

GUE-2012-011

April 4, 2012

John Andrews
IPC Energy
2550 Argentia Road,
Suite 105 Mississauga,
ON L5N 5R1

RE: NHA Confirmation for the HAF 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 HAF Wind Energy Project in the Municipality of West Lincoln submitted by IPC Energy on March 30, 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 assessment report has been prepared in accordance with procedures established by the 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:

- Bat Maternity Colony Habitat (Mill Creek-Inverary Woods – EIS Appendix D – Figure 1)
- Terrestrial Crayfish Habitat (MAS 2 – EIS Appendix E – Figure 1)

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 on March 26, 2012.

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 April Nix – Renewable Energy Planning Ecologist with Guelph District at (519) 826-4939 or april.nix@ontario.ca.

Sincerely,



Ian Hagman
District Manager
Guelph District MNR

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



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Project Number: 1104037.00

Project Title: HAF WIND ENERGY PROJECT

Report: 007-R02-11040367

Title: NATURAL HERITAGE ASSESSMENT REPORT

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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RECORDS REVIEW REPORT- FINAL VERSION

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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 HAF 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 4808 hectares of primarily agricultural fields. The land inside the study area is mostly flat, with an elevation of 190m to 197m above mean sea level. (See Figure 1.)

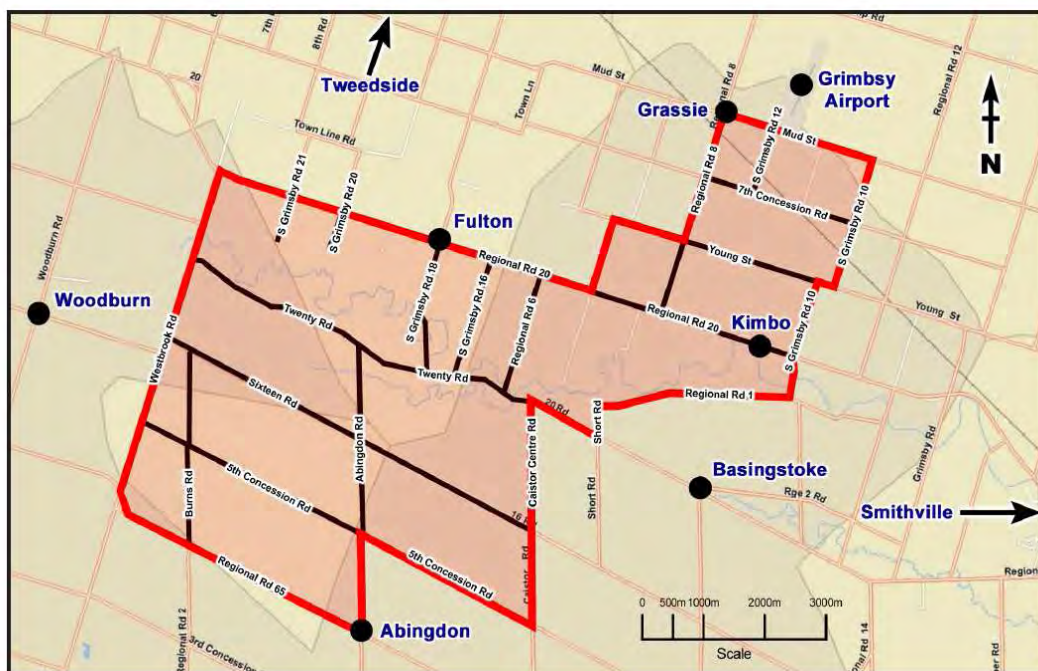


Figure 1. HAF Wind Energy Project Study Area

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 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
- A Maintenance Building

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 natural feature;
 - Within 50m of an area of natural and scientific interest (earth science); and
 - Within 120m of a natural science feature that is not an area of natural and scientific interest (earth science).

2.1 Methodology

Databases:

Background information was collected from several sources, including:

- Land Information Ontario;

This source provided mapping of wooded areas.

- Natural Heritage Information Centre Database (NHIC);

This database provided information on the significant woodlots. It was noted in the historical (1987) NHIC data that Lower Twenty Mile Creek Wetland Complex (AKA Abingdon Northwest Wetland) once provided a colonial nesting 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 herpetofauna species.

- Ontario Breeding Bird Atlas;

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

Natural Heritage Assessment Report

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 • Significant Wildlife Habitat (Deer Winter Congregation Areas) • 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"> • Historical observations of rare vegetation
Township of West Lincoln	June 21, 2010	Adam Huycke	They referred us to their Official Plan.
Regional Municipality of	June 15, 2010	Ms. Maria	Mapping data for:

Natural Heritage Assessment Report

Niagara		Andersen, 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:

- 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 West Lincoln Official Plan.

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

2.2 Results

Wetlands

The MNR Guelph office provided up-to-date mapping showing the boundaries of the evaluated wetlands within the project area. There are two small portions of one evaluated wetland (Lower Twenty Mile Creek Wetland Complex AKA Abingdon (Northwest) Wetland) within 120m of the project location. MNR also provided a copy of the evaluation for this wetland. Niagara Region also provided mapping of evaluated wetlands. **(See Figure 3.)**

No unevaluated wetlands were identified during the records review.

Valleylands

No valleylands were identified during the records review.

Woodlands

Mapping of woodlots was provided by Land Information Ontario and NHIC. Niagara Region also provided mapping of significant woodlots. All of these sources identified small portions of two significant woodlots within the project location: Mill Creek-Inverary Woods and Twenty Mile Creek Woodlot. **(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 two natural areas within 120m of the project location: Mill Creek – Inverary Woods and Twenty Mile Creek. The Natural Areas Inventory Study noted that Mill Creek – Inverary Woods is approximately 363 hectares in size. The woods were identified in the report to contain 3 ELC communities: Deciduous Swamp (SWD); Deciduous Forest (FOD); and Shallow Marsh (MAS).

Twenty Mile Creek is identified and discussed within the Natural Areas Inventory. It is approximately 584 hectares of floodplain. There were seven communities identified including; Deciduous Forest (FOD); Deciduous Thicket (THD); Graminoid Meadow (MEG); Meadow Marsh (MAM); Mixed Shallow Aquatic (SAM); Open Water (OAW); and Shallow Marsh (MAS). Within these communities there were a total of 93 recorded taxa, one of these is a species at risk and another was considered provincially rare. The Honey Locust (*Gleditsia triacanthos*) was also identified in the site and is a provincially rare species.

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 up-to-date mapping showing the boundaries of the evaluated wetlands within the project area. The MNR Guelph office also 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; however, potential exists for suitable hibernacula habitat in the Niagara area with many of the caves and karst formations found along the Niagara escarpment, including the area around Upper Twenty Mile Creek.

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.

It is noted in the historical (1987) NHIC data that Lower Twenty Mile Creek Wetland Complex AKA Abingdon (Northwest) Wetland once provided an active feeding area for Great Blue Heron and habitat for American Bullfrog. **(See Figure 5.)**

Ministry of Natural Resources (MNR) Guelph office provided a list of potential species at risk listed as special concern (flora and fauna) in the project area. Additional species were located within the NHIC Database **(See Table 2.)**

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
Insects	Monarch Butterfly	<i>Danaus plexippus</i>	S2N, S4B	Special Concern	Special Concern

Candidate habitats for these species were considered during site investigations.

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.

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 they conducted in 2006-2009. This report confirms records of Honey Locust (*Gleditsia triacanthos*) within the project area.

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 Oak Ridges Moraine or the Niagara Escarpment Plan. The project site is located within the Ontario Greenbelt protected countryside. Lands within the Protected Countryside are subject to the entirety of this

Natural Heritage Assessment Report

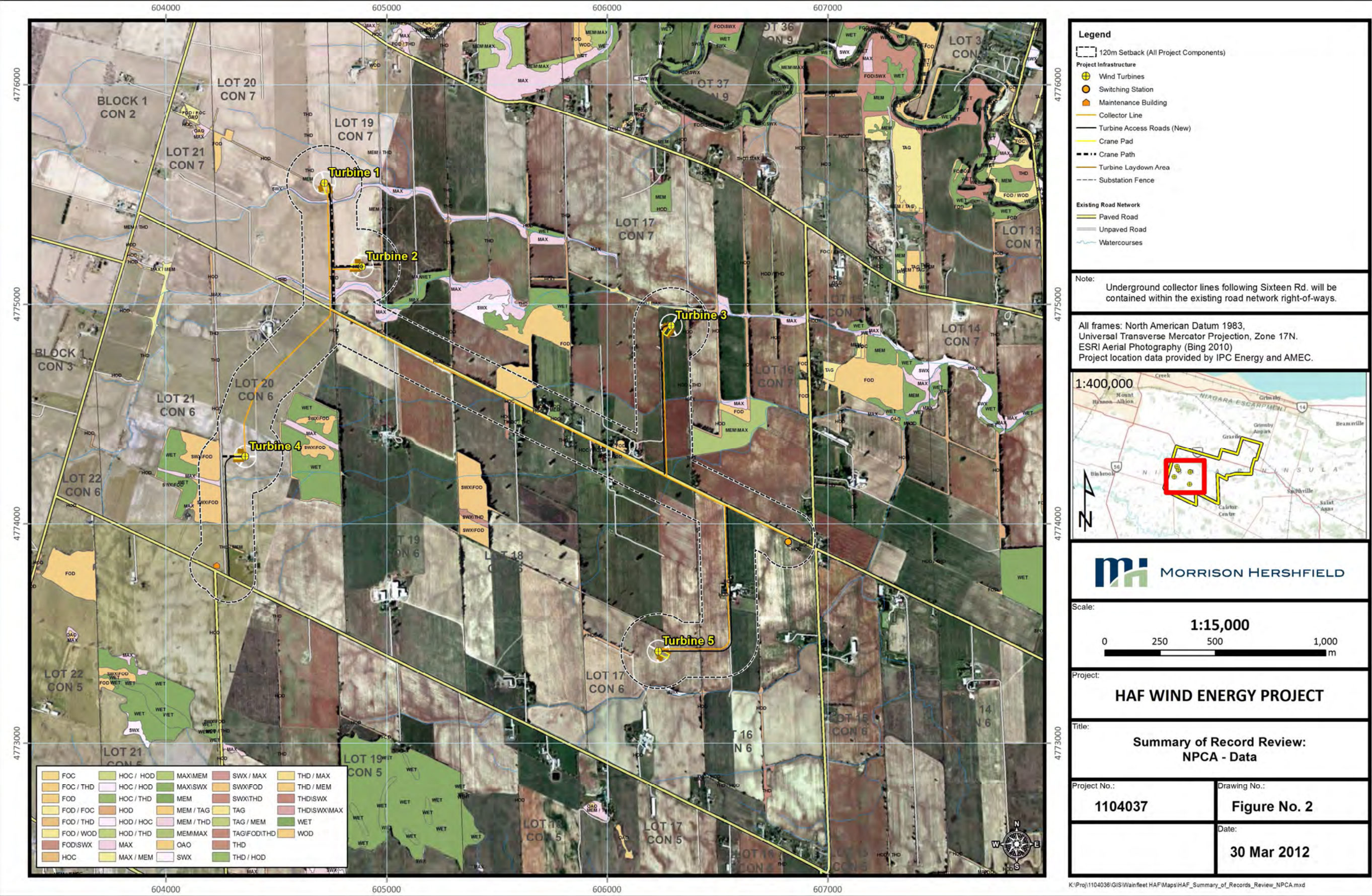
Greenbelt Plan. The Protected Countryside contains a Natural System that provides a continuous and permanent land base necessary to support human and ecological health in the Greenbelt and beyond. The Natural System policies protect areas of natural heritage, hydrologic and/or landform features, which are often functionally inter-related and which collectively support biodiversity and overall ecological integrity. No amendments to the Greenbelt Plan can be made, except by the Province and through the 10-year review of the Plan.

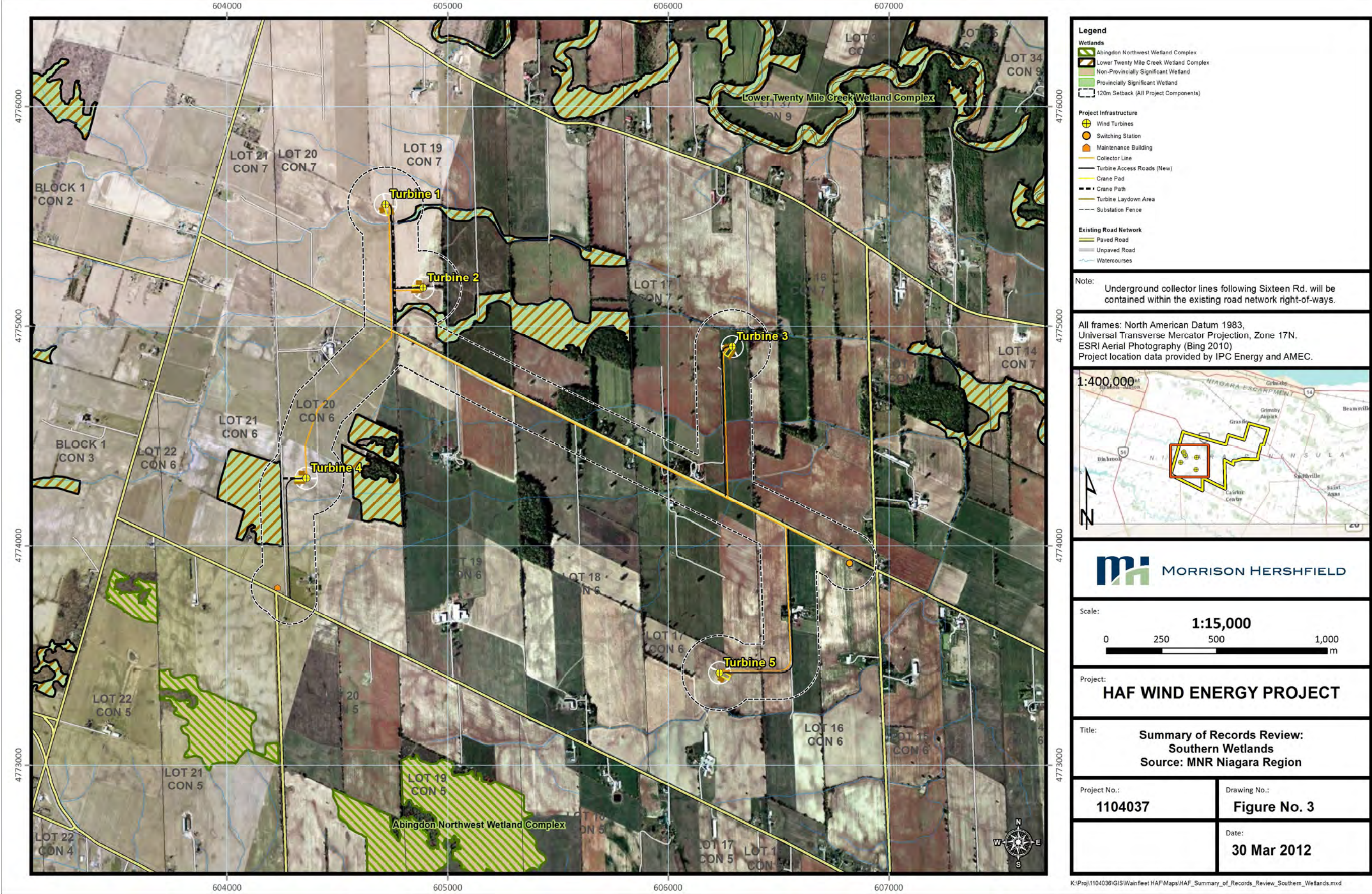
Additional Information

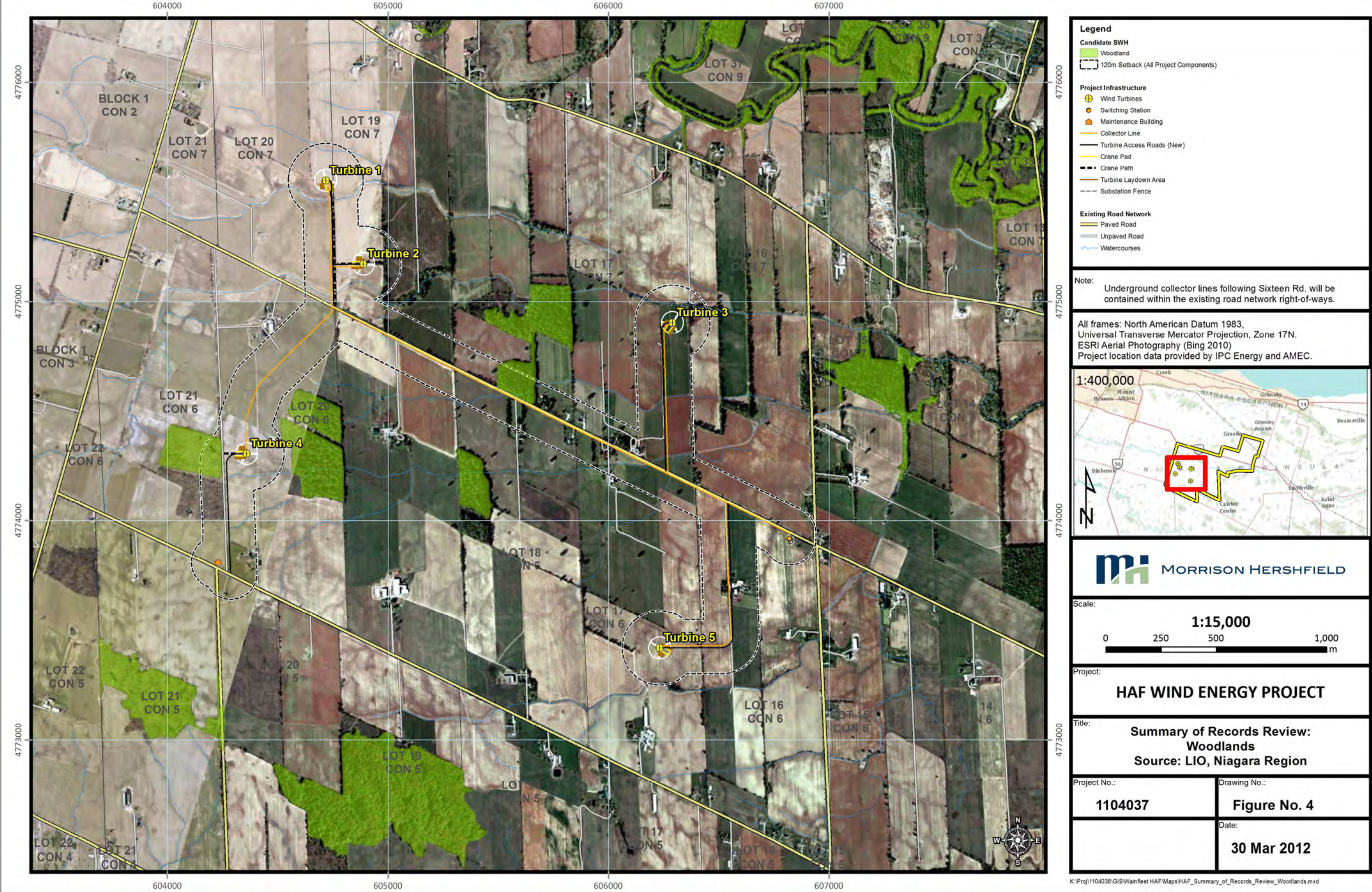
The MNR Vineland office provided fisheries data for the Water Resources Report.

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 West Lincoln referred us to their Official Plan for information on natural features.







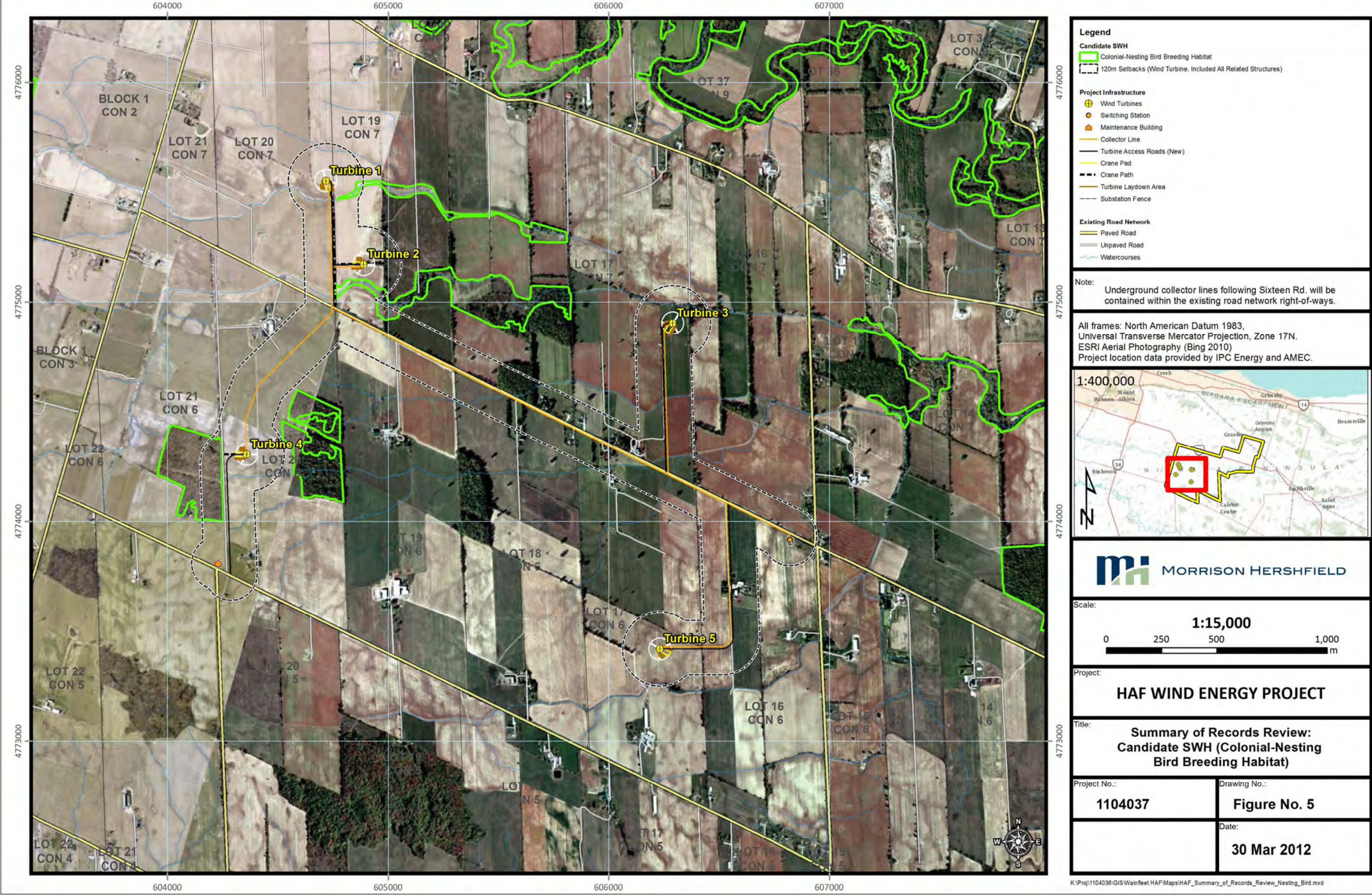


Table 3. Natural Features Project Location Identified During Records Review

Feature	Source	Distance from Project Works
Wetlands	MNR	2 portions of Provincially Significant Wetland; Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (Northwest) Wetland) are within 120m of the project location.
Woodlots	Niagara Region, LIO, NHIC	A portion of Twenty Mile Creek Woodlot is within 120m of the project location.
	Niagara Region, LIO, NHIC	A portion of Mill Creek-Inverary Woods is within 120m of the project location.
Candidate Significant Wildlife Habitat	NHIC	Candidate location of Great Blue Heron nesting and breeding habitat within the Lower Twenty Mile Creek Wetland Complex (AKA Abindgon (northwest) wetland).

References

- Bat Conservation Trust 2007. Bat Surveys: Good Practice Guidelines. Bat Conservation Trust, London.
- COSEWIC 2010a. COSEWIC assessment and update status report on the Bobolink *Dolichonyx oryzivorus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii + 42pp.
- COSEWIC 2010b. COSEWIC assessment and update status report on the Monarch *Danaus plexippus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii + 43pp.
- COSEWIC 2008a. COSEWIC status report on the Short-eared Owl *Asio flammeus* in Canada. Committee on the Status of endangered Wildlife in Canada. Ottawa.vii +24pp.
- COSEWIC 2008b. COSEWIC status report on the Snapping Turtle *Chelydra serpentina* in Canada. Committee on the Status of endangered Wildlife in Canada. Ottawa.vii +37pp.
- COSEWIC 2002a. COSEWIC assessment and status report on the eastern ribbonsnake *Thamnophis sauritus*. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 24 pp.
- COSEWIC 2002b. COSEWIC assessment and status report on the milksnake *Lampropeltis triangulum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 29 pp.
- Dobbyn, J.S. 1966. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists
- 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 2010a. Bats and Bat Habitats: Guidelines for Wind Power Projects (Draft).
- 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.
- OMNR. 2008. Species at Risk in Ontario List.
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
- OMNR 2000. Significant Wildlife Habitat Technical Guide. Fish and Wildlife Branch. October 2000. 151 p.
- 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.



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SITE INVESTIGATIONS 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 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 including 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. All of the surveys conducted for 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 29 th , 2010 July 30 th , 2010	50m transects were conducted for all non-crop lands within project location; croplands within the project location were surveyed on foot	July 29 th 9:00am-5:30pm July 30 th – 8:00am-5:00pm	July 29 th - 8.5 hours July 30 th - 9 hours	July 29 th – partly cloudy, 24°C July 30 th – cloudy, light wind, 26°C	Bettina Henkelman
Candidate Significant Wildlife (Bird) Habitat Survey	July 29 th , 2010 Aug. 2 nd , 2010 Aug. 4 th , 2010 Aug. 6 th , 2010	Searches were conducted for potentially suitable sites throughout the entire project location	July 29 th - 12:00pm-6:00pm Aug. 2 nd – 11:00am-5:00pm Aug. 4 th – 12:00pm-5:00pm Aug. 6 th – 11:00am-6:00pm	July 29 th – 6 hours Aug. 2 nd – 6 hours Aug. 4 th – 5 hours Aug. 6 th – 7 hours	July 29 th – overcast, 22°C Aug. 2 nd – mostly cloudy, 26°C Aug. 4 th – cloudy, windy, 27°C Aug. 6 th – cloudy, 22°C	Erin McLachlan, Samantha Lawton
Candidate Significant Wildlife (Mammal) Habitat Survey	Sept. 23 rd , 2009 Sept. 24 th , 2009 June 17 th , 2010 July 29 th , 2010	Searches were conducted for potentially suitable sites throughout the entire project location.	Sept. 23 rd - 9:30 am-4:30pm Sept. 24 th - 10:00am-5:00pm June 17 th – 9pm-	Sept. 23 rd – 7 hours Sept. 24 th – 7 hours June 17 th – 1.0 hour July 29 th – 6 hours July 30 th – 6.75	Sept. 23 rd – cloudy, 22°C Sept. 24 th - cloudy, 18°C June 17 th – clear, 17°C July 29 th – overcast, 22°C	Erin McLachlan, Samantha Lawton

Natural Heritage Assessment Report

Survey Type	Date	Method	Times	Duration	Weather	Field Personnel
	July 30 th , 2010	Forests were surveyed for suitability by noting abundance of snags, cavity trees and were visually surveyed for bat activity one evening.	10:00pm July 29 th - 12:00pm-6:00pm July 30 th – 10:15am-5:00pm	hours	July 30 th – sunny, 21°C	
Candidate Significant Wildlife (Herpetofauna) Habitat Survey	June 17 th , 2010 June 18 th , 2010 June 21 st , 2010 June 22 nd , 2010 July 29 th , 2010 July 30 th , 2010 Aug. 2 nd , 2010 Aug. 4 th , 2010	Searches were conducted for potentially suitable sites throughout the entire project location	June 17 th – 10:00am-5:00pm June 18 th – 10:30am-4:30pm June 21 st – 11:00am-5:30pm June 22 nd – 11:00am-5:00pm July 29 th - 12:00pm-6:00pm July 30 th – 10:15am-5:00pm Aug. 2 nd – 11:00am-5:00pm Aug. 4 th – 12:00pm-5:00pm	June 17 th – 7.0 hours June 18 th – 6.0 hours June 21 st – 6.5 hours June 22 nd – 6 hours July 29 th – 6 hours July 30 th – 6.75 hours Aug. 2 nd – 6 hours Aug. 4 th – 5 hours	June 17 th – sunny, light wind, 22°C June 18 th – sunny, clear, 22°C June 21 st – sunny, light wind, 23°C June 22 nd – cloudy, rainy (on and off), 23°C July 29 th – overcast, 22°C July 30 th – sunny, 21°C Aug. 2 nd – mostly cloudy, 26°C Aug. 4 th – cloudy, windy, 27°C	Erin McLachlan and Samantha Lawton
Candidate Significant Wildlife (Insects & Molluscs) Habitat Survey	July 29 th , 2010 July 30 th , 2010	Searches were conducted for potentially	July 29 th - 12:00pm-6:00pm July 30 th – 10:15am-	July 29 th – 6 hours July 30 th – 6.75	July 29 th – overcast, 22°C July 30 th – sunny, 21°C	Erin McLachlan and Samantha Lawton

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Survey Type	Date	Method	Times	Duration	Weather	Field Personnel
	Aug. 2 nd , 2010 Aug. 4 th , 2010	suitable sites throughout the entire project location	5:00pm Aug. 2 nd – 11:00am-5:00pm Aug. 4 th – 12:00pm-5:00pm	hours Aug. 2 nd – 6 hours Aug. 4 th – 5 hours	Aug. 2 nd – mostly cloudy, 26°C Aug. 4 th – cloudy, windy, 27°C	
Valleylands/Seeps and Springs Survey	April 27 th , 2010	Searches were conducted for potentially suitable sites throughout the entire project location	April 27 th – 12:40pm-5:40pm	April 27 th – 5.0 hours	April 27 th – clear, no wind, 10°C	Josephine Gilson and Kelly Sadlier

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 Swamp White Oak (*Quercus bicolor*), Bur Oak (*Quercus macrocarpa*), American Elm (*Ulmus americana*), Black Walnut (*Juglans nigra*), Green Ash (*Fraxinus pennsylvanica*), Basswood (*Tilia americana*), Red Maple (*Acer rubrum*), and to a lesser extent Freeman Maple (*Acer freemanii*), Trembling Aspen (*Populus tremuloides*), Eastern Cottonwood (*Populus deltoides*), Bitternut Hickory (*Carya cordiformis*), Shagbark Hickory (*Carya ovata*), Black Locust (*Robinia pseudoacacia*), American Beech (*Fagus grandifolia*), Red Oak (*Quercus rubra*), Pin Oak (*Quercus palustris*), Hawthorn (*Crataegus* sp.), Common Apple (*Malus* sp.) and Crack Willow (*Salix fragilis*). As well, Manitoba Maple (*Acer negundo*) and several non-native species which were planted within landscapes or were growing 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 no greater than 1.5 m.

Poison Ivy (*Toxicodendron radicans*), both the climbing and groundcover forms, was prevalent in almost all natural communities and dominant in some hedgerows. Also common was Chokecherry (*Prunus virginiana*), Blue Beech (*Carpinus caroliniana*), Ironwood (*Ostrya virginiana*), Raspberry (*Rubus ideaus*), Gray Dogwood (*Cornus racemosa*), Round-leaved Dogwood (*Cornus rugosa*), Staghorn Sumac (*Rhus typhina*), Spicebush (*Lindera benzoin*), and Tartarian Honeysuckle (*Lonicera tartarica*). Less commonly observed was Eastern Red Cedar (*Juniperus virginiana*), Running Strawberry Bush (*Euonymus obovatus*), Virginia Creeper (*Parthenocissus vitacea*), Riverbank Grape (*Vitis riparia*), Shrub Willow (*Salix* sp.) Red-osier Dogwood (*Cornus stolonifera*), and Nannyberry (*Viburnum lentago*) were noted in the open marsh areas and hedgerows.

The groundcover was sparse in forested areas with ephemeral ponding, but better-drained and higher areas almost always contained tall enchanters' nightshade (*Circaea lutetiana*), Jack in the Pulpit (*Arisaema triphyllum*), Bottlebrush Grass (*Elymus hystrix*), 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.

Ecological Land Classification (ELC) communities within 120m of the project location consist of: Cultural Hedgerow (CUH), Mineral Cultural Woodland (CUW1), Deciduous Forest (FOD), Fresh-Moist Oak-Maple Deciduous Forest (FOD9-2), Fresh-Moist Bur Oak Deciduous Forest (FOD9-3), Mineral Shallow Marsh (MAS2), Deciduous Swamp (SWD), and Deciduous Thicket (THD). **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 features, 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: CLO1, CLS1, CLS2, CLT1, CLT2, TAO1, TAO2, TAS1, TAT1, TAT2. None of these communities were present 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. These rare habitats are known to occur in Ecoregion 6E on the Iroquois Plain (OMNR 2000 pg 42). According to the Draft Ecoregion Criteria Schedule (OMNR 2011), candidate sand barren communities can include ELC ecosites such as: SBO1, SBS1, SBT1 with tree cover $\leq 60\%$. None of these communities were present 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 (SWHTG 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 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. 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. None of these communities were present within 120 metres of the project location.

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 can include ELC ecosites, such as: TPS1, TPS2 with 25%<tree cover<35% or TPW1, TPW2 with 35%<tree cover<60%. None of these communities were present 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 are 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). A list of vegetation communities ranked as S1, S2 and S3 is available through the Natural Heritage Information Center (NHIC) database. No rare vegetation communities were identified within 120 metres of the project location during the records review or site investigations.

2.2 Results of Confirmation of Natural Features Identified During Records Review

Wetlands

There are two wetland complexes within 120 metres of the project location: Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (Northwest) Wetland) and HAF Windfarm Wetland Unit. See Figure 2.

Lower Twenty Mile Creek Wetland Complex 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).

HAF Windfarm Wetland Unit was identified during Site Investigations. This wetland complex will be evaluated for significance in the Evaluation of Significance report.

Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (Northwest) Wetland)

Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (Northwest) Wetland) is a 1907.1-hectare provincially significant wetland complex with 88% swamp and 12% marsh communities. The wetland provides habitat for birds, amphibians and fish. The boundaries of this wetland have been revised to include the adjacent FOD9-2 polygon.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Lower Twenty Mile Creek Wetland Complex	1907.10 ha	Provincially Significant	-wetland dominated by swamp (88%) and marsh (12%)	-MAS -dominated by swamp white oak, green ash and white elm	-provides habitat for birds, amphibians and fish -contains federal, provincial and locally significant species -historically active feeding area for American Bullfrogs and Great Blue Heron	3-5 metres from Access Road to Turbine 1 and 2	Yes

HAF Windfarm Wetland Unit

This 0.419-hectare wetland complex is connected to Lower Twenty Mile Creek Wetland Complex. It is composed of 2 mineral shallow marsh communities and may provide marginal wildlife habitat. It will be evaluated for significance in the Evaluation of Significance Report.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
HAF Windfarm Wetland Unit	0.419 ha	Unknown	-wetland dominated by marsh species	MAS2 -mineral shallow marsh -dominated by reed canary grass	-minimal wetland area -marginal wildlife habitat -conveys water downstream	0 meters Access road and underground collector line will intersect this feature	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
 - 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 two areas that meet the definition of woodland within 120 metres of the project location: Mill Creek-Inverary Woods and Twenty Mile Creek Woodland. See Figure 3. These woodlands were identified during Records Review and confirmed during Site Investigations. These woodlands will be evaluated in the Evaluation of Significance report.

Mill Creek-Inverary Woods

This 4.97-hectare significant woodland is a fresh-moist oak maple deciduous forest dominated by pin oak, swamp white oak and trembling aspen in the canopy, swamp white oak and willow in the sub-canopy and moist-fresh silty clay soil.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Mill Creek-Inverary Woods	4.97 ha	Significant	-dominated by deciduous trees with Mill Creek flowing through woodland	FOD9-2 -fresh-moist oak maple deciduous forest	-large mature forest -regionally rare plant species	25.4metres from Underground Collector Line	Yes

Twenty Mile Creek Woodland

This 2.49-hectare significant woodland is a fresh-moist bur oak deciduous forest dominated by white elm, bur oak and red ash in the canopy, blue beech, white ash and red ash in the sub-canopy, sensitive fern and fowl manna grass in the understory and jack in the pulpit in the groundcover.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Twenty Mile Creek Woodland	2.49 ha	Significant	-dominated by deciduous trees with 20 Mile Creek flowing through woodland	FOD9-3 -fresh-moist bur oak deciduous forest	-large mature forest -regionally rare plant species	7 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:

- The unknown marsh communities (MAX) within Lower Twenty Mile Creek Wetland were identified as Mineral Shallow Marsh (MAS2) and an additional Deciduous Swamp (SWD) community was observed; of note is that the Mineral Meadow Marsh within the Lower Twenty Mile Creek Wetland had been ploughed and attempts to grow crops within the wetland had been made without great success – the wetter areas remained crop-free and emergent grassy wetland species persisted;
- The community identified as unknown Swamp community with Deciduous Forest inclusions (SWX/FOD) near Turbine 4 was corrected to Fresh-Moist Oak-Maple Deciduous Forest (FOD9-2);

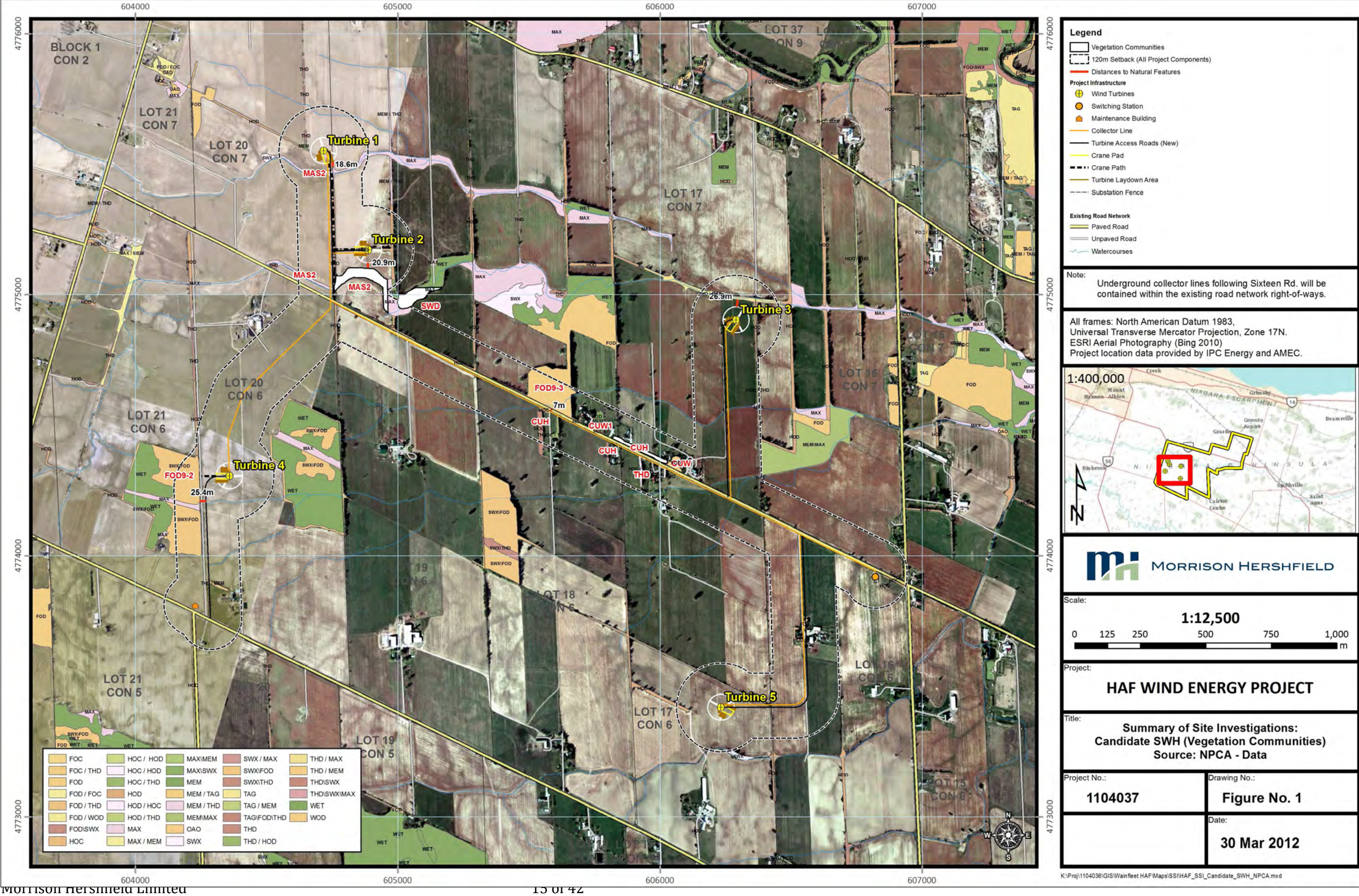
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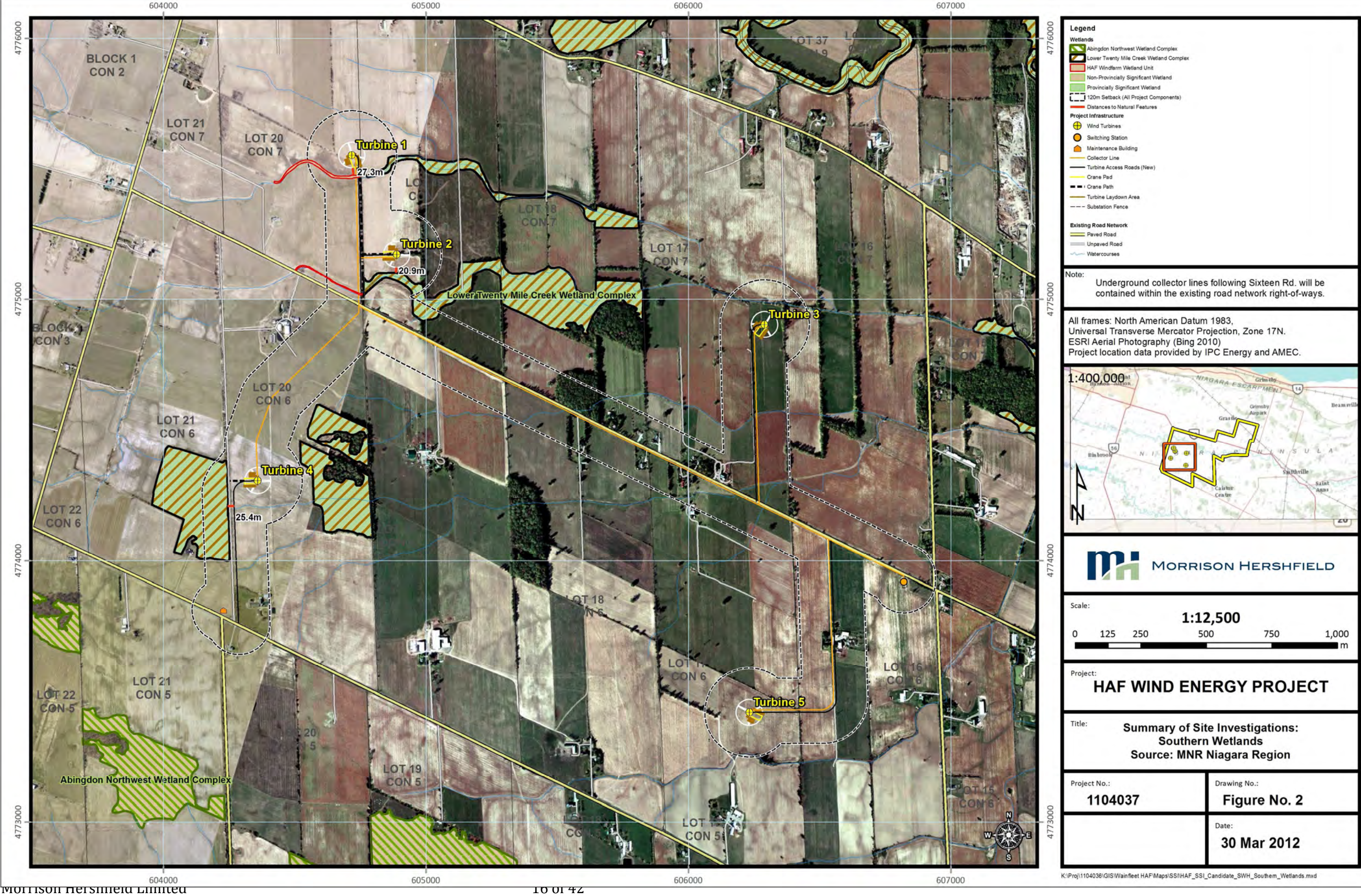
- 2 Coniferous Hedgerows (HOC) near Turbine 3 were corrected to Cultural Hedgerow (CUH);
- 1 Coniferous/Deciduous Hedgerow (HOC/HOD) near Turbine 3 was corrected to Deciduous Thicket (THD);
- The large Deciduous Forest (FOD) near Turbine 3 was corrected to Fresh-Moist Bur Oak Deciduous Forest (FOD9-3);
- The small Deciduous Forest (FOD) near Turbine 3 was corrected to Cultural Woodland (CUW);
- A small Mixed Meadow (MEM) community near Turbine 3 was corrected to Mineral Cultural Woodland (CUW1);
- 1 additional community was noted: 1 Cultural Hedgerow (CUH) community near Turbine 3.

