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June 4, 2013

Hali Zigomanis,
Environmental Manager, East
Versen Inc. .
Suite 502, 216 Chrislea Road,
Woodbridge, Ontario, L4L 8S5

RE: NHA Confirmation for GrandValley Wind Farms, Phase 3 Wind Project

Dear Hali Zigomanis:

In accordance with the Ministry of the Environment's (MOE's) Renewable Energy Approvals (REA) Regulation (O.Reg.359/09), the Ministry of Natural Resources (MNR) has reviewed the natural heritage assessment and environmental impact study for the Grandvalley Wind Farms, Phase 3 Wind Project in the Town of Grand Valley and Township of Amaranth, Dufferin County submitted on May 31, 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 set out in the Natural Heritage Assessment Guide.
2. The MNR confirms that the site investigation and records review were conducted using applicable evaluation criteria or procedures set out in the Natural Heritage Assessment Guide.
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 set out in the Natural Heritage Assessment Guide.
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 the Natural Heritage Assessment Guide.

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

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;

- i. Amphibian breeding habitat (wetland): ABWE-2
- ii. Amphibian breeding habitat (woodland): ABWO-1 to ABWO-9, and ABWO-13 to ABWO-15
- iii. Bat Maternity Colonies: BMC-1 and BMC-2
- iv. Marsh breeding bird habitat: MBB-1
- v. Waterfowl nesting area: WNA-3 and WNA-4

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

Post-Construction Monitoring

In addition to the NHA, Environmental Effects Monitoring Plans (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.

A commitment has been made in the Environmental Impact Study and will be included in the Environmental Effects Monitoring Plan, part of the Design and Operations Report, to conduct post-construction monitoring, this includes the following features should they be deemed to be significant though pre construction surveys;

- vi. Amphibian breeding habitat (wetland): ABWE-2
- vii. Amphibian breeding habitat (woodland): ABWO-1 to ABWO-9, and ABWO-13 to ABWO-15
- viii. Bat Maternity Colonies: BMC-1 and BMC-2
- ix. Marsh breeding bird habitat: MBB-1
- x. Waterfowl nesting area: WNA-3 and WNA-4

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 Eric Prevost at 705-755-3134 or eric.prevost@ontario.ca.

Sincerely,

A handwritten signature in black ink, appearing to be 'AF', followed by a horizontal line extending to the right.

Andrea Fleischhauer on behalf of:
Kathy Woeller
Regional Land Use Planning Supervisor
Regional Resources Section, Southern Region
Ministry of Natural Resources

CC Andrea Fleischhauer, Renewable Energy Coordinator, Southern Region, MNR
Eric Prevost, Planning Ecologist, Peterborough District, MNR
Narren Santos, Environmental Assessment and Approvals Branch, MOE
Sandra Guido, Environmental Assessment and Approvals Branch, MOE
Sean Spisani, Senior Ecologist, Stantec Consulting Ltd



Stantec

**GRANDVALLEY WIND FARMS –
PHASE 3 WIND PROJECT
NATURAL HERITAGE
ASSESSMENT AND
ENVIRONMENTAL IMPACT STUDY**

File Number: 160960698
May 2013

Prepared for:

Grand Valley Wind Farms Inc.
Suite 502, 216 Chrislea Road
Woodbridge, ON, L4L 8S5

Prepared by:

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1.0 Introduction

1.1 BACKGROUND

Grand Valley Wind Farms Inc. (GVWF) is proposing to develop, construct, operate and decommission the 40 megawatt (MW) Grand Valley Wind Farms - Phase 3 Wind Project (the Project) in the Town of Grand Valley and Township of Amaranth, Dufferin County in response to the Government of Ontario's initiative to promote the development of renewable electricity in the province.

The Project Study Area is generally bordered on the north by Highway 89, on the south by County Road 109, on the east by 9th Line and on the west by East West Luther Townline. The proposed Project Location includes all parts of the land in, on or over which the Project is proposed (the 'construction area' for the Project). The proposed Project Location and Project Study Area are shown in **Appendix A**.

The basic components of the Project include:

- Between 14 and 17 wind turbine generators (Siemens SWT-2.3-113 and/or SWT 3.0-113 turbine) with a total maximum installed nameplate capacity of 40MW. The turbine models are identical in structure, and would be 'de-rated', generating less electricity per turbine to meet the contract nameplate capacity. Noise Assessment Reports have been completed for both turbine models as part of the Renewable Energy Approval (REA) process;
- A 34.5 kV underground power line collector system that would transport the electricity generated from the Project to the Hydro One Networks Inc. (HONI) transmission system;
- Fibre optic cabling laid with the underground collector lines;
- Turbine access roads;
- Crane pads;
- One connection point to the existing HONI electrical transmission system;
- Existing operations and maintenance facilities to be leased by the Project (joining the current facilities for the operation of the Grand Valley Phase 1 and 2 Wind Projects). The currently municipally-serviced office facility is located at 35A Main Street South, Grand Valley and the currently unserviced warehouse facility is located at 27 Mill Street West, Grand Valley;
- Existing parking (owned) and gravel quarry (leased) sites to be used for employee parking and temporary construction trailer sites (174321 and 173395 County Road 25, Grand Valley);
- A 34.5 kV/230 kV 45 MVA transformer station; and,

- Meteorological equipment, including an approximately 100 m MET tower or a ground mounted SoDAR unit.

Temporary components include:

- Work and storage areas during construction at the turbine locations and along the underground power line collector system; and,
- Office, parking and storage areas during construction for the work crews during the construction phase of the Project.

GVWF retained Stantec Consulting Ltd. (Stantec) to prepare the REA application with input from Zephyr North Ltd., and Archaeological Services Inc. The REA application is a requirement under Ontario Regulation 359/09 - Renewable Energy Approvals under Part V.0.1 of the *Environmental Protection Act* (O. Reg. 359/09), as amended. According to subsection 6 (3) of O. Reg. 359/09, the Project is classified as a Class 4 Wind Facility and would follow the requirements identified in O. Reg. 359/09 for such a facility.

1.2 STUDY AREA, PROJECT LOCATION AND ZONE OF INVESTIGATION

The Project is proposed within the Townships of Amaranth and Grand Valley, as illustrated on **Figure 1, Appendix A**. The Project will be located on privately owned land and within municipal right-of-way (ROWs).

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

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

For the purposes of this Project, the “Project Location” includes the footprint of the facility components, plus any temporary work and storage locations. The boundary of the Project Location is used for defining setback and site investigation distances according to O. Reg. 359/09. The buildable area (construction area) includes the footprint of the facility components, plus any temporary work and storage locations on private lands possibly required during the construction of the Project. All construction and installation activities would be conducted within this designated area, including construction vehicles and personnel. All installation activities related to collector lines would be contained within the boundaries of the municipal road allowance (opened and unopened), with the exception of where collectors are located on participating private properties.

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

As required by the regulation, a “Zone of Investigation” (ZOI) has been identified around the outer limits of the Project Location. The ZOI was measured 120m from the outer limit of turbines, including blade tips, and 50 m from collector lines and transformer stations. The Project Location and ZOI are shown on **Figure 1, Appendix A**.

1.3 REPORT REQUIREMENTS

This Natural Heritage Assessment and Environmental Impact Study (NHA/EIS) is intended to satisfy the requirements outlined within O. Reg. 359/09 (s. 24 through 28, 37 and 38) and is to be submitted as a component of the REA application. The Project Study Area is not located within the Niagara Escarpment Plan, the Oak Ridges Moraine Conservation Plan Area or the Protected Countryside of the Greenbelt Plan.

A Natural Heritage Assessment is required to determine whether any of the following features exist in and/or within the ZOI (120m for turbines, and 50 m for collector lines and transformer stations; O. Reg 359/09) of the Project Location:

- Wetlands;
- Coastal wetlands;
- Life Science Areas of Natural and Scientific Interest (ANSIs);
- Earth Science ANSIs (within 50 m);
- Woodlands;
- Wildlife habitat; and
- Provincial parks and conservation reserves.

This report identifies the existence and boundaries of all natural features within the ZOI of the Project Location based on a review of background records and on-site field investigations. As natural features are within the ZOI of project components, this report provides an evaluation of significance for each identified feature based on either an existing Ministry of Natural Resources (MNR) designation of the feature or by using evaluation criteria or procedures established or accepted by the MNR.

An EIS is required to identify and assess any negative environmental effects and identify mitigation measures for natural features within the ZOI as per (O.Reg. 359/09, s.38). Earth Science ANSIs are considered if they occur within 50 m of the Project Location.

The results of the NHA must be consolidated into a report and submitted to MNR for confirmation in advance of submission of the REA application to the Ministry of the Environment (MOE). Written confirmation from the MNR, as well as any written comments received from the MNR, must be submitted along with the NHA and EIS to the MOE as part of the REA application.

1.4 GUIDANCE DOCUMENTS

During the preparation of this report, several guidance documents were referenced to ensure compliance with current standards and agency requirements. These documents include:

- Natural Heritage Assessment Guide for Renewable Energy Projects – Second Edition (MNR, 2012a)
- Bats and Bat Habitats Guidelines for Wind Power Projects (MNR, 2011a)
- Birds and Bird Habitats Guidelines for Wind Power Projects (MNR, 2011b)
- Significant Wildlife Habitat Technical Guide (SWHTG) (MNR, 2000); including, the draft Ecoregion 6E Criterion Schedule for (MNR, 2012b)
- Natural Heritage Reference Manual (MNR, 2009)
- Ontario Wetland Evaluation System, Southern Manual (MNR, 2002)

2.0 Records Review

2.1 METHODS

This Records Review report was prepared in accordance with O. Reg. 359/09, s. 25 (3). The Project is not located in Northern Ontario; therefore there are no planning boards, local roads boards, or Local Services boards applicable to the Records Review.

Background data was collected and reviewed to identify natural features located in the Project Location or within the ZOI. Documents reviewed and agencies contacted as part of the Records Review included but were not limited to:

Crown in Right of Canada

- Environment Canada. 2011. SARA Registry online database. Accessed November, 2012. Available: http://www.registrelep-sararegistry.gc.ca/default_e.cfm

Provincial

- Ministry of Natural Resources. Project Manager, Southern Region Renewable Energy Operations Team.
- Ministry of Natural Resources. Renewable Energy Project Manager, Southern Region MNR.
- Ministry of Natural Resources. Species at Risk Biologist, Midhurst District.
- Natural Heritage Information Centre (NHIC) database. 2011. Natural Areas and Species records search. Biodiversity explorer, <http://nhic.mnr.gov.on.ca>. MNR, Peterborough.
- Ontario Ministry of Natural Resources (MNR). 2011. Land Information Ontario (LIO) digital mapping of natural heritage features;
- Renewable Energy Atlas (MNR, 2010) Bat hibernacula mapping; and,
- Ontario Parks Planning and Management Information (<http://www.ontarioparks.com/english/plan-res.html>).

Conservation Authority

- Grand River Conservation Authority. Nathan Garland, Regulations Officer.

Local and Upper-Tier Municipalities / Municipal Planning Authority

- Town of Grand Valley. Official Plan and associated schedules (Draft Office Consolidation, 2012)
- Township of East Luther Grand Valley. Official Plan and associated schedules (2008).
- Township of Amaranth. Official Plan and associated schedules (2004).

Other data sources

- Important Bird Areas database (Bird Studies Canada and BirdLife International, undated);
- Ontbirds Archives;
- Various wildlife atlases (Atlas of the Mammals of Ontario, Dobbyn, 1994; the Ontario Herpetofaunal Summary, Oldham and Weller, 2000; and the Ontario Breeding Bird Atlas, Cadman et al., 2007; and,
- Christmas Bird Count database (National Audubon Society, 2010).
- Luther Marsh Management Plan

A summary of agencies contacted, information requested and responses received is provided in **Table B1, Appendix B**.

The information received from each source and the manner in which it was used to identify natural features, provincial parks or conservation reserves that exist within the ZOI for the Project Location is detailed below (**Section 2.2**).

2.2 RESULTS

A review of available background information has indicated the presence of known natural features occurring within the Project Study Area. The results of the Records Review search were used to determine whether natural features are within the Project Location or ZOI. The locations of these features, including the boundaries of all natural features relative to the Project Location, are provided in **Figure 1, Appendix A**, and described in the following sections.

2.2.1 Wetlands

Key information sources reviewed to identify wetlands for the Project Study Area include the Grand River Conservation Authority, Land Information Ontario and the Natural Heritage Information Center, the Township of East Luther – Grand Valley Official Plan (2008) and the Township of Amaranth Official Plan (2004). This review identified 219 wetlands within the Project Study Area as shown on **Figure 1, Appendix A**. A summary of these findings is provided by wetland significance in the sections below.

None of the identified wetlands are located in the Project Location. A total of eight wetlands are within the ZOI, including the Luther Marsh PSW, and seven unevaluated wetlands.

2.2.1.1 Provincially Significant

Three wetlands within the Study Area have been evaluated by the MNR in accordance with the OWES (Ontario Wetland Evaluation System) and are considered Provincially Significant Wetlands (PSWs):

- Luther Marsh – a provincially significant wetland complex, comprised of six individual wetlands. Four wetland types are located within this complex: 13% bog, 1% fen, 55% swamp and 31% marsh. This wetland is located in the western portion of the Project Study Area, and is not located within the ZOI of the Project Location.
- Keldon Swamp Wetland Complex – comprised of four individual wetlands. Two types are located within this complex: 87.4% swamp and 12.6% marsh. This wetland is located in the northwest section of the Project Study Area, and is not located within the ZOI of the Project Location.
- Bowling Green Swamp – composed of three wetland types: 20% bog, 1.6% fen and 78.4% swamp. This wetland is located in the eastern portion of the Project Study Area, and is not within the ZOI of the Project Location.

No PSWs are located inside the ZOI or Project Location.

2.2.1.2 Other/Locally Significant Wetlands

Three locally significant (Non-Provincially significant) wetlands were identified within the Project Study Area during the Records Review; none of the three locally significant wetlands are located within the Project Location or ZOI:

- Campania Fen – composed of two wetland types: 15% fen and 85% swamp. This wetland is located in the eastern portion of the Project Study Area.
- Maple Grove Bog – a wetland complex comprised of three individual wetlands. Three wetland types are located within this complex: 10% bog, 5% fen and 85% swamp. This wetland is located in the eastern portion of the Project Study Area.
- Melancthon #2 Wetland – composed of two wetland types: 86% carr, 9% swamp and 5% marsh. This wetland is located in the northern portion of the Project Study Area.

2.2.1.3 Unevaluated Wetlands

213 unevaluated wetlands were identified within the Project Study Area during the Records Review. None of these wetlands are located inside the Project Location. Seven of the unevaluated wetlands are within the ZOI.

2.2.2 Woodlands

Woodlands are defined as treed areas, woodlots or forested areas other than cultivated fruit, nut orchards or Christmas tree plantations that are located east and south of the Canadian Shield (MNR, 2012a).

The Project Study Area is located within the Upper St. Lawrence section of the Great Lakes – St. Lawrence Forest Region (Rowe, 1972), within the subregion known as Ecoregion 6E-5 (Mount Forest). This section is dominated by sugar maple and beech with various associates such as red maple, yellow birch, basswood, white ash, largetooth aspen, and red and bur oaks. Localized occurrences of additional associates include white oak, red ash, grey birch, rock elm, blue-beech and bitternut hickory. River valleys typically include butternut, eastern cottonwood and slippery elm, with lowlands of pure black maple and silver maple. Black ash dominated hardwood swamps are typical of poorly-drained depressions.

Settled landscapes are typically dominated by white elm. Coniferous associates include eastern hemlock, white pine, white spruce and balsam fir. Stands of white or red pine may occur in upland areas with wetter habitats dominated by black spruce or white cedar (Rowe 1972).

A review of aerial photos and the Township of East Luther – Grand Valley Official Plan (2008) and the Township of Amaranth Official Plan (2004) indicate the Project Study Area is predominantly agricultural, with portions of wooded areas. The Great Lakes Conservation Blueprint for Terrestrial Biodiversity (Henson and Brodribb, 2005) approximates forest cover in Ecoregion 6E-5 at 27%. A Watershed Forest Plan for the Grand River (GRCA, 2004) has Grand Valley Township at 13 to 16% forest cover and Amaranth Township at 16 to 19% forest cover.

The Natural Heritage Reference Manual (MNR, 2009) and the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2012a) defines significant woodlands based on a combination of size, shape, proximity to other features (e.g., water), linkages, diversity of vegetation types, and any unique attributes, as well as their economic and social values.

The Town of Grand Valley defines Significant Woodlands in their Official Plan as woodlands 40 ha in size, or with 8ha of interior habitat, and/or woodlands within a Natural Heritage System. The Township of East Luther Grand Valley and the Township of Amaranth Official Plans define Significant Forest Areas as features including but not limited to County Forests, lands on which former Woodlands Management agreements existed, all woodlands 40 hectares in size of larger, and all forest stands that are in excess of 60 years of age and 4.0 hectares in size. Comprehensive mapping of these features is not available in the Township OP schedules.

Forty-one discrete Wooded Areas are located in the ZOI, all occurring outside the Project Location. These known Wooded Areas are shown on **Figure 1, Appendix A**. The occurrence, classification (as per Ecological Land Classification) and boundaries of these features as well as any additional woodlands will be verified during the Site Investigation and evaluated for significance as per the NHA Guide (MNR, 2012a).

2.2.3 Wildlife Habitat

Wildlife habitat is defined as an area where plants, animals and other organisms live, including areas where species concentrate at a vulnerable point in their life cycle and that are important to migratory and non-migratory species (O.Reg 359/09). The Draft Significant Wildlife Habitat Ecoregion6E Criterion Schedule (MNR, 2012b) groups wildlife habitat into four categories:

- Seasonal concentration areas of animals;
- Rare vegetation communities or specialized habitat for wildlife;
- Habitat for species of conservation concern; and
- Animal movement corridors.

Unlike other natural features such as woodlands, ANSIs or wetlands, known occurrence and location information for many components of significant wildlife habitat are often not available on a site specific basis. As a result background information that is available from the greater Study Area has been compiled and is used to identify known significant wildlife habitat, and inform the potential for candidate significant wildlife habitat habitats. Using this information, a preliminary assessment was conducted to identify wildlife habitat features that may be present in the Project Location or ZOI to determine whether the area contains confirmed significant wildlife habitat (SWH). Site specific information is required to determine whether or not the habitat to support a particular component is present in the Project Location or ZOI.

Wildlife records from within the range of the Grand Valley Phase 3 Project Study Area were compiled from available literature and resources including the Atlas of the Mammals of Ontario (Dobbyn, 1994), the Ontario Herpetofaunal Summary (Oldham and Weller, 2000), the Ontario Breeding Bird Atlas (Cadman et al., 2007), the Luther Marsh Wildlife Management Area Management Plan (GRCA and MNR, 2012) and the NHIC database (2011). Based on a review of background information, 247 species of birds, 37 species of mammals, 12 species of amphibians and 13 species of reptiles are known to occur within the range of the Project Study Area (**Appendix C**). Exact locations of species occurrences are not available from these atlases and, instead, are recorded within 10 x 10 km squares. The potential for species to be present within the Project Location will be limited by the habitat suitability and availability supported by the Project Study Area. Therefore the identified species recorded from these databases may not occur within the Project Location or ZOI.

2.2.3.1 Luther Marsh Important Bird Area

The Luther Marsh Important Bird Area (IBA) is located in the western portion of the Project Study Area (**Figure 1, Appendix A**). Although this feature is not identified as a “natural feature” within O. Reg 359/09 a consideration of the functions supported by the site may assist in the identification and evaluation of significant wildlife habitat that may be found in the ZOI.

The Luther Marsh IBA is approximately 10,500 ha. Four turbines (T114, T115, T117 and T118) are located inside of the delineated boundary of Luther Marsh IBA boundary; however all are located on privately own lands that are currently actively managed as agricultural fields.

Luther Marsh IBA was formed by damming one of the Grand River's upper tributaries. Within this site, there are a variety of habitat types, including the lake, and various islands and bogs-like features, a forest with uncommon northern characteristics, and Wylde Lake, a raised bog of boreal character southeast of the main lake. Luther Marsh provides significant habitat for a variety of wetland bird species, such as Black Tern, Red-neck Grebe, Wilson's Phalarope, Osprey, Great Egret, and Great Blue Heron. This site is also significant for waterfowl. At least 15 species of ducks nest near Luther Marsh. In addition, several landbird species of have been recorded to nest at this site, including Short-eared Owl (IBA Canada, 2012).

Luther Marsh is a staging area for large numbers of migrating waterfowl and provides breeding habitat for both waterfowl and several species of marsh birds. More than 10,000 waterfowl utilize the IBA as a staging area during fall migration (IBA Canada, 1999). The majority of migrants are dabbling ducks. The most common fall migrants include Mallard, American Black Duck, American Wigeon, and Green-winged Teal and Blue-winged Teal. Notable spring migrants include Bufflehead and Ruddy Duck.

2.2.3.2 Luther Marsh Wildlife Management Area

The Luther Marsh Wildlife Management Area (LMWMA) as shown on **Figure 1, Appendix A** is jointly owned and managed by the MNR and GRCA (approximately 5,680 ha in total). The management area occurs within the Study Area, outside the Project Location and ZOI. The LMWMA Management Plan (the "Luther Marsh Management Plan") describes the LMWMA as "arguably the most significant natural area in the Grand River watershed, and certainly the largest natural area in public ownership." (GRCA and MNR, 2012) The feature is also designated an ANSI, IBA and PSW.

GRCA and MNR (2012) have identified the following goals for the LMWMA:

- to protect the PSW and other significant features and species;
- to optimize habitat value and benefits to wildlife;
- to accommodate compatible human uses that do not impair significant features; and
- to provide low flow augmentation to the Grand River.

The LMWMA includes forest eskers, upland forest, and all types of wetlands, including marshes, swamps, bogs and fens. The diverse landscape provides habitat for a great variety of wildlife, including nine species of mammals (including significant bat populations), ten amphibians, eleven reptiles, and 18 fish. As discussed above, Luther Marsh is also recognized for contributions to bird populations, including breeding and migratory waterfowl, shorebirds and other bird groups. The Luther Marsh Management Plan reports observations of 251 bird

species, including approximately 43 provincially significant species, many of which are confirmed breeders. (GRCA and MNR, 2012)

Sandilands(1984) reports a total of 604 flora species, including 184 introduced species. The low diversity (i.e., for the size of the management area) is attributed to “relatively harsh climatic conditions...which has prevent the establishment of any Carolinian species as well as the disturbed or cultural nature of many vegetation communities.” (GRCA and MNR, 2012) Despite the low floristic diversity, there is a high proportion of regionally significant plant species, a noteworthy population of the provincially rare Marsh Valerian (*Valerinana sitchensis var. uliginosa*), some of the most significant bog and fen associations in southern Ontario, and excellent representative examples of swamp and marsh communities.

2.2.3.3 Seasonal Concentration Areas

Seasonal concentration areas are those sites where large numbers of a species gather together at one time of the year, or where several species congregate. As defined in the Ecoregion Criteria (MNR, 2012b), the seasonal concentrations areas are:

- waterfowl stopover and staging areas (terrestrial);
- waterfowl stopover and staging areas (aquatic);
- shorebird migratory stopover areas;
- raptor wintering areas;
- bat hibernacula;
- bat maternity colonies;
- bat migratory stopover areas;
- turtle wintering areas;
- snake hibernacula;
- colonially-nesting bird breeding habitat (bank and cliff, tree/shrubs, and ground);
- migratory butterfly stopover areas;
- landbird migratory stopover areas;
- deer yarding areas; and
- deer winter congregation areas.

A review of background information was used to assess the potential for seasonal concentration areas in the Project Study Area. The review considered species occurrence within southern Ontario and availability of suitable habitat in the Project Study Area. The results of the review are provided below.

Waterfowl Stopover and Staging Areas

Areas generally considered candidate significant wildlife habitat for waterfowl staging areas are very large wetlands, associated with lakes that generally have a diversity of vegetation communities interspersed with open water (MNR, 2000). Marshes along Great Lakes shorelines are considered particularly valuable (MNR, 2000). The Luther Marsh Management Plan (GRCA and OMNR, 2012) describes Luther Marsh as an important area for migratory waterfowl.

Terrestrial

The Records Review completed for the Project Study Area did not identify known occurrences of waterfowl concentrations in terrestrial habitat outside Luther Marsh. However, a review of aerial photography suggests meadow habitat which may flood in the spring, suitable for foraging geese or dabbling ducks, is present. Breeding in Luther Marsh has been confirmed for American Black Duck, Wood Duck, Blue-winged Teal, Mallard, American Wigeon and Gadwall (GRCA and OMNR, 2012).

Site investigations will be conducted to determine whether this type of seasonal concentration area is supported in the Project Location or ZOI.

Aquatic

The Records Review completed for the Project Study Area did not identify known occurrences of waterfowl concentrations in aquatic habitat outside Luther Marsh. However, a review of aerial photography suggests marsh habitat is present, including portion of Luther Marsh. Breeding in Luther Marsh has been confirmed for Canada Goose, American Black Duck, Wood Duck, Blue-winged Teal, Mallard, American Wigeon, Gadwall, Ring-necked Duck and Redhead (GRCA and OMNR, 2012).

Site investigations will determine whether this type of seasonal concentration area is supported in the Project Location or ZOI.

Shorebird Migratory Stopover Areas

Relatively undisturbed shorelines along the Great Lakes that produce abundant food (clams, insects, snails and worms) are extremely important for migratory shorebirds (MNR, 2000). The Grand Valley Phase 3 Project Location is not located within 5 km of Great Lakes shoreline and does not support candidate coastal shorebird stopover habitat. The Luther Marsh Management Plan (GRCA and OMNR, 2012) describes Luther Marsh as an important area for shorebird migration stopover areas, particularly during fall migration.

Inland features that may qualify as candidate significant wildlife habitat include shorelines of lakes, rivers and wetlands, including beach bars and seasonally flooded, un-vegetated shoreline habitats (MNR, 2000). The Records Review did not identify known occurrences of such inland candidate habitat features outside Luther Marsh.

Site investigations will determine whether this type of seasonal concentration area is supported in the Project Location or ZOI.

Winter Raptor Feeding and Roosting Areas

Hay fields, pastures and open meadows greater than 20 ha that support large and productive small mammal populations can provide critical winter feeding areas (MNR, 2000). The best roosting sites are typically found in relatively mature mixed or coniferous woodlands that abut windswept fields, with scattered trees and fence posts providing perches for hunting (MNR, 2000). "Sites that are mostly likely to remain unchanged for several years are preferred. Cattle pastures often remain unchanged for many years, whereas hay fields can be cultivated and different crops planted that make the site unsuitable" (MNR, 2000). Actively managed hay and pasture fields do not meet the habitat requirements of candidate significant wildlife habitat for winter raptor feeding and roosting areas.

Breeding in Luther Marsh has been confirmed for Northern Harrier and American Kestrel (LMWMP).

The background review did not identify any winter raptor feeding and/or roosting areas. Site investigations will determine whether these types of seasonal concentration areas are supported in the Project Location or ZOI.

Bat Hibernacula, Maternity Colonies and Migratory Stopover Areas

The Luther Marsh Management Area is known to host significant bats and bat populations (GRCA and MNR, 2012).

Hibernacula

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

Karst formations tend to be more common along joints between two different bedrock formations. Also, thin drift and exposed bedrock terrains with deep joints and potential features at edges of bedrock valleys and cliff edges are prime areas for karst, crevasse or cave formations. Mapping of known and potential karst within Ontario indicates there is no observed evidence of karst within the Project Study Area (Brunton, 2008).

No known bat hibernacula have been identified within the Project Study Area (Renewable Energy Atlas; MNR, 2010). Site investigations will determine where any potential features are present in the Project Location or ZOI, including a review of the Renewable Energy Atlas for any hibernacula within 1120 m from Project Components (1000 m habitat buffer plus 120 m)

Maternity Colonies

Depending on the species, maternity roosts for bats can include tree foliage, tree cavities and crevices under loose bark or buildings. Known locations of forested bat maternity colonies is extremely rare in all Ontario landscapes (MNR, 2012)

The background review did not identify any known maternity roosts in the Project Study Area. Site investigations will confirm whether candidate significant wildlife habitat for bat hibernacula or maternity roosts are in the Project Location or ZOI.

Bat Migratory Stopover Areas

Stopover areas for long distance migrant bats, including Hoary Bat, Eastern Red Bat and Silver-haired Bat, are important during fall migration. Long distance migratory bats typically migrate during late summer and early fall from summer breeding habitats throughout Ontario to southern wintering areas. Their annual fall migrations concentrate these species of bats at stopover areas. The location and characteristics of stopover habitats are generally unknown.

The background review did not identify any known migratory stopover areas occur within the Project Study Area. Criteria have not been developed for this habitat in this Ecoregion to date, and it is therefore not possible to further assess this habitat (MNR, 2012b). This feature will not be carried forward into the Site Investigation.

Turtle Wintering Areas

Candidate turtle overwintering habitat is defined as permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen (MNR, 2012a). Water bodies must be deep enough not to freeze, with soft mud substrates (MNR, 2012). Wintering areas for turtles occurring the same general area as their core habitat.

The NHIC database, the Herpetofaunal Summary (Oldham and Weller, 2000), the Vascular Plants and Vertebrates of Luther Marsh, Ontario (Sandilands, 1984) and the Luther Marsh Management Plan (GRCA and MNR, 2012) include records for four native turtle species within the vicinity of the Project Study Area, including Common Snapping Turtle and Midland Painted Turtle.

The background review did not identify any known turtle wintering areas in the Project Study Area. Site investigations will confirm whether candidate significant wildlife habitat for turtle wintering areas in the Project Location or ZOI.

Snake Hibernacula

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

Many of Ontario's reptile species only occur in the southern most parts of the province and the Project is located within the ranges of several common species of snakes (Oldham and Weller 2000).

The background review did not identify any known snake hibernacula in the Project Study Area. Site investigations will confirm whether candidate significant wildlife habitat for snake hibernacula found in or within the ZOI of the Project Location.

Colonial Bird Nesting Sites

Colonial bird nesting sites can be located in swamps and along large bodies of water for herons, islands for gulls and cliffs, banks and artificial structures for swallows (MNR, 2000).

No known nesting sites are located in the Project Study Area. One known Great Blue Heron Nesting Site is located within the Luther Marsh. This Heronry is outside the Project Study Area and greater than 420 m from the Project Location and is not carried forward to the Site Investigation. Breeding in Luther Marsh has been confirmed for Bank Swallow, Cliff Swallow, Green Heron and Black-Crowned Night Heron (GRCA and MNR, 2012).

The background review did not identify any known colonial bird nesting sites in the Project Study Area. Site investigations will determine whether colonial bird nesting sites are found in or within the ZOI of the Project Location.

Migratory Butterfly Stopover Areas

During fall migration, Monarchs tend to move along the north shore of the Great Lakes (Calvert, 2001). Fields and other open areas with varied habitat types that are found within 5 km of the Lake Erie or Lake Ontario shoreline are considered candidate significant wildlife habitat for migratory butterfly stopover areas (MNR, 2000).

The Project Study Area is not located within 5 km of a Great Lakes shoreline and is not considered to be in an area that would serve as a significant butterfly stopover site. This feature will not be carried forward into the Site Investigation.

Landbird Migratory Stopover Areas

Migratory passerines are known to use forested landscapes along Great Lakes shorelines as stopover sites during spring and fall migration (Ewert et al., 2006; MNR, 2000). Areas that

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

The Grand Valley Phase 3 Project Location is located inland, greater than 5 km of a Great Lakes shoreline. The Project Location is not located in an area that would constitute candidate significant wildlife habitat for a landbird migratory stopover area. This feature will not be carried forward into the Site Investigation.

Deer Yarding Areas

Deer yards are areas of key winter habitat for White-Tailed Deer. They usually consist of a core area of coniferous forest, which provides shelter from snow and wind, adjacent to an area of deciduous forest or other foraging habitat (MNR, 2012a). The identification and delineation of deer yards is the responsibility of the MNR (MNR, 2012b).

MNR has not identified any deering yarding areas in the Project Location or ZOI. This habitat will not be carried forward to the Site Investigation.

Winter Deer Yards

Deer winter congregation areas are applicable in the southern areas of Ecoregion 6E where deer movement in the winter is not constrained by snow depth, but where deer congregate in suitable woodlands to reduce or avoid winter conditions. Forested or treed swamp ecosites >100 ha in size or smaller conifer plantations are considered candidate significant wildlife habitat (MNR, 2012b).

MNR undertakes the identification and delineation of significant deer winter congregation areas. Review of MNR NHIC and LIO databases identified three deer wintering areas within the Project Study Area. One of these deer wintering areas are in the ZOI, immediately north of T112 (**Figure 1, Appendix A**). Neither of these features is in the Project Location. The habitat will be carried forward to the Site Investigation.

2.2.3.4 Rare Vegetation Communities or Specialized Habitats

Rare Vegetation Communities

The Draft Significant Wildlife Habitat (SWH) Ecoregion 6E Criterion Schedule (MNR, 2012b) identifies the following features as rare vegetation communities:

- Cliffs and talus slopes;
- Sand barren;
- Alvar;
- Old growth forests;

- Savannah;
- Tallgrass prairie; and
- Other rare vegetation communities listed in Appendix M of the SWHTG.

The poorly drained topography of Grand Valley is not conducive to rare vegetation communities such as alvar, prairie, savannah, rock barren and sand barren, and there are no records of these community types from within the Project Study Area.

A search of the NHIC database and other background information did not identify any records of known rare vegetation communities in the Study Area (LIO, 2011; NHIC, 2011; Township of East Luther Grand Valley Official Plan, 2008). Field investigations will determine if any rare communities are present in the Project Location or ZOI.

Old growth forests are characterized by having a dominant tree species greater than 140 years old, in stands 30 ha or greater or with at least 10 ha interior habitat (assuming 100 m buffer at edge of forest) (MNR, 2012b). These forest stands are rare throughout Ontario, particularly in southern Ontario, largely due to past logging practices.

41 Wooded Areas were identified for the Project Location and ZOI (**Section 2.2.2**); however, the background review did not identify any known woodlands greater than 100 years old.

Site investigations will determine if any rare communities are present in the Project Location or ZOI.

Specialized Habitats

Specialized habitats are microhabitats that are critical to some wildlife species. The Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b) identify the following potential specialized habitats:

- waterfowl nesting areas;
- bald eagle and osprey nesting, foraging, and perching habitat;
- woodland raptor nesting habitat;
- turtle nesting areas;
- seeps and springs; and
- amphibian breeding habitat (woodland and wetland).

A review of background information assessed the potential for specialized habitats to occur in the Project Study Area. Findings are presented by habitat type below.

Waterfowl Nesting Areas

Waterfowl nesting occurs in upland habitat that is located near marshes, ponds or lakes. Sites considered candidate significant wildlife habitat for waterfowl nesting typically contain a high density of small and medium sized ponds, or are single wetlands that are large and diverse (MNR, 2000). Luther Marsh is an extremely important area for breeding and migrating waterfowl (GRCA and MNR, 2012). Nesting waterfowl may also be present in or adjacent to the Provincially Significant Wetland (PSW), seven unevaluated wetlands located within ZOI of the Project Location, and other unidentified wetlands.

The Luther Marsh Management Plan (GRCA and OMNR, 2012) describes Luther Marsh as an important area for waterfowl nesting. The Monticello Project in particular (west of Sideroad 21 and 22, south of Concession Road 15) is a wetland that holds water for much of the year and has become a very productive wetland, providing valuable spring staging habitat for prairie waterfowl moving through the region, and nesting and feeding habitat for resident species (Weseloh, 2009).

The Records Review completed for the Project Study Area did not identify known occurrences of waterfowl nesting area outside the LMWMA. Site investigations will determine the presence of candidate significant wildlife habitat for waterfowl nesting areas in and within the ZOI of the Project Location.

Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat

The SWHTG indicates that some raptors require somewhat specialized habitats. Under the criteria and guidelines outlined in Appendix Q of the SWHTG, critical habitat features that would support specialized Bald Eagle and Osprey nesting habitat are identified as waterbodies with fish populations and trees with good visibility and flight lines.

