Environment

Goshen Wind, Inc.
Goshen Wind Energy Centre

Natural Heritage Assessment and Environmental Impact Study Report Third Addendum

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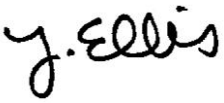

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Glossary of Terms

Area of Investigation ..... Area encompasses by 120 m setback from Project Location boundary
EIS ..... Environmental Impact Study
MNR ..... Ministry of Natural Resources
O. Reg. 359/09 ..... Ontario Regulation 359/09
Project Location ..... The area encompassing all construction activities and project components
REA ..... Renewable Energy Approval

1. Introduction

Goshen Wind, Inc., a wholly owned subsidiary of NextEra Energy Canada, ULC (NextEra), is proposing to construct a wind energy project in Bluewater and South Huron, Huron County, Ontario. AECOM Canada Ltd. (AECOM) was retained by NextEra to prepare a Natural Heritage Assessment (NHA) and Environmental Impact Study (EIS) for the proposed Goshen Wind Energy Centre (the Project), in accordance with the requirements of the Renewable Energy Approval (REA) process and O.Reg. 359/09. The Goshen Wind Energy Centre Natural Heritage Assessment and Environmental Impact Study Report (AECOM, 2013a) was submitted to the Ontario Ministry of Natural Resources (MNR) in January 2013. AECOM later prepared two Natural Heritage Assessment and Environmental Impact Study Report Addenda (AECOM, 2013b and 2013c) in respect to modifications to the Project Location proposed after the original submission of the NHA and EIS to MNR.

MNR issued confirmation and re-confirmation letters on January 15 and 16, 2013 and October 22, 2013 stating that the Natural Heritage Assessment and Environmental Impact Study Report (AECOM, 2013a), the first Natural Heritage Assessment and Environmental Impact Study Report Addendum (AECOM, 2013b) and the Second NHA Addendum (AECOM, 2013c), respectively, met all requirements in accordance with the REA regulation for this Project (refer to **Appendix A**). The Natural Heritage Assessment and Environmental Impact Study Report and the First and Second NHA Addenda are hereafter collectively referred to as the approved NHA and EIS.

This NHA Addendum has been prepared as a supplement to the approved NHA and EIS in accordance with the requirements of the REA process and O. Reg. 359/09, with respect to a modification to the transmission line proposed after MNR confirmation of the approved NHA and EIS.

1.1 Overview of Project Changes

Goshen Wind Inc. is proposing the following modification to the transmission line:

- Replacement of underground transmission line infrastructure with above-ground transmission line infrastructure within the same construction disturbance area on private property, in the vicinity of the Ausable River crossing, to optimize project design/constructability.

There is no change to the extent of the Project Location and its associated 120 m Area of Investigation as a result of the proposed modification (**Figure 1**).

The proposed modification is within 120 m of Natural Area 609. Features (*i.e.*, woodlands, wetlands, significant wildlife habitat and/or Areas of Natural and Scientific Interest) within 120 m of this modification include the following:

- Significant Wetland Feature WET-012 (minimum distance reduced to 0 m; transmission line above Feature);
- Significant Woodland Features WOD-104 and WOD-109 (minimum distance reduced to 0 m; transmission line above Features);
- Significant Valleyland Feature VAL-02 (no change to minimum distance; 0 m); and
- Generalized Candidate Significant Wildlife Habitat: Plant Species of Conservation Concern, Seeps and Springs, Bat Maternity Colony and Amphibian Wetland Breeding Habitat (minimum distance reduced to 0 m; transmission line above Feature); Reptile Hibernaculum (no change to minimum distance; 14 m).

Legend

- Transmission Line Study Area
- Wind Energy Centre Study Area
- Properties
- 120m Area of Investigation
- Transmission Line Construction Disturbance Area
- Natural Areas

Legend

Vegetation Types

- CUM - Cultural Meadow
- CUP - Cultural Plantation
- CUS - Cultural Savannah
- CUT - Cultural Thicket
- CUW - Cultural Woodland
- FOC - Coniferous Forest
- FOD - Deciduous Forest
- FOM - Mixed Forest
- HED - Hedgerow
- MAM - Meadow Marsh
- MAS - Shallow Marsh
- OAO - Open Aquatic
- SAF - Floating-leaved Shallow Aquatic
- SAS - Submerged Shallow Aquatic
- SDT - Treed Sand Dune
- SWD - Deciduous Swamp
- SWT - Thicket Swamp
- TPO - Open Tallgrass Prairie
- TPS - Tallgrass Savannah

610 FOD

FOD6-5

611

OAO

MAM

Ausable River

CUT

SWD2-2

SWD2-2

609

SWT2-2

SWD2-2

SWD

CUT

CUT

SWT2-2

SWT2-2

SWD2-2

SWT2-2

SWD2-2

SWT2-2

CUP3

SWD2-2

SWT2-2

OAO

CUP3

SWT2-2

OAO

SWD2-2

SWT2-2

SWD2-2

SWD2-2

SWT2-2

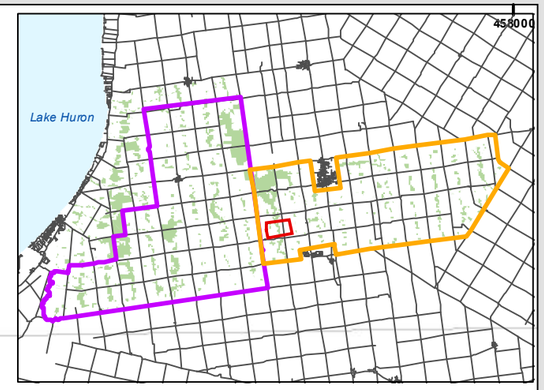
SWD2-2

FOD

FOD

Ausable Line

612 CUW



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UTM Zone 17N, NAD 83

Natural Heritage Assessment and Environmental Impact Study Report Thrid Addendum

Project Location

September 2013
Project 60155032

AECOM

Figure 1

458000

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According to a recent amendment to O. Reg. 359/09, Significant Valleylands are no longer included as a natural feature requiring a Natural Heritage Assessment or Environmental Impact Study; therefore, Significant Valleyland Feature VAL-02 is not considered further in this NHA Addendum.

1.2 Summary of NHA Addendum

Changes required to the approved NHA and EIS in order to address the proposed modification are summarized in **Table 1** below. The relevant sections of this NHA Addendum pertaining to these changes are also provided in the table below.

Table 1. Summary of Changes to NHA and EIS

Approved NHA and EIS Section	Change	Refer to Addendum Section(s)
2. Records Review	**Methods:** No changes.	**Section 2**
	Results: No changes.	
3. Site Investigation	**Methods:** Site investigations were conducted in Natural Area 609 to confirm the presence of candidate Bat Maternity Colony Features. In addition, where minimum distances from the transmission line to Significant Wildlife Habitat Features changed as a result of the proposed modification, the Features were re-examined to determine whether the modifications resulted in changes to the designation of candidate Significant Wildlife Habitat and Generalized Candidate Significant Wildlife Habitat.	**Section 3.1**
	Results: The following Features were carried forward to the Evaluation of Significance as a result of the proposed modification: • Candidate Significant Amphibian Wetland Breeding Habitat Feature AWE-30; and • Candidate Significant Plant Species of Conservation Concern Habitat Features SCP-18, SCP-19, SCP-20, SCP-21 and SCP-22.	**Section 3.2**
4. Evaluation of Significance	**Methods:** Evaluation of Significance studies were completed for candidate Significant Amphibian Wetland Breeding Habitat Feature AWE-30, and candidate Significant Plant Species of Conservation Concern Habitat Features SCP-18, SCP-19, SCP-20, SCP-21 and SCP-22, following the methods described in the approved NHA and EIS.	**Section 4.1**
	Results: None of the evaluated Features were confirmed to be significant; therefore, no new Features were carried forward to the EIS as a result of the proposed modification.	**Section 4.2**
5. EIS	Changes to the potential effects, mitigation measures and monitoring commitments are required (and described herein) for the following Features: • Significant Wetland Feature WET-012; and • Significant Woodland Features WOD-104 and WOD-109.	**Section 5**

2. Amendments to the Records Review

There is no change to the extent of the Project Location and its associated 120 m Area of Investigation as a result of the proposed modification (**Figure 1**). Consequently, no changes to the Records Review are required as a result of the proposed modification.

3. Amendments to the Site Investigation

3.1 Methods

Site investigations were conducted in Natural Area 609 to confirm the presence of candidate Bat Maternity Colony Features. The methods used to conduct these surveys are described in detail in **Appendix B**.

Where the minimum distance from the transmission line to Significant Wildlife Habitat Features changed as a result of the proposed Project Location modification, these Features were re-examined to determine whether the modification resulted in changes to the designation of candidate Significant Wildlife Habitat and Generalized Candidate Significant Wildlife Habitat as per Appendix D of the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2012).

3.2 Results

3.2.1 Wetlands

As result of the proposed modification, the minimum distance from the transmission line to wetland Feature WET-012 decreased from >0.1 m to 0 m, as the above-ground transmission line is now above this Feature (refer to **Figure 2** for location). The attributes, composition and functions of wetland Feature WET-012 remain the same as described in the approved NHA and EIS and are therefore not repeated here.

As described in the approved NHA and EIS, two Provincially Significant Wetlands, Hay Swamp and McDonald Marsh Wetland, form a portion of WET-012 (although the mapped boundaries of these evaluated wetlands do not extend into the Project Location). Therefore, this Feature did not require re-evaluation as a result of the proposed modification, but was carried forward to the EIS of this NHA Addendum to ensure that any potential effects of the modified transmission line are addressed through appropriate mitigation measures.

3.2.2 Woodlands

As a result of the proposed modification, the minimum distances from the transmission line to woodland Features WOD-104 and WOD-109 decreased from >0.1 m to 0 m, as the above-ground transmission line is now above these Features (refer to **Figure 2** for locations). The attributes, composition and functions of woodland Features WOD-104 and WOD-109 remain the same as described in the approved NHA and EIS and are therefore not repeated here. These Features did not require re-evaluation as a result of the proposed modification but were carried forward to the EIS of this NHA Addendum to ensure that any potential effects of the modified transmission line are addressed through appropriate mitigation measures.

3.2.3 Wildlife Habitat

The following Generalized Candidate Significant Wildlife Habitats previously identified in Natural Area 609 in the approved NHA and EIS changed to candidate Significant Wildlife Habitat because the minimum distance from the transmission line to these Features decreased from >0.1 m to 0 m, as the above-ground transmission line is now above these Features (refer to **Figure 3** for locations):

- Generalized Candidate Significant Amphibian Wetland Breeding Habitat was changed to candidate Significant Amphibian Wetland Breeding Habitat Feature AWE-30; and
- Generalized Candidate Significant Plant Species of Conservation Concern Habitat Features were changed to candidate Significant Plant Species of Conservation Concern Habitat Features SCP-18, SCP-19, SCP-20, SCP-21 and SCP-22.

These Features were carried forward to the Evaluation of Significance of this NHA Addendum to ensure that any potential effects of the modified transmission line are addressed through the application of appropriate mitigation measures, if required.

Legend
- Transmission Line Study Area
- Wind Energy Centre Study Area
- Properties
- 120m Area of Investigation
- Transmission Line Construction Disturbance Area
- Natural Areas

Legend
- Significant Woodlots
- Natural Area
- Significant Wetlands

458000

Kirkton Rd

4796000

605

622

610

Ausable River

609

621

611

Ausable Line

WET-012

WOD-104

WOD-109

612

620

Middle St

Victoria Ave E

Guettinger St

Crediton Rd

613

614

456000

458000

N
W E
S

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UTM Zone 17N, NAD 83

Natural Heritage Assessment and Environmental Impact Study Report Thrid Addendum

Woodland and Wetland Features

September 2013
Project 60155032

AECOM

Figure 2

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A Generalized Candidate Seep and Spring Habitat Feature was previously identified in Natural Area 609 due to the presence of watercress, a seep indicator species. Upon review of the site investigation field notes for Natural Area 609 (provided in Appendix B of the approved NHA and EIS) as well as the vascular plant surveys conducted in support of this NHA Addendum (refer to **Appendix C**), there is no record of watercress at this location, nor were any other indicators of seeps or springs observed. Consequently, the Generalized Candidate Seep and Spring Habitat Feature in Natural Area 609 is not considered further in this NHA Addendum.

Generalized Candidate Bat Maternity Colony Features were previously identified in Natural Area 609, in two woodlands that are now overlapped by the transmission line. Site investigations were conducted in these woodlands to confirm the presence of candidate Bat Maternity Colony Features. The results of these surveys are described in detail in **Appendix B**. No candidate Bat Maternity Colony Features were identified through these surveys, therefore the Generalized Candidate Bat Maternity Colony Features in Natural Area 609 are not considered further in this NHA Addendum.

4. Amendments to the Evaluation of Significance

4.1 Methods

4.1.1 Wildlife Habitat

Evaluation of significance studies were conducted for the following candidate Significant Wildlife Habitat Features using the methods described for this Significant Wildlife Habitat type in the approved NHA and EIS:

- Candidate Significant Amphibian Wetland Breeding Habitat Feature AWE-30; and
- Candidate Significant Plant Species of Conservation Concern Habitat Features SCP-18, SCP-19, SCP-20, SCP-21 and SCP-22.

4.2 Results

4.2.1 Amphibian Wetland Breeding Habitat

The results of Evaluation of Significance surveys completed for candidate Significant Amphibian Wetland Breeding Habitat Feature AWE-30 are summarized in **Table 2**. Field notes are provided in **Appendix C**. The qualifications of the field personnel were previously provided in Appendix C of the approved NHA and EIS.

Table 2. Determination of Significance for Amphibian Wetland Breeding Habitat

Feature ID	Habitat Assessment		Surveys Targeting Vocalizing Amphibians			Surveys Targeting Non-vocalizing Amphibians		Determination of Significance
			Round 1	*Round 2*	*Round 3*	*Egg Mass Survey*	*Larval Survey*	
AWE-30	Pond with depth greater than 1 m and potential to hold water until July; surrounded by thick vegetation including Willow and Dogwood species; considered potentially suitable to support breeding amphibians.	**Date, Time and Weather Conditions**	April 17, 2013 Survey was attempted but could not be completed due to inaccessibility of the Feature, as the site was	May 15, 2013 22:57 – 23:00 Wind (Beaufort Scale): 2 Cloud Cover: 0% Background Noise: 1 Temperature: 8°C Precipitation: None	June 19, 2013 23:18 – 23:21 Wind (Beaufort Scale): 1 Cloud Cover: 10% Background Noise: 1 Temperature: 13°C Precipitation: None	April 17, 2013 Survey was attempted but could not be completed due to inaccessibility of the Feature, as the site was	May 15, 2013 10:10 – 10:40 Wind (Beaufort Scale): 5 Cloud Cover: 0% Temperature: 16°C Precipitation: None	No – not Significant Wildlife Habitat. No amphibians observed.
		Results	completely flooded.	No amphibians heard calling.	No amphibians heard calling.	completely flooded.	No amphibians observed.	

Feature AWE-30 was determined not to be Significant Wildlife Habitat; therefore, this Feature was not carried forward to the EIS of this NHA Addendum.

4.2.2 Plant Species of Conservation Concern Habitat

Vascular plant inventories in Natural Area 609 were completed on June 19 and August 14, 2013, for the purpose of this NHA Addendum. A summary of the results of vascular plant inventories conducted in Features SCP-18, SCP-19, SCP-20, SCP-21 and SCP-22 is provided in **Table 3**. Field notes are provided in **Appendix C** and a complete list of plant species observed is provided in **Appendix D**. The qualifications of all field personnel were provided in Appendix C of the approved NHA and EIS.

No plant Species of Conservation Concern were observed at any of these Features and thus none were carried forward to the EIS phase of this NHA Addendum.

Table 3. Determination of Significance for Plant Species of Conservation Concern Habitat

Feature ID	Natural Area	ELC Unit	Plant Species of Conservation Concern Observed	Carried Forward to EIS
SCP-18	609	SWD2-2	No	No – not Significant Wildlife Habitat
SCP-19	609	SWT2-2	No	No – not Significant Wildlife Habitat
SCP-20	609	SWT2-2	No	No – not Significant Wildlife Habitat
SCP-21	609	SWT2-2	No	No – not Significant Wildlife Habitat
SCP-22	609	SWD2-2	No	No – not Significant Wildlife Habitat

5. Amendments to the Environmental Impact Study

5.1 Transmission Line

In the approved NHA and EIS, the transmission line was to be directionally drilled in one location to avoid affecting Significant Wetland Feature WET-012. Construction was to follow the same process described in the approved NHA and EIS for directionally drilling the collection line system.

According to the amended O. Reg. 359/09, applicants may seek an exemption from the prohibition on development within a Provincially Significant Wetland for the construction or installation of a transmission line. In support of this exemption, the EIS Report must provide an explanation for why it is not reasonable for the transmission line to be entirely outside the wetland, including a review of alternative transmission line routes and a description of how the proposed route has the fewest effects and is most easily mitigated. A description of the preferred transmission line route (spanning the wetland) is provided below, followed by an explanation for why it is not reasonable for the transmission line to be entirely outside Significant Wetland Feature WET-012.

5.1.1 Preferred Transmission Line Route

At the location of the crossing of Significant Wetland Feature WET-012, the 115 kV electrical transmission line is proposed to be located above-ground on private property (**Figure 2**). At this location, the transmission line will be mounted on new transmission line poles. The poles are proposed to be constructed of wood, concrete or steel. The transmission line poles will generally be 24 m above grade; however the poles will be taller (43 m above grade) at the crossing of Significant Wetland Feature WET-012 to reduce impacts to this feature. These taller poles will eliminate the need to remove trees within Wetland Feature WET-012, as the line will span above the trees within this feature and be set back far enough on either side of the feature.

Holes for new transmission line poles are typically augered in the ground using a truck mounted auger device. The poles will then be inserted using special cranes to a typical depth of 2 m to 3 m below grade. The taller (43 m above grade) poles on either side of the crossing will be installed approximately 7 m below grade. A concrete foundation may be required for these taller poles. The poles are typically “dressed” (made ready to accept conductors) on the ground prior to installation. All transmission line poles will be set back at least 5 m from the boundaries of Significant Wetland Feature WET-012.