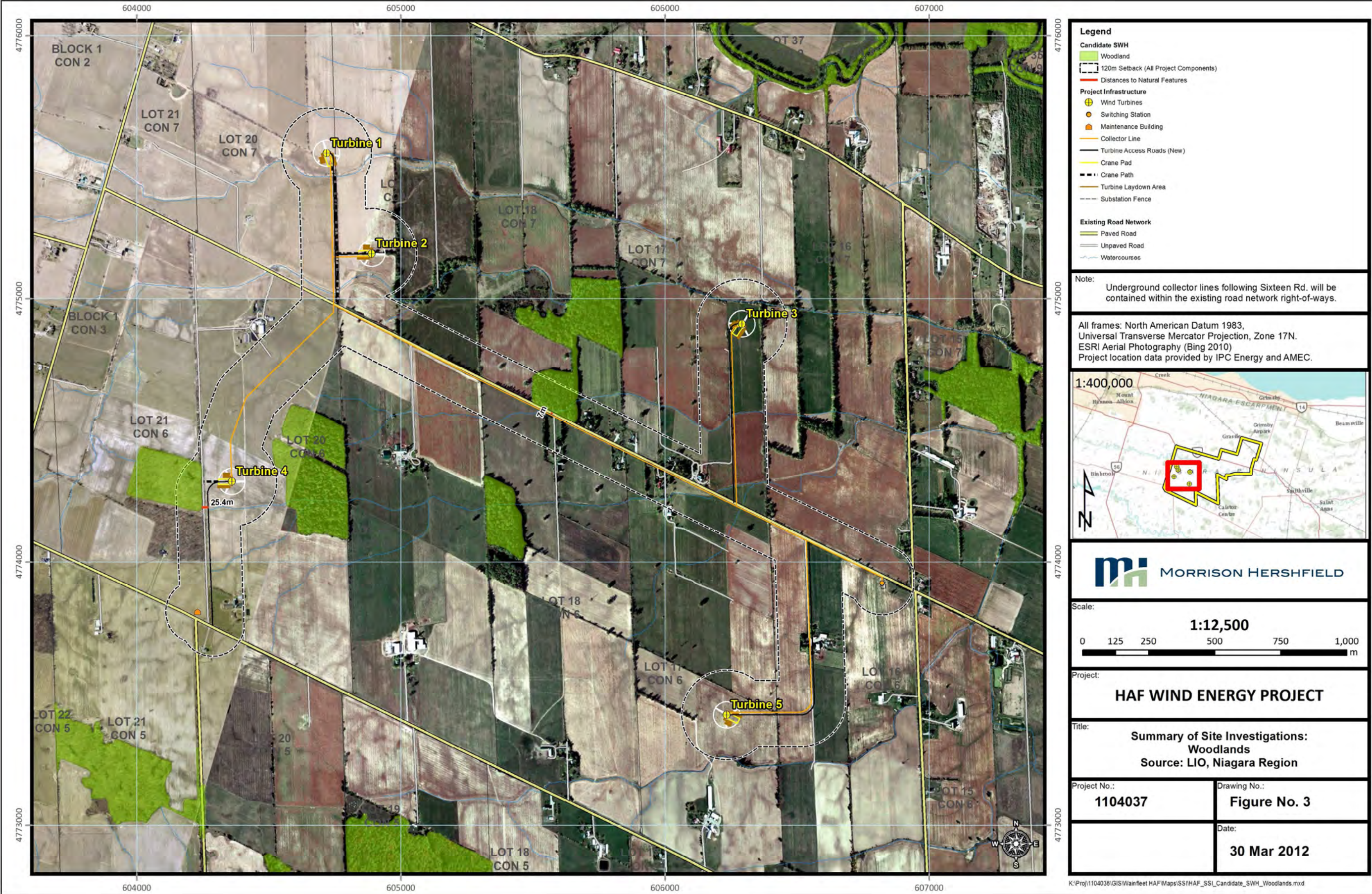
Changes to the ELC data received from Niagara Peninsula Conservation Authority during Records Review are shown as white polygons with red text. **See Figure 1.**

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 Woodland	CUW1	Tree cover is ≥35% and ≤60%. The community is resulting from or maintained by cultural or anthropogenic-based disturbances. 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.
Fresh-Moist Oak-Maple Deciduous Forest	FOD9-2	Tree cover is ≥ 60%. Deciduous tree cover is ≥ 75% of canopy. Dominated by white oak, bur oak, red oak, and sugar maple, and to a lesser extent basswood, shagbark hickory, American elm, American beech, and ash. Has greater proportion of wetland species (Swamp Fern, Sensitive Fern, Wild Blue Flag).
Fresh-Moist Bur Oak Deciduous Forest	FOD9-3	Tree cover is ≥ 60%. Deciduous tree cover is ≥ 75% of canopy. Dominated by white oak, bur oak, and red maple. Also, shagbark hickory, black walnut, green ash, black ash, American elm, trembling aspen, beech and bitternut hickory in variable mixtures, and occasional white pine. Represents the forest swamp interface.
Mineral Shallow Marsh	MAS2	Grasses, sedges and rushes usually dominant. Hydrophytic emergent macrophyte cover ≥25%. Variable flooding regimes, with water depth <2 m.
Deciduous Swamp	SWD	Tree cover is >25%. >5 m in height. Dominated by hydrophytic vegetation. Deciduous tree cover is ≥75% of canopy. Mix of freeman maple, white elm, black and red oak, white oak, bur oak, sugar maple, red maple. Also, basswood, and bitternut hickory in variable mixtures. Variable flooding regimes. Water depth <2m. Standing water or vernal pooling >20% ground coverage.
Deciduous Thicket	THD	Tree and shrub cover is >50%. 1<5 m in height. Typically a result of surrounding anthropogenic disturbance, and from removal of the mature canopy.







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 pg 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, SD01, 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 wintering areas are defined as sites that are greater than 20 hectares with a combination

forest (FOC, FOD, FOM) and upland (CUM, CUT, CUS, CUW) communities. There were no suitable sites within 120 metres of the project location.

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, Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (Northwest) 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 July 29th, August 2nd, 4th, and 6th, 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 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) greater than 5 hectares in size within 5 km of Lake Ontario or Lake Erie. There were no suitable sites within 120 metres of the project location.

Bald Eagle Winter Feeding and Roosting Areas

According to Appendix Q of the SWHTG and the Draft 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.

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 Draft 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 Draft 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 the project location.

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 including: large (greater than 10 hectares) grassland areas, including natural and cultural fields (CUM1); are not being 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 Draft 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. There were no suitable sites within 120 metres of the project location.

Woodland Raptor Nesting Habitat (Generalized Candidate Significant Wildlife Habitat)

According to the Draft Ecoregion Criteria Schedule (OMNR 2011), candidate 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 (Mill-Creek Inverary Woods and Twenty Mile Creek Woodland) were identified within 120 metres of the project location. See Figure 4. Generalized candidate significant wildlife habitat will be treated as significant and discussed in the EIS.

Woodland raptor nesting habitat is also discussed in the Significant Wildlife Habitat Technical Guide (OMNR, 2000).

Candidate Woodland Raptor Nesting Habitat #1 (Mill Creek-Inverary Woods)

This 4.97- hectare mature forest 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 (Mill Creek-Inverary Woods)	4.97 ha	Unknown	-dominated by deciduous trees with Mill Creek flowing through woodland	FOD9-2 -fresh-moist oak maple deciduous forest	-mature forest provides woodland nesting areas for raptors	25.4 metres from Underground Collector Line	No – Is being considered as part of the candidate generalized significant wildlife habitat area identified on figure 8.

Candidate Woodland Raptor Nesting Habitat #2 (Twenty Mile Creek Woodland)

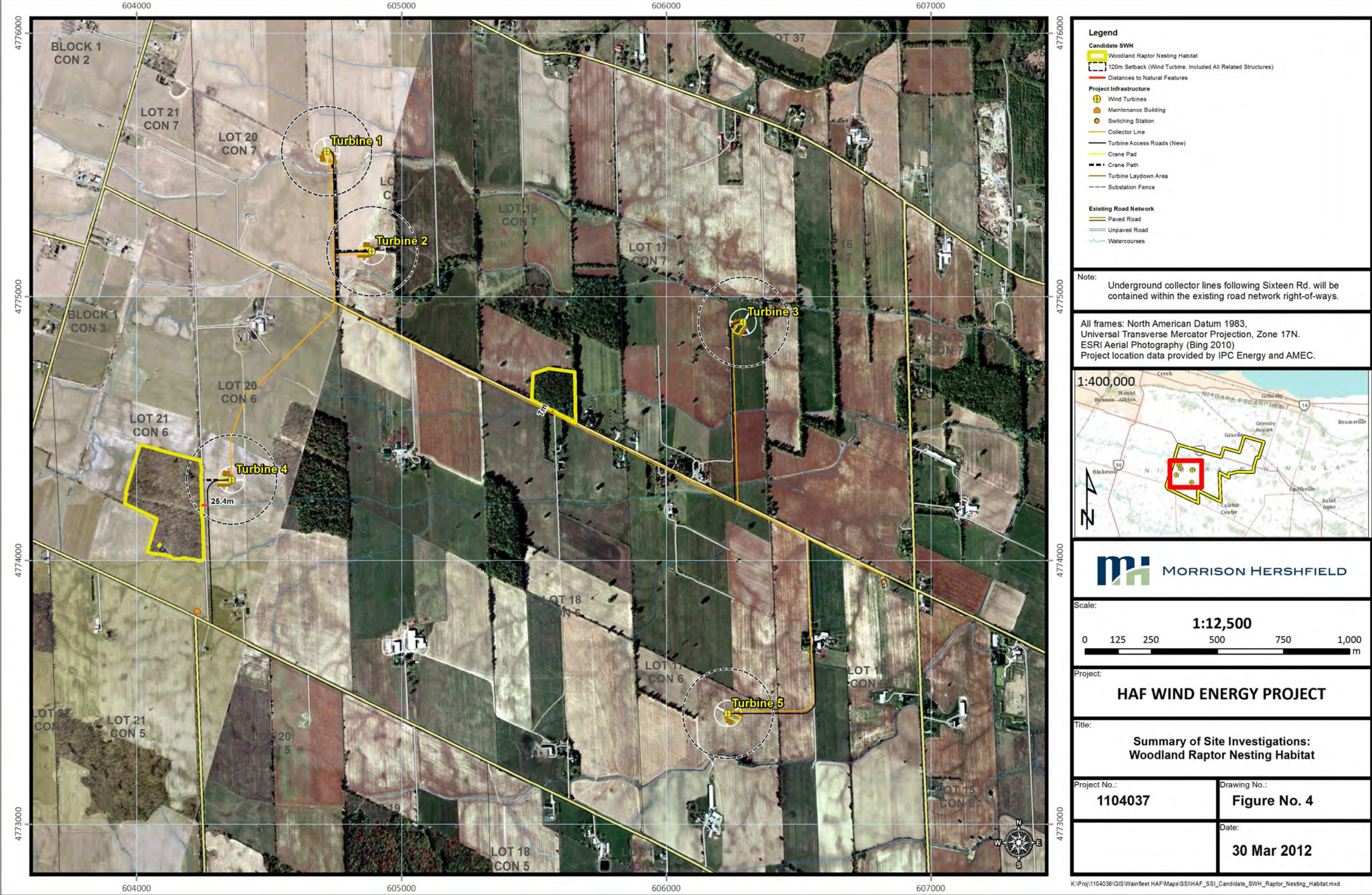
This 2.49- hectare forest may provide nesting habitat for woodland raptors. No stick nests were observed during site investigations.

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 (Twenty Mile Creek Woodland)	2.49 ha	Unknown	-dominated by deciduous trees with 20 Mile Creek flowing through woodland	FOD9-3 -fresh-moist bur oak deciduous forest	-large forest for protection -mature forest provides woodland nesting areas for raptors	7 metres from Underground Collector Line	No – Is being considered as part of the candidate generalized significant wildlife habitat area identified on figure 8.

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 Draft Ecoregion Criteria Schedule (OMNR 2011), candidate Woodland area sensitive breeding bird habitat is large (greater than 10 hectares) of mature forest stands (including ELC ecosites such as: FOC, FOM, FOD, SWC, SWM, and SWD) within an interior forest at least 100m from the edge. There were no suitable sites within 120 metres of the project location.



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 can include these ELC 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 (OMNR 2011), 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 Mill Creek-Inverary Woods was identified as a candidate site. **See Figure 5.** It will be evaluated in the Evaluation of Significance Report.

Candidate Bat Maternity Colony (Mill Creek-Inverary Woods)

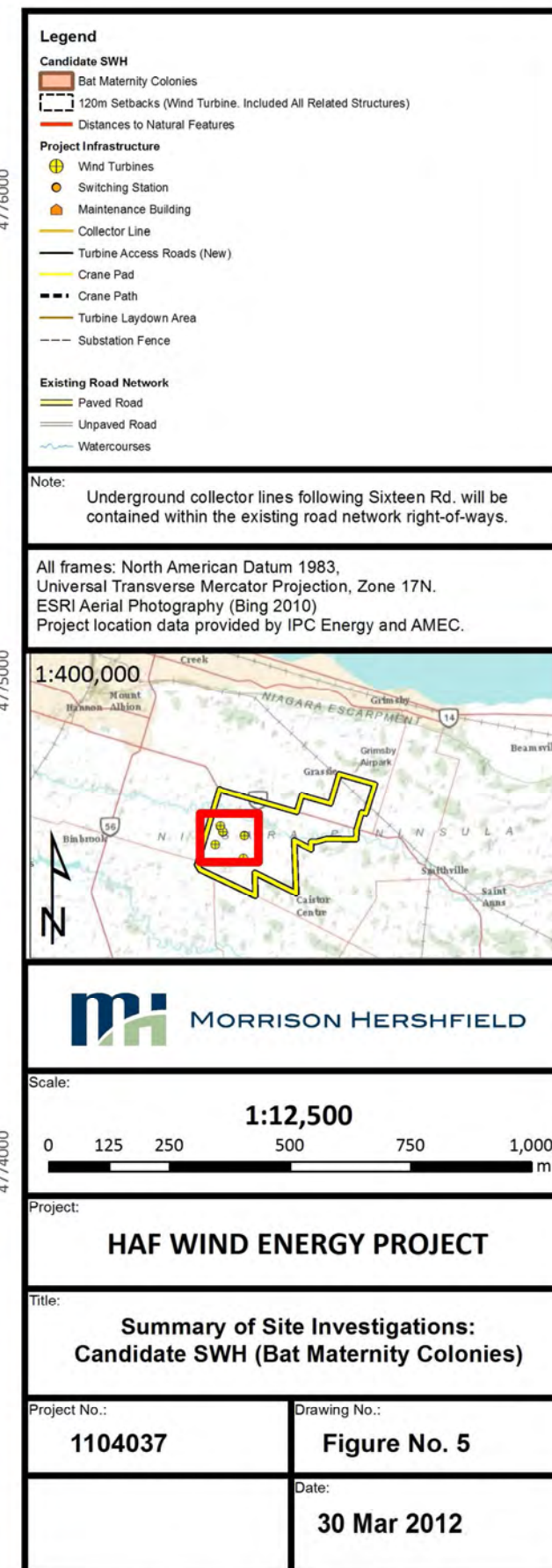
This 4.97-hectare deciduous forest has abundant snags and cavity trees that make it suitable for a bat maternity colony site. The candidate site was investigated for bat activity (i.e. bat droppings below a hole, smell of ammonia near a hole, grease marks, urine stains or actual bats) during the day and at dusk (9:00pm) and bat activity was observed.

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 (Mill Creek-Inverary Woods)	4.97 ha	Unknown	-dominated by deciduous trees with Mill Creek flowing through woodland	FOD9-2 -fresh-moist oak maple deciduous forest	-large forest for protection - abundance of snag and cavity trees suitable for bat maternity colony sites	65.4 metres from Turbine 4	No – assumed significant and carried forward to EIS (Pre-construction monitoring will be outlined in the EIS.)

Deer Winter Congregation Areas

Deer winter congregation areas in the Niagara/Hamilton/Haldiman regions are woodlands that are greater than 100 hectares and are habitually used by deer during winter

conditions (personal communication, Anne Yagi, OMNR, 2011). There were no suitable sites within 120 metres of the project location.



2.8 Results of Candidate Significant Wildlife (Herpetofauna) Habitat Survey

Turtle Wintering Areas

According to the 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 Ecoregion Criteria Schedule (OMNR 2011), candidate snake hibernaculum include areas such as 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 other 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 other 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.

Amphibian Breeding Habitat (woodland + wetland)

According to the draft 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 such as ELC ecosites FOC, FOM, FOD, SWC, SWM, or SWD.

Appendix Q of the SWHTG contains criteria for identifying candidate amphibian breeding habitats including: degree of permanence of pools/ponds; size and number of ponds; diversity of submergent and emergent vegetation; presence of shrubs, logs/woody debris

at edge of pond(s); degree of forest canopy closure; and, presence of predatory fish (OMNR 2000). There were no suitable sites within 120 metres of the project location.

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

Amphibian Movement Corridors

According to the draft 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 (OMNR, 2011). These habitats are dependant on the presence of breeding and summer habitats, and no candidate amphibian breeding habitats were identified, as noted above. There were no suitable sites within 120 metres of the project location.

Turtle Nesting Habitat

According to the draft Ecoregion Criteria Schedule (OMNR 2011), candidate turtle nesting areas are within MAM1-MAM6, SAS1, SAF1, SAM1, BOO1, FE01 communities with sand or gravel adjacent to a marsh, lake or river. There were no suitable sites within 120 metres of the project location.

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. As the project is not within 5km of the shoreline 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). Breeding and feeding habitats for monarch include large 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.

Terrestrial Crayfish (Candidate Significant Wildlife Habitat)

During Site Investigations, 2 candidate sites (MAS2) were identified within 120 metres of the project location. See Figure 6. This feature will be treated as significant and discussed in the EIS. A pre-construction monitoring plan will be outlined in the EIS.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Candidate Terrestrial Crayfish Habitat	4.76 ha	Unknown	-wetland dominated by marsh species	MAS2 -mineral shallow marsh -dominated by reed canary grass	- suitable conditions for terrestrial crayfish habitat	0 meters Access road and underground collector line will intersect this feature	No – assumed significant and carried forward to EIS (Pre-construction monitoring will be outlined in the EIS.).

2.10 Results of Valleylands/Seeps and Springs Survey

Five valleylands (all associated with Twenty Mile Creek) were identified within 120 metres of the project location during Site Investigations. **See Figure 7.** These valleylands will be evaluated for significance in the Evaluation of Significance report.

Valleyland #1 (Twenty Mile Creek)

This 2.55-hectare valleyland is a permanent channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Twenty Mile Creek. 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)
Valleyland #1 (Twenty Mile Creek)	2.55	Unknown	-permanent watercourse flowing through lands dominated by agriculture, grasses and riparian vegetation; channelized by agricultural practices (highly disturbed)	-warm water, moderate to high sensitivity watercourse; potential presence of sensitive species at certain times of year	-landform depression that has flowing water contributing to downstream flows	0 metres Underground Collector Line and Access Road to Turbine 1 will intersect this feature	Yes

Valleyland #2 (Tributary of Twenty Mile Creek)

This 3.88-hectare valleyland is a permanent channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Twenty Mile Creek. 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)
Valleyland #2 (Tributary of Twenty Mile Creek)	3.88	Unknown	-permanent watercourse flowing through lands dominated by agriculture; channelized by agricultural practices (highly disturbed)	-warm water, moderate to high sensitivity watercourse; potential presence of sensitive species at certain times of year	-landform depression that has flowing water contributing to downstream flows -	0 metres Underground Collector Line and Access Road to Turbine 1 and 2 will intersect this feature	Yes

Valleyland #3 (Tributary of Twenty Mile Creek)

This 1.2-hectare valleyland is a permanent channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Twenty Mile Creek. 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)
Valleyland 3 (Tributary of Twenty Mile Creek)	1.2 ha	Unknown	-permanent watercourse flowing through lands dominated by agriculture, grasses and riparian vegetation; channelized by agricultural practices (highly disturbed)	-warm water, moderate to high sensitivity watercourse; potential presence of sensitive species at certain times of year	-landform depression that has flowing water contributing to downstream flows -	0 metres Underground Collector Line and Access Road to Turbine 3 will intersect this feature	Yes

Valleyland #4 (Tributary of Twenty Mile Creek)

This 2.6-hectare valleyland is an intermittent channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Twenty Mile Creek. 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)
Valleyland #4 (Tributary of Twenty Mile Creek)	2.6 ha	Unknown	-intermittent watercourse flowing through lands dominated by agriculture; channelized by agricultural practices (highly disturbed)	-warm water, moderate to high sensitivity watercourse; potential presence of sensitive species at certain times of year	-landform depression that has flowing water contributing to downstream flows -	0 metres Underground Collector Line and Access Road to Turbine 3 and 4 will intersect this feature	Yes

Valleyland #5 (Tributary of Twenty Mile Creek)

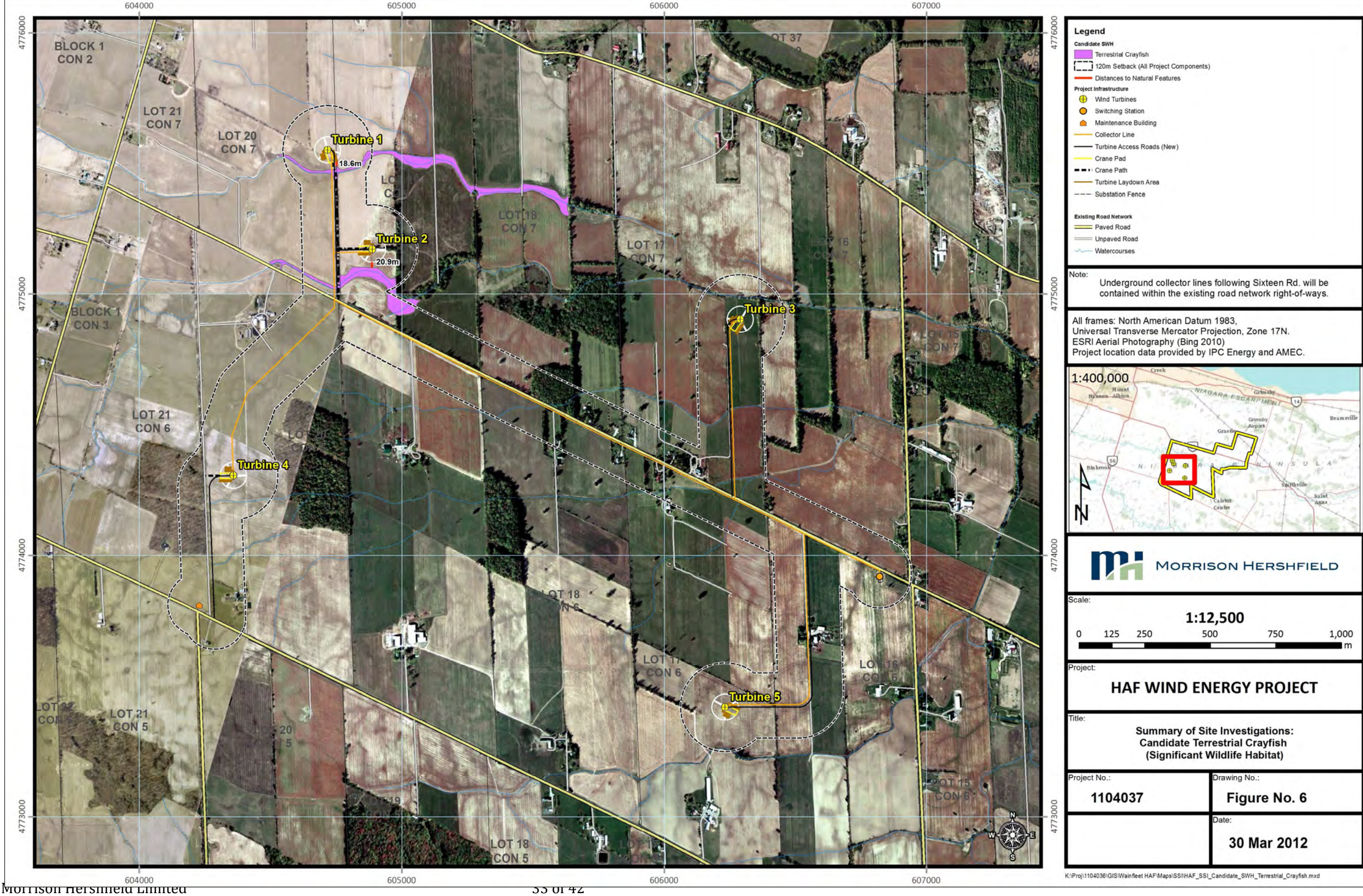
This 1.2-hectare valleyland is an intermittent channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Twenty Mile Creek. There is potential for this watercourse to provide habitat for sensitive species during certain times of the year.

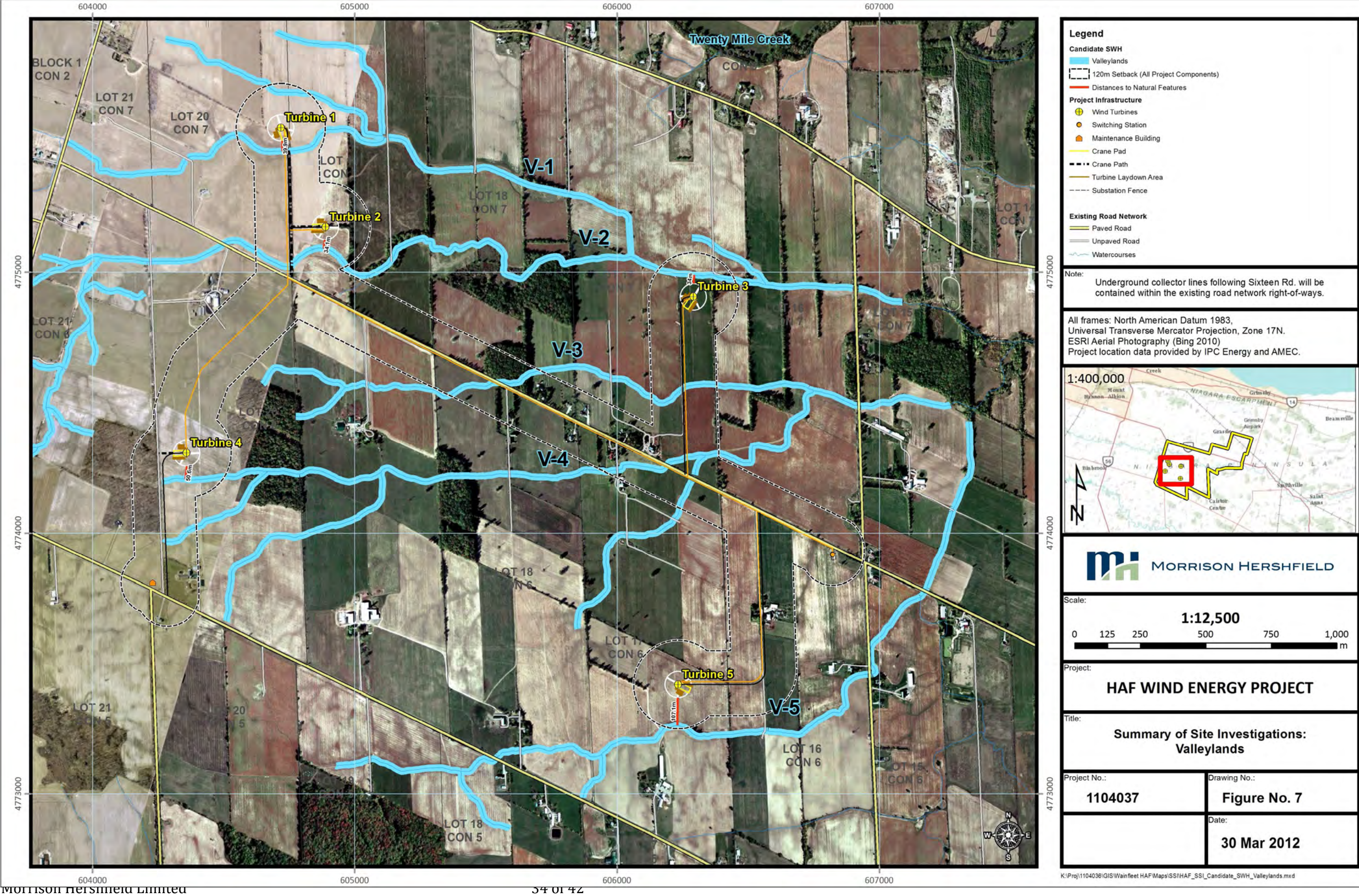
Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions	Minimum distance between feature & project location	Carried forward to EOS (y/n)
Valleyland #5 (Tributary of Twenty Mile Creek)	2.3 ha	Unknown	-intermittent watercourse flowing through lands dominated by agriculture, grasses and riparian vegetation; channelized by agricultural practices	-warm water, moderate to high sensitivity watercourse; potential presence of sensitive species at certain times of year	-landform depression that has flowing water contributing to downstream flows -	107 metres from Access Road to Turbine 5	Yes

			(highly disturbed)				
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Seeps and Springs

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.





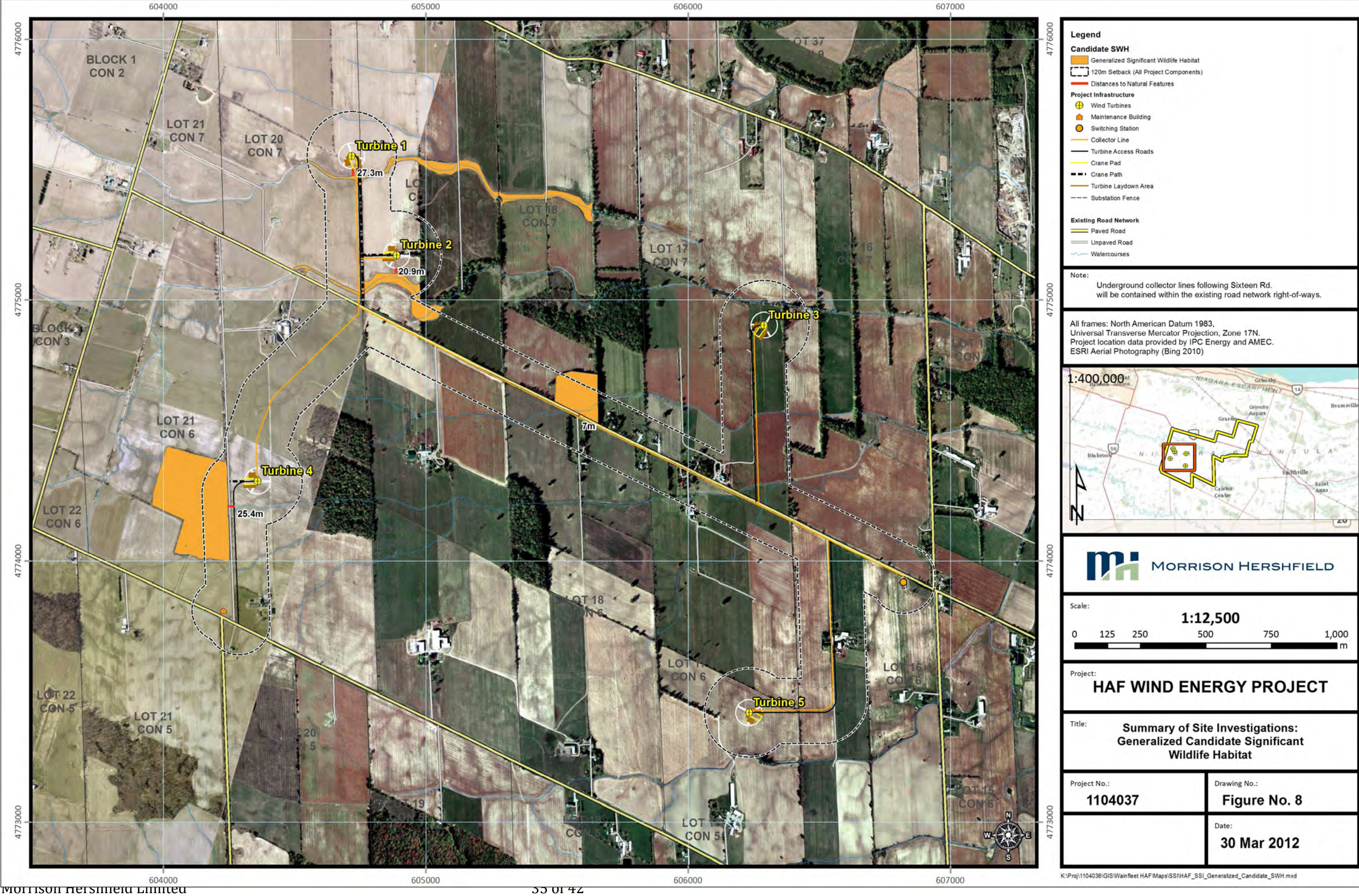


Table 3. Summary of Natural Features within the Project Location

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 (Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (northwest) Wetland)) was identified during Records Review (Source: MNR, Niagara Region)	Confirmed & Boundary Adjusted (Lower Twenty Mile Creek Wetland Complex) Identified – 2 wetland communities were identified during Site Investigations. (HAF Windfarm Wetland Unit)	Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (northwest) Wetland) is being treated as provincially significant. It will be discussed in the EIS. HAF Windfarm Wetland Unit will be evaluated for significance. They will be discussed in the Evaluation of Significance Report.
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 – 5 valleylands were identified during Site Investigations.	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?
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 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.)	Yes - 2 woodlands (Twenty Mile Creek Woodland and Mill Creek-Inverary Woods) were identified during Records Review (Source: LIO, NHIC, Niagara Region).	Confirmed.	These features will be evaluated for significance. They will be discussed in the Evaluation of Significance Report.
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	No	N/A
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 – 1 Candidate Bat Maternity Colony (Mill Creek-Inverary Woods) was identified during Site Investigations	This feature will be treated as significant. A pre-construction monitoring plan will be outlined 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?
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 (Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (Northwest) Wetland)). (Source: NHIC)	No. 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	No	N/A
Deer Winter Congregation Area	In the Niagara/ Hamilton/Haldimand regions all woodlands > 100 ha are habitually used by deer during winter conditions (personal communication, Anne Yagi, MNR)	No	No	N/A
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				

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?
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.)	No	No	N/A
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	No	N/A
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	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?
	2011.)			
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, 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	No	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	No	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	No	N/A
Special Concern & S1-S3 Species and Communities: Monarch	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	Yes- this species was identified during Records Review in MNR’s list of potential S1-S3 species in the area	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?
Butterfly	other open spaces where these plants grow. (Environment Canada 2011).			
Terrestrial Crayfish	Meadow Marshes and edges of shallow marshes (MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS, MAS2, MAS3) (Ontario Ministry of Natural Resources 2011.)	No	Identified – 2 Candidate sites (MAS2) were identified during Site Investigations	These features will be treated as significant. A pre-construction monitoring plan will be outlined in the EIS.
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	No	N/A
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 (Twenty Mile Creek Woodland and Mill Creek-Inverary Woods) 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	No	N/A

References

- Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: January 23, 2011).
- Bat Conservation Trust 2007. Bat Surveys: Good Practice Guidelines. Bat Conservation Trust, London.
- COSEWIC 2010. COSEWIC assessment and update status report on the Monarch *Danaus plexippus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii + 43pp. (www.sararegistry.gc.ca/status/status_e.cfm)
- COSEWIC 2009. COSEWIC assessment and update status report on the Whip-poor-will *Caprimulgus vociferous* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii + 28pp. (www.sararegistry.gc.ca/status/status_e.cfm)
- COSEWIC 2008. COSEWIC status report on the Snapping Turtle *Chelydra serpentina* in Canada. Committee on the Status of endangered Wildlife in Canada. Ottawa.vii +37pp.
- COSEWIC 2007. COSEWIC assessment and update status report on the Red-headed Woodpecker *Melanerpes erthrocephalus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vi + 27 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
- COSEWIC 2005. COSEWIC assessment and update status report on the Blanding's Turtle *Emydoidea blandingii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. viii + 40 pp.
- COSEWIC 2002. COSEWIC assessment and status report on the milksnake *Lampropeltis triangulum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 29 pp.
- COSEWIC 2000. COSEWIC assessment and update status report on the Hooded Warbler *Wilsonia citrina* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii + 11pp. (www.sararegistry.gc.ca/status/status_e.cfm)
- Dobbyn, J.S. 1966. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists
- 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.
- Environment Canada. 2011. Species at Risk Public Registry. http://www.sararegistry.gc.ca/default_e.cfm
- Niagara Peninsula Conservation Authority. 2009. Natural Areas Inventory 2006-2009. [http://www.npca.ca/water-management/water-planning/documents/natural-inventory-areas-report/0.1%20NAI-Volume%201%20\(Sections%20120to%208\)-title%220page-partners-abstr.pdf](http://www.npca.ca/water-management/water-planning/documents/natural-inventory-areas-report/0.1%20NAI-Volume%201%20(Sections%20120to%208)-title%220page-partners-abstr.pdf)

Natural Heritage Assessment Report

- Ontario Ministry of the Environment. 2011. Ontario Regulation 359/09 Renewable Energy Approvals Under Part V.1 of the Act O. Reg 359/09 Consolidation Period: From January 1, 2011 to September 2, 2011. Queens Printer for Ontario.
- Ontario Ministry of Natural Resources. 2011. Significant Wildlife Habitat Ecoregion Criteria Schedules: Addendum to Significant Wildlife Habitat Technical Guide.
- Ontario Ministry of Natural Resources. 2011a. Bats and Bat Habitats: Guidelines for Wind Power Projects (Draft).
- Ontario Ministry of Natural Resources. 2011b. Natural Heritage Assessment Guide for Renewable Energy Projects.
- Ontario Ministry of Natural Resources. 2010. Birds and Bird Habitats: Guidelines for Wind Power Projects.
- Ontario Ministry of Natural Resources. 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.
- Ontario Ministry of Natural Resources. 2008. Species at Risk in Ontario List. http://www.mnr.gov.on.ca/STEL02_163859.pdf
- Ontario Ministry of Natural Resources. 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
- Ontario Ministry of Natural Resources. 2000. Significant Wildlife Habitat Technical Guide. Fish and Wildlife Branch, Wildlife Section, Science Development and Transfer Branch, Southcentral Sciences, Peterborough. Queens Printer for Ontario. 139 pp + appendices. <http://www.mnr.gov.on.ca/mnr/pubs/wildlife/swhtg.html>
- Ontario Ministry of Natural Resources. 2000b. Decision Support System for the Significant Wildlife Habitat Technical Guide.
- Ontario Partners in Flight. 2008. Ontario Landbird Conservation Plan: Boreal Softwood Shield, North American Bird Conservation Region 8. Ontario Ministry of Natural Resources, Bird Studies Canada, Environment Canada. Draft Version 2.0.
- Township of West Lincoln. 2010. Township of Wainfleet Official Plan. <http://www.westlincoln.ca/departments/official-plan>

APPENDIX A

Field Notes

IPC Turbine Number & Location:	Environmental Feature	Dist.(m) to Turbine	GPS Co-ord of Feature
HAF #2	Groundwater Evidence (120m)		
Date: April 27 /10	<input type="checkbox"/> Watercress		
Time: 10:55 AM	<input type="checkbox"/> Iron Staining		
GPS Co-ordinates:	<input type="checkbox"/> Seepage		
Comments:	<input checked="" type="checkbox"/> Forest Stand (30m) (1)		17T 0604832 4775076
	✓ #3	77m	17T 0604864 4775179
	<input checked="" type="checkbox"/> Waterway (30m)	170m	
Radius of Detailed Site Survey: <input type="checkbox"/> 200m <input type="checkbox"/> 300m <input type="checkbox"/> 350m			
Detailed Map of Environmental Features:			
<p>Map details: Sod Farm, Tree line #1, Tree line #3, Tree line #5, Ponded Area #2, Waterway, GPS points, distances (38m, 170m, 220m), compass rose, deer + raccoon tracks.</p>			

Moving → North (in sod farm)
North East (into corn field)

IPC Turbine Number & Location:	Environmental Feature	Dist.(m) to Turbine	GPS Co-ord of Feature
HAF/W. Lincoln #3	Groundwater Evidence (120m)		
Date: April 28 /10	<input type="checkbox"/> Watercress		
Time: 9:00 AM	<input type="checkbox"/> Iron Staining		
GPS Co-ordinates:	<input type="checkbox"/> Seepage		
	<input type="checkbox"/> Forest Stand (30m)		
Comments: Accessed from 116 Rd. (property agreement) ① - turbine location is in on a ridge in the marked area or to the west. #1 - Waterway is flowing grasses in the channel Wetted Width - 3m channel width - 30cm Depth ~ 10cm -trees/shrubs only on S. side of ch. Forest stand to the west ~ 550-600m from turbine #2 - Sparse tree line to east of turbine loc'n. - 60m 17T 0606359 4774909	<input checked="" type="checkbox"/> Waterway (30m)	85m	17T 0606236 4774994
	Radius of Detailed Site Survey: <input type="checkbox"/> 200m <input type="checkbox"/> 300m <input type="checkbox"/> 350m		
	Detailed Map of Environmental Fetures:		

IPC Turbine Number & Location:

HAF - #4

Date: April 2, 2010

Time: 12:40

GPS Co-ordinates:

Comments:

①/② forest stand - large + significant
 (deer paths / raccoons)

① 40m from proposed turbine - 17T 06042611
 4774283

③ gas line - petroleum pipeline
 103m 17T 0604252 4774175

② 17 0604563 47741215
 270m from proposed turbine

- no hydrocarbons / no drainage features

Recommendations - some species from hydro
 more with south, east &

needs to move east cause too close
 to ① forest stand

- Distance (with hydro)

Environmental Feature

Groundwater Evidence (120m)

☐ Watercress

☐ Iron Staining

☐ Seepage

☐ Forest Stand (30m)

☐ Waterway (30m)

