Studies, June 2008
- Provincial Scholarship for Academic Achievement, June 2008
- 2nd at Bruce-Lockhart Debate Tournament, January 2008

APPENDIX C

Summary of Natural Features within 120 Metres of the Project Locations

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
Natural Features				
Area of Natural and Scientific Interest (Earth Science)	An area that has earth science values related to protection, scientific study or education (Ontario Ministry of the Environment 2011.)	No	No	N/A
Area of Natural and Scientific Interest (Life Science)	An area that has life science values related to protection, scientific study or education (Ontario Ministry of the Environment 2011.)	No	No	N/A
Coastal wetland	A wetland that is located, (a) on Lake Ontario, Lake Erie, Lake Huron, Lake Superior or Lake St. Clair, (b) on the St. Mary's, St. Clair, Detroit, Niagara or St. Lawrence River, or (c) subject to subsection (3), on a tributary to any water body mentioned in clause (a) or (b) and, either in whole or in part, downstream of a line located 2km upstream of the 1:100 year floodline of the water body (Ontario Ministry of the Environment 2011.)	No	No	N/A
Southern wetland	A wetland located south of the northern limit of Ecoregions 5E, 6E and 7E (Ontario Ministry of the Environment 2011.)	Yes – 1 southern wetland (Emerson Road Woods Provincially Significant Wetland) was identified during Records Review (Source: MNR, Niagara Region)	Confirmed.	This feature is being treated as provincially significant. It will be discussed in the EIS.
Valleyland	A natural area, (a) that is 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 (b) that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year (Ontario Ministry of the Environment 2011.)	No	Identified – 2 valleylands were identified during Site Investigations: Old Mill Race Creek valleyland and Casey Drain valleyland.	These features will be evaluated for significance. They will be discussed in the Evaluation of Significance Report.
Woodland	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	Yes - 2 woodlots (Burnaby Bush and Emerson Road Woods) were identified during Records Review (Source: LIO, NHIC,	Confirmed. One additional woodlot was identified (FOD).	These features will be evaluated for significance. They will be discussed in the Evaluation of Significance Report.

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
	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 (Ontario Ministry of the Environment 2011.)	Niagara Region).		
Provincial Park	“Provincial park” means a provincial park within the meaning of the Provincial Parks and Conservation Reserves Act, 2006 (Ontario Ministry of the Environment 2011.)	No	No	N/A
Conservation Reserve	“Conservation reserve” means a conservation reserve within the meaning of the Provincial Parks and Conservation Reserves Act, 2006 (Ontario Ministry of the Environment 2011.)	No	No	N/A
Seasonal Concentration Areas for Wildlife Species Considered Candidate Significant Wildlife Habitat				
Waterfowl Stopover & Staging Area (terrestrial)	CUM1 or CUT1 community with evidence of annual spring flooding within these ecosites. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Waterfowl Stopover & Staging Area (aquatic)	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3, SAF1, SAM1, SAS1, SWD1 or SWD3 community with abundant food supply (aquatic invertebrates and vegetation in shallow water). (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Shorebird Migratory Stopover Area	BBO, BBO2, BBS1, BBS2, BBT1, BBT2, SDO1, SDS2, SDT1, MAM1, MAM2, MAM3, MAM4 or MAM5 community along a shoreline of a lake, river or wetland, usually muddy and unvegetated. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Raptor Wintering Area	Site >20ha with a combination of forest (FOC, FOD, FOM) and upland (CUM, CUT, CUS, CUW) community. (Ontario Ministry of Natural Resources 2011.)	No	Identified - 1 Candidate Raptor Wintering Area was identified during Site Investigations.	This feature will be evaluated for significance. It will be discussed in the Evaluation of Significance Report.
Bat Hibernacula	Caves, abandoned mine shafts, underground foundations, and these ecosites: CCR1, CCR2, CCA1 or CCA2. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Bat Maternity Colony	Mixed forest or Deciduous Forest with >10 snags/cavity trees per hectare of trees >25cm dbh (Ontario Ministry of Natural Resources 2011.)	No	Identified – Identified – 2 Candidate Bat Maternity Colonies (Burnaby Bush and Emerson Road Woods) were identified	This feature will be treated as significant. See pre-construction monitoring plan in the EIS.