5.1.2 Rationale for Selecting the Preferred Transmission Line Route

The preferred transmission line route was selected based on the following assessment of alternatives:

- Significant Wetland Feature WET-012 extends along the floodplain of the Ausable River within the Project Study Area. The Ausable River must be crossed by the transmission line at some point to reach the Project’s Point of Interconnection with the Independent Electricity System Operator (IESO)-controlled grid.
- There are no road right-of-ways in the immediate vicinity (within 750 m) of the proposed crossing of Significant Wetland Feature WET-012. Significant Wetland Feature WET-012 extends to either side of the nearest road right-of-way (Kirkton Road) to the north. To the south, the nearest road right-of-way (Crediton Road) has many homes fronting on it.
- The landowner at the crossing location is willing to host the transmission line on private property.
- Burying the transmission line under Significant Wetland Feature WET-012 using horizontal directional drilling would require termination structures at the transition from the overhead to underground line; these structures would be large and have a visual impact. In addition, a specialized crew would be required for the installation of the underground transmission line as well as to repair the underground transmission line in the case of a failure; no such specialized crew is available locally. Finally, the transition to an underground transmission line cable causes the line to be less efficient and would result in higher losses of energy during transmission.

5.2 Significant Wetlands

The minimum distance from Significant Wetland Feature WET-012 to the nearest infrastructure (transmission line) is reduced from >0.1 to 0 m (transmission line above Feature) as a result of the proposed modification. A detailed vegetation species inventory was conducted in Wetland Feature WET-012 in support of this NHA Addendum. A complete list of the plant species observed during the inventory is provided in **Appendix D**.

On the west bank of the Ausable River, the transmission line will be installed above a Willow Mineral Thicket Swamp (SWT2-2) vegetation community. As described in the approved NHA and EIS, the sparse canopy within this mid-age thicket swamp community consists of a few crack willow and green ash. The dominant shrub layer consists of sandbar willow, alternate-leaved dogwood and red-osier dogwood. The ground cover consists of reed canary grass, wood nettle, spotted jewelweed and goldenrod species. A representative photograph of this community is provided below (**Photograph 1**). A complete list of plant species observed during the detailed vegetation inventory conducted in support of this NHA Addendum is provided in **Appendix D**.

On the east bank of the Ausable River, the transmission line will be installed above a Green Ash Mineral Deciduous Swamp Type (SWD2-2) vegetation community. As described in the approved NHA and EIS, the canopy layer of this mid-age deciduous swamp community consists of green ash and Freeman's maple. The sub-canopy layer consists of Freeman's maple and green ash. The shrub layer consists of wild red raspberry, Freeman's maple and green ash. The ground cover consists of wood nettle, goldenrod species, spotted jewelweed and blue flag iris. Representative photographs of this community are provided below (**Photographs 2 and 3**). A complete list of plant species observed during the detailed vegetation inventory conducted in support of this NHA Addendum is provided in **Appendix D**.

Photograph 1. Willow Mineral Thicket Swamp Type (SWT2-2) Vegetation Community (Foreground)

Photograph 2. Green Ash Mineral Deciduous Swamp Type (SWD2-2) Vegetation Community ↑

Photograph 3. Green Ash Mineral Deciduous Swamp Type (SWD2-2) Vegetation Community ↑

Potential effects of transmission line construction/decommissioning and operation, mitigation measures, monitoring commitments and contingency measures to address potential effects to WET-012 are described in **Table 4** below.

5.3 Significant Woodlands

The minimum distances from Significant Woodland Features WOD-104 and WOD-109 to the nearest Project infrastructure (transmission line) are reduced from >0.1 to 0 m (transmission line above Feature) as a result of the proposed modification. These features are overlapped by Wetland Feature WET-012 (refer to **Figure 2**). Therefore, the mitigation measures described for Wetland Feature WET-012 in **Table 4** above will be applied to Woodland Features WOD-104 and WOD-109.

Table 4. Additional Potential Effects on Significant Wetlands and Mitigation Measures

Significant Wetland	Potential Effects	Performance Objectives	Mitigation Measures	Likelihood and Significance of Residual Effects	Monitoring Plan and Contingency Measures
WET-012 (0 m; transmission line above Feature)	**Construction/ Decommissioning** • Accidental intrusion into Significant Wetland resulting in damage to vegetation and disturbance to wildlife.	• Avoid accidental damage to Significant Wetland.	For construction activities outside the Significant Wetland: • Install transmission line poles outside the boundaries of the Significant Wetland. Apply a minimum setback of 5 m during installation of transmission line poles. • Where construction occurs within 30 m, install and maintain protective fencing to clearly define the construction area and prevent accidental damage to vegetation. For construction activities inside the Significant Wetland: • Pull the transmission line across the Significant Wetland either by helicopter or by hand with the use of a winch. If required, branches may be selectively removed under the supervision of an arborist or forester by hand-held equipment (e.g. chainsaws) and accessed by foot to prevent soil compaction. Cut branches will be left in place in the wetland but will be cut up to lie low on the ground. No heavy equipment will be used within the Significant Wetland. Construction activities within the Significant Wetland should take place in the winter (November 1 to March 15), if possible, or outside the breeding bird season (May 1 to July 31). If this is not possible, MNR will be consulted regarding additional mitigation measures that may be required.	• Accidental damage will be avoided through clear delineation of boundaries and protective fencing. • Negligible residual effects.	• Undertake weekly site inspections by an Environmental Monitor to ensure that protective fencing is intact and that there is no damage caused during construction. • Conduct a post-construction survey to confirm that the disturbance to Significant Wetland Feature WET-012 is minimal. • **Contingency Measures:** ▪ Repair protective fencing if damaged. ▪ Prune any damaged trees through implementation of proper arboricultural techniques, under supervision of an Arborist or Forester. ▪ If excessively disturbed areas are detected through the post-construction survey, restoration planting may be implemented as a contingency measure. These plantings should consist of suitable native wetland species such as nannyberry, silky dogwood, buttonbush, spicebush, or slender willow.
	• Increased erosion and sedimentation resulting from clearing and grubbing, excavation, backfilling and stockpiling.	• Minimize erosion and sedimentation from clearing, grubbing, excavation, backfilling and stockpiling.	For construction activities outside the Significant Wetland: • Install transmission line poles outside the boundaries of the Significant Wetland. Apply a minimum setback of 5 m during installation of transmission line poles. • Install sediment and erosion control fencing along edge of construction area as per Ontario Provincial Standard Specifications (OPSD 219.130). For construction activities inside the Significant Wetland: • Pull the transmission line across the Significant Wetland by hand or by helicopter. No heavy equipment will be used within the Significant Wetland.	• Sedimentation avoided or minimized through application of mitigation measures. • Minimal residual effects.	• Monitor on-site conditions (*i.e.,* erosion and sediment control, flooding, etc.) by an Environmental Monitor where construction occurs within 30 m of the Significant Wetland on the following basis: ▪ Daily during active construction periods; ▪ Prior to, during and post forecasted large rainfall events (>20 millimetres in 24 hours) or significant snowmelt events (*i.e.*, spring freshet); ▪ Daily during extended rain or snowmelt periods; ▪ Monthly during inactive construction periods, where the site is left alone for 30 days or longer.

Table 4. Additional Potential Effects on Significant Wetlands and Mitigation Measures

Significant Wetland	Potential Effects	Performance Objectives	Mitigation Measures	Likelihood and Significance of Residual Effects	Monitoring Plan and Contingency Measures
					• **Contingency Measures:** ▪ Suspend work if excessive flows of sediment discharges occur until additional mitigation measures are in place (e.g., install the extra erosion and sediment control materials kept on site, such as heavy duty silt fencing, straw bales, etc.).
	• Risk of soil or water contamination resulting from accidental spills of fuel, etc.	• Minimize soil or water contamination.	• Develop and implement emergency spills plan outlining steps to contain any chemicals or to avoid contamination of adjacent Significant Wetland feature.	• Soil and water contamination avoided or minimized through application of mitigation measures. • Low likelihood and limited magnitude of effect as a result.	• Contractor to conduct routine inspections of construction equipment for leaks / spills. • Develop an emergency spills plan. • **Contingency Measures**: ▪ Immediately stop all work until the spill is cleaned up. ▪ Notify MOE's Spills Action Centre of any leaks or spills. ▪ If a spill enters Significant Wetland, collect and analyze water samples for appropriate parameters. ▪ Monitor daily until cleanup is completed.
	• Risk of spread of invasive species into Significant Wetland as a result of construction disturbance.	• Avoid spread of invasive species into Significant Wetland.	• Ensure all equipment, including clothing/boots, is thoroughly washed before entering the Significant Wetland to avoid introducing seeds or fragments of invasive species into the Significant Wetland.	• Spread of invasive species avoided or minimized through the application of mitigation measures. • Low likelihood and limited magnitude of effect as a result.	• Daily monitoring of areas where construction activities are occurring within the Significant Wetland by Environmental Monitor. • Conduct post-construction survey, as described above.
	Operation • Risk of soil or water contamination from oil, gas, etc. during maintenance of the transmission line.	• No off-site contamination of soil and no contamination of groundwater or surface water.	• Develop and implement an emergency spills plan outlining steps to contain any spills during maintenance activities to avoid contamination of Significant Wetland.	• Residual effects considered negligible.	• No monitoring required. • **Contingency Measures:** ▪ Report the details of the spill to MOE, including a description of any assessment and remediation undertaken.

6. Summary and Conclusions

As was the case for the original proposed Project (as described in the approved NHA and EIS), the significance of anticipated residual effects associated with the proposed modification is predicted to be low provided that the recommended mitigation measures are properly implemented and proactively managed throughout the duration of construction and post-construction activities.

7. References

AECOM, 2013a:
Goshen Wind Energy Centre Natural Heritage Assessment and Environmental Impact Study Report. Prepared for Goshen Wind, Inc. January, 2013.

AECOM, 2013b:
Jericho Wind Energy Centre Natural Heritage Assessment and Environmental Impact Study Report Addendum. Prepared for Goshen Wind, Inc. January, 2013.

AECOM, 2013c:
Jericho Wind Energy Centre Natural Heritage Assessment and Environmental Impact Study Report Second Addendum. Prepared for Goshen Wind, Inc. September, 2013.

Ontario Ministry of Natural Resources (MNR), 2011a:
Birds and Bird Habitats: Guidelines for Wind Power Projects.

Ontario Ministry of Natural Resources (MNR), 2011b:
Bats and Bat Habitats: Guidelines for Wind Power Projects.

Ontario Ministry of Natural Resources (MNR), 2012:
Natural Heritage Assessment Guide for Renewable Energy Projects. 2nd Edition.

Appendix A

MNR Confirmation and Re-confirmation Letters

Ministry of Natural Resources
Renewable Energy Operations Team
300 Water Street
4th Floor, South Tower
Peterborough, Ontario K9J 8M5

Ministère des Richesses naturelles

Ontario

January 15, 2013

NextEra Energy Canada
5500 Service Road, Suite 205
Burlington, ON L7L 6W6

RE: NHA Confirmation for Goshen Wind Energy Centre

Dear Tom Bird:

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 Report – Goshen Wind Energy Centre* for the Goshen Wind Energy Centre project located in the Municipalities of Blue Water and South Huron, and submitted by Nextera Energy Canada, ULC on January 15, 2013.

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.
4. The MNR confirms that the project location is not in a provincial park or conservation reserve.
5. The MNR confirms that the environmental impact study report has been prepared in accordance with procedures established by the MNR.

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

Turbines 9, 46, 47 and 82

At this time, information available in the Natural Heritage Assessment and Environmental Impact Study is insufficient to support development of turbines 9, 46, 47 and 82. Candidate significant waterfowl stopover and staging habitats WSST-15 (near turbine 9) and WSST-36 (near turbines 46, 47 and 82) require additional wildlife surveys and information about potential negative environmental effects. As a result, this letter does not confirm the following section of the Environmental Impact Study:

- Table 5.6 as it relates to Waterfowl Stopover and Staging Areas

The alternative infrastructure layout proposed in a memo submitted January 14, 2013 has been accepted and supersedes information provided in the Natural Heritage Assessment and Environmental Impact Study.

Preconstruction Monitoring

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 Colonies (features BMC-235, BMC-242, BMC-249, BMC-267, BMC-282, BMC-285, BMC-352, BMC-358, BMC-372, BMC-648, BMC-720)
- Turtle Wintering Ares (features TOW-01, TOW-03)
- Reptile Hibernacula (features RH-01, RH-02, RH-03, RH-04, RH-05, RH-06, RH-07, RH-08)
- Amphibian Woodland Breeding Habitat (features AWO-02, AWO-33, AWO-34, AWO-35)
- Colonial Nesting Bird Breeding Habitat (feature CNB-01; Note: this habitat was deemed significant but requires supplemental data collection)

MNR has reviewed and confirmed the assessment methods and the range of mitigation 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.

Post-Construction Monitoring

A commitment has been made in the Environmental Impact Study to conduct post-construction monitoring and if determined necessary, implement mitigation measures. For the Goshen Wind Energy Centre this includes the following significant natural features:

- Bat Maternity Colonies (features BMC-189, BMC-229, BMC-326, BMC-342, BMC-757)
- Amphibian Woodland Breeding Habitat (features AWO-14, AWO-25, AWO-27, AWO-30)
- Colonial Nesting Bird Breeding Habitat (feature CNB-01)
- Habitat for Plant Species of Conservation Concern – multiple species (featuresSCP-12, SCP-13, SCP-14, SCP-15, SCP-16, SCP-17)
- Habitat for Bird Species of Conservation Concern – Red-headed Woodpecker (feature SCB-03)

The following candidate significant natural features will also be monitored post-construction if they are deemed significant during pre-construction surveys:

- Bat Maternity Colonies (features BMC-235, BMC-242, BMC-249, BMC-267, BMC-282, BMC-285, BMC-352, BMC-358, BMC-372, BMC-648, BMC-720)
- Turtle Wintering Ares (features TOW-01, TOW-03)
- Reptile Hibernacula (features RH-01, RH-02, RH-03, RH-04, RH-05, RH-06, RH-07, RH-08)
- Amphibian Woodland Breeding Habitat (features AWO-02, AWO-33, AWO-34, AWO-35)

In addition to the NHA and EIS, an Environmental Effects Monitoring Plan (EEMP) that address post-construction mortality monitoring and mitigation for birds and bats must be prepared and implemented. Environmental Effects Monitoring Plans for birds and bats must be prepared in accordance with MNR Guidelines and should be reviewed by MNR in advance of submitting a REA application to MOE in order to minimize potential delays in determining if the application is complete. Comments provided by the MNR with respect to the EEMP must be submitted as part of the application for a REA.

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/EIS 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 Jim Beal at Jim.Beal@ontario.ca or 705-755-3203.

Sincerely,

Kazia Milian
Regional Planning Supervisor
Southern Region MNR

cc Jim Beal, Southern Region Renewable Energy Coordinator, MNR
Amy Cameron, Renewable Energy Planning Ecologist, MNR
Ian Hagman, Guelph District Manager, MNR
Narren Santos, Environmental Approvals Access & Service Integration Branch, MOE
Zeljko Romic, Environmental Approvals Access & Service Integration Branch, MOE

Ministry of
Natural Resources
Renewable Energy Operations Team
300 Water Street
4th Floor, South Tower
Peterborough, Ontario K9J 8M5

Ministère des
Richesses naturelles

Ontario

January 16, 2013

NextEra Energy Canada
5500 Service Road, Suite 205
Burlington, ON L7L 6W6

RE: Modifications to Goshen Wind Energy Centre Project Location

Dear Tom Bird:

The Ministry of Natural Resource (MNR) has received the document dated January 15, 2013, which describes modifications to the Goshen Wind Energy Centre project location made subsequent to MNR's letter confirming the Natural Heritage Assessment in respect of the project.

Upon review of the modifications, MNR is satisfied that the Natural Heritage Assessment requirements of Ontario Regulation 359/09 have been met. Please add this letter as an addendum to the confirmation letter issued January 15, 2013 for the Goshen Wind Energy Centre project.

If you wish to discuss, please contact Jim Beal at Jim.Beal@Ontario.ca or 705-755-3203.

Sincerely,

Kazia Milian
Regional Planning Supervisor
Southern Region MNR

cc Jim Beal, Southern Region Renewable Energy Coordinator, MNR
Amy Cameron, Renewable Energy Planning Ecologist, MNR
Ian Hagman, Guelph District Manager, MNR
Narren Santos, Environmental Approvals Access & Service Integration Branch, MOE
Zeljko Romic, Environmental Approvals Access & Service Integration Branch, MOE

Ministry of
Natural Resources
Southern Region
300 Water Street
4th Floor, South Tower
Peterborough, Ontario K9J 8M5
Telephone: 705-755-3243
Fax: 705-755-3292

Ministère des
Richesses naturelles

Ontario

October 22, 2013

Tom Bird
NextEra Energy Canada, ULC
390 Bay Street, Suite 1720
Toronto, ON M5H 2Y2
thomas.bird@nee.com

RE: Goshen Wind Energy Centre NHA Second Addendum

Dear Mr.Bird,

The Ministry of Natural Resources (MNR) has received the document dated October 2013 that describes modifications to the Goshen Wind Energy Centre made subsequent to MNR's letter confirming the Natural Heritage Assessment in respect of the project.

Upon review of the modifications, MNR is satisfied that the Natural Heritage Assessment requirements of Ontario Regulation 359/09 have been met. Please add this letter as an addendum to the confirmation letter issued January 15, 2013, the re-confirmation letter issued on January 16, 2013, and the update to NHA confirmation letter (Waterfowl (Tundra Swan) Stopover and Staging Areas (Terrestrial) Pre-construction Evaluation of Significance Survey Results) issued on June 26, 2013 for the Goshen Wind Energy Centre project.