There are no known Osprey or Bald Eagle nests within the Project Study Area (LIO, 2011; Cadman et al., 2007); however, breeding has been confirmed for both species in portions of Luther Marsh outside the Study Area (GRCA and MNR, 2012). The Township of East Luther Grand Valley OP Schedule also locates one Osprey nest in Luther Marsh, outside the Project Study Area and greater than 3 km for the ZOI.

Site investigations will determine the presence of candidate significant wildlife habitat for specialized raptor habitat for Bald Eagle and Osprey in and within the ZOI of the Project Location.

Woodland Raptor Nesting Habitat

The Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b) indicates that some raptors require somewhat specialized habitats. All natural or conifer plantation, woodland or forest stands greater than 30 ha with greater than 10 ha of interior habitat are considered candidate significant woodland raptor nesting habitat.

Breeding Bird Atlas confirmed raptor species nesting in the vicinity of the Project Study Area include: Turkey Vulture, Osprey, Northern Harrier, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered Hawk, Red-tailed Hawk, American Kestrel and Merlin. Breeding in Luther Marsh has been confirmed for Northern Goshawk (GRCA and MNR, 2012).

The background review did not identify any known woodland raptor nesting habitat in the Project Study Area. Site investigations will confirm the presence and boundaries of woodland features for woodland raptor nesting habitat and the presence of raptor stick nests in and within the ZOI of the Project Location.

Turtle Nesting Habitat

Areas that would be considered candidate significant wildlife habitat for turtle nesting include areas containing sandy or fine gravel soils (e.g. shoreline beaches) in proximity or adjacent to wetland habitat occupied by turtles (MNR, 2012).

The NHIC database, the Herpetofaunal Summary (Oldham and Weller, 2000), the Vascular Plants and Vertebrates of Luther Marsh, Ontario (Sandilands, 1984) and the Luther Marsh Management Plan (GRCA and MNR, 2012) include records for four native turtle species within the vicinity of the Project Study Area, including Common Snapping Turtle and Midland Painted Turtle.

The background review did not identify any known turtle nesting habitat in the Project Study Area. Site investigations will determine the presence of candidate significant wildlife habitat for turtle nesting habitat in and within the ZOI of the Project Location.

Seeps and Springs

Seepage areas and springs provide habitat for numerous uncommon species and may support a high diversity of plant species (MNR, 2000). In winter, these areas provide foraging opportunities for Wild Turkey and White-tailed Deer (MNR, 2000). Those that occur within forested areas where the canopy maintains cool, shaded conditions are most important (MNR, 2000).

The background review did not identify any known seeps and springs in the Project Study Area. Site investigations will determine the presence of candidate significant wildlife habitat for seeps and springs in and within the ZOI of the Project Location.

Amphibian Breeding Habitat (Woodland)

Woodland ponds may provide important habitat for local amphibian populations. Productive habitats are characterized by well-developed vegetation structure in and around the perimeter, and proximity to closed canopy woodlands with dense undergrowth and damp micro-climates (MNR, 2012b).

The Ontario Herpetofaunal Summary (Oldham and Weller, 2000) indicates the Project Study Area falls within the range of a number of common woodland amphibian species, including Spotted Salamander, Gray Treefrog, Western Chorus Frog, Spring Peeper, and Wood Frog. The Luther Marsh Management Plan (GRCA and MNR, 2012) lists the following species as being recorded in Luther Marsh: Spotted Salamander, Spring Peeper, Western Chorus Frog and Wood Frog. Woodlands are present within the Project Study Area and may provide amphibian habitat.

The background review did not identify any known woodland amphibian breeding habitat in the Project Study Area. Site investigations will determine the presence of candidate significant wildlife habitat for amphibian woodland breeding in the ZOI and Project Location.

Amphibian Breeding Habitat (Wetland)

Wetlands and pools >500 m² and isolated from woodlands are considered candidate significant wetland amphibian breeding habitat. Several common wetland amphibian species are known to occur in the vicinity of the Study Area, including Mudpuppy, American Toad, Gray Treefrog, Bullfrog, Northern Green Frog, Pickerel Frog, Northern Leopard Frog, and Mink Frog (Oldham and Weller, 2000). The Luther Marsh Management Plan lists the following species as being recorded in Luther Marsh: American Toad, Spotted Salamander, Western Chorus Frog, Northern Leopard Frog, Green Frog, Mink Frog and Bullfrog. Wetland habitat is present in the ZOI as document in **Section 2.2.1**; i.e., one PSW (Luther Marsh) and seven unevaluated significant wetlands were identified for the ZOI (none in the Project Location).

Bullfrogs are found in deep, permanent water with abundant emergent plants and are considered area-sensitive, requiring at least 1 ha of suitable habitat (MNR, 2000). No known bullfrog concentration areas were identified during the Records Review.

The background review did not identify any known wetland amphibian breeding habitat in the Project Study Area. However, at the Redstone Demonstration Site (west of the Study Areas/East Luther Townline, north of Concession Road 15) in Luther Marsh, a significant population of Mink Frog has colonized the area's new ponds (GRCA and MNR, 2012). This is a well-established population near the southern extent of its range (Gore & Storrie Limited, Beak Consultants Limited, 1991).

Site investigations will determine the presence of habitat for amphibian wetland breeding in and within the ZOI of the Project Location.

2.2.3.5 Species of Conservation Concern

Species of conservation concern include four types of species: those that are rare, those whose populations are significantly declining, those that have been identified as being at risk from certain common activities, and those with relatively large populations in Ontario compared to the remainder of the globe.

Rare species are considered at five levels: globally rare, nationally rare (with designations by COSEWIC), provincially rare, regionally rare (at the Site Region level), and locally rare (in the municipality or Site District). This is also the order of priority that should be assigned to the importance of maintaining species. Some species have been identified as being susceptible to certain practices, and their presence may result in an area being designated significant wildlife habitat. Examples include species vulnerable to habitat loss and species such as woodland raptors that may be vulnerable to forest management or human disturbance. The final group of species of conservation concern includes species that have a high proportion of their global population in Ontario. Although they may be common in Ontario, they are found in low numbers in other jurisdictions.

The Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b) identifies the following features as habitat for species of conservation concern:

- Marsh bird breeding habitat;
- Woodland area-sensitive bird breeding habitat;
- Open country bird breeding habitat;
- Shrub/early successional bird breeding habitat;
- Terrestrial crayfish; and
- Special concern and rare wildlife species.

A review of background information assessed the potential for habitats for species of conservation concern to occur in the Project Study Area. Findings are presented by habitat type below.

Marsh Bird Breeding Habitat

Marsh breeding bird nesting occurs in wetlands with emergent aquatic vegetation (MNR, 2012b). Wetland habitat is present in the ZOI as document in **Section 2.2.1**; i.e., one PSW (Luther Marsh) and seven unevaluated significant wetlands were identified for the ZOI (none in the Project Location). Breeding in Luther Marsh has been confirmed for American Bittern, Virginia Rail, Common Moorhen, American Coot, Pied-billed Grebe, Common Loon, Sandhill Crane, Green Heron and Trumpeter Swan (GRCA and MNR, 2012). The Drain 40 area (west of the Study Area/East Luther Townline) of Luther Marsh is a shallow water marsh community with emergent and submergent vegetation that provides suitable breeding habitat for a variety of marsh birds, including Sora, and Virginia Rail that have been observed in recent years by GRCA staff (GRCA and MNR, 2012). Other notable marsh breeding factors associated with Luther Marsh include (GRCA and MNR, 2012):

- historically a rare occurrence, Sandhill Cranes are now annual breeders; and,
- a self-sustaining population of Trumpeter Swans was established in 2009, with significant contributions from Luther Marsh.

The background review did not identify any known marsh bird breeding habitat in the Project Study Area outside Luther Marsh. Site investigations will determine the presence of candidate significant wildlife habitat for marsh bird breeding in the ZOI or Project Location.

Bird Breeding Habitat (woodland area-sensitive, open country, and shrub/early successional)

Woodlands and grasslands of at least 30 ha are considered to have the potential to host populations of area-sensitive species (MNR, 2012b).

Appendix C of the SWHTG (MNR, 2000) contains a list of area-sensitive wildlife. Ontario Breeding Bird Atlas information indicates that the 10x10 km atlas squares that encompass the Project Study Area contain records of woodland, shrub/early successional, and grassland area sensitive breeding birds. Breeding in Luther Marsh has been confirmed for Savannah Sparrow, Northern Harrier, Clay-coloured Sparrow and Black-billed Cuckoo (LMWMP).

The background review did not identify any woodland area-sensitive, open country, and shrub/early successional bird breeding habitat in the Project Study Area. Site investigations will determine the presence of candidate significant wildlife habitat for woodland area-sensitive, open country and shrub/early successional breeding birds in the ZOI or Project Location.

Woodland Interior Breeding Birds

Mature forest stands or woodlots greater than 30 ha with 4 ha of interior habitat are considered candidate woodland interior breeding bird habitat (MNR, 2012b). One Wooded Area identified for the ZOI (**Section 2.2.2**) is 30 ha or greater, located immediately north of T112 (**Figure 1, Appendix**).

Open Country Breeding Birds

Large, contiguous undisturbed grasslands of at least 30 ha are considered likely to support and sustain a diversity of grassland species (MNR, 2012b).

Agricultural habitat is found in the Project Study Area that could support grassland breeding bird species. Open country habitat contained within the ZOI of the Project Study Area is generally composed of actively hay fields, grazed pasture and fallow fields. The farming practice of hay field cutting before the end of the breeding cycle for grassland birds can reduce breeding success for these species up to 94% and hayfields are not considered to support viable populations of grassland breeding bird species (COSSARO 2010).

Shrub/Early Successional Breeding Birds

Shrub thicket habitats greater than 10 ha are most likely to support and sustain a diversity of shrub /early successional bird breeding species (MNR, 2012b). The background wildlife list (**Appendix C**) contains all eight bird species that are listed as indicator, common, and special

concern shrub /early successional birds (i.e., Brown Thrasher, Clay-coloured Sparrow, Black-billed Cuckoo, Willow Flycatcher, Eastern Towhee, Field Sparrow, Yellow-breasted Chat, and Golden-winged Warbler) as per the Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b).

Terrestrial Crayfish

Terrestrial crayfish use meadow and the edges of shallow marshes to construct burrows (MNR, 2012b). The Canadian range of terrestrial crayfish is restricted to southwestern Ontario (MNR, 2012b).

The background review did not identify any known terrestrial crayfish habitat in the Project Study Area. Site investigations will determine whether habitat is present to support terrestrial crayfish in and within the ZOI of the Project Location.

Special Concern and Rare Wildlife Species

Correspondence with the MNR, and a review of the NHIC database, wildlife atlases and the Luther Marsh Wildlife Management Program (2010) was used to identify historic records of species of conservation concern that occur in the vicinity of the Project Study Area. Special concern and rare wildlife species are those that are listed as special concern and provincially rare (S1-S3, SH) plant and animal species. Endangered and threatened species listed as federally endangered or threatened with no provincial ESA protection are also listed in this category. Special concern and rare wildlife species identified in the Project Study Area are listed in **Table B2, Appendix B**, including a discussion of their habitat requirements. Background review identified a total of forty (40) rare species potentially occurring within the Project Study Area; four (4) plants, two (2) butterflies, one (1) amphibian, three (3) reptiles and thirty (30) birds.

Within the context of O. Reg 359/09, endangered and threatened species are addressed as part of MNR's *Approval and Permitting Requirements Document for Renewable Energy Projects* (APRD) requirements. Information required as part of these requirements is being submitted to MNR as part of the APRD Report (separate cover). Where this information indicates that approvals or permits are required, these will be addressed separately through the applicable statute and its permitting process.

Animal Movement Corridors

Animal movement corridors are elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another (MNR, 2000). The Project Study Area is largely composed by agriculture, with naturalized connections across the area limited to narrow treed hedgerows.

The background review did not identify any known animal movement corridors in the Project Study Area (LIO, 2011). Hedgerows and other narrow naturalized features can also serve as small linkages for localized movement of wildlife (MNR, 2000). A review of aerial photography

indicates the presence of small linear hedgerows and riparian corridors in and within the ZOI of the Project Location.

Amphibian Movement Corridors

The background review did not identify any known amphibian movement corridors in the Project Study Area. Site investigations will determine whether habitat is present to support breeding amphibians (woodland and wetland) and identify any associated corridors in and within the ZOI of the Project Location.

Deer Movement Corridors

One deer wintering areas is known to occur within the ZOI of the Project Location immediately north of T112 (**Figure 1, Appendix A**); however, background review did not identify any known deer movement corridors in the Project Study Area. Site investigations will determine whether habitat is present in and within the ZOI of the Project Location to support deer movement via forested corridors from the known deer wintering significant wildlife habitat.

2.2.4 Areas of Natural and Scientific Interest (ANSIs)

MNR identifies two types of ANSIs: Life Science and Earth Science. Life Science ANSIs are significant representative areas of Ontario's biodiversity and natural landscapes, while Earth Science ANSIs are geological in nature and consist of significant representative examples of bedrock, fossils and landforms in Ontario.

Life Science ANSI's

One Life Science ANSI was identified within the Project Study Area through the Records Review (LIO, 2012; NHIC, 2012; Township of East Luther – Grand Valley, 2008). This ANSI is not located within the Project Location or ZOI.

- Luther Marsh – a large wetland complex, functioning as a major headwater reservoir for the Grand River. This ANSI is located in the west and southwest portion of the Project Study Area.

Earth Science ANSI's

One Earth Science ANSIs was identified within the Project Study Area through the Records Review (LIO, 2012; NHIC, 2012; Township of East Luther – Grand Valley, 2008). This ANSI is not located within the Project Location or ZOI.

- Kelson Esker – portions located within the Keldon Swamp PSW. These esker segments are representative of deposits by Tavistock ice (Georgian Bay ice lobe) during the Port Bruce Stadial. This esker is located within the northwest portion of the Project Study Area.

2.2.5 Provincial Parks and Conservation Reserves

There were no provincial parks or conservation reserves identified in or within the ZIO of the Project Location through the Records Review (NHIC, 2011; Ontario Parks, 2010).

2.2.6 Summary of Natural Features and Boundaries Identified

A summary of known natural features identified through the Records Review as occurring in and within the ZOI for the Project Location provided in **Table 2.1**, below.

Table 2.1: Summary of Natural Features Identified in Records Review for the ZOI

Feature	Carried Forward to Site Investigation (Y/N)	Known Recorded Information in the Zone of Investigation	Known Recorded Information in the Project Location
Wetlands	Y	Seven unevaluated wetlands	No wetlands located within the proposed Project Location; site investigations are required to confirm the presence and boundaries of these features
Woodlands	Y	41 Wooded Areas as per LIO mapping	No records
Wildlife Habitat			
Seasonal Concentration Area			
Waterfowl stopover and staging areas (terrestrial)	Y	No records	No records
Waterfowl stopover and staging areas (aquatic)	Y	No records	No records
Shorebird migratory stopover areas	Y	No records	No records
Raptor wintering areas	Y	No records	No records
Bat hibernacula	Y	No records	No records
Bat maternity colonies	Y	No records	No records
Bat migratory stopover areas	N	No records	No records
Turtle wintering areas	Y	No records	No records
Snake hibernaculum	Y	No records	No records
Colonial bird nesting sites (bank and cliff)	Y	No records	No records
Colonial bird nesting sites (tree/shrub)	Y	No records	No records
Colonial bird nesting sites (ground)	Y	No records	No records
Migratory butterfly stopover areas	N	Project Study Area is not within 5km of a Great Lakes shoreline	Project Study Area is not within 5km of a Great Lakes shoreline
Landbird migratory stopover areas	N	Project Study Area is not within 5km of a Great Lakes shoreline	Project Study Area is not within 5km of a Great Lakes shoreline
Deer yarding areas	N	No records	No records
Deer winter congregation areas	Y	One known areas located immediately north of T112	No records

Table 2.1: Summary of Natural Features Identified in Records Review for the ZOI

Feature	Carried Forward to Site Investigation (Y/N)	Known Recorded Information in the Zone of Investigation	Known Recorded Information in the Project Location
Rare Vegetation Communities or Specialized Habitat for Wildlife			
Rare Vegetation Communities: <ul style="list-style-type: none"> • Cliffs and talus slopes • Sand barren • Alvar • Old growth forests • Savannah • Tallgrass prairie • Other rare vegetation communities listed in Appendix M of the SWHTG 	Y	No records	No records
Specialized Habitat for Wildlife			
Waterfowl nesting area	Y	No records	No records
Bald Eagle and Osprey nesting, foraging, and perching habitat	Y	No records	No records
Woodland raptor nesting habitat	Y	No records	No records
Turtle nesting habitat	Y	No records	No records
Seeps and springs	Y	No records	No records
Amphibian breeding habitat (woodland)	Y	No records	No records
Amphibian breeding habitat (wetland)	Y	No records	No records
Habitat for Species of Conservation Concern			
Marsh Bird Breeding Habitat	Y	No records	No records
Bird Breeding Habitat (woodland area-sensitive)	Y	One Wooded Area is 30 ha or greater (immediately north of T112)	No records
Bird Breeding Habitat (open country)	Y	No records	No records
Bird Breeding Habitat (shrub/early successional)	Y	No records	No records
Terrestrial Crayfish	Y	No records	No records
Special Concern and Rare Wildlife Species	Y	Known species for the Project Study Area (Table B2, Appendix B)	Known species for the Project Study Area (Table B2, Appendix B)
Animal Movement Corridors			
Amphibian Movement	Y	No records	No records
Deer Movement	N	No Records	No Records
Areas of Natural and Scientific Interest (ANSI): <ul style="list-style-type: none"> • Life Science ANSI • Earth Science ANSI 	N	No records	No records
Specified Provincial Plan Areas	N	No records	No records
Provincial Parks and Conservation Reserves	N	No records	No records

3.0 Site Investigations

Site investigations were conducted in accordance with O. Reg 359/09, s. 26 (1), Natural Heritage Site Investigation. This report is prepared in accordance with s. 26 (3) with guidance provided from the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2012a).

Site investigations in support of this report were completed with the purpose of confirming the status and boundaries of natural features identified through the Records Review and identifying any additional features. Data collected during the Records Review concerning natural features and species occurrences were used to guide the scope and direction of site investigations. The extent of the site investigation program and type of field surveys included in the program is directly reflective of the extent of natural features and triggers for significant wildlife habitat that are identified within the Project Study Area. The Project is primarily sited within actively farmed agricultural fields and has been sited outside of the majority of natural features in the Project Study Area.

Natural features that have the potential to occur in or within the ZOI of the Project Location, as identified through the Records Review, are listed in **Table 2.1**. Site investigations are required to confirm the presence and delineate the boundaries of natural features in or within the ZOI of the Project Location.

3.1 METHODS

Site investigations detailed the current conditions in the ZOI of the Project Location, and were based on the information about the Project Location and siting that was current at the time of the respective survey. Survey dates, times, duration, field personnel and weather conditions are presented in **Table B3, Appendix B**. All surveys conducted within the Project Study Area were completed by qualified personnel. Field notes from all Site Investigations are provided in **Appendix D**. Staff summaries and qualifications for personnel involved in conducting the site investigations are provided in **Appendix F**. Land access was available for all land parcels where Project components are proposed, and areas within the ZOI of the Project Location were traversed on foot during site investigations where land access was available.

All site investigations were carried out in accordance with O. Reg. 359/09 and the NHA Guide for Renewable Energy Projects (MNR, 2012a), using guidance provided in the SWHTG and the Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b).

3.1.1 Alternative Site Investigation Methods

Site investigations were conducted for all areas within the ZOI except where private property was adjacent to the following Project components and access was not granted:

- underground transmission lines within existing municipal road ROWs; and,
- the proposed access road to T105.

In these cases, it was necessary to conduct an Alternative Site Investigations, as described in Part IV, Section 26 of O.Reg. 359/09. Alternative Site Investigation methods were used in locations where the above noted Project components are proposed and the adjacent property is active agriculture, residential property, or property including the following candidate wildlife habitat features:

- Bat Maternity Colony 2 (BMC-2), located on the north side of the proposed underground transmission line and access road to T105 (**Figure 3.2 and 4.2, Tile 5, Appendix A**).

Alternative Site Investigations were completed using aerial photograph interpretation as well as field observations, including observations made from the nearest property where access was available, or from the nearest road ROW. Vegetation communities in these natural areas were identified to the lowest level possible using the Ecological Land Classification for Southern Ontario.

Stantec and Grand Valley Wind Farms worked collaboratively to identify land access requirements and contact landowners for the purpose of site investigations. Sites were not accessed in cases where permission was denied or a response was not received, including BMC-2.

3.1.2 Vegetation Community and Vascular Plants Assessment

Ecological Land Classification (ELC) and preliminary botanical inventories of the vegetation communities within the ZOI of the Project Location were conducted by Stantec in 2011 and 2012, with the majority of the surveys occurring in October 2011 and August-September 2012.

Vegetation communities were delineated on aerial photographs and checked in the field in October 2011, and August and September 2012. Vascular plant species lists were recorded separately for each community. Community characterizations were then based on the ELC system (Lee et al., 1998). English colloquial names and scientific binomials of plant species generally follow Newmaster et al. (1998). Specific emphasis was placed on searching for plant species of conservation concern identified through the Records Review with historical occurrences within the Project Study Area.

Natural heritage information collected from the subject lands was evaluated to confirm potential significance. The provincial status of vegetation communities and plant species was based on

data obtained from the database of the Natural Heritage Information Centre (NHIC, 2001). Identification of potentially sensitive plant species is based on assignment of a Coefficient of Conservatism value (CC) to each native species in southern Ontario (Oldham et al., 1995).

3.1.3 Wetland Confirmation and Delineation

Wetlands are defined in the REA regulation as features that are swamp, marsh, bog, or fen that are seasonally or permanently covered by shallow water or has the water table close to the surface, and have hydric soils and vegetation dominated by hydrophytic or water-tolerant plants (MNR, 2012a). Wetlands are identified during ELC surveys and are further evaluated using the Ontario Wetland Evaluation System (OWES).

Wetland boundaries were identified based on field surveys and ELC mapping. All wetland and fresh-moist upland communities (ELC criteria) were used to identify known and potential OWES wetland communities. Mapping generally included ELC wetland communities, but was further refined based on site investigations, imagery interpretation, and GIS analysis tools. Delineations were completed by a certified OWES evaluator.

3.1.4 Woodlands

Woodlands include treed areas, woodlots, or forested areas, other than cultivated fruit or nut orchards or plantations established for the purpose of producing Christmas trees (MNR, 2012a).

The limits of all woodlands that occur, or partially occur, in or within the ZOI of the Project Location were delineated through aerial photo interpretation and confirmed during site investigations. Woodlands were delineated using the driplines of the trees. Information regarding woodland size, ecological function and uncommon characteristics was collected during ELC surveys and through GIS analysis. Treed areas identified during vegetation surveys were compared to the definition of woodlands provided in O.Reg. 359/09 to delineate the limits of woodlands.

3.1.5 Areas of Natural and Scientific Interest (ANSI)

No ANSIs occur within the ZOI of the Project Location; therefore, field investigations were not required.

3.1.6 Wildlife and Wildlife Habitat

Site investigations to determine the presence of candidate significant wildlife habitat were conducted by Stantec on the following dates:

- October 6-7, 17-18, 25, and November 11, 2011;
- February 13, 28, June 6-7, 20-21, July 4-5, August 21, 27, September 14, and October 25, 2012; and,
- January 8, 15, 24, March 14, April 9, 16, 17, 22, 29, and May 1, 6, 8, 2013.

Survey information (i.e., survey times, weather conditions and field personnel) is summarized in **Table B3, Appendix B**.

Site investigations focused on determining whether candidate significant wildlife habitats, as identified during the Records Review, have the potential to occur in or within the ZOI of the Project Location. Criteria used to identify candidate significant wildlife habitat were derived from the Significant Wildlife Habitat Technical Guide (MNR, 2000) and the Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b). Specific emphasis was placed on determining whether the critical habitat features required to support significant wildlife habitat were present in natural features in or within the ZOI of the Project Location.

3.1.6.1 Seasonal Concentration Areas of Animals

Seasonal concentration areas are areas where wildlife species occur in aggregations at certain times of the year, on an annual basis. Such areas are sometimes highly concentrated with members of a given species, or several species, within relatively small areas. In spring and autumn, migratory wildlife species will concentrate where they can rest and feed. Other wildlife species require habitats where they can survive winter. Seasonal concentration habitats have been identified by using the habitat criteria found in the SWHTG (MNR, 2000) and Draft Significant Wildlife Habitat: Ecoregion 6E Criteria Schedules (MNR, 2012). The habitat criteria for each potential seasonal concentration area, and methods employed to identify them within the ZOI of the Project Location are outlined below.

Waterfowl Stopover and Staging Area

Terrestrial

Criteria used to identify Waterfowl Stopover and Staging Area includes fields with sheet water during spring (mid-March to May) or annual spring melt water flooding found in Meadow (CUM1) and Thicket (CUT1) Community Types. Agricultural fields with waste grains are commonly used by waterfowl; however, such sites are not considered SWH.

Vegetation community classifications were utilized to assess features within the ZOI of the Project Location that would support waterfowl stopover and staging areas (terrestrial). ELC surveys and GIS analysis of the landscape were used to identify large wetlands or marshes with a diversity of vegetation communities interspersed with cultural meadows that flood each spring (terrestrial staging areas). Surveys conducted in April and May 2013 were used to document flooding in candidate ELC ecosites.

Aquatic

Criteria used to identify aquatic Waterfowl Stopover and Staging Area includes Community Types of: Meadow Marsh (MAM), Shallow Marsh (MAS), Shallow Aquatic (SA), and Deciduous Swamp (SWD). Other criteria include ponds, marshes, lakes, bays, coastal inlets, and

watercourses used during migration. These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water).

Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify, such as Luther Marsh.

Vegetation community classifications were utilized to assess features within the ZOI of the Project Location that would support waterfowl stopover and staging areas (aquatic). ELC surveys and GIS analysis of the landscape were used to identify large wetlands or marshes with a diversity of vegetation communities interspersed with open water (aquatic staging areas). Only those communities that contain standing water for a portion of the year will be considered candidate SWH.

Shorebird Migratory Stopover Area

Shorebird Migratory Stopover Areas were identified as seasonally flooded shoreline areas of lakes, rivers and wetlands, including beach areas, bars in any of the following Community Types: Open Beach (BBO), Shrub Beach/Bar (BBS), Treed Beach/Bar (BBT), Open Sand Dune (SDO), Shrub Sand Dune (SDS), Treed Sand Dune (SDT), and Meadow Marsh.

Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify.

Vegetation community classifications were utilized to assess features within the ZOI of the Project Location that would support shorebird migratory stopover area. Only shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy un-vegetated shoreline habitats were considered candidate significant wildlife habitat.

Winter Raptor Feeding and Roosting Areas

Criteria used to determine Winter Raptor Feeding and Roosting Areas include the presence of fields and woodlands. Raptor wintering sites need to be >20 ha with a combination of forest and upland areas, such as idle/fallow or lightly grazed field/meadow. Upland must represent in at least 15 ha of the 20 ha minimum size.

Vegetation community classifications and size calculations are utilized to assess features within the ZOI of the Project Location that would support raptor wintering areas.

Bat Hibernacula and Maternity Colonies

Hibernacula

Hibernacula can be found in caves, mine shafts, underground foundations and karsts, including the following ELC Community Types: Crevice (CCR) or Cave (CCA). There are no known bat hibernacula identified within 1120 m (1000m habitat buffer plus 120m) of the ZOI (Renewable Energy Atlas; MNR 2010). Site investigations (Wildlife Habitat Assessment completed during ELC surveys) were conducted to identify potential bat hibernacula within the ZOI and extending up to 1120m from infrastructure.

Maternity Colonies

Maternity Colonies that are considered significant wildlife habitat are found in forested ecosites. Community Types include; Deciduous Forest (FOD) or Mixed Forest (FOM) that have >10/ha wildlife trees with a >25 cm diameter at breast height (dbh). Bat maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Female bats also prefer to inhabit wildlife trees (snags) in early stages of decay, class 1-3 or class 1 or 2. Northern Myotis prefer contiguous tracts of older forest cover for foraging and roosting in snags and trees. Silver-haired Bats prefer older mixed of deciduous forest and form maternity colonies in tree cavities and small hallows. Older forest areas with at least 21 snags/ha are preferred.

Turtle Wintering Areas

Snapping and Midland Painted turtles utilize ELC community classes: Swamp (SW), Marsh (MA) and Open Water (OA). Shallow Water (SA), Open Fen (FEO) and Open Bog (BOO). Northern Map Turtle utilizes open water areas such as deep rivers or streams and lakes for over-wintering habitat. For most turtles, wintering areas are in the same general habitat as their core habitat. Water has to be deep enough not to freeze and have soft mud substrate. Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen.

Vegetation community classifications were utilized to assess features within the ZOI of the Project Location that would support turtle wintering areas.

Snake Hibernacula

Snake hibernation occurs in sites located below frost lines in burrows, rock crevices, broken and fissured rock and other natural features. Wetlands such as conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover can be important over-wintering habitat. Any ecosite in southern Ontario other than very wet ones may provide habitat.

The following Community Types may be directly related to snake hibernacula: Talus (TA), Rock Barren (RB), Crevice (CCR), Cave (CCA), and Alvar (AL).

Vegetation community classifications were utilized to assess natural features within the ZOI of the Project Location to identify potential snake hibernacula. Habitat features that would provide an underground route, act as a potential hibernacula including exposed rock crevices or inactive animal burrows were recorded during wildlife habitat assessment surveys.

Colonial Bird Nesting Sites

Bank and Cliff

Habitat features are identified as eroding banks, sandy hills, borrow pits, steep slopes, sand piles, cliff faces, bridge abutments, silos, or barns found in Meadow (CUM), Thicket (CUT), Bluff (BL) and Cliff (CL) Community Types. Man-made structures (bridges or buildings) and recently disturbed areas (berms, embankments, soil or aggregate stockpiles) are not included as candidate seasonal concentration areas for colonial nesting birds.

Vegetation community classifications were utilized to assess features within the ZOI of the Project Location that would support this type of colonial bird breeding habitat. Open habitats near bodies of water were scanned for evidence of previous use by nesting swallows, areas of exposed vertical surfaces, such as hills, valley slopes and banks.

Trees/Shrubs

Colonial birds that utilize trees/shrubs as nesting sites typically prefer any of the following Community Types: Mixed Swamp (SWM), Deciduous Swamp (SWD) and Treed Fen (FET). The entire SWH contains the edge of the colony and a minimum 300 m of habitat or extent of the Forest Ecosite containing the colony or any island <15.0 ha with a colony. Nests are mainly found in live or dead standing trees in wetlands, lakes and peninsulas. However, shrubs and occasionally emergent vegetation may also be used. Most nests in trees are 11 to 15 m from ground, near the top of the tree.

Vegetation community classifications were utilized to assess features within the ZOI of the Project Location that would support colonial bird nesting sites. Large areas of marsh or swamp habitat with live or an abundance of dead trees, within the ZOI were searched for the presence of large colonially-nesting bird species and nests within suitable ELC communities.

Ground

Ground colonial bird nests occur on any rocky island or peninsula within a lake or large river, close proximity to watercourses in open fields or pastures with scattered trees or shrubs found in any of the following Community Types: Meadow Marsh (MAM1-6), Shallow Marsh (MAS1-3), Meadow (CUM), Thicket (CUT), Savannah (CUS). Nesting islands of gulls and terns occur on islands or peninsulas associated with open water or in marshy areas.

Brewers Blackbird colonies are found loosely on the ground or in low bushes in close proximity to streams and irrigation ditches within farmlands. The entire SWH contains the edge of the colony and a minimum 150 m area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0 ha with a colony. The core breeding area for Brewer's blackbird is largely restricted to the Bruce Peninsular and is not expected to occur in the Study Area.

Vegetation community classifications were utilized to assess features within the ZOI of the Project Location that would support colonial bird nesting habitat. The presence of appropriate habitat for colonially-nesting bird species within suitable ELC communities will be assessed.

Winter Deer Yards

MNR undertakes the identification and delineation of significant deer winter congregation areas. Review of MNR NHIC and LIO databases identified one deer wintering area in the ZOI, immediately north of T112 (**Figure 1, Appendix A**). This habitat feature will be carried forward to the Evaluation of Significance. Additional site investigations are not required.

3.1.6.2 Rare Vegetation Communities

Rare vegetation communities often contain rare species, particularly plants and small invertebrates, which depend on such habitats for their survival and cannot readily move to or find alternative habitats. Some wildlife species require large areas of suitable habitat for their long-term survival. Many wildlife species require substantial areas of suitable habitat for successful breeding. Their populations decline when habitat becomes fragmented and reduced in size.

Rare vegetation communities and candidate specialized wildlife habitat have been identified by using the habitat criteria found in the SWHTG (MNR, 2000) and Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b). The habitat criteria for each potential rare vegetation community and candidate specialized wildlife habitat, and methods employed to identify them within the ZOI of the Project Location are outlined below.

As discussed in the Records Review, there are no known rare vegetation communities within the ZOI of the Project Location. ELC conducted by Stantec in 2011 and 2012 was used to assess the presence of rare vegetation communities, as described below.

Cliffs and Talus Slopes

Criteria for a Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris. These features include any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT. Most cliffs and talus slopes occur along the Niagara Escarpment.

Sand Barrens

Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little or no soil and the underlying rock protrudes through the surface. They are usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%. Sand Barrens can occur within any of the following Community Types: SB01 (Open Sand Barren Ecosite), SBS1 (Shrub Sand Barren Ecosite), SBT1 (Treed Sand Barren Ecosite). The tree cover is always < 60% but there is no minimum size for a Sand Barren area.

Alvars

An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant species. Undisturbed alvars can be phyto- and zoo-geographically diverse, supporting many uncommon or are relict plant and animal species.

Vegetation cover varies from patchy to barren with a less than 60% tree cover. Alvars occur in any of the following Community Types: ALO1 (Open Alvar Rock Bottom Ecosite), ALS1 (Alvar Shrub Rock Barren Ecosite), ALT1 (Treed Alvar Rock Barren Ecosite), FOC1 (Dry-Fresh Pine Coniferous Forest), FOC2 (Dry-Fresh Cedar Coniferous Forest), CUM2 (Bedrock Cultural Meadow), CUS2 (Bedrock Cultural Savannah), CUT2-1 (Common Juniper Cultural Alvar Thicket), or CUW2 (Bedrock Cultural Woodland). Also, an alvar site needs to be > 0.5 ha in size.

Old-growth Forest

Old-growth forests tend to be relatively undisturbed, structurally complex, and contain a wide variety of trees and shrubs in various age classes. These habitats usually support a high diversity of wildlife species. For old-growth forest sites there is no minimum size criteria in any of the following Community Types: FOD (Deciduous Forest), FOM (Mixed Forest), FOC (Coniferous Forest).

ELC conducted in 2011 and 2012 and was used to further assess the presence of old-growth forests. Forests greater than 120 years old and with no historical forestry management will be the main criteria when identifying for old-growth forests.

Savannahs

A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. Tallgrass Prairie (TGP) and Savannah were historically common in the near-shore areas of the Great Lakes. In Ecoregion 6E, known TGP and Savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). TGP and Savannah occur in any of the following Community Types: TPS1 (Dry-Fresh Tallgrass Mixed Savannah Ecosite), TPS2 (Fresh-Moist Tallgrass Deciduous Savannah Ecosite), TPW1 (Dry-Fresh Black Oak Tallgrass Deciduous Woodland Ecosite), TPW2 (Fresh-Moist Tallgrass Deciduous Woodland Ecosite), CUS2 (Bedrock Cultural Savannah Ecosite). There is no minimum size requirement for consideration as SWH. Remnant sites such as railway right of ways are not considered to be SWH.

Tall-grass Prairies

A Tallgrass Prairie (TPG) has ground cover dominated by prairie grasses and has < 25% tree cover. TGP and Savannah were historically common in the near-shore areas of the Great Lakes. In Ecoregion 6E, known TGP and Savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). TGP occurs in any of the following Community Types: TPO1 (Dry Tallgrass Prairie Ecosite), TPO2 (Fresh-Moist Tallgrass Prairie Ecosite). There is no minimum size requirement for consideration as SWH. Remnant sites such as railway right of ways are not considered to be SWH.

Other Rare Vegetation Communities

Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps. Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG, with updates maintained on the NHIC database. Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.