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
			during Site	
Bat Migratory Stopover Area	Long Point is the only known stopover area (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Turtle Wintering Area	Permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Snake Hibernacula	Rock piles or slopes, stone fences and crumbling foundations. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Colonial Nesting Bird Breeding Habitat (bank & cliff)	CUM1, CUT1, CUS1, BLO1, BLS1, BLT1, CLO1, CLT1 or CLS1 community with exposed banks, undisturbed or naturally eroding for 10 years+. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Colonial-Nesting Bird Breeding Habitat (tree/shrub)	SWM2, SWM3, SWM, SWM6, SWD1, SWD2, SWD3, SWD4, SWD5, SWD6, SWD7 or FET1. (Ontario Ministry of Natural Resources 2011.)	Yes- 1 Candidate Colonial Nesting Bird Breeding Habitat (tree/shrub) was identified during Records Review (Lowbanks Backshore Wetland Complex AKA Emerson Road Woods Wetland). (Source: NHIC)	Eliminated. Site Investigations were conducted and there were no active colonial bird nests observed. This site was eliminated as a Candidate site.	N/A
Colonial-Nesting Bird Breeding Habitat (ground)	Any rocky island or peninsula within a lake or large river (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Migratory Butterfly Stopover Area	Site >10 ha with a combination of field (CUM, CUT, CUS) and forest (FOC, FOM, FOD, CUP) within 5km of Lake Erie. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Landbird Migratory Stopover Area	Woodlots (FOC, FOM, FOD, SWC, SWM, SWD) >5ha in size within 5km of Lake Ontario or Lake Erie (Ontario Ministry of Natural Resources 2011)	No	Identified- 2 Candidate Landbird Migratory Stopover Areas (Emerson Road Woods and Burnaby Bush) were identified during Site Investigations.	This feature will be treated as significant. See pre-construction monitoring plan in the EIS.
Bald Eagle Winter Feeding and Roosting Areas	Large continuous areas of mixed or deciduous woods with large trees and snags around the shores of large rivers or lakes (Ontario Ministry of Natural Resources 2000).	No	No	N/A

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
Rare Vegetation Communities Considered Candidate Significant Wildlife Habitat				
Cliffs and Talus Slopes	CLO1, CLS1, CLS2, CLT1, CLT2, TAO1, TAO2, TAS1, TAT1, TAT2 (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Sand Barren	SBO1, SBS1, SBT1 with tree cover < 60% (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Alvar	ALO1, ALS1, ALT1 > 0.5ha with 3 or more Alvar indicator species and not dominated by exotic or introduced species (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Old-growth Forest	FOD, FOC, FOM that is undisturbed, structurally complex and contain a wide variety of trees and shrubs in various age classes (Ontario Ministry of Natural Resources 2011.)	Yes - 1 Candidate Old-growth Forest (Emerson Road Woods) was identified during Records Review (Source: Niagara Peninsula Conservation Authority)	Confirmed.	This feature will be evaluated for significance. It will be discussed in the Evaluation of Significance Report.
Savannah	TPS1, TPS2 with 25%<tree cover<35% or TPW1, TPW2 with 35%<tree cover<60% (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Tallgrass Prairie	TPO1, TPO2 with <25% tree cover (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Other Rare Vegetation Communities	Provincially rare S1, S2, S3 vegetation communities as listed in Appendix M of the SWHTG (Ontario Ministry of Natural Resources 2011). Rare vegetation communities are also outlined in the Niagara Peninsula Conservation Authority's Natural Areas Inventory (Niagara Peninsula Conservation Authority 2009).	No	Identified -1 site (a portion of Emerson Road Woods) was classified as SWD1 (a provincially rare vegetation community) during Site Investigations	This feature will be evaluated for significance. It will be discussed in the Evaluation of Significance Report.
Specialized Wildlife Habitats Considered Candidate Significant Wildlife Habitat				
Waterfowl Nesting Areas	Large (120m wide) upland habitats located adjacent to a wetland community (MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4) (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Bald Eagle and Osprey Nesting, Foraging, Perching Habitat	Forest community directly adjacent to riparian areas (rivers, lakes, ponds, wetlands). (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Turtle Nesting Areas	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAF1, SAM1, BOO1 or FEO1 community with sand or	No	No	N/A