If you wish to discuss this matter further, please contact Lindsay Kingdon at Lindsay.kingdon@ontario.ca or 705-755-3215

Sincerely,

Kathy Woeller
Southern Region Land Use Planning Supervisor
Southern Region MNR

cc Joe Halloran, A\ Renewable Energy Coordinator, Southern Region MNR
Jessica Mackay Ward, AECOM
Narren Santos, Environmental Approvals Access & Service Integration Branch, MOE
Zeljko Romic, Environmental Approvals Access & Service Integration Branch, MOE

Appendix B

Goshen Wind Energy Centre Bat Monitoring Report & EIS Amendment (NRSI, 2013)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Memo

Project No. 1076-D

To: **Marc Rose**

CC: **Jessica McKay Ward**

From: **Andrew Ryckman**

Date: **September 11, 2013**

Re: **Goshen Wind Energy Centre**
Bat Monitoring Report & EIS Amendment

Natural Resource Solutions Inc. (NRSI) was retained in June 2010 by AECOM, on behalf of NextEra Energy Canada, ULC (NextEra), to conduct a natural environment resource assessment specific to bats and bat habitat, in accordance with the Renewable Energy Approval (REA) Regulation. This assessment included a records review, site investigation, and evaluation of significance and impact assessment of any potentially significant bat habitats at a proposed 102MW wind energy facility in Huron County, within the Municipalities of Bluewater and South Huron, Ontario. This wind energy project is proposed by Goshen Wind, Inc., a subsidiary of NextEra. The Project is referred as the Goshen Wind Energy Centre (the "Project").

The proposed Project is located in Huron County, within the Municipalities of Bluewater and South Huron. The Project is proposed to be 102MW in size, and consisting of up to 71 GE 1.6-100 Wind Turbine generator locations and pad mounted step-up transformers and 1 GE 1.5-100 Wind Turbine generator location and pad mounted step-up transformer (however, only 63 turbines are proposed to be constructed), as well as supporting infrastructure and development activities. This includes turbine laydown and storage areas (including temporary staging areas, cranepads, and turnaround areas surrounding each wind turbine), construction laydown areas, a transformer substation and ancillary equipment, 34.5kV electrical collection lines, a 115kV transmission line, turbine access roads, permanent meterological towers, and an operations/maintenance building and ancillary equipment. As identified in the REA Regulation, the proposed layout of these features is collectively referred to as the 'Project location'. For the purposes of this memo, NRSI will refer to the areas within 120m of the Project location as the 'Project area'.

The records review, site investigation, evaluation of significance, and environmental impact study (EIS) pertaining to bat habitats for the Goshen Wind Energy Centre were completed by NRSI during the period of 2010 to 2013 as part of the Natural Heritage

Assessment (NHA). The Goshen Wind Energy Centre NHA (AECOM 2013) confirmation was granted in January 2013 by the Ministry of Natural Resources' Renewable Energy Operations Team. As part of this confirmation, several pre-construction commitments were identified along with the commitment for the proponent to inform the MNR of any changes made to the Project that would alter the NHA.

In order to obtain the greatest efficiency in utilities placement and construction, the construction plan for the transmission line has been slightly modified from the proposed original construction plan that was presented in the approved NHA. The purpose of this memo is to review the proposed modifications to the layout and discuss any effects they may have on candidate or confirmed significant bat habitats as they were presented in the NHA.

Staff Roles

The requirements of the REA process indicate that the name and qualifications of all staff participating in the NHA should be provided. This staffing information is provided in the Goshen Wind Energy Centre NHA and its appended Bat Monitoring Report and Environmental Impact Study (AECOM 2013). The qualifications and roles of key staff participating in the amendment to this Project's NHA as it pertains to bat habitats have been outlined below.

Andrew G. Ryckman, B.Sc.

Andrew is a Terrestrial and Wetland Biologist with 8 years of environmental experience. He routinely manages the natural heritage aspects of renewable energy projects, with specific expertise relating to bats and herpetofauna. Andrew is certified in Ecological Land Classification (2010), and has successfully completed a Bat Conservation International (BCI) Acoustic Monitoring Workshop (2008).

Andrew's role in the Project was to act as the project manager, overseeing all aspects of the records review, site investigation, evaluation of significance, and environmental impact study, including all associated field work and reporting.

Christy Humphrey, B.E.S.

Christy is a Terrestrial and Wetland Biologist with more than 5 years of environmental consulting experience, working on a variety of project tasks. Her areas of expertise are vegetation mapping and floral inventories, as well as acoustic bat monitoring, but she has experience conducting bird assessments, amphibian studies, and other fauna assessments. Christy is certified in both the ELC for Southern Ontario (2010) and Northeastern ELC (2010), as well as the OMNR Wetland Evaluation System (2012). She has also participated in the Ontario MNR Bat Monitoring Workshop for Wind Power Projects (2010) and has received training in Eastern Bat Acoustic Field Techniques (Bat Conservation and Management Inc. 2012).

Christy organized and conducted field work for the site investigation, and compiled, interpreted, and reported on the results of the site investigation. She assisted with the completion of this memo.

Andrew Dean, B.E.S.

Andrew is a Terrestrial and Wetland Biologist with over 3 years of environmental consulting and not-for-profit work experience. He specializes in environmental monitoring and natural area inventories including vegetation community mapping and vascular plant identification. He is certified in both the ELC for Southern

Ontario (2010) the OMNR Wetland Evaluation System (2012). Andrew has experience conducting pre-construction vegetation and wildlife monitoring, including acoustic and visual bat surveys, as well as post-construction monitoring of fauna for wind power projects in Ontario.

Andrew conducted field work for the site investigation, quantitatively assessing the number of suitable cavity trees within woodlands.

Proposed Layout Modifications

The proposed layout modifications relate to the construction of the transmission line across the Ausable River as an above-ground line. The transmission line was originally presented as a directionally-drilled below ground line within the original NHA. A detailed list of proposed Project modifications can be found within the Goshen Wind Energy Centre NHA Amendment (AECOM 2013). The proposed Project layout is shown on Figure 1 below.

Table 1. Changes to the Goshen Wind Energy Centre Layout

Project Component	Location	Description of Change	Closer to Features or Habitat Within 120m?	Affected Bat Habitats with a Potential Operational Effect	Reference Figure(s)
Transmission Line	Feature 609 (Ausable River)	Transmission Line will now be placed above ground rather than below.	Two new forested polygons will be overlapped by the transmission line.	Feature 609 (2 polygons)	1

Amendments to the Records Review Report

The study area initially examined for the Goshen Wind Energy Centre Records Review Report included the area within 120m of the proposed modifications in the Project, as the location of the transmission line has not changed. In the original Records Review, it was identified that 2 woodlands are shown to overlap the transmission line (NRSI 2013, AECOM 2013). However, the transmission line was previously planned to be directionally drilled beneath these features and as a result the Project infrastructure was not considered to be within the features themselves. Therefore the woodlands were not identified for the potential to contain candidate significant bat maternity colony habitat.

As a result of the proposed modifications to the Project, the Records Review identifies that 2 woodland polygons will be overlapped by the above-ground transmission line, and will require site investigation to identify candidate significant bat maternity colony habitats.

Amendments to the Site Investigation Report

As part of a review of alternatives for the Project at an earlier stage, the site investigations of these woodlands were conducted in June and July of 2012. In accordance with the REA Regulation, NRSI recorded the date, time, duration, and weather conditions during the site investigation. This information has been summarized in Table 2 below. The crew lead for the survey is indicated in bold font within the table. Detailed descriptions of staff roles and qualifications can be found above, and detailed field forms have been appended to this memo (Appendix I).

Figure 1

Goshen Wind Energy Centre: Bat Habitats

Transmission Line Crossing of the Ausable River

Legend

- Proposed Transmission Line
- Project Location
- Permanent Watercourse
- Intermittent Watercourse
- Natural Forested Habitat (AECOM)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 1076D
Date: September 11, 2013

NAD83 - UTM Zone 17
Size: 8.5 x 11"
1:4,000

0 50 100 150 Metres

N

Path: X:\1076_Goshen\NRSI_1076D_Fig1_BatHabitat_RiverT-LineCrossing_4K_2013_09_11_KEB.mxd

Table 2. Site Investigation Survey Dates

Purpose	General Methods	Feature ID	Date (2012)	Time(s) and Duration	Weather	Staff
Bat Habitat Assessment	Quantitative assessment of wildlife trees	609A	June 7	17:40 – 18:20 40 minutes	20°C, 0% Cloud Cover, Wind Speed 2, No precipitation.	**Christy Humphrey**, Matt Dil
Bat Habitat Assessment	Quantitative assessment of wildlife trees	609D	July 26	15:50 – 16:55 1 hr 5 minutes	27°C, 70% Cloud Cover, Wind Speed 3, No precipitation.	**Andrew Dean**, Colin Oaks

Identification of Bat Habitat

Bat maternity colonies can be found in any of the following Community Types: Deciduous Forest (FOD), Mixed Forest (FOM) that have greater than 10/ha wildlife trees (snags or cavity trees) which are greater than 25cm diameter at breast height (DBH) (OMNR 2012). Candidate significant bat hibernacula are found in caves, mine shafts, underground foundations, karsts or one of the following Community Types: Crevice (CCR), Cave (CCA), but do not include buildings (OMNR 2012)

The site investigation conducted for the woodlands (609A and 609D) which are proposed to be overlapped by the transmission line followed the most recent OMNR guidance document, *Bats and Bat Habitats: Guidelines for Wind Power Projects* (2011), which indicates that the number of cavity trees per hectare can be determined using 0.05ha plots (circular plots with a radius of 12.6m), which are randomly placed throughout each woodland being investigated. The document stipulates that a minimum of 10 plots should be used for woodlands which are 10ha or less in size, with one additional plot for every additional hectare for larger woodlands (up to a maximum of 35 plots). NRSI randomly selected circular plots within the portions of these woodlands for which access was granted. The number of suitable cavity trees within these plots were documented. Field notes for these assessments are appended to this report (Appendix I).

Site Investigation Results

NRSI used habitat criteria outlined by the Significant Wildlife Habitat Ecoregion 6E and 7E Criterion Schedules (OMNR 2012) and Bats and Bat Habitat Guidelines (OMNR 2011) to compare site-specific habitat conditions to potential bat habitats. No candidate bat hibernacula were identified by NRSI or AECOM biologists within the revised Goshen Wind Energy Centre.

The results of the site investigation for bat habitat in features 609A and 609D are included in Table 3 below.

Table 3. Summary of Site Investigation Results and Consideration for Candidate Significant Bat Habitats

Feature ID	Size (ha)	Composition	Quantitative Assessment		Evaluation of Significance Required (Y/N)
			Number of Sample Plots	# Wildlife Trees per ha	
609A	0.54	SWD2-2	4*	0	**No**
609D	0.62	SWD2-2	9*	2.22	**No**

**Note the number of plots sampled was limited by the size of forest found on properties for which access was granted.*

In addition, NRSI biologists have also reviewed the potential for additional generalized candidate significant wildlife habitat (GCSWH) that may be present within 120m of the updated Project location. As the footprint of the Project has not changed, there are no new potential habitats found within 120m of the Project location and as a result, no new GCSWH for bats.

Changes in Distances to Bat Habitats

As the Project location has not changed considerably and there were no new candidate significant bat habitats identified, there have been no changes in distances to bat habitats within the Project area.

Amendments to the Evaluation of Significance

As part of this NHA amendment, NRSI biologists have reviewed the potential for changes to the Evaluation of Significance phase of this Project. After examining the changes in the Project layout and completing a site investigation of 2 new natural features, it has been determined that no new candidate significant bat habitats exist within 120m of the Project location. Therefore, no additional bat habitats require evaluation of significance at the Goshen Wind Energy Centre as a result of these modifications.

Amendments to the Environmental Impact Study

Because no new significant bat habitats were identified within the Project area and there were no changes in distance from significant bat habitat to the Project location, there are no changes required to the Environmental Impact Study relating to bat habitat(s).

Summary and Conclusions

In accordance with the REA Regulation, NRSI biologists have completed a comprehensive records review, site investigation, evaluation of significance, and EIS of the Goshen Wind Energy Centre Project area. Following the review of proposed adjustments to the Project location (as discussed above), NRSI has re-considered all aspects of the Natural Heritage Assessment for bats within this report to determine if there are new bat habitats, changes in distance to Project location, or new mitigation measures or monitoring commitments required to ensure that potential environmental impacts to bats are mitigated, minimized, and/or studied appropriately.

A total of 2 new woodlands were identified by the records review to be overlapped by the proposed Project modifications. These 2 woodlands were then investigated to identify if any candidate significant bat habitats are present within these woodlands. Neither woodland was identified as candidate significant bat habitat based on low snag densities. As a result, no new significant bat habitats were identified and no changes to the EIS were required.

With this amendment, it is maintained that with the implementation of the planned mitigation measures, monitoring programs, and contingency plans as presented in the Goshen Wind Energy Centre Natural Heritage Environmental Impact Study (AECOM 2013) and its appended Bat Monitoring Report and Environmental Impact Study (NRSI 2013) there are unlikely to be any significant impacts to bat habitats.

Appendix I
Field Notes: Site Investigation for Bat Maternity Colony Habitats

Candidate Bat Maternity Roost Data Form

Use this form in FOD, FOM, SWD, SWM

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project Manager Use Only:
Woodland Number : 609A

Project Name: Goshen Project #: 10763

Start Time 17:40 End Time 18:20 Date: June 7 2012 Observer(s): CLH, MND

Area # 609 Parcel Numbers 65H 2717 Weather Conditions: 20°C No precip., wind 2 100%

Plot Number	# live or dead cavity trees ≥ 25cm dbh	Plot Center UTM (Zone: 17T)	Comments
Plot 1	0	457229 4795155	green ash swamp
Plot 2	0	457207 4795167	
Plot 3	0	457221 4795176	
Plot 4	0	457211 4795163	
Plot 5			could not fit any more plots in this
Plot 6			area (on property with access granted)
Plot 7			
Plot 8			
Plot 9			
Plot 10			
Plot 11			
Plot 12			
Plot 13			
Plot 14			
Plot 15			
Plot 16			
Plot 17			
Plot 18			
Plot 19			
Plot 20			
Plot 21			
Plot 22			
Plot 23			
Plot 24			
Plot 25			
Plot 26			
Plot 27			
Plot 28			
Plot 29			
Plot 30			
Plot 31			
Plot 32			
Plot 33			
Plot 34			
Plot 35			

Number of Plots: Sites ≤10ha: 10 plots (minimum); each extra ha: 1 plot (up to max 35 plots)
Plots = 0.05ha or 12.6m radius
Select plots randomly

Identification of Suitable Candidate Wildlife Trees for Evaluation of Significance

Identify the best candidate wildlife trees in the applicable woodland/polygon: <10ha in size = up to 10 >10ha in size = 1 additional for each ha up to 25

Tree #	Species	# of Cavities	DBH (cm)	UTM	Photo Number(s)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

This Section Project Manager Use Only

Formula: Total # Candidate Trees / (# Plots x 0.05ha)

Final Wodland Tally = 0/(4 x 0.05) = 0/0.2 = 0 > or = 10/ha? Yes (No) If >10/ha: BMA-

Candidate Bat Maternity Roost Data Form

Use this form in FOD, FOM, SWD, SWM

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project Manager Use Only:
Woodland Number : 609D

Project Name: Goshen Project #: 1076D

Start Time 1550 End Time 1655 Date: July 26, 2012 Observer(s): CMO, AMD

Area # 609 Parcel Numbers GSH7717 Weather Conditions: Cloudy, 27°C, wind 3/NW, 70% CC.