3.1.6.3 Specialized Habitats

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

Specialized habitats and candidate specialized wildlife habitat have been identified by using the habitat criteria found in the SWHTG (MNR, 2000) and Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b). The habitat criteria for each potential specialized habitat and candidate specialized wildlife habitat, and methods employed to identify them within the ZOI of the Project Location are outlined below.

Waterfowl Nesting Area

All upland habitats located adjacent to PSWs and the following wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, and SWD4.

The results of ELC surveys and GIS analysis of the landscape were used to identify upland areas of open habitat >120 m wide that occurred adjacent to a large marsh, pond, swamp, or swamp thicket communities or clusters of these vegetation communities within the ZOI of the Project Location. Habitats adjacent to wetlands without standing water will not be considered candidate SWH.

Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat

Nests are associated with lakes, ponds, rivers, or wetlands along forested shorelines, islands, or on structures over water. Osprey nests are usually at the top of a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. Nests located on man-made objects are not considered candidate SWH (e.g. telephone poles and constructed nesting platforms). Nests occur in the ELC Forest Community Series of: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds, and wetlands.

Searches for stick nests were combined with ELC surveys in the fall of 2011 and summer/fall of 2012.

Woodland Raptor Nesting Habitat

All natural and conifer plantation woodland/forest stands combined > 30 ha or with >10 ha of interior habitat. Interior habitat is determined with a 200 m buffer. Stick nests are typically found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers Hawk nest along forest edges sometimes on peninsulas or small offshore islands. In disturbed sites, nests may be used again, or a new nest will be in close proximity to an old nest. The woodland raptor nesting habitat may be found in all forested ELC Ecosites and may also be found in SWC, SWM, SWD and CUP3.

Searches for stick nests were combined with ELC surveys in the fall of 2011 and summer/fall of 2012.

Turtle Nesting Areas

Turtle nesting areas require exposed mineral soil (sand or gravel) and areas adjacent (< 100 m) or within the following ELC Ecosites: MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1, BOO1, and FEO1. The best nesting habitat for turtles is close to water, away from roads and sites less prone to loss of eggs by predation from skunks, raccoons, or other animals.

For an area to function as a turtle nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the side of municipal or provincial road embankments and shoulders are not considered SWH. Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.

ELC surveys were used to identify candidate SWH for turtle nesting.

Seeps and Springs

Seeps/springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs. They also occur in any forested area (with <25% meadow/field/pasture) within the headwaters of the stream or river system. Seeps and springs are important feeding and drinking areas especially in the winter as they typically support a variety of plant and animal species.

Searches for seeps and springs were conducted during ELC investigations. As the Project Study Area consists primarily of cultivated agricultural cropland, the search for seeps and springs focused on the natural features (forested ecosites) within the ZOI of the Project Location.

Amphibian Breeding Habitat (Woodland)

Amphibian breeding habitat in woodlands is associated with the following ELC Community Series: FOC, FOM, FOD, SWC, SWM, and SWD. Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians. There also needs to be a presence of a wetland, lake, or pond within or adjacent (within 120 m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat.

Natural vegetation communities with the potential to support amphibian breeding habitat (woodland) were assessed by Stantec during vegetation assessment surveys. ELC polygons with areas of standing water or areas which showed evidence of holding water through the spring (based on topography and vegetation) were identified.

Amphibian Breeding Habitat (Wetland)

Amphibian breeding habitat for wetlands is associated with ELC Community Classes of: SW, MA, FE, BO, OA, and SA. Wetlands areas need to be > 120 m from woodland habitats. Wetlands and pools (including vernal pools) > 500 m² (about 25 m diameter) supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNR mapping and could be important amphibian breeding habitats.

The presence of shrubs or logs increase significance of ponds for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. Bullfrogs require permanent water bodies with abundant emergent vegetation.

Vegetation community classification surveys were used to identify habitat features within the ZOI of the Project Location including those that may support Bullfrogs (i.e., natural open aquatic and marsh habitats greater than 500 m² in size). ELC polygons with areas of standing water or areas which showed evidence of holding water through the spring (based on topography and vegetation) were identified.

3.1.6.4 Species of Conservation Concern

Habitats within the ZOI of the Project Location were assessed for their suitability to support species of conservation concern that are known to occur or have the potential to occur within the vicinity of the Project Study Area (**Table B2, Appendix B**). Assessments were carried out for the following categories of species of conservation concern:

- Marsh bird breeding habitat;
- Woodland area-sensitive bird breeding habitat;
- Open country bird breeding habitat;
- Shrub/early successional bird breeding habitat;
- Terrestrial crayfish; and
- Special concern and rare wildlife species.

Site investigations were carried out through a combination of vegetation surveys for plant species of conservation concern, and ELC-based habitat assessments for both plant and wildlife species of conservation concern as described in the Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b).

Marsh Bird Breeding Habitat

Marsh bird breeding primarily occurs in wetlands, particularly where shallow water and emergent aquatic vegetation occur. Breeding habitat for Green Heron includes the edges of sluggish streams, ponds and marshes sheltered by shrubs and trees, and less frequently, it may be found in upland shrubs or forest at a considerable distance from water. Ecosites may include any of the following Community Types: Meadow Marsh (MAM), Shallow Aquatic (SA), Open Bog (OB), Open Fen (FEO), or for Green Heron: Swamp (SW), Marsh (MA) and Meadow (CUM).

Site investigations were conducted to assess the potential for this habitat using ELC to document suitable habitat within the ZOI of the Project Location, including nest searches for Green Heron.

Wooded Area-sensitive Bird Breeding Habitat

Breeding birds are breeding in habitats where interior forest is > 4 ha (at least 200 m from the forest edge). These include Forest (FO) and Treed Swamp (SW) Community Types that are mature (>60 years old) and >30 ha.

Site investigations were conducted to assess the potential for woodlots within the ZOI of the Project Location > 30 ha in size with the potential to host populations of area-sensitive species, through the delineation and verification of forest communities by ELC.

Open Country Bird Breeding Habitat

Criteria for open country bird breeding habitat includes grassland areas >30 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or intensive hay or livestock pasturing in the last 5 years, in Meadow (CUM) Community Types. It is important to consider the condition of existing habitat (level of disturbance) at the site. For example, fields with intensive agriculture are not considered candidate habitat, whereas fields with light grazing are considered candidate habitat. Size and location of habitat must also be taken into consideration.

Site investigations were conducted to assess the potential for grassland communities within the ZOI of the Project Location to support area-sensitive bird species, through the delineation of and verification of grassland communities by ELC.

Shrub/Early Successional Bird Breeding Habitat

Criteria for shrub/early successional bird breeding habitat include successional old-field areas >10 ha in Thicket (CUT), Savannah (CUS), or Woodland (CUW) Community Series. Class 1 or Class 2 agricultural lands, row-cropping and intensive hay or livestock pasturing (in the last 5 years) do not qualify as candidate habitat.

Site investigations were conducted to assess the potential for this habitat type using ELC to delineate thicket and savannah type communities.

Terrestrial Crayfish

Terrestrial crayfish use meadow and the edges of shallow marshes to construct burrows (MNR, 2012b). The Canadian range of terrestrial crayfish is restricted to southwestern Ontario (MNR, 2012b).

Vegetation community classification surveys were used to identify habitat features within the Zion Project Location including those that may support Terrestrial Crayfish, and document any encountered evidence including the presence of burrows.

Special Concern and Rare Wildlife Species

Table B2, Appendix B provides a description of each species of conservation concern and their associated habitat. Site investigations were carried out through a combination of vegetation surveys for plant species of conservation concern, and ELC-based habitat assessments for both plant and wildlife species of conservation concern as described in the Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b). Habitat mapping and ELC community results were compared to the habitat requirements of the species identified through the Records Review to determine whether the critical habitat components required to support each of the species occurred within the Project Location or ZOI.

3.1.6.5 Animal Movement Corridors

Animal Movement Corridors should only be identified as SWH where a Confirmed or Candidate SWH has been identified by MNR or the planning authority based on documented evidence of a habitat identified within these Criterion Schedules or the Significant Wildlife Habitat Technical Guide. The identified wildlife habitats will have distinct passageways or rely on well-defined natural features for movements between habitats required by the species to complete its life cycle.

Amphibian Movement Corridor

Amphibian movement corridors may be found in all Ecosites associated with wetland and aquatic habitats. Amphibian movement corridors should consist of native vegetation, no road crossings, no gaps such as fields, waterways or bodies, and undeveloped areas are most significant (MNR, 2012). Corridors should be at least 200 m wide with gaps <20 m and if following riparian area with at least 15 m of vegetation on both sides of waterway. Shorter corridors are more significant than longer corridors; however amphibians must be able to get to and from their summer and breeding habitat (MNR, 2012a). This criteria was applied to the candidate amphibian breeding habitat – wetland features using a combination of ELC mapping and GIS investigations to determine if candidate amphibian movement corridors are present.

Deer Movement Corridors

Deer movement corridors may be found in forested Ecosites that measure at least 200m in width. Vegetation community investigations were used to confirm any such features associated with known deer wintering yards identified in the Records Review and occurring within the ZOI or Project Location.

3.2 RESULTS

The ZOI is comprised primarily of active agriculture including row crops, hay and pasture. Natural vegetation consisted of deciduous forest, swamp, cultural woodland and hedgerows and is described in **Section 3.2.1**. The Project Location is located primarily within active agriculture use. The ZOI, Project Location, and ELC delineations are mapped in on **Figures 2-1-2.2, Appendix A**.

Field notes for the site investigations are provided in **Appendix D**.

A summary of the corrections to the features identified through the Records Review, including new features or functions identified as a result of site investigations, is provided in **Table B4, Appendix B** and discussed in the following sections. A list of all natural features confirmed/identified in and within the ZOI for the Project Location is provided in **Table 3.3**.

3.2.1 Vegetation Community and Vascular Plants Assessment

Two ELC tables were created, which succinctly describe each vegetation community within the ZOI. These tables were divided into roadside assessments (i.e. collector line components) and property assessments (i.e. turbine and access road components).

One potentially rare vegetation community (FES1) was identified within the ZOI. This was a shrub fen community and was observed near the intersection of 20 Sideroad and Amaranth East Luther Townline (wetland feature #22; **Figure 2.2, Tile 5, Appendix A**; and **Figure 3.2, Tile 5, Appendix A**). Property access restrictions prevented a complete assessment of the species composition, which restricted the surveyor to Ecosite classification. While no fen indicator species were observed, this could be a reflection of the limited survey period and limited property access. To account for this, a conservative approach was taken and the community was identified as a Shrub Fen. While not all Shrub Fen communities are rare within Ontario, there are some with a rank of S3. This vegetation unit is carried forward to the Evaluation of Significance as Generalized Habitat (Table 3.3. – Other Rare Vegetation Communities). No bog communities were recorded within the Project Study Area. Historically, this community type was known to occur in the Luther Marsh area; these communities were gradually reduced in size and cover by logging and agricultural practices. Drainage channels were constructed throughout this landscape to improve soil conditions for crop cultivation. These channels have played a role in altering former bog communities by providing drainage corridors into and out of these communities. Since bog communities are ombrogenous (receive hydrological input from precipitation only), many of these bog-like communities within the landscape may be more appropriately defined as a fen or swamp. Although many wetland communities in this landscape are still referred to as “bog” communities, no bogs were delineated during site investigations due to limited property access and known hydrological influences.

Two hundred and eleven (211) species of vascular plants were recorded from the Project Study Area. It must be recognized, however, that this number reflects all optioned properties

surveyed, including property outside of the current ZOI. Seventy-two percent of the recorded species are considered native.

One hundred and forty-five (145) of the native species (97%) are ranked as S5 (common, widespread, and abundant in Ontario), while the remaining 3% of species are ranked as S4 (uncommon but not rare). No nationally or provincially rare, threatened or endangered species, or species with provincial ranks of S1, S2 or S3 were found.

The vegetation communities found within the Project Study Area are described in **Table B5, Appendix B** and shown on **Figures 2.1-2.2, Appendix A**. The complete plant species list appears in **Appendix E**.

3.2.2 Wetlands

Wetlands within the Project Study Area are typically deciduous swamp, swamp thickets, and meadow marshes, with rare occurrences of open aquatic and shrub fen (one unit). Site investigations identified a total of 30 wetlands as occurring within the ZOI for the Project Location, including features known from the Records Review. Descriptions of these features can be found in **Table 3.5**, with boundaries are shown on **Figures 3.1-3.2, Appendix A**.

The Project Location is not located in any wetland features with potential exceptions noted as follows:

- The location of collector lines occurring within municipal road ROWs will be determined during detail design. For the purposes of this EIS, it is assumed that the collector lines will be located outside of all wetlands (features 1, 6-15, 17-19, 24 and 26) and mitigation measures will be detailed as such. If, during final design, it is found that the collector lines will overlap any or all wetlands that occur with these ROWs, an addendum to this report will be issued where directional drill methods of installation will minimize direct loss of the feature.

3.2.2.1 Provincially Significant Wetlands

No PSWs have been identified in the ZOI or Project Location. None of the field identified wetlands are contiguous with known PSW features, therefore, no boundary adjustments to PSWs are required.

3.2.2.2 Unevaluated Wetlands

Field investigations confirmed the seven unevaluated wetlands identified in the Records Review, and identified an additional 23 wetlands within the ZOI for the Project Location. These wetlands consisted primarily of deciduous swamp, swamp thicket and meadow marsh units. All wetlands delineated during field investigations are shown on **Figures 3.1-3.2, Appendix A**.

Potential wetland communities that were beyond the ZOI of the Project Location and were not contiguous with identified features, as determined through air photo interpretation, were not included as part of the feature.

Corrections made to the Records Review for wetlands as a result of the site investigations are summarized in **Table B4, Appendix B**. Wetland units are also summarized in **Table 3.5**, including associated vegetation community types. An Evaluation of Significance is required for non-PSW wetlands identified through field verification. No wetland features were identified in the Project Location.

3.2.3 Woodlands

ELC investigations reviewed woodland boundaries identified in the background review, and documented a total of 33 woodland features within the ZOI for the Project Location. Results of woodland mapping are shown **Figures 3.1-3.2, Appendix A**; features are summarized in **Table 3.5**, include documentation of vegetation community types. An Evaluation of Significance is required for all woodlands identified through field verification.

None of the 33 woodlands are within the Project Location.

Potential woodland communities that were beyond the ZOI for the Project Location and were not contiguous with identified features, as determined through air photo interpretation, were not included as part of the feature mapping.

3.2.4 ANSIs

No ANSIs occur within the ZOI of the Project Location; therefore, field investigations were not required. ANSIs will not be carried to the Evaluation of Significance.

3.2.5 Wildlife and Wildlife Habitat

Site investigations identified a total of 18 candidate significant wildlife habitat features within the ZOI. None of the 18 candidate significant wildlife habitat features are in the Project Location.

The results were established using criteria for significant wildlife habitat as outlined within the SWHTG (MNR, 2000) and Draft Significant Wildlife Habitat Ecoregion 6E Criterion Schedule (MNR, 2012b). Candidate significant wildlife habitats are discussed in the sections below, and illustrated in **Figures 4.1-4.2, Appendix A**. **Table 3.5** provides a summary list of all candidate significant wildlife habitats identified by feature number, and describes associated vegetation community classifications. Corrections to the Records Review are summarized in **Table B4, Appendix B**.

All candidate features require an Evaluation of Significance to determine if confirmed significant wildlife habitat is present.

3.2.5.1 Seasonal Concentration Areas

Site investigations involved a thorough assessment of natural areas for seasonal concentration areas for wildlife habitat. Potential habitat for seasonal concentration areas was examined during the site investigation phase, and is discussed below. Seasonal concentration areas that

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did not have any candidate significant wildlife habitat will not be carried forward to the Evaluation of Significance phase.

Table 3.1: Summary of Site Investigation Results for Seasonal Concentration Areas

Candidate Seasonal Concentration Areas	Present within ZOI of Project Location (Feature No.)	Present in Project Location	Rationale	Carried Forward to Summary and EOS (Y/N)
Waterfowl Stopover and Staging Area (Terrestrial)	No	No	Areas of cultural meadows and agricultural pastures were present within the ZOI of the Project Location; however, surveys conducted in fall 2011 and 2012, and spring 2013 determined spatial and temporal duration of flooding was insufficient to support required aggregations of staging waterfowl, and required waterfowl use was not documented.	No
Waterfowl Stopover and Staging Area (Aquatic)	No	No	Areas of Meadow Marsh, Shallow Marsh, and Deciduous Swamp were present within the ZOI of the Project Location; however, surveys conducted in fall 2011 and 2012, and spring 2013 determined spatial and temporal duration of flooding was insufficient to support required aggregations of staging waterfowl, and required waterfowl use was not documented.	No
Shorebird Migratory Stopover Area	No	No	Of the candidate Ecosites, only Meadow Marsh was present in the ZOI; none of these features supported un-vegetated portions that may qualify as candidate Shoreline Migratory Stopover habitat.	No
Raptor Wintering Area	No	No	ELC and habitat assessments determined that there are no pastures, meadows or other upland cultural ELC types >15 ha located adjacent to >5 ha of forest found in the ZOI.	No
Bat Hibernacula	No	No	There are no caves, abandoned mine shafts, underground foundations, and karsts features or crevice/cave communities within 1120 m of the Project Location. No candidate features were observed during field investigations	No
Bat Maternity Colonies	BMC-1 and BMC-2	No	Vegetation community classifications were utilized to assess features within the ZOI of the Project Location that would support bat maternity colonies. Two areas of FOD and FOM ELC Ecosites were identified within 120m of proposed turbines as BMC-1 to BMC-2. Snag density calculations were conducted in BMC-1 in March 2013 to identify candidate significant wildlife habitat. BMC-1 supported snag/ cavity tree density of ≥10 snags per hectare of trees ≥25 cm dbh, therefore the site is a candidate for maternity colony roosts and EOS exit surveys are required. EOS surveys are planned for June 2013. Access to BMC-2 was not permitted and snag density surveys were not completed.	Yes
Turtle Wintering Areas	Yes	No	Candidate features are present in the ZOI; however no operational impacts are anticipated as per	Yes generalized;

Table 3.1: Summary of Site Investigation Results for Seasonal Concentration Areas

Candidate Seasonal Concentration Areas	Present within ZOI of Project Location (Feature No.)	Present in Project Location	Rationale	Carried Forward to Summary and EOS (Y/N)
			Appendix D of the NHA Guide; therefore these habitats are generalized and carried forward to the Environmental Impact Study where they will be treated as significant and general construction mitigation will be applied.	treated as significant
Snake Hibernacula	No	No	No snake hibernacula features such as buried concrete or rock (e.g. building foundations, culverts, rock crevices or abandoned animal burrows) were found within the ZOI of the Project Location.	No
Colonial-Nesting Bird Breeding Habitat (bank/cliff)	No	No	Results of the vegetation community surveys determined that there were no eroding banks, sandy hills, borrow pits, steep slopes and sand piles present within the ZOI of the Project Location.	No
Colonial-Nesting Bird Breeding Habitat (tree/shrub)	No	No	No colonial-nesting bird breeding habitat features or nests were found during the site investigation.	No
Colonial-Nesting Bird Breeding Habitat (ground)	No	No	Results of the vegetation community surveys determined that there were no rocky islands or peninsulas (natural or artificial) within a lake or large river within the ZOI of the Project Location. No colonial-nesting bird breeding habitat features were found during the site investigation. According to the 1 st and 2 nd OBBA, the core breeding area for Brewer's Blackbird is largely restricted to the Bruce Peninsula, which is located approximately 120 km from the Project Study Area; therefore this species is considered absent from the ZOI.	No
Deer Winter Congregation Areas	Yes	No	MNR identified features are present in the ZOI; however no operational impacts are anticipated as per Appendix D of the NHA Guide; therefore these habitats are generalized and carried forward to the Environmental Impact Study where they will be treated as significant and general construction mitigation will be applied.	Yes generalized; treated as significant

3.2.5.2 Rare Vegetation Communities or Specialized Habitats

Rare Vegetation Communities

Site investigation results pertaining to rare vegetation communities and specialized habitats the ZOI are summarized in **Table 3.2**. Rare vegetation community types or specialized habitats for wildlife that did not have any candidate significant wildlife habitat will not be carried forward to the Evaluation of Significance phase.

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Table 3.2: Summary of Site Investigation Results for Rare Vegetation Communities and Specialized Wildlife Habitat

Candidate Rare Vegetation Community/Specialized Wildlife Habitat	Present within ZOI of Project Location (Feature No.)	Present in Project Location	Rationale	Carried Forward to Summary and EOS (Y/N)
Cliffs and Talus Slopes	No	No	Rare vegetation communities (cliffs and talus slopes) were not observed during ELC and vegetation surveys within the ZOI of the Project Location.	No
Sand Barrens	No	No	Rare vegetation communities (sand barrens) were not observed during ELC and vegetation surveys within the ZOI of the Project Location.	No
Alvars	No	No	Rare vegetation communities (alvars) were not observed during ELC and vegetation surveys within the ZOI of the Project Location.	No
Old-growth Forest	No	No	Rare vegetation communities (old-growth forests) were not observed during ELC and vegetation surveys within the ZOI of the Project Location.	No
Savannahs	No	No	Rare vegetation communities (savannahs) were not observed during ELC and vegetation surveys within the ZOI of the Project Location.	No
Tall-grass Prairies	No	No	Rare vegetation communities (tall-grass prairie) were not observed during ELC and vegetation surveys within the ZOI of the Project Location.	No
Other Rare Vegetation Communities	Yes	No	One potentially rare vegetation community (identified as a Shrub Fen Ecosite - FES1) was observed during ELC and vegetation surveys within the ZOI of the Project Location (north of T106). While not all Shrub Fen communities are rare in Ontario, there are some with a rank of S3. This particular community type (FES1) is not listed in the SWHTG, Appendix M as a provincially rare type; however, a conservative approach is applied in this case, and the feature is carried forward. This feature is located outside the project location and is considered generalized habitat and carried forward to the EIS.	Yes generalized; treated as significant
Waterfowl Nesting Area	WNA-3 and WNA-4	No	Upland ELC Ecosites adjacent to wetland features were identified during ELC investigations as candidate habitats requiring EOS surveys. Two candidate features were identified and mapped as the wetland feature plus 120 m of upland habitat as defined by the Ecoregion 6E Criterion Schedule.	Yes
Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat	No	No	ELC and habitat assessments of all woodlands and vegetated watercourses within the ZOI of the Project Location did not	No

Table 3.2: Summary of Site Investigation Results for Rare Vegetation Communities and Specialized Wildlife Habitat

Candidate Rare Vegetation Community/Specialized Wildlife Habitat	Present within ZOI of Project Location (Feature No.)	Present in Project Location	Rationale	Carried Forward to Summary and EOS (Y/N)
			detect any nests of Osprey and Bald Eagle.	
Woodland Raptor Nesting Habitat	No	No	Three woodlands (including swamp forest and plantation communities)>30 ha are present in the ZOI (Woodland features 30, 32, and 35); however, no stick nests were found in these features during ELC and habitat assessments.	No
Turtle Nesting Areas	No	No	ELC and habitat assessment surveys undertaken in the ZOI located candidate ELC Ecosites for turtle nesting in close proximity to water and wetland habitats; however investigations in May 2013 did not locate any areas of exposed sand or gravel.	No
Seeps and Springs	No	No	ELC and woodland habitat assessment surveys did not identify seeps or springs.	No
Amphibian Breeding Habitat (Woodland)	ABWO-1, ABWO-2, ABWO-3, ABWO-4, ABWO-5, ABWO-6, ABWO-7, ABWO-8, ABWO-9, ABWO-13, ABWO-14, and ABWO-15,	No	Candidate ELC Ecosites were identified within the ZOI of the Project Location during ELC surveys. Candidate features supported standing water during early spring 2013 investigations.	Yes
Amphibian Breeding Habitat (Wetland)	ABWE-2	No	Candidate ELC Ecosites were identified within the ZOI of the Project Location during ELC surveys (features are >500 m ² and not located within 120 m of woodlands). Candidate features supported standing water during early spring 2013 investigations.	Yes

3.2.5.3 Species of Conservation Concern

Site Investigation results pertaining to habitats for species of conservation concern the ZOI for the Project Location are summarized in **Table 3.3**. Species of conservation concern that did not have any candidate significant wildlife habitat will not be carried forward to the Evaluation of Significance phase.

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Table 3.3: Summary of Site Investigation Results for Habitat for Species of Conservation Concern

Candidate Habitat for Species of Conservation Concern	Candidate Habitat Present in ZOI (Feature No.)	Candidate Habitat Present in Project Location	Rationale	Carried Forward to EOS (Y/N)
Marsh Bird Breeding Habitat	MBB-1	No	ELC investigations documented candidate Marsh Bird Breeding Habitat in the ZOI. Investigations conducted during spring 2013 in candidate ELC Ecosites habitats documented presence of standing water and emergent vegetation, and searched SW classifications for Green Heron stick nests (during leaf-off condition). One feature supported standing water and emergent vegetation and is carried forward to the EOS. No Green Heron stick nests were found.	Yes
Woodland Area-sensitive Bird Breeding Habitat	Yes	No	Candidate ELC Ecosite either 30 ha in size or with interior habitat are present in the ZOI, including Woodland Features 13 and 30. No operational impacts are anticipated as per Appendix D of the NHA Guide; therefore these habitats are generalized and carried forward to the Environmental Impact Study where they will be treated as significant and general construction mitigation will be applied.	Yes generalized; treated as significant
Open Country Bird Breeding Habitat	No	No	ELC and habitat assessments determined that no qualifying grassland areas, as per the SWH Ecoregion 6E Criterion Schedule were identified. All potential grassland habitats within the ZOI of the Project Location were identified to be active agricultural fields.	No
Shrub/Early Successional Bird Breeding Habitat	No	No	ELC investigations did not identify any Shrub/Early Successional Habitat 10 ha or larger in the ZOI	No
Terrestrial Crayfish	No	No	ELC and habitat assessment surveys undertaken in all MA units within the ZOI of the Project Location did not locate any burrows or other evidence of terrestrial crayfish.	No
Special Concern and Rare Wildlife Species				
A Moss	No	No	ELC surveys did not identify the species during investigations conducted in October 2011 and August-September 2012. No cracks or exposed faces of acidic or calcareous rocks were located during field investigations and suitable habitat of A Moss is considered absent.	No

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Table 3.3: Summary of Site Investigation Results for Habitat for Species of Conservation Concern

Candidate Habitat for Species of Conservation Concern	Candidate Habitat Present in ZOI (Feature No.)	Candidate Habitat Present in Project Location	Rationale	Carried Forward to EOS (Y/N)
Hart's Tongue Fern	Yes	No	<p>ELC surveys did not identify the species during investigations conducted in October 2011 and August-September 2012.</p> <p>Habitat indicators for Hart's Tongue Fern (limestone rock outcrops, particularly in FOD) were not located during field investigations and preferred habitat is considered absent.</p> <p>It is possible that FOD habitats in Woodland Features 13 and 26 support Hart's Tongue Fern; however, the species was not observed in portions overlapping with the ZOI and no removal of these features is proposed.</p>	Yes generalized; treated as significant
Hill's Pondweed	No	No	<p>OA habitats may support Hill's pondweed, including Wetland Features 10, 27 and 30; however ELC surveys did not identify the species during investigations conducted in October 2011 and August-September 2012, and no evidence of submergent plant forms were documented. The species is considered absent.</p>	No
Tuberous Indian Plantain	Yes	No	<p>Suitable habitat for occurs in FES1; however, this community does not overlap with the Project Location and therefore will not be impacted. FES1 is considered generalized candidate significant wildlife habitat and an evaluation of significance is not required.</p>	Yes generalized; treated as significant
Monarch	No	No	<p>This species is considered under migratory butterfly stopover areas. The Project Study Area is not located within 5km of a Great Lakes shoreline and is not considered to be in an area that would serve as a significant butterfly stopover site. Monarch was not documented during vegetation or other field investigations.</p>	No; considered through migratory butterfly stopover areas
West Virginia White	No	No	<p>This species is considered under migratory butterfly stopover areas. The Project Study Area is not located within 5km of a Great Lakes shoreline and is not considered to be in an area that would serve as a significant butterfly stopover site. This species was not documented during vegetation or other field investigations.</p>	No; considered through migratory butterfly stopover areas

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Table 3.3: Summary of Site Investigation Results for Habitat for Species of Conservation Concern

Candidate Habitat for Species of Conservation Concern	Candidate Habitat Present in ZOI (Feature No.)	Candidate Habitat Present in Project Location	Rationale	Carried Forward to EOS (Y/N)
Western Chorus Frog	Yes	No	Habitat for this species has been determined through wetland investigations and the assessment of amphibian breeding habitat. Surveys for this species will be assessed via amphibian surveys in 2013.	Yes; considered through Amphibian Breeding Habitat (Woodland) and Amphibian Breeding Habitat (Wetland)
Snapping Turtle	Yes	No	Habitat for this species was determined through the consideration of Turtle Overwintering and Nesting Habitat.	Yes; considered through Turtle Overwintering (generalized)
Eastern Ribbon Snake	No	No	Habitat has been determined through the consideration of Snake Hibernacula features.	No; considered through snake hibernaculum
Eastern Milksnake	No	No	Habitat has been determined through the consideration of Snake Hibernacula features.	No; considered through snake hibernaculum
Redhead	No	No	Habitat for this species has been determined through the consideration of Waterfowl Stopover and Staging Areas (Aquatic).	No; Waterfowl Stopover and Staging Areas (Aquatic)
Red-necked Grebe	Yes	No	Habitat for this species has been determined through the consideration of Marsh Bird Breeding Habitat.	Yes; considered through Marsh Bird Breeding Habitat.
Great Egret	No	No	Habitat for this species has been determined through the consideration of Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs).	No; considered under Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)
Black-crowned Night-heron	No	No	Habitat for this species has been determined through the consideration of Colonially -Nesting Bird Breeding Habitat (Tree/Shrubs).	No; considered under Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)
Bald Eagle	No	No	Habitat for this species was considered through Bald Eagle/Osprey Nesting.	No; considered under Bald Eagle/Osprey Nesting
Wilson's Phalarope	Yes	No	Habitat for this species has been determined through the consideration of Marsh Breeding Bird Habitat (features with shallow water and emergent vegetation, excluding habitat for Green Heron).	Yes; consideration of Marsh Bird Breeding Habitat.
Caspian Tern	No	No	Habitat for this species has been determined through the consideration for Colonial-Nesting Bird Breeding Habitat (ground).	No; considered under Colonially - Nesting Bird Breeding Habitat (ground)
Black Tern	Yes	No	Habitat for this species has been determined through the consideration for	Yes; consideration provided through

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Table 3.3: Summary of Site Investigation Results for Habitat for Species of Conservation Concern

Candidate Habitat for Species of Conservation Concern	Candidate Habitat Present in ZOI (Feature No.)	Candidate Habitat Present in Project Location	Rationale	Carried Forward to EOS (Y/N)
			Marsh Breeding Bird Habitat.	Bird Marsh Breeding Habitat
Short-eared Owl	No	No	Habitat for this species has been determined through the consideration of Open Country Breeding Bird Habitat and Raptor Wintering Areas.	No; considered under Open Country Breeding Bird Habitat and Raptor Wintering Areas
Common Nighthawk	No	No	ELC investigations did not identify any open areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings, rock barrens, peatbogs, lakeshores, or mine tailings.	No
Red-headed Woodpecker	Yes	No	Habitat greater than 4ha include Woodland Features 12, 18 and 30. Suitable cavity trees (at least 40dbh) were not located in the ZOI of Project components; however, they may occur beyond the ZOI, in contiguous habitat that was not accessed during site investigations. No removal of these features is proposed; therefore habitat for Red-headed Woodpecker is generalized and carried forward to the EIS.	Yes generalized; treated as significant
Olive-sided Flycatcher	No	No	One coniferous forest occurs (FOC2-2/FOC4-1; Woodland Feature 8) near a stream; however the feature lacks dead snags for perching and is dominated by a closed canopy of non-preferred species (Eastern White Cedar). The species prefers semi-open spruce communities. Woodland feature 8 is not considered candidate habitat and is not carried forward.	No
Louisiana Waterthrush	Yes	No	Habitat for this species has been determined through consideration of Woodland Area-sensitive Bird Breeding Habitat.	Yes; considered through Woodland Area-Sensitive Bird Breeding Habitat
Golden-winged Warbler	No	No	Habitat for this species has been determined through the consideration of Shrub/Early Successional Bird Breeding Habitat.	No; considered under Shrub/Early Successional Bird Breeding Habitat
Hooded Warbler	No	No	A combination of ELC investigations and GIS analysis was used to identify candidate FOD habitat with a minimum area of 15 ha and/or interior habitat, and along watercourses or with other forest clearings. No such candidate habitat features were identified.	No
Canada Warbler	Yes	No	Habitat for this species has been determined through the consideration of Woodland Area-Sensitive Bird Breeding Habitat. Woodland Area-sensitive habitat is generalized.	Yes; considered through Woodland Area-Sensitive Bird Breeding Habitat

Table 3.3: Summary of Site Investigation Results for Habitat for Species of Conservation Concern

Candidate Habitat for Species of Conservation Concern	Candidate Habitat Present in ZOI (Feature No.)	Candidate Habitat Present in Project Location	Rationale	Carried Forward to EOS (Y/N)
Eastern Wood Pewee	Yes	No	ELC Investigations identified the following candidate wooded features for this species: Woodland Features 1, 8, 13, 23, 26, and 30. No removal of these features is proposed; therefore, features are generalized and carried forward to the EIS.	Yes generalized; treated as significant

3.2.5.4 Animal Movement Corridors

Site Investigation results pertaining to animal movement corridors within the ZOI for the Project Location are summarized in **Table 3.4**.

Table 3.4: Summary of Site Investigation Results for Animal Movement Corridors

Candidate Animal Movement Corridor	Present in or within ZOI of Project Location	Present in Project Location	Rationale	Carried Forward to EOS (Y/N)
Amphibian Movement Corridor	No	No	One candidate amphibian breeding habitat – wetland feature was identified in the ZOI (AMBE-2); the feature is isolated in an agriculture field and movement corridors are not present as determined through ELC mapping.	No
Deer Movement Corridor	No	No	Field investigations did not identify any 200m forested corridors connecting to known deer yards with the ZOI.	No

3.3 SITE INVESTIGATION RESULTS SUMMARY

Table 3.5 provides a summary of only those natural features documented by the Site Investigations that are in the Project Location and or within the ZOI and will be carried forward to the Evaluation of Significance. Corrections made to the Records Review are provided in **Table B2, Appendix B**.

The location of collector lines occurring within municipal road ROWs will be determined during detail design. For the purposes of this EIS, it is assumed that the collector lines will be located outside of all wetlands (features 1, 6-15, 17-19, 24 and 26) and are indicated as such in **Table 3.5**. If, during final design, it is found that the collector lines will overlap any or all wetlands that occur with these ROWs, an addendum to this report will be issued where directional drill methods of installation will minimize direct loss of the feature.