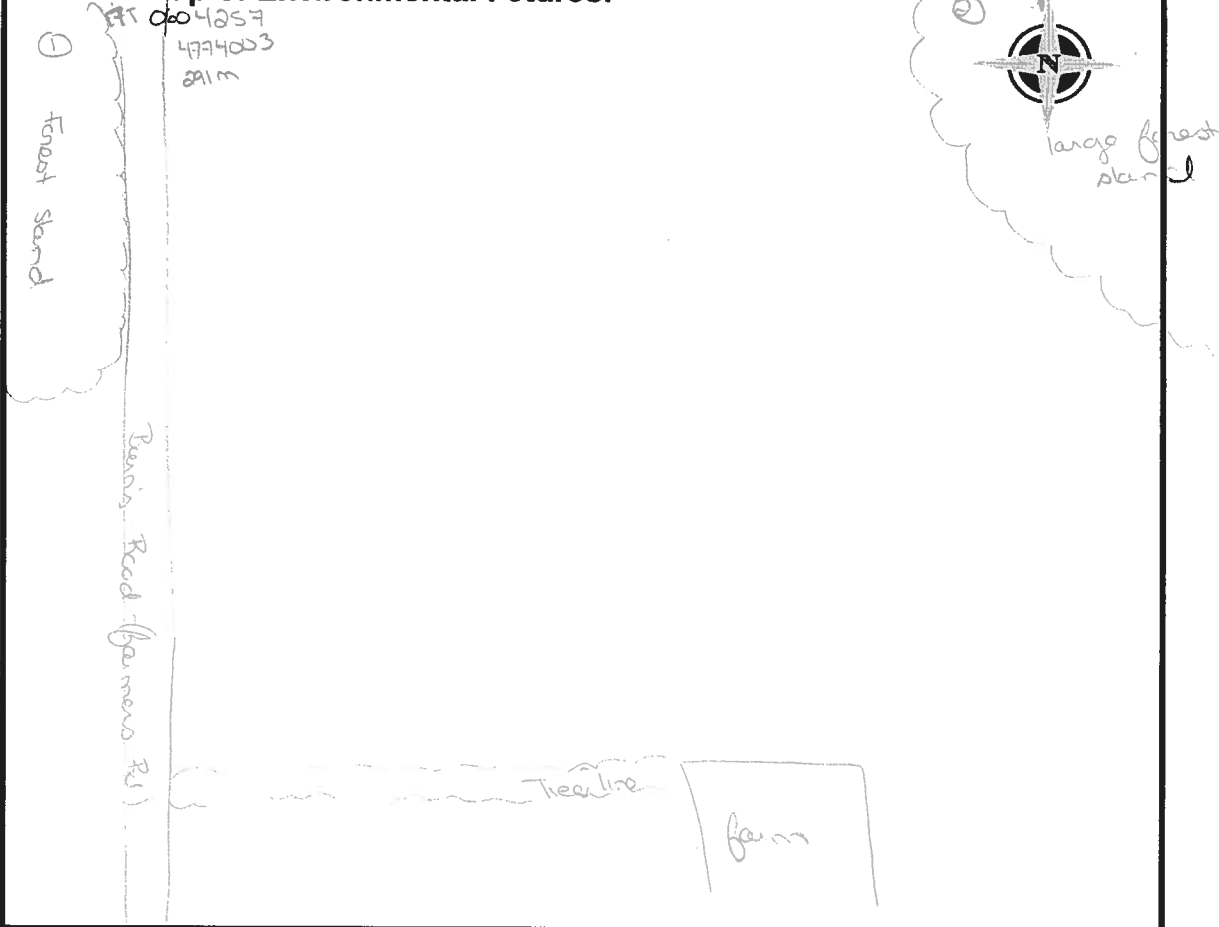
Radius of Detailed Site Survey:

☐ 200m

☐ 300m

☐ 350m

Detailed Map of Environmental Features:



IPC Turbine Number & Location:	Environmental Feature	Dist.(m) to Turbine	GPS Co-ord of Feature
#5 HAF/W LINCOLN	Groundwater Evidence (120m)		
Date: April 27 2012	<input type="checkbox"/> Watercress		
Time: 11:39	<input type="checkbox"/> Iron Staining		
GPS Co-ordinates:	<input type="checkbox"/> Seepage		
Comments:	<input type="checkbox"/> Forest Stand (30m)		
	<input type="checkbox"/> Waterway (30m)		
Radius of Detailed Site Survey:		<input type="checkbox"/> 200m	<input type="checkbox"/> 300m
Detailed Map of Environmental Features:			
<p>① - communication tower on a hill (temp) 274m from proposed site 17T 0606014 4773101</p> <p>② - drainage feature → 229m (no connector no flow - turbid)</p> <p>③ - tree line 215m → not sign. for less</p> <p>- no watercress -</p> <p>- south/east - tree line a stagnant</p> <p>④ drainage channel with 58m of proposed turbine site 17T 0606292 4773226</p> <p>⑤ tree line 192m 17T 0606119 4773237</p> <p>Recommend → north-east from tree line ④ or north west</p> <p>⑥ farm lane (chicken approx 130m away)</p> <p>- no problem appears for access Roads - may use farmers path</p> <p>⑦ test tower</p> <p>⑧ farm</p> <p>⑨</p> <p>⑩</p> <p>⑪</p> <p>⑫</p> <p>⑬</p> <p>⑭</p> <p>⑮</p> <p>⑯</p> <p>⑰</p> <p>⑱</p> <p>⑲</p> <p>⑳</p> <p>㉑</p> <p>㉒</p> <p>㉓</p> <p>㉔</p> <p>㉕</p> <p>㉖</p> <p>㉗</p> <p>㉘</p> <p>㉙</p> <p>㉚</p> <p>㉛</p> <p>㉜</p> <p>㉝</p> <p>㉞</p> <p>㉟</p> <p>㊱</p> <p>㊲</p> <p>㊳</p> <p>㊴</p> <p>㊵</p> <p>㊶</p> <p>㊷</p> <p>㊸</p> <p>㊹</p> <p>㊺</p> <p>㊻</p> <p>㊼</p> <p>㊽</p> <p>㊾</p> <p>㊿</p> <p>5th concern</p>			

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>HAF WIND ENERGY</u>		POLYGON: <u>FOD 9-2</u>	
	SURVEY(DOS)	DATE	TIME	STAR
	<u>BH</u>	<u>July 29</u>		
UTM Z	UTM Z	UTM X		

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input checked="" type="checkbox"/> TERRESTRIAL	<input type="checkbox"/> ORGANIC	<input type="checkbox"/> LAKE/STRINE	<input checked="" type="checkbox"/> NATURAL	<input type="checkbox"/> PLANKTON	<input type="checkbox"/> LAKE
<input type="checkbox"/> WETLAND	<input type="checkbox"/> MINERAL SOIL	<input type="checkbox"/> RIVERINE	<input type="checkbox"/> CULTURAL	<input type="checkbox"/> SUBMERGED	<input type="checkbox"/> POND
<input type="checkbox"/> ADJACENT	<input type="checkbox"/> PARENT MIN.	<input type="checkbox"/> BOTTOMLAND		<input type="checkbox"/> FLOATING-LVD	<input type="checkbox"/> RIVER
	<input type="checkbox"/> ACIDIC BEDROCK	<input type="checkbox"/> TERRACE		<input type="checkbox"/> GRASSLAND	<input type="checkbox"/> STREAM
	<input type="checkbox"/> BASIC BEDROCK	<input type="checkbox"/> VALLEY SLOPE		<input type="checkbox"/> ROSE	<input type="checkbox"/> MARSH
	<input type="checkbox"/> CARB. BEDROCK	<input type="checkbox"/> TABLELAND		<input type="checkbox"/> LICHEN	<input type="checkbox"/> SWAMP
		<input type="checkbox"/> ROLL UPLAND		<input type="checkbox"/> BRYOPHYTE	<input type="checkbox"/> PEN
		<input type="checkbox"/> CLIFF		<input checked="" type="checkbox"/> DECEIDUOUS	<input type="checkbox"/> BOG
		<input type="checkbox"/> TALL		<input type="checkbox"/> CONIFEROUS	<input type="checkbox"/> BARE
		<input type="checkbox"/> DRESS / CAUSE		<input type="checkbox"/> MIXED	<input type="checkbox"/> MEADOW
		<input type="checkbox"/> SLUR			<input type="checkbox"/> PRAIRIE
		<input type="checkbox"/> ROCKLAND			<input type="checkbox"/> THicket
		<input type="checkbox"/> BEACH / SAND			<input type="checkbox"/> SAVANNAH
		<input type="checkbox"/> SAND DUNE			<input type="checkbox"/> WOODLAND
		<input type="checkbox"/> SLICE			<input checked="" type="checkbox"/> FOREST
					<input type="checkbox"/> PLANTATION
SITE			COVER		
<input type="checkbox"/> OPEN WATER			<input type="checkbox"/> OPEN		
<input type="checkbox"/> SHALLOW WATER			<input type="checkbox"/> SHRUB		
<input type="checkbox"/> SURFICIAL DEP.			<input checked="" type="checkbox"/> TREED		
<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			<u>P. Oak > Swamp W. Oak = T. Aspen</u>
2 SUB-CANOPY			<u>Swamp White Oak = Willow sp.</u>
3 UNDERSTOREY			<u>S. Fern > Riverbank Grape = Mayapple</u>
4 CRD. LAYER			

HT CODES: 1 = < 20 ft 2 = 20-40 ft 3 = 40-60 ft 4 = 60-80 ft 5 = 80-100 ft 6 = 100-120 ft 7 = 120-140 ft 8 = 140-160 ft 9 = 160-180 ft 10 = 180-200 ft

CVR CODES: 1 = NONE 2 = 1-25% 3 = 26-50% 4 = 51-75% 5 = 76-100%

STAND COMPOSITION

SIZE CLASS ANALYSIS:		<u>A</u>	< 10	<u>A</u>	10 - 24	<u>O</u>	25 - 50	<u>R</u>	> 50
STANDING SNAGS:		<u>A</u>	< 10	<u>O</u>	10 - 24	<u>R</u>	25 - 50		> 50
DEADFALL / LOGS:		<u>A</u>	< 10	<u>A</u>	10 - 24	<u>O</u>	25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

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

TEXTURE: <u>silty clay</u>	DEPTH TO MOTTLES / GLEY: <u>B = 30</u>	<u>G = 45</u>
MOISTURE: <u>moist-fresh</u>	DEPTH OF ORGANICS: <u>1 cm</u>	(cm)
<u>HOMOGENEOUS</u> VARIABLE	DEPTH TO BEDROCK: <u>> 150</u>	(cm)

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	<u>Forest</u>	<u>F0</u>
COMMUNITY SERIES:	<u>Decid. Forest</u>	<u>F0D</u>
ECOSITE:	<u>Fresh-Moist Oak-Maple Hickory</u>	<u>FOD9</u>
VEGETATION TYPE:	<u>Fresh-Moist Oak-Maple Decid. Forest</u>	<u>FOD 9-2</u>
INCLUSION	<u>SWD</u>	
COMPLEX		

Notes:

ELC PLANT SPECIES LIST	SITE: <u>HAF Wind Energy.</u>
	POLYCON: <u>FOD 9-2</u>
	DATE: <u>July 29.</u>
	SURVEYOR(S): <u>BH</u>

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

SPECIES CODE	LAYER				COL
	1	2	3	4	
R. Maple	A	O			
Indian Hemp				R	
Jack-in-the-pulpit			A		
Calico Aster			O		
Large-leaved Aster			A		
D. Ragwort			O		
C. Wood Sedge			O		
Oval-headed Sedge			R		
Bristly Sedge			R		
Penn. Sedge			O		
Cypress-like Sedge			R		
Sedge sp.			O		
Awl-fruited Sedge			O		
B. Beech	O				
R. Hickory	R				
Shagbark H.	O				
E. Nightshade			A		
Bottlebrush G.			O		
F. Horsetail			A		
Running Strawberry bush		O			
A. Beech	O				
W. Strawberry		O			
C. Strawberry		O			
Bl. Ash	A	O			
R. Ash	O				
Blunt-leaved		O			

Redstraw

SPECIES CODE	LAYER				COL
	1	2	3	4	
S. Cranesbill				R	
Herb Robert				R	
Large-leaved Arvens.				O	
F. Manna Grass			A		
E. Manna Grass			O		
St. Johns Wort				A	
S. Jewelweed			D		
B. Walnut	R				
Rush sp.				O	
Rice cut grass				O	
Water horehound				O	
F. Solomons Seal				O	
H. Hornbeam			O		
Thicket Creeper				R	
W. Pine	R				
Mayapple				A	
Christmas fern			R		
T. Aspen	A	O			
C. Cinquefoil				O	
Selfheal				O	
Choke Cherry			O		
Swamp bl. oak	AA				
Pin Oak	AO				
Kidney-leaf Buttercup				R	
B. Locust		O			
B. Raspberry			R		
D. Raspberry			O		
Willow sp.		A			
C. Goldenrod			A		

ELC PLANT SPECIES LIST	SITE: <u>HAF</u>
	POLYGON: <u>FOD 9-2 contd.</u>
	DATE: <u>July 29</u>
	SURVEYOR(S): <u>BH</u>

SURVEYOR'S BH

ABUNDANCE CODE: R = Rare O = Occasional A = Abundant C = Common

[illegible]

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>HAF</u>		POLYGON: <u>FOD 9-3</u>	
	SURVEYOR: <u>BH</u>		DATE: <u>July 29</u>	TIME: <u>Start</u>
	UTM12: <u></u>		UTM13: <u></u>	UTM14: <u></u>

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 type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MTL <input type="checkbox"/> ALLUVIAL DEPOS <input type="checkbox"/> SAND / GRAVEL <input type="checkbox"/> COARSE GRAVEL	<input type="checkbox"/> LAKE/STRIKE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY FLOOR <input type="checkbox"/> TADPOLE <input checked="" type="checkbox"/> ROLL / UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> PAUSE <input type="checkbox"/> OFFSHORE / CORAL <input type="checkbox"/> MOUNTAIN <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / SAND <input type="checkbox"/> SAND DUNE <input type="checkbox"/> CLIFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL COVER <input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input checked="" type="checkbox"/> TREE	<input type="checkbox"/> PLANTAIN <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING LILY <input type="checkbox"/> GRASS / LILY <input type="checkbox"/> ROSE <input type="checkbox"/> LILY <input checked="" type="checkbox"/> BRICKWATER <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARCH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOWL <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 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			White Elm = Bur Oak > Red Ash
2 SUB-CANOPY			R. Beech = White Ash = Red Ash
3 UNDERSTOREY			Sensitive Fern > Fowl Nanna Grass
4 CRD. LAYER			Jack in the Pulpit

HT CODES: 1=1-2m 2=2-4m 3=4-6m 4=6-8m 5=8-10m 6=10-12m 7=12-14m 8=14-16m 9=16-18m 10=18-20m

CVR CODES: 0=NONE 1=1-10% 2=10-20% 3=20-30% 4=30-40% 5=40-50% 6=50-60% 7=60-70% 8=70-80% 9=80-90% 10=90-100%

STAND COMPOSITION:

BA:

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

COMM. AGE	EMER.	YOUNG	<u>ADULT</u>	OLD	GROWTH
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SOIL ANALYSIS

TEXTURE: <u>silty clay</u>	DEPTH TO MOTTLES / GLEY: <u>g = 30</u>	<u>g = 50</u>
MOISTURE: <u>moist-fresh</u>	DEPTH OF ORGANICS: <u>2 cm</u>	(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: <u>>150</u>	(cm)

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	<u>Forest</u>	<u>FO</u>
COMMUNITY SERIES:	<u>Deciduous Forest</u>	<u>FOD</u>
ECOSITE:	<u>Fresh Moist Oak Maple</u>	<u>FOD 9</u>
VEGETATION TYPE:	<u>Hickory</u> <u>Fresh Moist Bur Oak</u>	<u>FOD 9-3</u>
INCLUSION		
COMPLEX		

Notes:

ELC PLANT SPECIES LIST	SITE: <u>HAF</u>
	POLYGON: <u>FOD 9-3</u>
	DATE: <u>July 29</u>
	SURVEYOR(S): <u>BA</u>

POLYGON: FOD 9-3

DATE: July 29

SURVEYOR'S: BH

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTORY 4 = GROUND (GRASS) LAYER
ABUNDANCE CODES: R = RARE A = OCCASIONAL AA = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER				COL
	1	2	3	4	
S. Maple	R	R			
G. Mustard				O	
S. Serviceberry			A		
Jack in the pulpit				A	
Calico Aster				O	
Large-leaved Aster				A	
Penn. Sedge				O	
B. Beech		O			
Shag. Hickory		O			
E. Nightshade			A		
Rough-legged Dogwood			O		
R. Strawberrybush			A		
C. Boneset				O	
W. Strawberry				O	
C. Strawberry				O	
W. Ash	O	O			
R. Ash	A	O			
S. Cranesbill				O	
Large-leaved Avena				O	
F. Manna Grass			A		
C. Privet				R	
Spicebush			O		
Sensitive Fern			D		
Hop Hornbeam		R			
Thicket Creeper				O	
Magnopple			A		
Christmas Fern			O		
Choke Cherry		O			

[illegible]

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>HAF</u>		POLYGON: <u>MAS 2-1</u>	
	SURVEYOR(S): <u>BH</u>		DATE: <u>July 30.</u>	TIME: station <u> </u> on <u> </u>
	UTM Z: <u> </u>	UTM Z: <u> </u>	UTM X: <u> </u>	
	UTM Y: <u> </u>			

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input type="checkbox"/> TERRESTRIAL <input checked="" type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input checked="" type="checkbox"/> ORGANIC <input type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDROCK <input type="checkbox"/> BASIC BEDROCK <input type="checkbox"/> CARBON BEDROCK	<input type="checkbox"/> LAKE/STRAINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input type="checkbox"/> TADPOLE LAND <input type="checkbox"/> ROLL UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALLS <input type="checkbox"/> OPENICE / 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 checked="" type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input type="checkbox"/> TREED	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LEAF <input checked="" type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input type="checkbox"/> DECEIDUOUS <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 checked="" 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 type="checkbox"/> SURFICIAL DEEP <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			Grey Dogwood = Red Osier Dogwood
2 SUB-CANOPY			N. Cattail > B. Cattail
3 UNDERSTOREY			
4 CRD. LAYER			Swamp Milkweed = Grass-leaved Goldenrod

HT CODES: 1 = >30 m 2 = 10-30 m 3 = 2-10 m 4 = 1-10 m 5 = 0.5-1 m 6 = 0.2-0.5 m 7 = 0.1-0.2 m

CVR CODES: 0 = NONE 1 = 0% < CVR < 10% 2 = 10% < CVR < 25% 3 = 25% < CVR < 50% 4 = 50% < CVR < 75% 5 = 75% < CVR < 90% 6 = 90% < CVR < 100%

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: <u>Clay loam</u>	DEPTH TO MOTTLES / GLEY: <u>0 = 10</u>	G: <u>25</u>
MOISTURE: <u>Wet</u>	DEPTH OF ORGANICS: <u>5 cm</u>	(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: <u>> 150</u>	(cm)

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	<u>marsh</u>	MA
COMMUNITY SERIES:	<u>shallow marsh</u>	MAS
ECOSITE:	<u>graminoid mineral shallow marsh</u>	MAS 2
VEGETATION TYPE:	<u>Cattail min. shallow marsh</u>	MAS 2-1
INCLUSION		
COMPLEX		

Notes:

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>HAF Wind Energy.</u>		POLYGON: <u>MAS2.</u>	
	SURVEY(ES): <u>BH</u>	DATE: <u>July 30.</u>	TIME:	DATE M/D/Y
	UTM X:	UTM Y:	UTM Z:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input type="checkbox"/> TERRESTRIAL <input checked="" type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input checked="" type="checkbox"/> ORGANIC <input type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDROCK <input type="checkbox"/> BASIC BEDROCK <input type="checkbox"/> CAVE BEDROCK	<input type="checkbox"/> LAKE/STAGNE <input type="checkbox"/> RIVER/INE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY FLOPS <input type="checkbox"/> TAILSLAND <input type="checkbox"/> ROLL UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALL <input type="checkbox"/> OPEN WIDE / CAVE <input type="checkbox"/> ALPINE <input type="checkbox"/> RICHLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> SLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL COVER <input checked="" type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input type="checkbox"/> TREE	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LEAF <input checked="" type="checkbox"/> GRAMINOID <input type="checkbox"/> ROSE <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 checked="" type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> TARBED <input type="checkbox"/> MEADOW <input type="checkbox"/> PARK <input type="checkbox"/> THicket <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE <input type="checkbox"/> OPENWATER <input type="checkbox"/> SHALLOW WATER <input 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			<u>N. Cattail = R. Cattail</u>
2 SUB-CANOPY			<u>Reed Canary Grass > Sedge sp.</u>
3 UNDERSTOREY			
4 GRD. LAYER			

HT CODES: 1 = > 20 m 2 = 10-20 m 3 = 5-10 m 4 = 1-5 m 5 = 0.5-1 m 6 = 0.2-0.5 m 7 = 0-0.2 m

CVR CODES: 0 = NONE 1 = 1% < CVR < 10% 2 = 10% < CVR < 25% 3 = 25% < CVR < 50% 4 = 50% < CVR < 75% 5 = CVR > 75%

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: <u>silty clay</u>	DEPTH TO MOTTLES / GLEY: <u>0 = 10.</u>	<u>1 = 25</u>
MOISTURE: <u>wet</u>	DEPTH OF ORGANICS: <u>5cm</u>	(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: <u>> 150</u>	(cm)

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	<u>marsh</u>	<u>MA</u>
COMMUNITY SERIES:	<u>shallow marsh</u>	<u>MAS.</u>
ECOSITE:	<u>graminoid mineral</u>	<u>MA-S2</u>
VEGETATION TYPE:	<u>shallow marsh</u>	
INCLUSION		
COMPLEX		

Notes:

PLANT SPECIES LIST

SURVEYOR'S: BH

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTORY 4 = GROUND (FOLI) LAYER
ABUNDANCE CODES: R = RARE 0 = OCCASIONAL A = ABUNDANT D = DOMINANT

[illegible][illegible]

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>HAF</u>		POLYGON: <u>SWD</u>	
	SURVEYOR: <u>BH</u>		DATE: <u>July 30</u>	TIME: <u>5:45</u>
	UTM Z: <u></u>	UTM E: <u></u>	UTM N: <u></u>	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input checked="" type="checkbox"/> TERRESTRIAL <input checked="" type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MTL <input type="checkbox"/> ACIDIC BEDRK <input type="checkbox"/> BASIC BEDRK <input type="checkbox"/> CALD BEDRK	<input type="checkbox"/> UPLAND <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY FLOOR <input type="checkbox"/> TADPOLE <input type="checkbox"/> ROLL UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALL <input type="checkbox"/> OPENICE / CAVE <input type="checkbox"/> SILVER <input type="checkbox"/> RICHLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> CLIFF	<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"/> SPREADING <input type="checkbox"/> ROSE <input type="checkbox"/> UCHON <input checked="" type="checkbox"/> BROTAPHYTE <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> TREED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARCH <input checked="" type="checkbox"/> SWAMP <input type="checkbox"/> PEN <input type="checkbox"/> BOG <input type="checkbox"/> BARN <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"/> OPENWATER <input type="checkbox"/> SHALLOW WATER <input 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			White Elm = Swamp White Oak
2 SUB-CANOPY			W. Elm = Swamp W. Oak = Grey Dogwood
3 UNDERSTOREY			W. Wood Aster = C. Goldenrod
4 GRD. LAYER			C. Anemone > C. Milkweed

HT CODES: 1 = 0-20m 2 = 20-30m 3 = 30-40m 4 = 40-50m 5 = 50-60m 6 = 60-70m 7 = 70-80m 8 = 80-90m 9 = 90-100m

CVR CODES: 0 = NONE 1 = 0-25% 2 = 25-50% 3 = 50-75% 4 = 75-100% 5 = 100-125% 6 = 125-150% 7 = 150-175% 8 = 175-200%

STAND COMPOSITION:	BA:
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SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	O	25 - 50	R	> 50
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STANDING SNAGS:	N	< 10	N	10 - 24	R	25 - 50	N	> 50
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DEADFALL / LOGS:	O	< 10	O	10 - 24	R	25 - 50	R	> 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: <u>silty clay</u>	DEPTH TO MOTTLES / GLEY	G = 10	G = 25
MOISTURE: <u>wet</u>	DEPTH OF ORGANICS: <u>10 cm</u>	(cm)	
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: <u>7150</u>	(cm)	

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	<u>Swamp</u>	<u>SW</u>
COMMUNITY SERIES:	<u>deciduous swamp</u>	<u>SWD.</u>
ECOSITE:		
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes:

SURVEYOR(S): BH

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

[illegible]

Mo:

Forest

Location Vineland #1

Observer *AW*

Start Time 0631

End Time 0641

Weather Temperature 14 Wind Speed Calm
 Wind Direction

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

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

Species	Number of Birds	Behaviour	Height	Direction	Notes
American Robin	♂, 1				
Mallard	pairs				
Cowbird	1				
C. Grackle	1, 1				
House Wren	♂				
Starling	2				
R.b Gull	1				
N Cardinal	♂, 1				
Song Sp.	♂, ♂				
American Crow	1				
American Goldfinch	♂, 2				
M Dove	♂				
STOP → Bridge					
West → deciduous forest (mature) w/ houses + creek					
East → wooded residential + creek					

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Forest

Location Vineland #2

Start Time 0645

End Time 0655

Weather Temperature 14 Wind Speed Calm
 Wind Direction

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

None	Fog	Drizzle	Lt Rain	Hvy Rain
------	-----	---------	---------	----------

 Cloud Cover (%) 0
 Visibility ✓

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

\emptyset No Direction

Height

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

Forest

Location Vineland #3

AW

AW

STOP → telephone pole
N side - mature deciduous forest
S side - hedgerows + crops

\emptyset No Direction

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

Forest

Location Vineland #4

Start Time 0722

End Time 0732

Weather Temperature 14 Wind Speed Light
 Wind Direction:

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
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 Precipitation:

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

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Forest

Location Vineland #5

Start Time 0740

End Time 0751

Weather Temperature 14 Wind Speed light
 Wind Direction

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

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

Species	Number of Birds	Behaviour	Height	Direction	Notes
Red-w B Bird	1, ♂				
Downy Woodp	1				
Ring-b Gull	8, 5				
Am Robin	1, ♂				
Red-bellied Woodp.	1				
Tr Bunting	♂				
Song Sparrow	♂, ♂				
C Grackle	2, 1, 1				
M Dove	♂				
Mallard	pr.				
B Oriole	1				
Great-cr. Flyc	1				
Am Goldfinch	1				
Spotted Sandp.	2				
Stop → N side of new bridge					
East — bottomland deciduous forest (+ river)					
West " " " " (+ river)					

Behaviour

Height

F	Flying; purposeful flight
L	Loafing

Ø No Direction

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

Forest

Location Vineland #6

Aw

0800

0810

Weather Temperature 14 Wind Speed Light
 Wind Direction

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

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

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Forest

Location Vineland #7

Aw

0822

0832

Weather Temperature 14 Wind Speed Light
 Wind Direction

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

 Precipitation

<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain
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 Cloud Cover (%) 0
 Visibility ✓

Species	Number of Birds	Behaviour	Height	Direction	Notes
Great cr Flyc	1				
Brown Thrasher	♂				
Red-w B Bird	♂, ♂				
N Cardinal	♂				
Cowbird	1				
Song Sparrow	♂, ♂				
Blue Jay	1				
Am Goldfinch	♂ + pr				
Dowdy Woodp	1				
Rare-br Grosbeak	♂				
Stop → telephone pole					
S side - deciduous forest (inn)					
N side - wheat + hedgerows					

Behaviour	
F	Flying; purposeful flight
L	Loafing

Ø No Direction

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

Forest

Location Vineland #8

End Time 0847

Weather Temperature 14 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
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 Cloud Cover (%) 0
 Visibility ✓

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Forest

Location Vineland #9

Observer

AW

Start Time

0850

End Time

0900

Weather Temperature 14 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
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 Cloud Cover (%) 10
 Visibility ✓

[illegible]

Behaviour	
F	Flying; purposeful flight
L	Loafing

Ø No Direction

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

Forest

Location Vineland #1

Start Time 0627

End Time 0637

Weather Temperature 12 Wind Speed Calm
 Wind Direction

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

<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain
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 Cloud Cover (%) 10
 Visibility ✓

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

\emptyset No Direction

Height

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

Forest

July 2/10

Vineland #3

AW

0655

0705

[illegible]

Height

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

Ø No Direction

Stationary Survey

Date July 2/10 Location Forest Vineland #4
 Observer AW Start Time 0712 End Time 0722

Weather	Temperature	12										Wind Speed	Trace				
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	<u>W</u>	WNW	NW	NNW	
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	10									
Visibility	<u>✓</u>																

Species	Number of Birds	Behaviour	Height	Direction	Notes
Song Sparrow	♂, 1, ♂, 1				
N Flicker	1, ♂				
Starling	1				
Red-w B Bird	♂, 11				
Red-eyed Vireo	♂				
Chipping Sp	1				
Am Goldfinch	♂, 1				
Am Crow	1111				
I Bunting	♂				
Cont bird	11 (pr.)				
Am Robin	♂, ♂				
Barn Swallow	11				
N Oriole	1				
N Cardinal	♂				

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Stationary Survey

Date July 2/10

Location Forest Vineland #6

Observer AW

Start Time 0745

End Time 0755

Weather	Temperature	12										Wind Speed	Trace									
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 (%)						10					
Visibility	✓																					

Species	Number of Birds	Behaviour	Height	Direction	Notes
Blue Jay	11				
Song Sparrow	♂				
Am Robin	11, ♂, ♂				
N Cardinal	1				
C Grackle	11				
Yellow Warbler	1				
M Dove	♂				
Am Goldfinch	11				
Starling	1				
Red-w B Bird	♂				
B Oriole	1				
Am Crow	1				
Red-bellied Woodp	♂				
Gray Catbird	♂				
Rb Gull	1	(V)			

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Stationary Survey

Date July 2/10
Observer AW

Forest

Location Vineland #8

Observer AW Start Time 0813 End Time 0823

Weather Temperature 15 Wind Speed Calm

Wind Direction

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

<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain
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 Cloud Cover (%) 10

Visibility ✓

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Stationary Survey

Date July 2/10 Location Forest Vineland #9
 Observer AW Start Time 0827 End Time 0837

Weather	Temperature	14										Wind Speed	Light									
Wind Direction	<input type="checkbox"/> N <input type="checkbox"/> NNE <input type="checkbox"/> NE <input type="checkbox"/> ENE <input type="checkbox"/> E <input type="checkbox"/> ESE <input type="checkbox"/> SE <input type="checkbox"/> SSE <input type="checkbox"/> S <input type="checkbox"/> SSW <input checked="" type="checkbox"/> SW <input type="checkbox"/> WSW <input type="checkbox"/> W <input type="checkbox"/> WNW <input type="checkbox"/> NW <input type="checkbox"/> NNW																					
Precipitation	<input checked="" type="checkbox"/> None <input type="checkbox"/> Fog <input type="checkbox"/> Drizzle <input type="checkbox"/> Lt Rain <input type="checkbox"/> Hvy Rain										Cloud Cover (%) <u>10</u>											
Visibility	<u>✓</u>																					

Species	Number of Birds	Behaviour	Height	Direction	Notes
Willow Flycatcher	1				
Song Sparrow	♂				
C Grackle	1				
Starling	28				
Cowbird	1111 1111				
Killdeer	1				
Redw B Bird	♂, ♂, ♂				
I Bunting	♂				
N Cardinal	♂				
Am Robin	111				
Tree Swallow	1				
Yellow Warbler	♂				
Gray Catbird	♂				
E Kingbird	1				
Hayfield cut (drying)					

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Fields

Location Vineland #1

End Time 0928

Weather Temperature 17 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 (%) 10
 Visibility ✓

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Fields

Location Vineland #2

End Time 0955

Weather Temperature 17 Wind Speed True 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 (%) 10
 Visibility ✓

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Fields

Location Vineland #3

End Time 1014

Weather Temperature 17 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 ✓

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Fields

Location Vineland #4

AW

Start Time

1018

End Time

1028

Weather Temperature 17 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
Bobolink	2♂, ♀, ♂, ♀				
E Meadowlark	♂				
Red-w B Bird	2♂, 2♂, ♀, ♀				
Am Crow	1				
Savannah Sp	3, 1, ♂, ♂, 1				
T Vulture	2				
Starling	1, 2				
Song Sp	1				
Am Robin	♂, 1				
C Grackle	1				
STOP → dead elm					
E side - extensive grassland					
W side — " "	" "				

Height

F	Flying; purposeful flight
L	Loafing

Ø No Direction

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

Fields

Location Vineland #5

AW

1049

1059

Weather Temperature 17 Wind Speed ~~Light~~ Mod
 Wind Direction

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

 Precipitation

<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain
-------------	-----	---------	---------	----------

 Cloud Cover (%) 10
 Visibility ✓

[illegible]

Behaviour

Height

F	Flying; purposeful flight
L	Loafing

Ø No Direction

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

Fields

Location Vineland #6

Start Time 1:08

End Time 1108

Weather	Temperature	<u>17</u>				Wind Speed	<u>Mod</u>									
	Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	<u>W</u>	WNW	NW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u>15</u>								
Visibility	<u>✓</u>															

[illegible]

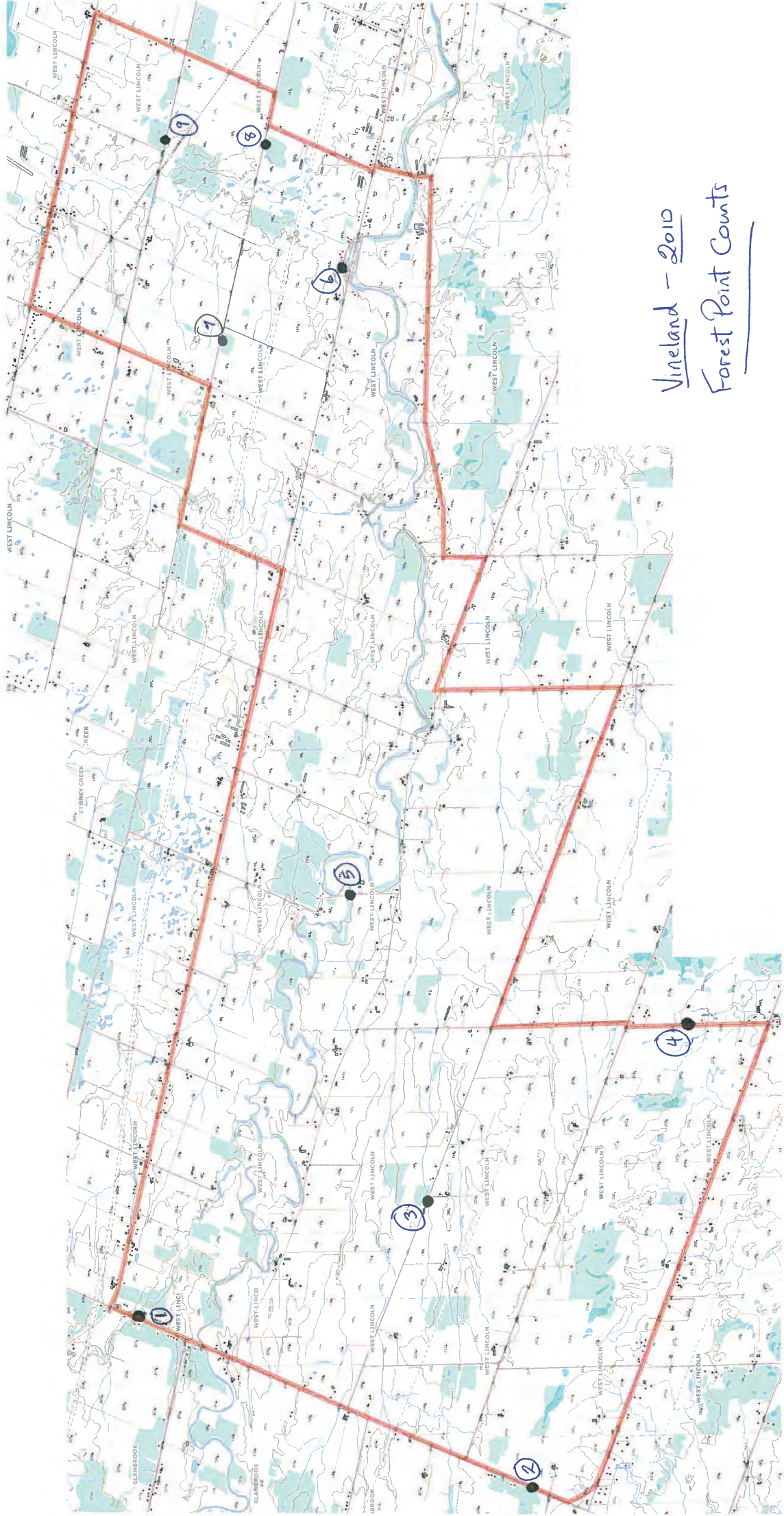
Behaviour

F	Flying; purposeful flight
L	Loafing

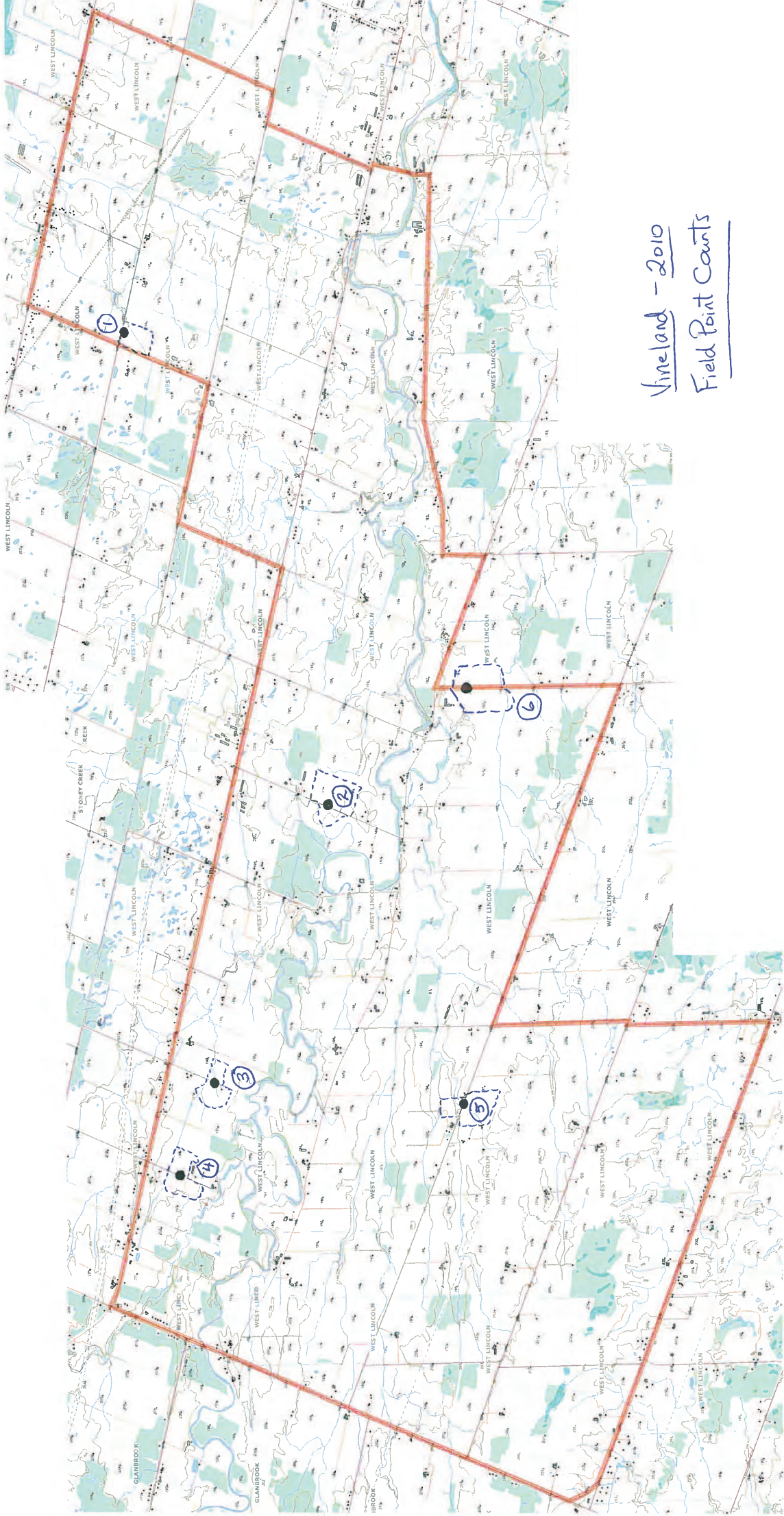
\emptyset No Direction

Height

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



Vineland - 2010
Forest Point Counts



Vineland - 2010
Field Point Counts

Stationary Survey

Date March 17 / 10 Location Vineland - Site ①
 Observer AW Start Time 1007 End Time 1107

Weather	Temperature	<u>12° C</u>		Wind Speed	<u>Calm Trace</u>											
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	<u>NW</u>	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u><10</u>								
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
GB Heron	1	F	H	W	
Canada Goose	20, 2, 1, 5, 3, 29	F	H	N	
Herring Gull	1, 1	F	H	N	
Canada Goose	3, 4, 4	F	M	N	
Rb Gull	1	F	M	NW	
Killdeer	1, 3	F	M	NW	
* Cackling Goose	2	F	H	W	
Canada Goose	6	F	H	W	
Killdeer	1	F	M	W	
Wood Duck	2	F	M	W	
Rb Gull	1, 6	F	H	NW	
C Goose	5	F	H	NW	
C Grackle	5, 2, 3	F	M	N	
T Vulture	1, 1	F	M	W	
Tundra Swan	2	F	H	E	
Herring Gull	2, 2	F	H	NW	
Killdeer	1, 3	F	M	N	
Am Robin	1	F	M	NE	
M Dove	1	F	M	N	
E Meadowlark	2	F	L	N	
Am Kestrel	2	F	L	N	

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 March 17/10 Location Vineland - Site (2)
 Observer AW Start Time 1129 End Time 1229

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

Species	Number of Birds	Behaviour	Height	Direction	Notes
Red-Tailed Hawk	1	F	M	NW	
Ring-b Gull	1	F	M	N	
Killdeer	1	F	M	N	
" "	1, 1	F	M	NE	
C Grackle	1	F	M	E	
Rough-legged Hawk	1	F	M	NW	light
Red-w BB	2	F	L	NE	
Rough-legged	1	F	H	NW	dark
Starling	20	F	M	S	
Am Crow	3	F	M	E	
Red-tailed Hawk	3, 3, 1, 1, 2, 1, 1	F	H	NW	
N Harrier	1	F	H	NW	
Starling	12	F	M	W	
Am Crow	3	F	M	NW	
Starling	10	F	M	NE	
C Grackle	8	F	M	NE	
Rough-legged	1	F	H	NW	light
C Grackle	2	F	M	E	

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 March 18, 2010 Location Vineland- Site ①
Observer AW Start Time 1155 End Time 1255

Weather Temperature 12°C Wind Speed Mod.
 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 (%) 15
 Visibility ✓

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

⊙ No Direction

Height

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

N, E, S

Stationary Survey

Date March 18, 2010 Location Vineland - Site (2)
 Observer Am Start Time 1028 End Time 1128

Weather Temperature 9°C Wind Speed Light + Moderate

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

Precipitation None Fog ☐ Drizzle ☐ Lt Rain ☐ Hvy Rain ☐ Cloud Cover (%) 15

Visibility ✓

Species	Number of Birds	Behaviour	Height	Direction	Notes
Tundra Swan	21	F	M	N	
C Goose	18, 5	F	M	N	
C Goose	13	F	M	W	
Killdeer	1, 1	F	M	N	
C Goose	1, 6	F	H	E	
Ring-b Gull	7	F	M	NW	
Am Robin	4	F	M	NW	
Herring Gull	1	F	M	S	
C Goose	14	F	H	NE	
Am Crow	3, 4	F	H	E	
C Goose	13	F	H	NE	
Copler's Hawk	1	F	H	NE	
N Harrier	2	F	H	NE	

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Stationary Survey

Date March 31 / 2016

Location Vineland - Stn #1

Observer AW

Start Time 0955

End Time 1055

Weather

Temperature

8

Wind Speed

Light Trace

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 (%)

5%

Visibility

✓

Species	Number of Birds	Behaviour	Height	Direction	Notes
T Vulture	1	F	M	W	
" "	2, 2	F	M	Ø	
Herring Gull	4	F	H	Ø	
G.B. Heron	1	F	H	E	
Killdeer	2	F	H	Ø	
Herring Gull	1	F	H	N	
Coopers Hawk	1	F	H	Ø	
" "	1	F	H	W	
G.B. Heron	1	F	H	N	
T Vulture	1	F	H	W	
Am Kestrel	1	F	M	W	
C. Goose	7	F	M	N	
N. Harrier	1	F	H	W	
T Vulture	1, 2	F	H	Ø	
Red-tailed	4, 2	F	H	Ø	
C. Goose	8	F	H	N	
No REAL MOVEMENT OF HAWKS					

Behaviour

F

Flying; purposeful flight

L

Loafing

Ø No Direction

Height

L

Low (< 130 feet)

M

Medium (130 to 410 feet)

H

High (> 410 feet)

Stationary Survey

Date March 31 / 2010

Location Vineland - Station 2

Observer AW

Start Time 1120

End Time 1220

Weather	Temperature <u>10</u>	Wind Speed <u>Light SW (increasing)</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>15</u>																
Visibility <u>✓</u>		<u>(increasing)</u>																

Species	Number of Birds	Behaviour	Height	Direction	Notes
T Vulture	1, 1	F	H	Ø	
Red-tailed	2	F	H	Ø	
Am Crow	3	F	H	W	
T Vulture	1, 5	F	H	N	
Am Crow	3	F	H	E	
T Vulture	1, 1, 1, 2	F	M	NW	
Red-tailed	1, 2, 2	F	H	NW	
T Vulture	1	F	H	E	
Red-tailed	1	F	M	NW	
T Vulture	1, 4, 2	F	H	NW	
Coopers Hawk	1	F	M	NE	
LIGHT HAWK FLIGHT DEVELOPING					
DURING SURVEY					

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Stationary Survey

Date April 1, 2010 Location Vineland - Station #1
Observer AW Start Time 1205 End Time 1305

Weather Temperature 16°C Wind Speed Moderate +

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 (%) 20

Visibility ✓

[illegible]

Behaviour

F	Flying; purposeful flight
L	Loafing

\emptyset No Direction

Height

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

Stationary Survey

Date April 7, 2010

Location Vineland - Station #2

Observer 

Start Time 1040

End Time 1/40

Weather

Temperature 10

Wind Speed Moderate +

Wind
Direction

N

NNE

NE

ENE

E

ESE

SE

SSR

S

SSW

SW

WSW

W

WNW

NW

NNW

Precipitation

None

Egg

Drizzle

Light Rain

Hwy Rain

Cloud Cover (%) *25*

Visibility

[illegible]

Behaviour

F

Flying; purposeful flight

L

Loafing

Ø No Direction

Height

Low (< 130 feet)

M

Medium (130 to 410 feet)

H

High (> 410 feet)

Stationary Survey

Date April 12 / 2010 Location Vineland- Station #1
 Observer AW Start Time 0945 End Time 1045

Weather	Temperature	<u>8</u>	Wind Speed	<u>Light</u>												
Wind Direction	N	<u>NNE</u>	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>20</u>									
Visibility	<u>✓</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
T Vulture	1	F	L	W	
Ring-b Gull	1, 6	F	M	N	
T Vulture	1, 7, 2	F	M	W	
Tree Swallow	1	F	M	NE	
Ring-b Gull	2	F	H	NW	
T Vulture	2, 1	F	H	W	
Red-shouldered	1	F	M	W	
SS Hawk	1	F	M	W	
Red-tailed	2, 1	F	M	W	
SS Hawk	1, 1	F	H	W	
Red-tailed	1	F	H	W	
G B Heron	1	F	H	W	
Red-shouldered	1	F	H	W	
Bonapartes Gull	25	F	H	NW	
Coopers Hawk	1	F	H	W	
" "	1, 1	F	H	W	
N Harrier	1	F	H	W	
MODERATE FLIGHT → MOST N OF SITE, AND Most FIRST 1/2 OF PERIOD!					