Plot Number	# live or dead cavity trees ≥ 25cm dbh	Plot Center UTM (Zone: 17)	Comments
Plot 1	0	0457122 4795142	
Plot 2	0	0457095 4795127	
Plot 3	1	0457059 4795118	
Plot 4	0	0457043 4795107	
Plot 5	0	0457019 4795094	
Plot 6	0	0457001 4795050	
Plot 7	0	0457011 4795034	
Plot 8	0	0457035 4795029	
Plot 9	0	0457003 4794997	
Plot 10			
Plot 11			
Plot 12			
Plot 13			
Plot 14			
Plot 15			
Plot 16			
Plot 17			
Plot 18			
Plot 19			
Plot 20			
Plot 21			
Plot 22			
Plot 23			
Plot 24			
Plot 25			
Plot 26			
Plot 27			
Plot 28			
Plot 29			
Plot 30			
Plot 31			
Plot 32			
Plot 33			
Plot 34			
Plot 35			

Number of Plots: Sites ≤10ha: 10 plots (minimum); each extra ha: 1 plot (up to max 35 plots)
Plots = 0.05ha or 12.6m radius
Select plots randomly

Identification of Suitable Candidate Wildlife Trees for Evaluation of Significance
Identify the best candidate wildlife trees in the applicable woodland/polygon: <10ha in size = up to 10 >10ha in size = 1 additional for each ha up to 25

Tree #	Species	# of Cavities	DBH (cm)	UTM	Photo Number(s)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

This Section Project Manager Use Only

Final Wodland Tally

Formula: Total # Candidate Trees / (# Plots x 0.05ha)

= 1/(9 x 0.05) = 1/0.45 = 2.22

> or = 10/ha? Yes (No)

If >10/ha: BMA- ✓

Appendix C

Field Notes

C1. Vascular Plant Inventory

C2. Amphibian Wetland Breeding Habitat Evaluation of Significance Surveys

C1. Vascular Plant Inventory

Plant Species List
2012

Trees & Shrubs	1	2	3	4	5
Conifers					
Balsam Fir *(Abies balsamea)*	R				
Common Juniper *(Juniperus communis)*					
Eastern Red Cedar *(Juniperus virginiana)*					
Tamarack *(Larix laricina)*					
Norway Spruce (Picea abies)	F				
White Spruce *(Picea glauca)*	F				
Black Spruce *(Picea mariana)*					
Jack Pine *(Pinus banksiana)*					
Red Pine *(Pinus resinosa)*					
Eastern White Pine *(Pinus strobus)*	F				
Scotch Pine *(Pinus sylvestris)*					
Canada Yew *(Taxus canadensis)*					
Eastern White Cedar *(Thuja occidentalis)*					
Eastern Hemlock *(Tsuga canadensis)*					
Deciduous					
Manitoba Maple *(Acer negundo)*	U	R			
Black Maple *(Acer nigrum)*					
Norway Maple *(Acer platanoides)*					
Red Maple *(Acer rubrum)*					
Silver Maple *(Acer saccharinum)*					
Freeman's Maple *(Acer X freemanii)*		U			
Sugar Maple *(Acer saccharum)*					
Mountain Maple *(Acer spicatum)*					
Speckled Alder *(Alnus incana)*					
Downy Serviceberry *(Amelanchier arborea)*					
Serviceberry *(Amelanchier sanguinea)*					
Yellow Birch *(Betula alleghaniensis)*					
White Birch *(Betula papyrifera)*					
European Birch *(Betula pendula)*					
Blue Beech *(Carpinus caroliniana)*					
Bitternut hickory *(Carya cordiformis*					
Shagbark Hickory *(Carya ovata)*					
Climbing Bittersweet *(Celastrus scandens)*					
Common Hackberry *(Celtis occidentalis)*					
Buttonbush *(Cephalanthus occidentalis)*					
Alt.-leaved Dogwood *(Cornus alternifolia)*		U			
Silky Dogwood *(Cornus amomum)*		U			
Bunchberry *(Cornus canadensis)*					
Gray dogwood *(Cornus racemosa)*		U			
Round-leaved Dogwood *(Cornus rugosa)*					
Red-osier Dogwood *(Cornus sericea)*		U			
American Hazel *(Corylus americana)*					
Beaked Hazel *(Corylus cornuta)*					
Cockspur Thorn *(Crataegus crus-galli)*					
English Hawthorn *(Crataegus monogyna)*					
Large-fruited Thorn *(Crataegus punctata)*					
Crataegus					
Crataegus					
Bush Honeysuckle *(Diervilla lonicera)*					
Russian Olive *(Elaeagnus angustifolia)*					
Autumn Olive *(Elaeagnus umbellata)*					
Run. Strawberry-bush *(Euonymus obovata)*					
American Beech *(Fagus grandifolia)*					
Glossy Buckthorn *(Frangula alnus)*					
White Ash *(Fraxinus americana)*					
Black Ash *(Fraxinus nigra)*					
Green Ash *(Fraxinus pennsylvanica)*		D			
Witch-hazel *(Hamamelis virginiana)*					
Winterberry *(Ilex verticillata)*					
Butternut *(Juglans cinerea)*					
Black Walnut *(Juglans nigra)*	R	R			
Common Privet *(Ligustrum vulgare)*					
Spicebush *(Lindera benzoin)*					
Fly Honeysuckle *(Lonicera canadensis)*					
Glaucous Honeysuckle *(Lonicera dioica)*					
Morrow's Honeysuckle *(Lonicera morrowii)*					
Tartarian Honeysuckle *(Lonicera tatarica)*	R	R			
Common Apple *(Malus pumila)*	R	R			
White Mulberry *(Morus alba)*					
Sweet Gale *(Myrica gale)*					
Ironwood *(Ostrya virginiana)*					
Thicket-creeper *(Parthenocissus inserta)*		U	R		
Ninebark *(Physocarpus opulifolius)*					
Balsam Poplar *(Populus balsamifera)*					
Eastern Cottonwood *(Populus deltoides)*		R			
Large-tooth Aspen *(Populus grandidentata)*					
Trembling Aspen *(Populus tremuloides)*					
Sweet Cherry *(Prunus avium)*					
Pin Cherry *(Prunus pensylvanica)*					
Black Cherry *(Prunus serotina)*					
Choke Cherry *(Prunus virginiana)*					
Prunus sp.		R			

Tree & Shrubs	1	2	3	4	5
Deciduous					
White Oak *(Quercus alba)*					
Bur Oak *(Quercus macrocarpa)*	R				
Red Oak *(Quercus rubra)*					
Alder Buckthorn *(Rhamnus alnifolia)*					
Common Buckthorn *(Rhamnus cathertica)*					
Smooth Sumac *(Rhus glabra)*					
Staghorn Sumac *(Rhus hirta)*					
Wild Black Currant *(Ribes americanum)*					
Prickly Gooseberry *(Ribes cynosbati)*					
Swamp Black Currant *(Ribes lacustre)*					
Red Currant *(Ribes rubrum)*					
Ribes					
Black Locust *(Robinia pseudo-acacia)*					
Prickly Rose *(Rosa acicularis)*					
Smooth Rose *(Rosa blanda)*					
Multiflora Rose *(Rosa multiflora)*		R			
Rosa					
Com. Blackberry *(Rubus allegheniensis)*					
Wild Red Raspberry *(Rubus idaeus)*	U				
Black Raspberry *(Rubus occidentalis)*					
Purple-fl. Raspberry *(Rubus odoratus)*					
Dwarf Raspberry *(Rubus pubescens)*					
Rubus					
Peach-leaved Willow *(Salix amygdaloides)*					
Bebb's Willow *(Salix bebbiana)*					
Pussy Willow *(Salix discolor)*					
Missouri Willow *(Salix eriocephala)*			F		
Sandbar Willow *(Salix exigua)*			F		
Shining Willow *(Salix lucida)*					
Black Willow *(Salix nigra)*					
Slender Willow *(Salix petiolaris)*					
Salix					
Hybrid Crack Willow *(Salix X rubens)*	R	U			
Black-berried Elder *(Sambucus nigra)*					
Red-berried Elder *(Sambucus racemosa)*		R			
Buffaloberry *(Shepherdia canadensis)*					
Eur. Mountain Ash *(Sorbus aucuparia)*					
Narrow Meadow-sweet *(Spiraea alba)*					
Common Lilac *(Syringa vulgaris)*					
Poison-ivy *(Toxicodendron rydbergii)*	R	R			
Climbing Poison-ivy *(Toxicodendron radicans)*	R	R			
White Elm *(Ulmus americana)*		R			
Siberian Elm *(Ulmus pumila)*					
Slippery Elm *(Ulmus rubra)*		R			
Low Blueberry *(Vaccinium angustifolium)*					
Maple-leaf Viburnum *(Viburnum acerifolium)*					
Hobblebush *(Viburnum lantanoides)*					
Nannyberry *(Viburnum lentago)*					
Guelder-Rose *(Viburnum opulus)*					
Downy Arrow-wood *(Vib. rafinesquianum)*					
Riverbank Grape *(Vitis riparia)*		U			
Am. Prickly-ash *(Zanthoxylum americanum)*					
Filamer		R			
ROSA SP (SWAMP ROSE ?)		R			
Ferns & Allies					
Lady Fern *(Athyrium filix-femina)*					
Rattlesnake Fern *(Botrychium virginianum)*					
Bulbet Bladder Fern *(Cystopteris bulbifera)*					
Spin. Wood Fern *(Dryopteris carthusiana)*					
Crested Wood Fern *(Dryopteris cristata)*					
Marginal Wood Fern *(Dryopteris marginalis)*					
Dryopteris					
Ostrich Fern *(Matteuccia struthiopteris)*					
Sensitive Fern *(Onoclea sensibilis)*					
Cinnamon Fern *(Osmunda cinnamomea)*					
Interrupted Fern *(Osmunda claytoniana)*					
Royal Fern *(Osmunda regalis)*					
Christmas Fern *(Polystichum acrostichoides)*					
Eastern Bracken-fern *(Pteridium aquilinum)*					
Marsh Fern *(Thelypteris palustris)*					
Field Horsetail *(Equisetum arvense)*		R			
Scouring-rush *(Equisetum hyemale)*					
Variegated Horsetail *(Equisetum variegatum)*					
Equisetum					
Ground-cedar*(Lycopodium digitatum)*					
Shining Clubmoss *(Lycopodium lucidulum)*					
Ground-pine *(Lycopodium obscurum)*					

Graminoids	1	2	3	4	5
Grasses					
Giant Redtop *(Agrostis gigantea)*					
Redtop *(Agrostis stolonifera)*					
Awnless Brome *(Bromus inermis)*	R	R			
Bromus					
Blue-joint Grass *(Calamagrostis canadensis)*					
Orchard Grass *(Dactylis glomerata)*	R	R			
Poverty Oat Grass *(Danthonia spicata)*					
Quack Grass *(Elymus repens)*	R	R			
Virginia Wild Rye *(Elymus virginicus)*					
Elymus					
Fowl Manna Grass *(Glyceria striata)*		U	R		
Glyceria					
Rice Cut Grass *(Leersia oryzoides)*					
Tall Fescue *(Lolium arundinaceum)*					
Muhlenbergia					
Witch-grass *(Panicum capillare)*					
Panicum					
Reed Canary Grass *(Phalaris arundinacea)*	R		D		
Timothy *(Phleum pratense)*					
Common Reed *(Phragmites australis)*		R	R		
Canada Blue Grass *(Poa compressa)*					
Fowl Meadow Grass *(Poa palustris)*		U			
Kentucky Bluegrass *(Poa pratensis)*					
Yellow Foxtail *(Setaria pumila)*					
Green Foxtail *(Setaria viridis)*					
Sedges					
Drooping Wood Sedge *(Carex arctata)*					
Golden-fruited Sedge *(Carex aurea)*					
Graceful Sedge *(Carex gracillima)*					
Inland Sedge *(Carex interior)*					
Bladder Sedge *(Carex intumescens)*					
Lake-bank Sedge *(Carex lacustris)*					
Hop Sedge *(Carex lupulina)*					
Pennsylvania Sedge *(Carex pensylvanica)*					
Awl-fruited Sedge *(Carex stipata)*					
Fox Sedge *(Carex vulpinoidea)*					
Carex bebbii		U			
Carex rostrata (CF)*		U			
Carex lupulina		U			
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Cyperus					
Redroot Spike-rush *(Eleocharis erythropoda)*					
Eleocharis					
Hard-stem Bulrush *(Schoenoplectus acutus)*					
Three-square Bulrush *(Sch. pungens)*					
Soft-stem Bulrush *(Sch. tabernaemontani)*					
Dark-green Bulrush *(Scirpus atrovirens)*					
Wool-grass *(Scirpus cyperinus)*					
Other Graminoids					
Broad Bur-reed *(Sparganium eurycarpum)*					
Narrow-leaved Cattail *(Typha angustifolia)*					
Broad-leaved Cattail *(Typha latifolia)*					
Broad-leaved Cattail *(Typha X glauca)*					
Articulated Rush *(Juncus articulatus)*					
Soft Rush *(Juncus effusus)*					
Path Rush *(Juncus tenuis)*					
Juncus					
Juncus					
Typha sp.		U	R		

D - Dominant: represented by large numbers, generally forming >10% ground cover or >25% vegetation cover in any one stratum

F - Fairly common (=Abundant in ELC): generally widespread represented by fairly large numbers of individual clumps; usually forming >10% ground cover

U - Uncommon (=Occasional in ELC): present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this catergory)

R - Rare: represented in the polygon by less than about five individuals or small clumps

Map Number: 609 65H2394/2717/2493	1					CUP3	4				OAO
Date: June 19, 2013	2					SHO 2-2	5				
Surveyors: Rob Aitken + Jess Piette	3					SWT 2-2					

* CF - compares favorably

Plant Species List
2012

Dicot Herbs - Asteraceae	1	2	3	4	5
Common Yarrow (*Achillea millefolium*)					
White Snakeroot (*Ageratina altissima*)					
Com. Ragweed (*Ambrosia artemisiifolia*)	R	R			
Giant Ragweed (*Ambrosia trifida*)		R			
Field Pussytoes (*Antennaria neglecta*)					
Artemisia					
Common Burdock (*Arctium minus*)	R	R			
Nodding Beggar-ticks (*Bidens cernua*)					
Devil's Beggar-ticks (*Bidens frondosa*)					
Spotted Knapweed (*Centaurea biebersteinii*)					
Brown Knapweed (*Centaurea jacea*)					
Chicory (*Cichorium intybus*)					
Canada Thistle (*Cirsium arvesnse*)		R			
Bull Thistle (*Cirsium vulgare*)					
Horseweed (*Conyza canadensis*)					
Daisy Fleabane (*Erigeron annus*)					
Philadelphia Fleabane (*Erig. philadelphicus*)	R	R			
Erigeron					
Joe-pye-weed (*Eupatorium maculatum*)		R			
Boneset (*Eupatorium perfoliatum*)					
Large-leaved Aster (*Eurybia macrophylla*)					
Flat-top Goldenrod (*Euthamia graminifolia*)					
Orange Hawkweed (*Hieracium aurantiacum*)					
Field Hawkweed (*Hieracium caespitosum*)					
Hieracium					
Elecampane (*Inula helenium*)					
Prickly Lettuce (*Lactuca serriola*)					
Lactuca					
Ox-eye Daisy (*Leucanthemum vulgare*)	R	R			
Pineapple-weed (*Matricaria discoidea*)		R			
Tall White Lettuce (*Prenanthes altissima*)					
Black-eyed Susan (*Rudbeckia hirta*)					
Tall Goldenrod (*Solidago altissima*)					
Blue-stem Goldenrod (*Solidago caesia*)					
Canada Goldenrod (*Solidago canadensis*)					
Zig-zag Goldenrod (*Solidago flexicaulis*)					
Giant Goldenrod (*Solidago gigantea*)		R			
Early Goldenrod (*Solidago juncea*)					
Gray Goldenrod (*Solidago nemoralis*)					
Solidago sp.	U	U			
Field Sow-thistle (*Sonchus arvensis*)					
Sonchus					
Heart-leaf Aster (*Symph. cordifolium*)					
Heath Aster (*Symphyotrichum ericoides*)					
Tall White Aster (*Symph. lanceolatum*)					
Calico Aster (*Symphyotrichum lateriflorum*)					
New England Aster (*Symph. novae-angliae*)		R			
Purple-stem Aster (*Symph. puniceus*)					
Common Tansy (*Tanacetum vulgare*)					
Common Dandelion (*Taraxacum officinale*)	R	R			
Com. Goatsbeard (*Tragopogon pratensis*)		R			
Coltsfoot (*Tussilago farfara*)					
Bidens sp		R			

Other Dicot Herbs					
White Baneberry (*Actaea pachypoda*)					
Red Baneberry (*Actaea rubra*)					
Tall Agrimony (*Agrimonia gryposepala*)					
Garlic Mustard (*Alliaria petiolata*)	F	R			
Green Amaranth (*Amaranthus retroflexus*)					
Hog-peanut (*Amphicarpa bracteata*)					
Pearly Everlasting (*Anaphalis margaritacea*)					
Canada Anemone (*Anemone canadensis*)	U	U			
Ivy Hepatica (*Anemone acutiloba*)					
Thimbleweed (*Anemone virginiana*)					
Purple Angelica (*Angelica atropurpurea*)					
Indian Hemp (*Apocynum cannabinum*)					
Wild Sarsaparilla (*Aralia nudicaulis*)					
Spikenard (*Aralia racemosa*)					
Wild Ginger (*Asarum canadense*)					
Swamp Milkweed (*Asclepias incarnata*)					
Common Milkweed (*Asclepias syriaca*)					
Yellow Rocket (*Barbarea vulgaris*)					
False Nettle (*Boehmeria cylindrica*)		R			
Black Mustard (*Brassica nigra*)					
Marsh-marigold (*Caltha palustris*)					
Creeping Bellflower (*Campanula rapunculoides*)					

Dicot Herbs	1	2	3	4	5
Shepherd's Purse (*Capsella bursa-pastoris*)					
Cutleaf Toothwort (*Cardamine concatenata*)					
Toothwort (*Cardamine diphylla*)					
Penn. Bitter-cress (*Cardamine pensylvanica*)					
Cardamine					
Blue Cohosh (*Caulophyllum thalictroides*)					
Mouse-ear Chickweed (*Cerastium fontanum*)					
Turtlehead (*Chelone glabra*)					
Spotted Water-hemlock (*Cicuta maculata*)					
Water-hemlock (*Cicuta virosa*)					
Enchanter's Nightshade (*Circaea lutetiana*)					
Carolina Spring Beauty (*Claytonia caroliniana*)					
Virginia Spring Beauty (*Claytonia virginica*)					
Virgin's-bower (*Clematis virginiana*)					
Field Bindweed (*Convolvulus arvensis*)	R	R			
Dog-strangling Vine (*Cynanchum rossicum*)					
Wild Carrot (*Daucus carota*)	R	R			
Deptford Pink (*Dianthus armeria*)					
Squirrel-corn (*Dicentra canadensis*)					
Dutchman's-breeches (*Dicentra cucullaria*)					
Wild Teasel (*Dipsacus fullonum*)		R			
Wild Cucumber (*Echinocystis lobata*)		R			
Viper's Bugloss (*Echium vulgare*)					
Northern Willow-herb (*Epilobium ciliatum*)					
Hairy Willow-herb (*Epilobium hirsutum*)					
Small-fl. Willow-herb (*Epilobium parviflorum*)					
Epilobium					
Worm Mustard (*Erysimum cheiranthoides*)					
Euphorbia					
Hemp Nettle (*Galeopsis tetrahit*)					
Wild Madder (*Galium mollugo*)					
Marsh Bedstraw (*Galium palustre*)					
Sweet-scented Bedstraw (*Galium triflorum*)					
Galium sp.		R			
Spotted Geranium (*Geranium maculatum*)					
Herb-robert (*Geranium robertianum*)					
Yellow Avens (*Geum aleppicum*)	U	U			
White Avens (*Geum canadense*)		R			
Urban Avens (*Geum urbanum*)					
Dame's Rocket (*Hesperis matronalis*)		R			
Virg. Water-leaf (*Hydrophyllum virginianum*)					
Com. St. John's-wort (*Hypericum perforatum*)					
Spotted Jewelweed (*Impatiens capensis*)		U	U		
Wood Nettle (*Laportea canadensis*)		F	F		
Motherwort (*Leonurus cardiaca*)					
Field Peppergrass (*Lepidium campestre*)					
Eur. Gromwell (*Lithospermum officinale*)					
Butter & Eggs (*Linaria vulgaris*)					
Great Lobelia (*Lobelia siphilitica*)					
Lobelia					
Cut-leaf Bugleweed (*Lycopus americanus*)					
Northern Bugleweed (*Lycopus uniflorus*)					
Fringed Loosestrife (*Lysimachia ciliata*)		F			
Moneywort (*Lysimachia nummularia*)		U			
Lysimachia					
Purple Loosestrife (*Lythrum salicaria*)					
Black Medick (*Medicago lupulina*)	R	R			
Alfalfa (*Medicago sativa*)		R			
White Sweet-clover (*Melilotus alba*)					
Yellow Sweet-clover (*Melilotus officinalis*)		R			
Wild Mint (*Mentha arvensis*)					
Wild Bergamot (*Monarda fistulosa*)					
Small Forget-me-not (*Myosotis laxa*)					
Forget-me-not (*Myosotis scorpioides*)					
Water-cress (*Nasturtium officinale*)					
Com. Evening-primrose (*Oenothera biennis*)		R			
Sweet-cicely (*Osmorhiza berterii*)					
Yellow Wood-sorrel (*Oxalis stricta*)		R			
Wild Parsnip (*Pastinaca sativa*)					
English Plantain (*Plantago lanceolata*)					
Common Plantain (*Plantago major*)					
Rugel's Plantain (*Plantago rugelii*)					
May-apple (*Podophyllum peltatum*)					
Pale Smartweed (*Polygonum lapathifolium*)					
Lady's-thumb (*Polygonum persicaria*)					
Virginia Knotweed (*Polygonum virginianum*)					
Polygonum					
Polygonum					
Rough Cinquefoil (*Potentilla norvegica*)					
Rough-fruited Cinquefoil (*Potentilla recta*)		R			
Common Cinquefoil (*Potentilla simplex*)					
Potentilla					
Heal-all (*Prunella vulgaris*)					
Shinleaf (*Pyrola elliptica*)					
Pilea pumila		R			