In addition to the features indicated in **Table 3.5**, the following habitats are carried forward as generalized features (i.e., no operational impacts are anticipated as per Appendix D of the NHA Guide):

- Turtle overwintering areas (including consideration of Snapping Turtle)
- Deer wintering congregation areas
- Rare Vegetation Community – FES1
- Woodland area-sensitive breeding bird habitat (including consideration of Louisiana Waterthrush and Canada Warbler)
- Special Concern and Rare Wildlife Species – Hart’s Tongue Fern, Tuberous Indian-plantain, Red-headed Woodpecker and Eastern Wood Pewee

Table 3.5: Summary of Natural Features Carried Forward to EOS

Feature ID	Feature Type	ELC communities	Area (ha)	Located in Project Location	Located in Zone of Investigation (ZOI)	Carried Forward to EOS (Y/N)
Wetlands						
1	Wetland	SWT2-2	4.7	No	Yes	Yes
2	Wetland	MAM2-2	0.4	No	Yes	Yes
3	Wetland	SWT2-2,MAM2-2	27.7	No	Yes	Yes
5	Wetland	SWT2-2	1.0	No	Yes	Yes
6	Wetland	SWT2-2	5.9	No	Yes	Yes
7	Wetland	SWT2-2	1.1	No	Yes	Yes
8	Wetland	SWT2-5	3.8	No	Yes	Yes
9	Wetland	SWT2-5	0.5	No	Yes	Yes
10	Wetland	MAM2-2,OA	1.2	No	Yes	Yes
11	Wetland	MAM2-2	2.6	No	Yes	Yes
12	Wetland	MAM2-2	0.5	No	Yes	Yes
13	Wetland	MAM2-2	0.4	No	Yes	Yes
14	Wetland	MAM2-2	1.4	No	Yes	Yes
15	Wetland	SWD4-5*	29.6	No	Yes	Yes
16	Wetland	SWT2-2,MAM2,MAS2-3b,SWD4-5*,MAM2-2,SWD4-5*,SWD	21.3	No	Yes	Yes
17	Wetland	SWD4-5*,SWT2-2,SWT2-2,MAM2-2	3.5	No	Yes	Yes
18	Wetland	SWT2-2	0.3	No	Yes	Yes
19	Wetland	SWT2-2	0.4	No	Yes	Yes
20	Wetland	SWD4-5*	0.2	No	Yes	Yes
21	Wetland	SWD4-5*	0.9	No	Yes	Yes
22	Wetland	FES1,SWC4-2,SWD4-3,SWT	46.2	No	Yes	Yes
23	Wetland	MAM2-2	0.1	No	Yes	Yes
24	Wetland	MAM2-2, FOD7-2	23.9	No	Yes	Yes
25	Wetland	SWD4-5*	2.7	No	Yes	Yes
26	Wetland	SWT2-2	13.1	No	Yes	Yes
27	Wetland	OA	0.2	No	Yes	Yes
30	Wetland	SWD4,OA	3.9	No	Yes	Yes
31	Wetland	CUP/SWT, CUM1-1/SWT2-2	6.8	No	Yes	Yes
32	Wetland	MAM2-2	2.1	No	Yes	Yes
33	Wetland	SWT2-5,MAM2-2	1.5	No	Yes	Yes

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Table 3.5: Summary of Natural Features Carried Forward to EOS

Feature ID	Feature Type	ELC communities	Area (ha)	Located in Project Location	Located in Zone of Investigation (ZOI)	Carried Forward to EOS (Y/N)
Woodlands						
1	Woodland	FOD6-5	1.8	No	Yes	Yes
2	Woodland	CUW1-3*/Drain	0.8	No	Yes	Yes
3	Woodland	CUP1-11*	0.8	No	Yes	Yes
4	Woodland	CUP3-8	0.4	No	Yes	Yes
5	Woodland	CUP1	2.2	No	Yes	Yes
6	Woodland	CUP3-12*	7.4	No	Yes	Yes
7	Woodland	CUP3-12*	6.2	No	Yes	Yes
8	Woodland	FOC4-1,FOC2-2,FOM4-2	3.7	No	Yes	Yes
9	Woodland	CUP3-3,CUP3-3	0.9	No	Yes	Yes
10	Woodland	CUP3-3,CUP3-13*,CUP3-3,CUP3-14*	1.8	No	Yes	Yes
11	Woodland	CUW1	1.2	No	Yes	Yes
12	Woodland	CUW1-4*	8.9	No	Yes	Yes
13	Woodland	FOD3-1,FOM,CUP3-2	18.2	No	Yes	Yes
14	Woodland	CUP3,CUP3-13*,CUP3-3,CUP3-13*,CUP3-13*,CUP3-13*,CUP3-12*,SWD4-5*,SWD,CUP3-13*	18.8	No	Yes	Yes
15	Woodland	SWD4-5*,CUP3-3	2.1	No	Yes	Yes
16	Woodland	SWD4-5*	0.8	No	Yes	Yes
17	Woodland	SWD4-5*	0.2	No	Yes	Yes
18	Woodland	SWC4-2,SWD4-3	13.5	No	Yes	Yes
19	Woodland	SWD4-5*	1.7	No	Yes	Yes
20	Woodland	SWD4-5*	1.2	No	Yes	Yes
21	Woodland	CUP3-2	1.0	No	Yes	Yes
22	Woodland	CUP3-12*	17.1	No	Yes	Yes
23	Woodland	FOD7-2	23.2	No	Yes	Yes
24	Woodland	SWD4-5*	2.7	No	Yes	Yes
25	Woodland	CUP3/CUM1	1.5	No	Yes	Yes
26	Woodland	FOD8-1	5.4	No	Yes	Yes
29	Woodland	CUP3-13*	2.8	No	Yes	Yes
30	Woodland	SWD4	79.6	No	Yes	Yes
31	Woodland	CUP3-13*/CUP3-12*,CUP3-6	26.7	No	Yes	Yes
32	Woodland	CUP/SWT	38.4	No	Yes	Yes
33	Woodland	CUP3-12*	0.4	No	Yes	Yes
34	Woodland	CUP3-9	0.5	No	Yes	Yes
37	Woodland	CUP3-15*, CUP3-12*, CUP3-13*, CUP3-14*	13.9	No	Yes	Yes
ANSIs						
1	Luther Marsh (Life Science)		1191.8	No	No	No
Wildlife Habitat						
ABWE-2	Amphibian Breeding (Wetland)	SWT2-2, MAM2-2	27.3	No	Yes	Yes
ABWO-1	Amphibian Breeding (Woodland)	FOD6-5	1.8	No	Yes	Yes
ABWO-2	Amphibian Breeding (Woodland)	FOD3-1	2.4	No	Yes	Yes
ABWO-3	Amphibian Breeding (Woodland)	FOM	9.9	No	Yes	Yes
ABWO-4	Amphibian Breeding (Woodland)	SWD4-5*	1.7	No	Yes	Yes
ABWO-	Amphibian Breeding	SWD4-5*	0.7	No	Yes	Yes

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Table 3.5: Summary of Natural Features Carried Forward to EOS

Feature ID	Feature Type	ELC communities	Area (ha)	Located in Project Location	Located in Zone of Investigation (ZOI)	Carried Forward to EOS (Y/N)
5	(Woodland)					
ABWO-6	Amphibian Breeding (Woodland)	SWD4-5*	0.1	No	Yes	Yes
ABWO-7	Amphibian Breeding (Woodland)	SWD4-3	5.4	No	Yes	Yes
ABWO-8	Amphibian Breeding (Woodland)	SWD4-5*	1.6	No	Yes	Yes
ABWO-9	Amphibian Breeding (Woodland)	SWD4-5*	1.1	No	Yes	Yes
ABWO-13	Amphibian Breeding (Woodland)	AG-fallow, SWD	3.8	No	Yes	Yes
ABWO-14	Amphibian Breeding (Woodland)	SWT2-2	0.5	No	Yes	Yes
ABWO-15	Amphibian Breeding (Woodland)	SWT2-2, MAM2, MAS2-3b, SWD4-5*, MAM2-2, SWD4-5*	7.2	No	Yes	Yes
BMC-1	Bat Maternity Colonies	FOD6-5	1.8	No	Yes	Yes
BMC-2	Bat Maternity Colonies	FOD3-1	2.4	No	Yes	Yes
MBB-1	Marsh Bird Breeding	SWT2-2, MAM2-2	27.3	No	Yes	Yes
WNA-3	Waterfowl Nesting Area	OA	1.5	No	Yes	Yes
WNA-4	Waterfowl Nesting Area	OA, SWD4	6.8	No	Yes	Yes

3.4 QUALIFICATIONS

Personnel responsible for conducting the site investigation are listed in **Table B3, Appendix B**. Curricula vitae are provided in **Appendix F**.

4.0 Evaluation of Significance

Natural heritage information collected from the Records Review, the Site Investigations and agency consultations were analyzed to determine the significance and sensitivity of existing natural heritage features and their ecological functions. For all natural features existing in or within the ZOI of the Project Location, a determination was made of whether the natural feature is provincially significant, significant, not provincially significant or not significant.

Natural features present within the ZOI of the Project Location requiring an Evaluation of Significance are summarized in **Table 3.5**.

4.1 METHODS

4.1.1 Wetlands

A method for Wetland Characteristics and Ecological Functions Assessment (WCEFA) was developed by the MNR to provide a set of evaluation criteria focused on wetland attributes relevant to the completion of an Environmental Impact Statement (EIS) for renewable energy projects. The criteria to be evaluated are presented in Appendix C of the NHA Guide (MNR, 2012a).

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

Data is based on GIS analysis, imagery interpretation, agricultural soil mapping, and on-site field investigations. The criteria and procedures found within Appendix C of the Draft Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2010) are based on sections of the OWES – Southern Edition (MNR, 2012). Although this procedure does not evaluate the significance of these wetlands, it provides a procedure by which the significance of these wetlands can be assumed and their functions assessed based on the criteria established within the OWES manual. Specifically, these criteria were addressed in the following manner:

Biological Component

Wetland Size: This characteristic is based on the overall size of the contiguous wetland, including areas that are within but extend outside of ZOI. Data based on field surveys and/or imagery interpretation. (OWES Section 1.3)

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

Site Type: The wetland site type is provided. Data based on field surveys and/or aerial photo interpretation. (OWES Section 1.1.3)

Vegetation Forms: Based on ELC data, vegetation forms that were dominant, abundant, or occasional will be provided using OWES descriptors (e.g. “h” indicates deciduous trees). (OWES Section 1.2.2)

Proximity to Other Wetlands: The distance to the next closest wetland unit is provided. Adjacent wetland data may refer to agency wetland mapping or wetlands that were identified based on imagery interpretation. Data based on field surveys and/or imagery interpretation. (OWES Section 1.2.4)

Interspersion: When feasible, interspersion maps will be creating and the total number of point provided. In some cases, this assessment may be based estimates of total interspersion points, with due consideration given to the size and complexity of the wetland type delineations. Data based on field surveys and/or imagery interpretation. (OWES Section 1.2.5)

Open Water Types: The open water type number (page 52 of the OWES manual) is listed in the Table; data will be based on field surveys and/or imagery interpretation. (OWES Section 1.2.6)

Hydrological Component

Flood Attenuation: The general proximity of the wetland within the local watershed is stated, indicating if it is headwater, mid-reach, or lower-reach. The wetland catchment area is also provided, where data will typically derive from Digital Elevation Model (DEM) mapping and resulting flow accumulations. Where this is not possible, data will derive from interpretation of topographic mapping.

Water Quality Improvement (Short Term):

- *Watershed Improvement Factor (WIF)* – this is based on presence/absence of specific site types (e.g. palustrine wetlands with no inflow and intermittent outflow, or riverine wetlands with permanent inflow and outflow). This data is derived from field surveys where possible, or flow accumulation and water course mapping [OWES Section 3.2.1.1]
- *Adjacent and Watershed Land Use (LUF)* – estimated percent of land use and land use type within the catchment area (i.e. agricultural, urban or forested) is included (data derived from field surveys and/or imagery interpretation [OWES Section 3.2.1.2])
- *Pollutant Uptake Factor (PUT)* – this is based on the single *most* dominant vegetation form observed within the wetland community (data derived from field surveys where possible [OWES Section 3.2.1.3]), described as:
 - high proportion of emergent, submergent, and/or floating vegetation.

- a high proportion of live trees, shrubs, herbs, or mosses.
- a high proportion of wetland with little or no vegetation.

Water Quality Improvement (Long Term Nutrient Trap): Wetlands with a retentive capacity for nutrients (e.g., those with organic soils) provide protection for recharging groundwater. A characterization of wetland type and soil conditions is provided. Data based on field surveys where possible, or agricultural soil series mapping (OWES Section 3.2.2):

- *Water Quality Improvement (Groundwater Discharge):* OWES establishes eight indicators of hydrological discharge (OWES Section 3.2.3). When available, data indicative of groundwater discharge was provided.
- *Shoreline Erosion Control:* Shoreline wetlands provide a measure of protection from shoreline erosion caused by flowing water or waves. A description of the dominant shoreline vegetation is provided based on field surveys and/or imagery interpretation (OWES Section 3.4)
- *Groundwater Recharge (Site Type):* Site type is provided, where data is based on field surveys where possible (OWES Section 3.5.1)
- *Groundwater Recharge (Soils):* Soil type was indicated for each wetland unit, based on field surveys or agricultural soil mapping. (OWES Section 3.5.2)

Special Features

Species Rarity: All rare species observed during field surveys or species known to be present were documented and listed in the WCEFA results table (**Table B6, Appendix B**). Data based on field surveys, review of background materials (including existing wetland evaluations), and correspondence with agencies where possible (OWES Section 4.1.2).

Significant Features and Habitats: All significant features and habitats present in the wetland are documented and listed in the WCEFA Table (**Table B6, Appendix B**). Features/Habitat of interest include Colonial Waterbird Habitat, Winter Wildlife Cover, Waterfowl Staging and/or Moulting Areas, Waterfowl Breeding, and Migratory Passerine, Shorebird, or Raptor Stopover Areas. Data based on field surveys, background data, and correspondence with agencies where possible (OWES Section 4.2). Information on significant deeryards, obtained from Land Information Ontario (LIO) mapping, was also reviewed.

Fish Habitat: This provides presence/absence data of fish species observed during field surveys; if surveys indicate that fish were observed (regardless of species), the wetland is considered to provide suitable fish habitat. (OWES Section 4.2.6)

4.1.2 Woodlands

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

Woodlands are to be assessed within the context of the regional landscape and standards for each criteria vary based on the percentage of woodland cover in the municipality where the Project is proposed. The Grand Valley Phase 3 Project is located in the Town of Grand Valley and Township of Amaranth, with respective reported percent forest cover values between 13 to 16% and 16 to 19% (GRCA, 2004). As per the NHA Guide, all woodlands in the Town of Grand Valley and the Township of Amaranth are considered significant if they are 4 ha and 20 ha in size respectively.

The Townships of East Luther Grand Valley (now amalgamated with into the Town of Grand Valley) and Amaranth OPs define significant woodlands as woodlands in excess of 60 years of age and 4 hectares in size.

For the purposes on this report, all woodlands 4.0 ha are considered significant, regardless of municipal jurisdiction.

The 4 ha size threshold was combined with other criteria appearing the NHA Guide to assess significance of all woodlands identified within the ZOI of the Project Location, as described below. A summary of these criteria and the results from this assessment are discussed further in **Table B7, Appendix B**.

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

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

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

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

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

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

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

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

4.1.3 Wildlife and Wildlife Habitat

The SWHTG (MNR, 2000) and draft Ecoregion 6E Criterion Schedule was used to guide the identification of areas and features that should be considered candidate significant wildlife habitat (Section 4.2.3). This list was developed using ELC and wildlife habitat assessments conducted for the Project Study Area by qualified biologists in 2011, 2012 and 2013. All candidate significant wildlife habitat features are treated as significant in this evaluation, with pre-construction field investigations planned for 2013.

All wildlife observations made over the duration of the field program are compiled for the Project Study Area (**Appendix G**) and are considered in the assessment of wildlife use of the site. This list will be supplemented with findings of 2013 pre-construction surveys.

Given a review of available background information and an analysis of candidate significant wildlife habitat components that occurred within the ZOI, site investigation and pre-construction field surveys were planned for appropriate timing windows in all four-seasons. Collectively, these multiple surveys, the habitats they cover, and the period over which they occur (season and time of day) will offer a comprehensive set of field observations for fauna species on site.

The following pre-construction surveys will be implemented:

- Bat Maternity Colonies - evaluation of significance exit surveys (June 2013)
- Waterfowl Nesting Areas - spring waterfowl brood rearing surveys (May–July 2013)
- Amphibian surveys - woodland and wetland (April-June 2013)
- Marsh bird breeding (May-July 2013)
- Targeted surveys for: Western Chorus Frog, Red-necked Grebe, Wilson's Phalarope and Black Tern (May-July 2013)

Additional surveys targeting particular species at risk are also planned for 2013. Species at risk are legislated under the Endangered Species Act, 2007. Information regarding these surveys is not a regulatory requirement of O. Reg 359/09. As such, endangered and threatened species are not address in the NHA; however, a separate Species at Risk Report will be prepared and submitted to MNR as part of their Approval and Permitting Requirements.

The following candidate significant wildlife habitats were identified as occurring within the ZOI of the Project Location, requiring an Evaluation of Significance.

Seasonal Concentration Areas

- Bat Maternity Colonies: BMC-1 and BMC-2.

Rare Vegetation Communities or Specialized Habitat for Wildlife

- Waterfowl nesting area: WNA-3 and WNA-4.
- Amphibian breeding habitat (woodland): ABWO-1 to ABWO-9, and ABWO-13 to ABWO-14.
- Amphibian breeding habitat (wetland): ABWE-2

Species of Conservation Concern Habitats:

- Marsh breeding bird habitat: MBB-1

Species of Conservation Concern:

- Western Chorus Frog: candidate amphibian breeding habitat (woodland and wetland) feature; ABWO-1 to ABWO-9, ABWO-13 to ABWO-15 and ABWE-2.
- Red-necked Grebe: candidate marsh breeding habitat feature; MBB-1.
- Wilson's Phalarope: candidate marsh breeding habitat feature; MBB-1.
- Black Tern: candidate marsh breeding habitat feature; MBB-1.

Generalized Habitats

- Turtle overwintering areas (including consideration of Snapping Turtle)
- Deer wintering congregation areas
- Rare Vegetation Community – FES1
- Woodland area-sensitive breeding bird habitat (including consideration of Louisiana Waterthrush and Canada Warbler)
- Special Concern and Rare Wildlife Species –Hart's Tongue Fern, Tuberous Indian-plantain, Red-headed Woodpecker and Eastern Wood Pewee

A summary of the methods and the criteria used to evaluate the significance of each component of candidate significant wildlife habitat is provided below. All candidate significant wildlife habitat will be evaluated prior to construction.

4.1.3.1 Seasonal Concentration Areas of Animals

The criteria and methods used to evaluate the significance of candidate significant wildlife seasonal concentration areas within the ZOI for the Project Location are presented in **Table 4.1**. The locations of all survey points and transects are illustrated on **Figures 6.1 and 6.2, Appendix A**.

Table 4.1: Criteria and Methods Used to Evaluate Seasonal Concentration Areas of Animals

Candidate Seasonal Concentration Area	Criteria	Methods	Seasonal Timing
Bat Maternity Colonies	<ul style="list-style-type: none"> • Presence of >20 Northern Myotis, >10 Big Brown Bats, >20 Little Brown Myotis, >5 Adult Female Silver-haired Bats • Area of habitat includes entire woodland or the forest stand ELC Ecosite containing the maternity colonies. 	<ul style="list-style-type: none"> • All FODs within 120 of Turbines were surveyed during leaf-off condition in March 2013 to document ≥25cm dbh wildlife trees and identify candidate forests for maternity colony roosts. • BMC-1 has ≥10 snags per hectare of trees ≥25 cm dbh and will be subject to evaluation of significance exit surveys in June (30 minutes before dusk until 60 minutes after dusk) to identify confirmed SWH. Access to BMC-2 is not available and is assumed to be significant • Evaluation methods will follow the “Guidelines for Wind Power Projects Potential Impacts to Bats and Bat Habitats” • The survey protocol is detailed in the EIS. 	<ul style="list-style-type: none"> • March-June
Deer Winter Congregation Area	<ul style="list-style-type: none"> • MNR identified one feature in the ZO (Figure 1, Appendix A). Deer Wintering Areas identified by MNR were assumed to be significant. No operational impacts are anticipated as per Appendix D of the NHA Guide; therefore this habitat is generalized. 	<ul style="list-style-type: none"> • No surveys required; deer Wintering Areas identified by MNR were assumed to be significant. 	<ul style="list-style-type: none"> • Habitat is generalized; therefore no surveys required

4.1.3.2 Rare Vegetation Communities or Specialized Habitat for Wildlife

The criteria and methods used to evaluate the significance of candidate significant wildlife habitat for rare vegetation communities or specialized habitat for wildlife within the ZOI for the Project Location are presented in **Table 4.2**.

Table 4.2: Criteria and Methods Used to Evaluate Rare Vegetation Communities or Specialized Habitat for Wildlife

Candidate Rare Vegetation Community or Specialized Habitat for Wildlife	Criteria	Methods	Seasonal Timing
Other Rare Vegetation Community	<ul style="list-style-type: none"> One potentially rare community was identified, FES1. This community type (FES1) is not listed in the SWHTG, Appendix M as a provincially rare type; however, a conservative approach is applied in this case, and the feature is carried forward. This feature is located outside the project located and will be considered generalized habitat and carried forward to the EIS 	<ul style="list-style-type: none"> No surveys required 	<ul style="list-style-type: none"> Habitat is generalized; therefore no surveys required
Waterfowl Nesting Areas	<ul style="list-style-type: none"> Presence of 3 or more nesting pairs for listed species (i.e., American Black Duck, Northern Pintail, Northern Shoveler, Gadwall, Blue-winged Teal, Green-winged Teal, Wood Duck, Hooded Merganser, excluding Mallards), or; Presence of 10 or more nesting pairs for listed species including Mallards. Any active nesting site of an American Black Duck is considered significant. 	<ul style="list-style-type: none"> Brood rearing surveys will occur in open aquatic portions of the candidate feature on three separate occasions during the period of May to July. Surveys will including transects and point counts to maximize detection of any waterfowl, recording numbers of species observed, including numbers of young birds. Surveyors will spend 15 minutes at each vantage point. Vantage points will be recorded at all survey locations. Surveys will not take place during rain or periods of strong wind. The survey protocol is detailed in the EIS. 	<ul style="list-style-type: none"> May to July
Amphibian Breeding Habitat (Woodland)	<ul style="list-style-type: none"> Presence of breeding population of 1 or more of the listed salamander species (i.e., Eastern Newt, Blue-spotted Salamander or Spotted Salamander) or 2 or more of the listed frog species (i.e., Gray Treefrog, Spring Peeper, Western Chorus Frog or Wood Frog) with at least 20 individuals (adults, juveniles, eggs/larval masses). The habitat is the woodland (ELC polygons) 	<ul style="list-style-type: none"> Survey methods, timing and weather restrictions will the 'Marsh Monitoring Protocol' (BSC 2003). Amphibian surveys will consist of call counts at potential woodland breeding habitat conducted in each of April, May, and June. Monitoring stations were established a minimum of 500 m apart and 3 minute surveys were performed at each station, listening for all amphibian calls within a semi-circular sampling area. Surveys will be conducted between one-half hour after sunset and midnight, during appropriate 	<ul style="list-style-type: none"> April – June

Table 4.2: Criteria and Methods Used to Evaluate Rare Vegetation Communities or Specialized Habitat for Wildlife

Candidate Rare Vegetation Community or Specialized Habitat for Wildlife	Criteria	Methods	Seasonal Timing
	<ul style="list-style-type: none"> and wetland (ELC polygons) combined, or in the case of a wetland, the wetland and shoreline. A travel corridor connecting the woodland and wetland polygons is to be included in the habitat. 	weather conditions. <ul style="list-style-type: none"> Survey station location, dates, timing and weather conditions will be recorded during all events. The survey protocol is detailed in the EIS. 	
Amphibian Breeding Habitat (Wetland)	<ul style="list-style-type: none"> Presence of breeding population of 1 or more of the listed salamander species (i.e., Eastern Newt, Blue-spotted Salamander, Four-toed Salamander or Spotted Salamander) or 2 or more of the listed frog species (i.e., American toad, Northern Leopard Frog, Pickerel Frog, Green Frog, Mink Frog, Bullfrog, Gray Treefrog, or Western Chorus Frog) with at least 20 individuals (adults, juveniles, eggs/larval masses). The ELC ecosite wetland area and shoreline are included in the habitat. 	<ul style="list-style-type: none"> Survey methods, timing and weather restrictions will be the 'Marsh Monitoring Protocol' (BSC 2003). Amphibian surveys will consist of call counts at potential woodland breeding habitat conducted in each of April, May, and June. Monitoring stations were established a minimum of 500 m apart and 3 minute surveys were performed at each station, listening for all amphibian calls within a semi-circular sampling area. Surveys will be conducted between one-half hour after sunset and midnight, during appropriate weather conditions. Survey station location, dates, timing and weather conditions will be recorded during all events. The survey protocol is detailed in the EIS. 	<ul style="list-style-type: none"> April – June

4.1.3.3 Habitat for Species of Conservation Concern

The criteria and methods used to evaluate the significance of candidate significant wildlife habitat for species of conservation concern for wildlife within the ZOI for the Project Location are presented in **Table 4.3**.

Table 4.3: Criteria and Methods Used to Evaluate Habitat for Species of Conservation Concern

Candidate Habitat for Species of Conservation Concern	Criteria	Methods	Seasonal Timing
Marsh Breeding Bird Habitat	<ul style="list-style-type: none"> Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or 1 pair of Sandhill Cranes or 	<ul style="list-style-type: none"> Three rounds of breeding bird surveys will be conducted where marsh habitat occurs within or adjacent to optioned lands. 	<ul style="list-style-type: none"> Late May – early July

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Table 4.3: Criteria and Methods Used to Evaluate Habitat for Species of Conservation Concern

Candidate Habitat for Species of Conservation Concern	Criteria	Methods	Seasonal Timing
	<p>breeding by any combination of 5 or more of the listed species (American Bittern, Virginia Rail, Sora, Common Moorhen, American Coot, Pied-billed Grebe, Marsh Wren, Sedge Wren, Common Loon, Sandhill Crane, Green Heron, Trumpeter Swan).</p> <ul style="list-style-type: none"> Any site with breeding or 1 or more Black Terns, Trumpeter Swan, Green Heron, or Yellow Rail is SWH. 	<ul style="list-style-type: none"> Surveys will consist of standard point counts in conjunction with playback surveys. Playback surveys will target less conspicuous species including Pied-billed Grebe, American Bittern, American Coot, Common Moorhen, and Virginia Rail. Survey timing, restrictions and methods will follow “Birds and Bird Habitats: Guidelines for Wind Power Projects”. The survey protocol is detailed in the EIS. 	
Woodland Area-Sensitive Bird Breeding Habitat	<ul style="list-style-type: none"> Presence of nesting or breeding pairs of 3 or more of the listed species (Yellow-bellied Sapsucker, Red-breasted Nuthatch, Veery, Blue-headed Vireo, Northern Parula, Black-throated Green Warbler, Blackburnian Warbler, Black-throated Blue Warbler, Ovenbird, Scarlet Tanager, Winter Wren). Based on background information collected by Stantec identifies potential area-sensitivity of songbird species (those requiring >30 ha of continuous habitat, see Appendix G). Any site with breeding Cerulean Warbler or Canada Warbler is significant. 	<ul style="list-style-type: none"> Generalized as per Appendix D of the NHA Guide and treated as significant 	<ul style="list-style-type: none"> No surveys required
Special Concern and Rare Wildlife Species	<p>Presence of:</p> <ul style="list-style-type: none"> Hart’s Tongue Fern 	<ul style="list-style-type: none"> No Specific surveys are proposed Candidate habitat is available in Woodland Features 13 and 26; however, the species was not observed in portions overlapping with the ZOI and no removal of these features is proposed. Habitat for Hart’s Tongue Fern is generalized. 	<ul style="list-style-type: none"> Habitat is generalized ; therefore no surveys required

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Table 4.3: Criteria and Methods Used to Evaluate Habitat for Species of Conservation Concern

Candidate Habitat for Species of Conservation Concern	Criteria	Methods	Seasonal Timing
	Presence of: <ul style="list-style-type: none"> • Tuberous Indian Plantain 	<ul style="list-style-type: none"> • No Specific surveys are proposed • Candidate habitat occurs in FES1; however, this community does not overlap with the Project Location and is generalized. 	<ul style="list-style-type: none"> • Habitat is generalized ; therefore no surveys required
	Presence of: <ul style="list-style-type: none"> • Snapping Turtle 	<ul style="list-style-type: none"> • No specific surveys are proposed. • Snapping Turtle is addressed through the assessment of Turtle Wintering (generalized SWH) and Turtle Nesting wildlife habitat features. 	<ul style="list-style-type: none"> • Turtle Wintering Areas are generalized ; therefore no surveys required
	Presence of: <ul style="list-style-type: none"> • Western Chorus Frog 	<ul style="list-style-type: none"> • Field investigations to be conducted in woodland and wetland habitats in spring. • Western Chorus Frog is addressed through the assessment of ABWE and ABWO. 	<ul style="list-style-type: none"> • April-June
	Presence of Waterfowl Species: <ul style="list-style-type: none"> • Red-necked Grebe • Wilson’s Phalarope • Black Tern 	<ul style="list-style-type: none"> • Three surveys will be conducted during the breeding season. • Considered through Marsh Bird Breeding habitat features as described above. 	<ul style="list-style-type: none"> • Late May – early July
	Presence of Area-Sensitive Woodland Species: <ul style="list-style-type: none"> • Canada Warbler • Louisiana Waterthrush 	<ul style="list-style-type: none"> • No Specific surveys are proposed • Species are considered through Area-sensitive Bird Breeding (generalized). 	<ul style="list-style-type: none"> • Area-Sensitive Woodland Habitat is generalized; therefore no surveys required
	Presence of: <ul style="list-style-type: none"> • Red-Headed Woodpecker 	<ul style="list-style-type: none"> • Candidate habitat for Red-Headed Woodpecker includes Woodland Features 12, 18 and 30. No removal of these features is proposed; therefore habitat for Red-headed Woodpecker is generalized and carried forward to the EIS. 	<ul style="list-style-type: none"> • Habitat is generalized; therefore no surveys required
	Presence of: <ul style="list-style-type: none"> • Eastern Wood Pewee 	<ul style="list-style-type: none"> • No Specific surveys are proposed • Candidate habitat is available in Woodland Features 1, 8, 13, 23, 26, and 30; however, no removal of these features is proposed and habitat is generalized. 	<ul style="list-style-type: none"> • Habitat is generalized; therefore no surveys required

4.2 RESULTS

4.2.1 Wetlands

Findings of the WCEFA assessment for all wetlands within the ZOI of Influences are presented in **Table B6, Appendix B**. Significance is assumed for all 30 wetland features documented and summarized in **Table 4.4** below. All wetlands are carried forward to the EIS.

4.2.2 Woodlands

Criteria for woodland significance were applied to each of the woodland features located within the ZOI for the Project Location. Results of the evaluation are provided in **Table B7, Appendix B**, and summarized in the **Table 4.4** below. Twenty-five of the woodlands met the criteria for significance based on criteria standards within the NHA Guide for Renewable Energy Projects, including Features: 1, 2, 5-8, 10-15, 18-26, 30-32, and 37. These features are shown on **Figures 5.1-5.2, Appendix A** and will be included in the EIS.

4.2.3 Wildlife and Wildlife Habitat

Candidate Significant Wildlife Habitat was identified as per the SWHTG (MNR, 2000) and Draft Ecoregion 6E Criterion Schedule (MNR, 2012b) and ELC investigations conducted for the Project Study Area by qualified biologists in 2012. This process identified 18 habitat features as summarized in **Table 4.4** below and shown on **Figures 4.1-4.2, Appendix A**. Field investigations planned for 2013 will be used to support the significance evaluation of these features; as per Appendix D of the NHA Guide, all areas of Candidate Significant Wildlife Habitat will be treated as significant and studied via pre-construction surveys in 2013.

4.3 SUMMARY

This Natural Heritage Assessment was undertaken to identify natural features found in the Project Location and within the ZOI and evaluate their significance. Results of the evaluation are summarized in **Table 4.4** below, including identification of significant features, and respective closest distances to project components.

The location of collector lines occurring within municipal road ROWs will be determined during detail design. For the purposes of this EIS, it is assumed that the collector lines will be located outside of all features identified within such ROWs, including wetland features 1, 6-15, 17-19, 24 and 26. These features are treated as follows in the table below: the distance to the buildable area for the collector line "BA (CL)" is indicated as <0.1m. If, during final design, it is found that the collector lines will overlap any or all wetlands that occur with these ROWs, an addendum to this report will be issued where directional drill methods of installation will minimize direct loss of the feature.

In addition to the features indicated in **Table 4.4**, the following habitats are carried forward to the EIS as generalized features (i.e., no operational impacts are anticipated as per Appendix D of the NHA Guide):

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- Turtle overwintering areas (including consideration of Snapping Turtle)
- Deer wintering congregation areas
- Rare Vegetation Community – FES1
- Woodland area-sensitive breeding bird habitat (including consideration of Louisiana Waterthrush and Canada Warbler)
- Special Concern and Rare Wildlife Species – Hart’s Tongue Fern, Tuberous Indian-plantain, Red-headed Woodpecker and Eastern Wood Pewee

Table 4.4: Summary of Natural Features Carried Forward to EIS

Feature ID	Feature Type	Distance to Project Component	Project Component in Feature	Significant? (Y/N)
1	Wetland	BA (CL) – <0.1	None	Treated as Significant
2	Wetland	TC – 105	None	Treated as Significant
3	Wetland	TC – <0.1 BS – 8 WT – 64 BA (CL/AR) - 64	None	Treated as Significant
5	Wetland	BA (CL) – 2	None	Treated as Significant
6	Wetland	BA (CL) – <0.1	None	Treated as Significant
7	Wetland	BA (CL) – <0.1	None	Treated as Significant
8	Wetland	BA (CL) – <0.1	None	Treated as Significant
9	Wetland	BA (CL) – <0.1	None	Treated as Significant
10	Wetland	BA (CL) – <0.1	None	Treated as Significant
11	Wetland	BA (CL) – <0.1	None	Treated as Significant
12	Wetland	BA (CL) – <0.1	None	Treated as Significant
13	Wetland	BA (CL) – <0.1	None	Treated as Significant
14	Wetland	BA (CL) – <0.1	None	Treated as Significant
15	Wetland	BA (CL) – <0.1	None	Treated as Significant
16	Wetland	BA (CL/AR) – <0.1	None	Treated as Significant
17	Wetland	BA (CL/AR) – <0.1 BS - 63	None	Treated as Significant
18	Wetland	BA (CL/AR) – <0.1	None	Treated as Significant
19	Wetland	BA (CL/AR) – <0.1	None	Treated as Significant
20	Wetland	TC – 1 BS – 21 WT – 77 BA (CL/AR) – 21	None	Treated as Significant
21	Wetland	TC – 20 BS – 114	None	Treated as Significant
22	Wetland	TC – <0.1 BS – 4 WT – 60 BA (CL/AR) – 40	None	Treated as Significant

Table 4.4: Summary of Natural Features Carried Forward to EIS

Feature ID	Feature Type	Distance to Project Component	Project Component in Feature	Significant? (Y/N)
23	Wetland	BA (CL) – <0.1	None	Treated as Significant
24	Wetland	BA (CL) – <0.1	None	Treated as Significant
25	Wetland	TC - 85	None	Treated as Significant
26	Wetland	BA (CL) – <0.1	None	Treated as Significant
27	Wetland	TC – 14 BS – 69	None	Treated as Significant
30	Wetland	TC – <0.1 BS – 4 WT – 60 BA (CL/AR) - 60	None	Treated as Significant
31	Wetland	BA (CL/AR) – 0	None	Treated as Significant
32	Wetland	BA (CL) - 41	None	Treated as Significant
33	Wetland	TC – 15 BS – 102	None	Treated as Significant
1	Woodland	BA (CL) – <0.1 TC – <0.1 WT – 45	None	Y
2	Woodland	BA (CL) – <0.1	None	Y
5	Woodland	BA (CL) – <0.1	None	Y
6	Woodland	BA (CL) – <0.1	None	Y
7	Woodland	BA (CL) – <0.1	None	Y
8	Woodland	BA (CL) – <0.1	None	Y
10	Woodland	BA (CL) – <0.1	None	Y
11	Woodland	BA (CL) – <0.1	None	Y
12	Woodland	BA (CL) – 59	None	Y
13	Woodland	BA (CL/AR) – <0.1 BS – 114	None	Y
14	Woodland	BA (CL) – <0.1	None	Y
15	Woodland	BA (CL/AR) – <0.1 BS - 63	None	Y
18	Woodland	BA (CL/AR) – <0.1 TC – <0.1 BS – 4 WT – 60	None	Y
19	Woodland	BA (CL) – <0.1	None	Y
20	Woodland	BA (CL) – <0.1	None	Y
21	Woodland	BA (CL) – <0.1	None	Y
22	Woodland	BA (CL) – 15	None	Y
23	Woodland	BA (CL) – <0.1	None	Y
24	Woodland	TC - 85	None	Y
25	Woodland	BA (CL) – <0.1 BS – 17 WT - 56	None	Y
26	Woodland	BA (CL) – <0.1	None	Y
30	Woodland	TC - <0.1 BS – 1 WT – 56 BA (CL/AR) - 56	None	Y
31	Woodland	TC – 1 BS – 24 WT – 81 BA (CL/AR) – 81	None	Y
32	Woodland	BA (CL/AR) – <0.1	None	Y

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Table 4.4: Summary of Natural Features Carried Forward to EIS

Feature ID	Feature Type	Distance to Project Component	Project Component in Feature	Significant? (Y/N)
37	Woodland	BA (CL) – <0.1	None	Y
ABWE-2	Amphibian Breeding (Wetland)	BS – 8 WT - 64 BA (AR/CL) – 55 TC – <0.1 WT – 64	None	Treated as Significant
ABWO-1	Amphibian Breeding (Woodland)	BA (AR/CL) – 1 TC – 1	None	Treated as Significant
ABWO-2	Amphibian Breeding (Woodland)	BS – 112 BA (AR/CL) – <0.1 TC – 67	None	Treated as Significant
ABWO-3	Amphibian Breeding (Woodland)	BA (AR/CL) – 1 BA (CL) – 0.3	None	Treated as Significant
ABWO-4	Amphibian Breeding (Woodland)	BS – 71 BA (AR/CL) – <0.1 BA (CL) – 87 TC – 31	None	Treated as Significant
ABWO-5	Amphibian Breeding (Woodland)	BS – 109 BA (AR/CL) – 29 TC – 3	None	Treated as Significant
ABWO-6	Amphibian Breeding (Woodland)	BS – 20 BA (AR/CL) – 24 TC – 0.5 WT – 76	None	Treated as Significant
ABWO-7	Amphibian Breeding (Woodland)	BS – 4 BA (AR/CL) – 1 TC – <0.1 WT - 60	None	Treated as Significant
ABWO-8	Amphibian Breeding (Woodland)	BA (AR/CL) – <0.1	None	Treated as Significant
ABWO-9	Amphibian Breeding (Woodland)	BA (AR/CL) - <0.1	None	Treated as Significant
ABWO-13	Amphibian Breeding (Woodland)	BS – 4 BA (AR/CL) – 40 TC – 3 WT - 60	None	Treated as Significant
ABWO-14	Amphibian Breeding (Woodland)	BA (AR/CL) – <0.1 BA (CL) – <0.1	None	Treated as Significant
ABWO-15	Amphibian Breeding (Woodland)	BA (AR/CL) – <0.1 BA (CL) - <0.1	None	Treated as Significant
BMC-1	Bat Maternity Colonies	BA (AR/CL) – 1 TC – 1	None	Treated as Significant
BMC-2	Bat Maternity Colonies	BS – 112 BA (AR/CL) – <0.1 TC - 67	None	Treated as Significant
MBB-1	Marsh Bird Breeding	BS – 8 BA (AR/CL) – 55 TC – <0.1 WT - 64	None	Treated as Significant
WNA-3	Waterfowl Nesting Area	BS – 25 BA (AR/CL) – 50 BA (CL) – <0.1 TC – <0.1 WT – 81	None	Treated as Significant
WNA-4	Waterfowl Nesting Area	BS – 4 BA (AR/CL) – 40 TC – 3 WT - 60	None	Treated as Significant

Legend: BA – Buildable Area; TC – Temporary Construction; BS – Blade Sweep; WT – Wind Turbine Base; CL – Collector Line; AR Access Road.