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
	gravel adjacent to marsh, lake or river. (Ontario Ministry of Natural Resources 2011.)			
Amphibian Breeding Habitat (woodland)	Breeding pools within or adjacent (within 120m) to a woodland (FOC, FOM, FOD, SWC, SWM or SWD community) (Ontario Ministry of Natural Resources 2011.)	No	Identified- 1 Candidate Amphibian Breeding Habitat (Emerson Road Woods) was identified during Site Investigations	This feature will be evaluated for significance. It will be discussed in the Evaluation of Significance Report.
Amphibian Breeding Habitat (wetland)	Breeding pools within MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1 or SWT1 community. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Habitats of Species of Conservation Concern Considered Candidate Significant Wildlife Habitat				
Marsh Breeding Bird Habitat	Wetland habitat (MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAF1, SAM1, FE01, BO01) with shallow water and emergent vegetation (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Open Country Bird Breeding Habitat	Large (>30ha) grasslands (CUM1) not actively being used for farming (i.e. in the last 5 years). (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Shrub/Early Successional Breeding Bird Habitat	Large (>10ha), older fields or shrub thickets (CUT1, CUS1) not actively being used for farming (i.e. in the last 5 years). (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Special Concern & S1-S3 Species and Communities: Milksnake	Farmlands, meadows, hardwood or aspen stands; pine forest with brushy or woody cover; river bottoms or bog woods; hides under logs, stones, or boards or in outbuildings; often uses communal nest sites (Ontario Ministry of Natural Resources 2000a.)	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and Communities: Eastern Ribbonsnake	Sunny grassy areas with low dense vegetation near bodies of shallow permanent quiet water; wet meadows, grassy marshes or sphagnum bogs; borders of ponds, lakes or streams; hibernates in groups (Ontario Ministry of Natural Resources 2000a.)	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and	Permanent, semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddy	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
Communities: Snapping Turtle	banks or bottoms; often uses soft soil or clean dry sand on south-facing slopes for nest sites; may nest at some distance from water; often hibernate together in groups in mud under water; home range size ~28 ha (Ontario Ministry of Natural Resources 2000a.)			
Special Concern & S1-S3 Species and Communities: Red-headed Woodpecker	Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory (Ontario Ministry of Natural Resources 2000a.)	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and Communities: Short-eared Owl	Grasslands, open areas or meadows that are grassy or bushy; marshes, bogs or tundra; both diurnal and nocturnal habits; ground nester; destruction of wetlands by drainage for agriculture is an important factor in the decline of this species; home range 25 - 125 ha; requires 75-100 ha of contiguous open habitat (Ontario Ministry of Natural Resources 2000a.)	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and Communities: Yellow-breasted Chat	Thickets, tall tangles of shrubbery beside streams, ponds; overgrown bushy clearings with deciduous thickets; nests above ground in bush, vines etc. (Ontario Ministry of Natural Resources 2000a.)	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3 Species and Communities: Hooded Warbler	This species as an area-sensitive species. (Ontario Ministry of Natural Resources 2000b). See page 8 for a discussion of Woodland Area-sensitive Breeding Bird Habitat.	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Confirmed. This species is an area-sensitive species (Ontario Ministry of Natural Resources 2000b). 2 Candidate Woodland Area-sensitive Breeding Bird Habitat (Emerson Roads Woods and Burnaby Bush) were identified during Site Investigations	These features will be treated as significant. Generalized Candidate Significant Wildlife Habitat will be discussed in the EIS.
Special Concern & S1-S3 Species and Communities: Monarch Butterfly	Monarchs in Canada exist primarily wherever milkweed (Asclepius) and wildflowers (such as Goldenrod, asters, and Purple Loosestrife) exist. This includes abandoned farmland, along roadsides, and other open spaces where these plants grow. (Environment Canada 2011).	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Special Concern & S1-S3	Sheltered forest ponds, streams and lake coves	Yes- this species was identified during	Eliminated.	N/A