Dicot Herbs	1	2	3	4	5
Kidney-leaf Buttercup (*Ranunculus abortivus*)					
Tall Buttercup (*Ranunculus acris*)		U			
Hooked Buttercup (*Ranunculus recurvatus*)					
Ranunculus Sept		U	R		
Sheep Sorrel (*Rumex acetosella*)					
Curly-leaf Dock (*Rumex crispus*)		R			
Bitter Dock (*Rumex obtusifolius*)					
Bloodroot (*Sanginaria canadense*)					
Black Snakeroot (*Sanicula marilandica*)					
Bouncing Bet (*Saponaria officinalis*)					
Marsh Skullcap (*Scutellaria galericulata*)					
Mad Dog Skullcap (*Scutellaria lateriflora*)					
White Campion (*Silene latifolia*)					
Bladder Campion (*Silene vulgaris*)					
Hemlock Water-parsnip (*Sium suave*)					
Bitter Nightshade (*Solanum dulcamara*)		R	R		
Black Nightshade (*Solanum ptychanthum*)					
Grassleaf Stitchwort (*Stellaria graminea*)					
Common Chickweed (*Stellaria media*)					
Early Meadow-rue (*Thalictrum dioicum*)					
Tall Meadow-rue (*Thalictrum pubescens*)		U	R		
Field Penny-cress (*Thlaspi arvense*)					
Foamflower (*Tiarella cordifolia*)					
Star-flower (*Trientalis borealis*)					
Red Clover (*Trifolium pratense*)		R			
White Clover (*Trifolium repens*)		R			
Trifolium					
Stinging Nettle (*Urtica dioica*)		F	F		
Greater Bladderwort (*Utricularia vulgaris*)					
Common Mullein (*Verbascum thapsus*)		R			
Blue Vervain (*Verbena hastata*)					
White Vervain (*Verbena urticifolia*)					
Water Speedwell (*Veron. anagallis-aquatica*)					
Common Speedwell (*Veronica officinalis*)					
Veronica					
Cow Vetch (*Vicia cracca*)		R			
Vicia					
Periwinkle (*Vinca minor*)					
Dog Violet (*Viola conspersa*)					
Yellow Violet (*Viola pubescens*)					
Com. Blue Violet (*Viola sororia*)					
Viola sp.		R			
Nuphar variegata				X	
Glechoma hederacea	U				

Monocot Herbs	1	2	3	4	5
Water-plantain (*Alisma plantago-aquatica*)		R			
Wild Leek (*Allium tricoccum*)					
Jack-in-the-pulpit (*Arisaema triphyllum*)					
Asparagus (*Asparagus officinalis*)					
Wild Calla (*Calla palustris*)					
Bluebead-lily (*Clintonia borealis*)					
Garden Lily-of-valley (*Convallaria majalis*)					
Yel. Lady's Slipper (*Cypripedium parviflora*)					
Canada Waterweed (*Elodea canadensis*)					
Helleborine (*Epipactis helleborine*)					
Yellow Trout Lily (*Erythronium americanum*)					
Blue-flag Iris (*Iris versicolor*)		R			
Orange Day Lily (*Hemerocallus fulva*)					
Lesser Duckweed (*Lemna minor*)					
Starry Duckweed (*Lemna trisulca*)					
Wild Lily-of-valley (*Maianthemum canadense*)					
False Solom Seal (*Maianthemum racemosum*)					
Star False Solomon (*Maianthemum stellatum*)					
True Solomon Seal (*Polygonatum pubescens*)					
Pickerel-weed (*Pontederia cordata*)					
Curly-leaf Pondweed (*Potamogeton crispus*)					
Sago Pondweed (*Potamogeton pectinatus*)					
Potamogeton					
Potamogeton					
Broad-leaved Arrowhead (*Sagittaria latifolia*)					
Blue-eyed-grass (*Sisyrinchium montanum*)					
Herb. Carrion Flower (*Smilax herbacea*)					
Bristly Greenbrier (*Smilax hispida*)					
Nodding Ladies' Tresses (*Spiranthes cernua*)					
Rose Twisted-stalk (*Streptopus lanceolatus*)					
Skunk-cabbage (*Symplocarpus foetidus*)					
Purple Trillium (*Trillium erectum*)					
White Trillium (*Trillium grandiflorum*)					
Large-flowered Bellwort (*Uvularia grandiflora*)					

D - Dominant: represented by large numbers; generally forming >10% ground cover or >25% vegetation cover in any one stratum

F - Fairly common (=Abundant in ELC): generally widespread represented by fairly large numbers of individual clumps; usually forming >10% ground cover

U - Uncommon (=Occasional in ELC): present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this catergory)

R - Rare: represented in the polygon by less than about five individuals or small clumps

Map Number:	1	CUP3	4	OAO
Date:	2	SW02-2	5	
Surveyors:	3	SW12-2		

Plant Species List
2012

Dicot Herbs - Asteraceae	1	2	3	4	5
Common Yarrow (*Achillea millefolium*)					
White Snakeroot (*Ageratina altissima*)					
Com. Ragweed (*Ambrosia artemisiifolia*)	R	R			
Giant Ragweed (*Ambrosia trifida*)		F	U		
Field Pussytoes (*Antennaria neglecta*)					
Artemisia					
Common Burdock (*Arctium minus*)	R	U	U		
Nodding Beggar-ticks (*Bidens cernua*)					
Devil's Beggar-ticks (*Bidens frondosa*)					
Spotted Knapweed (*Centaurea biebersteinii*)					
Brown Knapweed (*Centaurea jacea*)					
Chicory (*Cichorium intybus*)					
Canada Thistle (*Cirsium arvesnse*)		R			
Bull Thistle (*Cirsium vulgare*)		R			
Horseweed (*Conyza canadensis*)					
Daisy Fleabane (*Erigeron annus*)					
Philadelphia Fleabane (*Erig. philadelphicus*)		R	R		
Erigeron					
Joe-pye-weed (*Eupatorium maculatum*)		U	U		
Boneset (*Eupatorium perfoliatum*)			U		
Large-leaved Aster (*Eurybia macrophylla*)					
Flat-top Goldenrod (*Euthamia graminifolia*)					
Orange Hawkweed (*Hieracium aurantiacum*)					
Field Hawkweed (*Hieracium caespitosum*)					
Hieracium					
Elecampane (*Inula helenium*)					
Prickly Lettuce (*Lactuca serriola*)					
Lactuca					
Ox-eye Daisy (*Leucanthemum vulgare*)					
Pineapple-weed (*Matricaria discoidea*)		R			
Tall White Lettuce (*Prenanthes altissima*)					
Black-eyed Susan (*Rudbeckia hirta*)					
Tall Goldenrod (*Solidago altissima*)			U		
Blue-stem Goldenrod (*Solidago caesia*)					
Canada Goldenrod (*Solidago canadensis*)					
Zig-zag Goldenrod (*Solidago flexicaulis*)					
Giant Goldenrod (*Solidago gigantea*)		U			
Early Goldenrod (*Solidago juncea*)					
Gray Goldenrod (*Solidago nemoralis*)					
Solidago					
Field Sow-thistle (*Sonchus arvensis*)					
Sonchus					
Heart-leaf Aster (*Symph. cordifolium*)					
Heath Aster (*Symphyotrichum ericoides*)					
Tall White Aster (*Symph. lanceolatum*)	U				
Calico Aster (*Symphyotrichum lateriflorum*)	F	F	U		
New England Aster (*Symph. novae-angliae*)		U	U		
Purple-stem Aster (*Symph. puniceus*)					
Common Tansy (*Tanacetum vulgare*)					
Common Dandelion (*Taraxacum officinale*)	R	R	R		
Com. Goatsbeard (*Tragopogon pratensis*)		R			
Coltsfoot (*Tussilago farfara*)					
Bidens Sp.		U	U		
Other Dicot Herbs					
White Baneberry (*Actaea pachypoda*)					
Red Baneberry (*Actaea rubra*)					
Tall Agrimony (*Agrimonia gryposepala*)					
Garlic Mustard (*Alliaria petiolata*)	F	R	R		
Green Amaranth (*Amaranthus retroflexus*)					
Hog-peanut (*Amphicarpa bracteata*)					
Pearly Everlasting (*Anaphalis margaritacea*)					
Canada Anemone (*Anemone canadensis*)	U	U	U		
Ivy Hepatica (*Anemone acutiloba*)					
Thimbleweed (*Anemone virginiana*)					
Purple Angelica (*Angelica atropurpurea*)					
Indian Hemp (*Apocynum cannabinum*)					
Wild Sarsaparilla (*Aralia nudicaulis*)					
Spikenard (*Aralia racemosa*)					
Wild Ginger (*Asarum canadense*)					
Swamp Milkweed (*Asclepias incarnata*)		U	U		
Common Milkweed (*Asclepias syriaca*)		R	R		
Yellow Rocket (*Barbarea vulgaris*)					
False Nettle (*Boehmeria cylindrica*)					
Black Mustard (*Brassica nigra*)					
Marsh-marigold (*Caltha palustris*)					
Creeping Bellflower (*Campanula rapunculoides*)					

Dicot Herbs	1	2	3	4	5
Shepherd's Purse (*Capsella bursa-pastoris*)					
Cutleaf Toothwort (*Cardamine concatenata*)					
Toothwort (*Cardamine diphylla*)					
Penn. Bitter-cress (*Cardamine pensylvanica*)					
Cardamine					
Blue Cohosh (*Caulophyllum thalictroides*)					
Mouse-ear Chickweed (*Cerastium fontanum*)					
Turtlehead (*Chelone glabra*)					
Spotted Water-hemlock (*Cicuta maculata*)		R			
Water-hemlock (*Cicuta virosa*)					
Enchanter's Nightshade (*Circaea lutetiana*)		U	U		
Carolina Spring Beauty (*Claytonia caroliniana*)					
Virginia Spring Beauty (*Claytonia virginica*)					
Virgin's-bower (*Clematis virginiana*)					
Field Bindweed (*Convolvulus arvensis*)					
Dog-strangling Vine (*Cynanchum rossicum*)					
Wild Carrot (*Daucus carota*)	R	R	R		
Deptford Pink (*Dianthus armeria*)					
Squirrel-corn (*Dicentra canadensis*)					
Dutchman's-breeches (*Dicentra cucullaria*)					
Wild Teasel (*Dipsacus fullonum*)		R			
Wild Cucumber (*Echinocystis lobata*)		F	U		
Viper's Bugloss (*Echium vulgare*)					
Northern Willow-herb (*Epilobium ciliatum*)					
Hairy Willow-herb (*Epilobium hirsutum*)					
Small-fl. Willow-herb (*Epilobium parviflorum*)					
Epilobium					
Worm Mustard (*Erysimum cheiranthoides*)					
Euphorbia					
Hemp Nettle (*Galeopsis tetrahit*)					
Wild Madder (*Galium mollugo*)					
Marsh Bedstraw (*Galium palustre*)					
Sweet-scented Bedstraw (*Galium triflorum*)					
Galium Sp.		R			
Spotted Geranium (*Geranium maculatum*)					
Herb-robert (*Geranium robertianum*)					
Yellow Avens (*Geum aleppicum*)	U	U			
White Avens (*Geum canadense*)		R			
Urban Avens (*Geum urbanum*)					
Dame's Rocket (*Hesperis matronalis*)					
Virg. Water-leaf (*Hydrophyllum virginianum*)					
Com. St. John's-wort (*Hypericum perforatum*)					
Spotted Jewelweed (*Impatiens capensis*)					
Wood Nettle (*Laportea canadensis*)		U	U		
Motherwort (*Leonurus cardiaca*)		F	F		
Field Peppergrass (*Lepidium campestre*)					
Eur. Gromwell (*Lithospermum officinale*)					
Butter & Eggs (*Linaria vulgaris*)					
Great Lobelia (*Lobelia siphilitica*)					
Lobelia Cardinalis		U	U		
Cut-leaf Bugleweed (*Lycopus americanus*)		U	U		
Northern Bugleweed (*Lycopus uniflorus*)					
Fringed Loosestrife (*Lysimachia ciliata*)		F			
Moneywort (*Lysimachia nummularia*)		F	U		
Lysimachia					
Purple Loosestrife (*Lythrum salicaria*)		R			
Black Medick (*Medicago lupulina*)	R	R			
Alfalfa (*Medicago sativa*)		R			
White Sweet-clover (*Melilotus alba*)		R			
Yellow Sweet-clover (*Melilotus officinalis*)		R			
Wild Mint (*Mentha arvensis*)			U		
Wild Bergamot (*Monarda fistulosa*)					
Small Forget-me-not (*Myosotis laxa*)					
Forget-me-not (*Myosotis scorpioides*)					
Water-cress (*Nasturtium officinale*)					
Com. Evening-primrose (*Oenothera biennis*)		R			
Sweet-cicely (*Osmorhiza berterii*)					
Yellow Wood-sorrel (*Oxalis stricta*)		R			
Wild Parsnip (*Pastinaca sativa*)					
English Plantain (*Plantago lanceolata*)					
Common Plantain (*Plantago major*)					
Rugel's Plantain (*Plantago rugelii*)					
May-apple (*Podophyllum peltatum*)					
Pale Smartweed (*Polygonum lapathifolium*)					
Lady's-thumb (*Polygonum persicaria*)		R			
Virginia Knotweed (*Polygonum virginianum*)					
Polygonum					
Polygonum					
Rough Cinquefoil (*Potentilla norvegica*)					
Rough-fruited Cinquefoil (*Potentilla recta*)		R			
Common Cinquefoil (*Potentilla simplex*)					
Potentilla					
Heal-all (*Prunella vulgaris*)					
Shinleaf (*Pyrola elliptica*)					
P. ica aurita		U	U		

Dicot Herbs	1	2	3	4	5
Kidney-leaf Buttercup (*Ranunculus abortivus*)					
Tall Buttercup (*Ranunculus acris*)		U			
Hooked Buttercup (*Ranunculus recurvatus*)					
Ranunculus sept		U	R		
Sheep Sorrel (*Rumex acetosella*)					
Curly-leaf Dock (*Rumex crispus*)		U			
Bitter Dock (*Rumex obtusifolius*)					
Bloodroot (*Sanginaria canadense*)					
Black Snakeroot (*Sanicula marilandica*)					
Bouncing Bet (*Saponaria officinalis*)					
Marsh Skullcap (*Scutellaria galericulata*)		R			
Mad Dog Skullcap (*Scutellaria lateriflora*)					
White Campion (*Silene latifolia*)					
Bladder Campion (*Silene vulgaris*)					
Hemlock Water-parsnip (*Sium suave*)			R		
Bitter Nightshade (*Solanum dulcamara*)		R	R		
Black Nightshade (*Solanum ptychanthum*)					
Grassleaf Stitchwort (*Stellaria graminea*)					
Common Chickweed (*Stellaria media*)					
Early Meadow-rue (*Thalictrum dioicum*)					
Tall Meadow-rue (*Thalictrum pubescens*)		U	R		
Field Penny-cress (*Thlaspi arvense*)					
Foamflower (*Tiarella cordifolia*)					
Star-flower (*Trientalis borealis*)					
Red Clover (*Trifolium pratense*)		R			
White Clover (*Trifolium repens*)		R			
Trifolium					
Stinging Nettle (*Urtica dioica*)		F	F		
Greater Bladderwort (*Utricularia vulgaris*)					
Common Mullein (*Verbascum thapsus*)		R			
Blue Vervain (*Verbena hastata*)					
White Vervain (*Verbena urticifolia*)					
Water Speedwell (*Veron. anagallis-aquatica*)					
Common Speedwell (*Veronica officinalis*)					
Veronica					
Cow Vetch (*Vicia cracca*)		U			
Vicia					
Periwinkle (*Vinca minor*)					
Dog Violet (*Viola conspersa*)					
Yellow Violet (*Viola pubescens*)					
Com. Blue Violet (*Viola sororia*)					
Viola sp.		R			
Helianthus tuberosus		O	O		
Nuphar variegata				U	
Glechoma hederacea	U	R			
Pentharum sedoides					
Monocot Herbs					
Water-plantain (*Alisma plantago-aquatica*)		R			
Wild Leek (*Allium tricoccum*)					
Jack-in-the-pulpit (*Arisaema triphyllum*)					
Asparagus (*Asparagus officinalis*)					
Wild Calla (*Calla palustris*)					
Bluebead-lily (*Clintonia borealis*)					
Garden Lily-of-valley (*Convallaria majalis*)					
Yel. Lady's Slipper (*Cypripedium parviflora*)					
Canada Waterweed (*Elodea canadensis*)					
Helleborine (*Epipactis helleborine*)					
Yellow Trout Lily (*Erythronium americanum*)					
Blue-flag Iris (*Iris versicolor*)		R	R		
Orange Day Lily (*Hemerocallus fulva*)					
Lesser Duckweed (*Lemna minor*)					
Starry Duckweed (*Lemna trisulca*)					
Wild Lily-of-valley (*Maianthemum canadense*)					
False Solom Seal (*Maianthemum racemosum*)					
Star False Solomon (*Maianthemum stellatum*)					
True Solomon Seal (*Polygonatum pubescens*)					
Pickerel-weed (*Pontederia cordata*)					
Curly-leaf Pondweed (*Potamogeton crispus*)					
Sago Pondweed (*Potamogeton pectinatus*)					
Potamogeton					
Potamogeton					
Broad-leaved Arrowhead (*Sagittaria latifolia*)		R			
Blue-eyed-grass (*Sisyrinchium montanum*)					
Herb. Carrion Flower (*Smilax herbacea*)					
Bristly Greenbrier (*Smilax hispida*)					
Nodding Ladies' Tresses (*Spiranthes cernua*)					
Rose Twisted-stalk (*Streptopus lanceolatus*)					
Skunk-cabbage (*Symplocarpus foetidus*)					
Purple Trillium (*Trillium erectum*)					
White Trillium (*Trillium grandiflorum*)					
Large-flowered Bellwort (*Uvularia grandiflora*)					