4.4 QUALIFICATIONS

The following Stantec personnel were responsible for the application of evaluation criteria and procedures:

- Sean Spisani, Senior Ecologist (evaluation of significance)
- James Leslie, Terrestrial Ecologist (ELC, woodland and habitat assessments, wetland evaluation, evaluation of significance)
- Natalie Leava, Terrestrial Ecologist (Records Review, ELC and habitat assessments)
- Andrea Orr, Terrestrial Ecologist (ELC and habitat assessment)

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

5.0 Environmental Impact Study

The construction, installation or expansion of a renewable energy generation facility is not permitted within a provincially significant southern wetland (with some exceptions), provincially significant coastal wetland, or a provincial park or conservation reserve (unless otherwise permitted under the Provincial Parks and Conservation Reserves Act, 2006) (O. Reg. 359/09, s. 37).

Such facilities may be permitted within the following areas subject to the completion of an EIS (O. Reg. 359/09, s. (38(1)):

- provincially significant northern wetland;
- provincially significant life science ANSI;
- significant woodland;
- significant wildlife habitat;
- within 120 m (turbines) or 50m (collector lines and transformer stations) of the above natural features, provincially significant southern wetland, provincially significant coastal wetland, provincial park or conservation reserve; or
- within 50 m of a provincially significant earth science ANSI (O. Reg. 359/09, s. (38(1))).

In accordance with O. Reg. 359/09, s. 37, no Project Components are sited within a provincially significant southern or coastal wetland, or previously unevaluated wetland assumed significant through the application of the Wetland Characteristics and Ecological Functions Assessment or “WCEFA” protocol, MNR, 2012a). Furthermore, since the Project Location includes the air space in which a Project operates, the wind turbines have been sited such that no part of a turbine blade overhangs a provincially significant southern or coastal wetland.

Significant natural heritage features that occur in or within the ZOI for the Project Location are summarized in **Table 4.4**, including wetlands treated as significant (as per WCEFA), significant woodlands and significant wildlife habitat components.

In accordance with O. Reg 359/09, an EIS must be prepared to identify and assess potential environmental effects and identify mitigation measures designed to prevent or minimize potential effects on a natural feature. Direct impacts on wildlife (i.e. mortality) are addressed through the Environmental Effects Monitoring Plan (EEMP) which is provided in the Design and Operations Report (Stantec, 2013a). A summary of the EEMP can be found in **Section 5.6**.

The SWHTG (MNR, 2000), the SWHTG Decision Support System (SWHTGDSS; 2000), the draft Ecoregion 6E Criterion Schedule (MNR, 2012b) and the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2012a) were used to assist in the evaluation of impacts and mitigation measures.

5.1 SUMMARY OF PROJECT COMPONENTS

The Project construction plan is summarized below, including descriptions of Project Components and construction timing. Full details of construction are provided in the Grand Valley Wind Farms – Phase 3 Wind Project Construction Plan Report (Stantec, 2013b).

Turbines

A total of 17 possible turbine locations is proposed. If approved, the Project will consist of between 14 and 17 wind turbine generators (Siemens SWT-2.3-113 and/or SWT 3.0-113 turbine). A total maximum installed nameplate capacity of 40MW is being applied for the REA application. The turbine models are identical in structure, and would be 'de-rated', generating less electricity per turbine to meet the contract nameplate capacity. A summary of the basic specifications of a typical turbine model in this class is provided in **Table 5.1**.

Turbine lighting must conform to Transport Canada standards. In order to reduce rural light pollution, lights would be synchronized, with the minimal allowable flash duration, and a narrow beam.

Table 5.1: Basic Wind Turbine Specifications

Manufacturer	Siemens	Siemens
Model	SWT 2.3-113	SWT 3.0-113
Name plate capacity (MW)	2.3 MW	3.0 MW
Hub height above grade	99.5 m	99.5 m
Blade length	55 m	55 m
Full blade diameter	113 m	113 m
Blade sweep area	10,000 m ²	10,000 m ²
Speed range	6-13 rpm	6-16 rpm
Frequency spectrum	60 Hz	60 Hz

Foundations

The foundations for the turbines will be made of poured-in-place reinforced concrete, approximately 2.5 m deep. The foundation is expected to be octagonal in shape with a diameter of approximately 16 m. Selection of the final foundation design will be based on the site-specific detailed geotechnical assessment to be carried out prior to the design and construction of the tower foundations. An excavator, dozer and truck would perform excavation for the foundation; no blasting is anticipated. Surface material will be stripped and stockpiled (topsoil separate from subsoil). Each excavation will take approximately two to three days.

The turbine tower base is approximately 4-5 m in diameter and will be anchored to the concrete foundation. The turbine towers will be assembled using heavy-lift crawler and mobile cranes.

Collector Lines

All underground collector lines will be constructed on leased lands and within municipal road right-of-ways (ROW). Wherever possible, underground collector lines on private lands will be aligned with the access roads to reduce the area required for construction and minimize potential construction impacts. The cables will be installed immediately to one side of the access road, just off the graveled surface. In the municipal road ROW the cables are proposed to be installed within the boulevard and final cable installation locations will be subject to municipal agreements. The collector lines will be buried at a minimum depth of 1.0 m. Overhead lines are not anticipated for the Project.

Where underground collector lines cross watercourses, roads, or other obstacles, the buried lines will be installed using directional drill techniques in suitably sized HDPE conduits at a sufficient depth below the feature to prevent any possibility of accidental damage. The entrance and exit points for the cable will be spaced to suit the particular situation and can vary widely in distance depending on the type of bore (e.g., along roadways, road crossings, water crossings, etc.) with pull and junction pits approximately 10 m long X 2 m wide.

Access Roads

Existing provincial and municipal roads will be used to transport Project-related components, equipment and personnel to the Project Location. The Project will be situated exclusively on privately owned land and municipal road allowances. Access to these lands will be required for installation and operation of the wind turbines. Agricultural laneways will be utilized and upgraded where possible. New laneways will be constructed as required and in consultation with landowners, to provide access to the individual turbine sites. Permanent access laneways will be approximately 4-6 m wide and will not require resizing for the operation phase.

Construction Timing

Construction activities are anticipated to be ongoing throughout the 3rd and 4th quarters of 2014. The majority of construction works are planned for this period, with turbine installation occurring in the 4th quarter of 2014.

5.2 LAND USE OF PROJECT LOCATION

The Project Location and the associated ZOI consisted of a mix of naturalized habitat and active cropland (row crops, hay and pasture). Woodland and wetland communities occurred throughout the ZOI. These communities frequently consisted of deciduous forest, swamp, meadow marsh and cultural woodland, with fewer occurrences of other cultural meadows and other community types.

The Project components are sited entirely within lands currently managed for agriculture to avoid natural heritage features, and no direct loss of natural vegetation cover is anticipated as a result of the Project components.

The location of collector lines occurring within municipal road ROWs will be determined during detail design. For the purposes of this EIS, it is assumed that the collector lines will be located outside of all features identified within such ROWs. If, during final design, it is found that the collector lines will overlap any or all features that occur within these ROWs, an addendum to this report will be issued to address impacts. Any impacts to vegetation cover resulting from ROW collector lines will occur along existing edges of features and are expected to be minimal. It is also anticipated that suitable mitigation is available to offset any negative effects, including standard mitigation and ecological vegetation community restoration measures.

5.3 NEGATIVE ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES ASSOCIATED WITH THE PROJECT

The primary mitigation measure employed to reduce impacts to natural features and functions was avoidance; micro-siting decisions made during the development of the Project layout considered minimizing impacts to natural features and wildlife habitat. The Project is sited predominately within actively agricultural land with minimal natural habitat removal required from within existing municipal ROWs for the Project. Through the course of site plan design, several modifications were made to avoid placing the Project in natural features to extent possible, including relocating turbines and collector lines to avoid the Luther Marsh PSW and ANSI, unevaluated wetlands, woodlands and candidate significant wildlife habitat, and other natural and naturalized communities. Setback distances to all significant natural features are provided in **Table 4.4**.

5.3.1 Significant Wetlands

Prior to final siting of the Project, previously unevaluated wetlands were assessed by applying WCEFA criteria and assuming significance for all identified features. Substantial effort was allocated to the design of the final layout to ensure that Project components were sited outside of all identified significant wetland boundaries. Separation distances from Project components to significant wetlands were maximized to the extent possible as an impact avoidance strategy. These distances are summarized in **Table 4.4**; also refer to **Figures 5.1-5.2, Appendix A**.

Turbines are sited more than 50 m from wetland features, with the following exceptions:

- Feature 3 is approximately 8 m from the blade sweep of T104.
- Feature 20 is approximately 21 m from the blade sweep of T106.
- Feature 22 is approximately 4 m from the blade sweep of T106.
- Feature 30 is approximately 4 m from the blade sweep of T112.

There will be no direct loss of significant wetland habitat or function outside existing municipal ROWs due to the Project. The location of collector lines occurring within municipal road ROWs will be determined during detail design. For the purposes of this EIS, it is assumed that the collector lines will be located outside of all wetlands (features 1, 6-15, 17-19, 24 and 26) and mitigation measures will be detailed as such. If, during final design, it is found that the collector lines will overlap any or all wetlands that occur with these ROWs, an addendum to this report will be issued where there is some potential for the collector lines to overlap wetlands that occur with these ROWs (wetland features 1, 6-15, 17-19, 24 and 26); however design will avoid wetlands in these locations. Where collector lines overlap wetlands, directional drill methods of installation will minimize direct loss of the feature.

Construction Phase

Indirect impacts resulting from construction activities, such as dust generation, dewatering, sedimentation, and erosion are expected to be short term and temporary in duration; mitigation is available through the use of standard site control measures.

New access roads and infrastructure can alter surface flow. Minimal increase in hard surface area could result in increased run-off quantities during precipitation events. Access roads (permanent width of 4-6 m) will cover minimal area relative to the Project Study Area. The percent area converted to hard surfaces is negligible and no effect to the water balance is anticipated. Potential impacts and mitigation measures for dewatering are provided in **Section 5.4**.

During construction, there will be increased vehicular traffic and the potential for accidental spills. These potential impacts will be avoided where possible and mitigated via implementation of a sediment and erosion protection plan, including the identification of specific locations for material stock-piling and maintenance activities to isolate any spills from the wetland. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately. Mitigation measures for stock-piling, maintenance, and potential spills are provided in **Section 5.4**.

Vegetation clearing and construction disturbance in close proximity to wetland features may create new edges in adjacent communities. Such edges may cause changes in vegetation composition as a result of increased exposure to sun and wind, particularly in closed canopy situations. This can create opportunities for the introduction and spread of invasive species in nearby wetland units.

Potential negative impacts and proposed mitigation measures for significant wetlands during the construction and decommissioning phases of the Project are detailed in **Table B8, Appendix B**.

Operation Phase

Operation of the Project is anticipated to have very limited impacts to significant wetlands.

During operation, infrequent day to day use of access roads and maintenance activities associated with the road may result in impacts to wetlands, due to dust, but such impacts are expected to be very minimal. If required, dust suppression during operation of the Project could be considered.

There may be occasional impacts during maintenance of access roads or collector lines. If major maintenance activities are required in proximity to significant wetlands, mitigation measure for construction and decommissioning (**Table B8, Appendix B**) should be implemented.

Other potential impacts that might occur during operation include spills and contamination to the wetlands. Improper disposal of wastes (e.g. fluids, containers, cleaning materials, etc.) could also have a negative impact on the feature. Storage of fuel and activities with the potential to cause contamination will occur in properly protected and sealed areas. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

5.3.2 Significant Woodlands

No removal of any portion of any significant woodland feature is proposed outside of the municipal ROW as part of the Project. The location of collector lines occurring within municipal road ROWs will be determined during detail design. For the purposes of this EIS, it is assumed that the collector lines will be located outside of all woodlands (features 2-11, 13-15, 18-21, 23, 25, 26, 30, 32 and 37) and mitigation measures will be detailed as such. If, during final design, it is found that the collector lines will overlap any or all wetlands that occur with these ROWs, an addendum to this report will be issued to minimize direct loss of the feature.

Turbines are sited more than 50 m from significant woodlands, with the following exceptions:

- Feature 18 is approximately 4 m from the blade sweep of T106.
- Feature 25 is approximately 17 m from the blade sweep of T110.
- Feature 30 is approximately <0.1 m from the blade sweep of T112.
- Feature 31 is approximately 24 m from the blade sweep of T114.

Separation distances from Project components to significant woodlands were maximized to the extent possible as an impact avoidance strategy. All separation distances for significant woodlands are summarized in **Table 4.4** for all project components, including construction zones; also refer to **Figures 5.1-5.2, Appendix A**.

Construction and Decommissioning Phase

Indirect impacts to significant woodlands resulting from construction activities, such as dust generation, sedimentation and erosion are expected to be short term and temporary in duration; mitigation is available through the use of standard site control measures. Potential impacts and mitigation requirements to significant woodlands are described in **Table B8, Appendix B** as well as in the general construction mitigation recommendations in **Section 5.5** below.

Operation Phase

Operation of the Project is anticipated to have very limited impacts to significant woodlands.

During operation, infrequent day to day use of access roads and maintenance activities associated with the road may result in impacts to woodlands, due to dust, but such impacts are expected to be minimal. If required, dust suppression during operation of the Project could be considered.

There may be occasional impacts during maintenance of access roads or collector lines. If major maintenance activities are required in proximity to significant woodlands, mitigation measures for construction and decommissioning (**Table B8, Appendix B**) should be implemented.

Other potential impacts that might occur during operation include spills and contamination to proximate woodlands; however separation distances are generally sufficient to avoid impacts. Improper disposal of wastes (e.g. fluids, containers, cleaning materials) could also have a negative impact on the feature. Storage of fuel and activities with the potential to cause contamination will occur in properly protected and sealed areas. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

5.3.3 Significant Wildlife Habitats

A total of 18 significant wildlife habitats was identified within the ZOI for the Project Location (**Figures 4.1-4.1, Appendix A**):

- Amphibian breeding habitat (wetland): ABWE-2
- Amphibian breeding habitat (woodland): ABWO-1 to ABWO-9, and ABWO-13 to ABWO-15
- Bat Maternity Colonies: BMC-1 and BMC-2
- Marsh breeding bird habitat: MBB-1
- Waterfowl nesting area: WNA-3 and WNA-4

None of the 18 candidate significant wildlife habitat features are located in the Project Location. All separation distances for significant wildlife habitats are summarized in **Table 4.4** for all project components, including construction zones; also refer to **Figures 4.1-4.2, Appendix A**. Potential direct impacts to features with Project component interactions are discussed in the following sections. Mitigation measures of potential impacts (direct and indirect) are summarized in **Table B8, Appendix B**.

Habitats identified as Generalized Candidate Significant Wildlife Habitats are discussed in Section 5.3.4. Indirect impacts are minimized through standard measures discussed in **Section 5.4**.

5.3.3.1 Amphibian breeding habitat (wetland: ABWE-2) and (woodland: ABWO-1 to ABWO-9, and ABWO-13 to ABWO-15)

No direct loss to amphibian breeding habitat (wetland) and amphibian breeding habitat (woodland) features is proposed.

Habitat use surveys are planned for 2013 in all amphibian breeding habitats to confirm or deny significance as per the Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b). Survey methodologies are described in **Table 4.2**.

Construction and Decommissioning Phase

Barrier fencing is proposed around all construction zones within 120 m of amphibian breeding habitat features to prevent amphibians and other wildlife from interacting with the Project. Provided the fence is constructed to suitable specifications and maintained in good repair, direct impacts to amphibians are very unlikely. Erosion control fencing is suitable for this purpose and also protects any aquatic features from sediment laden runoff.

Increased traffic on municipal roads and new access roads during construction phases might be expected to increase potential for direct mortality of amphibians during operation and maintenance activities, particularly during cool, rainy spring nights as amphibians move to warmer road surfaces (SWHTGDSS Index #40;MNR, 2000). Given the planned timing of construction activity (3rd and 4th quarters of 2014), and the short-term and temporary nature of construction activity, negligible effects are anticipated. In the event construction occurs between the amphibian breeding period of March 15 to June 30, construction will occur during daylight hours to avoid excessive noise and vehicle caused mortality. Proposed mitigation is detailed in in **Table B8, Appendix 2**.

Development can have significant impacts if dewatering and or alternations to surface water flow influence water levels in breeding locations, potentially rendering sites unsuitable for reproduction. The Project has been designed to maintain existing drainage and no change to surface water flow is anticipated. Given the short-term and temporary nature of construction activity, negligible effects are anticipated as a result of any required dewatering or surface water

run-off from construction sites. Best management practices for sediment and erosion control, and mitigation for any required dewatering is discussed in greater detail in **Section 5.3**.

Operation Phase

Potential impacts to significant amphibian breeding habitat during operation of the Project are anticipated to be minimal.

Amphibians are known to move to warmer road surfaces particularly during cool, rainy spring nights (SWHTG DSS Index #40, MNR, 2000); however, infrequent day to day uses of the access roads and maintenance activities are unlikely to result in increased vehicle strikes or habitat impacts. If required, dust suppression and speed restrictions during operation of the Project could be considered.

There may be occasional impacts during maintenance of collector lines, resulting in habitat degradation by dust, siltation, erosion or accidental spill. If collector line maintenance activities are required in proximity to amphibian breeding features, mitigation measures used during construction (**Table B8, Appendix B**) should be implemented.

During operation of the facility, some materials such as lubricating oils and other fluids associated with turbine maintenance have the potential for discharge on the environment through accidental spills, resulting in a potential impact to amphibian habitat through ground or surface water contamination. In the event of an accidental spill, the MOE Spills Action Centre will be contacted and emergency spill procedures implemented immediately.

Preconstruction Survey Requirements: Anuran Call Surveys (ABWE2, AMBO1-9, and ABWO1-5)

The primary mitigation strategy applied to these features was avoidance. Appendix D of the Natural Heritage Assessment Guide identifies that an operational impact may occur when an access road is located within 120 m of a significant amphibian habitat. As per the requirements of Appendix D of the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2011a), due to the location of proposed turbines within 120 m of the features listed above, the proponent must commit to undertaking studies to determine the actual use of the habitat by these species prior to any construction activities occurring within 120 m of the habitat.

Anuran call surveys will be conducted within all features, with evaluation methods to follow the 'Marsh Monitoring Protocol' (BSC, 2003). Amphibian call surveys will be conducted three times in 2013 between April, May, June. In some areas of the province, primarily southern Ontario, surveys may need to begin in March, with at least 15 days between each survey. Monitoring stations will be established a minimum of 500 m apart and 3 minute surveys were performed at each station, listening for all amphibian calls within a semi-circular sampling area. The locations of these surveys were determined in the field where vernal pooling is present at the first survey (**Figures 6.1 – 6.2, Appendix A**). The surveys will be conducted in the same locations

for all three surveys. Surveying will begin one half-hour after sunset and end by midnight during evenings with little wind and minimum night air temperatures of 5°C, 10°C and 17°C for each of the three respective survey periods. These temperature requirements are in place because amphibian calling intensity is strongly associated with season, time of day, and weather conditions.

Additional information that will be recorded on the appropriate data forms include:

- Weather conditions (temperature, wind speed (on a Beaufort scale), % cloud cover, and presence of any precipitation should be recorded).
- Date, time of day, and duration.
- Description of habitats or areas scanned during the surveys
- GPS coordinates of the call stations.
- Name of the observer(s) doing field work.
- Complete list of all amphibian species observed

Call abundance codes for each amphibian species detected as outlined below:

- Code 1: individual calls do not overlap and calling individuals can be discretely counted; NOTE: individual frogs need to be counted if Code 1 is assigned.
- Code 2: calls of individuals sometimes overlap, but numbers of individuals can still be estimated; NOTE: individual frogs need to be counted if Code 2 is assigned.
- Code 3: overlap among calls seems continuous (full chorus), and a count estimate is impossible; NOTE: individual frogs cannot be counted if Code 3 is assigned.

If any of the habitats is deemed significant as a result of habitat use studies, the mitigation proposed in **Table B8, Appendix B** will be applied, which includes post-construction monitoring. However, if the feature is deemed not significant, no mitigation will be applied.

5.3.3.2 Bat Maternity Colonies: BMC-1 and BMC-2

All project components are site outside of BMC-1 and BMC-2, and no direct loss to these maternity colonies is proposed.

Habitat use surveys are planned for 2013 in all bat maternity colonies to confirm or deny significance as per the Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b). Survey methodologies are described in **Table 4.1**.

Construction Phase

Bats may be displaced from suitable habitat due to habitat loss or fragmentation during the construction of a project, human activity, or noise (e.g. construction activities, roads, turbines, etc.) (MNR, 2011a). Provided the short-term and temporary nature of construction activity,

negligible effects are anticipated. Best management practices for noise are discussed in greater detail in **Section 5.4**.

Operation Phase

Environment Canada et al. (2011) reported that bat casualties outnumbered birds at almost all wind farm sites in Canada (64% of all carcasses found) and Ontario (66% of all carcasses found) for post-construction monitoring studies conducted between 2006 and 2009. Bats may be injured or killed through collisions with moving turbine blades and barotrauma (internal haemorrhaging), caused by rapid air pressure reduction near moving turbine blades.

Contributing factors include time of year, species, habitat or landscape features in the area, and weather conditions, including wind speed, with the following key consideration prevalent in the literature:

- Bats demonstrate that peak fatalities occur during late summer - early fall migrations (NWCC 2011; Environment Canada et al. 2011; MNR, 2007).
- Bats tend to be most active during periods of low wind. Some studies indicate that bat collisions occur primarily on nights with low speed and typically increase immediately before or after passing storm fronts (NWCC 2011).

Based on known bat mortality rates from operational wind projects, MNR has set a threshold for bat mortality (MNR, 2011a). If mortality levels are maintained below the threshold, the Project would not be considered to have significant impacts to bat populations. The Environmental Effects Monitoring Plan (included in the Project Design and Operations Report) describes a response and contingency plan that will be implemented if performance objectives cannot be met.

Indirect impacts to bats, such as avoidance of an area, habitat disruption, reduced population density, habitat abandonment, loss of refugia, habitat unsuitability and behavioural effects have not been demonstrated in North America (NWCC 2010).

Preconstruction Survey Requirements: Exit Surveys (BMC-1 and BMC-2)

The primary mitigation strategy applied to these features was avoidance. Appendix D of the Natural Heritage Assessment Guide identifies that an operational impact may occur when a wind turbine is located within 120 m of a significant bird habitat. As per the requirements of Appendix D of the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a), due to the location of proposed turbines T102 and T105 within 120 m of BMC-1 and BMC-2 respectively, the proponent must commit to undertaking studies to determine the actual use of the habitat prior to any construction activities occurring within 120 m of the habitat. Habitat use studies will be conducted according to "*Bats and Bat Habitats: Guidelines for Wind Power Projects*" (MNR, 2011a).

Bat maternity habitat pre-construction surveys will be undertaken in BMC-2 (FOD community within 120 of Turbines for which access is available, and candidate habitat was identified; i.e., snag/cavity density was determined to be ≥ 10 snags per hectare of trees ≥ 25 cm dbh). No surveys will be undertaken in BMC-2 due to access constraints. BMC-2 will be assumed to be significant.

BMC-2 will be subject to evaluation of significance exit surveys in June (30 minutes before dusk until 60 minutes after dusk) to identify confirmed SWH. 10-30 candidate roost trees will be monitored once per candidate habitat. Evaluation methods will follow the "Guidelines for Wind Power Projects Potential Impacts to Bats and Bat Habitats".

Exit surveys must be conducted in the month of June within candidate bat maternity colony habitat. Each of a minimum 10 selected snag/cavity trees (i.e., BMC-1 is < 10 ha) will be monitored from 30 minutes before dusk until 60 minutes after dusk in order to observe evidence of bats exiting the candidate snag/cavity tree. Each candidate roost tree will be monitored once.

Bat surveys and data analysis will be conducted by a biologist experienced in bat identification, monitoring. Acoustic analysis will also be conducted by experienced staff. A handheld GPS unit will be used to georeference trees where exit surveys are completed.

The best candidate snag trees are selected according to the following criteria (in order of importance):

- Tallest snag/cavity tree;
- Exhibits cavities or crevices most often originating as cracks, scars, knot holes or woodpecker cavities;
- Has the largest diameter breast height
- Is within the highest density of snags/cavity trees (e.g. clusters of snags);
- Has a large amount of loose, peeling bark;
- Cavity or crevice is high in snag/cavity tree (> 10 m);
- Tree species that provide good cavity habitat (e.g. white pine, maple, aspen, ash, oak);
- Canopy is more open (to determine canopy, determine the percentage of the ground covered by a vertical projection of the outermost perimeter of the natural spread of the foliage of trees) and
- Exhibits early stages of decay (decay class 1-3; refer to Watt and Caceres 1999)

Candidate roosts trees should be monitored for evidence of maternity colonies through exit surveys as follows:

- Observers should choose a viewing station with a clear aspect of cavity opening or crevice (multiple observers may be required if multiple openings are present in one snag)
- Surveys will be completed with the use of either human visual observation and/or the use of a low light, night-vision, or infrared video recorders. For the use of video recorders, viewing stations will be set-up prior to the exit survey timing window and will be conducted in the same candidate habitat as where there are also human visual exit surveys being conducted. Once an evening's monitoring is completed (60 minutes after sunset), the cameras will be collected by the field staff conducting visual surveys in the same candidate habitat and the visual recordings for the each video recorder will be reviewed for evidence of significant bat roosting activity. After a suitable camera model has been identified, field staff will provide detailed camera specifications to the Ontario Ministry of Natural Resources prior to the onset of monitoring for confirmation that it will collect the information required.
- A bat detector should be used in conjunction with visual surveys to determine species. Microphones will be positioned to maximize bat detection (e.g. situated away from nearby obstacles to allow for maximum range detection, microphones angled slightly away from the prevailing wind to minimize wind noise). The same broadband detector will be used throughout the survey. Information on the equipment used will be recorded, including information on all adjustable settings (e.g. gain level) and the position of the microphone. Audio data collected will be analyzed by biologists who are experienced in bat identification and monitoring.

Additional information that will be recorded on the appropriate data forms include:

- Weather conditions (temperature, wind speed (on a Beaufort scale), % cloud cover, and presence of any precipitation should be recorded);
- Date and time of day;
- GPS coordinates of the point location; and,
- Name of the observer doing field work

If BMC-1 is deemed significant as a result of habitat use studies, the mitigation proposed in **Table B8, Appendix B** will be applied, which includes post-construction monitoring. However, if the feature is deemed not significant, no mitigation will be applied. BMC-2 is assumed to be significant and mitigation will be applied.

5.3.3.3 Marsh breeding bird habitat: MBB-1

All project components are sited outside MBB-1, and no other direct loss to marsh breeding bird habitat features is proposed.

Habitat use surveys are planned for 2013 in all marsh breeding habitats to confirm or deny significance as per the Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b). Survey methodologies are described in **Table 4.3**.

Construction and Decommissioning Phase

Indirect construction-phase impacts, such as noise, dust and sedimentation may have some temporary negative impact to the marsh bird breeding features, particularly where construction zones are adjacent to the feature (setback distances are shown in **Table 4.4**). Given the planned timing of construction activity (3rd and 4th quarters of 2014), and the short-term and temporary nature of construction activity, negligible effects to breeding activity is anticipated. In the event construction occurs outside the planned window, construction will be restricted during the breeding period of April 1 to July 31 for any components within 120m of confirmed habitat. Proposed mitigation is detailed in **Table B8, Appendix 2**.

Mitigation for indirect impacts is available through the use of site control measures described in **Section 5.4**.

Operation Phase

Marsh breeding birds are among the more sensitive bird species with respect to disturbance from wind power development. In their meta-analysis of the effect of wind turbines on bird abundance at 19 globally-distributed wind farms, Stewart et al. (2007) concluded that wading birds were the second-most likely bird taxon to demonstrate declines in abundance. Pearce-Higgins et al. (2012) found construction disturbance was the primary cause of bird population declines at wind farms. For some species, populations rebounded once construction ceased and turbines became operational, however some disturbance-sensitive species such as Snipe and Curlew did not return to their pre-construction abundance (Pearce-Higgins et al 2012).

Differences in avoidance behaviour have been noted at North American wind development projects when compared with European studies. The single wind turbine at Pickering Nuclear Generating Station, adjacent to the Hydro Marsh, has not proved to be a deterrent to local marsh breeding birds. Black-crowned Night Herons and Common Terns were observed flying within 50 m of the active turbine and regularly visited the Hydro Marsh (James 2002). At the Erie Shores Wind Farm, Great Blue Heron were relatively scarce due to limited habitat; however, half of the 19 individuals observed in 2006 and 2007 flew within 100 m of operating turbines (James 2008). Post-construction studies at the Wolfe Island Wind Plant did not find any significant declines in species diversity or abundance in the large coastal wetlands adjacent to operational wind turbines; no declines were observed in the common marsh species such as Swamp Sparrow, Marsh Wren and Common Yellowthroat. More sensitive species, such as Least Bittern, were also recorded breeding on Wolfe Island in proximity to operational wind turbines (Stantec 2012a).

It is anticipated that similar results would be found at the Grand Valley Phase 3 Project. Post-construction monitoring will be conducted in these features for a period of three years, to confirm disturbance to marsh breeding birds is not higher than expected. The Environmental Effects Monitoring Plan (included in the Project Design and Operations Report) describes a response and contingency plan that will be implemented if performance objectives cannot be met.

Overall, disturbance impacts from operational wind turbines to breeding birds in marsh breeding habitats are expected to be negligible.

Preconstruction Survey Requirements: Breeding Bird Surveys (MBB-1)

The primary mitigation strategy applied to this feature was avoidance. Appendix D of the Natural Heritage Assessment Guide identifies that an operational impact may occur when a wind turbine is located within 120 m of a significant bird habitat. As per the requirements of Appendix D of the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2012a), due to the location of proposed turbine T104 within 120 m of Features MBB1 the proponent must commit to undertaking studies to determine the actual use of the habitat prior to any construction activities occurring within 120 m of the habitat. Habitat use studies will be conducted according to *“Bird and Bird Habitats: Guidelines for Wind Power Projects”* (MNR, 2011c).

Point count stations are located approximately 250 m apart throughout MBB1. The approximate locations of these surveys are shown on **Figures 6.1-6.2, Appendix A**, but these locations may be refined in the field. Each of the surveys will include a ten-minute point count at each location, conducted during the breeding season (May 1 to July 31). Each station will be surveyed a minimum of 3 times: once early in the season (late May to early June); once in mid-season (mid to late June); and, once later in the season (July) with at least 10 days between surveys at a particular station. Point counts must be performed in the early morning, between dawn (one half hour before sunrise) and about 4 hours after sunrise. Surveys in late June and early July will be completed within 3 hours of sunrise. Surveys will be performed when the wind speed is 3 or less on the Beaufort scale and when there is no precipitation.

At each station, the surveyor will observe for ten minutes, recording all species seen or heard, along with an estimate of the number of individuals of each species and the highest level of breeding evidence observed. Surveyors will estimate the distance to each bird using a scale of 0–50 m, 50–100 m and further than 100 m. Birds that move during the survey will be recorded in the closest distance category that they entered during the survey. Data that will be reported are the number of birds of each species detected in each distance band. Birds that fly over without stopping should be recorded separately as ‘fly-overs’.

Playback surveys will supplement standard point counts to target less conspicuous species including Pied-billed Grebe, American Bittern, American Coot, Common Moorhen, and Virginia

Rail. Playback surveys will immediately succeed 10 minute point counts at each station as follows:

- Surveys will play series of three calls (20 seconds) for each species, followed by 30 seconds of silence, documenting all species heard during periods of silence.
- A minimum of one minute of silence will occur between playback calls of different species.

Additional information that will be recorded on the appropriate data forms include:

- Weather conditions (temperature, wind speed (on a Beaufort scale), % cloud cover, and presence of any precipitation should be recorded).
- Date and time of day.
- GPS coordinates of each point location (same location is to be used for each survey).
- Name of the observer doing field work.

If any of the habitats is deemed significant as a result of habitat use studies, the mitigation proposed in **Table B8, Appendix B** will be applied, which includes post-construction monitoring. However, if the feature is deemed not significant no mitigation will be applied.

5.3.3.4 Waterfowl nesting area: WNA-3 and WNA-4

All project components are sited outside features WNA-3 and WNA-4 and no direct loss of waterfowl nesting habitat is proposed.

Habitat use surveys are planned for 2013 in all waterfowl nesting habitats to confirm or deny significance as per the Draft SWH Ecoregion 6E Criterion Schedule (MNR, 2012b). Survey methodologies are described under Preconstruction Survey Requirements below.

Construction and Decommissioning Phase

Given the planned timing of construction activity (3rd and 4th quarters of 2014), and the short-term and temporary nature of construction activity, negligible indirect effects to waterfowl nesting are anticipated. In the event that construction is to proceed outside the planned period, construction will avoid the breeding periods of April 1 to July 31 for any components within 120 m of habitat features.