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Stationary Survey

Date April 12, 2010

Location Vineland- Station 2

Observer AW

Start Time 1105

End Time 1205

Weather	Temperature <u>8</u>	Wind Speed <u>Light → Mod</u>																
Wind Direction	<table border="1"> <tr> <td>N</td> <td>NNE</td> <td><u>NE</u></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	<u>NE</u>	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
N	NNE	<u>NE</u>	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>20</u>																
Visibility	<u>9</u>																	

Species	Number of Birds	Behaviour	Height	Direction	Notes
N Harrier	1	F	M	NW	
Common Loon	1	F	H	NE	
ducks	2	F	H	NW	
Am Kestrel	1	F	M	NW	
T Vulture	2	F	H	NW	
Rough-legged	1	F	H	NW	light morph
" "	2	F	M	Ø	locals (light)
Red-tailed	1	F	M	NW	
T Vulture	1, 2, 4	F	M	NW	
" "	3	F	H	NW	
Doc Cormorant	14	F	H	N	
LIGHT BUT DISTINCT RAPTOR FLIGHT					

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Stationary Survey

Date April 13, 2010 Location Vineland - Station #1
Observer AW Start Time 1155 End Time 1255

Weather Temperature 9°C 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 (%) 15

Visibility ✓

[illegible]

Behaviour	
F	Flying; purposeful flight
L	Loafing

Ø No Direction

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

M	Medium (130 to 410 feet)
H	High (> 410 feet)

Stationary Survey

Date April 28, 2010 Location Vineland - Station #1
 Observer AW Start Time 1025 End Time 1125

Weather Temperature 8°C Wind Speed Moderate to Stiff (35km/hr.)
 Wind Direction

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

 Precipitation

<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain
-------------	-----	---------	---------	----------

 Cloud Cover (%) 0
 Visibility 9

Species	Number of Birds	Behaviour	Height	Direction	Notes
T. Vulture	3, 2, 1, 1, 3, 1	F	M	W	
" "	1, 1				
Red-tailed	1	F	M	W	
Cormorant	12	F	M	N	
" "	16	F	H	N	
Red-tailed	1, 4	F	M	Ø	local
" "	1	F	H	Ø	local
Sharp-shinned	1, 1	F	M	W	

DESPITE THE STRONG WIND, A DISTINCT BUT LIGHT
 MOVEMENT OF RAPTORS - PERHAPS THEY ARE ESPECIALLY
 DETERMINED TO MIGRATE DUE TO STRONG WINDS THE
 PAST SEVERAL DAYS.

Behaviour	
F	Flying; purposeful flight
L	Loafing

Ø No Direction

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

Vin

Stationary Survey

Date April 29, 2019 Location Vineland - Station #1
 Observer AW Start Time 1150 End Time 1250

Weather	Temperature	<u>10</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><u>W</u></td> <td>WNW</td> <td>NW</td> <td>NNW</td> </tr> </table>				N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	<u>W</u>	WNW	NW	NNW
N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	<u>W</u>	WNW	NW	NNW					
Precipitation	<table border="1"> <tr> <td><u>None</u></td> <td>Fog</td> <td>Drizzle</td> <td>Lt Rain</td> <td>Hvy Rain</td> </tr> </table>				<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain											
<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain																
Cloud Cover (%)	<u>15</u>																			
Visibility	<u>✓</u>																			

Species	Number of Birds	Behaviour	Height	Direction	Notes
T. Vulture	5, 2	F	H	W	
"	3, 1, 1, 2, 1, 1	F	m	W	
Barn Swallow	1, 1	F	L	NW	
Red-tailed	1, 1, 1	F	M	φ	local
" "	1, 1, 1, 1	F	H	φ	local
G. B. Heeron	1	F	H	N	
" " "	1	F	H	W	
OTHER THAN VULTURES, NO MOVEMENT; PERHAPS DUE TO INCREASING WINDS					

Behaviour		Height	
F	Flying; purposeful flight	L	Low (< 130 feet)
L	Loafing	M	Medium (130 to 410 feet)
φ	No Direction	H	High (> 410 feet)

Stationary Survey

Date April 29, 2010 Location Vineland - Station #2
 Observer AW Start Time 1020 End Time 1120

Weather	Temperature	Wind Speed																								
	<u>10</u>	<u>Light +</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><u>W</u></td><td>WNW</td><td>NW</td><td>NNW</td> </tr> </table>										N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	<u>W</u>	WNW	NW	NNW
N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	<u>W</u>	WNW	NW	NNW											
Precipitation	<table border="1"> <tr> <td><u>None</u></td><td>Fog</td><td>Drizzle</td><td>Lt Rain</td><td>Hvy Rain</td> </tr> </table>										<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u>10</u>									
<u>None</u>	Fog	Drizzle	Lt Rain	Hvy Rain																						
Visibility	<u>✓</u>																									

Species	Number of Birds	Behaviour	Height	Direction	Notes
Osprey	1	F	M	N	
Sharp-sh Hawk	1	F	M	N	
Red-tailed	2, 1	F	M	φ	locals
" "	1	F	M	NW	
" "	1	F	H	NW	
" "		F	H	φ	local
T Vulture	1, 2, 3	F	H	NW	
" "	3, 1, 1, 1	F	M	NW	
" "	3	F	M	N	
WEAK BUT DISTINCT FLIGHT					

Behaviour

F	Flying; purposeful flight
L	Loafing

φ No Direction

Height

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

Stationary Survey

Date May 5/10 Location Vineland #1
 Observer JH Start Time 10¹⁵ End Time 11¹⁵

Weather Temperature 14°C Wind Speed 20 kph

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 (%) 10

Visibility UL

Species	Number of Birds	Behaviour	Height	Direction	Notes
RT Hawk	1,1,1			SW	
L. Longspur	1	F	L	W	
T. Vulture	1,1	F	L	S	
RT Hawk	1,1,1,1	F	M	W	
T. Vulture	1,1,1,1,1,1	F	M	W	
T. Vulture	1,1,1	F	L	W	
RT Hawk	1	F	L	W	
C. Swift	2	F	L	W	
Bw Hawk	2	F	M	W	
RT Hawk	1,1,1	F	M	S	
Gr. Yellowlegs	1	F	L	WSW	
A. Pipit	1,1,1	F	L	W	
SS Hawk	1	F	L	SW	
Am Gb	2,2	F	L	W	

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Stationary Survey

Date May 5/10

Location Vineland # 2

Observer 54

Start Time 11:35

End Time 12³⁵

Weather Temperature 16°C

Wind Speed 30 kph

Wind
Direction

N

NNE

NE

ENE

E

ESE

SE

SS

S

SSW

SW

WS

1

1

W

NW

NN

Precipitation

None

Fog

Drizzle

It Rains

Hwy Rain

Cloud Cover (%) 16

Visibility 02

[illegible]

Behaviour

F

Flying; purposeful flight

L

Loafing

\emptyset No Direction

Height

Low (< 130 feet)

Medium (130 to 410 feet)

H

High (> 410 feet)

Stationary Survey

Date May 6/10 Location Vineland # 1
 Observer JH Start Time 11²⁷ End Time 12²⁷

Weather	Temperature	<u>15°C</u>		Wind Speed	<u>25 kph</u>											
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	<u>WSW</u>	W	WNW	NW	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u>60</u>								
Visibility	<u>UL</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
TUVU	1, 1	F	L	SW	
RTHA	1, 1, 1, 1, 1	F	M	W	
AMPI	2	F	L	W	
RTHA	1, 1, 1, 1	F	M	NW	
RTHA	1, 1	F	H	W	
SSHA	1	F	M	W	
BWHA	1, 1, 1, 1, 1	F	H	W	
NOHA	1	F	H	W	
RTHA	1, 1	F	M	SW	
RTHA	1, 1, 1	F	L	W	
TUVU	2, 1, 1, 2	F	H	W	
SEPL	1	F	M	SW	
AMKE	1	F	M	W	
GBHE	1	F	M	N	
TUVU	4	F	M	W	
BLJA	1	F	L	N	

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Stationary Survey

Date May 6/10 Location Vineland #2
 Observer JH Start Time 10⁰⁵ End Time 11⁰⁵

Weather	Temperature	<u>13^{0C}</u>		Wind Speed	<u>25 kph</u>											
Wind Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	<u>WSW</u>	W	WNW	NW	NNW
Precipitation	<u>None</u>		Fog	Drizzle	Lt Rain	Hvy Rain	Cloud Cover (%)	<u>50</u>								
Visibility	<u>UL</u>															

Species	Number of Birds	Behaviour	Height	Direction	Notes
AmPI	2,2	F	L	E	
LALO	1,1	F	L	E	
AmKE	1	F	L	W	
RTHA	1,1,1,1	F	M	NW	
RSHA	1	F	M	NW	imm
RTHA	1,1,1,1	F	H	NW	
TUVU	3	F	L	W	
TUVU	1	F	H	NW	
BWHA	1,1,1	F	M	NW	
AmPI	1	F	H	N	
PESA	1	F	M	NW	
LEYE	1	F	M	NW	
BLJA	2,1	F	L	NW	
COHA	1	F	M	SW	
BWHA	1	F	H	NW	
AmGO	5,2	F	L	NW	

Behaviour

F	Flying; purposeful flight
L	Loafing

Ø No Direction

Height

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

Amphibian Call Survey

Date/Time:

April 6 8:00

Weather:

70° foggy

Observers:

EAM, SL.

Job Name & Number:

HAF 1104037

SPECIES	STATION 1		STATION 2		STATION 3	
	Code	Est. #	Code	Est. #	Code	Est. #
WOFO- Wood Frog	1	1			1	1
CHFR- Chorus Frog						
SPPE- Spring Peeper	2	10	2	10	2	10
AMTO- American Toad						
NLFR- Northern Leopard Frog			1	1	1	2
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 24 6:10

Weather:

9° raining

Observers:

EAM, SL

Job Name & Number:

HAF 1104037

SPECIES	STATION 1		STATION 2		STATION 3	
	Code	Est. #	Code	Est. #	Code	Est. #
WOFO- Wood Frog						
CHFR- Chorus Frog						
SPPE- Spring Peeper	2	10			1	1
AMTO- American Toad	2	10	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 31 9:10

Weather:

22° rain

Observers:

EM + SL

Job Name & Number:

HAF Wind Farm

SPECIES	STATION 1		STATION 2		STATION 3	
	Code	Est. #	Code	Est. #	Code	Est. #
WOFO- Wood Frog						
CHFR- Chorus Frog						
SPPE- Spring Peeper			2	10	2	10
AMTO- American Toad	2	10	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:

Field Work Collection Form

Date/Time: June 17. 10:00am Weather: 22°, sunny, light wind

Observers: EM & SL Location: _____

Job Name & Number: HAF Wind Energy.

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

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

Results: no suitable habitat noted.

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

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

Results: - small ponds in SWDS: ① 17T 604208
4775042 ② 17T 604694 4774389 ③ 17T
605065 4774967 *check back later to see if they
are permanent.

Field Work Collection Form

Date/Time: June 17 10:00am Weather: 22° sunny, light wind

Observers: SL & EM Location: _____

Job Name & Number: HAF Wind Energy 110403700

Goal of Field Study: investigate potential bat maternity colony.

Methods: - look for trees w/ holes for bat roosting opportunities (holes, cracks, etc.)

- look for evidence of bats (droppings, urine stains, grease marks)
- look for actual bats at dusk.

Results: _____

- suitable roosting trees observed. (some very large, mature trees in this forest) *do an acoustic survey here.

Goal of Field Study: _____

Methods: _____

Results: _____

Field Work Collection Form

Date/Time: June 18 . 10:30am Weather: 22° sunny, clear.

Observers: EM, SL Location: _____

Job Name & Number: HAF Wind Energy.

Goal of Field Study: - look for ~~turtles~~ potential reptile hibernacula

Methods: - look for actual turtles, snakes (d congregations)
- look for rock piles, rock crevices, muskrat/beaver lodges, rodent burrows, etc.

Results: no suitable habitat noted.

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

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

Results: -no suitable hab

Field Work Collection Form

Date/Time: Jun 21 11:00am Weather: 23° sunny, light wind

Observers: EM & SL

Location: _____

Job Name & Number: HAF

Goal of Field Study: look for potential reptile hibernacula

Methods: - look for actual turtles, snakes (& congregations)
- look for rock piles, rock crevices, muskrat / beaver lodges,
rodent burrows, etc.

Results: none found

Goal of Field Study: look for bullfrog conc. areas

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

Results: - none found

Field Work Collection Form

Date/Time: Jun 22 11:00am Weather: 23°, cloudy, rain on & off

Observers: EM, SL Location: _____

Job Name & Number: HAF Wind Energy

Goal of Field Study: look for potential reptile hibernacula

Methods: - look for actual turtles, snakes & snake congregations.

- look for rock piles, rock crevices, ^{beaver/} muskrat lodges, rodent burrows.

Results: none found

Goal of Field Study: look for bullfrog conc. areas.

Methods: - look for permanent waterbodies
- look for bullfrog tadpoles or adults.

Results: none found

Field Work Collection Form

Date/Time: July 29 12:00pm Weather: 22°, overcast

Observers: EM & SL Location: _____

Job Name & Number: HAF Wind Energy 110403700

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

① Ribbon snake hab. ② Snapping turtle hab.

③ waterfowl stopover/staging areas.

Methods: ① edge of wetland or shallow pond adj. to dense veg.

② slow-moving water w/ soft bottom & dense aquatic veg.

③ large wetland w/ undisturbed veg. shoreline (adj to large waterbody)

Results: _____

potential waterfowl habitat: 17T 606972 4772934
(flooded grassy field)

Goal of Field Study: - Search open areas for SWH features.

- Search for milk snake, monarch hab.

Methods: see attached.

Results: _____

Significant Wildlife Habitat Features: OPEN AREA

Date/Time: July 29 Weather: 22°, overcast

Observers: EM & SL Location: _____

Job Name & Number: HAF Wind Energy.

☐ 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: _____

milkshake habitat: 17T 605416 4774633

17T 605788 4774455 *near a barn,
which would
provide mice

Field Work Collection Form

Date/Time: July 29.

Weather: 22° overcast

Observers: EM & SL

Location: _____

Job Name & Number: HAF.

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: none found

Goal of Field Study: _____

Methods: _____

Results: _____

Field Work Collection Form

Date/Time: July 30. 10:15am Weather: 21° Sunny.

Observers: EM, SL. Location: _____

Job Name & Number: HAF

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

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

Results: none found.

Goal of Field Study: _____

Methods: _____

Results: _____

Field Work Collection Form

Date/Time: July 30. Weather: 21° sunny

Observers: EM & SL Location: _____

Job Name & Number: HAF

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

- ① Ribbonsnake hab ② Snapping turtle hab
③ Waterfowl stopover/staging areas.

Methods: ① Edge of wetland or shallow pond adj. to dense veg.
② slow-moving water w/ soft bottom & dense aquatic veg.
③ large wetland w/ undisturbed veg. shoreline (adj. to large water body)

Results: _____

Goal of Field Study: Search open areas for SWH features.

- search for milksnake, monarch hab.

Methods: see attached.

Results: _____

Significant Wildlife Habitat Features: OPEN AREA

Date/Time: July 30

Weather: 21° sunny

Observers: EM & SL

Location: _____

Job Name & Number: HAF

☐ **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: _____

milkshake hab: 17T 606561 4775581

17T 604442 4773680

Field Work Collection Form

Date/Time: Aug 2 11:00am Weather: 26° mostly cloudy,

Observers: EM & SL Location: _____

Job Name & Number: HAF

Goal of Field Study: Search wetlands for:

- ① Ribbonsnake hab ② Snapping turtle hab
③ Waterfowl stopover/staging areas.

Methods: ① edge of wetland or shallow pond adj. to
dense veg. ② slow-moving water w/ soft bottom & dense
aquatic veg. ③ large wetland w/ veg. shoreline (adj. to
large waterbody)

Results: _____

Goal of Field Study: search open areas for SWH features
& milksnake, monarch hab

Methods: see attached.

Results: _____

Significant Wildlife Habitat Features: OPEN AREA

Date/Time: Aug 2 11:00am Weather: 26° mostly cloudy
Observers: EM & SL Location: _____
Job Name & Number: HAF

☐ 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: _____

raptor winter hab: 17T 605119 4774794

17T 605679 4774512

17T 604180 4773871

17T 605706 4771597

Field Work Collection Form

Date/Time: Aug 4 12:00pm Weather: 27° cloudy, windy

Observers: EM, SL Location: _____

Job Name & Number: HAF

Goal of Field Study: Search wetland areas for:

① Ribbonsnake hab ② Snapping turtle hab
③ waterfowl stopover/staging areas.

Methods: ① edges of wetlands or shallow ponds adj. to
dense veg. ② slow-moving water w/ soft bottom & dense
③ large wetland w/ undisturbed veg. shoreline (adj. to large
waterbody)

Results: _____

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

Methods: see attached.

Results: _____

Significant Wildlife Habitat Features: OPEN AREA

Date/Time: Aug 4

Weather: 27°, cloudy, windy

Observers: EM, SL

Location: _____

Job Name & Number: 1104037

☐ 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: _____

* saw red-tailed hawk 17T 609734 4771063

- potential butterfly stopover area: 17T 604248
4774347 (lots of alfalfa, clover; lots of
butterflies observed).

Monday

December 7, 2009

VINELAND

- (1) Red-tailed Hawk - 1 ad. (perched / hedgerow)
- (2) " " " - 1 ad. (" / ")
- (3) Am Kestrel - 1 ♂ (perched / roadside wire)
- (4) Red-tailed Hawk - 1 ad. (" / rail line)
- (5) " " " - 1 ~~juv.~~ ^{juv.} (" / house property)
- (6) Sharp-sh. Hawk - 1 ad. (" / hedgerow)
- (7) Red-tailed Hawk - 1 ad. (" / trees)
- (8) " " " - 1 (" / isolated tree)
- (9) " " " - 1 ad. (" / woodlot edge)
- (10) " " " - 1 (" (" ")
- (11) " " " - 1 (" / isolated tree)
- (12) Am Kestrel - 1 (" / tree in meadow)
- (13) Red-tailed Hawk - 1 (" / isolated tree)
- (14) " " " - 1 ad. (flying at "M" height → S)
- (15) Canada Goose - 15 (flying SW @ "M" height)
- (16) Mallard - 6 (flying N @ "H" height)
- (17) Am Kestrel - 1 (perched / hedgerow)
- (18) Red-tailed Hawk - 1 (" / isolated tree)
- (19) " " " - 1 ad. (" / hedgerow)
- (20) Sharp-sh. Hawk - 1 ad. (" / ")
- (21) Red-tailed Hawk - 2 (" / isolated trees)
- (22) " " " - 1 (" / " ")
- (23) " " " - 2 ad. (" / posts in field)
- (24) " " " - 1 (" / isolated tree)
- (25) " " " - 1 (" / hedgerow)
- (26) Cooper's Hawk - 1 ad. (" / isolated tree)
- (27) Red-tailed Hawk - 2 (ad pair) (" / tree in floodplain)
- (28) " " " - 1 juv. (" / trees)
- (29) Am Kestrel - 1 ♂ (" / wire)
- (30) Red-tailed Hawk - 1 (" / hedgerow)

~~101~~ Monday

VINELAND - Dec 7/09

- (31) Rough-legged Hawk - 1 (perched / hedgerow)
(32) Red-tailed Hawk - 1 (" / isolated tree)
(33) " " " - 1 (" / hedgerow)
(34) " " " - 1 juv. (" / trees)
(35) " " " - 1 (" / hydro pole)
(36) " " " - 1 ad (" / isolated tree)
(37) " " " - 1 (" / " ")
(38) " " " - 2 (ad pair) (" / " ")
(39) Am Kestrel - 1 ♀ (" / wire) } pair?
(40) " " " - 1 ♂ (" / isolated tree) } pair?
(41) Red-tailed Hawk - 1 ad. (" / hedgerow) } pair
(42) " " " - 1 ad (" / ") } pair
(43) "Western" Red-tailed Hawk - 1 ad (" / farm homestead)
→ dark-morph adult; this is subspecies calurus of western N. America.
(44) Red-tailed Hawk - 2 (ad pair) (perched / hedgerow)
(45) " " " - 1 (" / woodlot edge)
(46) " " " - 2 (ad pair) (" / hedgerow)
(47) " " " - 1 (" / isolated tree)
(48) " " " - 1 ad. (" / hedgerow)
(49) " " " - 1 (" / ")
(50) " " " - 1 juv. (" / ")
(51) " " " - 1 (" / isolated tree)
(52) " " " - 1 ad (" / " ")
(53) Am Kestrel - 1 ♀ (" / wire)
(54) Red-tailed Hawk - 1 (" / isolated tree)
(55) " " " - 1 (" / ~~hedgerow~~ wood edge)
(56) Canada Goose - 68 (lawn)
(57) Red-tailed Hawk - 1 (perched / hydro pole)

Monday

111

December 7, 2009

0850-1145

3.0 hrs - 55 km.

VINELAND - DAY LIST

House Sparrow
Eur. Starling
N. Mockingbird
Killdeer (3)
Blue Jay
Red-tailed Hawk
Am. Kestrel
Am. Goldfinch
Rock Pigeon
White-br Nuthatch
Sharp-shinned Hawk
N Cardinal

Red-bellied Woodp.
Mourning Dove
Canada Goose
Mallard
Am Crow
Cooper's Hawk
Red-w Blackbird (8)
Rough-legged Hawk
Ring-billed Gull
Black-capped Chickadee
Hairy Woodp.
Downy Woodp.
Herring Gull

(25) Species

WEATHER

100% overcast
Light + variable winds
Temp about 2°C.

December 8, 2009

VINELAND ROAD SURVEYS

- | | | | | |
|------|------|-------------------|-------------|---------------------------------------|
| | (1) | Red-tailed Hawk | - 1 ad | (perched / isolated tree) |
| | (2) | " " | - 1 | (" / fencepost) |
| | (3) | Rough-legged Hawk | - 1 | (" / isolated tree) |
| | (4) | Red-tailed Hawk | - 1 | (" / ") |
| | (5) | " " | - 1 juv. | (" / barn silo) |
| | (6) | Am Kestrel | - 1 ♀ | (" / isolated tree) |
| | (7) | Red-tailed Hawk | - 1 | (" / trees) |
| | (8) | " " | - 1 ad | (" / edge of woodlot) |
| | (9) | " " | - 1 ad | (" / isolated tree) |
| | (10) | N Harrier | - 1 juv. | (" / fencepost) |
| | (11) | Red-tailed Hawk | - 1 | (" / hedgerow) |
| | (12) | " " | - 1 ad | (" / ") |
| | (13) | " " | - 1 juv. | (" / isolated tree) |
| | (14) | Am Kestrel | - 1 ♂ | (" / wire) |
| | (15) | Red-tailed Hawk | - 1 ad | (" / isolated tree) |
| Tues | (16) | " " | - 1 ad | (" / ") |
| | (17) | " " | - 1 ad | (" / ") |
| | (18) | " " | - 1 | (" / hydro line) |
| | (19) | Am Kestrel | - 1 ♀ | (" / laneway) |
| | (20) | " " | - 1 ♀ | (" / hedgerow) |
| | (21) | Red-tailed Hawk | - 1 | (flying N @ "M" height) |
| | (22) | " " | - 1 | (perched / isolated tree) |
| | (23) | Am Kestrel | - 1 | (" / wire) |
| | (24) | " " | - 1 | (" / wire) |
| | (25) | Red-tailed Hawk | - 1 | (" / hedgerow) |
| * | (26) | " " | - 1 | (" / isolated tree) |
| | (27) | " " | - 1 | (" / woodlot edge) |
| | (28) | " " | - 1 juv. | (" / isolated tree) |
| | (29) | " " | - 2 (ad pr) | (" / " trees) |
| | (30) | Rough-legged Hawk | - 1 | (on ground / harvested soybean field) |
| | | N Harrier | - 1 juv. | (" / ") |

* could be the "Western", but couldn't get a proper look.

VINELAND - December 8/09

31	Am Kestrel - 1	(perched / wire)	
32	Red-tailed Hawk - 1 ad	(perched / isolated tree)	
33	" - 1	" / "	
34	Rough-legged Hawk - 1	" / "	
35	Red-tailed Hawk - 1 ad.	" / hedgerow	
36	" - 1	" / hedgerow	
37	" - 1	" / isolated tree	
38	Rough-legged Hawk - 1	(perched / isolated tree)	
39	Red-tailed Hawk - 1	" / "	
40	" - 1	" / "	
41	Am Kestrel - 1	" / hedgerow	
42	Red-tailed Hawk - 1 juv.	" / woodlot edge	
43	" - 1	" / isolated tree	
44	" - 1	" / hedgerow	
45	Rough-legged Hawk - 1	" / isolated tree	
46	Red-tailed Hawk - 1	" / hedgerow	
47	" - 1	" / "	
48	" - 1 ad.	" / "	
49	" - 2 (ad pr)	" / isolated tree	
50	" - 1	" / "	
51	" - 1 ad	" / "	
52	" - 1	" / woodlot edge	
53	" - 2 (ad pr)	" / isolated tree	
54	" - 1 juv.	" / hydro pole	
55	Am Kestrel - 1	" / wire	
56	Red-tailed Hawk - 1 juv	" / hedgerow	
57	" - 1 ad.	" / "	
58	" - 1	" / woods	
59	Coopers Hawk - 1 ad.	" / woods edge	
60	Red-tailed Hawk - 1	" / hedgerow	

VINELAND - December 8/09

61	Red-tailed Hawk	- 1	(perched / isolated tree)
62	Am. Kestrel	- 1	(" / hedgerow)
63	Red-tailed Hawk	- 1 juv.	(" / wire)
64	" " "	- 1	(" / hedgerow)
65	Am Kestrel	- 1	(" / isolated tree)
66	" "	- 1	(" / fencepost)
67	Red-tailed Hawk	- 1	(" / hedgerow)
68	" " "	- 1	(" / ")
69	" " "	- 1	(" / ")
70	" "	- 1 ad.	(" / hydro pole)
"	Sharp-sh Hawk	- 1 ad.	(" / roadside tree)
71	Am Kestrel	- 1 ♂	(" / wire)
72	" "	- 1	(" / hedgerow)
"	Red-tailed Hawk	- 1	(" / wood edge)
73	Am Kestrel	- 1 ♂	(" / hedgerow)
74	Rough-legged Hawk	- 1	(" / isolated tree)
"	Red-tailed Hawk	- 2 ad. (mated pair)	(" / " ")
75	" " "	- 1 ad	(" / hedgerow)
76	" " "	- 1	(" / post)
77	Am Kestrel	- 1	(" / TV antenna)
78	Red-tailed Hawk	- 1	(" / fencepost)
79	Am Kestrel	- 1	(" / isolated tree)
80	Red-tailed Hawk	- 1 ad	(" / " ")
81	" " "	- 1	(" / hedgerow)

Tue

111

December 8, 2009

1555
1225 - = 3.5 hours (54 km)

VINELAND

Red-tailed Hawk
Herring Gull
Ring-billed Gull
Rough-legged Hawk
Am Crow
Am Kestrel
N Harrier
Blue Jay
White-br Nuthatch
Am Tree Sparrow
Canada Goose

House Sparrow
Brown-headed Cowbird (?)
Rusty Blackbird
Mourning Dove
Eur. Starling
N Cardinal
Hairy Woodp
Cooper's Hawk
Dark-eyed Junco
Sharp-sh Hawk

(21) SPECIES

OVERCAST

LIGHT WINDS

TEMP 0°C

page 1 of 2

Vineland

January 31, 2010

- (1) Red-tailed Hawk - 1 perched (hedgerow)
- (2) Tufted Titmouse - 1 (bird feeder)
- (3) Red-tailed Hawk - 1 ad hunting (field)
- (4) " " - 1 perched (hedgerow)
- (5) " " - 1 flying (fields)
- (6) " " - 2 adults perched (wood edge)
- (7) " " - 1 flying (fields)
- (8) " " - 1 juvenile perched (homestead)
- (9) " " - 3 adults hunting (fields)
- (10) " " - 1 adult perched (isolated tree)
- (11) Canada Goose - 155 resting (beside river)
- (11) Red-tailed Hawk - 1 adult hunting (woods)
- (12) Am Kestrel - 1 ♂ perched (hedgerow)
- (13) N Harrier - 1 juvenile hunting (" ")
- (14) Red-tailed Hawk - 1 ad hunting (fields)
- (15) " " - 1 perched (edge of woodlot)
- (16) " " - 1 hunting (floodplain)
- (16) Tufted Titmouse - 2 (woods)
- (17) Red-tailed Hawk - 1 ad hunting (fields)
- (18) " " - 1 ad " (" ")
- (19) " " - 2 ad. (pr) perched (forest edge)
- (20) N Harrier - 1 ad. ♂ hunting (fields)
- (21) Red-tailed Hawk - 1 perched (forest edge)
- (22) " " - 1 " (" ")
- (23) " " - 1 ad hunting (field)
- (24) Am Kestrel - 1 ♂ perched w/ mouse (wire along road)
- (25) Red-tailed H - 2 ad flying (fields)
- (26) " " - 2 ad (pair) perched (woods edge)
- (27) " " - 1 ad hunting (fields)

Vineland
Jan 31, 2010

page 2 of 2

- (28) Cooper's Hawk - 1 ad hunting (homestead)
- (29) Red-tailed Hawk - 1 ad perched (hedgerow)
- (30) " " - 2 ad (pr) hunting (fields)
- (31) " " - 1 perched (edge of woods)
- (32) " " - 1 " (" " ")
- (33) Rough-legged Hawk - 1 perched (dark morph) (hedgerow)
- (34) Red-tailed Hawk - 1 ad perched (isolated tree)
- (35) " " - 1 juvenile hunting (fields)
- " Am Kestrel - 1 ♀ perched (wire)
- (36) Rough-legged Hawk - 1 perched (light morph) (hedgerow)
- (37) Red-tailed Hawk - 1 hunting (fields)
- (38) " " - 1 ad hunting (fields)
- (39) Am Kestrel - 1 perched (roadside wire)
- (40) Red-tailed - 1 ad hunting (fields)
- (41) " " - 1 hunting (" ")
- " ~~(41)~~ N Harrier - 1 imm ♂ " (" ")
- (42) Am Kestrel - 1 ♂ perched (isolated tree)
- " Red-tailed Hawk - 1 ad perched (hedgerow)
- (43) " " - 1 perched (" ")
- (44) Herring Gull - 10 resting (field)
- " Red-tailed Hawk - 1 hunting (fields)
- (45) Snow Bunting - 350 feeding (plowed soybean field)
- (46) Red-tailed Hawk - 1 perched (wood edge)
- " Am Kestrel - 1 perched (roadside wire)
- (47) Canada Goose - 70 feeding (corn stubble)

3.4 hrs (74 km)

Vineland - Day List
January 31, 2010

Red-tailed Hawk
Am Tree Sparrow
Dark-eyed Junco
Tufted Titmouse
House Sparrow
White-br. Nuthatch
Black-c Chickadee
Red-bellied Woodp.
Am Crow
Canada Goose
Am Kestrel
N Harrier

Eur. Starling
Mourning Dove
Blue Jay
Rock Pigeon
Coopers Hawk
Downy Woodpecker
Snow Bunting
Norther Flicker
Herring Gull
Rough-legged Hawk

(22) species

WEATHER

~~partly~~ mostly cloudy - occasional very light snow

stiff SW wind

Temp: -5°C

minimum snow cover

Vineland
February 21, 2010

page 1 of 3

- ① Red-tailed Hawk x 2 (ad pair) (perched - hedgerow)
- ② " " " x 1 (" ")
- ③ Am Kestrel x 1 (" - isolated tree)
- ④ " " x 1 ♀ (" - ")
- ⑤ N Harrier x 1 juvenile (hunting - overgrown field)
- ⑥ Red-tailed Hawk x 1 (sitting - woodlot edge)
- ⑦ Sharp-sh Hawk x 1 juvenile (" - ")
- ⑧ Red-tailed Hawk x 2 juvenile (" - ")
- ⑨ " " " " x 1 adult (" - ")
- ⑩ " " " " x 1 adult (" - ")
- ⑪ " " " " x 2 adult (pair) (" - woodlot edge)
- ⑫ " " " " x 1 (" - isolated tree)
- ⑬ " " " " x 4 singles (" - hedgerow)
- ⑭ N Harrier x 1 ad ♀ (sitting - field)
- ⑮ Am Kestrel x 2 (pair) (" - isolated trees)
- ⑯ Red-tailed Hawk x 2 singles (" - ")
- ⑰ " " " " x 1 (" - " tree)
- ⑱ " " " " x 1 juvenile (" - woodlot edge)
- ⑲ " " " " x 1 (" - ")
- ⑳ Am Kestrel x 1 ♂ (" - ")
- ㉑ Red-tailed Hawk x 1 (" - ")
- ㉒ Am Kestrel x 1 ♀ (" - roadside wire)
- ㉓ " " x 2 (pair) (" - ")
- ㉔ " Red-tailed Hawk x 1 (" - isolated tree)
- ㉕ " " " " x 1 ad. (" - woodlot edge)
- ㉖ " " " " x 1 (" - ~~is~~ hedgerow)
- ㉗ " " " " x 1 (" - isolated tree)
- ㉘ " " " " x 1 (" - ")

Vineland - Feb 21 / 2010
page 2 of 3

- (26) Red-tailed Hawk x 5 (sitting / woodlot edge)
 (27) " " " x 1 (" / isolated tree)
 (28) Am Kestrel x 1 (" / wire)
 (29) Red-tailed Hawk x 1 ad. (" / woodlot edge)
 (30) " " " x 1 (" / hedgerow)
 (31) Rough-legged Hawk x 1 lightmorph (" / ")
 (32) " " " x 1 " (hunting / fields)
 * 32 (32) Am Kestrel x 2 pair (sitting / hedgerow)
 33 " " x 1 ♂ pair (" / roadside wire)
 (34) N Harrier x 1 juv. (hunting / over fields)
 (35) Red-tailed Hawk x 1 ad (sitting / river valley woods)
 (36) Am Kestrel x 1 (flying)
 (37) Red-tailed Hawk x 1 (sitting) hydro tower
 (38) " " " x 1 juvenile (" / roadside wire)
 (39) " " " x 2 (" / hedgerow)
 (40) " " " x 1 (" / isolated tree)
 (41) " " " x 1 (" / ")
 (42) " " " x 2 (" / hedgerow)
 42 (42) " " " x 1 ad (" / hydro pole)
 (43) Rough-legged Hawk x 1 lightmorph (hunting / over fields)
 (44) Red-tailed Hawk x 2 (sitting / woodlot)
 (45) " " " x 1 (" / fence post)
 " " " x 1 (" / hedgerow)
 (46) " " " x 1 (" / tree)
 (47) " " " x 2 ad (pair) (" / roadside tree)
 (48) " " " x 2 ad (") (" / isolated tree)
 → (24) Am Kestrel x 1 (" / ")
 (49) " " " x 1 (" / snag in meadow)
 (50) Red-tailed Hawk x 1 (" / isolated tree)
 (51) Am Kestrel x 1 ♀ (" / wire)
 (52) Red-tailed Hawk x 1 (" / isolated tree)

Vineland - Feb. 21/2010
page 3 of 3

- (53) Red-tailed Hawk x 1 (sitting / isolated tree)
- (54) Am Kestrel x 1 (" / wire)
- (55) Rough-legged Hawk x 1 light morph (" / isolated tree)
- (56) Red-tailed Hawk x 1 juv. (" / hedgerow)
- (57) Am Kestrel x 1 (" / wire)
- " Coopers Hawk x 1 (" / isolated tree)
- (58) Am Kestrel x 1 (" / wire)
- (59) Red-tailed Hawk x 1 (" / isolated tree)
- (60) Rough-legged Hawk x 1 light morph (hunting / fields)
- (61) Red-tailed x 1 (sitting / woodlot edge)
- (62) " " x 1 (" / hedgerow)
- " Rough-legged x 1 light morph (" / ")
- (63) Red-tailed x 1 ad (flying / fields)
- (64) N Harrier x 1 ad ♀ (sitting / field)
- (65) Red-tailed x 1 (" / isolated tree)
- (66) " " x 1 ad (hunting / fields)
- (67) " " x 1 ad (flying / fields)

Vineland - Feb. 21 / 2010

Blue Jay
Eur. Starling
Red-tailed Hawk
Am Crow
Am Kestrel
Rock Pigeon
House Sparrow
N Harrier
Horned Lark (spring migrants)
Sharp-sh Hawk
Dark-eyed Junco
Am Tree Sparrow

Red-bellied Woodpecker
Black-capped Chickadee
Canada Goose
Hairy Woodpecker
Rough-legged Hawk
N Cardinal
Cooper's Hawk

(19) Species

February 21, 2010

mostly clear
-3°C
light SW winds
- spotty snow cover

3.5 hours (70 km)

APPENDIX B

Plant List

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

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

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.

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 (*Spiraea 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

0 125 250 500 750 1,000 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 190 recorded taxa (unique plant records) for this study site.