Natural Feature	Definition	Was this Feature Identified During Records Review?	Was this Feature Confirmed, Eliminated or Identified During Site Investigation?	Will this Feature Be Evaluated for Significance?
Species and Communities: Cyrano Darner	(Abbott 2007).	Records Review in MNR's list of potential S1-S3 species in the area		
Special Concern & S1-S3 Species and Communities: Unicorn Clubtail	Semi-permanent ponds, lakes and slow areas of small streams with muddy bottoms (Abbott 2007).	Yes- this species was identified during Records Review in MNR's list of potential S1-S3 species in the area	Eliminated.	N/A
Animal Movement Corridors Considered Candidate Significant Wildlife Habitat				
Amphibian Movement Corridors	Movement corridors between breeding habitat and summer habitat (Ministry of Natural Resources 2011).	No	Identified. 1 Candidate Animal movement corridor was identified during Site Investigations.	This feature will be treated as significant and will be discussed in the EIS.
Bat Migration Corridors	Sites directly on the shores of large lakes or on areas of high elevation	No	No	N/A
Generalized Candidate Significant Wildlife Habitat				
Woodland Raptor Nesting Habitat	Intermediate-aged to mature woodlands or conifer plantations (FOC, FOM, FOD, SWC, SWM, SWD, CUP3). (Ontario Ministry of Natural Resources 2011.)	No	Identified- 2 Candidate Woodland Raptor Nesting Habitat (Emerson Roads Woods and Burnaby Bush) were identified during Site Investigations.	These features will be treated as significant. Generalized Candidate Significant Wildlife Habitat will be discussed in the EIS.
Seeps and Springs	Any forested ecosite within the headwater areas of a stream or river system. (Ontario Ministry of Natural Resources 2011.)	No	No	N/A
Woodland Area-sensitive Breeding Bird Habitat	Large (>10ha), mature (>60 years old) forest stands (FOC, FOM, FOD, SWC, SWM, SWD) with interior forest (at least 100m from the edge) where interior forest birds are breeding. (Ontario Ministry of Natural Resources 2011.)	No	Identified - 2 Candidate Woodland Area-sensitive Breeding Bird Habitat (Emerson Roads Woods and Burnaby Bush) were identified during Site Investigations	These features will be treated as significant. Generalized Candidate Significant Wildlife Habitat will be discussed in the EIS.

APPENDIX D

**Pre-construction Monitoring Work Plan + Results: Candidate
Raptor Winter Feeding and Roosting Area**



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Project Number: 1104036.00

Project Title: WAINFLEET WIND ENERGY PROJECT

Report: 007-R02-1104036

Title: PRE-CONSTRUCTION MONITORING WORK PLAN
+ RESULTS: CANDIDATE RAPTOR WINTER
FEEDING AND ROOSTING AREA

Client: IPC Energy
2550 Argentia Road Suite 105
Mississauga, Ontario
L5N 5R1

Date: March 2012

Morrison Hershfield Limited

Erin McLachlan
Terrestrial Ecologist and Environmental Planner

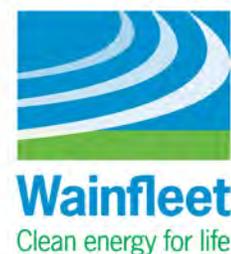


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- Figure 2. Pre-construction Monitoring Point Count Study Locations