Barrier fencing is proposed around all construction zones within 120 m of waterfowl nesting habitat features to prevent waterfowl from interacting with the Project. Provided the fence is constructed to suitable specifications and maintained in good repair, direct impacts to wildlife are unlikely. Erosion control fencing is suitable for this purpose and also protects any wetland features from sediment laden runoff.

Indirect construction-phase impacts, such as noise, dust and sedimentation may have some temporary negative impact to the waterfowl nesting features. Mitigation for indirect impacts is available through the use of site control measures described in **Section 5.3**.

Operation Phase

Potential indirect impacts to waterfowl nesting areas would include habitat degradation from dust, noise or accidental spill, as discussed for wetland features(see **Section 5.3.1**), and infrequent day to day uses of the access roads (access roads are less than 50 m from WNA-1 and 2). Generally, breeding waterfowl anticipated for the ZIO are not expected to engage in aerial displays or other high risk behaviour at the height of the blade sweep zone. Overall, waterfowl nesting areas are not anticipated to be impacted by the operation of the Project.

Preconstruction Survey Requirements: Brood Rearing Surveys (WNA-1 and WNA-3)

The primary mitigation strategy applied to these features was avoidance. Appendix D of the Natural Heritage Assessment Guide identifies that an operational impact may occur when a wind turbine is located within 120 m of a significant bird habitat. As per the requirements of Appendix D of the *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNR, 2011a), due to the location of proposed turbines T110 and T120 within 120 m of WNA-3 and WNA-4 respectively, the proponent must commit to undertaking studies to determine the actual use of the habitat prior to any construction activities occurring within 120 m of the habitat. Habitat use studies will be conducted according to "*Bird and Bird Habitats: Guidelines for Wind Power Projects*" (MNR, 2011c).

Area searches will be conducted at all open aquatic portions of the features using a combination of point counts and area searches. Surveyors will walk along routes specified on **Figures 5.1-5.2, Appendix A** to flush any occurring waterfowl, stopping at point counts and visually scanning open water for 10 minutes to observe swimming waterfowl.

Point count stations are located approximately 250 m apart throughout WNA-3 and WNA-4 to allow the entire open aquatic features to be observed. The approximate locations of these surveys are shown on **Figures 6.1-6.2, Appendix A**, but these locations may be refined in the field. Each of the surveys will include a 10-minute point count at each location, conducted during the breeding season (May 1 to July 31). Each station will be surveyed a minimum of 3 times: once early in the season (May); once in mid-season (June); and, once later in the season (July) with at least 10 days between surveys at a particular station. Surveys must be performed during morning hours, between sunrise and about 6 hours after sunrise. Surveys will be performed when the wind speed is 4 or less on the Beaufort scale and when there is no precipitation.

At each station, the surveyor will observe for 10 minutes, recording all species seen or heard, along with an estimate of the number of individuals of each species, including estimates of brood size. Data that will be reported are the number of birds of each species detected during

each the area search and point counts. Birds that fly over without stopping should be recorded separately as 'fly-overs'. Additional information that will be recorded on the appropriate data forms include:

- Weather conditions (temperature, wind speed (on a Beaufort scale), % cloud cover, and presence of any precipitation should be recorded).
- Date and time of day.
- GPS coordinates of each point location (same location is to be used for each survey) and walking transect.
- Name of the observer doing field work.

If any of the habitats is deemed significant as a result of habitat use studies, the mitigation proposed in **Table B8, Appendix B** will be applied, which includes post-construction monitoring. However, if the feature is deemed not significant no mitigation will be applied.

5.3.4 Generalized Candidate Significant Wildlife Habitats

In addition to the series of wildlife habitats identified above, a number of wildlife habitat types have also identified that may be present, but are located within the ZOI of project components that are not expected to have an operational impact on these habitats. In accordance with the Natural Heritage Assessment Guide (MNR, 2011a), potential impacts to these habitats are typically associated with the temporary disturbance of construction activity and can be grouped together as generalized impacts and mitigation measures.

The full suite of wildlife habitats that require generalized consideration have been reviewed, and have compiled a comprehensive list of general construction mitigation measures that will be implemented during the construction and decommissioning phases of the project are detailed below (**Section 5.4 and Table 5.2**).

5.3.4.1 Turtle overwintering areas and deer winter congregation areas

Potential impacts to generalized season concentration areas (turtle overwintering and deer winter congregation areas) during construction and operation of the Project are anticipated to be minimal, including infrequent day to day uses of the access roads. Potential indirect impacts would include habitat degradation from dust, noise or accidental spill, as discussed for wetland features and would be addressed through best management practices and other general mitigation measures (**Section 5.4**).

5.3.4.2 Woodland area-sensitive breeding bird habitat

Potential threats to woodland area-sensitive breeding birds as a result of wind energy projects include fragmentation and disturbance of habitat (Kingsley and Whittam 2007). No direct loss or fragment is proposed by the Project.

Potential disturbance impacts during construction and operation phases of the Project are expected to be minimal, including traffic disturbance and any maintenance of access road and/or collector lines or other activities. Potential indirect impacts include woodland degradation by dust, siltation, erosion or accidental spill, and noise disturbance to wildlife. Indirect impacts are minimized through standard measures discussed in **Section 5.4**.

5.3.4.3 Rare vegetation community – FES1

FES1 is located > 60 m from the nearest Project component, and no direct impacts are anticipated as a result of the construction or operation phases on the project. Potential indirect impacts would include habitat degradation from dust, noise or accidental spill, as discussed for wetland features and would be addressed through best management practices and other general mitigation measures (**Section 5.4**).

5.3.4.4 Special Concern and Rare Wildlife Species

Potential threats to Special Concern and Rare Wildlife Species as a result of wind energy projects include fragmentation and disturbance of habitat. No direct loss or fragment is proposed by the Project.

Potential disturbance impacts during construction and operation phases of the Project are expected to be minimal, including habitat degradation by dust, siltation, erosion or accidental spill, and noise disturbance to wildlife. Indirect impacts are minimized through standard measures discussed in **Section 5.4**.

5.3.4.5 Turtle Nesting Area: TNA-2 to TNA-4

Increased traffic on municipal roads and new access roads may increase potential for direct mortality of turtles during construction, operation and maintenance activities; however, no operational impact on these habitats is anticipated as per Appendix D of the Natural Heritage Assessment Guide (MNR, 2011a). Infrequent day to day uses of the access roads and maintenance activities are unlikely to result in measurable population effects via direct mortality or habitat impacts.

Potential indirect impacts would include habitat degradation from dust, noise or accidental spill, and sedimentation (during construction phases) as discussed for wetland features and would be addressed through best management practices and other general mitigation measures (**Section 5.4**).

5.4 BEST MANAGEMENT PRACTICES AND OTHER GENERAL CONSTRUCTION MITIGATION

This section provides best management practices and other measures intended to minimize or mitigate potential adverse impacts on adjacent significant natural features. These measures will be implemented, where required and reasonable, during the construction and decommissioning of the various turbines, access roads and collector lines.

5.4.1 Vegetation Removal

Where vegetation removal is proposed, the following mitigation measures will be applied.

- As appropriate, and prior to construction, the limits of any vegetation clearing will be staked in the field. The Construction Contractor will ensure that no construction disturbance occurs beyond the staked limits and that edges of sensitive areas adjacent to the work areas are not disturbed. Regular monitoring of the limits of clearing will be implemented to ensure the objective of minimal disturbance. Should monitoring reveal that clearing occurred beyond defined limits, mitigation action will be taken that could include rehabilitation of the disturbed area to pre-disturbance conditions at the direction of a qualified ecologist (with enhancement of any disturbed areas).
- To the extent practical, tree and/or vegetation removal will be completed prior to, or after, the core nesting season for migratory birds (May 1 to July 31). Should clearing be required during the breeding bird season, prior to construction, surveys will be undertaken by a qualified biologist to identify the presence/absence of nesting birds or breeding habitat. If a nest is located, a designated buffer will be marked off within which no construction activity will be allowed while the nest is active. The radius of the buffer will range from 5 - 60 m, depending on the species. Buffer widths are based on the species' sensitivity and on buffer width recommendations that will be determined in consultation with Environment Canada.
- Prior to the start of construction activity, the topsoil/seedbank will be stripped and preserved; material will be reapplied in suitable rehabilitation areas post construction.
- Excavated soil from crane pads will be re-used on site, as feasible. If not feasible, the soil will be disposed of at an approved off-site facility. Temporary laydown areas will be returned to an acceptable condition for its intended use in consultation with the landowners at the end of the construction phase, including replacement and/or restoration of topsoil as necessary.

5.4.2 Sediment and Erosion Control Measures

In order to minimize erosion and the introduction of sediment into significant natural features during grading and construction activities, erosion and sediment (E&S) control measures will be implemented prior to the initiation of any construction. The proximity of adjacent significant natural features increases the risk of sedimentation within a construction area.

E&S control measures will be installed to minimize erosion impacts adjacent to significant natural features, as appropriate. The following measures/guidelines will be implemented, as required, during the construction of the Project components:

- Sediment control measures, which may include perimeter silt fencing, mud mats (access roads), check dams (rock or straw bales), and sediment bags (dewatering);
- Silt barriers (e.g., fencing) will be erected along wetland and woodland community edges located within 30 m of construction areas (including staging areas and laydown areas) to minimize potential sediment transport to the significant natural features. These barriers

will be regularly monitored and properly maintained during and following construction until soils in the construction area are re-stabilized with vegetation; and

- Where culverts are proposed within 30 m of a significant natural feature, enhanced sediment and erosion control measure (i.e. straw bales, double rows of sediment fencing, check dams) will be installed as added protection to filter runoff and further minimize potential sedimentation within the downstream features (wetland, woodland). This added protection is proposed to reduce environmental risk.

Specific E&S control measures will be selected, located and sized by an engineer during the detailed design stage to ensure proper functioning of these measures. All E&S controls will be installed prior to construction and will be maintained during and following construction to ensure their effectiveness at protecting the adjacent significant natural features.

5.4.3 Dewatering

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

If groundwater is encountered during excavations, good construction practices will be implemented, such as minimizing the length of time that the excavation is open and monitoring seepage into the excavation. Should pumping be required to dewater excavated areas, water will be directed into the nearest drain (with input from a qualified fisheries biologist) or spread across the buildable area and appropriate energy dissipation techniques will be used to reduce the potential for erosion and scouring. Discharge piping will be free of leaks and will be properly anchored to prevent bouncing and snaking during surging.

The rate of discharge will be monitored to ensure no erosion or flooding occurs. If energy dissipation measures are found to be inadequate, the rate of dewatering will be reduced or ceased until satisfactory mitigation measures are in place.

In order to mitigate any impacts to significant natural features during dewatering activities, the following measures will be implemented, as required and necessary:

- The area to be used for dewatering will be clearly marked with flagging and/or snow-fencing prior to work commencing;
- During site preparation, silt fencing will be included to retain sediments on site so they do not enter any significant natural feature. All sediment control structures will be inspected regularly, and repaired/maintained as necessary;
- All water pumped during dewatering activities will be directed away from significant natural features and not directly into wetlands;
- Set back groundwater discharge locations at least 30 m from significant natural features. All groundwater discharge will undergo appropriate water quality and temperature controls, as required, and will be directed through a sediment filter (i.e., filter bag),

sediment basin or other appropriate device capable of handling the anticipated volumes of water, before being discharged to the environment. The specific locations for directing treated groundwater discharge will be selected in the field at the time of construction, but will generally be limited to grassed areas, existing drainage ditching or agricultural fields;

- The use of sediments bags (or filter rings) will be used as appropriate to filter out suspended sediment prior to discharge. Any sediment bags or filter rings will be monitored during pumping to ensure their efficacy, with any clogging or failures to be rectified immediately; and
- After the staging area and dewatering work area is no longer required, any remaining disturbed soils will be returned to pre-disturbance conditions and/or reseeded.

Further dewatering recommendations will be reviewed upon the completion of the detailed engineering design.

5.4.4 Noise

Noise can mask auditory environmental signals, such as bird and/or amphibian breeding calls, including noise from motorized vehicles and equipment during construction and operation-phase maintenance activities. Although such events are temporary and often short-term in duration, they could have negative impacts on local wildlife if they correspond with critical signaling periods. For example, construction noise occurring between May 1 and July 31 could have a negative impact on nesting birds if they are in close proximity to the works. Disturbance by noise could result in the abandonment of a nesting territory or nest. The likelihood of the impact increases if noise occurs early in the nesting effort. Noise disturbance during later parts of a nesting effort would have a smaller probability of causing negative impacts to nesting birds.

The following features are located with 30m of a project component, including a temporary construction area, or other component, and require noise mitigation outlined below:

- Wetlands 1-3, 5-24, 26 and 33;
- Woodlands 2, 5-8, 10-15, 18-23, 25, 26, 30-32 and 37; and,
- Wildlife feature MBB-1.

The following mitigation measures will be used for the construction of Project components within 30m of the features noted above:

- The sound power levels of all construction equipment should be considered and quieter units should be selected.
- The use of construction equipment with higher sound levels and/or potential for impact should be minimized during the bird breeding period of May 1 to July 31.

5.4.5 Other General Mitigation Measures

Table 5.2 summarizes the general mitigation measures which will be implemented during construction, including the mitigation objective and specific location where each mitigation measure should be applied.

Table 5.2: Summary of General Construction Phase Mitigation Measures Recommended

Mitigation Measure	Objective(s)	Location(s)
Any vegetation removal required along roadside collector lines should be minimized, and occur entirely within the road right-of-way.	Minimize vegetation removal and impacts on wildlife habitats.	Underground Collector Lines/ or overhead collector lines
Minimize vegetation removal during the breeding bird season (May 1st-July 31st), or hire a biologist to confirm no nests are present in areas proposed for vegetation removal.	Avoid impacts to locally breeding bird species or nesting success	Within 30 m of any significant feature, including significant woodlands and wetlands and significant wildlife habitat
Any accidentally damaged trees should be pruned through the implementation of proper arboricultural techniques.	Protect tree species from permanent damage.	Entire Project
Suspend work if high runoff volume is noted or excessive sediment discharge occurs.	Minimize erosion impacts on features when construction activities are proposed within 30 m of significant natural features.	Within 30 m of any significant feature, including significant woodlands and wetlands and significant wildlife habitat
Develop and implement an erosion and sedimentation control plan.	Protect natural features and wildlife habitats, where appropriate	Entire Project
Clearly delineate work area using silt fencing, erosion blankets, or similar barrier	Minimize erosion impacts on features when construction activities are proposed within 30 m of significant natural features	Within 30 m of any significant feature, including significant woodlands and wetlands and significant wildlife habitat
Maintain erosion control measures for the duration of construction or decommissioning activities.	Minimize erosion impacts on features when construction activities are proposed within 30 m of significant natural features	Within 30 m of any significant feature, including significant woodlands and wetlands and significant wildlife habitat
No vehicle traffic on exposed soils, and no heavy machinery traffic on slopes.	Limit unnecessary risk of increased erosion, turbidity or sedimentation.	Entire Project
Re-vegetate temporary access roads or crane paths to pre-construction conditions as soon as possible.	Limit the potential for erosion or sedimentation due to exposed soil conditions.	Entire Project
Maintain existing vegetation buffers around water bodies.	Minimize the potential for erosion, and protect wildlife habitat, within riparian areas.	Entire Project
Construction activities will occur during daylight hours.	Avoid noise/light disturbance of local wildlife in areas where construction activity will occur within 30 m of a significance feature or specific wildlife habitat type. Increase ability to observe and avoid any incidental species	Within 30 m of any significant feature, including significant woodlands and wetlands and significant wildlife habitat

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Table 5.2: Summary of General Construction Phase Mitigation Measures Recommended

Mitigation Measure	Objective(s)	Location(s)
	individuals	
Any stockpiled material will be stored more than 30 m from a significant wetland, woodland, or water body.	Limit the potential for increased erosion within 30 m of significant natural features.	Entire Project
All maintenance activities, vehicle refueling or washing, and chemical storage will be located more than 30 m from any significant feature.	Minimize the risk of contamination of chemical spill around significant natural features.	Entire Project
Develop a spill response plan, train staff on appropriate procedures, and keep emergency spill kits on site.	Minimize potential long-term effects or significant contaminations in the event an accidental spill occurs.	Entire Project
Dispose of waste material by authorized and approved offsite vendors.	Limit the potential for contamination of significant natural features.	Entire Project
Implement infiltration techniques to the maximum extent possible.	Minimize potential impacts to soil moisture regime and groundwater stores.	Entire Project
Design roads to promote infiltration.	Minimize potential impacts to soil moisture regime and groundwater stores.	Entire Project
No herbicides will be used within significant features or wildlife habitats.	Avoid impacts to natural vegetation species, significant features, and wildlife habitats.	Significant woodlands and wetlands, and significant wildlife habitat
Minimize grading activities to maintain existing drainage patterns, to the fullest extent possible.	Maintain existing surface water drainage patterns.	Entire Project
Control rate and timing of water pumping, and restrict taking of water during periods of extreme low flow.	Limit potential impacts on water temperature, surface water storage, and wildlife habitat.	Entire Project
Pump from deep wells to infiltration galleries adjacent to water bodies or wetlands when construction is located <30 m from water bodies and wetlands.	Minimize impacts to ground water stores, wetlands, or water bodies	Entire Project
Implementation of storm water discharge best management practices.	Avoid potential contamination of water sources.	Entire Project
Horizontal directional drill entry/exit pits will be located at least 30 m from any significant natural feature, and frac-out plan in place prior to performing directional drilling	Minimize impacts on significant natural features, water bodies, and wildlife habitat	Horizontal Directional Drilling
Collect drill cuttings as they are generated and placed in a soil bin or bag for off-site disposal.	Limit the potential for soil or water contamination.	Horizontal Directional Drilling
Restore and re-vegetate entry/exit pits to pre-construction conditions as soon as possible after construction.	Minimize the presence of exposed soil to reduce the potential for erosion.	Horizontal Directional Drilling
Construction workers will be made aware of the potential occurrence of deer, amphibians, turtles and other wildlife in construction zones and on access roads, and will avoid interaction with any observed individuals to the extent possible.	Minimize Project interaction with wildlife during construction and maintenance activities.	On all access roads and work areas.

5.5 MONITORING PLAN

O. REA Reg. 359/09 requires that applicants prepare an Environmental Effects Monitoring Plan (EEMP) as part of the Design and Operations Report to demonstrate how any negative environmental effects (direct and indirect) of the Project will be mitigated and to set out a program for ongoing monitoring of the effectiveness of mitigation measures. The EEMP includes a description of:

- Performance objectives in respect of each negative environmental effect
- All mitigation measures planned to achieve performance objectives
- Bird and bat mortality monitoring protocol
- Post-construction monitoring of significant wildlife habitat
- How the Project will be monitored to ensure that mitigation strategies are meeting performance objectives, and
- A contingency plan to be implemented should monitoring reveal that mitigation measures have failed

The EEMP covers potential impacts to natural features that were identified through the Environmental Impact Study of this report. Specifically, the EEMP includes monitoring for impacts to wildlife and wildlife habitat during construction, and post-construction monitoring for indirect impacts on wildlife (i.e., disturbance). **Table B9, Appendix B** summarizes the proposed monitoring of impacts to natural features, including the methods to be used, locations of monitoring, frequency of sample collection, how the results of the monitoring plan will be reported and contingency measures that will be undertaken.

In addition to impact to significant wildlife habitat, the EEMP also addresses potential direct impacts on wildlife (i.e. mortality). In accordance with O. Reg. 359/09, the direct impacts are addressed through the EEMP, including mitigation measures, monitoring requirements and contingency plans.

5.6 SUMMARY OF IMPACTS AND MITIGATION

The Project will result in the erection of up to 17 wind turbines as well as the installation of supporting infrastructure, such as access roads, electrical cabling, and a transform station. Through a comprehensive review of background material in conjunction with site-specific investigations and Evaluation of Significance surveys, several significant, or presumed significant, natural features and wildlife habitats have been identified in the Project Location or within the Zone of Investigation.

As part of this Environmental Impact Study, a series of monitoring commitments and mitigation measures have been recommended to be implemented as part of the development of this Project. These recommendations have been developed in association with the specific

significant natural features and wildlife habitats that have been identified within the Project Study Area.

The application of these protective, mitigation, and compensation measures are expected to address any negative environmental effects of construction, operation and decommissioning of the Project on the natural heritage features in the Project Study Area and their associated ecological functions.

6.0 Closure

This NHA and Environmental Impact Study for the Grand Valley Phase 3 Wind Power Project has been prepared on behalf of Grand Valley Wind Farms Inc. in accordance with O.Reg 359/09, s. 24-28 and 37-38.

The application of these protective, mitigation, and compensation measures are expected to address any negative environmental effects of construction, operation and decommissioning of the Project on the natural heritage features in the Project Study Area and their associated ecological functions. An environmental effects monitoring plan that includes a post-construction monitoring program will be developed to confirm the accuracy of predicted effects as well as to monitor the effects to other natural elements. Mortality monitoring, as required and described by the MOE, is described in the environmental effects monitoring plan, and will be conducted for three years following construction.

Grand Valley Wind Farms Inc. is committed to implementing the appropriate protection and mitigation measures as they apply to the construction and operation of the proposed Project.

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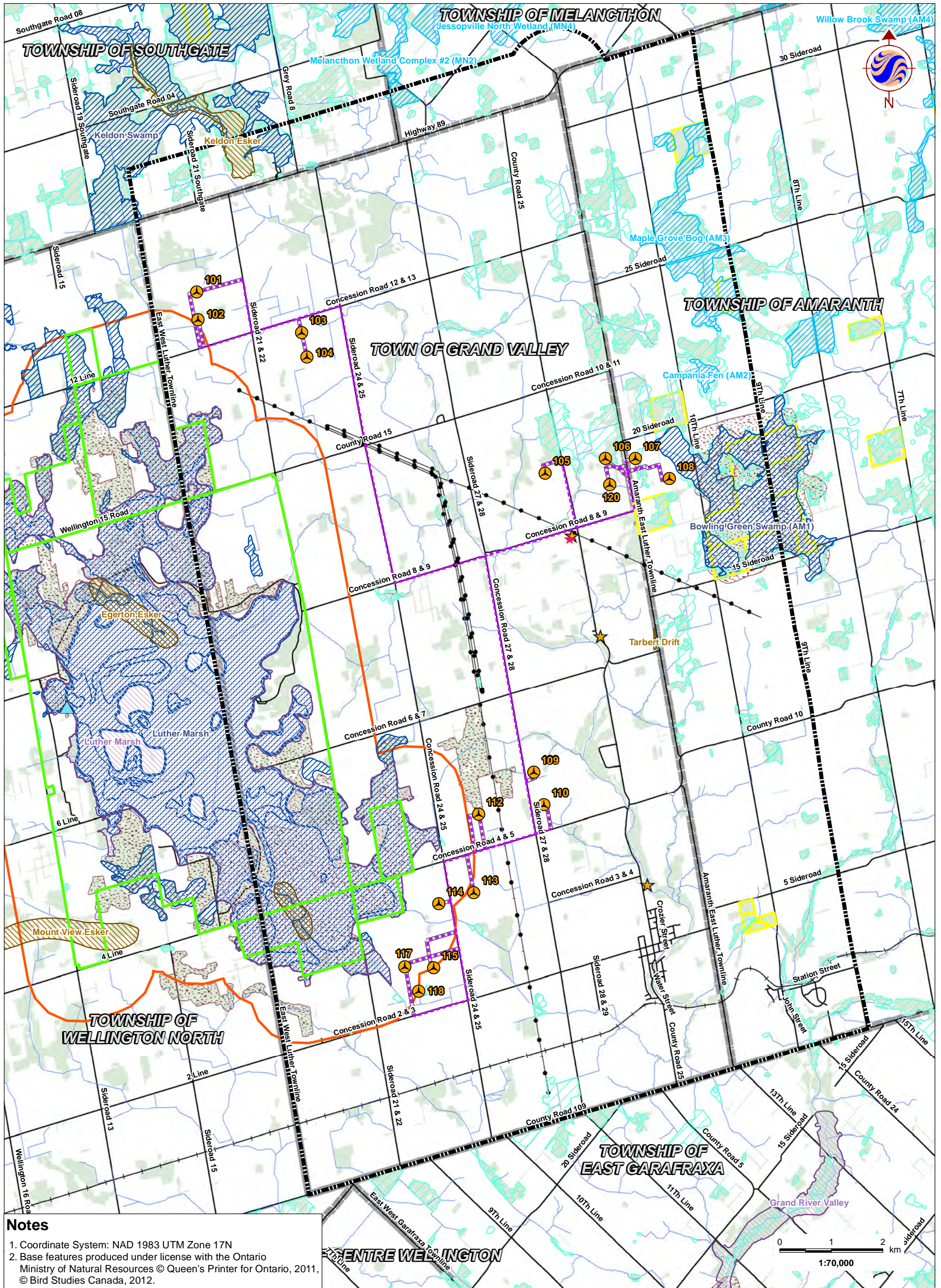
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Appendix A

Figures



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2011, © Bird Studies Canada, 2012.

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Revised: 2013-04-24 By: dhanvey

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160960698



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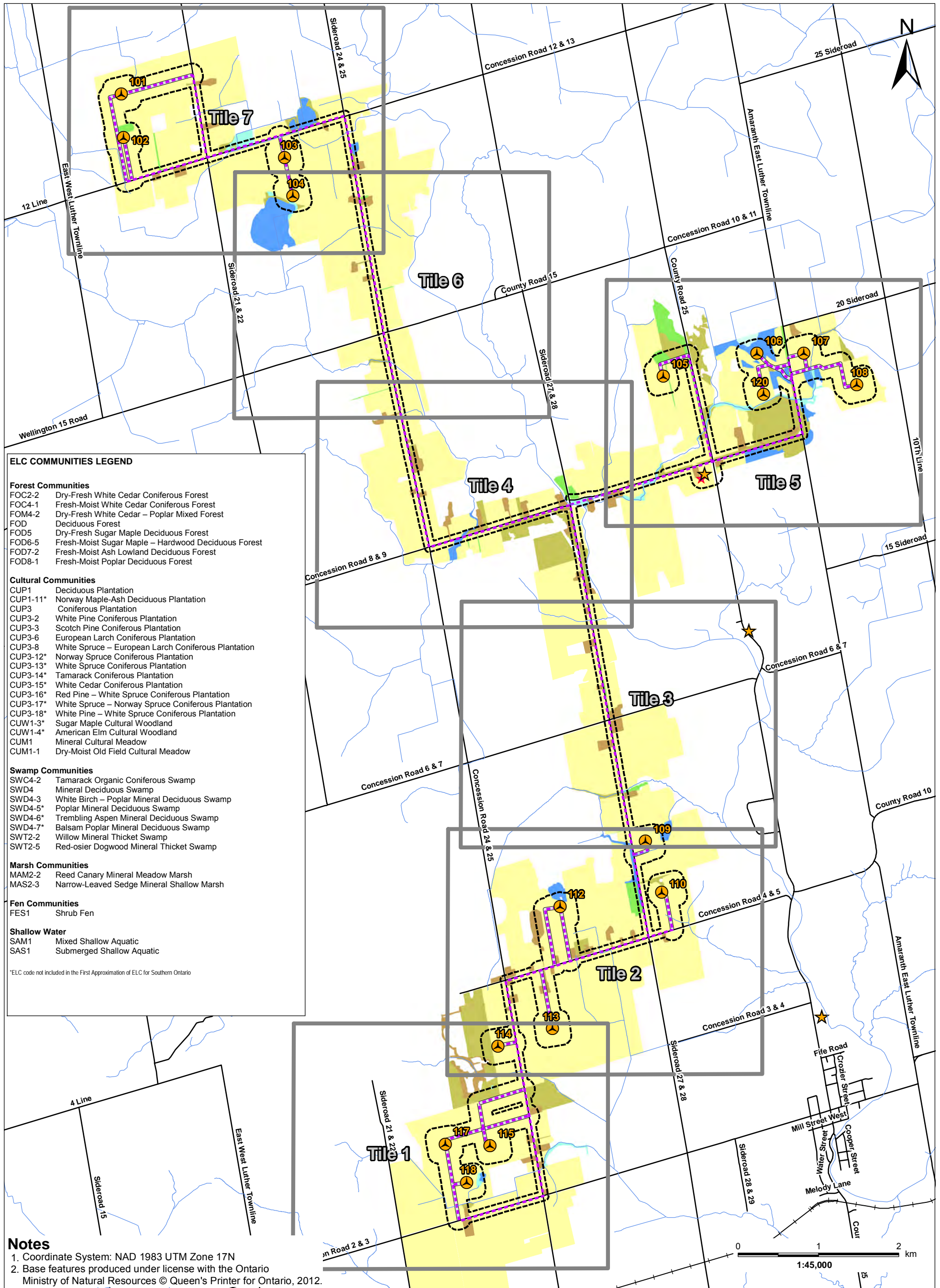
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| <p>Proposed Project Components</p> <ul style="list-style-type: none"> Study Area Turbines Access Roads Collector Lines Construction Trailer/ Parking Area (Previously Disturbed) Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown | <p>Existing Features</p> <ul style="list-style-type: none"> Road Railway Watercourse Waterbody Municipal Boundary | <p>Natural Features- Records Review</p> <ul style="list-style-type: none"> Great Blue Heron Nesting Site/Colony Conservation Area Important Bird Area Luther Marsh Wildlife Management Area Wintering Areas (Deer) Woodland | <p>Area of Natural and Scientific Interest (ANSI)</p> <ul style="list-style-type: none"> ANSI, Earth Science ANSI, Life Science <p>Wetlands</p> <ul style="list-style-type: none"> Provincially Significant Wetland Locally Significant Wetland Unevaluated Wetland |
|--|--|--|---|

Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
1.0

Title

Records Review



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Revised: 2013-04-24 By: dhanvey



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Construction Trailer/ Parking Area (Previously Disturbed)
- Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown

- Existing Features**
- Road
 - Railway
 - Waterbody
 - Watercourse

- ELC Communities**
- Agriculture
 - Cultural Communities
 - Fen

- Marsh
- Residential
- Swamp
- Wooded Area

Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
2.1

Title

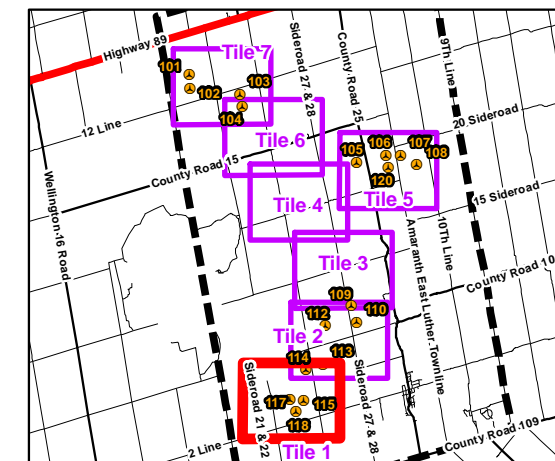
Ecological Land Classification- Overview

April, 2013
160960698



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel
- Natural Features**
- ELC



Notes

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Figure No.

2.2

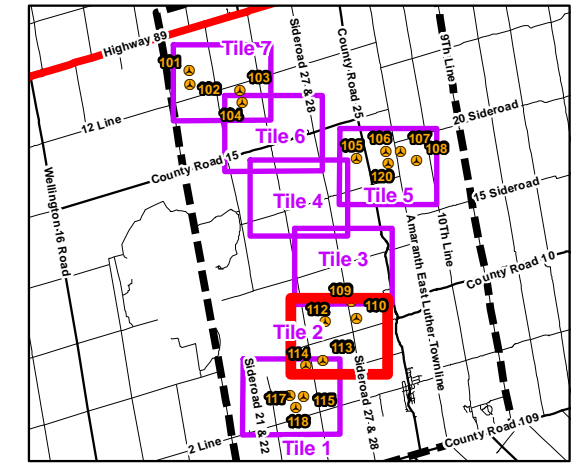
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**Ecological Land
Classification- Mapbook
Tile 1 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
 - Turbines
 - Access Roads
 - Collector Lines
 - Collector Line ROW
 - Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown
 - Turbine Blade Reach (56.5)
 - Turbine Construction Area
 - Turning Area
- Existing Features**
 - Road
 - Constructed Drain
 - Watercourse
 - Waterbody
 - Property Parcel
- Natural Features**
 - ELC



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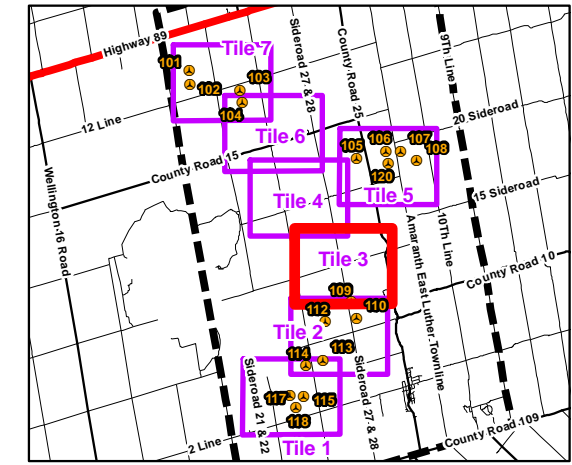
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**Ecological Land Classification- Mapbook
Tile 2 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel
- Natural Features**
- ELC



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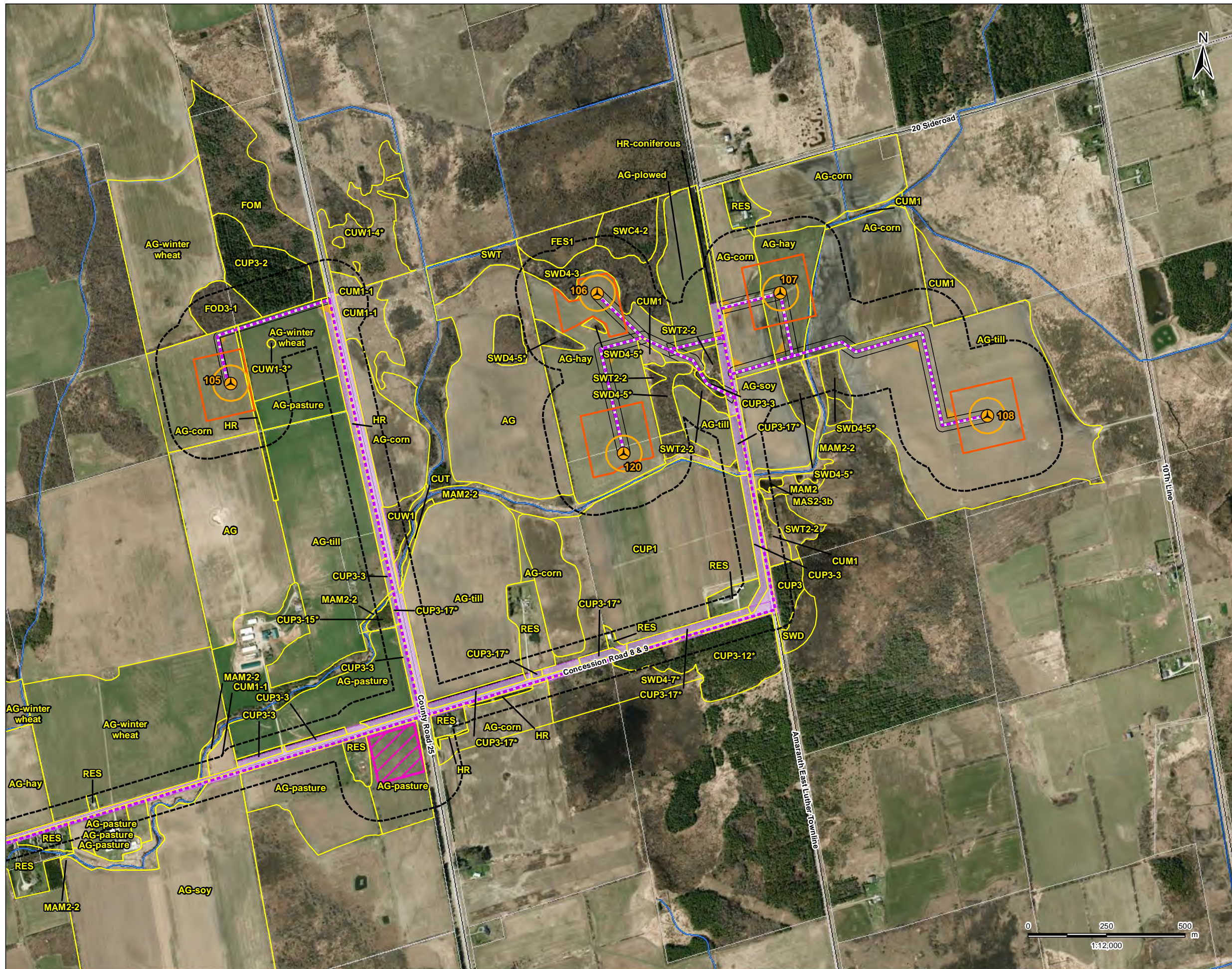
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Veresen Inc.