Community Series:

Deciduous Forest (FOD)
Deciduous Swamp (SWD)

Mixed Meadow (MEM)
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 (*Cornus 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-angliae*), 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)
Beggar-ticks 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

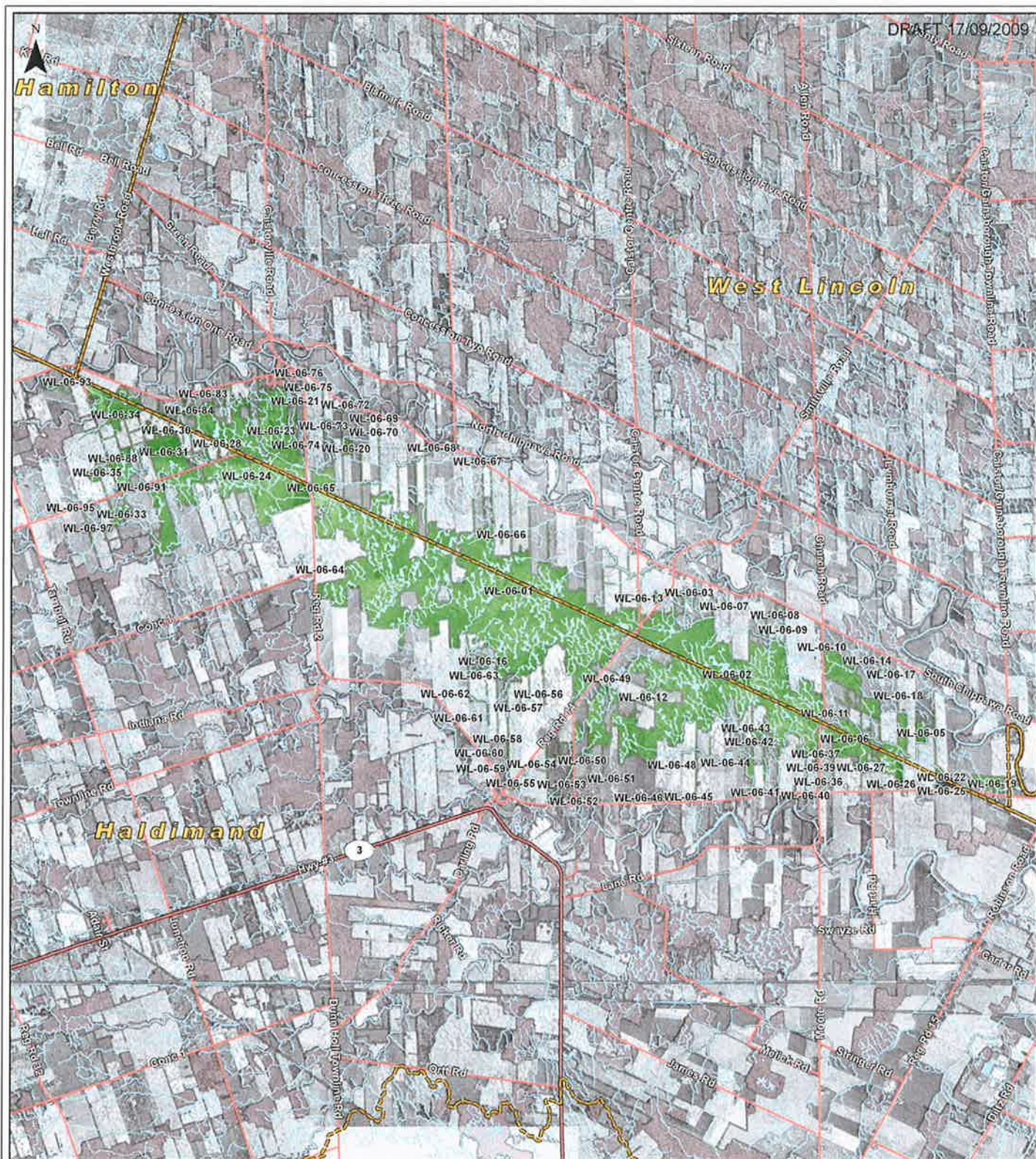
<http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

Macdonald, Ian D. 1980. *Life Science Features of the Haldimand Clay Plain Physiographic Region*. Richmond Hill, Ontario,

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



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)
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

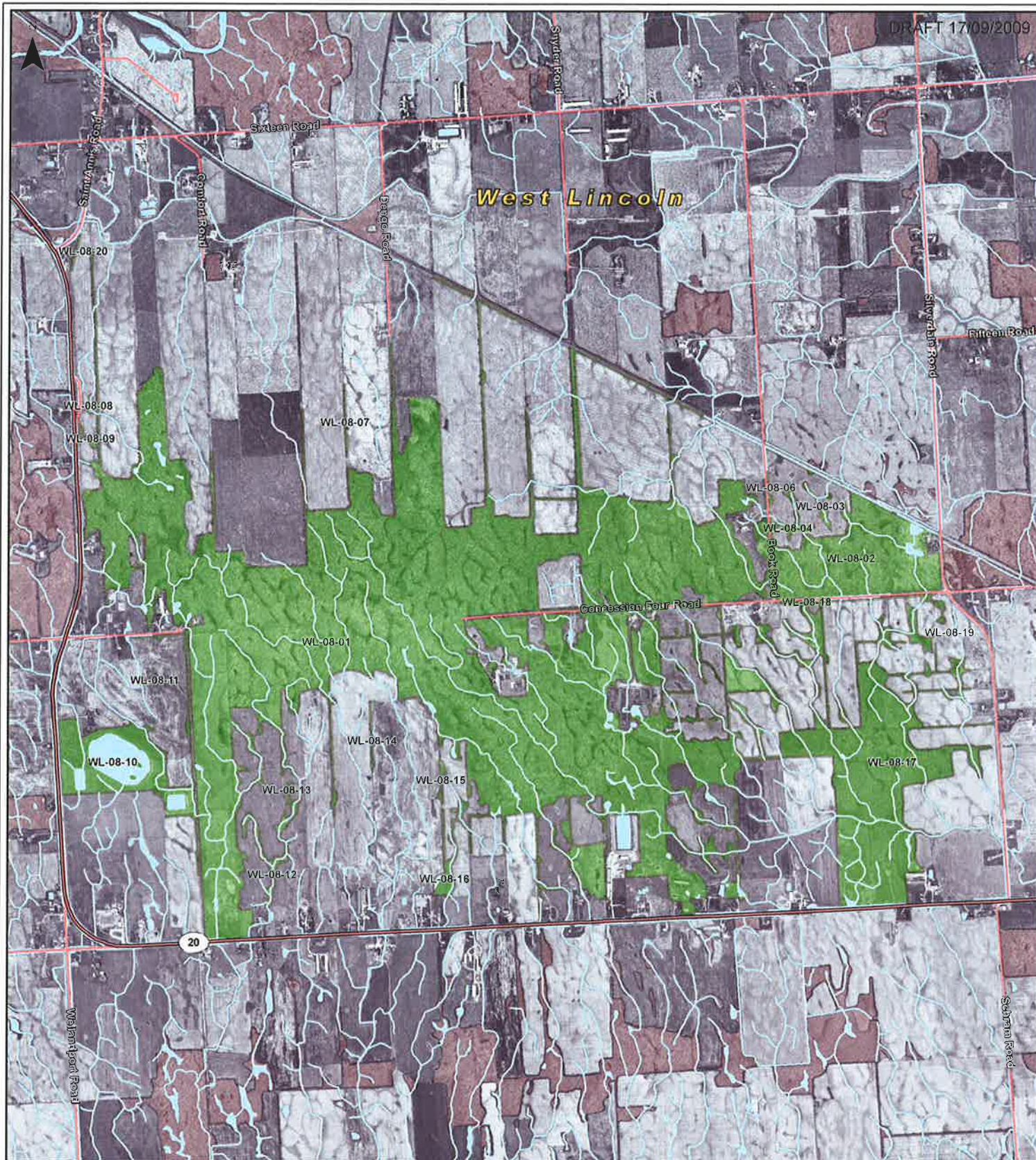
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

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>

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 | Waterbodies |
| == Regional Highways | Municipal Boundaries |
| — Roads | Study Sites |
| ~ Watercourses | 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

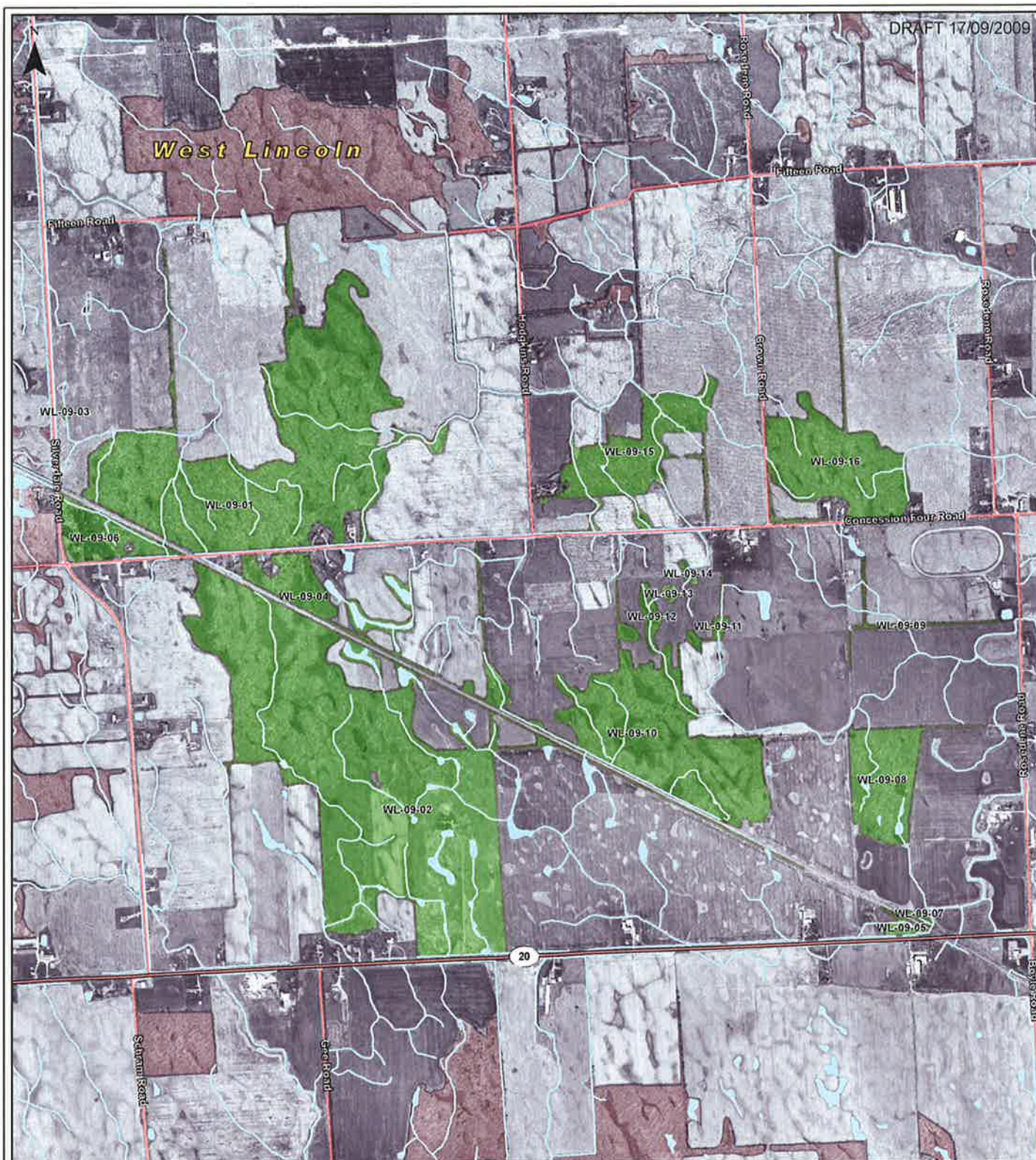
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

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

0 125 250 500 750 1,000 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 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

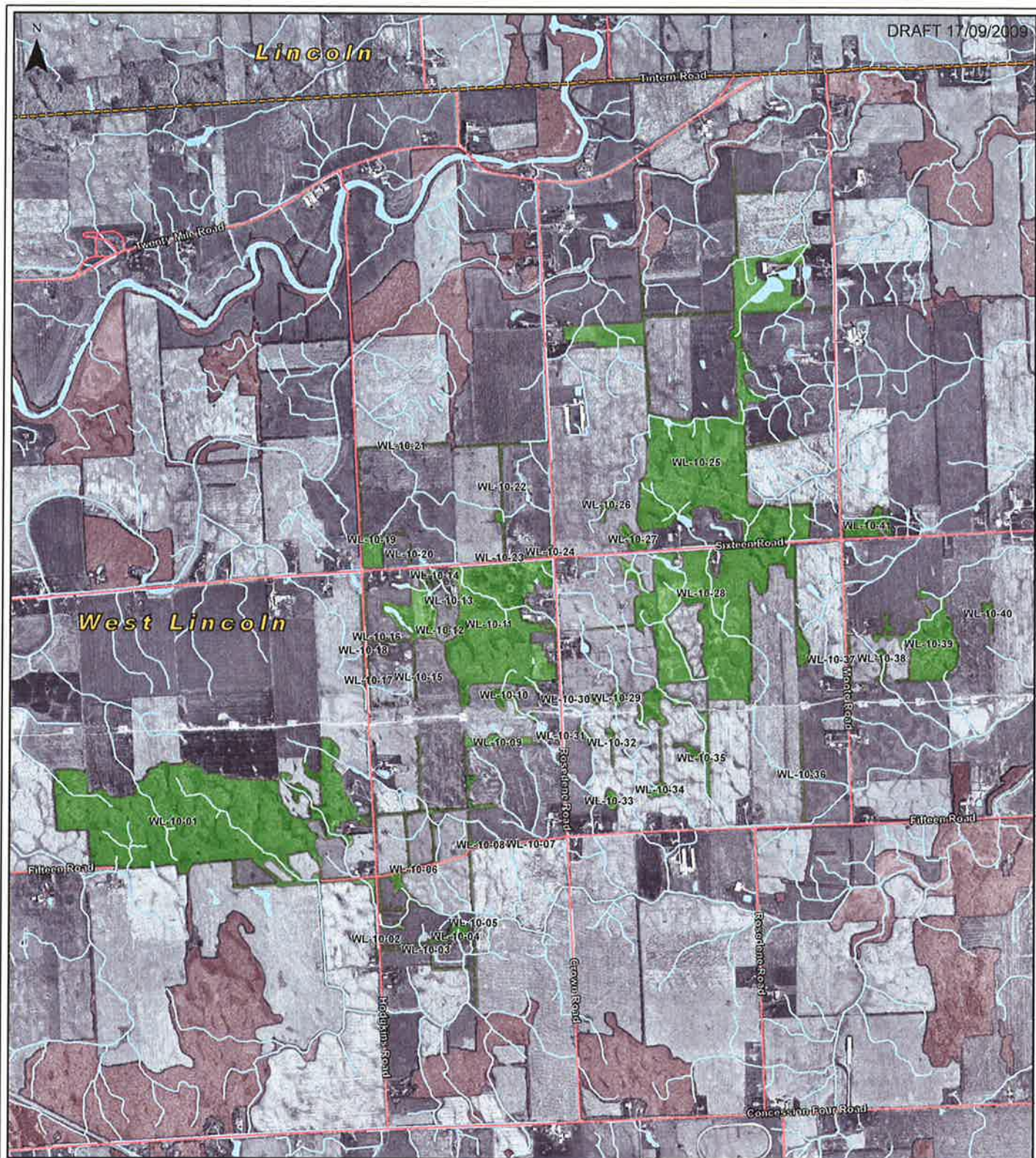
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

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>

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-10



Natural Areas Inventory

Study Site WL-10

1:22,000

0 150 300 600 900 1,200 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 183 recorded taxa (unique plant records) for this study site.

Community Series:
Deciduous Forest (FOD)
Deciduous Swamp (SWD)

Graminoid Meadow (MEG)
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

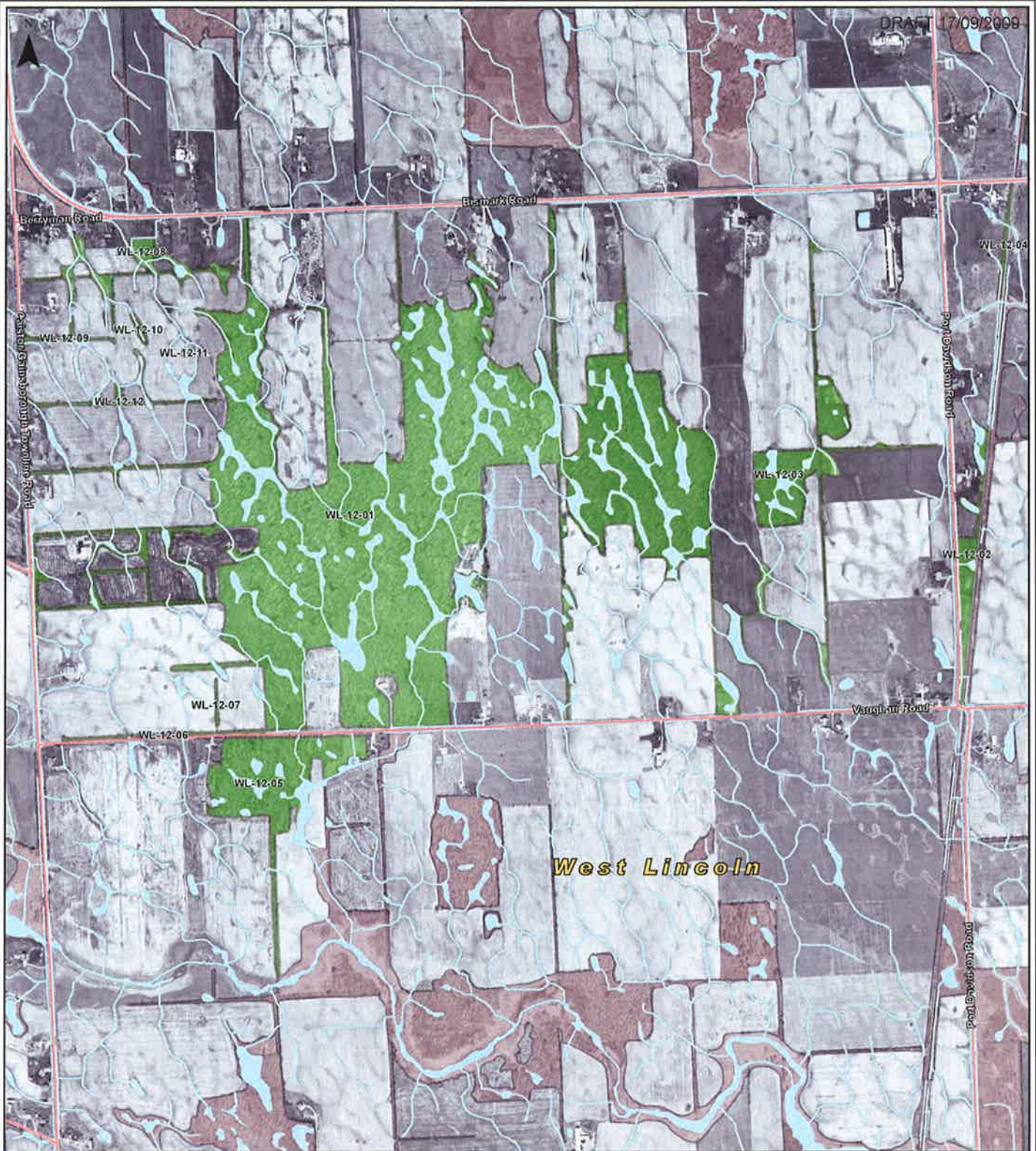
% of site visited

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.

DRAFT 17/09/2009



Legend

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



Natural Areas Inventory

Study Site WL-12

1:14,000

0 100 200 400 600 800 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 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

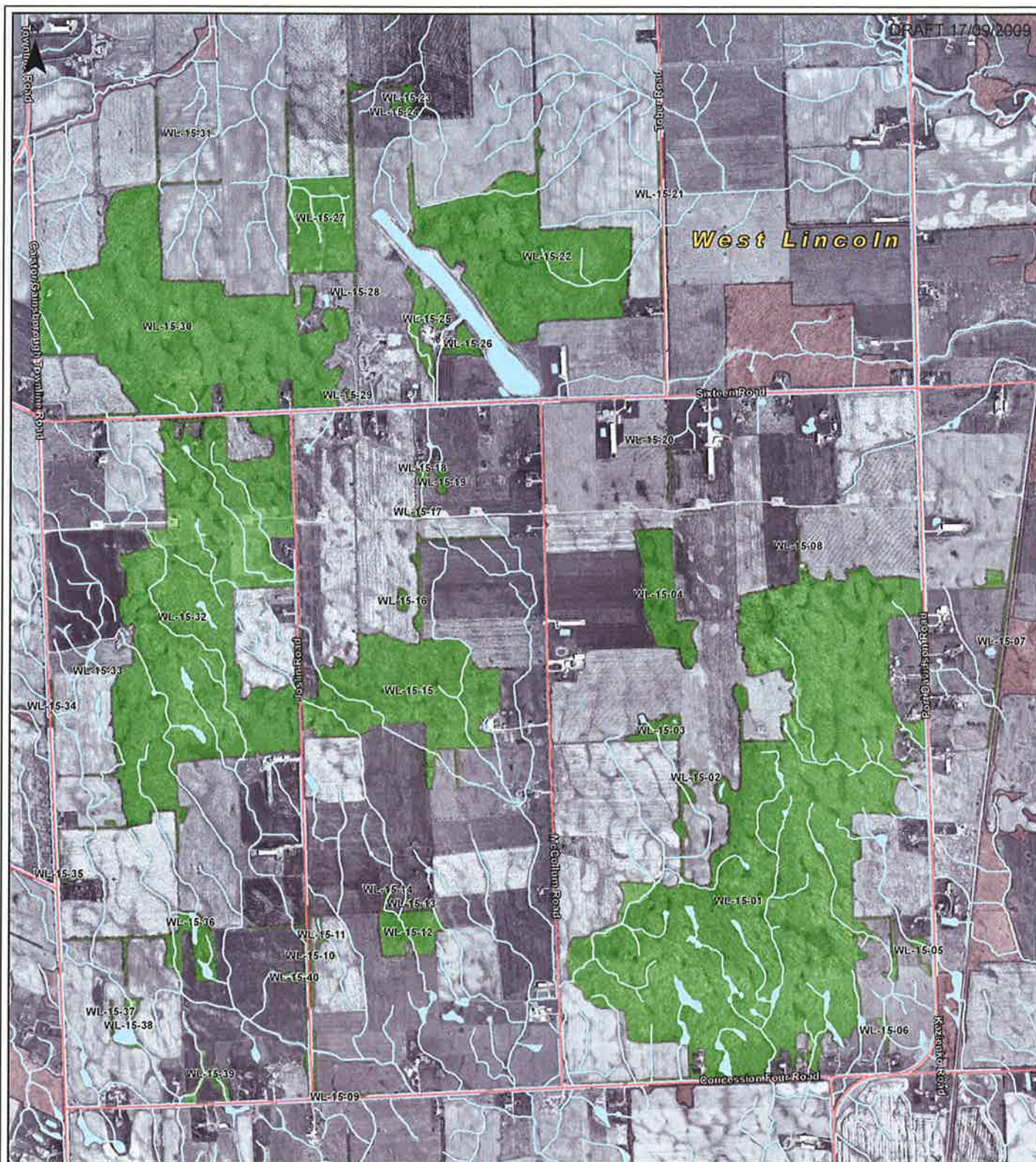
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

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>

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-15



Natural Areas Inventory

Study Site WL-15

1:17,000

0 125 250 500 750 1,000 Meters

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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.

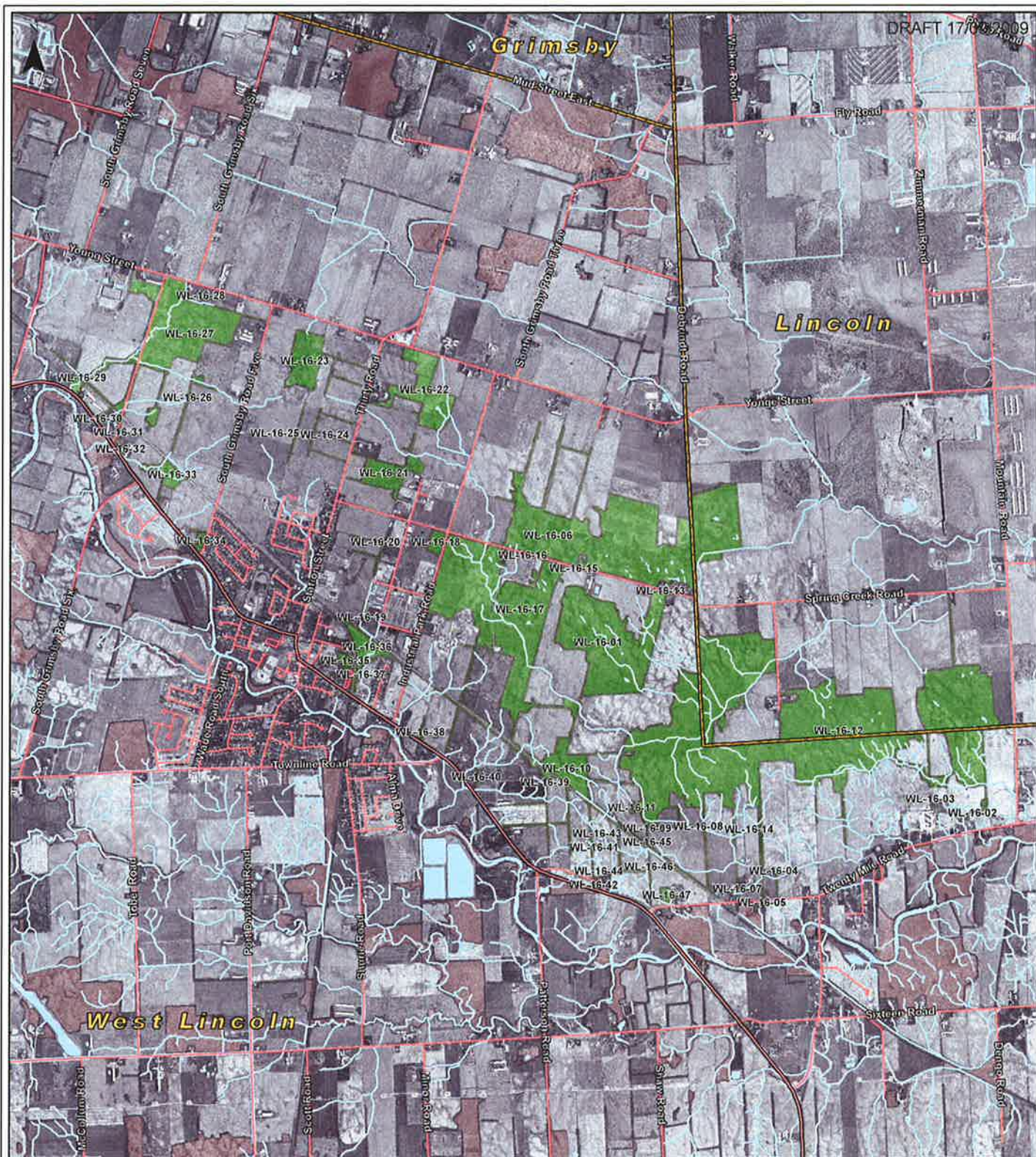
Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

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.

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



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. Nikitzuk

% 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>

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-20



Natural Areas Inventory

Study Site WL-20



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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

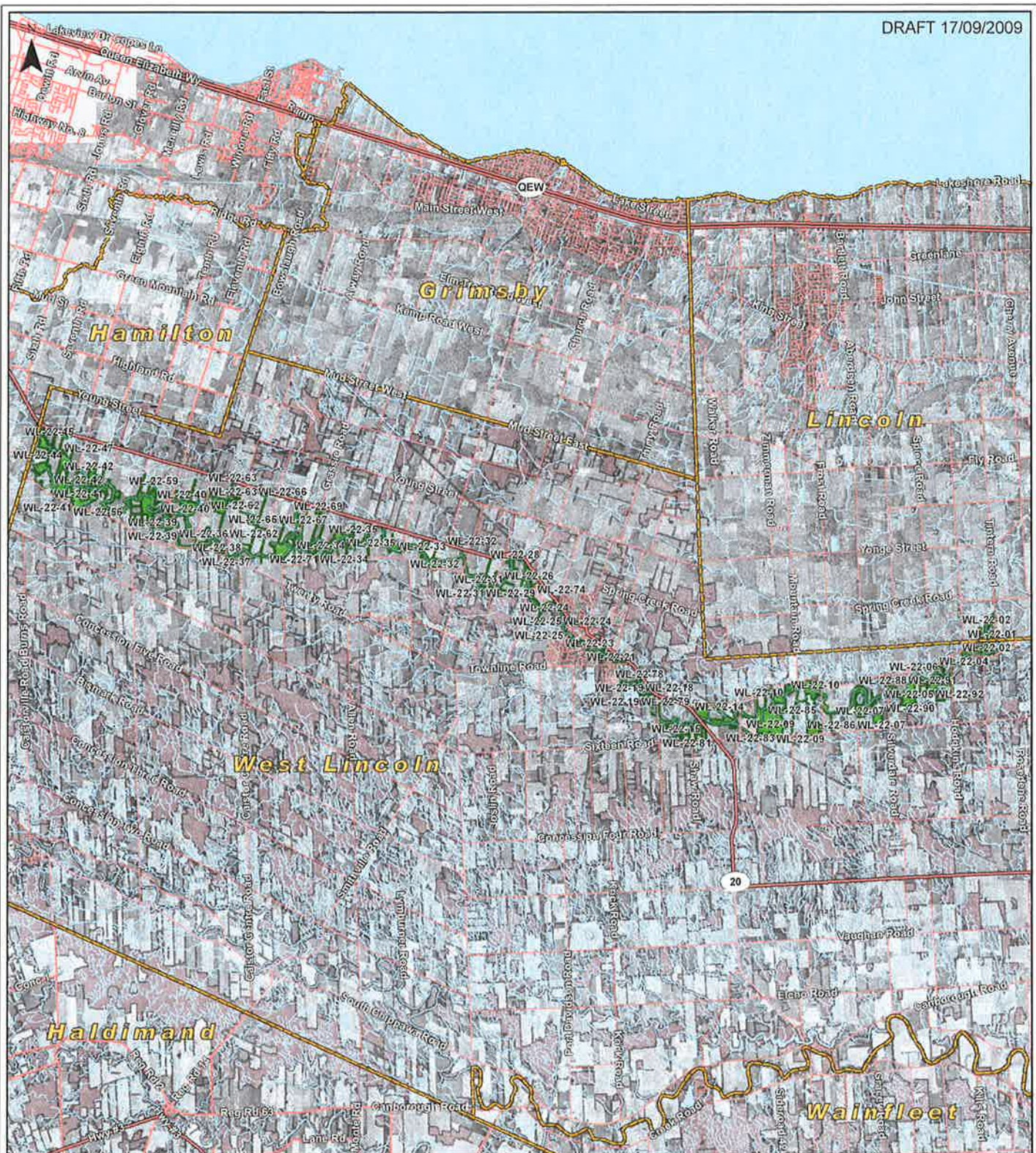
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

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-22



Natural Areas Inventory

Study Site WL-22

1:130,000

0 1,000 2,000 4,000 6,000 8,000 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 93 recorded taxa (unique plant records) for this study site
Community Series:
Deciduous Forest (FOD) Meadow Marsh (MAM)
Deciduous Thicket (THD) Open Water (OAW)
Grainoid 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.

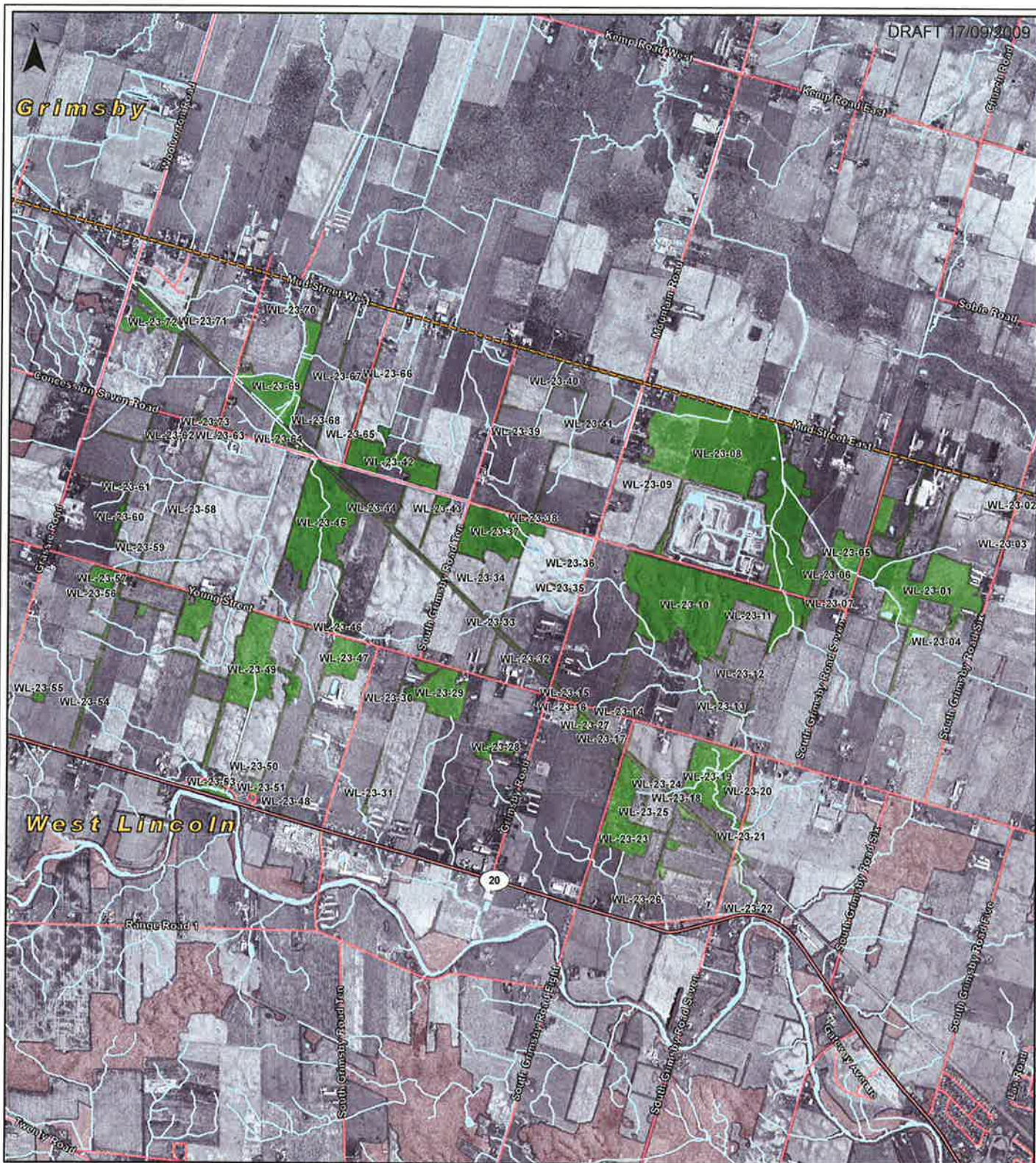
Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

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-23



Natural Areas Inventory

Study Site WL-23

1:33,000

0 250 500 1,000 1,500 2,000 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 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 (*Spiraea 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.

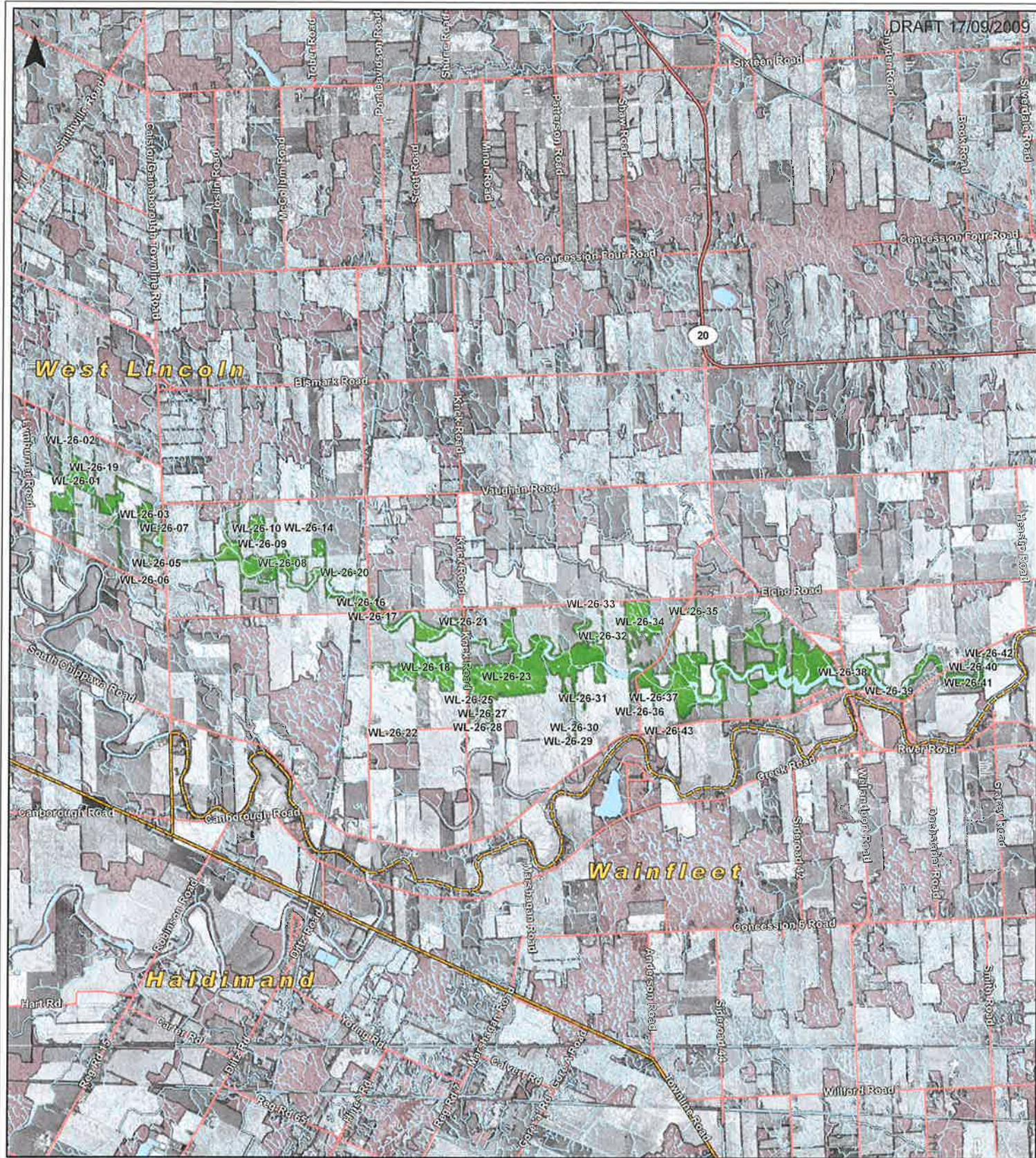
References Cited

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>

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-26



Natural Areas Inventory

Study Site WL-26

1:64,000

0 400 800 1,600 2,400 3,200 Meters

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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

1:28,000

0 200 400 800 1,200 1,600 Meters

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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

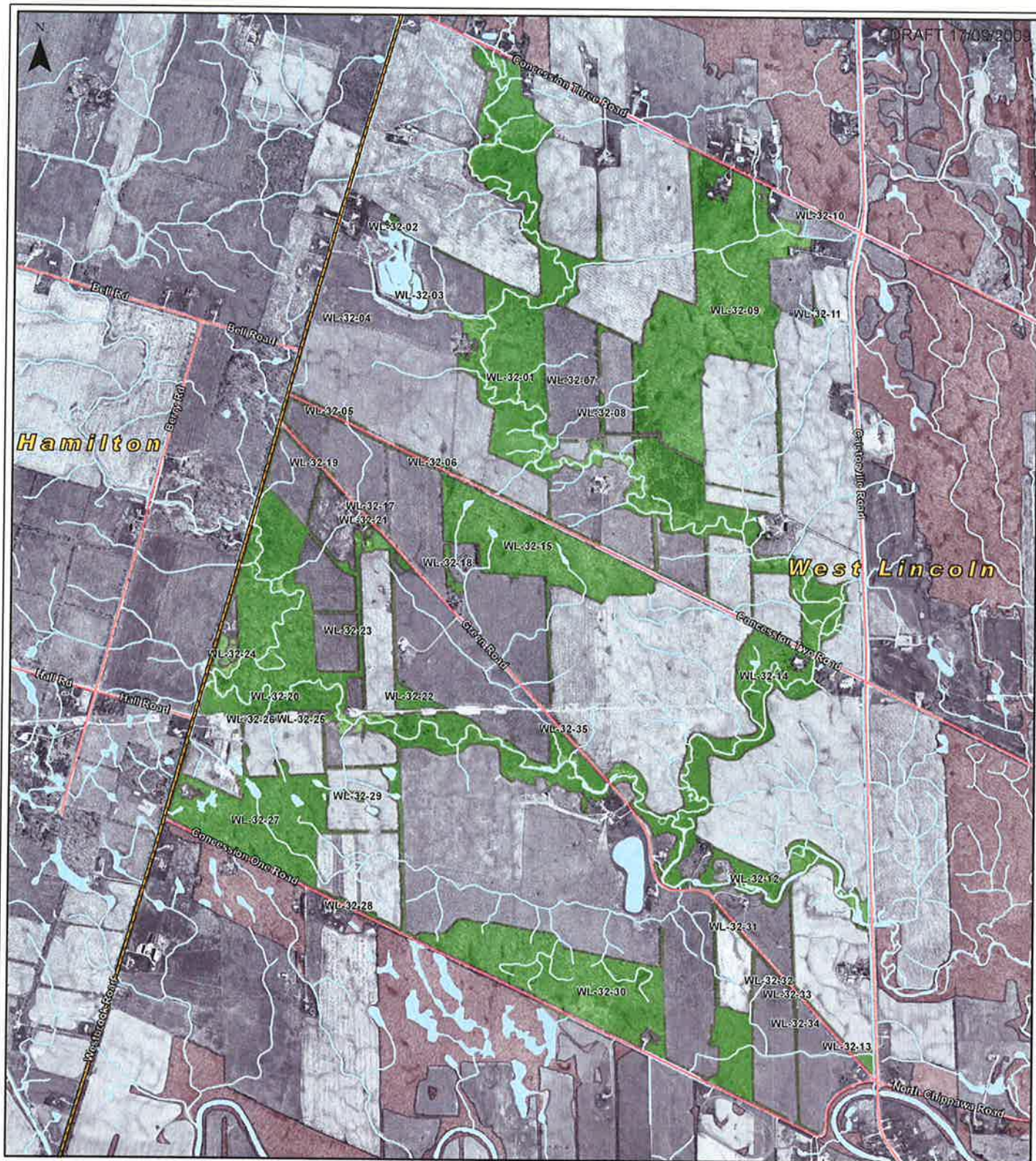
Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from

<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 | Waterbodies |
| Regional Highways | Municipal Boundaries |
| Roads | Study Sites |
| Watercourses | Study Site WL-32 |



Natural Areas Inventory

Study Site WL-32

1:18,000

0 125 250 500 750 1,000 Meters

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There are a total of 62 recorded taxa (unique plant records) for this study site.
Community Series:
Deciduous Swamp (SWD)

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							
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													
Common Names							Coefficient Conservation	Coefficient Wetness			SRank	NPCA Rare	Introduced
	Cultural	FOD9-2	FOD9-3	SWD	MAS2-1	MAS2			COSEWIC	COSSARO			
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 leptonervia
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 sprengelii
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>Cypripedium 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</i> ssp. <i>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</i> ssp. <i>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>
Pickereel-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 hatterianus</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	Uvularia sessilifolia
Velvetleaf Blueberry	Vaccinium myrtilloides
Tape-grass	Vallisneria americana
Narrow-leaved Vervain	Verbena simplex
Hoary Vervain	Verbena stricta
American Speedwell	Veronica americana
Wild Raisin	Viburnum cassinoides
Purple Vetch	Vicia americana
Carolina Vetch	Vicia caroliniana
Le Conte's Violet	Viola affinis
Lance-leaved Violet	Viola lanceolata
Smooth White Violet	Viola macloskeyi ssp. pallens
Kidney-leaf Violet	Viola renifolia
Round-leaved Violet	Viola rotundifolia
Dotted Water Meal	Wolffia borealis
Columbia Water Meal	Wolffia columbiana
Virginia Chain Fern	Woodwardia virginica
Horned Pondweed	Zannichellia palustris
White Camass	Zigadenus elegans ssp. glaucus

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.