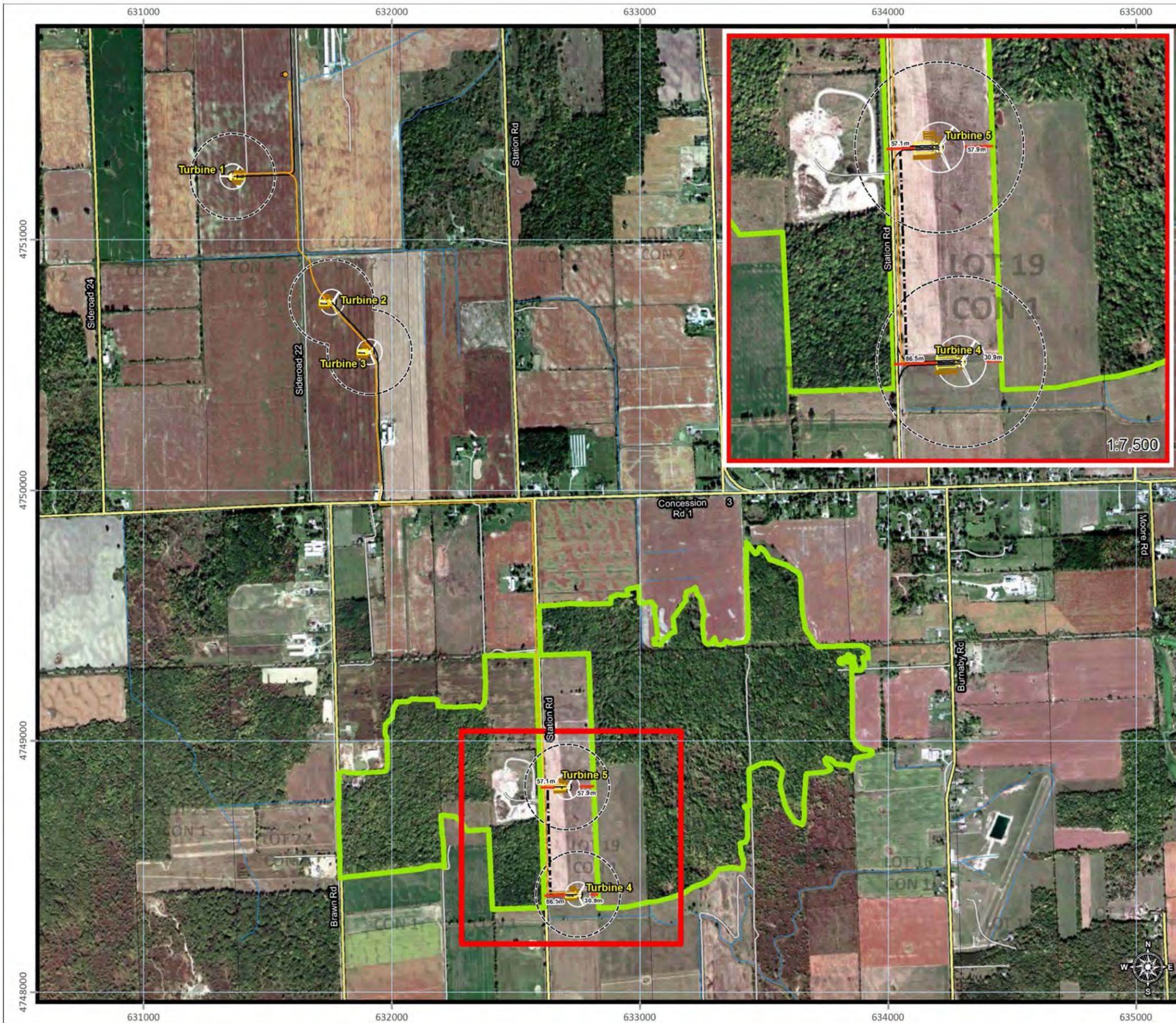
1.0 Introduction

A candidate raptor winter feeding and roosting area was identified within 120m of the Wainfleet Wind Energy project location in the Site Investigation Report. See Figure 1. This workplan outlines the proposed methods for pre-construction monitoring of this feature.

According to the draft Ecoregion 7E Criteria Schedule (OMNR 2011), candidate raptor winter feeding and roosting areas are defined as sites that are greater than 20 hectares with a combination of forest (FOC, FOD, FOM) or, swamp (SWD, SWM) and upland (CUM, CUT, CUS, CUW) communities.

This 177.3-hectare candidate raptor winter feeding and roosting area encompasses Emerson Road Woods (SWD), Burnaby Bush (SWD), and 2 CUM1 communities.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Raptor Winter Feeding and Roosting Area (SWD + CUM1)	155.60 ha	Unknown	-swamp dominated by red oak and pin oak -cultural meadow dominated by Canada goldenrod with fresh moist soil	SWD deciduous swamp CUM1 Cultural meadow dominated by smooth brome, Canada goldenrod	-large forest for protection -old growth forest provides potential winter feeding and roosting areas for raptors -cultural meadow provides potential winter feeding and roosting areas for raptors	30.9 metres from Turbine 4 & 5	Yes



Legend

Candidate SWH

- Raptor Wintering Area
- 120m Setback (Wind Turbine, Included All Related Structures)
- Distances to Natural Features

Project Infrastructure

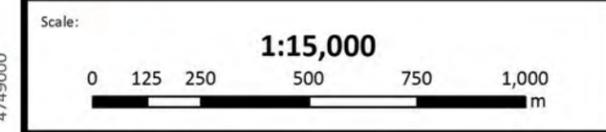
- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983,
 Universal Transverse Mercator Projection, Zone 17N.
 ESRI Aerial Photography (Bing 2010)
 Project location data provided by IPC Energy and AMEC.



Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Raptor Wintering Area**

Project No.: **1104036**

Drawing No.: **Figure No. 1**

Date: **30 Mar 2012**

Date: **30 Mar 2012**

2.0 Objectives of Study

This study will target birds of prey, including: Coopers Hawk, Sharp-shinned Hawk, Rough-legged Hawk, Red-tailed Hawk, Northern Harrier, American Kestrel, Snowy Owl, Short-eared Owl or other bird of prey species. We will collect information on the species diversity and abundance of raptors using the feature as well as the presence of species of conservation concern.

3.0 Timing of Study

This study will be conducted in January and February (and early March if weather interferes with field investigations) to include as much of the winter season as possible. Three field visits will be scheduled with approximately 10 days between each field visit.

- Site Visit #1: late January (between January 23- 31)
- Site Visit #2: early February (between February 2- 10)
- Site Visit #3: mid-late February (between February 13-29)
- If required: early March (between March 1- 16)

4.0 Study Methods

The study will include 1 standard 10-minute point count at 6 different locations within the feature, including 2 along the edge of Burnaby Bush, 2 along the edge of Emerson Road Woods and 1 within each of the cultural meadow communities. See Figure 2.

5.0 Analysis of Results

The Environmental Impact Study will include a discussion of different result outcome scenarios of the study. The analysis of results will be submitted to MNR for review immediately after study completion, and prior to construction.

5.1 Significant Wildlife Habitat Technical Guide

As per the Significant Wildlife Habitat Technical Guide (OMNR 2000), candidate raptor winter feeding and roosting areas are analyzed in terms of 6 criteria:

- Relative importance of the site
- Species diversity and abundance
- Presence of species of conservation concern
- Size of site
- Level of disturbance

- Habitat Quality

The relative importance of the site, size of site, level of disturbance and habitat quality are known. This study will provide information on the species diversity and abundance of raptors using the feature as well as the presence of species of conservation concern to conduct an analysis on the significance of the feature.

5.2 Ecoregion 7E Criteria Schedule

As per the draft Ecoregion 7E Criteria Schedule (OMNR 2011), candidate raptor winter feeding and roosting areas are deemed significant if studies confirm the use of the feature by:

- One or more Short-eared Owls
- At least 10 individuals and 2 listed species (Rough-legged Hawk, Red-tailed Hawk, Northern Harrier, American Kestrel, Snowy Owl, Short-eared Owl)
- To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days

As the study will be conducted over 3 days during 1 year, it will not be possible to evaluate the 3rd criteria. This study will provide information on the number of Short-eared Owls, species diversity and abundance of all resident or wintering birds of prey using the feature to conduct an analysis on the significance of the feature.

If the analysis of results deems the site not significant, no further studies or mitigation are required.

If the analysis of results deems the site significant, a discussion of potential impacts to the feature will be included in the Environmental Impact Study and mitigation measures will be provided and incorporated into the Environmental Effects Monitoring Plan (EEMP) to minimize impacts.

6.0 Field Personnel

Field investigations were conducted by Alan Wormington. See Appendix A for resume.

7.0 Results

Three field visits were made to collect point count data at the 6 locations within and adjacent to the Candidate Raptor Winter Feeding and Roosting Area. See Figure 2.

7.1 Site Visit #1: January 30

Weather Conditions: -5C, light westerly wind, no precipitation, 20% cloud cover, 3 inches fresh snow, excellent visibility

Timing of Study: 9:48am- 11:40am

Point Count Station #1: --

Point Count Station #2: --

Point Count Station #3: --

Point Count Station #4: --

Point Count Station #5: --

Point Count Station #6: --

7.2 Site Visit #2: February 13

Weather Conditions: 0C, stiff southwest wind, no precipitation, 0% cloud cover, 1 inch fresh snow with some bare patches, excellent visibility

Timing of Study: 12:20pm- 2:05pm

Point Count Station #1: --

Point Count Station #2: --

Point Count Station #3: --

Point Count Station #4: --

Point Count Station #5: 2 Red-tailed Hawks hunting overhead (1 was between 50-100m, 1 was higher than 100m); probable pair

Point Count Station #6: --

7.3 Site Visit #2: February 26

Weather Conditions: -2C, light northwest wind, no precipitation, 50% cloud cover, trace snowcover, excellent visibility

Timing of Study: 9:50am- 11:30am

Point Count Station #1: 1 adult Red-tailed Hawk between 50-100m high

Point Count Station #2: 2 adult Red-tailed Hawks flying overhead, higher than 100m