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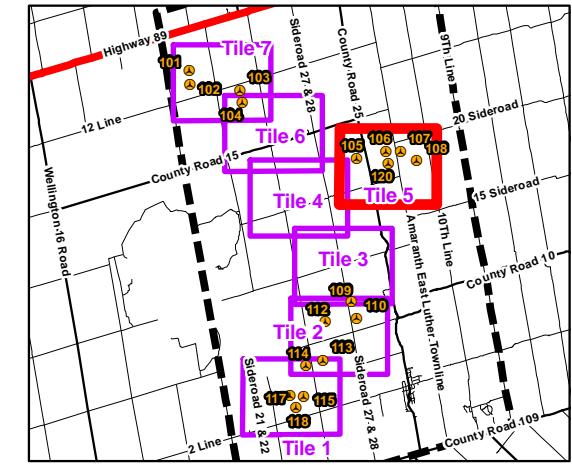
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**Ecological Land
Classification- Mapbook
Tile 3 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- ⋯ Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel
- Natural Features**
- ELC



Notes

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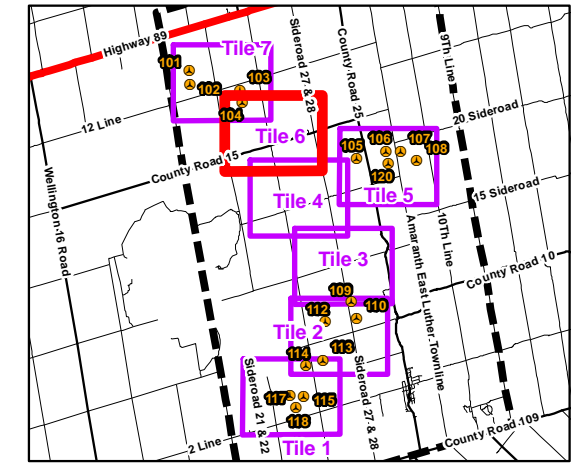
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Title
**Ecological Land
Classification- Mapbook
Tile 5 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel
- Natural Features**
- ELC



Notes

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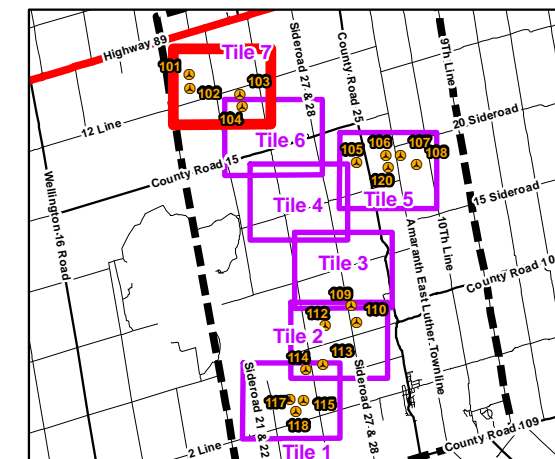
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Title
**Ecological Land
Classification- Mapbook
Tile 6 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- ⋯ Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel
- Natural Features**
- ELC



Notes

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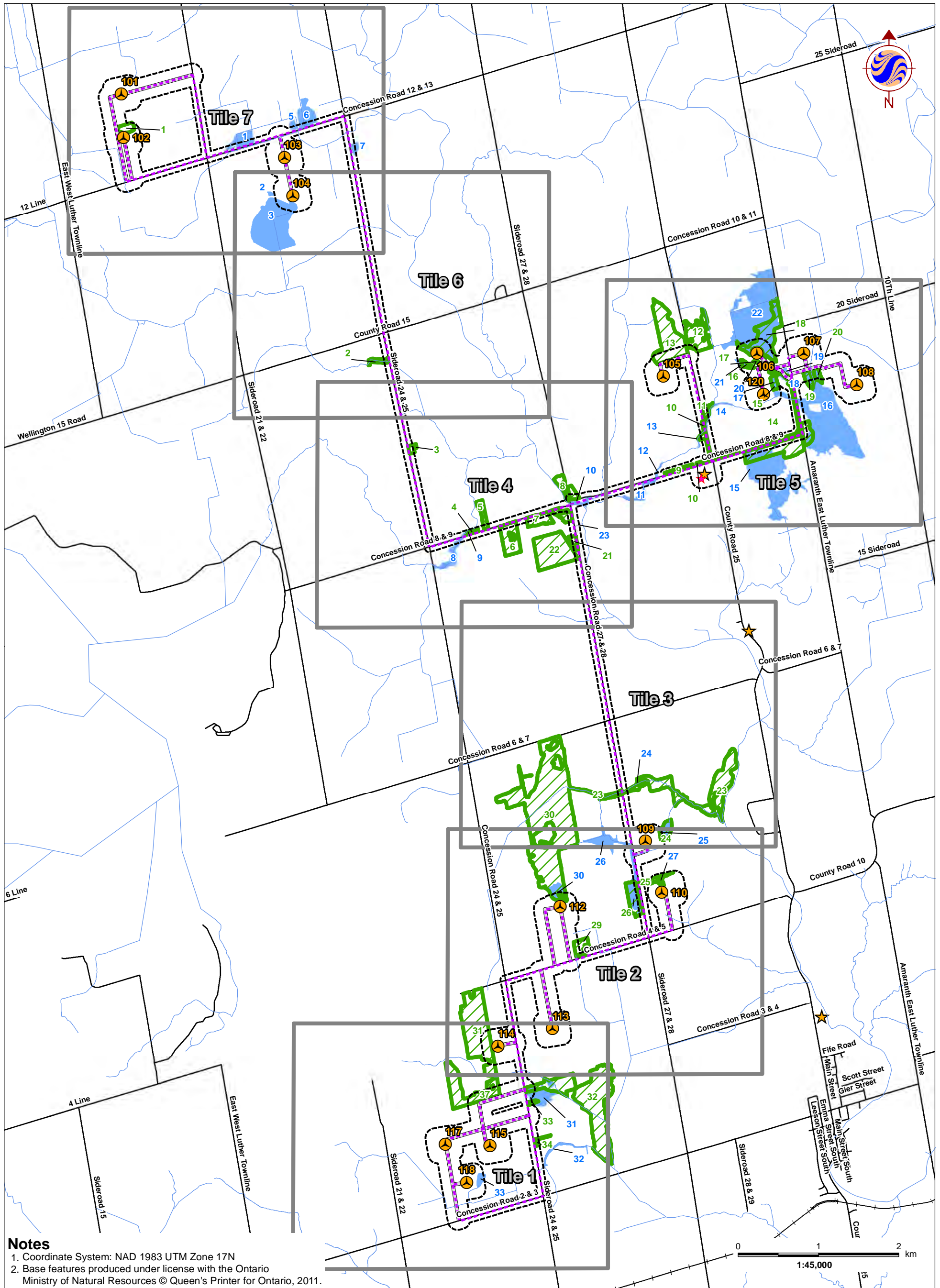
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**Ecological Land
Classification- Mapbook
Tile 7 of 7**

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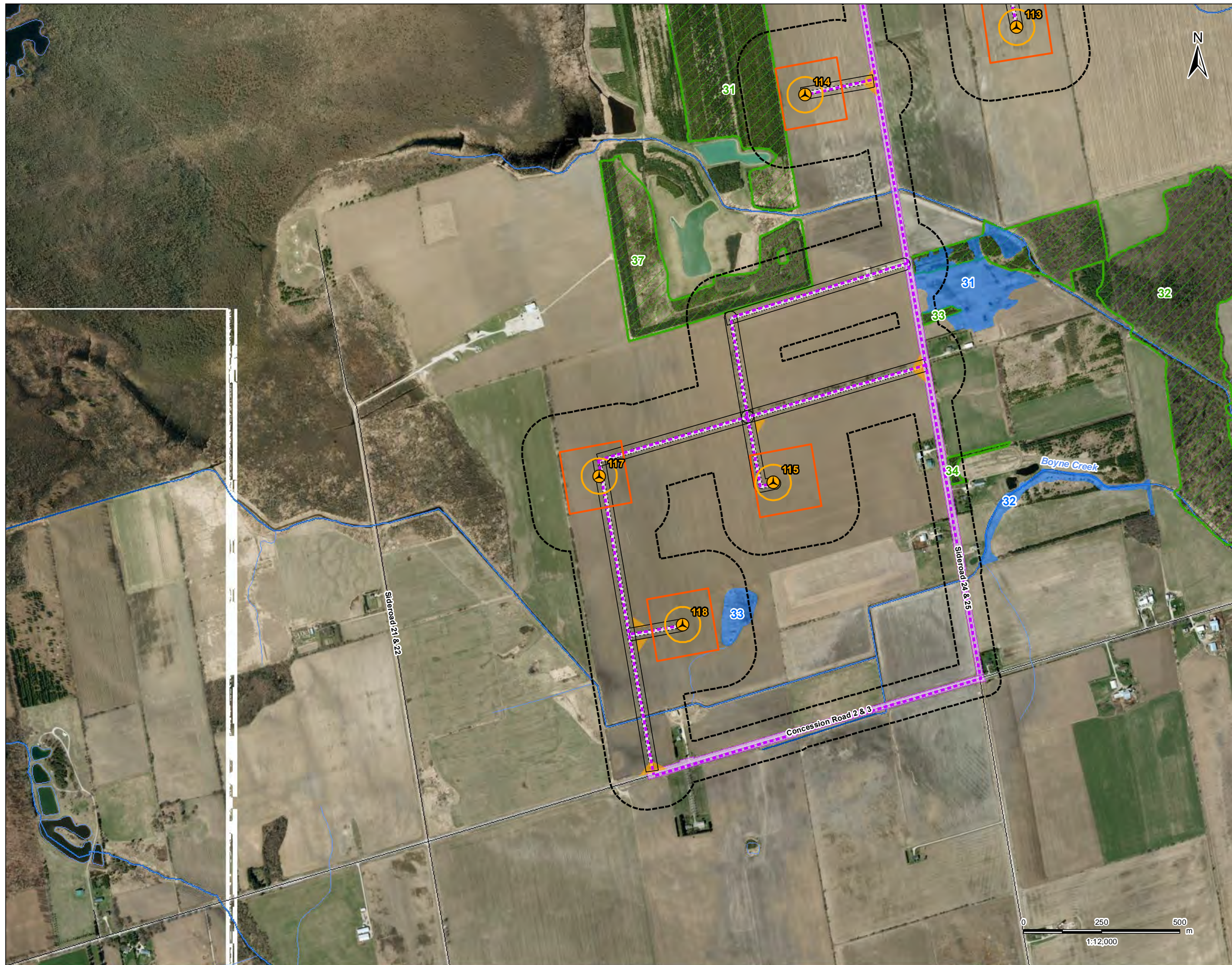


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Grand Valley Phase 3
Veresen Inc.

Figure No.
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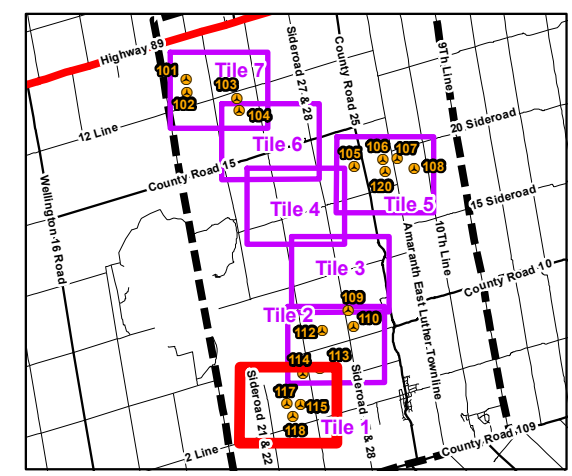
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**Site Investigation Results,
Wetlands, and Woodlands-
Overview**

April, 2013
160960698



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Natural Features**
- Candidate Significant Woodland
- Wetland Feature



Notes

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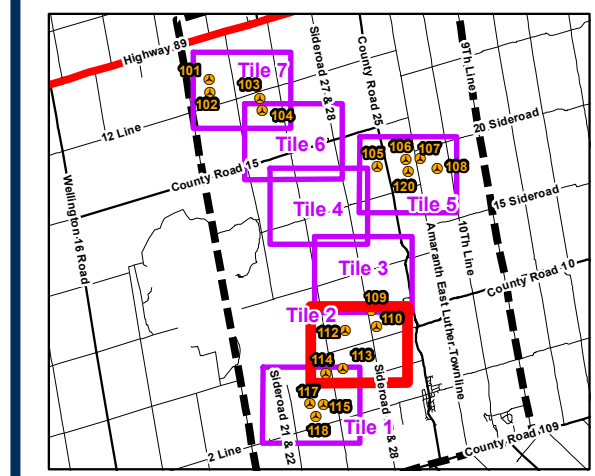
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Title **Site Investigation Results,
Wetlands and Woodlands
– Map Book Tile 1 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
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- Constructed Drain
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- Waterbody
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- Candidate Significant Woodland
- Wetland Feature



Notes

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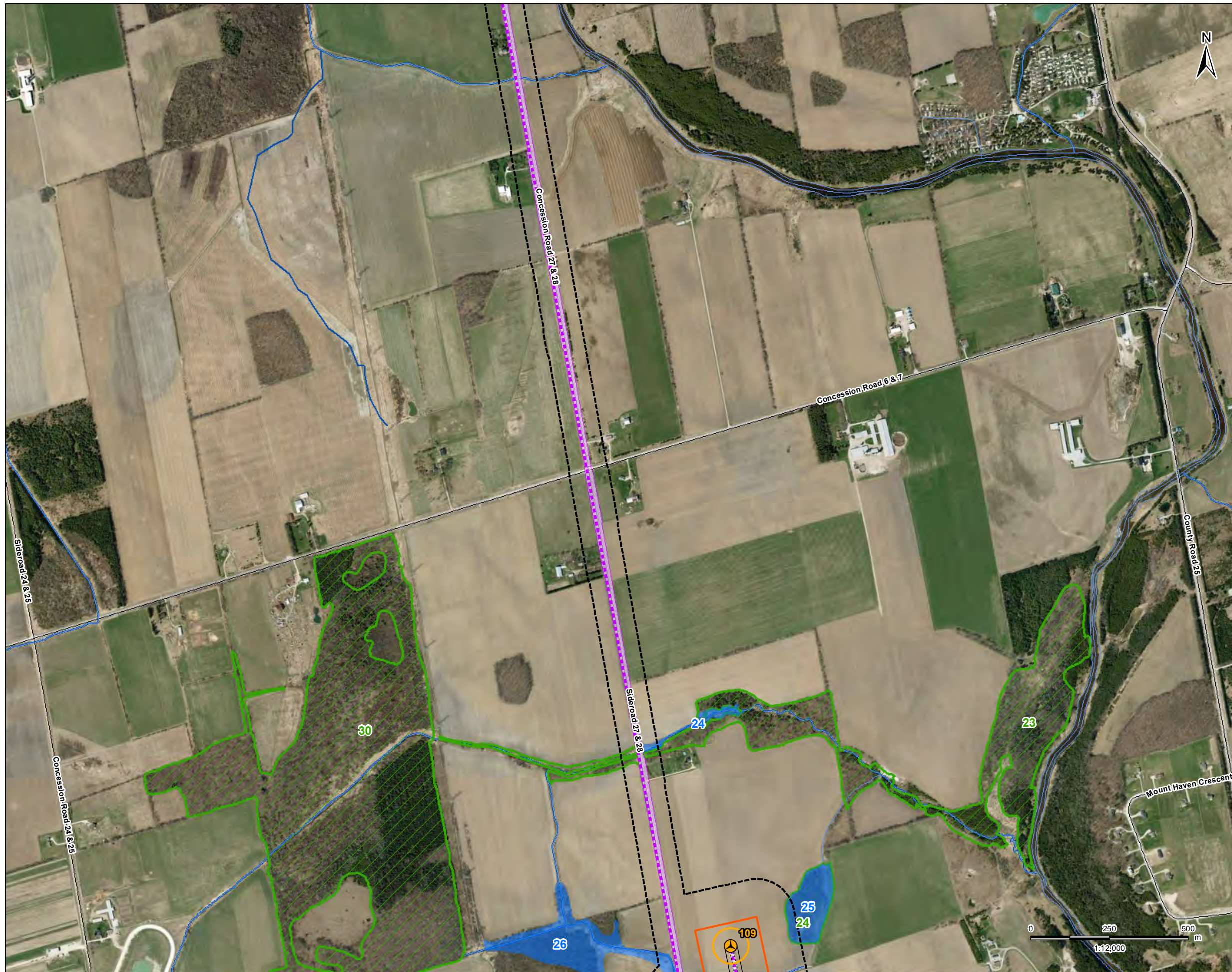
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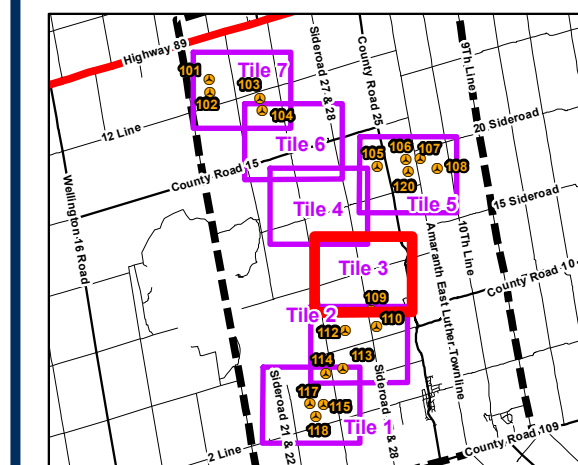
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Title
**Site Investigation Results,
Wetlands and Woodlands
– Map Book Tile 2 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- ⋯ Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Natural Features**
- Candidate Significant Woodland
- Wetland Feature



Notes

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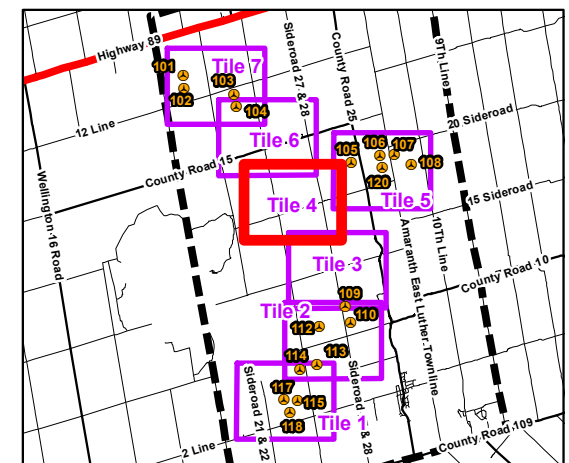
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Title
**Site Investigation Results,
Wetlands and Woodlands
– Map Book Tile 3 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Natural Features**
- Candidate Significant Woodland
- Wetland Feature



Notes

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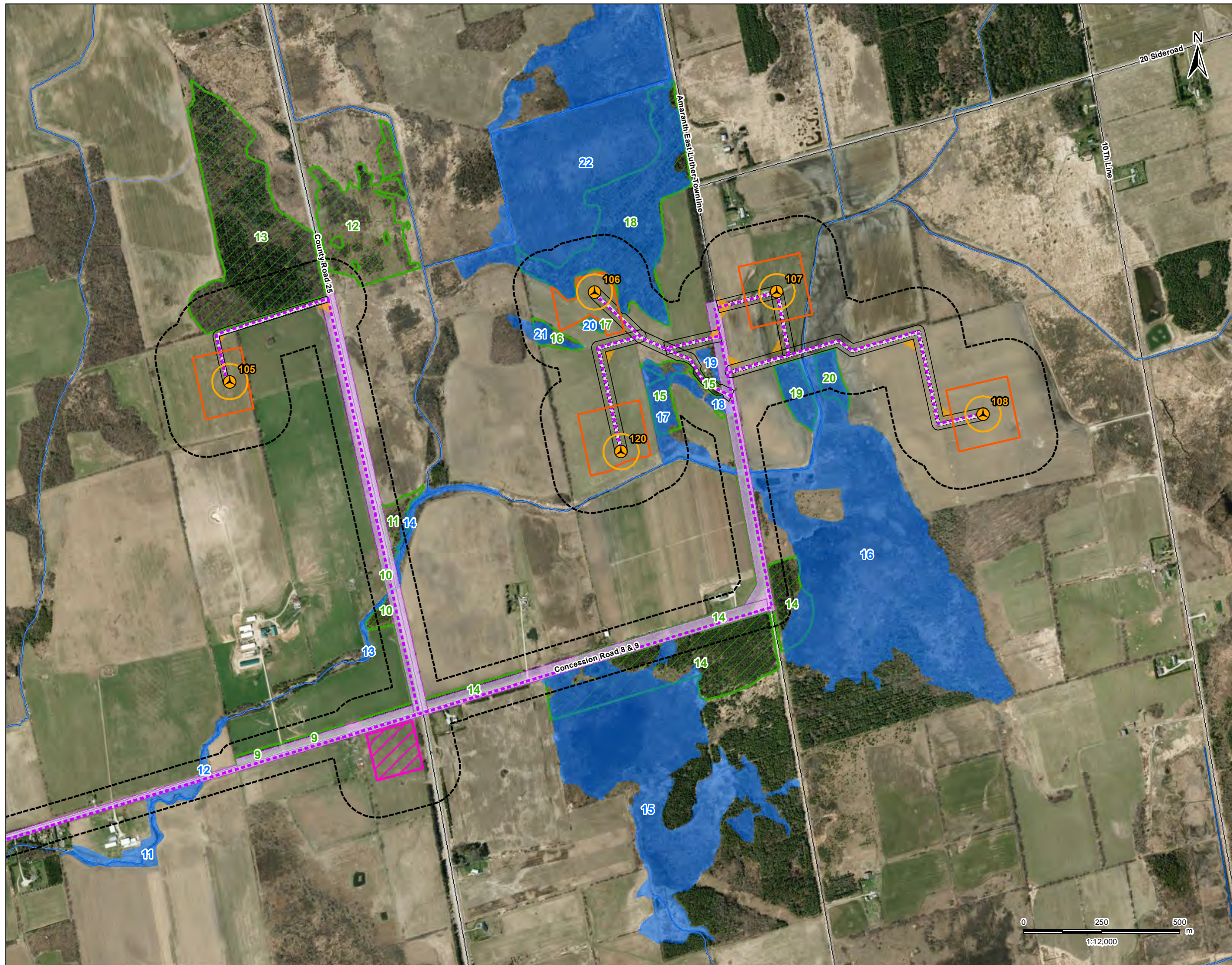
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Client/Project

Grand Valley Phase 3
Veresen Inc.

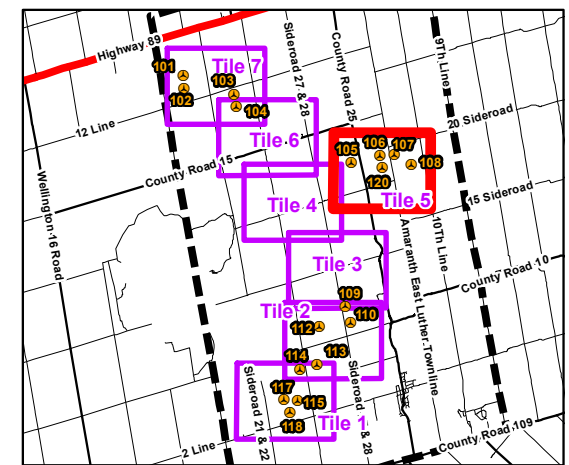
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Title **Site Investigation Results,
Wetlands and Woodlands
– Map Book Tile 4 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Natural Features**
- Candidate Significant Woodland
- Wetland Feature



Notes

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Grand Valley Phase 3
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Figure No.

3.2

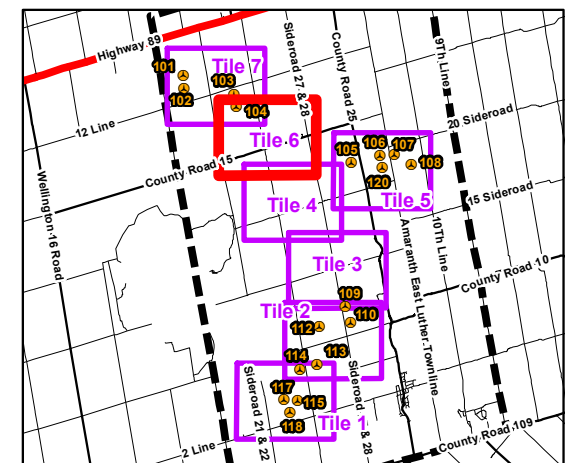
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**Site Investigation Results,
Wetlands and Woodlands
– Map Book Tile 5 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Natural Features**
- Candidate Significant Woodland
- Wetland Feature



Notes

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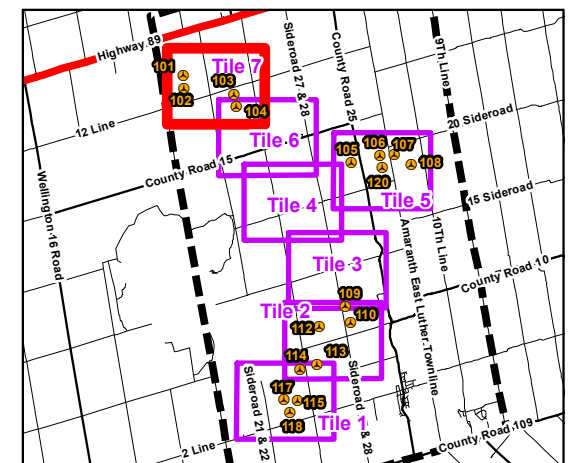
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Title **Site Investigation Results,
Wetlands and Woodlands
– Map Book Tile 6 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Natural Features**
- Candidate Significant Woodland
- Wetland Feature



Notes

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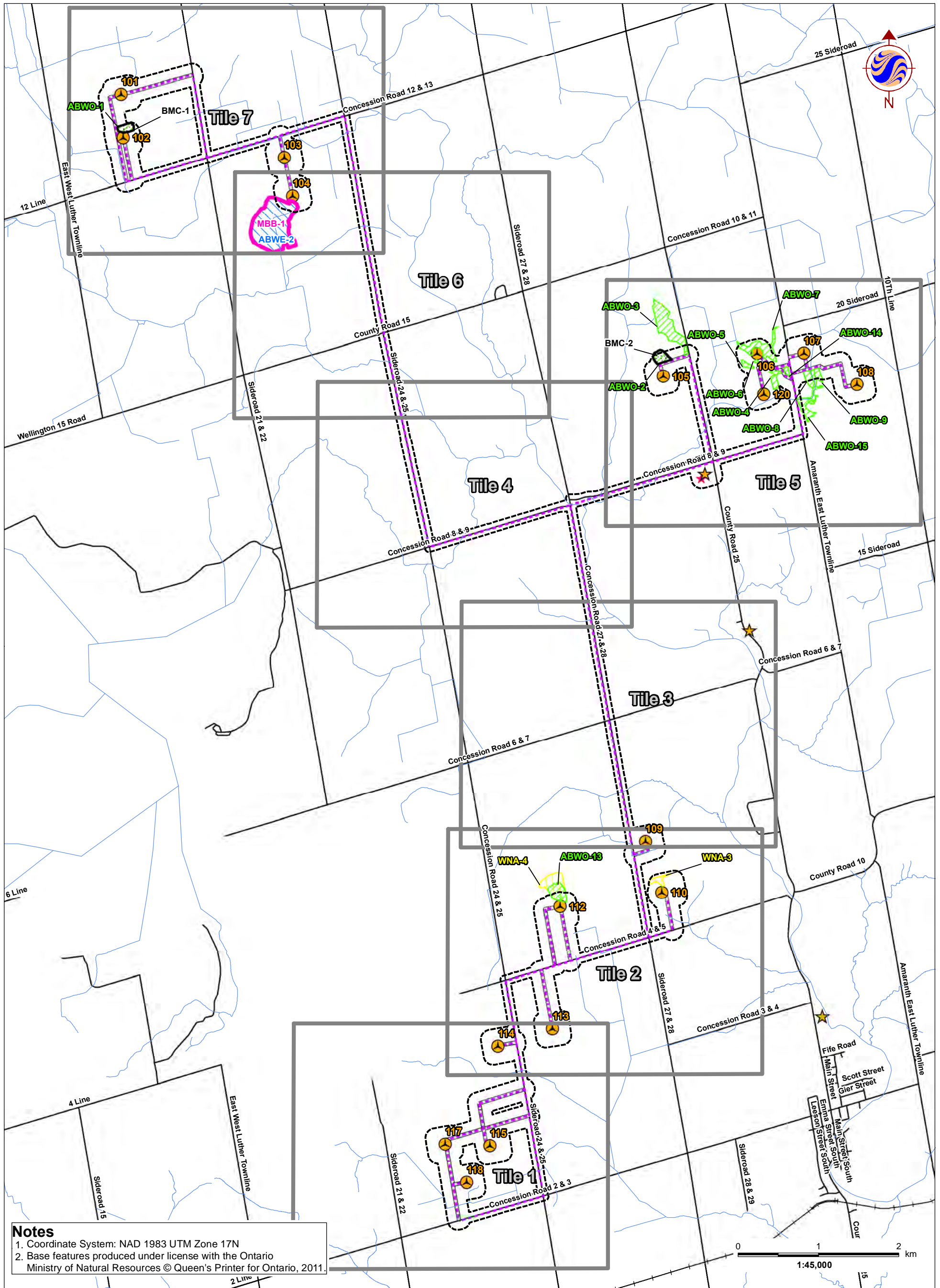
Grand Valley Phase 3
Veresen Inc.

Figure No.

3.2

Title

**Site Investigation Results,
Wetlands and Woodlands
– Map Book Tile 7 of 7**



Notes

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Revised: 2013-05-13 By: dharvey

May, 2013
160960698



Legend

- | | | |
|---|--|---|
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|---|--|---|

Client/Project

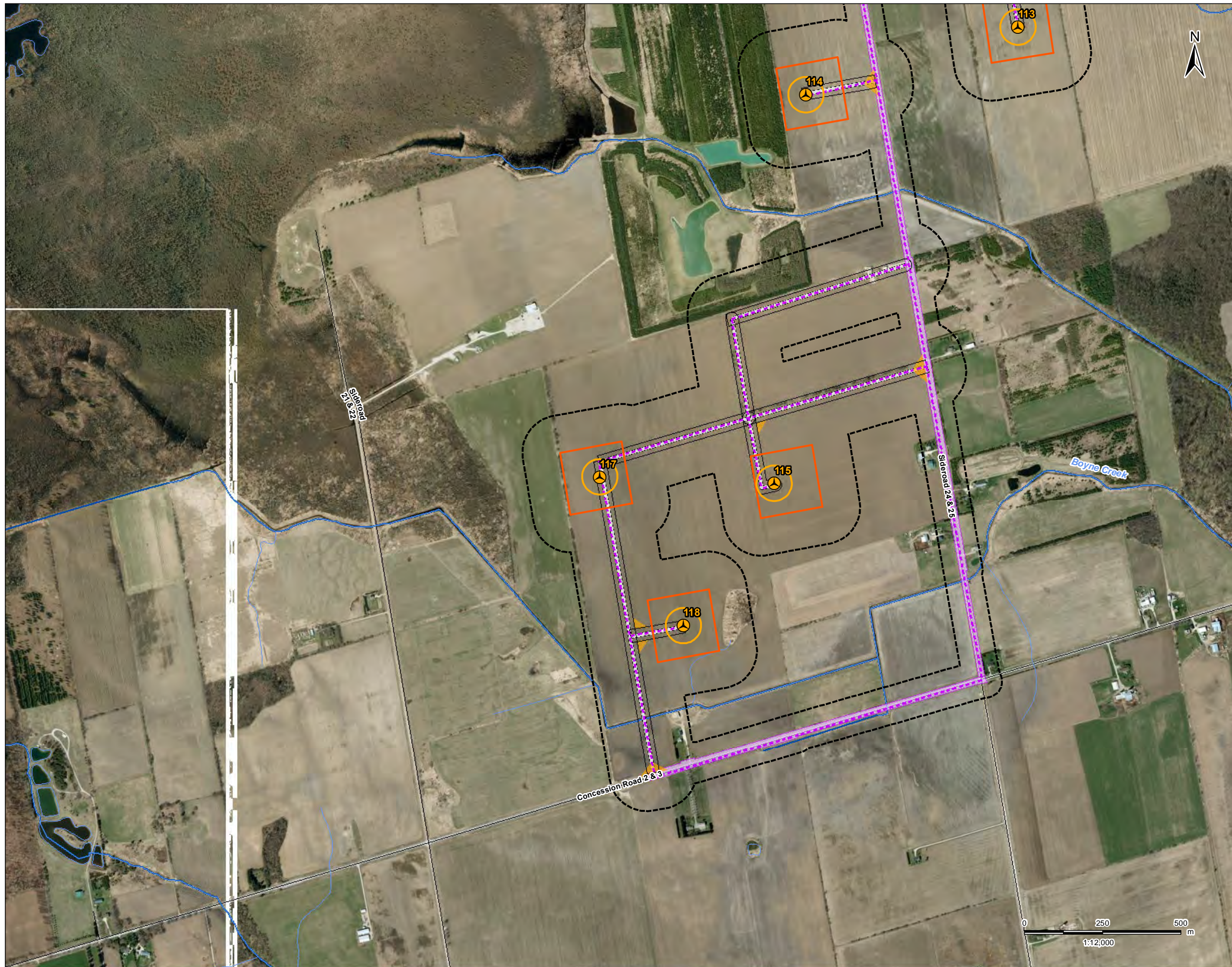
Grand Valley Phase 3
Veresen Inc.

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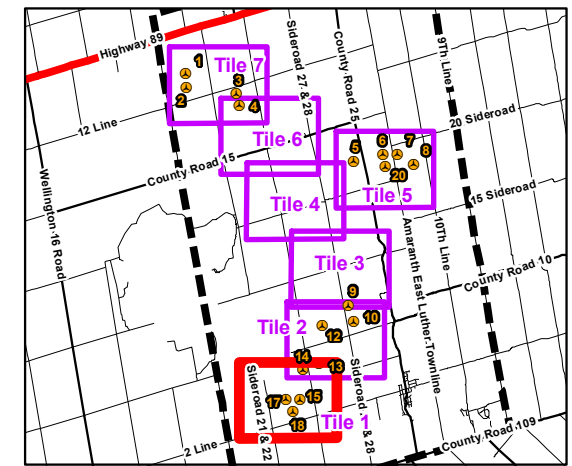
Title

**Site Investigation Results,
Wildlife Habitat – Overview**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- ⚡ Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optioned Property
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Wildlife Habitat**
- Amphibian Breeding (Wetland)- ABWE
- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA



lots

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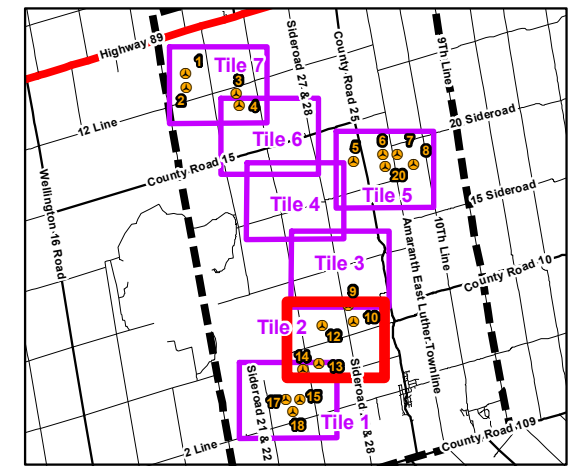
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Title
**Site Investigation Results,
Wildlife Habitat – Map Book**
Tile 1 of 7



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optioned Property
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Wildlife Habitat**
- Amphibian Breeding (Wetland)- ABWE
- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA



lots

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Veresen Inc.