D - Dominant: represented by large numbers, generally forming >10% ground cover or >25% vegetation cover in any one stratum

F - Fairly common (=Abundant in ELC): generally widespread represented by fairly large numbers of individual clumps, usually forming >10% ground cover

U - Uncommon (=Occasional in ELC): present as widespread scattered individuals or represented by one or more clumps of many individuals (most species will fall into this catergory)

R - Rare: represented in the polygon by less than about five individuals or small clumps

Map Number: GSH T-Line	1	CWP3	4	OAO
Date: Aug 14, 2013	2	SWD2-2	5	
Surveyors: RA/JP/TS	3	SWT2-2		

Plant Species List
2012

Trees & Shrubs	1	2	3	4	5
Conifers					
Balsam Fir *(Abies balsamea)*	R				
Common Juniper *(Juniperus communis)*					
Eastern Red Cedar *(Juniperus virginiana)*					
Tamarack *(Larix laricina)*					
Norway Spruce (Picea abies)	F				
White Spruce *(Picea glauca)*	F				
Black Spruce *(Picea mariana)*					
Jack Pine *(Pinus banksiana)*					
Red Pine *(Pinus resinosa)*					
Eastern White Pine *(Pinus strobus)*	F				
Scotch Pine *(Pinus sylvestris)*					
Canada Yew *(Taxus canadensis)*					
Eastern White Cedar *(Thuja occidentalis)*					
Eastern Hemlock *(Tsuga canadensis)*					
Deciduous					
Manitoba Maple *(Acer negundo)*	U	R			
Black Maple *(Acer nigrum)*					
Norway Maple *(Acer platanoides)*					
Red Maple *(Acer rubrum)*					
Silver Maple *(Acer saccharinum)*					
Freeman's Maple *(Acer X freemanii)*		U			
Sugar Maple *(Acer saccharum)*					
Mountain Maple *(Acer spicatum)*					
Speckled Alder *(Alnus incana)*					
Downy Serviceberry *(Amelanchier arborea)*					
Serviceberry *(Amelanchier sanguinea)*					
Yellow Birch *(Betula alleghaniensis)*					
White Birch *(Betula papyrifera)*					
European Birch *(Betula pendula)*					
Blue Beech *(Carpinus caroliniana)*					
Bitternut hickory *(Carya cordiformis*					
Shagbark Hickory *(Carya ovata)*					
Climbing Bittersweet *(Celastrus scandens)*					
Common Hackberry *(Celtis occidentalis)*					
Buttonbush *(Cephalanthus occidentalis)*		U	R		
Alt.-leaved Dogwood *(Cornus alternifolia)*		R			
Silky Dogwood *(Cornus amomum)*		F	F		
Bunchberry *(Cornus canadensis)*					
Gray dogwood *(Cornus racemosa)*					
Round-leaved Dogwood *(Cornus rugosa)*					
Red-osier Dogwood *(Cornus sericea)*		F	F		
American Hazel *(Corylus americana)*					
Beaked Hazel *(Corylus cornuta)*					
Cockspur Thorn *(Crataegus crus-galli)*					
English Hawthorn *(Crataegus monogyna)*					
Large-fruited Thorn *(Crataegus punctata)*		R			
Crataegus					
Crataegus					
Bush Honeysuckle *(Diervilla lonicera)*					
Russian Olive *(Elaeagnus angustifolia)*					
Autumn Olive *(Elaeagnus umbellata)*					
Run. Strawberry-bush *(Euonymus obovata)*					
American Beech *(Fagus grandifolia)*					
Glossy Buckthorn *(Frangula alnus)*					
White Ash *(Fraxinus americana)*					
Black Ash *(Fraxinus nigra)*					
Green Ash *(Fraxinus pennsylvanica)*		D			
Witch-hazel *(Hamamelis virginiana)*					
Winterberry *(Ilex verticilata)*					
Butternut *(Juglans cinerea)*					
Black Walnut *(Juglans nigra)*	R	R	R		
Common Privet *(Ligustrum vulgare)*					
Spicebush *(Lindera benzoin)*					
Fly Honeysuckle *(Lonicera canadensis)*					
Glaucous Honeysuckle *(Lonicera dioica)*					
Morrow's Honeysuckle *(Lonicera morrowii)*					
Tartarian Honeysuckle *(Lonicera tatarica)*	R	R	R		
Common Apple *(Malus pumila)*	R	R	R		
White Mulberry *(Morus alba)*					
Sweet Gale *(Myrica gale)*					
Ironwood *(Ostrya virginiana)*					
Thicket-creeper *(Parthenocissus inserta)*		U	R		
Ninebark *(Physocarpus opulifolius)*					
Balsam Poplar *(Populus balsamifera)*					
Eastern Cottonwood *(Populus deltoides)*		R			
Large-tooth Aspen *(Populus grandidentata)*					
Trembling Aspen *(Populus tremuloides)*					
Sweet Cherry *(Prunus avium)*					
Pin Cherry *(Prunus pensylvanica)*					
Black Cherry *(Prunus serotina)*					
Choke Cherry *(Prunus virginiana)*					
Prunus Sp.		R			

Tree & Shrubs	1	2	3	4	5
Deciduous					
White Oak *(Quercus alba)*					
Bur Oak *(Quercus macrocarpa)*	R				
Red Oak *(Quercus rubra)*					
Alder Buckthorn *(Rhamnus alnifolia)*					
Common Buckthorn *(Rhamnus cathartica)*					
Smooth Sumac *(Rhus glabra)*					
Staghorn Sumac *(Rhus hirta)*					
Wild Black Currant *(Ribes americanum)*			U		
Prickly Gooseberry *(Ribes cynosbati)*					
Swamp Black Currant *(Ribes lacustre)*					
Red Currant *(Ribes rubrum)*					
Ribes					
Black Locust *(Robinia pseudo-acacia)*					
Prickly Rose *(Rosa acicularis)*					
Smooth Rose *(Rosa blanda)*					
Multiflora Rose *(Rosa multiflora)*		R			
Rosa					
Com. Blackberry *(Rubus allegheniensis)*					
Wild Red Raspberry *(Rubus idaeus)*	U		U		
Black Raspberry *(Rubus occidentalis)*					
Purple-fl. Raspberry *(Rubus odoratus)*					
Dwarf Raspberry *(Rubus pubescens)*					
Rubus					
Peach-leaved Willow *(Salix amygdaloides)*					
Bebb's Willow *(Salix bebbiana)*					
Pussy Willow *(Salix discolor)*					
Missouri Willow *(Salix eriocephala)*			F		
Sandbar Willow *(Salix exigua)*			F		
Shining Willow *(Salix lucida)*					
Black Willow *(Salix nigra)*					
Slender Willow *(Salix petiolaris)*					
Salix					
Hybrid Crack Willow *(Salix X rubens)*	R	U			
Black-berried Elder *(Sambucus nigra)*					
Red-berried Elder *(Sambucus racemosa)*		R			
Buffaloberry *(Shepherdia canadensis)*					
Eur. Mountain Ash *(Sorbus aucuparia)*					
Narrow Meadow-sweet *(Spiraea alba)*					
Common Lilac *(Syringa vulgaris)*					
Poison-ivy *(Toxicodendron rydbergii)*	R	R			
Climbing Poison-ivy *(Toxicodendron radicans)*	R	R			
White Elm *(Ulmus americana)*		R			
Siberian Elm *(Ulmus pumila)*					
Slippery Elm *(Ulmus rubra)*		R			
Low Blueberry *(Vaccinium angustifolium)*					
Maple-leaf Viburnum *(Viburnum acerifolium)*					
Hobblebush *(Viburnum lantanoides)*					
Nannyberry *(Viburnum lentago)*					
Guelder-Rose *(Viburnum opulus)*					
Downy Arrow-wood *(Vib. rafinesquianum)*					
Riverbank Grape *(Vitis riparia)*		U			
Am. Prickly-ash *(Zanthoxylum americanum)*					
TILAMER		R			
Swamp Rose (cf.)		R			
Ferns & Allies					
Lady Fern *(Athyrium filix-femina)*					
Rattlesnake Fern *(Botrychium virginianum)*					
Bulbet Bladder Fern *(Cystopteris bulbifera)*					
Spin. Wood Fern *(Dryopteris carthusiana)*					
Crested Wood Fern *(Dryopteris cristata)*					
Marginal Wood Fern *(Dryopteris marginalis)*					
Dryopteris					
Ostrich Fern *(Matteuccia struthiopteris)*					
Sensitive Fern *(Onoclea sensibilis)*					
Cinnamon Fern *(Osmunda cinnamomea)*					
Interrupted Fern *(Osmunda claytoniana)*					
Royal Fern *(Osmunda regalis)*					
Christmas Fern *(Polystichum acrostichoides)*					
Eastern Bracken-fern *(Pteridium aquilinum)*					
Marsh Fern *(Thelypteris palustris)*					
Field Horsetail *(Equisetum arvense)*		R			
Scouring-rush *(Equisetum hyemale)*					
Variegated Horsetail *(Equisetum variegatum)*					
Equisetum					
Ground-cedar*(Lycopodium digitatum)*					
Shining Clubmoss *(Lycopodium lucidulum)*					
Ground-pine *(Lycopodium obscurum)*					

Graminoids	1	2	3	4	5
Grasses					
Giant Redtop *(Agrostis gigantea)*					
Redtop *(Agrostis stolonifera)*					
Awnless Brome *(Bromus inermis)*	R	R			
Bromus					
Blue-joint Grass *(Calamagrostis canadensis)*					
Orchard Grass *(Dactylis glomerata)*	R	R			
Poverty Oat Grass *(Danthonia spicata)*					
Quack Grass *(Elymus repens)*	R	R			
Virginia Wild Rye *(Elymus virginicus)*			U		
Elymus					
Fowl Manna Grass *(Glyceria striata)*		U	R		
Glyceria					
Rice Cut Grass *(Leersia oryzoides)*		U			
Tall Fescue *(Lolium arundinaceum)*					
Muhlenbergia					
Witch-grass *(Panicum capillare)*					
Panicum					
Reed Canary Grass *(Phalaris arundinacea)*	R		D		
Timothy *(Phleum pratense)*					
Common Reed *(Phragmites australis)*		R	R		
Canada Blue Grass *(Poa compressa)*					
Fowl Meadow Grass *(Poa palustris)*		U			
Kentucky Bluegrass *(Poa pratensis)*			U		
Yellow Foxtail *(Setaria pumila)*					
Green Foxtail *(Setaria viridis)*					
Sedges					
Drooping Wood Sedge *(Carex arctata)*					
Golden-fruited Sedge *(Carex aurea)*					
Graceful Sedge *(Carex gracillima)*					
Inland Sedge *(Carex interior)*					
Bladder Sedge *(Carex intumescens)*					
Lake-bank Sedge *(Carex lacustris)*					
Hop Sedge *(Carex lupulina)*					
Pennsylvania Sedge *(Carex pensylvanica)*					
Awl-fruited Sedge *(Carex stipata)*					
Fox Sedge *(Carex vulpinoidea)*		U			
Carex *bebbii*		U			
Carex *rostrata*		U			
Carex *lupulina*		U			
Carex *gravei*		U			
Carex					
Carex					
Carex					
Carex					
Carex					
Carex					
Cyperus					
Redroot Spike-rush *(Eleocharis erythropoda)*					
Eleocharis					
Hard-stem Bulrush *(Schoenoplectus acutus)*					
Three-square Bulrush *(Sch. pungens)*					
Soft-stem Bulrush *(Sch. tabernaemontani)*					
Dark-green Bulrush *(Scirpus atrovirens)*					
Wool-grass *(Scirpus cyperinus)*					
Other Graminoids					
Broad Bur-reed *(Sparganium eurycarpum)*					
Narrow-leaved Cattail *(Typha angustifolia)*					
Broad-leaved Cattail *(Typha latifolia)*					
Broad-leaved Cattail *(Typha X glauca)*					
Articulated Rush *(Juncus articulatus)*					
Soft Rush *(Juncus effusus)*		R			
Path Rush *(Juncus tenuis)*					
Juncus					
Juncus					
Typha Sp		U	R		

D - Dominant: represented by large numbers; generally forming >10% ground cover or >25% vegetation cover in any one stratum

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Map Number: GSH T-LIAC	1				
Date:	2				
Surveyors: JP/RA/TS	3				

CUP3	4				
SWD2-2	5				
SLIT2-2					

C2. Amphibian Wetland Breeding Habitat Evaluation of Significance Surveys

456750
457000
457250
457500
457750
4795250
4795000
4794750

Legend

Wind Energy Centre Study Area
Goshen Transmission Line Study Area
Municipal Division
120 m Area of Investigation
Roads
Railway

Natural Feature
Watercourse (ABCA, SCRCA)
Watercourse (MNR)

Project Location
GE Turbine
Permanent MET Tower
Access Roads
Collection Line
Transmission Line
Breaker Switch Station
Transformer Substation
Laydown Yard
Disturbance Area

Natural Features
Properties
Amphibian Wetland Breeding Habitat
Generalized Candidate Significant Wildlife Habitat

GSH2394
GSH2376
GSH2934
GSH2717
GSH2957
GSH2718
GSH3703
GSH2857
GSH2932
GSH2930
609
612
Ausable Line
← NO ACCESS →
← NO ACCESS →
No Access
Roes yes

Transect/point count/vantage point locations and/or property access status may be subject to change and will be confirmed at the time of field surveys (e.g. depending on site conditions and/or landowner consultation)

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Metres
0 10 20 40 80 80
UTM Zone 17N, NAD 83 1:3,258

Goshen Wind Energy Centre

Significant Wildlife Habitat
AWO EOS Survey
609_GSH2394/GSH2717

April 2013
Project 60155032

AECOM

Path: N:\0-aecom\60155032\2010\Ena\GIS\Spatial\MXDs\FieldMapMXDs\SWH_FieldMaps\GSH\60155032_GSH_SWH_AWO_FieldMap_609_GSH2394_GSH2717.mxd

Vernal Pool/Pond Habitat Description and Feature Identification Form

AECOM

Study Area (circle one):	Bluewater	(Goshen)	Jericho
Pre-determined Station #:	AWOEOS	Feature # [1]:	609 GSH 2394/2717
UTMs:			

Date (yyyy-mm-dd):	2013-04-17
Field Staff (full name):	Tom Shorney + Jess Pietke
Weather Conditions:	5°C, NE 9 km/h, Sunny
Time Started:	8:00 a.m.
Time Finished:	9:10 a.m.