Point Count Station #3: --

Point Count Station #4: 1 immature Red-tailed Hawk, hunting over the forest, approximately 0.4km to the east and 1 Cooper's Hawk, hunting over the forest, approximately 0.6km to the southeast

Point Count Station #5: --

Point Count Station #6: 1 Red-tailed Hawk sitting in tree less than 50m high

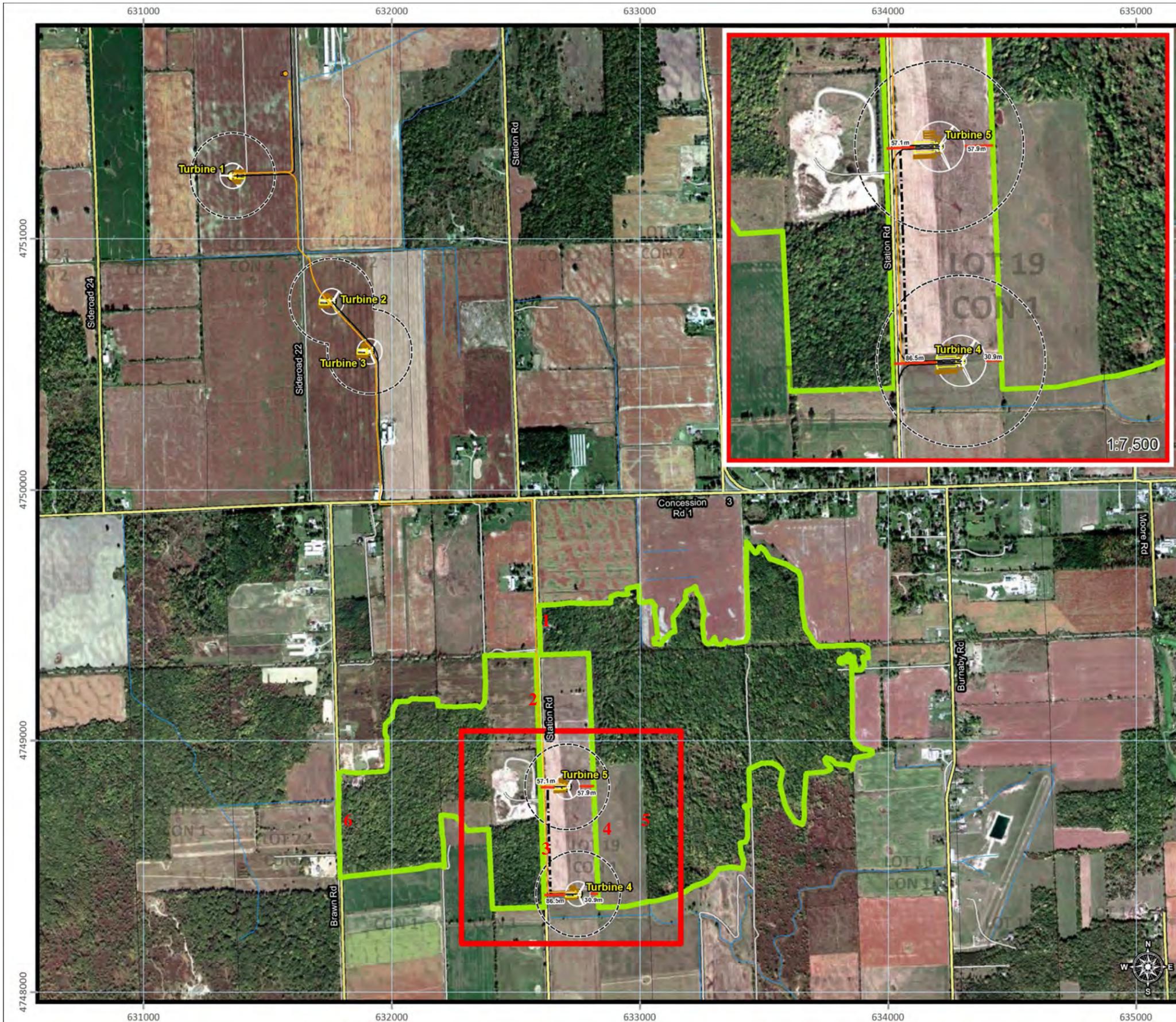
7.4 Total Tally of Raptors Observed

- 7 Red-tailed Hawks
- 1 Cooper's Hawk

8.0 Analysis of Results

The results of this study do not indicate a significant abundance or diversity of raptors. No Short-eared Owls or other species of conservation concern were observed.