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 (*Spiraea 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

0 125 250 500 750 1,000 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 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 (*Cornus 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-angliae*), 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)
Beggar-ticks 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

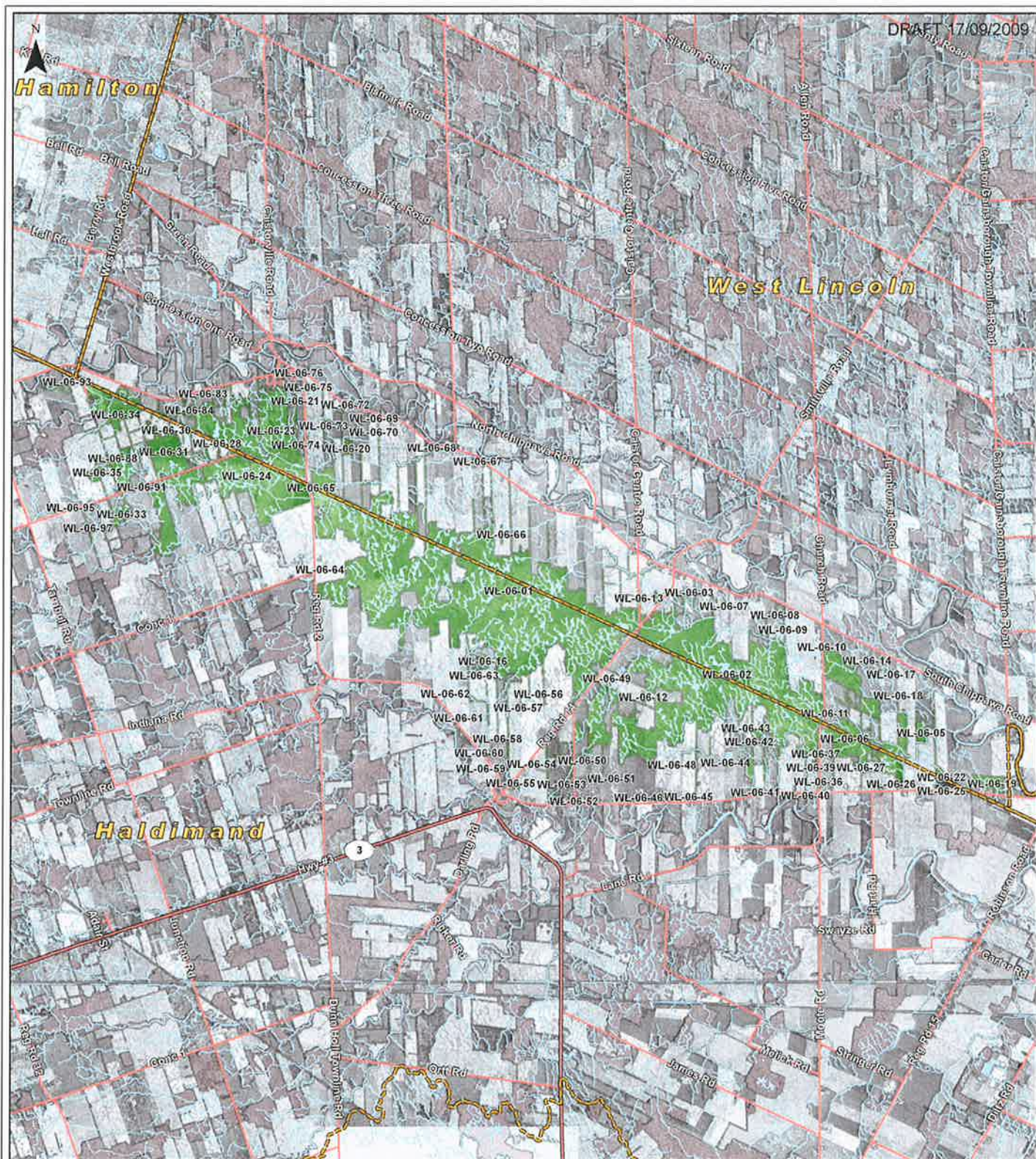
<http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

Macdonald, Ian D. 1980. *Life Science Features of the Haldimand Clay Plain Physiographic Region*. Richmond Hill, Ontario,

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



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

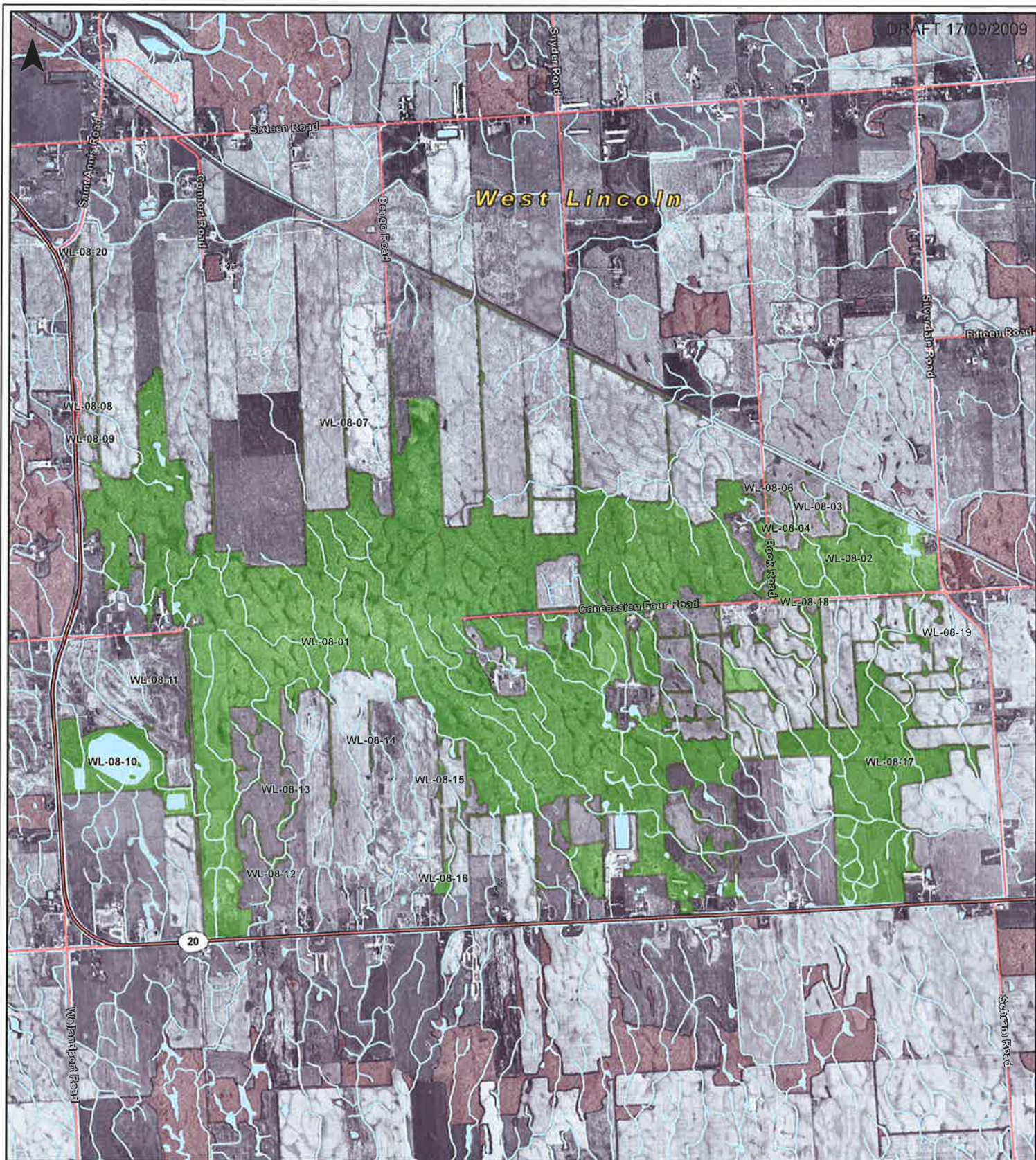
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

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>

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 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

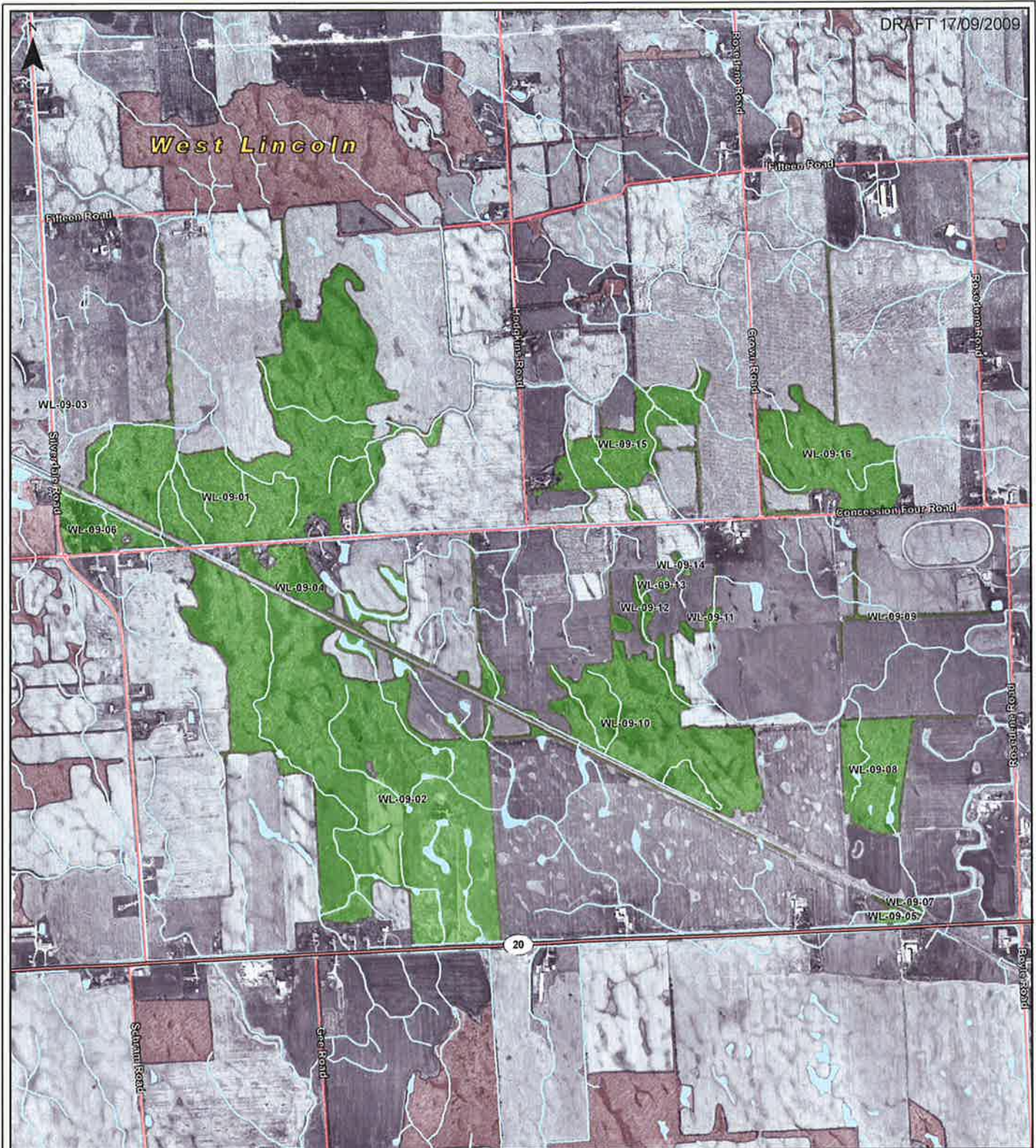
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

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

0 125 250 500 750 1,000 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 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

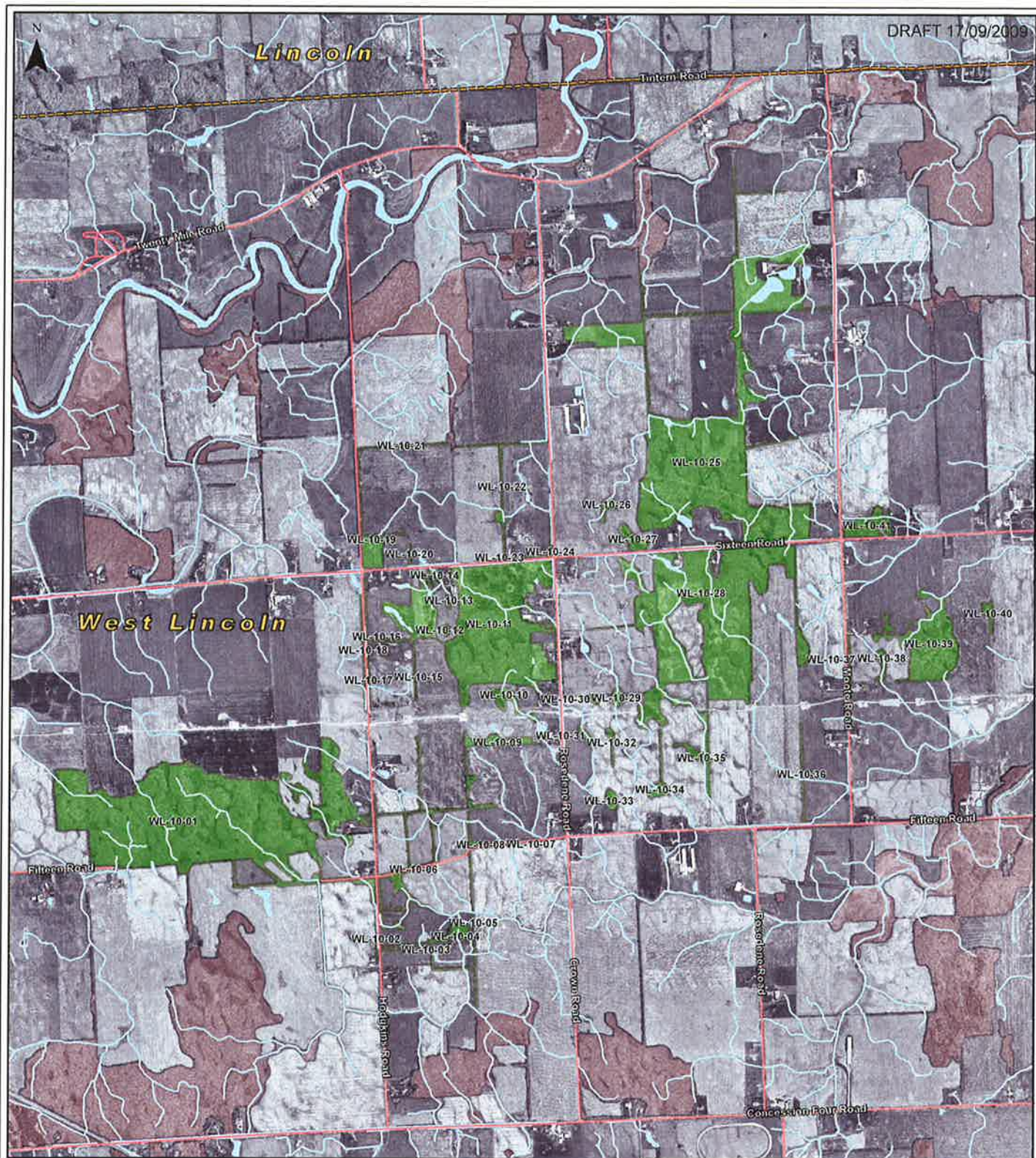
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

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>

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-10



Natural Areas Inventory

Study Site WL-10

1:22,000

0 150 300 600 900 1,200 Meters

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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)

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

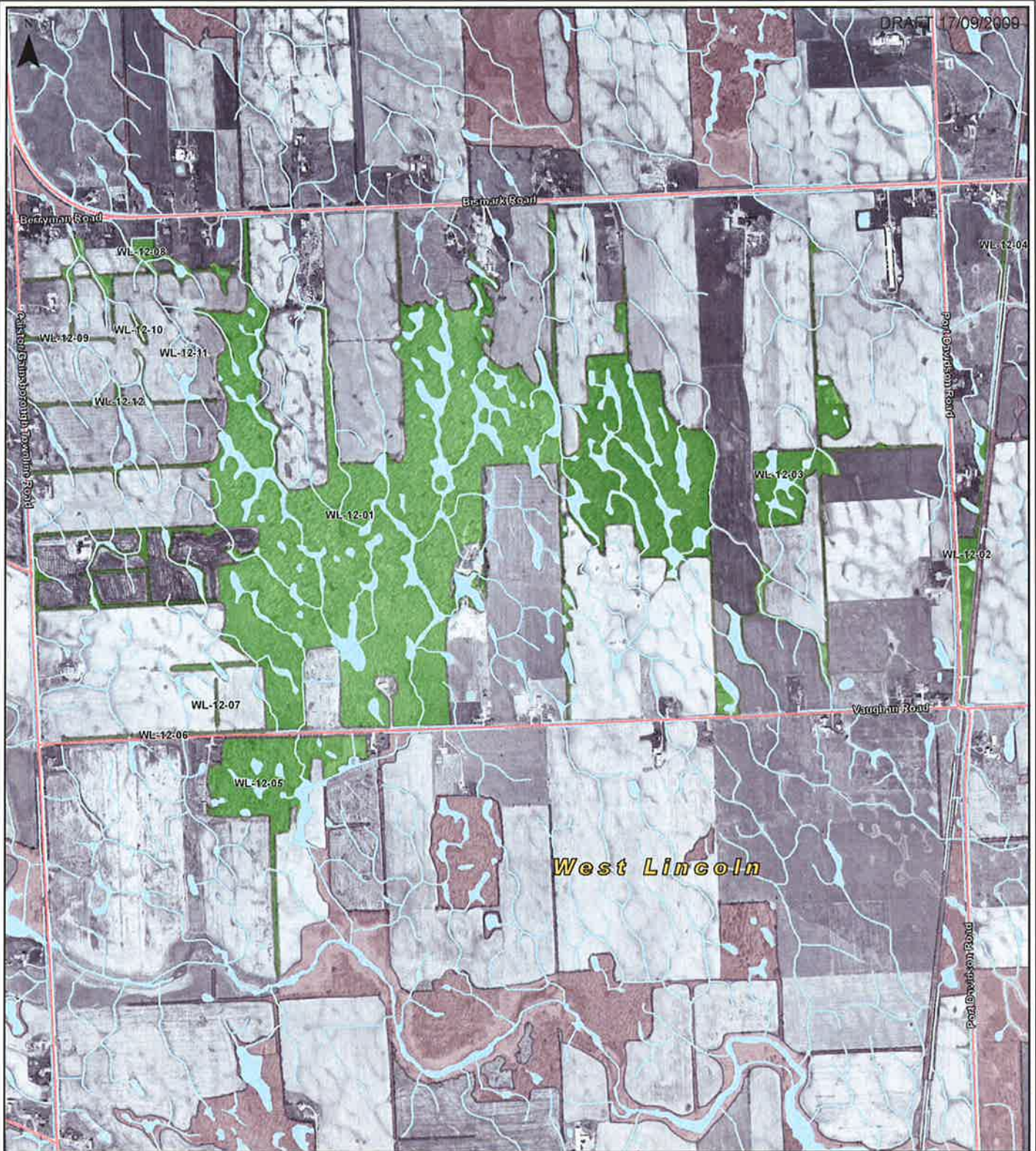
% of site visited

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.

DRAFT 17/09/2009



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

0 100 200 400 600 800 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 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

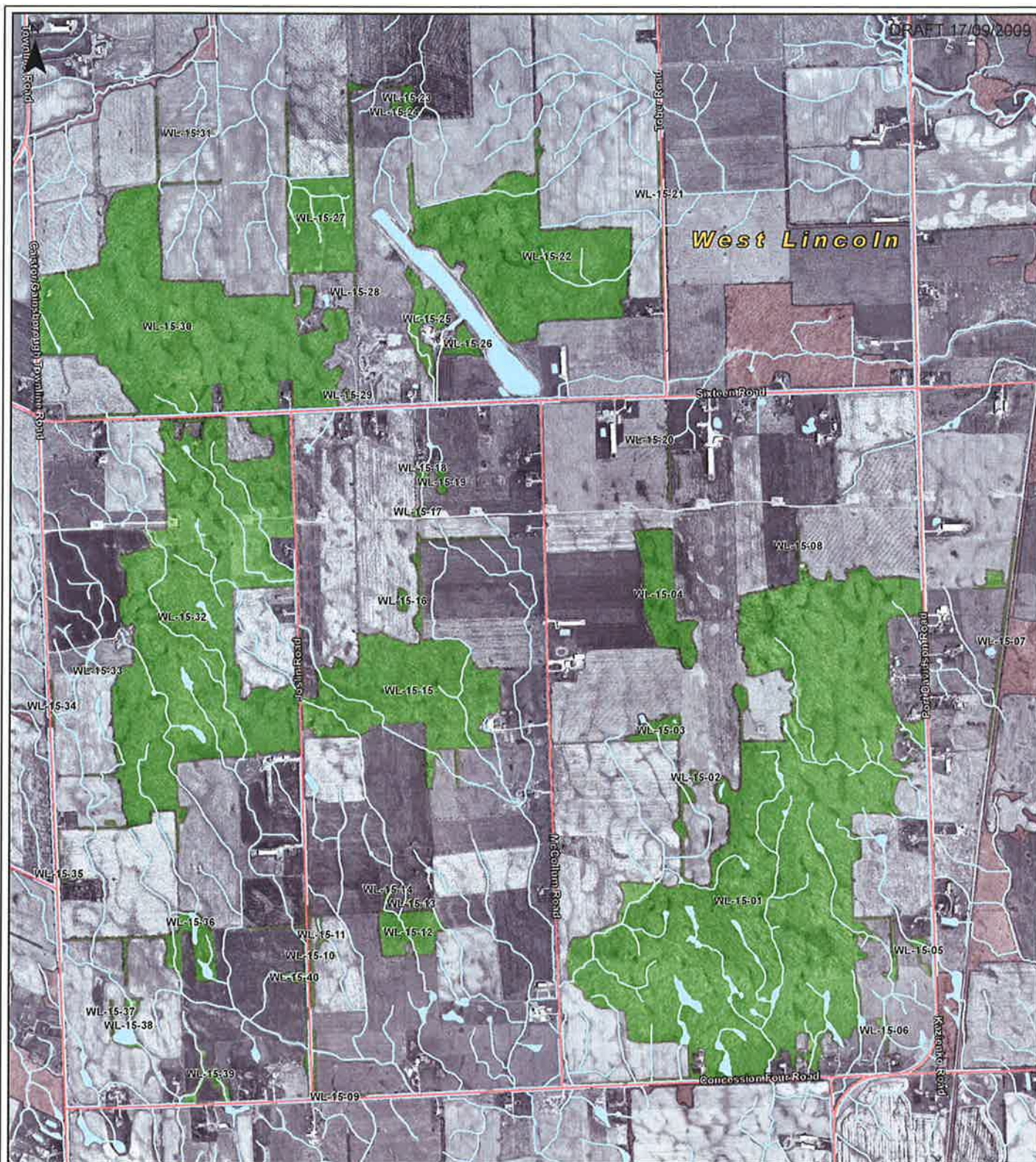
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

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>

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-15



Natural Areas Inventory

Study Site WL-15

1:17,000

0 125 250 500 750 1,000 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 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.

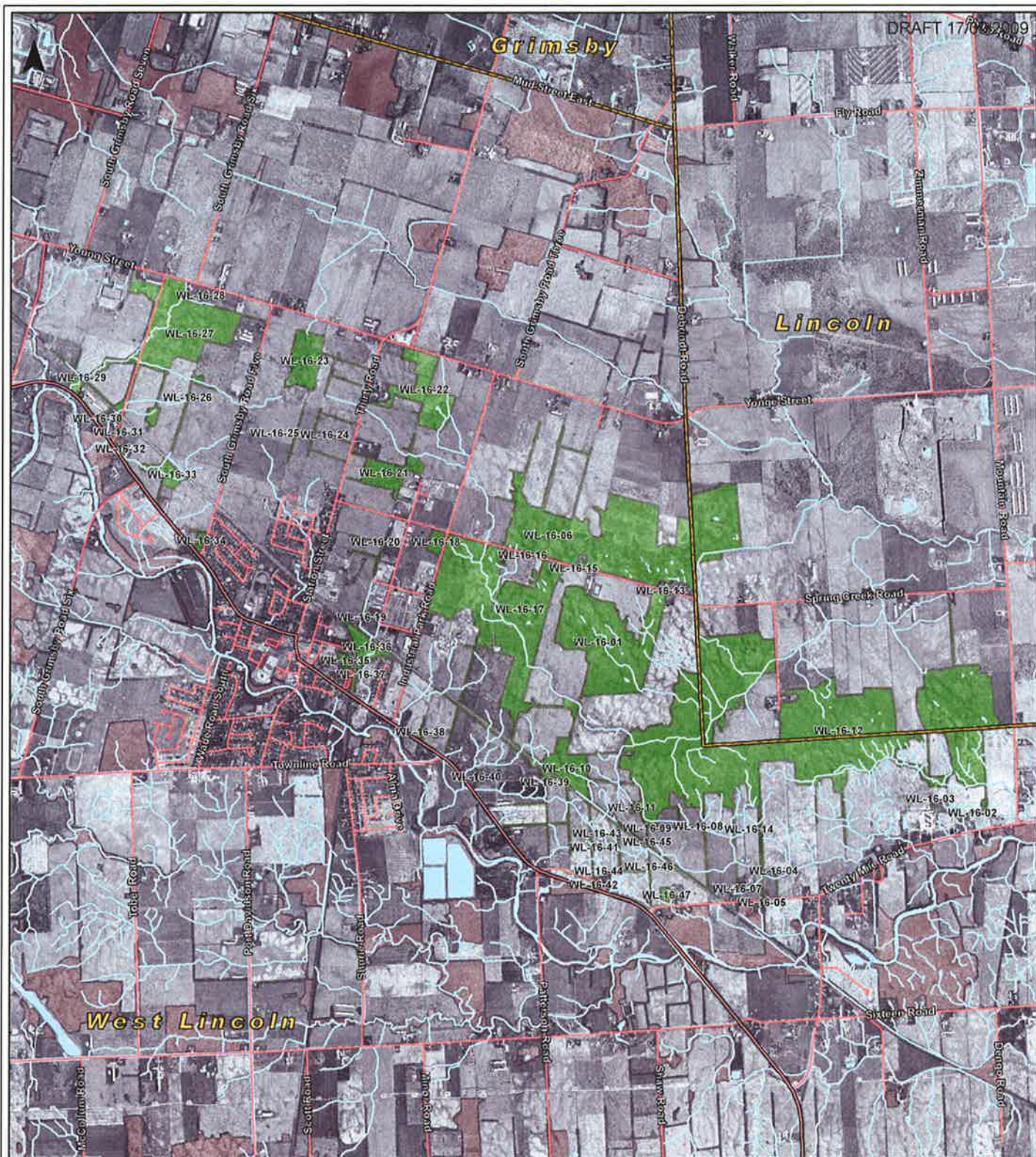
Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

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.

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



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. Nikitzuk

% 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>

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.



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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

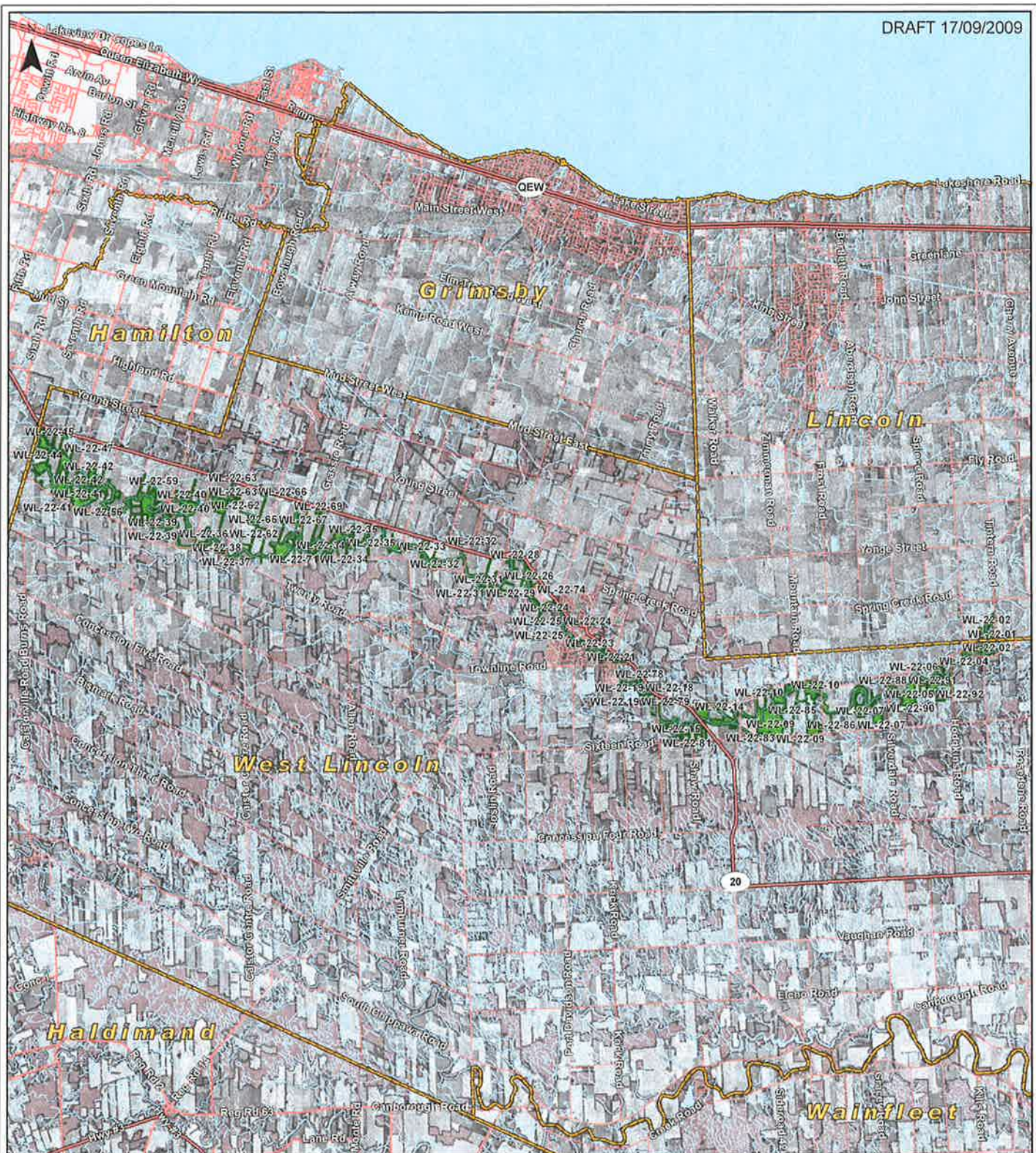
Brady, R., et al. 1980. *Environmentally Sensitive Areas*. Regional Municipality of Niagara, Brock University, Department of Geography, St. Catharines, Ontario.

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-22



Natural Areas Inventory

Study Site WL-22

1:130,000

0 1,000 2,000 4,000 6,000 8,000 Meters

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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)
Grainoid 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.

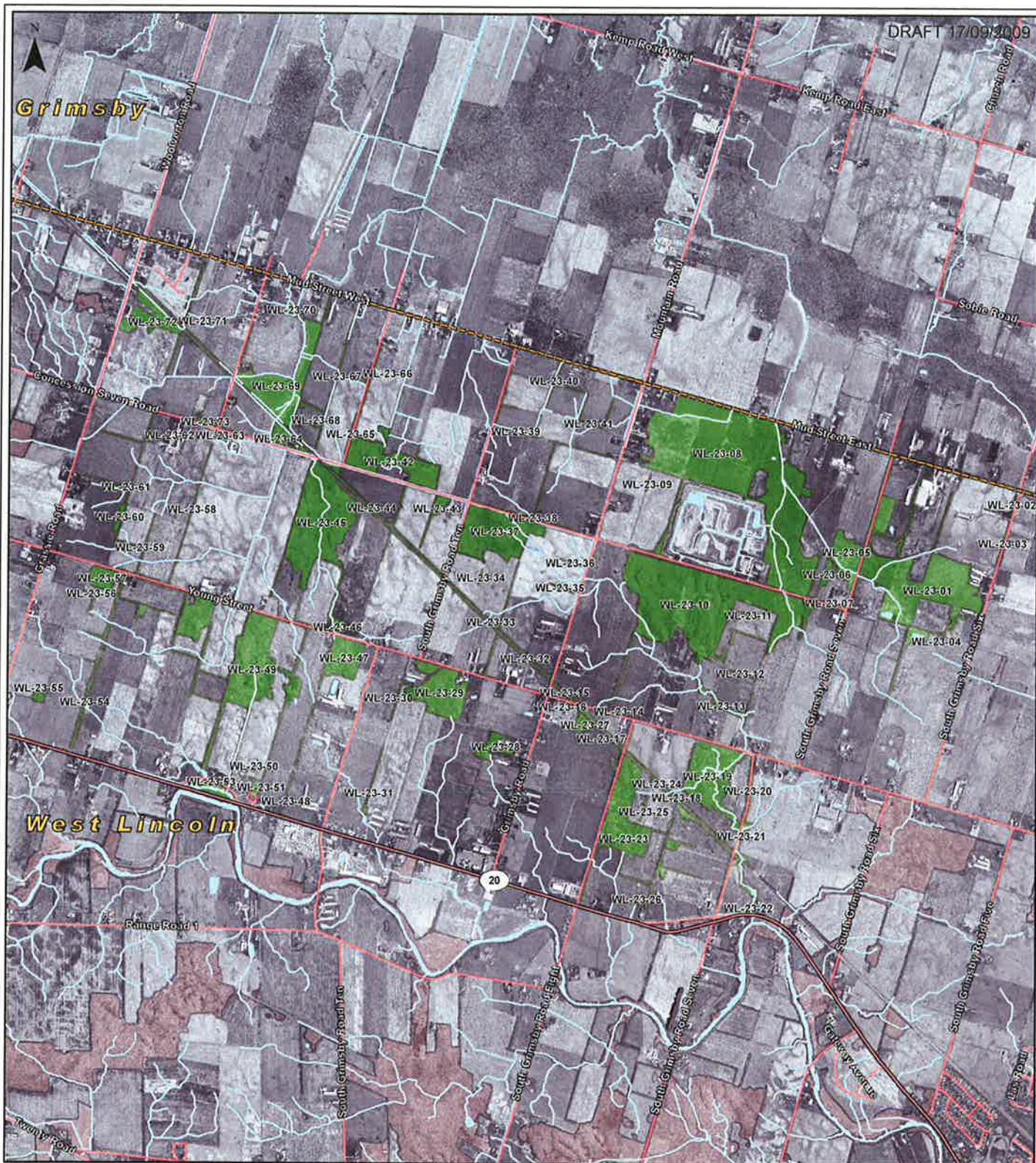
Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276504.html>

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-23



Natural Areas Inventory

Study Site WL-23

1:33,000

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

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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 (*Spiraea 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.

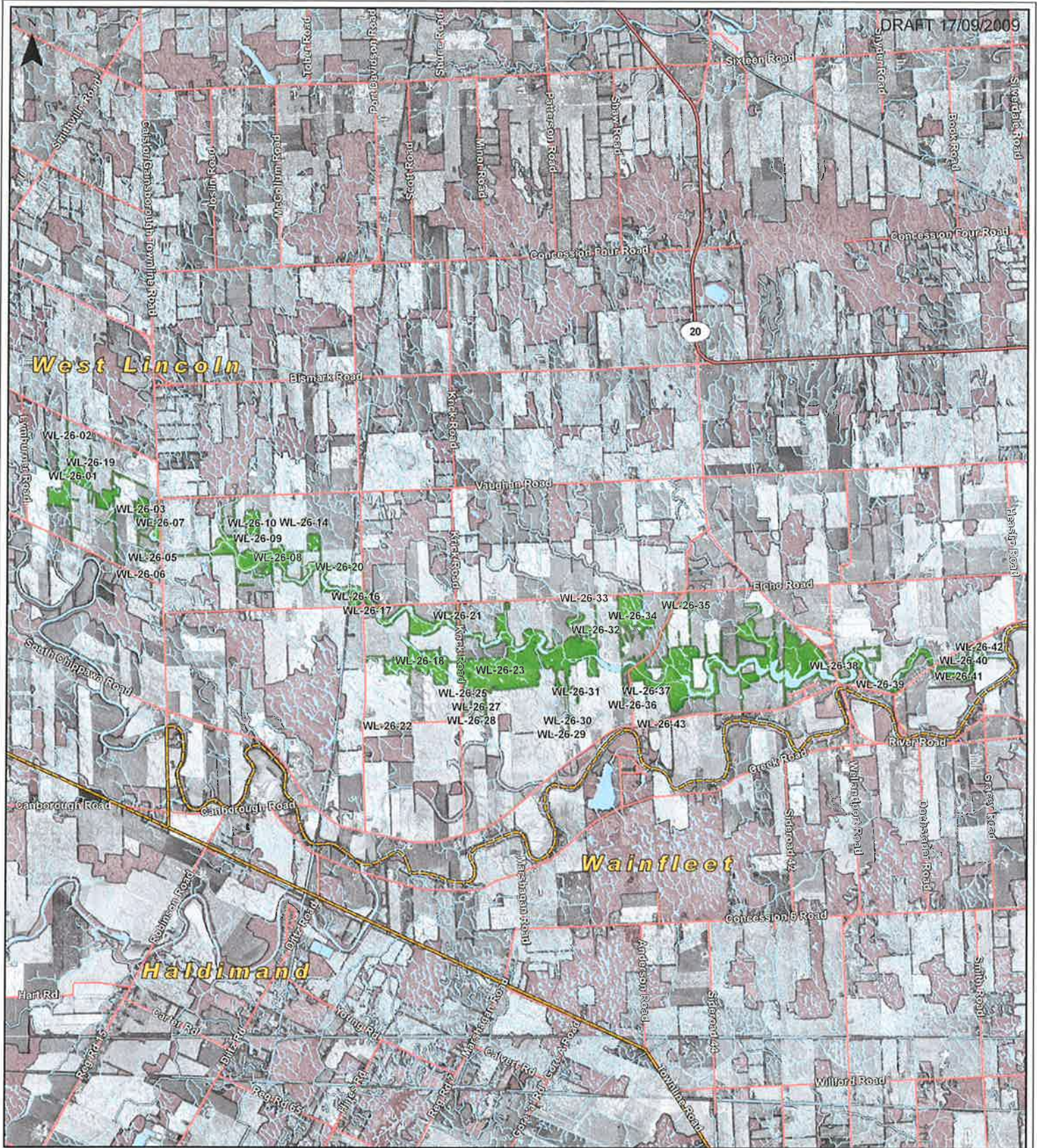
References Cited

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>

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-26



Natural Areas Inventory

Study Site WL-26

1:64,000

0 400 800 1,600 2,400 3,200 Meters

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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.

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

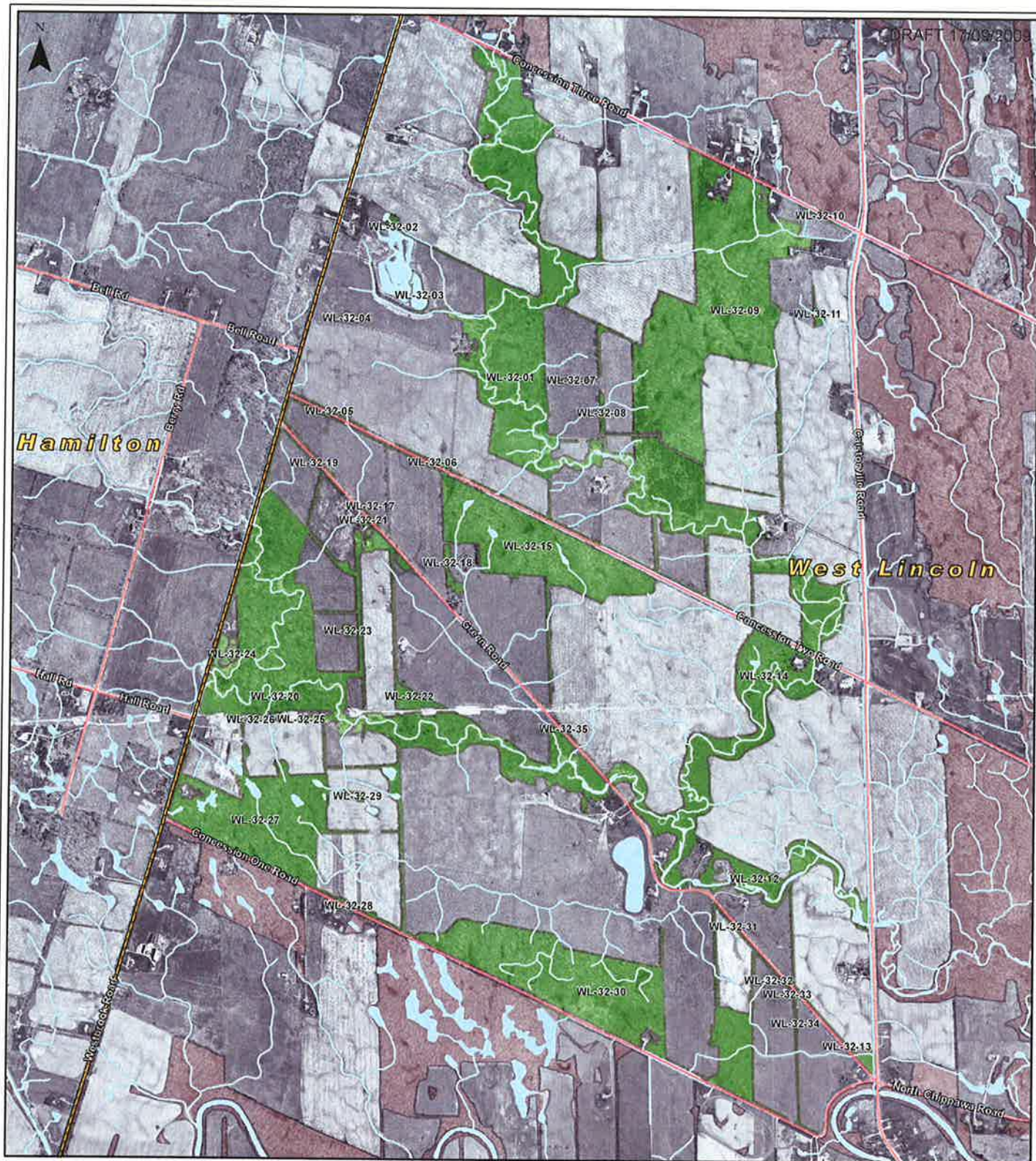
Government of Ontario, Ministry of Natural Resources. 2009. Deciduous Forest. Species at Risk in Ontario. Retrieved 11/05, 2009, from

<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 | Waterbodies |
| Regional Highways | Municipal Boundaries |
| Roads | Study Sites |
| Watercourses | Study Site WL-32 |



Natural Areas Inventory

Study Site WL-32

1:18,000

0 125 250 500 750 1,000 Meters

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There are a total of 62 recorded taxa (unique plant records) for this study site.
Community Series:
Deciduous Swamp (SWD)

APPENDIX C

Photographic Record

Photographic Record



Crossing 5 - agricultural swale looking east to Station Road



Crossing 5 - agricultural swale looking south to Station Road



Crossing 6 – Feeder of Old Mill Race Creek along Station Road looking north



Casey Drain – Near Turbine 4

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 Chelapeau, 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: 1104037.00

Project Title: HAF WIND ENERGY PROJECT

Report: 007-R02-1104037

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

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

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 (or provincially significant, as the case may be for wetlands and ANSIs);
- 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),
- Ecoregion 6E 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
Wetland: Twenty Mile Creek Wetland Complex AKA Abingdon Northwest Wetland	3-5 metres from Access Road to Turbine 1 and 2	MNR	OWES	Provincially Significant
Woodland: Mill Creek-Inverary Woods	25.4 metres from Turbine 4 Access Road	NPCA	NPCA Natural Areas Inventory Study, Township of West Lincoln Official Plan Schedule B and Region of Niagara Policy Plan.	Significant
Woodland: Twenty Mile Creek Woodlot	7 metres from Underground Collector Line	NPCA	NPCA Natural Areas Inventory Study, Township of West Lincoln Official Plan Schedule B and Region of Niagara Policy Plan.	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: Twenty Mile Creek Wetland Complex AKA Abingdon Northwest	3-5 metres from Access Road to Turbine 1 and 2	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

Natural Heritage Assessment Report

Feature Type/ID	Distance from Project Location	Evaluation of Significance Criteria & Procedures Used	Dates, Times & Duration of Evaluation	Names and qualifications of evaluators
Wetland				
Southern Wetland: HAF Windfarm Wetland Unit	0 meters Access road and underground collector line will intersect this feature	Significance criteria and procedures to evaluate significance followed OWES	See Appendix A	Bettina Henkelman, Erin McLachlan, Stephanie Goom See Appendix B
Valleyland: #1 (Twenty mile Creek)	0 metres Underground Collector Line and Access Road to Turbine 1 will intersect this 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: #2 (Tributary of Twenty Mile Creek)	0 metres Underground Collector Line and Access Road to Turbine 1 and 2 will intersect this 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	See Appendix A	Josephine Gilson, Kelly Sadlier, Stephanie Goom See Appendix B

Natural Heritage Assessment Report

Feature Type/ID	Distance from Project Location	Evaluation of Significance Criteria & Procedures Used	Dates, Times & Duration of Evaluation	Names and qualifications of evaluators
		<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>		
Valleyland: #3 (Tributary of Twenty Mile Creek)	0 metres Underground Collector Line and Access Road to Turbine 3 will intersect this feature	<p>A natural feature is considered a valleyland:</p> <p>(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</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>	See Appendix A	Josephine Gilson, Kelly Sadlier, Stephanie Goom See Appendix B
Valleyland: #4 (Tributary of Twenty Mile Creek)	0 metres Underground Collector Line and Access Road to Turbine 3 and 4 will intersect this feature	<p>A natural feature is considered a valleyland:</p> <p>(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.</p>	See Appendix A	Josephine Gilson, Kelly Sadlier, Stephanie Goom See Appendix B

Natural Heritage Assessment Report

Feature Type/ID	Distance from Project Location	Evaluation of Significance Criteria & Procedures Used	Dates, Times & Duration of Evaluation	Names and qualifications of evaluators
		<p>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>		
Valleyland: #5 (Tributary of Twenty Mile Creek)	107 metres from Turbine 5	<p>A natural feature is considered a valleyland:</p> <p>(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</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>	See Appendix A	<p>Josephine Gilson, Kelly Sadlier, Stephanie Goom</p> <p>See Appendix B</p>
Woodland: Mill Creek-Inverary Woods	25.4 metres from Underground Collector Line	<p>Significance confirmed by NPCA during Natural Areas Inventory Study, Township of West Lincoln Official Plan Schedule B and Region of Niagara Policy Plan.</p> <p>Other criteria: Provision of significant wildlife</p>	See Appendix A	<p>Bettina Henkelman, Erin McLachlan, Samantha Lawson, Stephanie Goom</p> <p>See Appendix B</p>

Natural Heritage Assessment Report

Feature Type/ID	Distance from Project Location	Evaluation of Significance Criteria & Procedures Used	Dates, Times & Duration of Evaluation	Names and qualifications of evaluators
		<p>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>		
Woodland: Twenty Mile Creek Woodlot	7 metres from Underground Collector Line	<p>Significance confirmed by NPCA during Natural Areas Inventory Study, Township of West Lincoln Official Plan Schedule B Region of Niagara Policy Plan.</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>

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 are two wetland complexes within 120 metres of the project location: Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (Northwest) Wetland) and HAF Windfarm Wetland Unit (**See Figure 1**).

Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (Northwest) Wetland)

Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (Northwest) 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. Wetlands were delineated using the Ontario Wetland Evaluation System (OWES) for Southern Ontario by a certified OWES evaluator (See Appendix B for Staff Resumes and Qualifications).

Lower Twenty Mile Creek Wetland Complex (AKA Abingdon (Northwest) Wetland) is a 1907.1-hectare provincially significant wetland complex with 88% swamp and 12% marsh communities. The wetland provides habitat for birds, amphibians and fish. This feature is being treated as Provincially Significant and will be discussed in the Environmental Impact Study (EIS).

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Lower Twenty Mile Creek Wetland Complex	1907.10 ha	Provincially Significant	-wetland dominated by swamp (88%) and marsh (12%)	-MAS -dominated by swamp white oak, green ash and white elm	-provides habitat for birds, amphibians and fish -contains federal, provincial and locally significant species -historically active feeding area for American Bullfrogs and Great Blue Heron

HAF Windfarm Wetland Unit

The HAF Windfarm Wetland Unit is a 0.419-hectare wetland complex that is connected to Lower Twenty Mile Creek Wetland Complex. It is composed of 2 mineral shallow marsh communities and may provide marginal wildlife habitat. The wetland was evaluated for significance using the Ontario Wetland Evaluation System (OWES) and got a total score of 315 (see Appendix D). This feature is not significant.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
HAF Windfarm Wetland Unit	0.419 ha	Unknown	-wetland dominated by marsh species	MAS2 -mineral shallow marsh -dominated by reed canary grass	-minimal wetland area -marginal wildlife habitat -conveys water downstream

Valleylands

Five valleylands (all associated with Twenty Mile Creek) were identified within 120 metres of the project location during Site Investigations (**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.

Valleyland #1 (Twenty Mile Creek)

This 2.55-hectare valleyland is a permanent channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Twenty Mile Creek. There is potential for this watercourse to provide habitat for sensitive species during certain times of the year. This valleyland is heavily impacted by agricultural practices and is of no significance within the project location, due to the amount of channelization, lack of vegetation communities, including riparian vegetation, and lack of valleyland morphological features such as slopes, flows, meanders, substrates, seepages and natural springs.

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Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Valleyland #1 (Twenty Mile Creek)	2.55	Unknown	-permanent watercourse flowing through lands dominated by agriculture, grasses and riparian vegetation; channelized by agricultural practices (highly disturbed)	-warm water, moderate to high sensitivity watercourse; potential presence of sensitive species at certain times of year	-landform depression that has flowing water contributing to downstream flows

Analysis based on Section 5.5 of the Natural Heritage Reference Manual (MNR, 2011):

Valleyland #1 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. It does have a linkage function as it contributes to downstream flows.

Evaluation Result:

This site is not considered significant.

Valleyland #2 (Tributary of Twenty Mile Creek)

This 3.88-hectare valleyland is a permanent channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Twenty Mile Creek. 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
Valleyland #2 (Tributary of Twenty Mile Creek)	3.88	Unknown	-permanent watercourse flowing through lands dominated by agriculture; channelized by agricultural practices (highly disturbed)	-warm water, moderate to high sensitivity watercourse; potential presence of sensitive species at certain times of year	-landform depression that has flowing water contributing to downstream flows -

Analysis based on Section 5.5 of the Natural Heritage Reference Manual (MNR, 2011):

Valleyland #2 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. It does have a linkage function as it contributes to downstream flows.

Evaluation Result:

This site is not considered significant.

Valleyland #3 (Tributary of Twenty Mile Creek)

This 1.2-hectare valleyland is a permanent channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Twenty Mile Creek. There is potential for this watercourse to provide habitat for sensitive species during certain times of the year.

This valleyland is heavily impacted by agricultural practices and is not significant within the project location, due to the degree of channelization of the valleyland, lack of vegetation communities, including riparian vegetation, and lack of valleyland morphological features such as slopes, flows, meanders, substrates, seepages and natural springs. This valleyland is not significant..

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Valleyland 3 (Tributary of Twenty Mile Creek)	1.2 ha	Unknown	-permanent watercourse flowing through lands dominated by agriculture, grasses and riparian vegetation; channelized by agricultural practices (highly disturbed)	-warm water, moderate to high sensitivity watercourse; potential presence of sensitive species at certain times of year	-landform depression that has flowing water contributing to downstream flows -

Analysis based on Section 5.5 of the Natural Heritage Reference Manual (MNR, 2011):

Valleyland #3 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. It does have a linkage function as it contributes to downstream flows.

Evaluation Result:

This site is not considered significant.

Valleyland #4 (Tributary of Twenty Mile Creek)

This 2.6-hectare valleyland is an intermittent channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to

Twenty Mile Creek. 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
Valleyland #4 (Tributary of Twenty Mile Creek)	2.6 ha	Unknown	-intermittent watercourse flowing through lands dominated by agriculture; channelized by agricultural practices (highly disturbed)	-warm water, moderate to high sensitivity watercourse; potential presence of sensitive species at certain times of year	-landform depression that has flowing water contributing to downstream flows

Analysis based on Section 5.5 of the Natural Heritage Reference Manual (MNR, 2011):

Valleyland #4 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. It does have a linkage function as it contributes to downstream flows.

Evaluation Result:

This site is not considered significant.

Valleyland #5 (Tributary of Twenty Mile Creek)

This 2.3-hectare valleyland is an intermittent channelized watercourse that flows through agricultural fields. It is a landform depression that has flowing water contributing to Twenty Mile Creek. 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
Valleyland #5 (Tributary of Twenty Mile Creek)	2.3 ha	Unknown	-intermittent watercourse flowing through lands dominated by agriculture, grasses and riparian vegetation; channelized by agricultural practices (highly disturbed)	-warm water, moderate to high sensitivity watercourse; potential presence of sensitive species at certain times of year	-landform depression that has flowing water contributing to downstream flows -

Analysis based on Section 5.5 of the Natural Heritage Reference Manual (MNR, 2011):

Valleyland #5 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. It does have a linkage function as it contributes to downstream flows.

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 two woodlands identified within 120m of the project location: Mill Creek-Inverary Woods and Twenty Mile Creek Woodlot **(See Figure 3)**. They were evaluated against the terms set out in Section 6.4 of the Township of West Lincoln Official Plan (Township of West Lincoln 2006) which state that Natural Heritage Areas, including woodlands designated as Environmentally Sensitive Areas (ESAs), have: representation, hydrological/hydrogeological function, species diversity, large size, lack of disturbance, unusual landforms, presence of uncommon vegetation type or the presence of vulnerable, threatened or endangered plant and/or animal species.

The Woodlands were also evaluated against the Region of Niagara Policy Plan (2010), which states that to be identified as significant a woodland must meet one or more of the following criteria:

- Contain threatened or endangered species or species of concern;
- In size, be equal to or greater than:
 - 2 hectares, if located within or overlapping Urban Area Boundaries;
 - 4 hectares, if located outside Urban Areas and north of the Niagara Escarpment;
 - 10 hectares, if located outside Urban Areas and south of the Escarpment;
- Contain interior woodland habitat at least 100 metres in from the 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 listed in Policies 7.B.1.3 or 7.B.1.4; or
- Abut or be crossed by a watercourse or water body and be 2 or more hectares in area.

Mill Creek-Inverary Woods

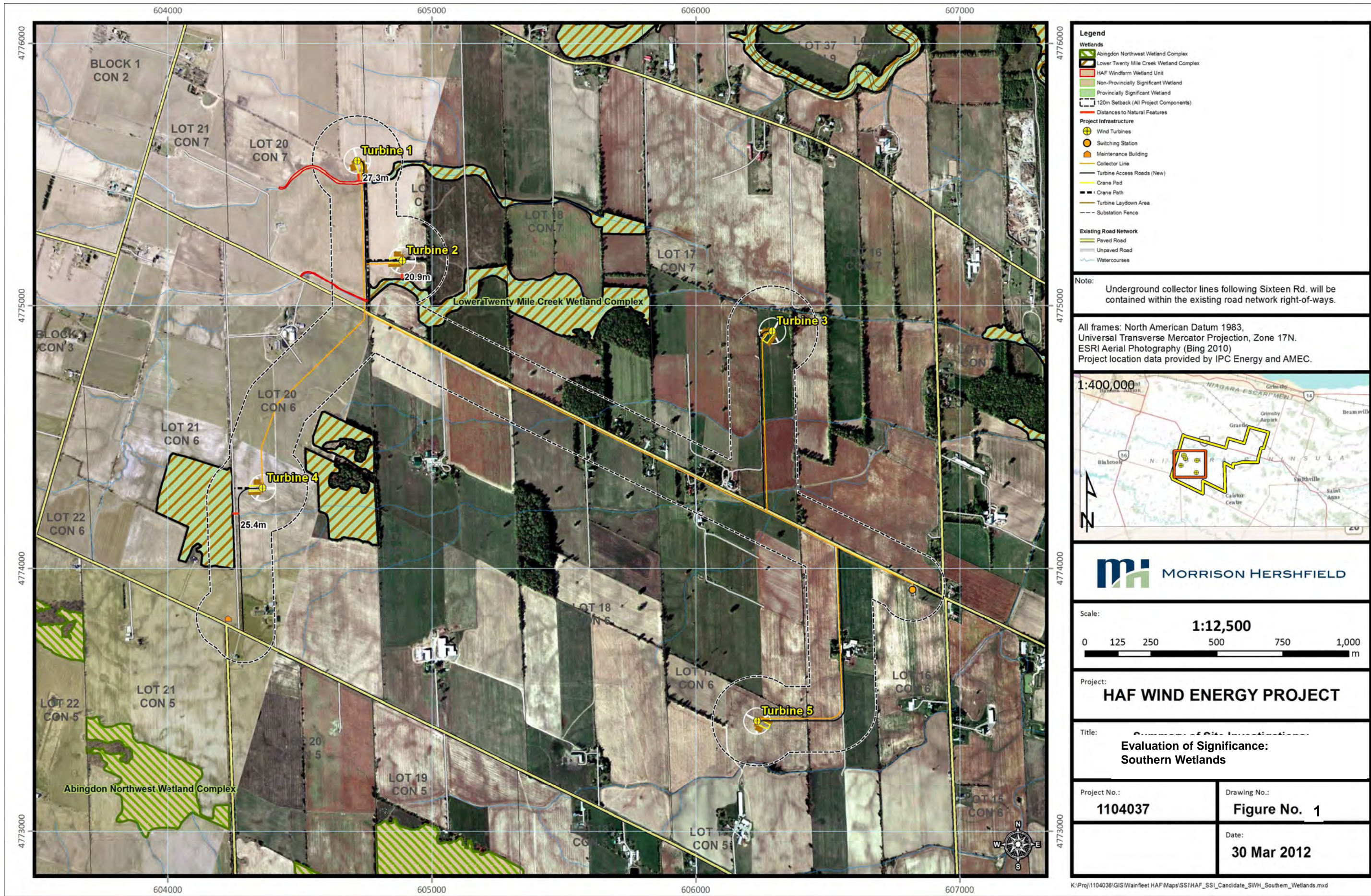
Mill Creek-Inverary Woods is a 4.97-hectare significant woodlot with a fresh-moist oak maple deciduous forest dominated by pin oak, swamp white oak and trembling aspen in the canopy, swamp white oak and willow in the sub-canopy and moist-fresh silty clay soil. Mill Creek-Inverary is considered an Environmental Protection Area within the Township of West Lincoln Official Plan Schedule C-1 (Township of West Lincoln, 2010). It is considered an Environmental Conservation Area under the Core Natural Features in the Region of Niagara Policy Plan (2010). We evaluated this woodlot against the criteria outlined in the Region of Niagara Policy Plan (2010). It does contain a threatened or endangered species (White Wood Aster) and it is abutted by 2 tributaries of Twenty Mile Creek. It is considered significant.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Mill Creek-Inverary Woods	4.97 ha	Significant	-dominated by deciduous trees with Mill Creek flowing through woodlot	FOD9-2 -fresh-moist oak maple deciduous forest	-large mature forest -regionally rare plant species

Twenty Mile Creek Woodlot

This 2.49-hectare significant woodlot with a fresh-moist bur oak deciduous forest dominated by white elm, bur oak and red ash in the canopy, blue beech, white ash and red ash in the sub-canopy, sensitive fern and fowl manna grass in the understory and jack in the pulpit in the groundcover. Twenty Mile Creek is considered an Environmental Protection Area within the Township of West Lincoln Official Plan Schedule C-1 (Township of West Lincoln, 2010). It is considered an Environmental Conservation Area under the Core Natural Features in the Region of Niagara Policy Plan (2010). We evaluated this woodlot against the criteria outlined in the Region of Niagara Policy Plan (2010). It is crossed by 1 tributary of Twenty Mile Creek. It is considered significant.

Feature Type/ID	Size	Significance (if known)	Attributes	Composition	Functions
Twenty Mile Creek Woodlot	2.49 ha	Significant	-dominated by deciduous trees with 20 Mile Creek flowing through woodlot	FOD9-3 -fresh-moist bur oak deciduous forest	-large mature forest -regionally rare plant species



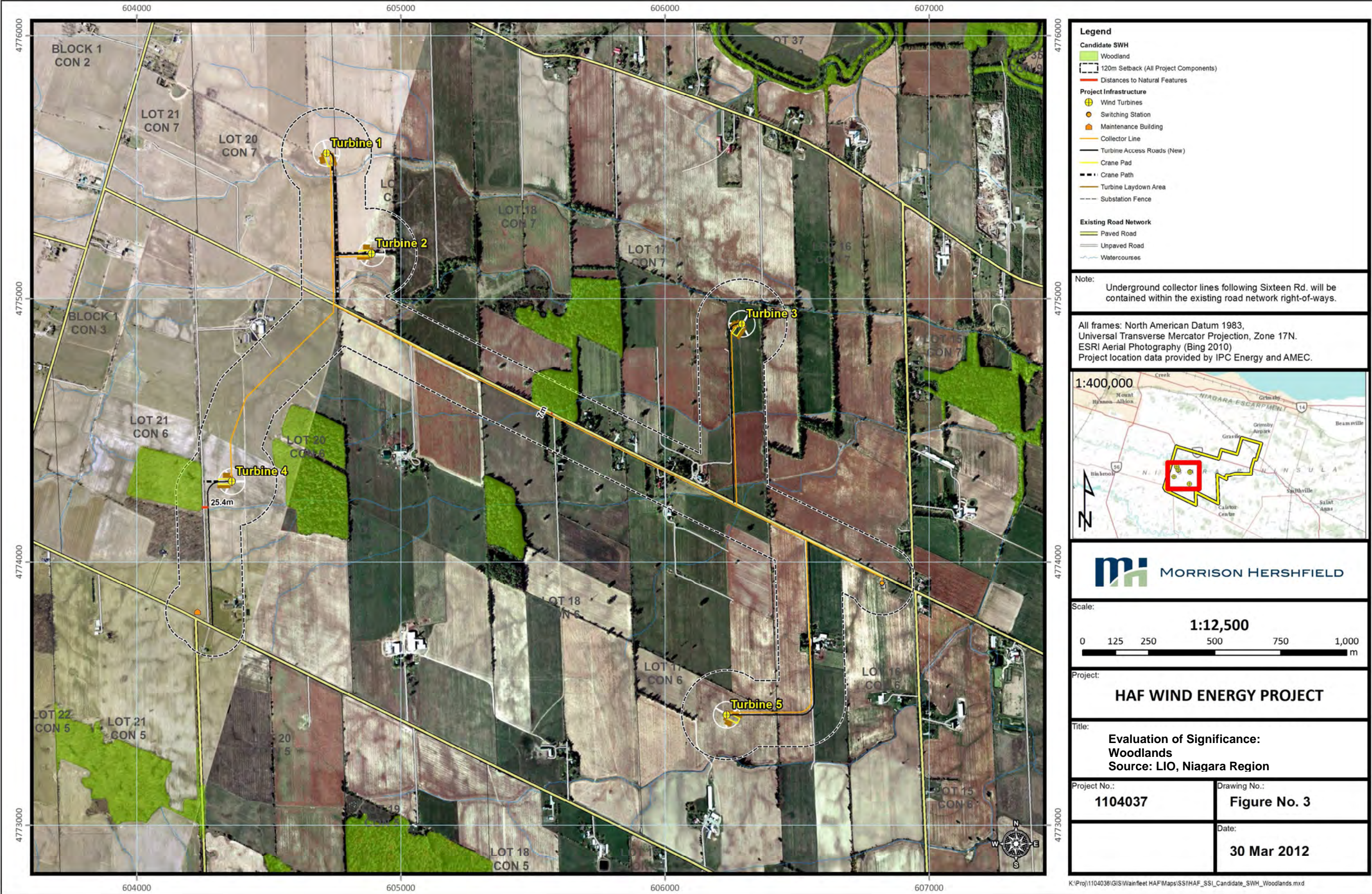


Table 3: Evaluation of Significance Results Summary

Feature Type/ID	Minimum Distance Between Feature and Project Location	Evaluation Results	Significantly/provincially significant feature or treated as (y/n)
Southern Wetland: Twenty Mile Creek Wetland Complex AKA Abingdon Northwest Wetland	3-5 metres from Access Road to Turbine 1 and 2	This feature is provincially significant and will be discussed in the EIS.	Y
Southern Wetland: HAF Windfarm Wetland Unit	0 meters Access road and underground collector line will intersect this feature	This feature is deemed not significant.	N
Valleyland: #1 (Twenty mile Creek)	0 metres Underground Collector Line and Access Road to Turbine 1 will intersect this feature	This feature is deemed not significant.	N
Valleyland: #2 (Tributary of Twenty Mile Creek)	0 metres Underground Collector Line and Access Road to Turbine 1 and 2 will intersect this feature	This feature is deemed not significant.	N
Valleyland: #3 (Tributary of Twenty Mile Creek)	0 metres Underground Collector Line and Access Road to Turbine 3 will intersect this feature	This feature is deemed not significant.	N
Valleyland: #4 (Tributary of Twenty Mile Creek)	0 metres Underground Collector Line and Access Road to Turbine 3 and 4 will intersect this feature	This feature is deemed not significant.	N
Valleyland: #5 (Tributary of Twenty Mile Creek)	107 metres from Turbine 5	This feature is deemed not significant.	N

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Woodland: Mill Creek-Inverary Woods	25.4 metres from Turbine 4 Access Road	This feature is significant and will be discussed in the EIS.	Y
Woodland: Twenty Mile Creek Woodlot	7 metres from Underground Collector Line	This feature is significant and will be discussed in the EIS.	Y

References

- Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: January 23, 2011).
- Bat Conservation Trust 2007. Bat Surveys: Good Practice Guidelines. Bat Conservation Trust, London.
- COSEWIC 2010. COSEWIC assessment and update status report on the Monarch *Danaus plexippus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii + 43pp. (www.sararegistry.gc.ca/status/status_e.cfm)
- COSEWIC 2009. COSEWIC assessment and update status report on the Whip-poor-will *Caprimulgus vociferous* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii + 28pp. (www.sararegistry.gc.ca/status/status_e.cfm)
- COSEWIC 2008. COSEWIC status report on the Snapping Turtle *Chelydra serpentina* in Canada. Committee on the Status of endangered Wildlife in Canada. Ottawa.vii +37pp.
- COSEWIC 2007. COSEWIC assessment and update status report on the Red-headed Woodpecker *Melanerpes erthrocephalus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vi + 27 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
- COSEWIC 2005. COSEWIC assessment and update status report on the Blanding's Turtle *Emydoidea blandingii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. viii + 40 pp.
- COSEWIC 2002. COSEWIC assessment and status report on the milksnake *Lampropeltis triangulum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 29 pp.
- COSEWIC 2000. COSEWIC assessment and update status report on the Hooded Warbler *Wilsonia citrina* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii + 11pp. (www.sararegistry.gc.ca/status/status_e.cfm)
- Dobbyn, J.S. 1966. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists
- 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.
- Environment Canada. 2011. Species at Risk Public Registry. http://www.sararegistry.gc.ca/default_e.cfm
- Niagara Peninsula Conservation Authority. 2009. Natural Areas Inventory 2006-2009. [http://www.npca.ca/water-management/water-planning/documents/natural-inventory-areas-report/0.1%20NAI-Volume%201%20\(Sections%2012to%208\)-title%220page-partners-abstr.pdf](http://www.npca.ca/water-management/water-planning/documents/natural-inventory-areas-report/0.1%20NAI-Volume%201%20(Sections%2012to%208)-title%220page-partners-abstr.pdf)

Natural Heritage Assessment Report

- Ontario Ministry of the Environment. 2011. Ontario Regulation 359/09 Renewable Energy Approvals Under Part V.1 of the Act O. Reg 359/09 Consolidation Period: From January 1, 2011 to September 2, 2011. Queens Printer for Ontario.
- Ontario Ministry of Natural Resources. 2011. Significant Wildlife Habitat Ecoregion Criteria Schedules: Addendum to Significant Wildlife Habitat Technical Guide.
- Ontario Ministry of Natural Resources. 2011a. Bats and Bat Habitats: Guidelines for Wind Power Projects (Draft).
- Ontario Ministry of Natural Resources. 2011b. Natural Heritage Assessment Guide for Renewable Energy Projects.
- Ontario Ministry of Natural Resources. 2010. Birds and Bird Habitats: Guidelines for Wind Power Projects.
- Ontario Ministry of Natural Resources. 2010a. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Second Edition. Toronto: Queen's Printer for Ontario. 248 pp.
- Ontario Ministry of Natural Resources. 2008. Species at Risk in Ontario List. http://www.mnr.gov.on.ca/STEL02_163859.pdf
- Ontario Ministry of Natural Resources. 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
- Ontario Ministry of Natural Resources. 2000. Significant Wildlife Habitat Technical Guide. Fish and Wildlife Branch, Wildlife Section, Science Development and Transfer Branch, Southcentral Sciences, Peterborough. Queens Printer for Ontario. 139 pp + appendices. <http://www.mnr.gov.on.ca/mnr/pubs/wildlife/swhtg.html>
- Ontario Ministry of Natural Resources. 2000b. Decision Support System for the Significant Wildlife Habitat Technical Guide.
- Ontario Partners in Flight. 2008. Ontario Landbird Conservation Plan: Boreal Softwood Shield, North American Bird Conservation Region 8. Ontario Ministry of Natural Resources, Bird Studies Canada, Environment Canada. Draft Version 2.0.
- Township of West Lincoln. 2010. Official Plan of the Township of West Lincoln. <http://www.westlincoln.ca/departments/official-plan>

APPENDIX A

Summary of Site Investigations for Evaluation of Significance

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Feature ID/Type	Survey Type	Date	Method	Times	Duration	Weather	Field Personnel
-Southern Wetland: Twenty Mile Creek Wetland Complex AKA Abingdon Northwest Wetland -Woodland: Mill Creek-Inverary Woods -Woodland: Twenty Mile Creek Woodlot	Ecological Land Classification Survey/Confirmation of Natural Features Identified During Records Review	July 29 th , 2010 July 30 th , 2010	50m transects were conducted for all non-crop lands within project location; croplands within the project location were surveyed on foot	July 29 th 9:00am-5:30pm July 30 th – 8:00am-5:00pm	July 29 th - 8.5 hours July 30 th - 9 hours	July 29 th – partly cloudy, 24°C July 30 th – cloudy, light wind, 26°C	Bettina Henkelman
-Valleyland: #1 (Twenty mile Creek) -Valleyland: #2 (Tributary of Twenty Mile Creek) -Valleyland: #3 (Tributary of Twenty Mile Creek) -Valleyland: #4 (Tributary of Twenty Mile Creek) -Valleyland: #5 (Tributary of Twenty Mile Creek)	Valleylands/Seeps and Springs Survey	April 27 th , 2010	Searches were conducted for potentially suitable sites throughout the entire project location	April 27 th – 12:40pm–5:40pm	April 27 th –5.0 hours	April 27 th – clear, no wind, 10°C	Josephine Gilson and Kelly Sadlier
-Southern Wetland: HAF Windfarm Wetland Unit	Wetland Evaluation	September 23 rd , 2011	Wetland was evaluated using Ontario Wetland Evaluation System protocol	September 23 rd 9:00am- 1:00pm	September 23 rd - 4 hours	September 23 rd - overcast, light rain	Erin McLachlan Stephanie Goom

APPENDIX B

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 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 Chelapeau, 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

Ontario Wetland Evaluation for HAF Windfarm Wetland Unit

WETLAND DATA AND SCORING RECORD

- i) WETLAND NAME: HAF Windfarm Wetland Unit
- ii) MNR ADMINISTRATIVE REGION: Central DISTRICT: Guelph
AREA OFFICE (if different from District): Vineland
- iii) CONSERVATION AUTHORITY JURISDICTION: Niagara Peninsula C.A.
 (If not within a designated CA, check here: _____)
- iv) COUNTY OR REGIONAL MUNICIPALITY: Niagara
- v) TOWNSHIP: West Lincoln
- vi) LOTS & CONCESSIONS: Lot 20 Con 7
 (attach separate sheet if necessary)
- vii) MAP AND AIR PHOTO REFERENCES
- a) Latitude 604949 Longitude: 4775541
- b) UTM grid reference: Zone: 17T Block: _____
 Grid: E _____ N _____
- c) National Topographic Series:
- map name(s) _____
- map number(s) _____ edition _____
- scale _____
- d) Aerial photographs: Date photo taken: _____ Scale: _____
- Flight & plate numbers: _____

 (attach separate sheet if necessary)
- e) Ontario Base Map numbers & scale _____

 (attach separate sheets if necessary)

viii) WETLAND SIZE AND BOUNDARIES

- a) Single contiguous wetland area: _____ hectares
- b) Wetland complex comprised of 2 individual wetlands:

Wetland Unit Number (for reference)	Size of each wetland unit
Wetland Unit No. 1	<u>0.106</u> ha
Wetland Unit No. 2.	<u>0.313</u> ha
Wetland Unit No. 3	_____ ha
Wetland Unit No. 4	_____ ha
Wetland Unit No. 5	_____ ha
Wetland Unit No. 6	_____ ha
Wetland Unit No. 7	_____ ha
Wetland Unit No. 8	_____ ha
Wetland Unit No. 9	_____ ha
Wetland Unit No. 10	_____ ha

(Attach additional sheets if necessary)

TOTAL WETLAND SIZE 0.419 ha

- c) Brief documentation of reasons for including any areas less than 0.5 ha in size:

Wind farm REA project

(Attach separate sheets if necessary)

1.0 BIOLOGICAL COMPONENT**1.1 PRODUCTIVITY****1.1.1 GROWING DEGREE-DAYS/SOILS****GROWING DEGREE DAYS**

(check one)

- 1) _____ <2800
 2) _____ 2800 - 3200
 3) _____ 3200 - 3600
 4) X _____ 3600 - 4000
 5) _____ >4000

SOILS

Estimated Fractional Area

- X _____ clay/loam
 _____ silt/marl
 _____ limestone
 _____ sand
 _____ humic/mesic
 _____ fibric
 _____ granite

SCORING:

Growing Degree-Days	Clay-Loam	Silt-Marl	Lime-stone	Sand	Humic-Mesic	Fibric	Granite
<2800	15	13	11	9	8	7	5
2800-3200	18	15	13	11	9	8	7
3200-3600	22	18	15	13	11	9	7
3600-4000	<u>26</u>	21	18	15	13	10	8
>4000	30	25	20	18	15	12	8

(maximum score 30; if wetland contains more than one soil type, evaluate based on the fractional area)

Steps required for evaluation: (maximum score 30 points)

1. Select GDD line in evaluation table applicable to your wetland;
2. Determine fractional area of the wetland for each soil type;
3. Multiply fractional area of each soil type by score;
4. Sum individual soil type scores (round to nearest whole number).

In wetland complexes the evaluator should aim at determining the percentage of area occupied by the categories for the complex as a whole.

Final Score Growing Degree-Days/Soils (maximum 30 points) 26

1.1.2 WETLAND TYPE (Fractional Area = area of wetland type/total wetland area)

	Fractional Area		Score
Bog	_____	x 3	_____
Fen	_____	x 6	_____
Swamp	_____	x 8	_____
Marsh	<u>100</u>	x 15	<u>15</u>

Wetland type score (maximum 15 points) 151.1.3 SITE TYPE (Fractional Area = area of site type/total wetland area)

	Fractional Area		Score
Isolated	_____	x 1 =	_____
Palustrine (permanent or intermittent flow)	<u>100</u>	x 2 =	<u>2</u>
Riverine	_____	x 4 =	_____
Riverine (at rivermouth)	_____	x 5 =	_____
Lacustrine (at rivermouth)	_____	x 5 =	_____
Lacustrine (on enclosed bay, with barrier beach)	_____	x 3 =	_____
Lacustrine (exposed to lake)	_____	x 2 =	_____

Site Type Score (maximum 5 points) 21.2 BIODIVERSITY1.2.1 NUMBER OF WETLAND TYPES

(Check only one)	Score
1) <input checked="" type="checkbox"/> one	9 points
2) <input type="checkbox"/> two	13
3) <input type="checkbox"/> three	20
4) <input type="checkbox"/> four	30

Number of Wetland Types Score (maximum 30 points) 9

1.2.2 VEGETATION COMMUNITIES

Attach a separate sheet listing community (map) codes, vegetation forms and dominant species. Use the form on the following page to record percent area by dominant vegetation form. This information will be used in other parts of the evaluation.

Communities should be grouped by number of forms. For example, 2 form communities might appear as follows:

2 forms

<u>Code</u>	<u>Forms</u>	<u>Dominant Species</u>
M6	re, ff	re, <i>Typha latifolia</i> ; ff, <i>Lemna minor</i> , <i>Wolffia</i>
S1	ts, gc	ts, <i>Salix discolor</i> ; gc, <i>Impatiens capensis</i> , <i>Thelypteris palustris</i>

Note that the dominant species for each form are separated by a semicolon. The dominant species (maximum of 2) within a form are separated by commas.

Scoring:

Total # of communities
with 1-3 forms

1 = 1.5 points

2 = 2.5

3 = 3.5

4 = 4.5

5 = 5

6 = 5.5

7 = 6

8 = 6.5

9 = 7

10 = 7.5

11 = 8

+0.5 each additional
community = 1.5

Total # of communities
with 4-5 forms

1 = 2 points

2 = 3.5

3 = 5

4 = 6.5

5 = 7.5

6 = 8.5

7 = 9.5

8 = 10.5

9 = 11.5

10 = 12.5

11 = 13

+0.5 each additional
community = 2

Total # of communities
with 6 or more forms

1 = 3 points

2 = 5

3 = 7

4 = 9

5 = 10.5

6 = 12

7 = 13.5

8 = 15

9 = 16.5

10 = 18

11 = 19

+1 each additional
community = _____

e.g., a wetland with 3 one form communities, 4 two form communities, 12 four form communities and 8 six form communities would score:

$$6 + 13.5 + 15 = 34.5 = 35 \text{ points}$$

Vegetation Communities Score (maximum 45 points) 3.5

Wetland Name: _____

Wetland Size (ha): 0.419

<u>Vegetation Form</u>	<u>% area in which form is dominant</u>
h	<u>2.5</u>
c	—
dh	—
dc	—
ts	<u>2.5</u>
ls	—
ds	—
gc	<u>10</u>
m	—
ne	<u>60</u>
be	—
re	<u>25</u>
ff	—
f	—
su	—
u (unvegetated)	—
Total = 100%	

1.2.3 DIVERSITY OF SURROUNDING HABITAT

(Check all appropriate items)

- | | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | row crop |
| <input type="checkbox"/> | pasture |
| <input type="checkbox"/> | abandoned agricultural land |
| <input type="checkbox"/> | deciduous forest |
| <input type="checkbox"/> | coniferous forest |
| <input type="checkbox"/> | mixed forest (at least 25% conifer and 75% deciduous or vice versa) |
| <input type="checkbox"/> | abandoned pits and quarries |
| <input type="checkbox"/> | open lake or deep river |
| <input type="checkbox"/> | fence rows with cover, or shelterbelts |
| <input type="checkbox"/> | terrain appreciably undulating, hilly, or with ravines |
| <input type="checkbox"/> | creek flood plain |

Diversity of Surrounding Habitat Score (1 for each, maximum 7 points)1**1.2.4 PROXIMITY TO OTHER WETLANDS**

(Check first appropriate category only)

Scoring

- | | | |
|--|--|----------|
| 1) <input checked="" type="checkbox"/> | Hydrologically connected by surface water to other wetlands (different dominant wetland type), or to open lake or deep river within 1.5 km | 8 points |
| 2) <input type="checkbox"/> | Hydrologically connected by surface water to other wetlands (same dominant wetland type) within 0.5 km | 8 |
| 3) <input type="checkbox"/> | Hydrologically connected by surface water to other wetlands (different dominant wetland type), or to open lake or deep river from 1.5 to 4 km away | 5 |
| 4) <input type="checkbox"/> | Hydrologically connected by surface water to other wetlands (same dominant wetland type) from 0.5 to 1.5 km away | 5 |
| 5) <input type="checkbox"/> | Within 0.75 km of other wetlands (different dominant wetland type) or open water body, but not hydrologically connected by surface water | 5 |
| 6) <input type="checkbox"/> | Within 1 km of other wetlands, but not hydrologically connected by surface water | 2 |
| 7) <input type="checkbox"/> | No wetland within 1 km | 0 |

Proximity to other Wetlands Score (Choose one only, maximum 8 points)8

1.2.5 INTERSPERSION

Number of Intersections (Check one)		Score
1) 26 or less	<input checked="" type="checkbox"/>	3
2) 27 to 40	<input type="checkbox"/>	6
3) 41 to 60	<input type="checkbox"/>	9
4) 61 to 80	<input type="checkbox"/>	12
5) 81 to 100	<input type="checkbox"/>	15
6) 101 to 125	<input type="checkbox"/>	18
7) 126 to 150	<input type="checkbox"/>	21
8) 151 to 175	<input type="checkbox"/>	24
9) 176 to 200	<input type="checkbox"/>	27
10) >200	<input type="checkbox"/>	30

Interspersion Score (Choose one only, maximum 30 points)

31.2.6 OPEN WATER TYPES

Permanently flooded: (Check one)		Score
1) <input type="checkbox"/>	type 1	8
2) <input type="checkbox"/>	type 2	8
3) <input type="checkbox"/>	type 3	14
4) <input type="checkbox"/>	type 4	20
5) <input type="checkbox"/>	type 5	30
6) <input type="checkbox"/>	type 6	8
7) <input type="checkbox"/>	type 7	14
8) <input type="checkbox"/>	type 8	3
9) <input checked="" type="checkbox"/>	no open water	0

Open Water Type Score (Choose one only, maximum 30 points)

0

1.3 SIZE

0.419 hectares

Size Score (Biological Component) (maximum 50 points) 8

Evaluation Table Size Score (Biological Component)

Wetland size (ha)	Total Score for Biodiversity Subcomponent									
	<37	37-48	49-60	61-72	73-84	85-96	97-108	109-120	121-132	>133
<21 ha	1	5	7	8	9	17	25	34	43	50
21-40	5	7	8	9	10	19	28	37	46	50
41-60	6	8	9	10	11	21	31	40	49	50
61-80	7	9	10	11	13	23	34	43	50	50
81-100	8	10	11	13	15	25	37	46	50	50
101-120	9	11	13	15	18	28	40	49	50	50
121-140	10	13	15	17	21	31	43	50	50	50
141-160	11	15	17	19	23	34	46	50	50	50
161-180	13	17	19	21	25	37	49	50	50	50
181-200	15	19	21	23	28	40	50	50	50	50
201-400	17	21	23	25	31	43	50	50	50	50
401-600	19	23	25	28	34	46	50	50	50	50
601-800	21	25	28	31	37	49	50	50	50	50
801-1000	23	28	31	34	40	50	50	50	50	50
1001-1200	25	31	34	37	43	50	50	50	50	50
1201-1400	28	34	37	40	46	50	50	50	50	50
1401-1600	31	37	40	43	49	50	50	50	50	50
1601-1800	34	40	43	46	50	50	50	50	50	50
1801-2000	37	43	47	49	50	50	50	50	50	50
>2000	40	46	50	50	50	50	50	50	50	50

WETLAND EVALUATION SCORING RECORD

WETLAND NAME AND/OR NUMBER

1.0 BIOLOGICAL COMPONENT

1.1 PRODUCTIVITY

1.1.1 Growing Degree-Days/Soils	26
1.1.2 Wetland Type	15
1.1.3 Site Type	2
Total for Productivity	43

1.2 BIODIVERSITY

1.2.1 Number of Wetland Types	9
1.2.2 Vegetation Communities (maximum 45)	3.5
1.2.3 Diversity of Surrounding Habitat (maximum 7)	1
1.2.4 Proximity to Other Wetlands	8
1.2.5 Interspersion	3
1.2.6 Open Water Type	0
Total for Biodiversity	24.5

1.3 SIZE (Biological Component) 8

TOTAL FOR BIOLOGICAL COMPONENT (not to exceed 250) 76

2.0 SOCIAL COMPONENT**2.1 ECONOMICALLY VALUABLE PRODUCTS****2.1.1 WOOD PRODUCTS**

Area of wetland forested (ha), i.e. dominant form is h or c. Note that this is not wetland size. (Check one only)

		Score
1) <input checked="" type="checkbox"/>	<5 ha	0
2) <input type="checkbox"/>	5 - 25 ha	3
3) <input type="checkbox"/>	26 - 50 ha	6
4) <input type="checkbox"/>	51 - 100 ha	9
5) <input type="checkbox"/>	101 - 200 ha	12
6) <input type="checkbox"/>	>200 ha	18

Source of information: field observations McLachlan 2011

Wood Products Score (Score one only, maximum 18 points) 0

2.1.2 WILD RICE

(Check one)

Present (minimum size 0.5 ha) 1) ☐
Absent 2) ☒

Score (Choose one)

6 points
0

Source of information: field observations McLachlan 2011

Wild Rice Score (maximum 6 points) 0

2.1.3 COMMERCIAL FISH (BAIT FISH AND/OR COARSE FISH)

(Check one)

Present 1) ☐
Habitat not suitable for fish 2) ☒

Score (Choose one)

12 points
0

Source of information: field observations McLachlan 2011

Commercial Fish Score (maximum 12 points) 0

2.1.4 BULLFROGS

(Check one)

Present 1) ☐
Absent 2) ☒

Score (Choose one)

1 point
0

Source of information: field observations McLachlan 2011

Bullfrog Score (maximum 1 point) 0

2.1.5 SNAPPING TURTLES

(Check one)

Present

Absent

1) _____

2) ✓

Score (Choose one)

1 point

0

Source of information:

field observations McLachlan 2Snapping Turtle Score (maximum 1 point) 02.1.6 FURBEARERS

(Consult Appendix 9)

Name of furbearerSource of information

1) _____

2) _____

3) _____

4) _____

5) _____

Scoring: 3 points for each species, maximum 12

Furbearer Score (maximum 12 points) 02.2 RECREATIONAL ACTIVITIES

Type of Wetland-Associated Use			
Intensity of Use	Hunting	Nature Enjoyment/ Ecosystem Study	Fishing
High	40 points	40 points	40 points
Moderate	20	20	20
Low	8	8	8
Not Possible/Not known	0	0	0

(score one level for each of the three wetland uses; scores are cumulative; maximum score 80 points)

Sources of
information:

Hunting: _____

Nature: _____

Fishing: _____

Recreational Activities Score (maximum 80 points) 0

2.4.3 RESEARCH AND STUDIES

(check appropriate spaces)

Long term research has been done _____

Score

12 points

Research papers published in refereed scientific journal or as a thesis _____

10

One or more (non-research) reports have been written on some aspect of the wetland's flora, fauna, hydrology, etc. _____

5

No research or reports ✓

0

Attach list of known reports by above categories

Research and Studies Score (Score is cumulative, maximum 12 points) _____**2.5 PROXIMITY TO AREAS OF HUMAN SETTLEMENT**

Circle the highest applicable score

Distance of wetland from settlement	1) population >10,000	2) population 2,500 - 10,000	3) population <2,500 or cottage community
1) Within or adjoining settlement	40 points	26	16
2) 0.5 to 10 km from settlement	26	16	10
3) 10 to 60 km from settlement	12	8	4
4) >60 km from settlement	5	2	0

Name of settlement: Stoney Creek _____**Proximity to Human Settlement Score (maximum 40 points)** _____**2.6 OWNERSHIP** (FA = fractional area) Fractional Area

Score

FA of wetland in public or private ownership, held under contract or in trust for wetland protection _____

x 10 = _____

FA of wetland area in public ownership, not as above _____

x 8 = _____

FA of wetland area in private ownership, not as above _____

100 x 4 = 4Source of information: IPC Energy**Ownership Score (maximum 10 points)** 4

2.7 SIZE0.49 hectares

Evaluation Table for Size Score (Social Component)

Wetland size (ha)	Total for Size Dependent Score									
	<31	31-45	46-60	61-75	76-90	91-105	106-109	121-135	136-150	>150
<2 ha	1	2	4	8	10	12	14	14	14	15
2-4	1	2	4	8	12	13	14	14	15	16
5-8	2	2	5	9	13	14	15	15	16	16
9-12	3	3	6	10	14	15	15	16	17	17
13-17	3	4	7	10	14	15	16	16	17	17
18-28	4	5	8	11	15	16	16	17	17	18
29-37	5	7	10	13	16	17	18	18	19	19
38-49	5	7	10	13	16	17	18	18	19	20
50-62	5	8	11	14	17	17	18	19	20	20
63-81	5	8	11	15	17	18	19	20	20	20
82-105	6	9	11	15	18	18	19	20	20	20
106-137	6	9	12	16	18	19	20	20	20	20
138-178	6	9	13	16	18	19	20	20	20	20
179-233	6	9	13	16	18	20	20	20	20	20
234-302	7	9	13	16	18	20	20	20	20	20
303-393	7	9	14	17	18	20	20	20	20	20
394-511	7	10	14	17	18	20	20	20	20	20
512-665	7	10	14	17	18	20	20	20	20	20
666-863	7	10	14	17	19	20	20	20	20	20
864-1123	8	12	15	17	19	20	20	20	20	20
1124-1460	8	12	15	17	19	20	20	20	20	20
1461-1898	8	13	15	18	19	20	20	20	20	20
1899-2467	8	14	16	18	20	20	20	20	20	20
>2467	8	14	16	18	20	20	20	20	20	20

Total Size Score (Social Component)

2

2.8 ABORIGINAL AND CULTURAL HERITAGE VALUES

Either or both Aboriginal or Cultural Values may be scored. However, the maximum score permitted for 2.8 is 30 points. Attach documentation.

2.8.1 ABORIGINAL VALUES

Full documentation of sources must be attached to the data record.

- | | | | |
|--|-----------------|---|-----------|
| 1) _____ | Significant | = | 30 points |
| 2) _____ | Not Significant | = | 0 |
| 3) <input checked="" type="checkbox"/> _____ | Unknown | = | 0 |

2.8.2 CULTURAL HERITAGE

- | | | | |
|--|-----------------|---|-----------|
| 1) _____ | Significant | = | 30 points |
| 2) _____ | Not Significant | = | 0 |
| 3) <input checked="" type="checkbox"/> _____ | Unknown | = | 0 |

Aboriginal Values/Cultural Heritage Score (maximum 30 points) 0

2.0 SOCIAL COMPONENT

2.1 ECONOMICALLY VALUABLE PRODUCTS

2.1.1 Wood Products	<u>0</u>
2.1.2 Wild Rice	<u>0</u>
2.1.3 Commercial Fish	<u>0</u>
2.1.4 Bullfrogs	<u>0</u>
2.1.5 Snapping Turtles	<u>0</u>
2.1.6 Furbearers	<u>0</u>

Total for Economically Valuable Products 0

2.2 RECREATIONAL ACTIVITIES (maximum 80) 0

2.3 LANDSCAPE AESTHETICS

2.3.1 Distinctness	<u>3</u>
2.3.2 Absence of Human Disturbance	<u>2</u>

Total for Landscape Aesthetics 5

2.4 EDUCATION AND PUBLIC AWARENESS

2.4.1 Educational Uses	<u>0</u>
2.4.2 Facilities and Programs	<u>0</u>
2.4.3 Research and Studies	<u>0</u>

Total for Education and Public Awareness 0

2.5 PROXIMITY TO AREAS OF HUMAN SETTLEMENT 26

2.6 OWNERSHIP 4

2.7 SIZE (Social Component) 2

2.8 ABORIGINAL AND CULTURAL VALUES 0

TOTAL FOR SOCIAL COMPONENT (not to exceed 250) 37

3.0 HYDROLOGICAL COMPONENT**3.1 FLOOD ATTENUATION**

If the wetland is a complex including isolated wetlands, apportion the 100 points according to area. For example, if 10 ha of a 100 ha complex is isolated, the isolated portion receives the maximum proportional score of 10. The remainder of the wetland is then evaluated out of 90.