Water Present (Y/N)		Vernal Pool or Pond ?	
Max Water Depth (m)		Water Quality (visual)	
Length(m)		Width(m)	
% open water (emergent)		% floating plant cover of open water	

Potential to hold water until July? (circle one) YES NO

Human Influences affecting area (dykes, agriculture etc.):

Describe area 100m behind you (field, marsh etc):

Submergent Plants (Species & % cover **)	
1	3
2	4
Emergent Plants (Species & % cover)	
1	3
2	4
Floating Plants (Species and % cover)	
1	3
2	4
Fringing Shrubs (Species & % cover)	
1	3
2	4
Trees (Species & % cover)	
1	3
2	4
Exposed mud/sand/rock	

Logs (size, quantity, location)

Amphibians/egg masses observed (Type, quantity, location)

Comments See Pictures 111-122 → Site flooded → could not Access Pond

*** Feature # refers to assigned AWO/ AWE EOS ID. This # will be used on call sheet & salamander forms**

**** Of total percent cover (surface and canopy), select top 4 and estimate percent of their cover.**

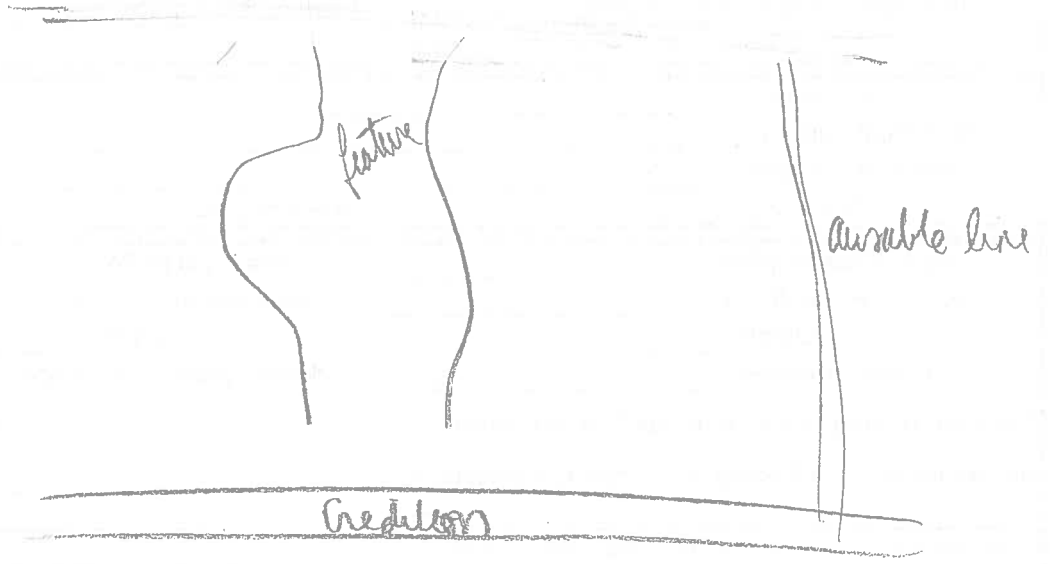
If no water present then no amphibian or salamander sheet completed

Pools created by tractor/ATV etc. ruts that are not naturalized are not considered vernal pool habitat

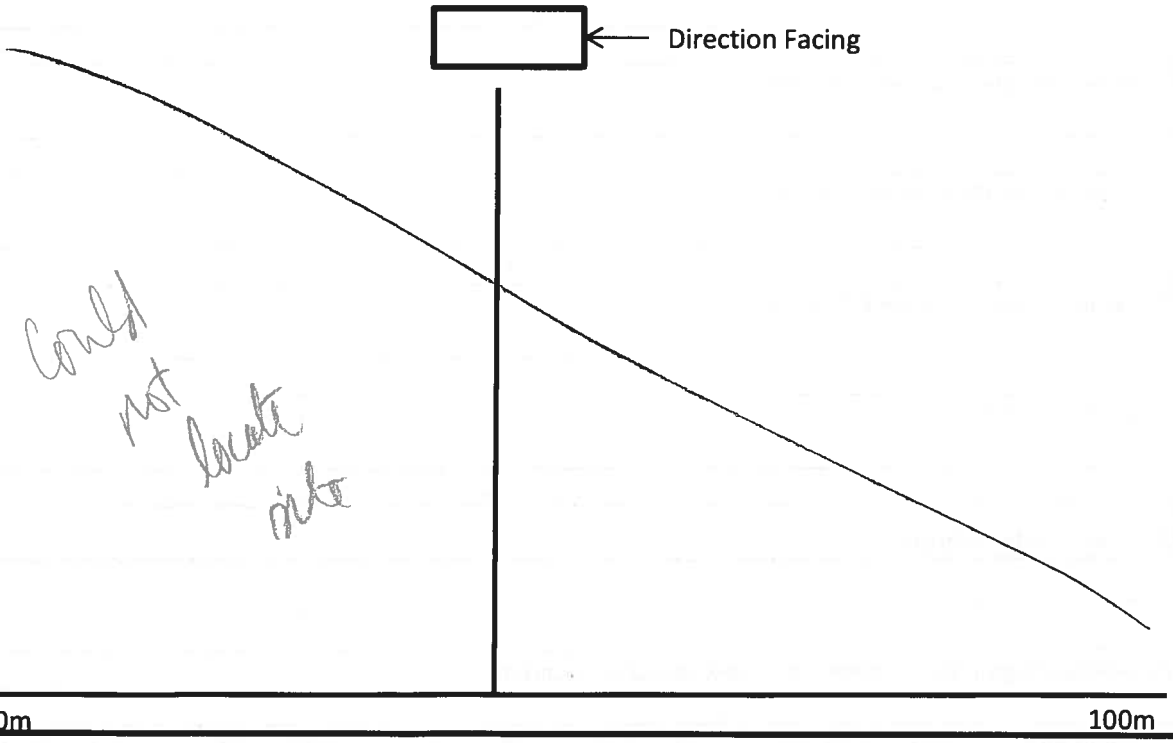
Vernal Pool/Pond Habitat Description and Feature Identification Form

AECOM

Map of general location - station location, road names, north arrow, entry route, house #, etc.



Map of Feature - GPS location, flow (if any), location of species (if any), vegetation, etc.



Photo#(locate on map and GPS if necessary)

Salamander Area Search Survey Form

AECOM

Study Area (circle one):	Bluewater	(Goshen)	Jericho
Pre-determined Station #:	AWO EOS	Feature #[1]:	609 GSH 2394/2717
UTMs:			

Date(yyyy-mm-dd):	2013-04-17
Field Staff (full name):	Tom Shorney + Jess Pirthe
Weather Conditions:	5°C, NE 9km/h, Sunny
Time Started:	8:00 a.m. Time Finished: 9:10 a.m.

Water Present Y/N)	Vernal pool depth (m)
Vernal Pool width (m)	Vernal Pool length (m)

Vegetation Comments:
(Dominant, % cover etc)

NO Amphibians Observed ☐

Amphibian Species	Life Stage [2]	Number [3]	Search Type [4]	Size [5]	Comments/GPS

Photo #	Location/or Subject	Photo #	Location/or Subject

Comments (ex: egg masses to have GPS)

[1] **Feature # refers to the vernal pool ID given on the habitat description form**

[2] **Adult or larvae or egg masses**

[3] **Number of individuals (adults or larvae) or egg masses**

[4] **Overturned logs, D-ring dipnet, observation**

[5] **Size of individual (adult or larvae) or egg masses (cm)**

Amphibian Night Time Call Survey Form

AECOM

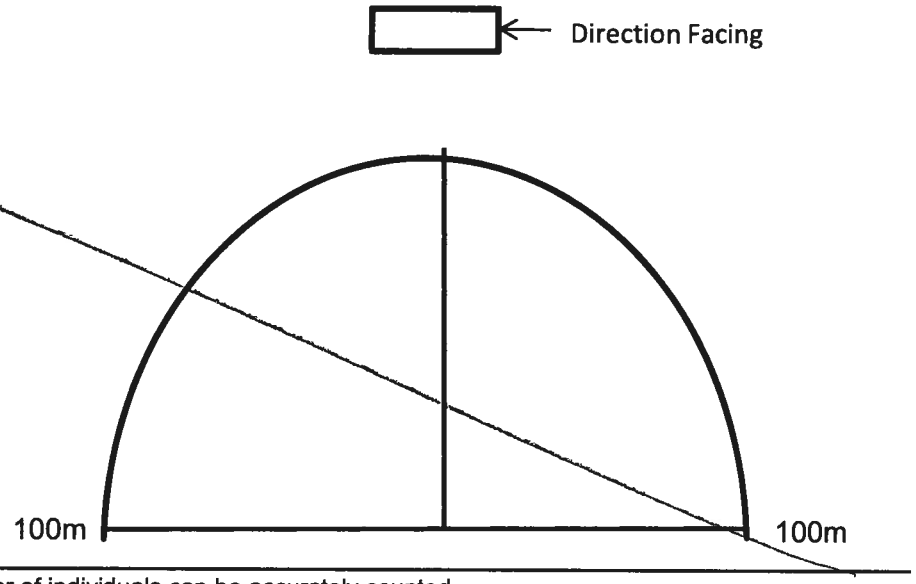
Study Area (circle one):	Bluewater	(Goshen)	Jericho
Pre-determined Station #:	609_FSH2394	*Feature # :	609 FSH2394
UTMs:	N/A		
Water Present (Y/N)	Yes		

** Feature # refers to the vernal pool ID given on the habitat description form*

Date (yyyy-mm-dd):	2013-04-17	Visit #(1-3):	1
Field Staff (full names):	Jen Potter + Tom Shanny		
Time Started:	—	Time Finished:	—

Beaufort Wind Scale (0-6):	—	Cloud Cover (%):	—
Background Noise Scale (0-4):	—	Temperature Celcius	—
Precipitation (None, fog, drizzle,or rain)			

Species	IN	OUT
NONE		
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		
WOFR		



Code 1 - not simultaneous, number of individuals can be accurately counted
Code 2 - some call simultaneous, but number of individulas can be reliable estimated
Code 3 - full chorus, call continuous, numbers of indiviudals cannot be reliably estimated

Beaufort Wind Scale	**0:** 0-2 km/hr - calm	**4:** 20-30 km/hr -moderate breeze -small branch moves
	1: 3-5 km/hr - light air movement	**5** : 31-38 km/hr - fresh breeze - moderate branch moves
	2: 6-11km/hr - slight breeze - can feel on face	**6:** 39-49 km/hr - strong breeze - large branch moves
	3: 12-19 km/hr- gentle breeze - leaves move on twigs	

Background Noise Scale	**0** - no appriciable effect	**3** - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	**4**- profound -continous traffic passing
	2 - moderate -distant traffic (2-5 cars)	

Species Codes	**AMTO** - American Toad	**GRTR** - Gray Treefrog	**SPPE** - Spring Peeper
	BULL- Bullfrog	**GRFR** - Green Frog	**WOFR** - Wood Frog
	CHFR - Chorus Frog	**NLFR** - N.Leopard Frog	
	MIFR - Mink Frog	**PIFR** - Pickeral Frog	

General Comments: Could not find pond, under water

Path: N:\0-aecom\60155032\2010\Final\GIS\pdf\MXD\pdf\Field\Maps\MXD\pdf\SWH_FieldMaps\GSH\60155032_GSH_SWH_AWO_FieldMap_609_GSH2394_GSH2717.mxd

Salamander Area Search Survey Form

AECOM

Study Area (circle one):	Bluewater	Goshen	Jericho
Pre-determined Station #:	609 GSH2394/2717	Feature #[1]:	609 GSH2394/2717
UTMs:	457060	4794292	

Date(yyyy-mm-dd):	2013-05-15		
Field Staff (full name):	Tom Shannon + Jessica Kotte		
Weather Conditions:	16°C, windy		
Time Started:	10:10am	Time Finished:	10:40am

Water Present Y/N)	YES	Vernal pool depth (m)	>1M
Vernal Pool width (m)	40-50 m	Vernal Pool length (m)	89 m

Vegetation Comments: agriculture, Ausable river
(Dominant, % cover etc)

NO Amphibians Observed X

Amphibian Species	Life Stage[2]	Number[3]	Search Type[4]	Size[5]	Comments/GPS

Photo #	Location/or Subject	Photo #	Location/or Subject
100-101	pond		
102-103	thick shrubs		

Comments (ex: egg masses to have GPS)
- water is very murky hard to see anything
- also very windy moving water around (30 km/h)
- surrounded by thick willows and playground, all around hard to walk through

[1] Feature # refers to the vernal pool ID given on the habitat description form
[2] Adult or larvae or egg masses
[3] Number of individuals (adults or larvae) or egg masses
[4] Overturned logs, D-ring dipnet, observation
[5] Size of individual (adult or larvae) or egg masses (cm)

Amphibian Night Time Call Survey Form

AECOM

Study Area (circle one):	Bluewater	Goshen	Jericho
Pre-determined Station #:	609_GSH 2394	*Feature # :	609-GSH2394
UTMs:	See Round #1 Notes		
Water Present (Y/N)	Yes		

** Feature # refers to the vernal pool ID given on the habitat description form*

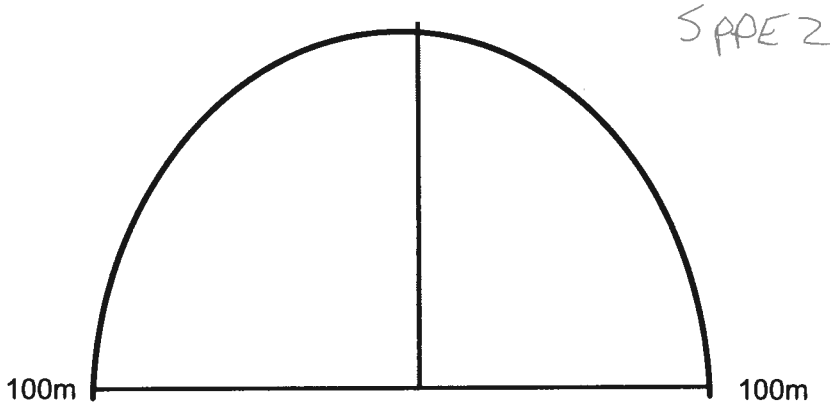
Date (yyyy-mm-dd):	2013-05-16	Visit #(1-3):	2
Field Staff (full names):	Tom Shoemaker + Justin Munro		
Time Started:	10:57 P.m	Time Finished:	11:00 P.m

Beaufort Wind Scale (0-6):	2	Cloud Cover (%):	0
Background Noise Scale (0-4):	1	Temperature Celcius	8°C
Precipitation (None, fog, drizzle,or rain)	None		

Species	IN	OUT
NONE		
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		
NLFR		
PIFR		
SPPE		X
WOFR		

N ← Direction Facing

SPPE 2



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	BULL- Bullfrog	**GRFR** - Green Frog	**WOFR** - Wood Frog
	CHFR - Chorus Frog	**NLFR** - N.Leopard Frog	
	MIFR - Mink Frog	**PIFR** - Pickeral Frog	

General Comments: * No frogs calling in dug pond

Amphibian Night Time Call Survey Form

AECOM

Study Area (circle one): Bluewater (Goshen) Jericho

Pre-determined Station #: 609-GSH2394/2717 *Feature # : 609GSH2394/2717

UTMs: See previous survey

Water Present (Y/N) YES

** Feature # refers to the vernal pool ID given on the habitat description form*

Date (yyyy-mm-dd): 2013-06-19 Visit #(1-3): 3

Field Staff (full names): Tom Shanley + Jen Piatto

Time Started: 11:18pm Time Finished: 11:21pm

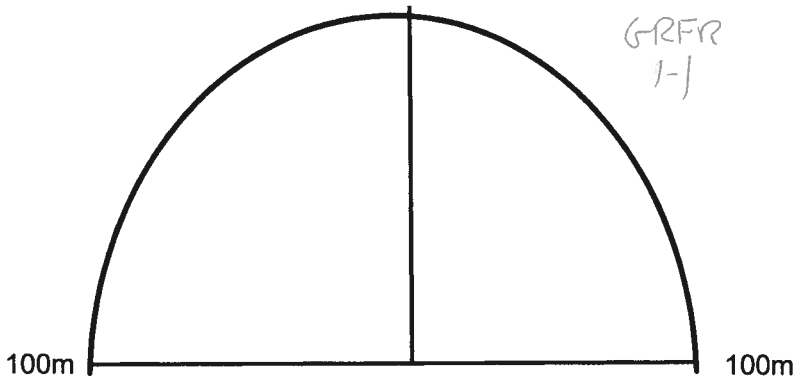
Beaufort Wind Scale (0-6): 1 Cloud Cover (%): 10%

Background Noise Scale (0-4): 1 Temperature Celcius 13°C

Precipitation (None, fog, drizzle,or rain) none

Species	IN	OUT
NONE		
AMTO		
BULL		
CHFR		
MIFR		
GRTR		
GRFR		X
NLFR		
PIFR		
SPPE		
WOFR		

NW ← Direction Facing



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Background Noise Scale	**0** - no appriciable effect	**3** - serious -continuous traffic nearby (6-10 cars)
	1 - slight - distant traffic (1 car)	**4**- profound -continous traffic passing
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	CHFR - Chorus Frog	**NLFR** - N.Leopard Frog	
	MIFR - Mink Frog	**PIFR** - Pickeral Frog	

General Comments:

Appendix D

Vascular Plant Species List

BOTANICAL NAME		COMMON NAME	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status	OMNR Status	COSEWIC Status	Global Status	Local Status Lambton County	Local Status Huron County	Natural Area 609							
			Oldham et al	Oldham et al	Oldham et al	Newmaster			Newmaster	Tiedje 2004	Oldham 1993	CUP3		SWD2-2		SWT2-2		OAO	
												19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13
PTERIDOPHYTES		**FERNS & ALLIES**																	
Equisetaceae		**Horsetail Family**																	
Equisetum	*arvense*	Field Horsetail	0	0		S5			G5					R	R				
Pinaceae		**Pine Family**																	
Abies	*balsamea*	Balsam Fir	5	-3		S5			G5			R	R						
Picea	*abies*	Norway Spruce		5	-1	SE3			G?			F	F						
Picea	*glauca*	White Spruce				S5			G5			F	F						
Pinus	*strobus*	Eastern White Pine	4	3		S5			G5	L3	X	F	F						
DICOTYLED		**DICOTS**																	
Aceraceae		**Maple Family**																	
Acer X	*negundo*	Manitoba Maple	0	-2		S5			G5	C		U	U	R	R				
Acer X	*freemanii*	Freeman's Maple				SNR			GNA		L4			U	U				
Anacardiaceae		**Sumac or Cashew Family**																	
Toxicodendron	*radicans ssp. negundo*	Climbing Poison-ivy	5	-1		S5			G5T		X	R	R	R	R				
Toxicodendron	*rydbergil*	Ground Poison-ivy	0	0		S5			G5T			R	R	R	R				
Apiaceae		**Carrot or Parsley Family**																	
Cicuta	*maculata*	Spotted Water-hemlock	6	-5		S5			G5						R				
Daucus	*carota*	Wild Carrot		5	-2	SE5			G?		I	R	R	R	R		R		
Sium	*suave*	Hemlock Water-parsnip	6	-5		S5			G5								R		
Asclepiadaceae																			
Asclepias	*incarnata*	Swamp Milkweed	6	-5		S5			G5						U		U		
Asclepias	*syriaca*	Common Milkweed	0	5		S5			G5						R		R		
Asteraceae		**Composite or Aster Family**																	
Ambrosia	*artemisiifolia*	Common Ragweed	0	3		S5			G5			R	R	R	R				
Ambrosia	*trifida*	Giant Ragweed	0	-1		S5			G5					R	F		U		
Arctium	*minus*	Common Burdock		5	-2	SE5			G?T?		I	R	R	R	U		U		
Bidens	*species*	Bidens species												R	U		U		
Symphyotrichum	*lanceolatum*	Tall White Aster	3	-3		S5			G5T?		X				U				
Symphyotrichum	*lateriflorum*	Calico Aster	3	-2		S5			G5T5		X				F		U		
Symphyotrichum	*novae-angliae*	New England Aster	2	-3		S5			G5	C				R	U		U		
Cirsium	*arvense*	Canada Thistle		3		SNA			GNR					R	R				
Cirsium	*vulgare*	Bull Thistle		4	-1	SE5			G5		I				R				
Erigeron	*philadelphicus ssp. philadelpl*	Philadelphia Fleabane	1	-3		S5			G5T?		X	R		R	R		R		
Eupatorium	*maculatum*	Joe-pye-weed				S5			G5					R	U		U		
Eupatorium	*perfoliatum*	Perfoliate Thoroughwort/Bon	2	-4		S5			G5		X						U		
Helianthus	*tuberosus*	Jerusalem Artichoke		0		S5			G5						O		O		