This site does not represent a Significant Raptor Winter Feeding and Roosting Area, as per the Significant Wildlife Habitat Technical Guide or the Ecoregion 7E Criteria Schedule.



Legend

Candidate SWH

- Raptor Wintering Area
- 120m Setback (Wind Turbine, Included All Related Structures)
- Distances to Natural Features

Project Infrastructure

- Wind Turbines
- Switching Station
- Collector Line
- Turbine Access Roads (New)
- Crane Pad
- Crane Path
- Turbine Laydown Area
- Substation Fence

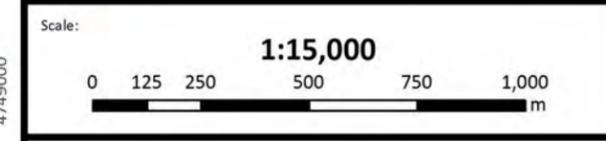
Existing Road Network

- Paved Road
- Unpaved Road
- Watercourses

1 Point Count Survey Locations

Note: Underground collector lines following Station Rd and Concession Rd 1 will be contained within the existing road network right-of-ways.

All frames: North American Datum 1983, Universal Transverse Mercator Projection, Zone 17N. ESRI Aerial Photography (Bing 2010) Project location data provided by IPC Energy and AMEC.



Project: **WAINFLEET WIND ENERGY PROJECT**

Title: **Pre-construction Monitoring Point Count Survey Locations**

Project No.: **1104036**

Drawing No.: **Figure No. | 2**

Date: **30 Mar 2012**

Date: **30 Mar 2012**

Alan Wormington

Ornithologist & Terrestrial Ecologist

Experience

Mr. Alan Wormington is an Ornithologist and avian habitat specialist with Morrison Hershfield and brings over 25 years of experience. He is a recognized expert in other terrestrial disciplines including butterflies, moths, terrestrial ecology and habitat inventory and impact assessment.

Alan is a regular contributor to the Breeding Bird Atlas of Ontario and the author of many ornithological reports and studies. Alan's extensive knowledge of Southern, Central and Northern Ontario habitats enables an accurate inventory and assessment of the significance of any breeding bird activity and habitats for species at risk. Alan has provided expert avian biological services in the transportation, mining, industrial and land development sectors.

Ornithological and SAR Studies

- Natural Sciences Scientific Retainer comprising numerous avian and SAR habitat inventory and impact assessment assignments, for MTO Central Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 5 km of Highway 8, for MTO Southwestern Region
- Project Ornithologist for the Zeiss Search for the Ivory-billed Woodpecker, for the Louisiana Department of Natural Resources
- Resident and Breeding Bird Species, Nesting Assessment and Protection, and Mitigation Plans for over 40 bridge structures including the Grand River Argyle Street Bridge, Bayfield River Bridge, Scugog River Bridge, and the Ausable River Bridge MTO Southwestern, Central, Eastern and Northeastern Regions
- Resident and Migratory Breeding Bird Species and Nesting Assessment and Protection and Mitigation Plans for over 20 resource extraction and land development sites in the Northwest Territories, for LGL Limited
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification

on 15 km of Highway 518 for MTO Northeastern Region

- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 8 km of Kennedy Road and on 8 km of McCowan Road, for the Regional Municipality of York
- Resident and Migratory Waterfowl Species and Habitat Assessment on the Ferry Docks at Leamington, Kingsville, and Pelee Island, MTO Southwestern Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 49 km of Highway 11 for MTO Central Region
- Resident and Breeding Bird Species and Habitat Assessment and Terrestrial SAR Habitat Identification on 29 km of Highway 101 for MTO Northeastern Region

Terrestrial Ecology

- Park Naturalist at Rondeau Provincial Park, Quetico Provincial Park, Point Pelee National Park
- Wetlands Evaluation and Inventories on over 50 wetlands for the Ontario Ministry of Natural Resources
- Project Biologist for the Environmentally Sensitive Areas Inventory and Classification Study for North Wellington County, Kent-Elgin County, Regional Municipality of Halton and Hamilton-Wentworth County

Education

- Historical/Natural Interpretive Services, Seneca College
- Applied Photography, Sheridan College of Applied Arts and Technology
- Ontario Wetland Evaluation Course

Memberships

- Ontario Field Ornithologists - Founding Life Member