Step 1 Determination of Maximum Score

- ☐ Wetland is located on one of the defined 5 large lakes or 5 major rivers (Go to Step 4).
☐ Wetland is entirely isolated (i.e. not part of a complex) (Go to Step 4)
☒ All other wetland types (Go through steps 2, 3, and 4B)

Step 2. Determination of Upstream Detention Factor (DF)

- | | | |
|-----|---|-------|
| (a) | Wetland area (ha) | 0.419 |
| (b) | Total area (ha) of <u>upstream</u> detention areas (include the wetland itself) | 0.419 |
| (c) | Ratio of (a):(b) | 1 |
| (d) | Upstream detention factor: (c) x 2 = (maximum allowable factor = 1) | 1 |

Step 3 Determination of Wetland Attenuation Factor (AF)

- | | | |
|-----|--|--------|
| (a) | Wetland area (ha) | 0.419 |
| (b) | Size of catchment basin (ha) <u>upstream</u> of wetland (include wetland itself in catchment area) | 668.73 |
| (c) | Ratio of (a):(b) | 0.0006 |
| (d) | Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1) | 0.006 |

Step 4. Calculation of final score

- | | | |
|-----|---|-----|
| (a) | Wetlands on large lakes or major rivers | 0 |
| (b) | Wetland entirely isolated | 100 |
| (b) | All other wetlands -- calculate as follows: | |

Initial score	100*
Upstream detention factor (DF) (Step 2)	1
Wetland attenuation factor (AF) (Step 3)	0.006
Final score: ((DF + AF)/2) x Initial score =	50

$1.006 / 2 \times 100$

*Unless wetland is a complex with isolated portions (see above).

Flood Attenuation Score (maximum 100 points) 50

3.2 WATER QUALITY IMPROVEMENT**3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT****Step 1: Determination of maximum initial score**

Wetland on one of the 5 defined large lakes or 5 major rivers (Go to Step 5a)
All other wetlands (Go through Steps 2, 3, 4, and 5b)

Step 2: Determination of watershed improvement factor (WIF)
Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

(FA = area of site type/total area of wetland)

Fractional
Area

FA of isolated wetland	_____ x 0.5 = _____
FA of riverine wetland	_____ x 1.0 = _____
FA of palustrine wetland with no inflow	_____ x 0.7 = _____
FA of palustrine wetland with inflows	<u>100</u> x 1.0 = <u>1</u>
FA of lacustrine on lake shoreline	_____ x 0.2 = _____
FA of lacustrine at lake inflow or outflow	_____ x 1.0 = _____

Sum (WIF cannot exceed 1.0) 1

Step 3: Determination of catchment land use factor (LUF)
(Choose the first category that fits upstream landuse in the catchment.)

- | | | |
|-------------|---|-----|
| 1) <u>✓</u> | Over 50% agricultural and/or urban | 1.0 |
| 2) _____ | Between 30 and 50% agricultural and/or urban | 0.8 |
| 3) _____ | Over 50% forested or other natural vegetation | 0.6 |

LUF (maximum 1.0) 1

Step 4: Determination of pollutant uptake factor (PUT)

Calculation of PUT is based on the fractional area (FA) of each vegetation type that makes up the total area of the wetland. Base assessment on the dominant vegetation form for each community except where dead trees or shrubs dominate. In that case base assessment on the dominant live vegetation type. (FA = area of vegetation type/total area of wetland)

FA of wetland with live trees, shrubs,
herbs or mosses (c,h,ts,ls,gc,m)

Fractional Area
.15 x 0.75 = 0.1125

FA of wetland with emergent, submergent
or floating vegetation (re,be,ne,su,f,ff)

.85 x 1.0 = 0.85

FA of wetland with little or no vegetation (u)

_____ x 0.5 = _____

Sum (PUT cannot exceed 1.0) 0.9625

Step 5: Calculation of final score

(a)	Wetland on large lakes or major rivers	0
(b)	All other wetlands - calculate as follows	
	Initial score	60
	Water quality improvement factor (WQF)	<u>1</u>
	Land use factor (LUF)	<u>1</u>
	Pollutant uptake factor (PUT)	<u>0.9625</u>

Final score: $60 \times \text{WQF} \times \text{LUF} \times \text{PUT} =$ 57.75

Short Term Water Quality Improvement Score (maximum 60 points) 57.75

3.2.2 LONG TERM NUTRIENT TRAP**Step 1:**

<u>✓</u>	Wetland on large lakes or 5 major rivers	0 points
	All other wetlands (Proceed to Step 2)	

Step 2: Choose only one of the following settings that best describes the wetland being evaluated

1) <u> </u>	Wetland located in a river mouth	10 points
2) <u> </u>	Wetland is a bog, fen, or swamp with more than 50% of the wetland being covered with organic soil	10
3) <u> </u>	Wetland is a bog, fen, or swamp with less than 50% of the wetland being covered with organic soil	3
4) <u>✓</u>	Wetland is a marsh with more than 50% of the wetland covered with organic soil	3
5) <u> </u>	None of the above	0

Long Term Nutrient Trap Score (maximum 10 points) 3

3.2.3 GROUNDWATER DISCHARGE

(Circle the characteristics that best describe the wetland being evaluated and then sum the scores. If the sum exceeds 30 points assign the maximum score of 30.)

Wetland Characteristics	Potential for Discharge		
	None to Little	Some	High
Wetland type	1) Bog = 0	2) Swamp/Marsh = 2	3) Fen = 5
Topography	1) Flat/rolling = 0	2) Hilly = 2	3) Steep = 5
Wetland Area:Upslope Catchment Area	Large (>50%) = 0	Moderate (5-50%) = 2	Small (<5%) = 5
Lagg Development	1) None found = 0	2) Minor = 2	3) Extensive = 5
Seeps	1) None = 0	2) = or < 3 seeps = 2	3) > 3 seeps = 5
Surface marl deposits	1) None = 0	2) = or < 3 sites = 2	3) > 3 sites = 5
Iron precipitates	1) None = 0	2) = or < 3 sites = 2	3) > 3 sites = 5
Located within 1 km of a major aquifer	N/A = 0	N/A = 0	Yes = 10

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) 7

3.3 CARBON SINK

Choose only one of the following

- 1) _____ Bog, fen or swamp with more than 50% coverage by organic soil 5 points
- 2) _____ Bog, fen or swamp with between 10 to 49% coverage by organic soil 2
- 3) ☒ Marsh with more than 50% coverage by organic soil 3
- 4) _____ Wetlands not in one of the above categories 0

Carbon Sink Score (maximum 5 points) 3

3.4 SHORELINE EROSION CONTROL

Step 1:

Score

- ☐ Wetland entirely isolated or palustrine
- ☒ Any part of the wetland riverine, or lacustrine (proceed to Step 2)

0

Step 2:

Choose the one characteristic that best describes the shoreline vegetation (see text for a definition of shoreline)

Score

- 1) ☒ Trees and shrubs
- 2) ☒ Emergent vegetation
- 3) ☐ Submergent vegetation
- 4) ☐ Other shoreline vegetation
- 5) ☐ No vegetation

15
8
6
3
0

Shoreline Erosion Control Score (maximum 15 points) 0

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

Score

- (a) Wetland > 50% lacustrine (by area) or located on one of the five major rivers
- (b) Wetland not as above. Calculate final score as follows: (FA = area of site type/total area of wetland)

0

Fractional Area

- FA of isolated or palustrine wetland .100 x 50 = 50
- FA of riverine wetland x 20 =
- FA of lacustrine wetland (wetland <50% lacustrine) x 0 =

Ground Water Recharge, Wetland Site Type Component Score (maximum 50 points) 50

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

(Circle only one choice that best describes the hydrologic soil class of the area surrounding the wetland being evaluated.)

Dominant Wetland Type	1) Sand, loam, gravel, till	2) Clay or bedrock
1) Lacustrine or on a major river	0	0
2) Isolated	10	5
3) Palustrine	7	4
4) Riverine (not a major river)	5	2

Ground Water Recharge, Wetland Soil Recharge Potential Score (maximum 10 points) 7

3.0 HYDROLOGICAL COMPONENT3.1 FLOOD ATTENUATION

50

3.2 WATER QUALITY IMPROVEMENT

3.2.1 Short Term Improvement

0.9625

3.2.2 Long Term Improvement

3

3.2.3 Groundwater Discharge (maximum 30)

7

Total for Water Quality Improvement

10.9625

3.3 CARBON SINK33.4 SHORELINE EROSION CONTROL03.5 GROUNDWATER RECHARGE

3.5.1 Site Type

50

3.5.2 Soils

7

Total for Groundwater Recharge

57TOTAL FOR HYDROLOGICAL COMPONENT (not to exceed 250)

121

4.0 SPECIAL FEATURES COMPONENT**4.1 RARITY****4.1.1 WETLANDS**Site Distric. 75

Presence of wetland type (check one or more)

☐ Bog☐ Fen☐ Swamp☒ Marsh

Score for rarity within the landscape and rarity of the wetland type. Score for rarity of wetland type is cumulative (maximum 80 points) based on presence or absence.

Site District	Score for Rarity within the Landscape	Score for Rarity of Wetland Type			
		Marsh	Swamp	Fen	Bog
6-1	60	40	0	80	80
6-2	60	40	0	80	80
6-3	40	10	0	40	80
6-4	60	40	0	80	80
6-5	20	40	0	80	80
6-6	40	20	0	80	80
6-7	60	10	0	80	80
6-8	20	20	0	80	80
6-9	0	20	0	80	80
6-10	20	0	20	80	80
6-11	0	30	0	80	80
6-12	0	30	0	60	80
6-13	60	10	0	80	80
6-14	40	20	0	40	80
6-15	40	0	0	80	80
7-1	60	0	60	80	80
7-2	60	0	0	80	80
7-3	60	0	0	80	80
7-4	80	0	0	80	80
7-6	80	30	0	80	80

Rarity within the Landscape Score (maximum 80 points)

Rarity of Wetland Type Score (Maximum 80 points)

60
20

4.1.2 SPECIES

4.1.2.1 BREEDING HABITAT FOR AN ENDANGERED OR THREATENED SPECIES

Name of species	Source of information
1) _____	_____
2) _____	_____
3) _____	_____

Attach documentation.

Scoring:

For each species 250 points

(Score is cumulative, no maximum score)

Breeding Habitat for Endangered or Threatened Species Score (no maximum) 0

4.1.2.2 TRADITIONAL MIGRATION OR FEEDING HABITAT FOR AN ENDANGERED OR THREATENED SPECIES

Name of species	Source of information
1) _____	_____
2) _____	_____
3) _____	_____

Attach documentation.

Scoring:

For one species 150 points

For each additional species 75

(Score is cumulative, no maximum score)

Traditional Habitat for Endangered or Threatened Species Score (no maximum) 0

4.1.2.3 PROVINCIALY SIGNIFICANT ANIMAL SPECIES

Name of species	Source of information
1) _____	_____
2) _____	_____
3) _____	_____
4) _____	_____
5) _____	_____

Attach separate list if necessary; Attach documentation

Scoring:

Number of provincially significant animal species in the wetland:

One species	=	50 points	14 species	=	154
2 species	=	80	15 species	=	156
3 species	=	95	16 species	=	158
4 species	=	105	17 species	=	160
5 species	=	115	18 species	=	162
6 species	=	125	19 species	=	164
7 species	=	130	20 species	=	166
8 species	=	135	21 species	=	168
9 species	=	140	22 species	=	170
10 species	=	143	23 species	=	172
11 species	=	146	24 species	=	174
12 species	=	149	25 species	=	176
13 species	=	152			

Add one point for every species past 25 (for example, 26 species = 177 points, 27 species = 178 points etc.)

(no maximum score)

Provincially Significant Animal Species Score (no maximum) 0

4.1.2.4 PROVINCIALY SIGNIFICANT PLANT SPECIES

(Scientific names must be recorded)

Common Name Scientific Name Source of information

1) _____	_____	_____
2) _____	_____	_____
3) _____	_____	_____
4) _____	_____	_____
5) _____	_____	_____

Attach separate list if necessary. Attach documentation.

Scoring:

Number of provincially significant plant species in the wetland:

One species	=	50 points	14 species	=	154
2 species	=	80	15 species	=	156
3 species	=	95	16 species	=	158
4 species	=	105	17 species	=	160
5 species	=	115	18 species	=	162
6 species	=	125	19 species	=	164
7 species	=	130	20 species	=	166
8 species	=	135	21 species	=	168
9 species	=	140	22 species	=	170
10 species	=	143	23 species	=	172
11 species	=	146	24 species	=	174
12 species	=	149	25 species	=	176
13 species	=	152			

Add one point for every species past 25 (for example, 26 species = 177 points, 27 species = 178 points etc.)

Provincially Significant Plant Species Score (no maximum) 0

4.1.2.5 REGIONALLY SIGNIFICANT SPECIES (SITE REGION)

Scientific names must be recorded for plant species. **Lists of significant species must be approved by MNR.**

SIGNIFICANT IN SITE REGION:

Common Name	Scientific Name	Source of information
1) _____	_____	_____
2) _____	_____	_____
3) _____	_____	_____
4) _____	_____	_____
5) _____	_____	_____
6) _____	_____	_____
7) _____	_____	_____
8) _____	_____	_____

Attach separate list if necessary. Attach documentation

Scoring:

No. of species significant in Site Region

One species	=	20	6 species	=	55
2 species	=	30	7 species	=	58
3 species	=	40	8 species	=	61
4 species	=	45	9 species	=	64
5 species	=	50	10 species	=	67

Add one point for every species past 10. (No maximum score)

Regionally Significant Species Score (Site Region) (no maximum) 0

4.2.1.6 LOCALLY SIGNIFICANT SPECIES (SITE DISTRICT)

Scientific names must be recorded for plant species. **Lists of significant species must be approved by MNR**

Common Name	Scientific Name	Source of information
1) _____	_____	_____
2) _____	_____	_____
3) _____	_____	_____
4) _____	_____	_____
5) _____	_____	_____
6) _____	_____	_____
7) _____	_____	_____
8) _____	_____	_____
9) _____	_____	_____
10) _____	_____	_____

Attach separate list if necessary. Attach documentation.

Scoring:

No. of species significant in Site District

One species	=	10	6 species	=	41
2 species	=	17	7 species	=	43
3 species	=	24	8 species	=	45
4 species	=	31	9 species	=	47
5 species	=	38	10 species	=	49

For each significant species over 10 in the wetland, add 1 point.

Locally Significant Species Score(Site District) (no maximum)

0

4.2 SIGNIFICANT FEATURES AND/OR FISH & WILDLIFE HABITAT

4.2.1 NESTING OF COLONIAL WATERBIRDS

Status	Name of species	Source of Information	Score
1) Currently nesting			50 points
2) Known to have nested within past 5 years			25
3) Active feeding area (Do not include feeding by great blue herons)			15
4) None known			0

Attach documentation (nest locations, etc., if known)

Score highest applicable category only; maximum score 50 points.

Score for Nesting Colonial Waterbirds (maximum 50 points) 0

4.2.2. WINTER COVER FOR WILDLIFE

(Check only highest level of significance) Score
(one only)

- 1) _____

Provincially significant

100
- 2) _____

Significant in Site Region

50
- 3) _____

Significant in Site District

25
- 3) _____

Locally significant

10
- 4) X _____

Little or poor winter cover present

0

Source of information: field observation McLachlan 2011

Winter Cover for Wildlife Score (maximum 100 points) 0

4.2.3 WATERFOWL STAGING AND/OR MOULTING

(Check only highest level of significance for both staging and moulting; score is cumulative across columns, maximum score 150)

	<u>Staging</u>	Score (one only)	<u>Moulting</u>	Score (one only)
1) Nationally significant	<input type="checkbox"/>	150	<input type="checkbox"/>	150
2) Provincially significant	<input type="checkbox"/>	100	<input type="checkbox"/>	100
3) Regionally significant	<input type="checkbox"/>	50	<input type="checkbox"/>	50
4) Known to occur	<input type="checkbox"/>	10	<input type="checkbox"/>	10
5) Not possible	<input type="checkbox"/>	0	<input type="checkbox"/>	0
6) Unknown	<input checked="" type="checkbox"/>	0	<input checked="" type="checkbox"/>	0

Source of information: field observation Mclachlan 2011

Waterfowl Moulting and Staging Score (maximum 150 points) 0

4.2.4 WATERFOWL BREEDING

(Check only highest level of significance) Score

- | | | |
|--|--------------------------|-----|
| 1) <input type="checkbox"/> | Provincially significant | 100 |
| 2) <input type="checkbox"/> | Regionally significant | 50 |
| 3) <input type="checkbox"/> | Habitat suitable | 10 |
| 4) <input checked="" type="checkbox"/> | Habitat not suitable | 0 |

Source of information: field observation Mclachlan 2011

Waterfowl Breeding Score (maximum 100 points) 0

4.2.5 MIGRATORY PASSERINE, SHOREBIRD OR RAPTOR STOPOVER AREA

(check highest applicable category)

- | | Score |
|--|-------|
| 1) <input type="checkbox"/> Provincially significant | 100 |
| 2) <input type="checkbox"/> Significant in Site Region | 50 |
| 3) <input type="checkbox"/> Significant in Site District | 10 |
| 4) <input checked="" type="checkbox"/> Not significant | 0 |

Source of information: field observation Mclachlan 2011

Passerine, Shorebird or Raptor Stopover Score (maximum 100 points) 0

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

Table 5. Area Factors for Low Marsh, High Marsh and Swamp Communities.

No. of ha of Fish Habitat	Area Factor
< 0.5 ha	0.1
0.5 - 4.9	0.2
5.0 - 9.9	0.4
10.0 - 14.9	0.6
15.0 - 19.9	0.8
20.0+ ha	1.0

Step 1:

- ☒ Fish habitat is not present within the wetland (Score = 0)
- ☐ Fish habitat is present within the wetland (Go to Step 2)

Step 2: Choose only one option

- 1) ☐ Significance of the spawning and nursery habitat within the wetland is known (Go to Step3)
- 2) ☐ Significance of the spawning and nursery habitat within the wetland is not known (Go through Steps 4, 5, 6, and 7)

Step 3: Select the highest appropriate category below, attach documentation:

- | | | |
|-----------------------------|---------------------------------------|------------|
| 1) <input type="checkbox"/> | Significant in Site Region | 100 points |
| 2) <input type="checkbox"/> | Significant in Site District | 50 |
| 3) <input type="checkbox"/> | Locally Significant Habitat (5.0+ ha) | 25 |
| 4) <input type="checkbox"/> | Locally Significant Habitat (<5.0 ha) | 15 |

Score for Spawning and Nursery Habitat (maximum score 100 points) 0

Step 4: Proceed to Steps 4 to 7 only if Step 3 was not answered.

(Low Marsh: marsh area from the existing water line out to the outer boundary of the wetland)

☐ Low marsh not present (Continue to Step 5)☐ Low marsh present (Score as follows)**Scoring for Presence of Key Vegetation Groups**

Scoring is based on the one most clearly dominant plant species of the dominant form in each Low Marsh vegetation community. Check the appropriate Vegetation Group (see Appendix 16, Table 16-2) for each Low Marsh community. Sum the areas of the communities assigned to each Vegetation Group and multiply by the appropriate size factor from Table 5.

Vegetation Group Number	Vegetation Group Name	Present as a Dominant Form (check)	Total Area (ha)	Area Factor (see Table 5)	Score	Final Score (area factor x score)
1	Tallgrass				6 pts	
2	Shortgrass-Sedge				11	
3	Cattail-Bulrush-Burreed				5	
4	Arrowhead-Pickerelweed				5	
5	Duckweed				2	
6	Smartweed-Waterwillow				6	
7	Waterlily-Lotus				11	
8	Waterweed-Watercress				9	
9	Ribbongrass				10	
10	Coontail-Naiad-Watermilfoil				13	
11	Narrowleaf Pondweed				5	
12	Broadleaf Pondweed				8	
Total Score (maximum 75 points)						

Step 5: (High Marsh: area from the water line to the inland boundary of marsh wetland type. This is essentially what is commonly referred to as a wet meadow, in that there is insufficient standing water to provide fisheries habitat except during flood or high water conditions.)

☐ High marsh not present (Continue to Step 6)☐ High marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

Scoring is based on the one most clearly dominant plant species of the dominant form in each High 1 Marsh vegetation community. Check the appropriate Vegetation Group (see Appendix 16, Table 16-2) for each High Marsh community. Sum the areas of the communities assigned to each Vegetation Group and multiply by the appropriate size factor from Table 5.

Vegetation Group Number	Vegetation Group Name	Present as a Dominant Form (check)	Total Area (ha)	Area Factor (see Table 5)	Score	Final Score (area factor x score)
1	Tallgrass				6 pts	
2	Shortgrass-Sedge				11	
3	Cattail-Bulrush-Burreed				5	
4	Arrowhead-Pickerelweed				5	
Total Score (maximum 25 points)						

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently.

Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

_____ Swamp containing fish habitat not present (Continue to Step 7)

_____ Swamp containing fish habitat present (Score as follows)

Swamp containing fish habitat	Present (check)	Total area (ha)	Area Factor (see Table 5)	Score	TOTAL SCORE (factor x score)
seasonally flooded				10	
permanently flooded				10	
SCORE (maximum 20 points)					

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = _____

Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = _____

Score for Swamp Containing Fish Habitat (maximum 20) = _____

Sum (maximum score 100 points) = 0

4.2.6.2 Migration and Staging Habitat

Step 1:

- 1) X Staging or Migration Habitat is not present in the wetland (Score = 0)
- 2) ___ Staging or Migration Habitat is present in the wetland, significance of the habitat is known (Go to Step 2)
- 3) ___ Staging or Migration Habitat is present in the wetland, significance of the habitat is not known (Go to Step 3)

NOTE: Only one of Step 2 or Step 3 is to be scored.

Step 2: Select the highest appropriate category below, attach documentation:

		Score
1) ___	Significant in Site Region	25 points
2) ___	Significant in Site District	15
3) ___	Locally Significant	10
4) ___	Fish staging and/or migration habitat present, but not as above	5

Score for Fish Migration and Staging Habitat (maximum score 25 points) 0

Step 3: Select the highest appropriate category below based on **presence** of the designated site type (does not have to be dominant). See Section 1.1.3. Note name of river for 2) and 3).

		Score
1) ___	Wetland is riverine at rivermouth or lacustrine at rivermouth	25 points
2) ___	Wetland is riverine, within 0.75 km of rivermouth	15
3) ___	Wetland is lacustrine, within 0.75 km of rivermouth	10
4) ___	Fish staging and/or migration habitat present, but not as above	0

Score for Staging and Migration Habitat (maximum score 25 points) 0

4.3 ECOSYSTEM AGE

(Fractional Area = area of wetland/total area of wetland area)

Fractional Area	Scoring
Bog	_____ x 25 _____
Fen, treed to open on deep soils, floating mats or marl	_____ x 20 _____
Fen, on limestone rock	_____ x 5 _____
Swamp	_____ x 3 _____
Marsh	<u>1.0</u> x 0 <u>1</u>
Ecosystem Age Score (maximum 25 points) <u>1</u>	

4.4 GREAT LAKES COASTAL WETLANDS

Score for coastal (see text for definition) wetlands only

Choose one only	
_____ wetland <10 ha	= 10 points
_____ wetland 10-50 ha	= 25
_____ wetland 51-100 ha	= 50
_____ wetland >100 ha	= 75
Great Lakes Coastal Wetlands Score (maximum 75 points) <u>0</u>	

4.0 SPECIAL FEATURES4.1 RARITY

4.1.1 Wetlands

4.1.1.1 Rarity within the Landscape

60

4.1.1.2 Rarity of Wetland Type (maximum 80)

20

Total for Wetland Rarity

80

4.1.2 Species

4.1.2.1 Endangered Species Breed

04.1.2.2 Traditional Use by Endangered or
Threatened Species0

4.1.2.3 Provincially Significant Animals

0

4.1.2.4 Provincially Significant Plants

0

4.1.2.5 Regionally Significant Species

0

4.1.2.6 Locally Significant Species

0

Total for Species Rarity

04.2 SIGNIFICANT FEATURES OR HABITAT

4.2.1 Colonial Waterbirds

0

4.2.2 Winter Cover for Wildlife

0

4.2.3 Waterfowl Staging and Moulting

0

4.2.4 Waterfowl Breeding

0

4.2.5 Migratory Passerine, Shorebird or Raptor Stopover

0

4.2.6 Fish Habitat

0

Total for Significant Features and Habitat

04.3 ECOSYSTEM AGE14.4 GREAT LAKES COASTAL WETLANDS0TOTAL FOR SPECIAL FEATURES (maximum 250)81

5.0 EXTRA INFORMATION

5.1 PURPLE LOOSESTRIFE

☒ Absent/Not seen

☐ Present

(a) One location in wetland

Two to many locations

Abundance code

(b) (1) < 20 stems

(2) 20-99 stems

(3) 100-999 stems

(4) >1000 stems

5.2 SEASONALLY FLOODED AREAS

Indicate length of seasonal flooding

Check one or more

Ephemeral

Temporal

Seasonal

Semi-permanent

No seasonal flooding

(less than 2 weeks)

(2 weeks to 1 month)

(1 to 3 months)

(>3 months)

5.3 SPECIES OF SPECIAL SIGNIFICANCE

5.3.1 Osprey

Present and nesting

Known to have nested in last 5 yr.

Feeding area for Osprey

Not as above

☒

5.3.2 Common Loon

Nesting in wetland

Feeding at edge of wetland

Observed or heard on lake or river adjoining the wetland

Not as above

☒

INVESTIGATORS

AFFILIATION

Erin McLachlan
Stephanie Goom

Morrison Hershfield
"

DATES WETLAND VISITED

Sept 23, 2011

DATE THIS EVALUATION COMPLETED: Oct. 7, 2011

ESTIMATED TIME DEVOTED TO COMPLETING THE FIELD SURVEY IN "PERSON HOURS"

4 hrs

WEATHER CONDITIONS

i) at time of field work overcast, light rain
(Continue in the space below if necessary)

ii) summer conditions in general Sunny

OTHER POTENTIALLY USEFUL INFORMATION:

CHECKLIST OF PLANT AND ANIMAL SPECIES RECORDED IN THE WETLAND:

Attach list of all flora and fauna observed in the wetland.

* Indicate if voucher specimens or photos have been obtained, where located, etc.

SUMMARY OF EVALUATION RESULT

Wetland _____

TOTAL FOR 1.0 BIOLOGICAL COMPONENT

76

TOTAL FOR 2.0 SOCIAL COMPONENT

37

TOTAL FOR 3.0 HYDROLOGICAL COMPONENT

121

TOTAL FOR 4.0 SPECIAL FEATURES COMPONENT

81

WETLAND TOTAL

315

INVESTIGATORS

Erin McLachlan
Stephanie Gorn

AFFILIATION

Morrison Hershfield

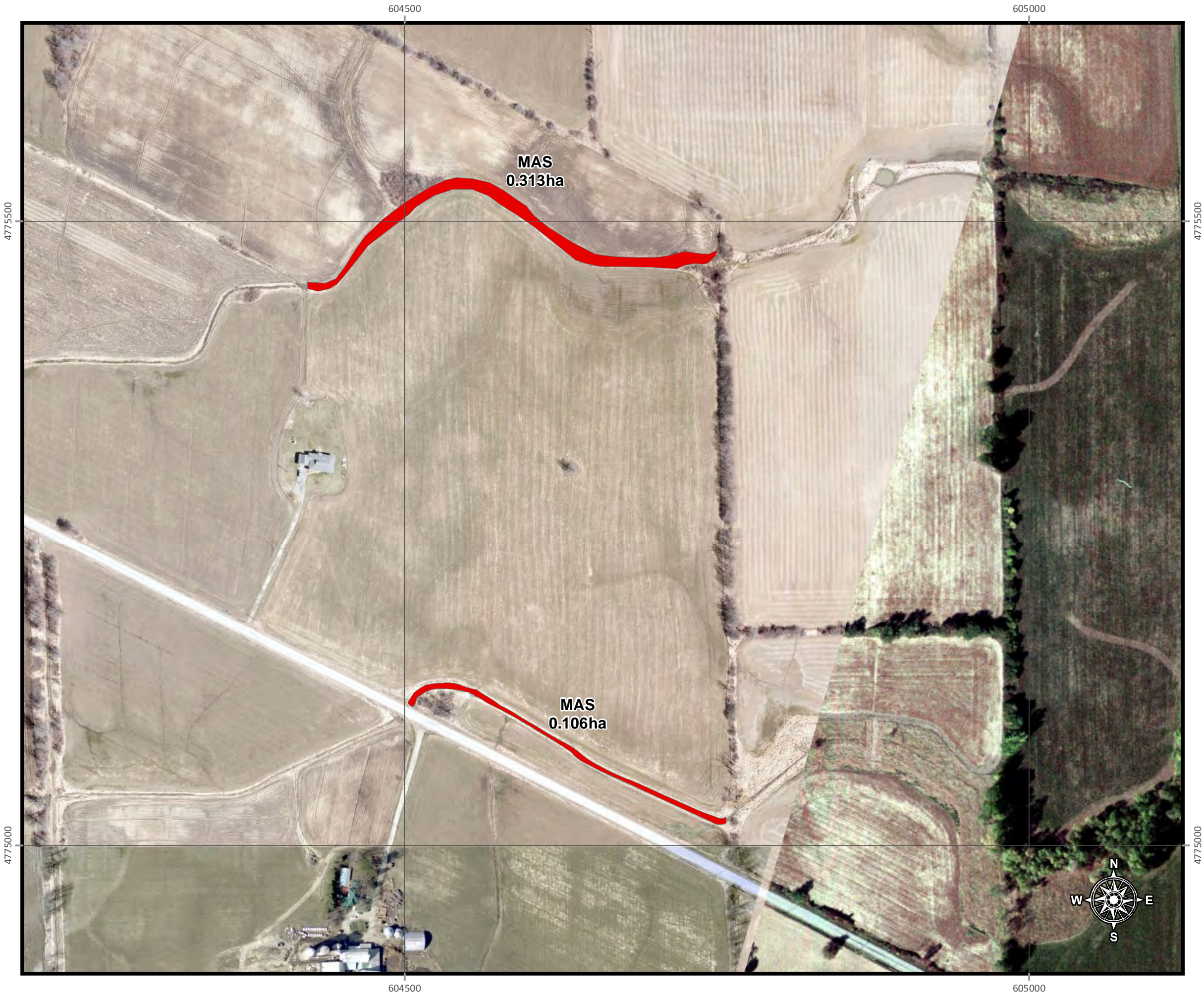
DATE Sept. 23/11

Plant List

Devil's Beggarticks (*Bidens frondosa*)
Scriber Bluegrass (*Poa trivialis*)
Flat-top Fragrant Goldenrod (*Euthamia graminifolia*)
New England Aster (*Symphyotrichum novae-angliae*)
Reed Canary Grass (*Phalaris arundinacea*)
Silky Dogwood (*Cornus sericea*)
Common Teasel (*Dipsacus sylvestris*)
Manitoba Maple (*Acer negundo*)
Barnyard Grass (*Echinochloa crusgalli*)
Bittersweet Nightshade (*Solanum dulcamara*)
Chicory (*Cichorium intybus*)
American Elm (*Ulmus americana*)
Panicked Aster (*Symphyotrichum lanceolatum*)
Queen Anne's Lace (*Daucus carota*)
Redroot Pigweed (*Amaranthus retroflexus*)
Curled Dock (*Rumex crispus*)
Tall Meadow-rue (*Thalictrum pubescens*)
Narrow-leaved Cattail (*Typha angustifolia*)
Velvetleaf (*Abutilon theophrasti*)

Animal List

American Toad (*Bufo americanus*)

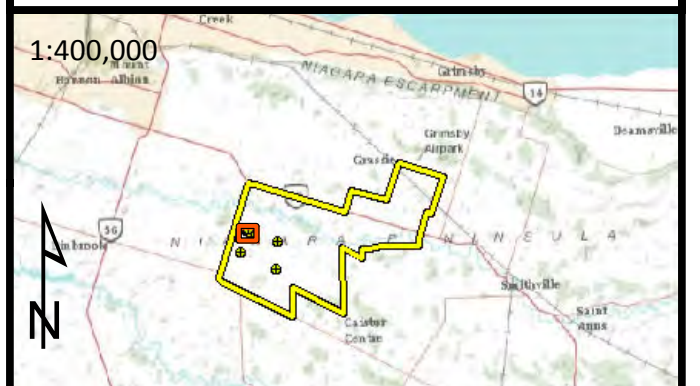


Legend

Evaluated Wetland Areas

All frames: North American Datum 1983,
Universal Transverse Mercator Projection, Zone 17N.

1:400,000



Scale:

1:3,000

0 25 50 100 150 200 250 m

Project:

HAF WIND ENERGY PROJECT

Title:

Wetland Polygon Identification Map

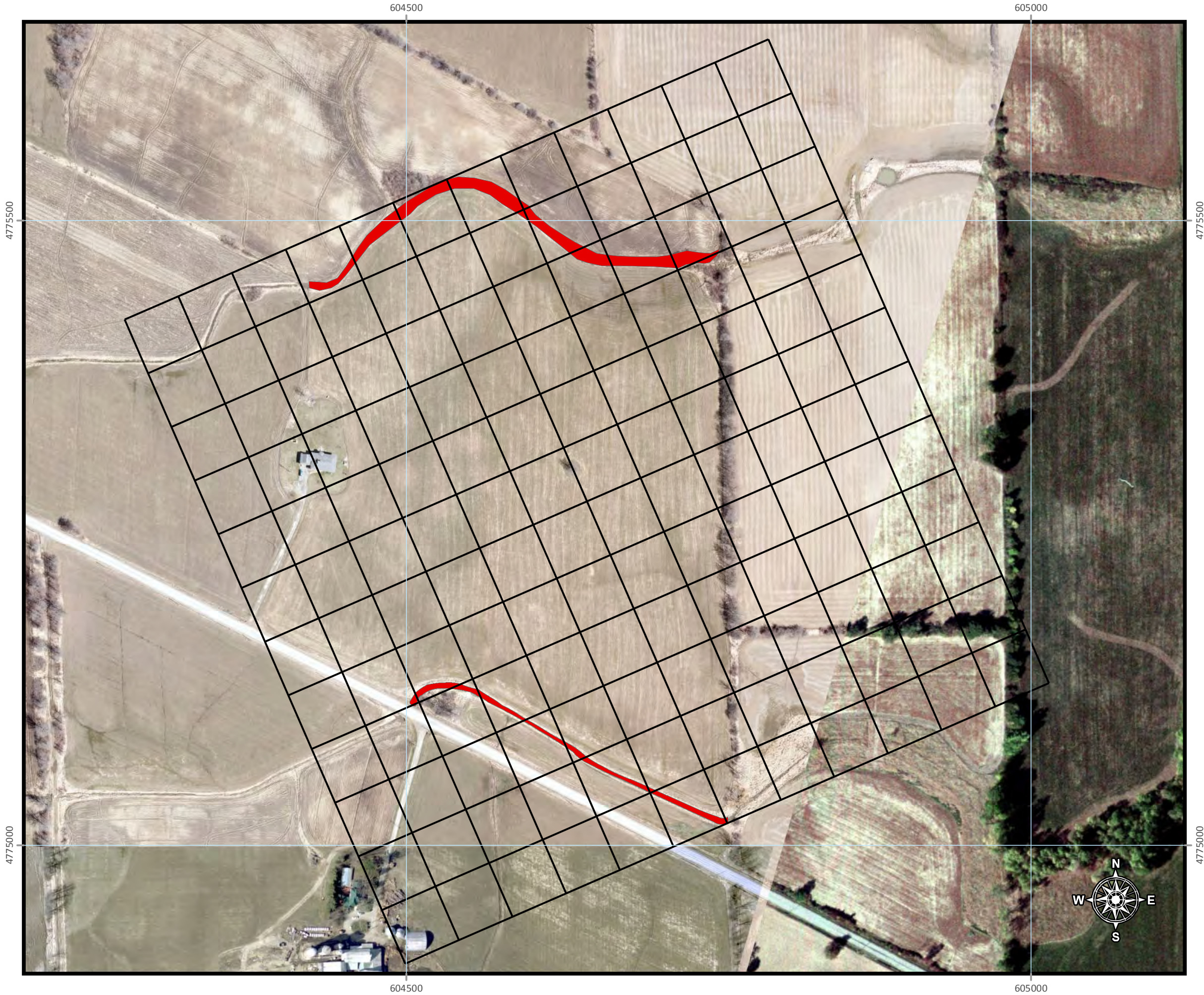
Project No.:

1104037

Drawing No.:

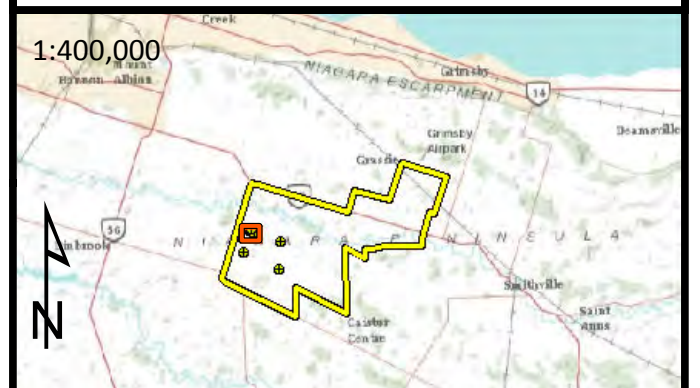
Date:

31 Oct 2011



Vertical Intersections: 11
+ Horizontal Intersections: 8
Total Intersections: 19

All frames: North American Datum 1983,
Universal Transverse Mercator Projection, Zone 17N.



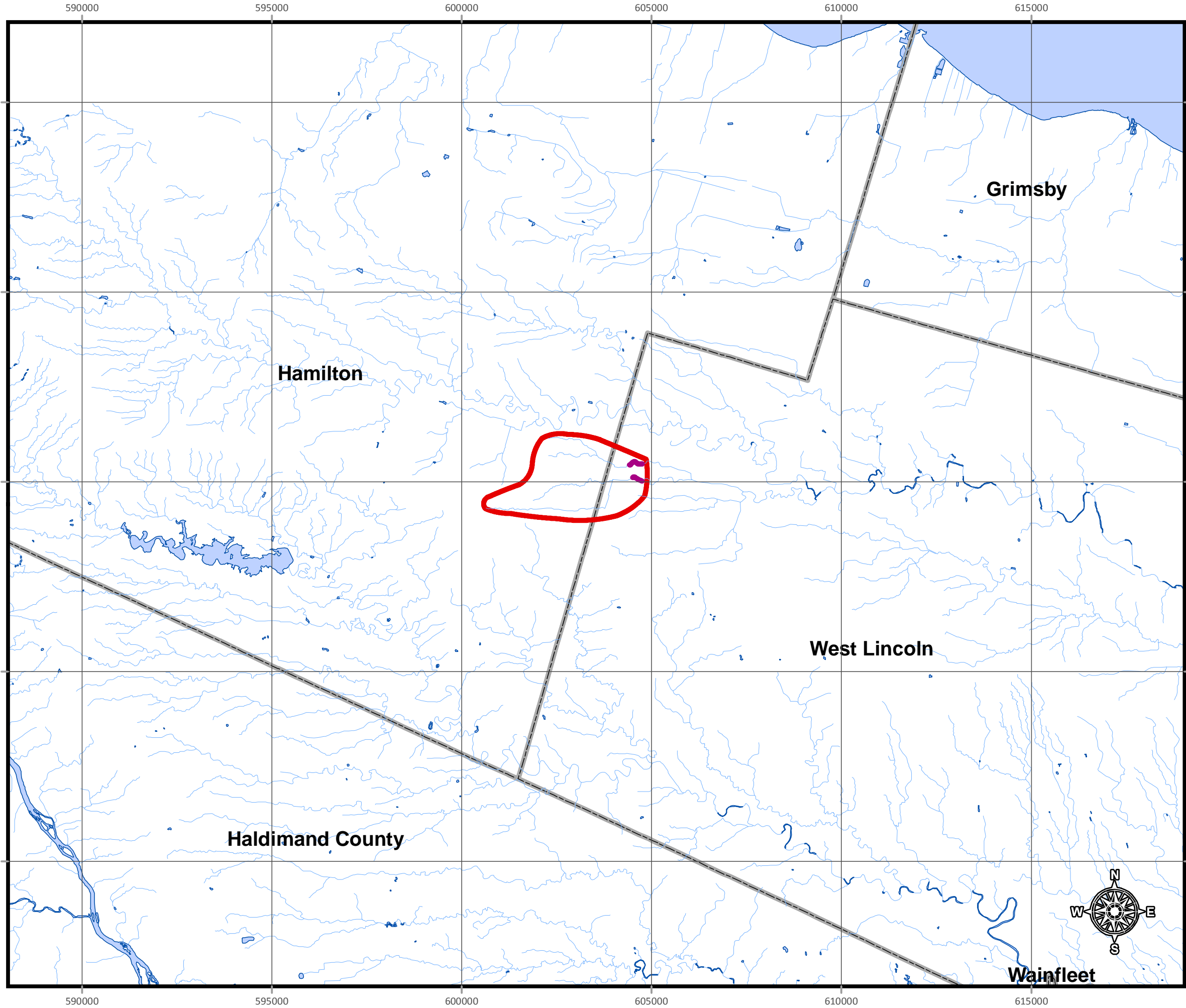
Project:
HAF WIND ENERGY PROJECT

Title:
Wetland Evaluation Interspersion Map

Project No.:
1104037

Drawing No.:

Date:
26 Oct 2011



Legend

- Wetland Areas
- Catchment Area
- Municipal Boundaries
- Watercourse Network
- Watercourse Features

All frames: North American Datum 1983,
Universal Transverse Mercator Projection, Zone 17N.

1:400,000

N

MORRISON HERSHFIELD

Scale:

1:100,000

0 0.5 1 2 3 4 5

Kilometers

Project:

HAF WIND ENERGY PROJECT

Title:

Wetland Evaluation
Catchment Area Map
(668.73 ha)






Project No.:
1104037

Drawing No.:

Date:
02 Nov 2011

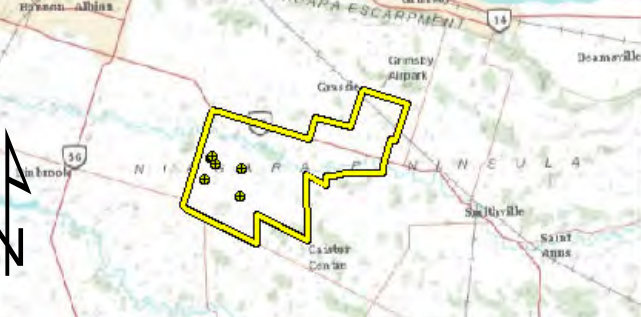


Legend

-  Wetland Areas
-  Catchment Area
-  Municipal Boundaries
-  Watercourse Network
-  Watercourse Features

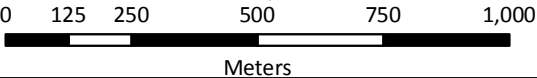
All frames: North American Datum 1983,
Universal Transverse Mercator Projection, Zone 17N.

1:400,000



Scale:

1:15,000



Project:

HAF WIND ENERGY PROJECT

Title:

**Wetland Evaluation
Catchment Area Map
(668.73 ha)**

Project No.:

1104037

Drawing No.:

Date:

02 Nov 2011