BOTANICAL NAME		COMMON NAME	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status	OMNR Status	COSEWIC Status	Global Status	Local Status Lambton County	Local Status Huron County	Natural Area 609							
			Oldham et al	Oldham et al	Oldham et al	Newmaster			Newmaster	Tiedje 2004	Oldham 1993	CUP3		SWD2-2		SWT2-2		OAO	
												19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13
Leucanthemum	*vulgare*	Ox-Eye Daisy		5		SNA			GNR			R		R					
Matricaria	*descoidea*	Pineapple-weed				SNA			G5						R				
Solidago	*altissima*	Tall Goldenrod	1	3		S5					X						U		
Solidago	*gigantea*	Giant Goldenrod	4	-3		S5			G5		X			R	U				
Solidago	*species*	Goldenrod species										U		U					
Taraxacum	*officinale*	Common Dandelion		3	-2	SE5			G5		I	R	R	R	R		R		
Tragopogon	*pratensis ssp. pratensis*	Common Goatsbeard		5		SNA			GNR					R	R				
Balsaminaceae		**Touch-me-not Family**																	
Impatiens	*capensis*	Spotted Jewelweed	4	-3		S5			G5		X			U		U			
Brassicaceae		**Mustard Family**																	
Alliaria	*petiolata*	Garlic Mustard		0	-3	SE5			G5		I	F	F	R	R		R		
Hesperis	*matronalis*	Dame's Rocket		5	-3	SE5			G4G5		I			R					
Campanulaceae																			
Lobelia	*cardinalis*	Cardinal Flower	7	-5		S5			G5						U		U		
Caprifoliaceae		**Honeysuckle Family**																	
Lonicera	*tatarica*	Tartarian Honeysuckle		3	-3	SE5			G?		I	R	R	R	R		R		
Sambucus	*racemosa var. racemosa*	Red-berried Elderberry	5	2		S5			G5T4T5	L3	X			R	R				
Convolvulaceae																			
Convolvulus	*arvensis*	Field Bindweed		5		SNA			GNR			R		R					
Cornaceae		**Dogwood Family**																	
Cornus	*alternifolia*	Alternate-leaved Dogwood	6	5		S5			G5		X			U	R				
Cornus	*amomum ssp. obliqua*	Silky Dogwood	5	-4		S5			G5T?		X			U	F		F		
Cornus	*racemosa*	Grey dogwood	2	-2		S5			G5?		X			U					
Cornus	*sericea*	Red-osier Dogwood	2	-3		S5			G5		X			U	F		F		
Crassulaceae																			
Penthorium	*sedoides*	Ditch-stonecrop	4	-5		S5			G5						R				
Cucurbitaceae																			
Echinocystis	*lobata*	Wild Mock-cucumber	3	-2		S5			G5					R	F		U		
Dipsacaceae		**Teasel Family**																	
Dipsacus	*fullonum ssp. sylvestris*	Wild Teasel		5	-1	SE5			G?T?		I			R	R				
Fabaceae		**Pea Family**																	
Medicago	*lupulina*	Black Medick		1		SNA			GNR			R	R	R	R				
Medicago	*sativa ssp. Sativa*	Alfalfa				SNA			GNRTNR					R	R				
Melilotus	*alba*	White Sweet Clover				SNA			G5						R				
Melilotus	*officinalis*	Yellow Sweet Clover				SNA			GNR					R	R				
Trifolium	*pratense*	Red Clover		2	-2	SE5			G?		I			R	R				

BOTANICAL NAME		COMMON NAME	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status	OMNR Status	COSEWIC Status	Global Status	Local Status Lambton County	Local Status Huron County	Natural Area 609							
			Oldham et al	Oldham et al	Oldham et al	Newmaster			Newmaster	Tiedje 2004	Oldham 1993	CUP3		SWD2-2		SWT2-2		OAO	
												19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13
Trifolium	*repens*	White Clover		2		SNA			GNR					R	R				
Vicia	*cracca*					SNA			GNR					R	U				
Fagaceae		**Beech Family**																	
Quercus	*macrocarpa*	Bur Oak	5	1		S5			G5		X	R	R						
Grossulariaceae		**Currant Family**																	
Ribes	*americanum*	Wild Black Currant	4	-3		S5			G5		X						U		
Juglandaceae		**Walnut Family**																	
Juglans	*nigra*	Black Walnut	5	3		S4			G5		X	R	R	R	R		R		
Lamiaceae		**Mint Family**																	
Glechoma	*hederacea*	Ground Ivy		3		SNA			GNR			U	U						
Leonurus	*cardiaca*	Common Mother-wort		5		SNA			GNR						F		F		
Lycopus	*americanus*	Cut-leaved Bungleweed	4	-5		S5			G5		X				U		U		
Mentha	*arvensis*	Wild Mint	3	-3		S5			G5								U		
Scutellaria	*galericulata*	Hooded Skullcap	6	-5		S5			G5						R				
Lythraceae																			
Lythrum	*salicaria*	Purple Loosestrife		-5	-3	SE5			G5	IC	I				R				
Nymphaeaceae																			
Nuphar	*variegata*	Yellow Pond-lily				S5			G5T5									X	U
Oleaceae		**Olive Family**																	
Fraxinus	*pennsylvanica*	Green Ash	3	-3		S5			G5	C		D		D	D				
Onagraceae		**Evening-primrose Family**																	
Circaea	*lutetiana*	Enchanter's Nightshade	3	3		S5			G5T5		X				U		U		
Oenothera	*biennis*	Common Evening-primrose	0	3		S5			G5					R	R				
Oxalidaceae		**Wood Sorrel Family**																	
Oxalis	*stricta*	Yellow Wood-sorrel	0	3		S5			G5		X			R	R				
Polygonaceae		**Smartweed Family**																	
Polygonum	*persicaria*	Lady's-thumb													R				
Rumex	*Crispus*	Curly-leaf Dock		-1	-2	SE5			G?	IC	I			R	U				
Primulaceae		**Primrose Family**																	
Lysimachia	*ciliata*	Fringed Loosestrife	6	-3		S5			G5					F	F				
Lysimachia	*nummularia*	Moneywort		-4	-3	SE5			G?		I			U	F		U		
Ranunculaceae		**Buttercup Family**																	
Anemone	*canadensis*	Canada Anemone	3	-3		S5			G5			U	U	U	U		U		
Ranunculus	*acris*	Tall Buttercup		-2		SNA			G5					U	U				
Ranunculus	*septentrionalis*	Swamp Buttercup												U	F	R	R		
Thalictrum	*pubescens*	Tale Meadow-rue	5	-2		S5			G5					U	U	R	R		

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												19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13
Rosaceae		**Rose Family**																	
Crataegus	*punctata*	Large-fruited Thorn	4	5		S5			G5						R				
Geum	*aleppicum*	Yellow Avens	2	-1		S5			G5	L2	X	U	U	U	U				
Geum	*canadense*	White Avens	3	0		S5			G5		X			R	R				
Malus	*pumila*	Common Apple		5	-1	SE5			G5		I	R	R	R	R		R		
Potentilla	*recta*	Rough-fruited Cinquefoil		5	-2	SE5			G?	I	I			R	R				
Prunus	*species*	Cherry Species												R	R				
Rosa	*multiflora*	Multiflora Rose		3		SNA			GNR					R	R				
Rosa	*palustris*	Swamp Rose	7	-5		S5			G5					R	R				
Rubus	*idaeus*	Wild Red Raspberry				SE1			G5T5			U	U				U		
Rubiaceae		**Madder Family**																	
Cephalanthus	*occidentalis*	Common Buttonbush	7	-5		S5			G5						U		R		
Galium	*species*	Galium species												R	R				
Salicaceae		**Willow Family**																	
Populus	*deltoides ssp. deltoides*	Eastern Cottonwood	4	-1		SU			G5T?		X			R	R				
Salix	*eriocephala*	Missouri Willow	4	-3		S5			G5							F	F		
Salix	*exigua*	Sandbar Willow	3	-5		S5			G5							F	F		
Salix X	*rubens*	Hybrid Crack Willow		-4	-3	SE4			HYB			R	R	U	U				
Scrophulariaceae		**Figwort Family**																	
Verbascum	*thapsus*	Common Mullein		5	-2	SE5			G?		I			R	R				
Solanaceae		**Nightshade Family**																	
Solanum	*dulcamara*	Bitter Nightshade		0	-2	SE5			G?		I			R	R	R	R		
Tiliaceae		**Linden Family**																	
Tilia	*americana*	American Basswood	4	3		S5			G5		X			R	R				
Ulmaceae		**Elm Family**																	
Ulmus	*americana*	White Elm	3	-2		S5			G5?		X			R	R				
Ulmus	*rubra*	Slippery Elm	6	0		S5			G5					R	R				
Urticaceae																			
Boehmeria	*cylindrica*	False Nettle	4	-5		S5			G5					R					
Laportea	*canadensis*	Wood Nettle												F	U	F	U		
Pilea	*pumila*	Canada Clearweed	5	-3		S5			G5					R	U	U	U		
Urtica	*dioica*	Stinging Nettle		-1		SNA			G5T5					F	F	F	F		
Violaceae		**Violet Family**																	
Viola	*species*	Violet Species												R	R				
Vitaceae		**Grape Family**																	
Parthenocissus	*vitacea*	Thicket-creeper	6	1		S4?			G5					U	U	R	R		

BOTANICAL NAME		COMMON NAME	Coefficient of Conservatism	Wetness Index	Weediness Index	Provincial Status	OMNR Status	COSEWIC Status	Global Status	Local Status Lambton County	Local Status Huron County	Natural Area 609							
			Oldham et al	Oldham et al	Oldham et al	Newmaster			Newmaster	Tiedje 2004	Oldham 1993	CUP3		SWD2-2		SWT2-2		OAO	
												19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13	19-Jun-13	14-Aug-13
Vitis	*riparia*	Riverbank Grape	0	-2		S5			G5		X			U	U				
MONOCOTYLEDONS		**MONOCOTS**																	
Alismataceae																			
Alisma	*plantago-aquatica*	Water-plantain												R	R				
Sagittaria	*latifolia*	Broadleaf Arrowhead	4	-5		S5			G5						R				
Cyperaceae		**Sedge Family**																	
Carex	*bebii*	Bebb's Sedge	3	-5		S5			G5					U	U				
Carex	*grayi*	Asa Gray Sedge	8	-4		S4			G4						U				
Carex	*lupulina*	Hop Sedge	6	-5		S5			G5		X			U	U				
Carex	*rostrata*	Beaked Sedge				S4?			G5					U	U				
Iridaceae																			
Iris	*versicolor*	Blue-flag Iris	5	-5		S5			G5					R	R		R		
Juncaceae		**Rush Family**																	
Juncus	*effusus*	Soft Rush				S5			G5						R				
Poaceae		**Grass Family**																	
Bromus	*inermis ssp. inermis*	Awnless Brome		5	-3	SE5			G4G5T?		I	R	R	R	R				
Dactylis	*glomerata*	Orchard Grass		3	-1	SE5			G?		I	R	R	R	R				
Elymus	*repens*	Quack Grass		3		SNA			GNR			R	R	R	R				
Elymus	*virginicus*	Virginia Wild Rye				S5			G5T5								U		
Glyceria	*striata*	Fowl Mana Grass	3	-5		S5			G5		X			U	U	R	R		
Leersia	*oryzoides*	Rice Cut Grass	3	-5		S5			G5						U				
Phalaris	*arundinacea*	Reed Canary Grass	0	-4		S5			G5		X	R	R			D	D		
Phragmites	*australis*	Common Reed	0	-4		S5			G5					R	R	R	R		
Poa	*paulustris*	Fowl Meadow Grass	5	-4		S5			G5					U	U				
Typhaceae		**Cattail Family**																	
Typha	*species*	Cattail species												U	U	R	R		

FLORISTIC SUMMARY & ASSESSMENT

Species Diversity

Total Species:	**86**	
Native Species:	**66**	77%
Exotic Species	**20**	23%
S1-S3 Species	0	
S4 Species	2	
S5 Species	68	

EXPLANATION OF TERMINOLOGY

Botanical and Common Name: From Integrated Taxonomic Information System (IT IS). 2012.
Co-efficient of Conservatism: This value, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to a specific habitat integrity.
Wetness Index: This value, ranging from -5 (obligate wetland) to 5 (upland) provides the probability of a species occurring in wetland or upland habitats.
Weediness Index: This value, ranging from -1 (low) to -3 (high) quantifies the potential invasiveness of non-native plants. In combination with the percentage of non-native plants, it can be used as an indicator of disturbance.
Provincial Status: Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These ranks are not legal designations. S4 and S5 species are generally uncommon to common in the province. Species ranked S1-S3 are considered to be rare in Ontario.
Local Status:
VU: native and very uncommon
X: native and not rare or very uncommon
C: native and common
R: native and rare
I: introduced and persisting outside of cultivation.
Ir: introduced and rare
Ih: introduced and known only from historic records
Ivu: introduced and very uncommon
Iu: introduced and uncommon
Ic: introduced and common
Annotations: Provides comments on general distribution and abundance on the subject lands.
Definitions of terminology and abbreviations used as follows.
Abundance
Dominant: represented by large numbers; generally forming >10% ground cover or >25% vegetation in any one stratum
Fairly common: generally widespread; represented by fairly large numbers of individual clumps; usually forming >10% ground cover
Uncommon: present as widespread scattered individuals or represented by one or more clumps of many individuals
Rare: represented in the polygon by less than about five individuals or small clumps

DETAILED EXPLANATION OF TERMS

Floral Quality Index and Coefficient of Conservatism Values

Vegetation species and community sensitivity was assessed through the application of coefficient of conservatism values (CC), assigned to each native species in southern Ontario (Oldham, et. al, 1995). The value of CC, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to specific habitat integrity. The occurrence of species with a CC of 9 or 10 can be good indicators of undisturbed conditions such as mature forests, fens or bogs.

General habitat values associated with the CC values are:

0-3: species found in a wide variety of communities, including disturbed sites

4-6: species associated with a specific community, but tolerate moderate disturbance

7-8: species associated with a community in an advanced successional stage, tolerant of minor disturbances

9-10: species with a high degree of fidelity to a narrow range of synecological parameters

The floristic quality of an area is reflected in the mean value of CC. For example, an old field or grazed woodlot would tend have a low mean CC; these habitats are dominated by opportunistic species that occur in a wide range of site conditions and are tolerant of disturbance. A bog, prairie or intact forest would have a higher value, reflecting the specific habitat requirements of many of the species and a generally undisturbed condition. The following provides an example of interpretation of CC values:

mean CC value / % spp CC >8 / Condition of the Landscape

5 / 27 / intact

3.5 / 19 / slightly degraded

1.3 / 2 / severely degraded

The FQI accounts for the species diversity of the area by equating the number of native species with the mean CC value. The FQI is generally used for comparing natural areas. The CC value and FQI of the study area were calculated for the entire study area.

Weediness Index

The sensitivity of natural areas can be assessed through application of the Weediness Index. The Weediness Index quantifies the potential invasiveness of non-native plants, and, in combination with the percentage of non-native plants can be used as an indicator of disturbance. Values (ranging from 1- to -3) have been assigned to most non-native species based on the potential impact each species can have in natural areas:

-1: little or no impact on natural areas (most non-native plants are in this category)

-2: occasional impacts on natural areas, generally infrequent or localized

-3: major potential impacts on natural areas

Wetness Index

All plants in southern Ontario have been assigned a wetland category, based on the designations developed for use by the United States Fish & Wildlife Service. Plants are designated into the following categories:

OBL (Obligate Wetland): occurs almost always in wetlands under natural conditions (estimated >99%

probability)
FACW (Facultative Wetland): usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67-99% probability)
FAC (Facultative): equally likely to occur in wetlands or non-wetlands (estimated 34-66% probability)
FACU (Facultative Upland): occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1-33% probability)
UPL (Upland): occurs almost never in wetlands under natural conditions (estimated <1% probability)

Further refinement of the Facultative categories are denoted by a "+" or "-" to express exaggerated tendencies for those species. The "+" denotes a greater estimated probability occurring in wetlands than species in the general indicator category, but a lesser probability than species occurring in the next higher category. The "-" denotes a lesser estimated probability of occurring in wetlands than species in the general indicator category, but a greater probability than species occurring in the next lower general category.

Each wetland category has been assigned a numerical value to facilitate the quantification of the wetness index. The wetland categories and their corresponding values are as follows:

OBL : -5
FACW+: -4
FACW: -3
FACW-: -2
FAC+: -1
FAC: 0
FAC-: 1
FACU+: 2
FACU: 3
FACU-: 4
UPL: 5

Provincial Status
Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These rankings are based on the total number of extant Ontario populations and the degree to which they are potentially or actively threatened with destruction. The ranks are:
S1: Critically Imperiled—Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province
S2: Imperiled—Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province
S3: Vulnerable—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation
S4: Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5:Secure—Common, widespread, and abundant in the nation or state/province
SH: Possibly Extirpated (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences
SNR Unranked—Nation or state/province conservation status not yet assessed
SX: Presumed Extirpated—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered
SNA Not Applicable —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
SU: Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends
Rank ranges, e.g. S2S3, indicate that the rank is either S2 or S3, but that current information is insufficient to differentiate.
S#S# Range Rank —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

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