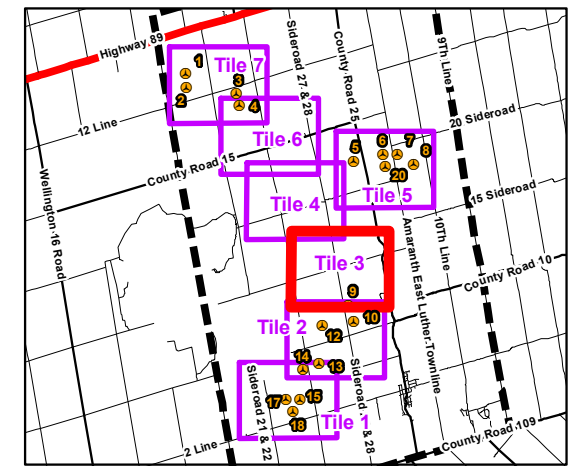
Figure No.
4.2

Title
**Site Investigation Results,
Wildlife Habitat – Map Book
Tile 2 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optioned Property
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Wildlife Habitat**
- Amphibian Breeding (Wetland)- ABWE
- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA



lots

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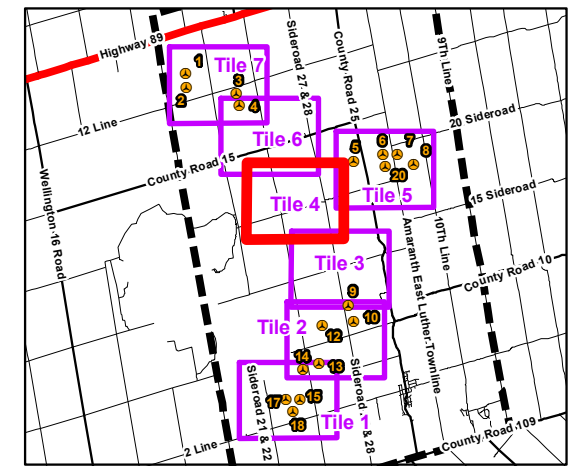
Figure No.
4.2

Title
**Site Investigation Results,
Wildlife Habitat – Map Book
Tile 3 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optioned Property
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Wildlife Habitat**
- Amphibian Breeding (Wetland)- ABWE
- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA



lots

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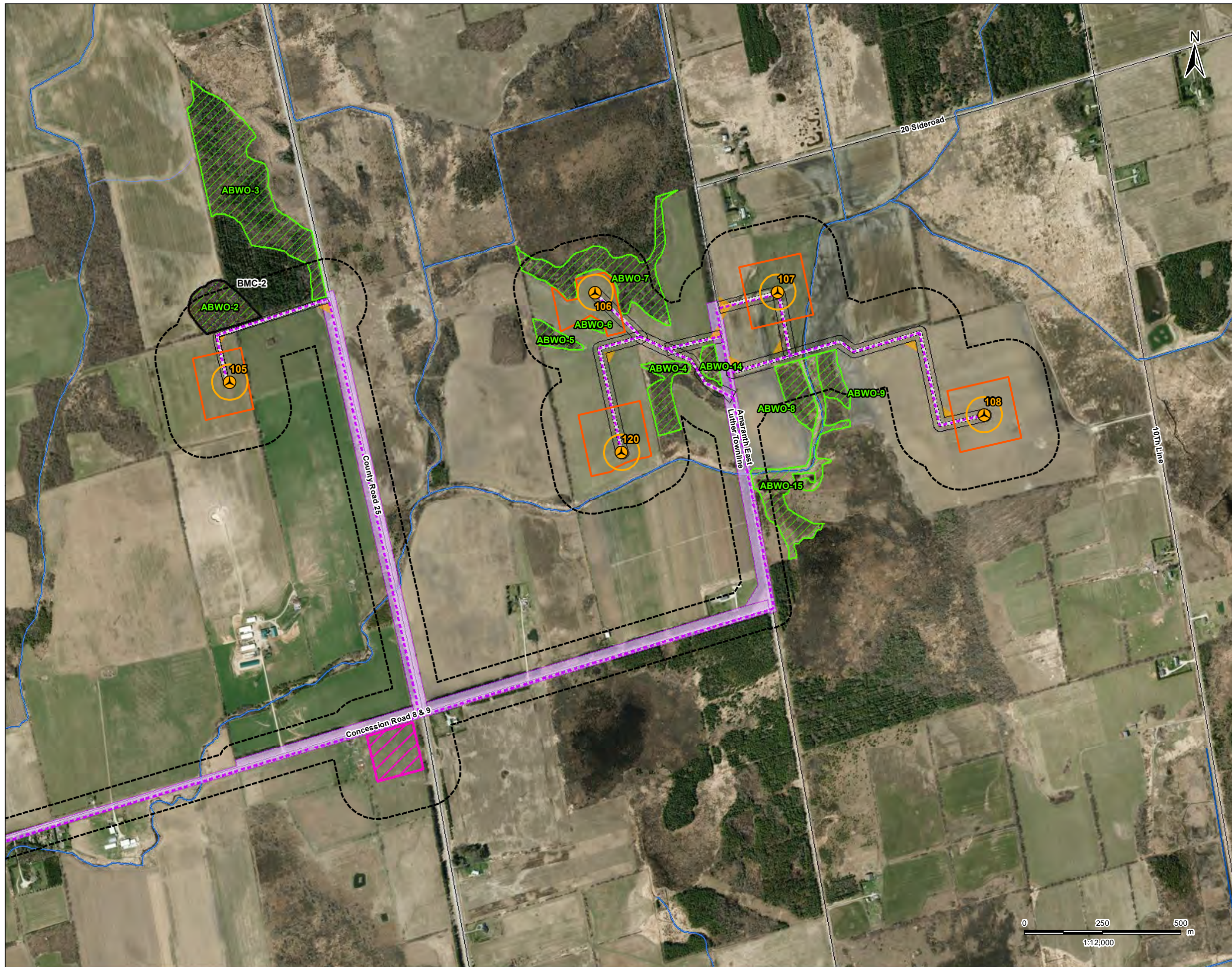
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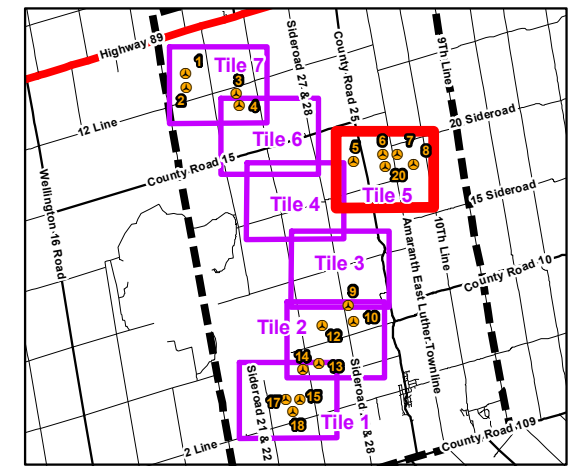
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4.2

Title
**Site Investigation Results,
Wildlife Habitat – Map Book
Tile 4 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optional Property
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Wildlife Habitat**
- Amphibian Breeding (Wetland)- ABWE
- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA



lots

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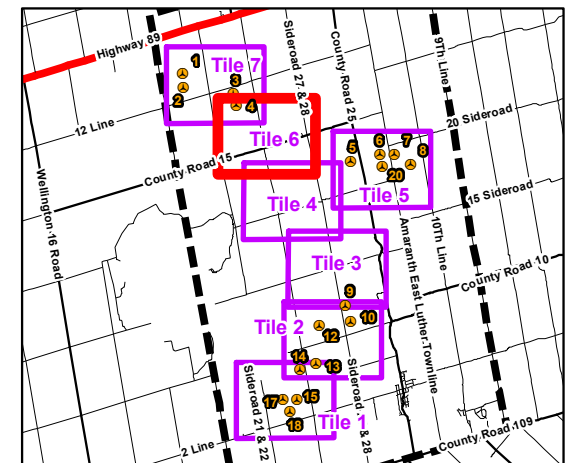
Figure No.
4.2

Title
**Site Investigation Results,
Wildlife Habitat – Map Book
Tile 5 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optioned Property
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Wildlife Habitat**
- Amphibian Breeding (Wetland)- ABWE
- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA



lots

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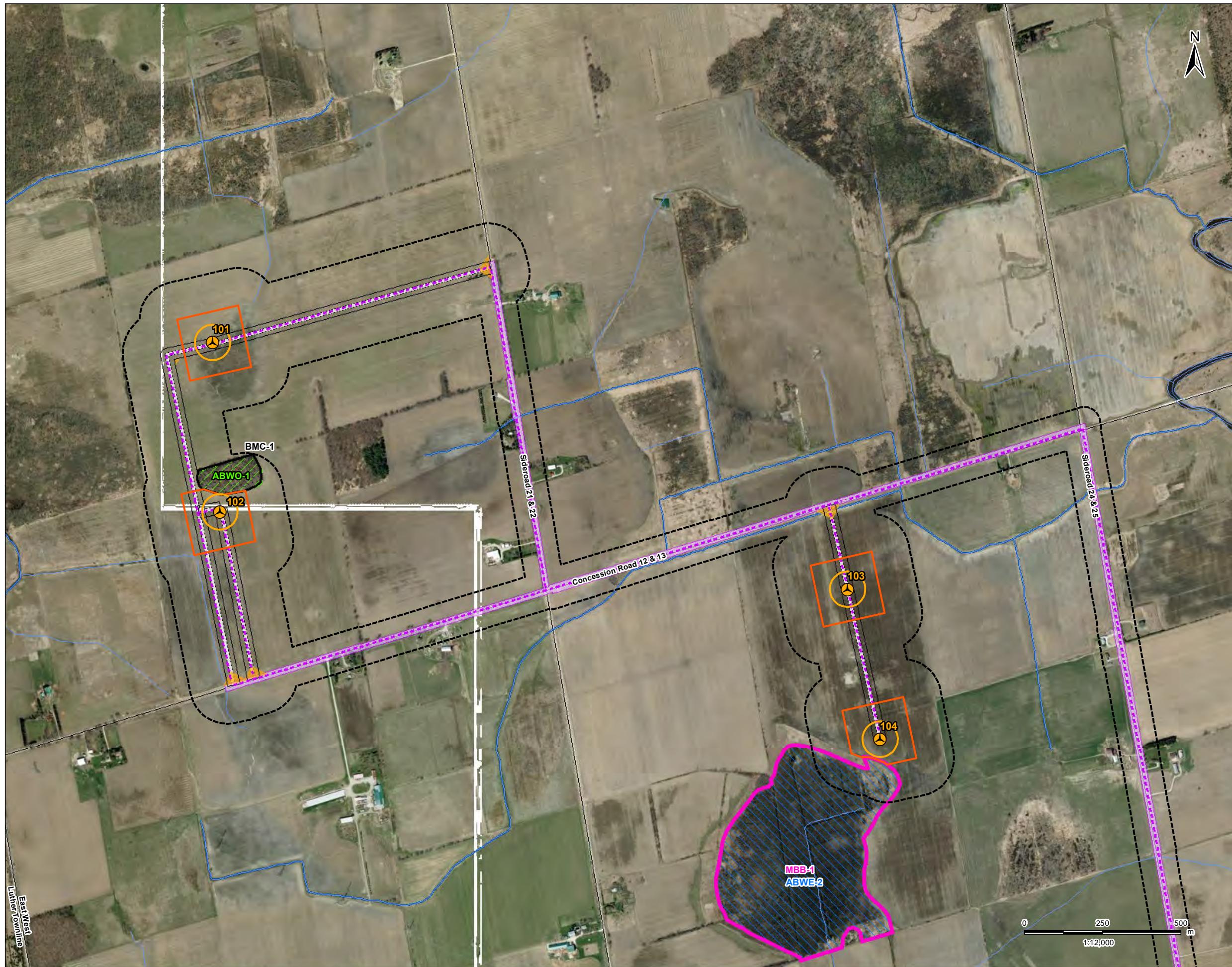
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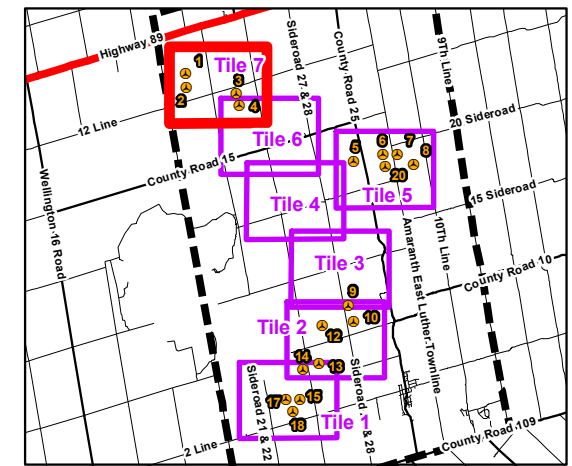
Figure No.
4.2

Title
**Site Investigation Results,
Wildlife Habitat – Map Book
Tile 6 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optioned Property
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Wildlife Habitat**
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- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA



lots

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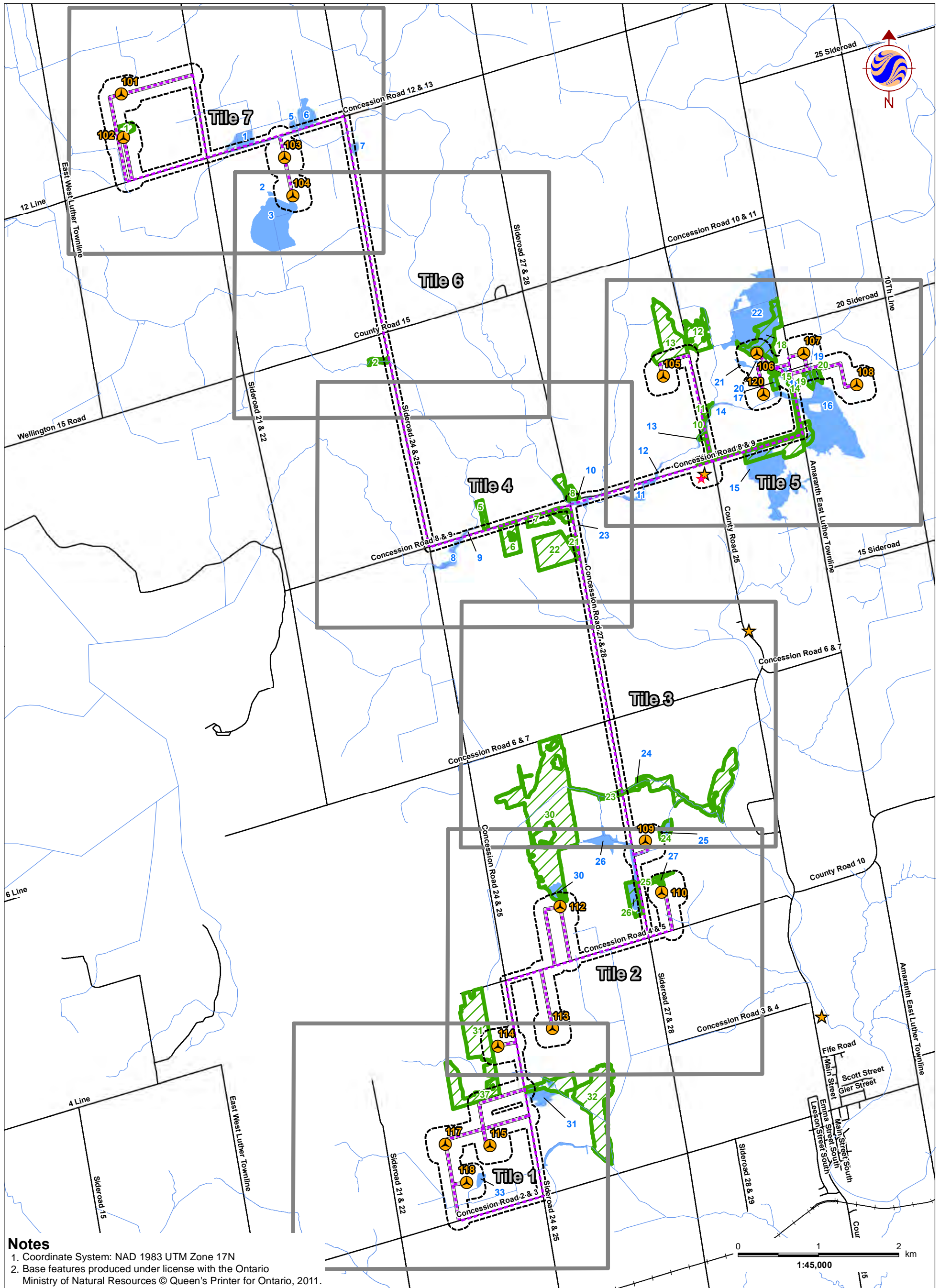
May 2013
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Figure No.
4.2

Title
**Site Investigation Results,
Wildlife Habitat – Map Book
Tile 7 of 7**

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- Notes**
1. Coordinate System: NAD 1983 UTM Zone 17N
 2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2011.



Legend

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> 120m Zone of Investigation Proposed Project Components ● Turbines Access Roads Collector Lines ★ Construction Trailer/ Parking Area (Previously Disturbed) | <ul style="list-style-type: none"> ★ Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown Existing Features Road Railway Waterbody Watercourse | <ul style="list-style-type: none"> Significant Natural Features Significant Woodland Wetland Feature |
|--|--|--|

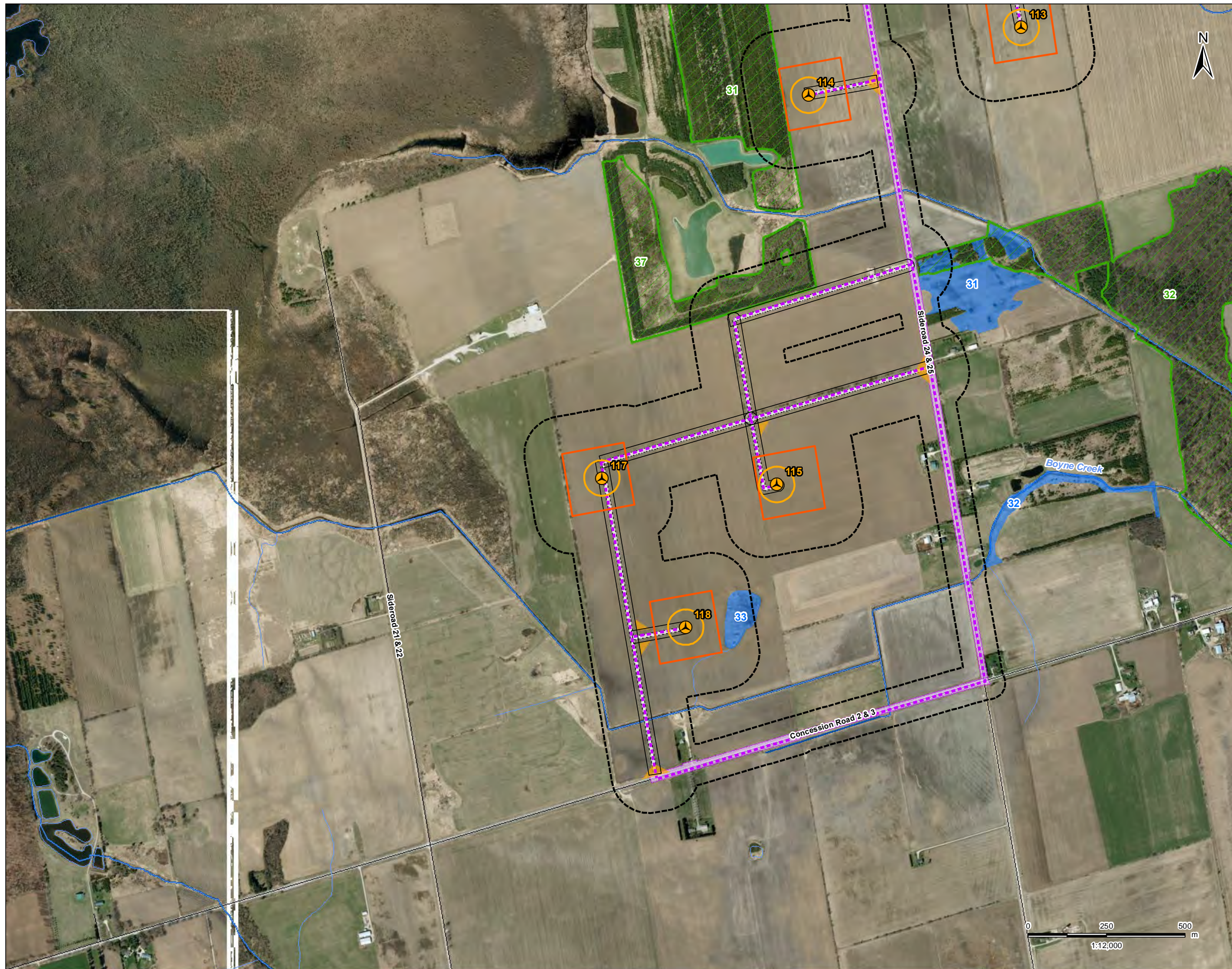
Client/Project
 Grand Valley Phase 3
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Figure No.
 5.1

Title

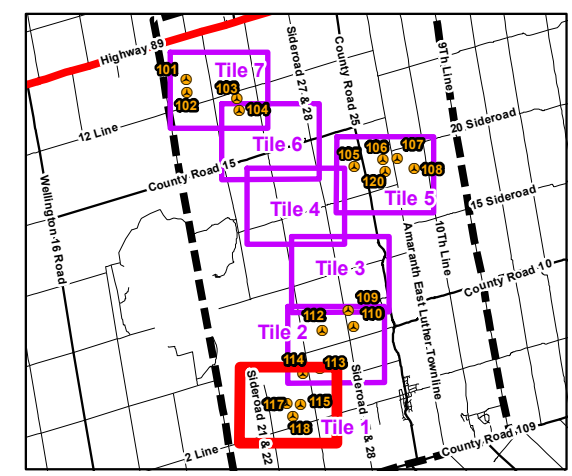
Significant Wetlands and Woodlands – Overview

May, 2013
 160960698



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Significant Natural Features**
- Significant Woodland
- Wetland Feature



Notes

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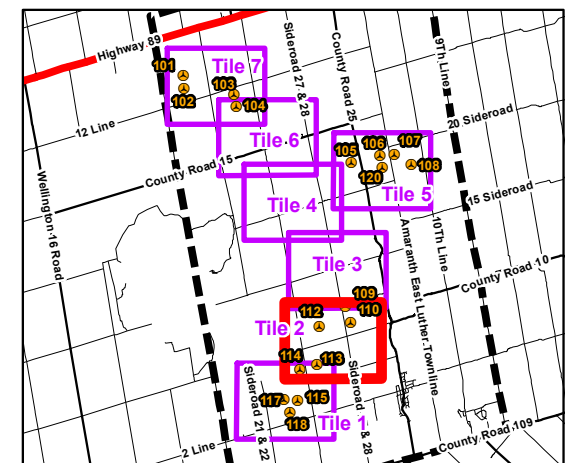
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5.2

Title
**Significant Wetlands and
Woodlands – Map Book
Tile 1 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- ⚙ Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Significant Natural Features**
- Significant Woodland
- Wetland Feature



Notes

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Grand Valley Phase 3
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Figure No.

5.2

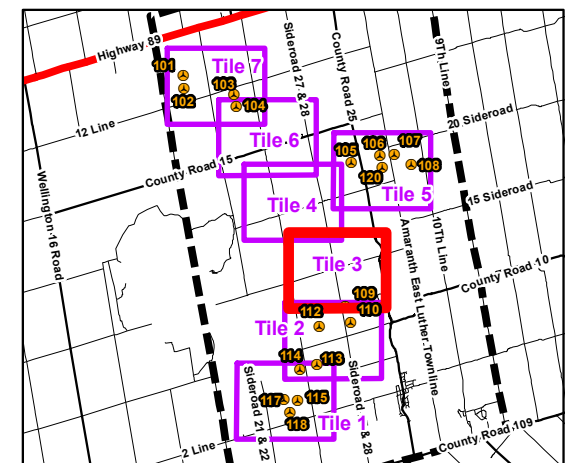
Title

**Significant Wetlands and
Woodlands – Map Book
Tile 2 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- ⋯ Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Significant Natural Features**
- Significant Woodland
- Wetland Feature



Notes

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Figure No.

5.2

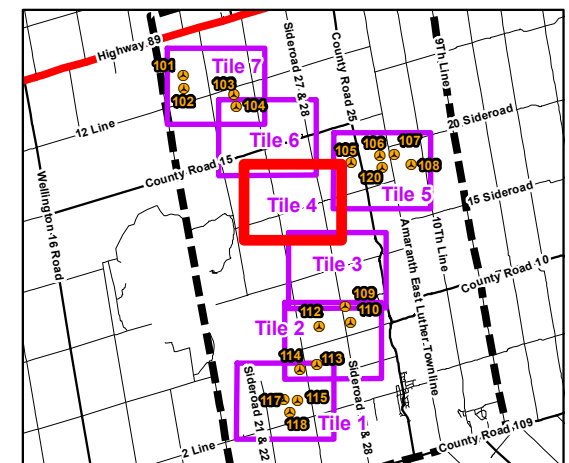
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**Significant Wetlands and
Woodlands – Map Book
Tile 3 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Significant Natural Features**
- Significant Woodland
- Wetland Feature



Notes

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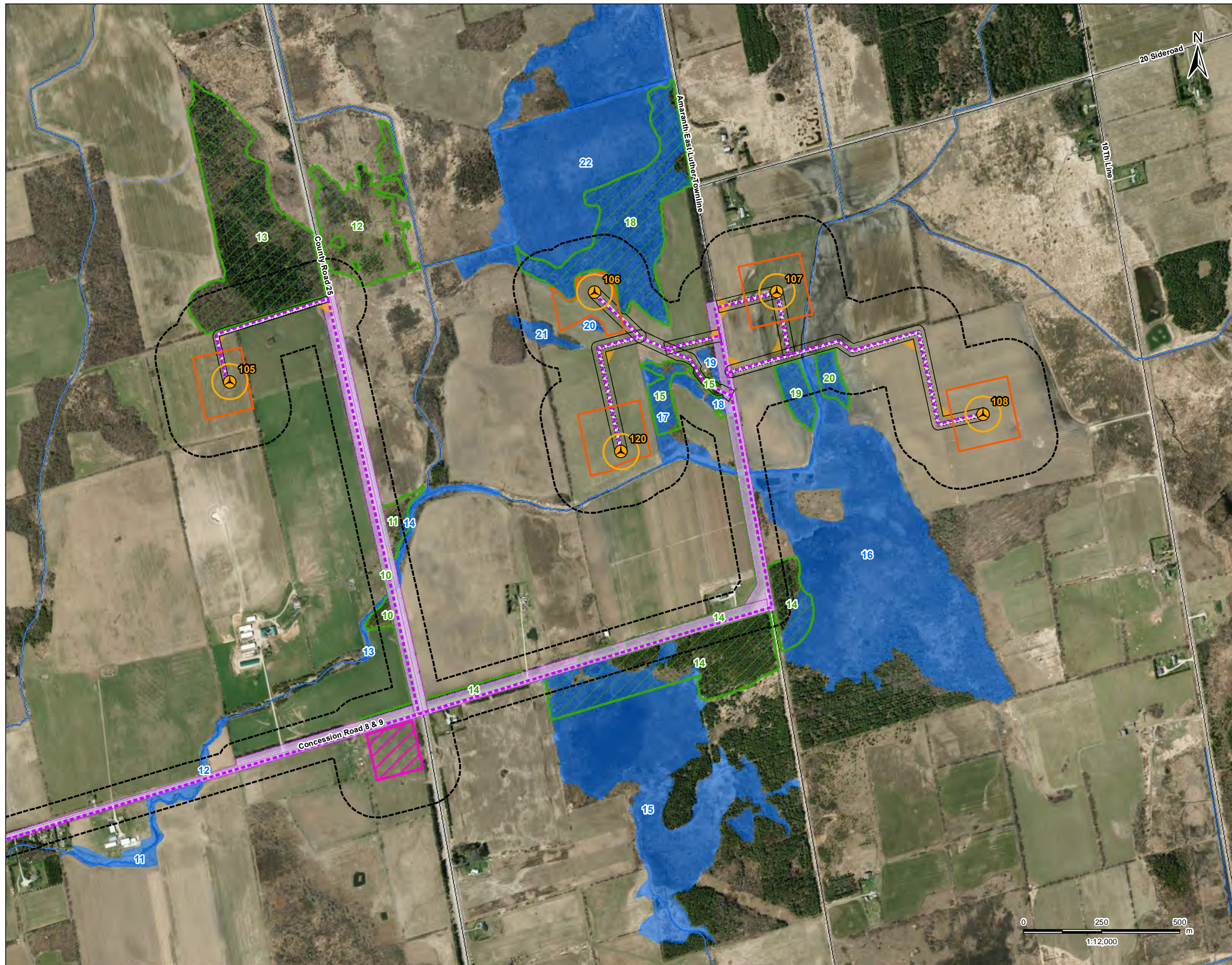
Grand Valley Phase 3
Veresen Inc.

Figure No.

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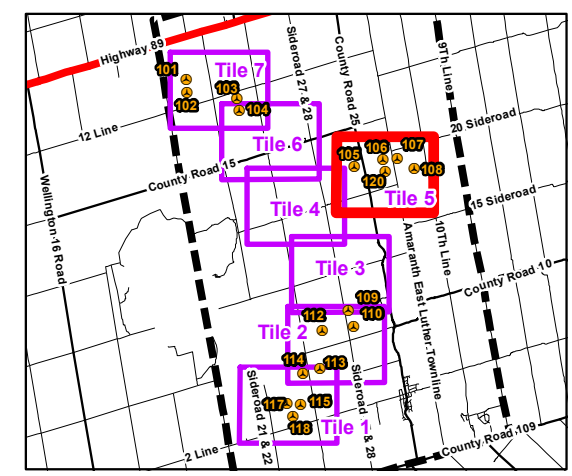
Title

**Significant Wetlands and
Woodlands – Map Book
Tile 4 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Significant Natural Features**
- Significant Woodland
- Wetland Feature



Notes

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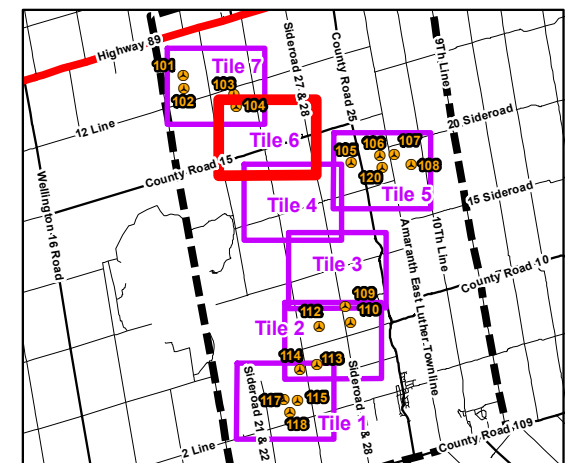
Figure No.
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Title
**Significant Wetlands and
Woodlands – Map Book
Tile 5 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- ⊙ Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Significant Natural Features**
- Significant Woodland
- Wetland Feature



Notes

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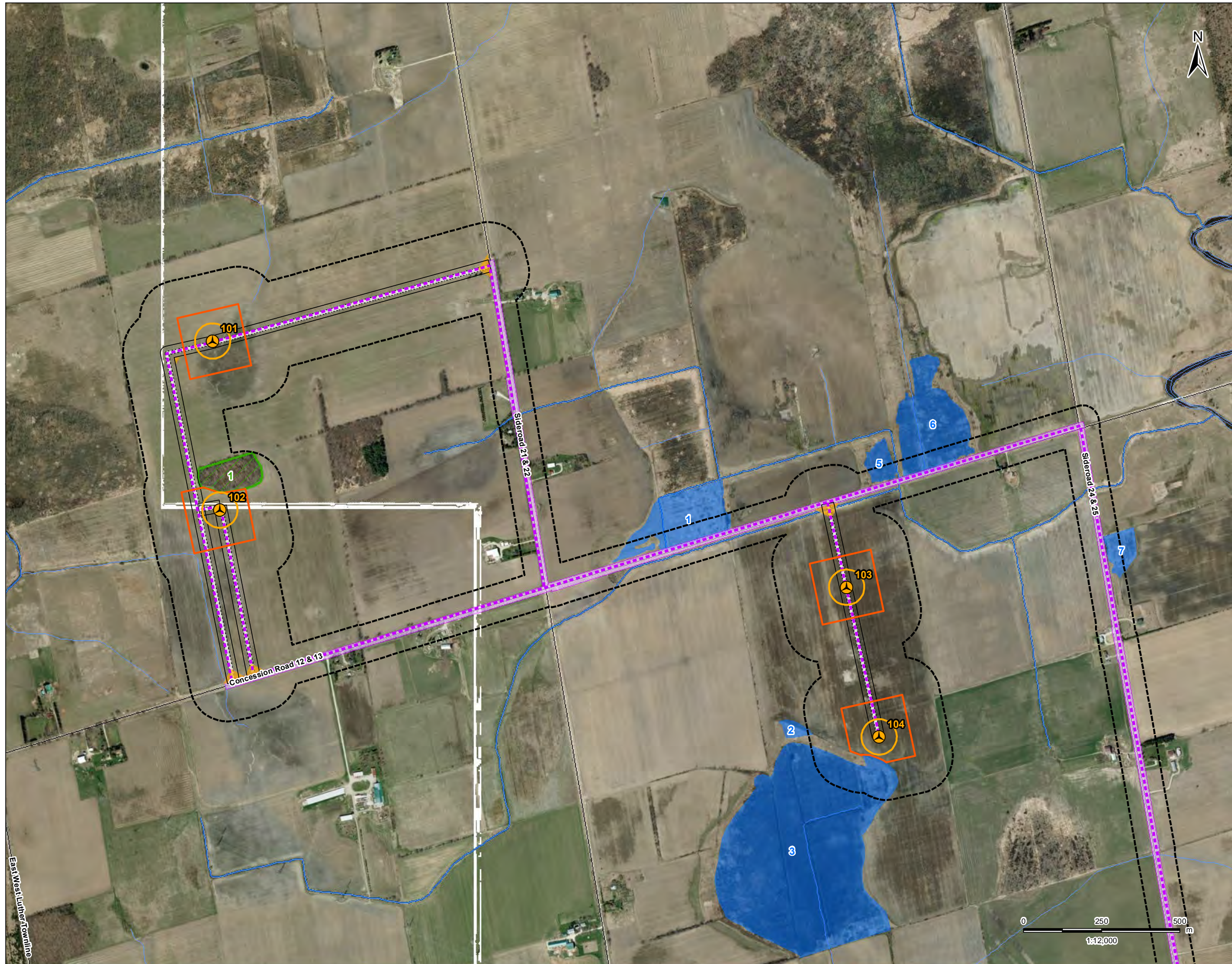
Grand Valley Phase 3
Veresen Inc.

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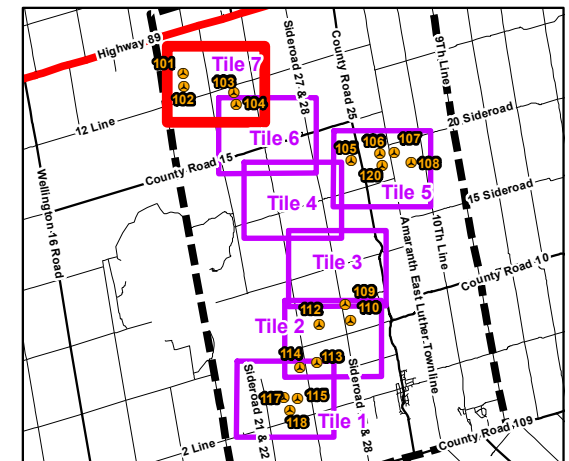
Title

**Significant Wetlands and
Woodlands – Map Book
Tile 6 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- ⋯ Collector Lines
- Collector Line ROW
- Transformer Location/
HONI Connection Point/
Met Tower/ Construction
Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Existing Features**
- Road
- Constructed Drain
- Watercourse
- Waterbody
- Significant Natural Features**
- Significant Woodland
- Wetland Feature



Notes

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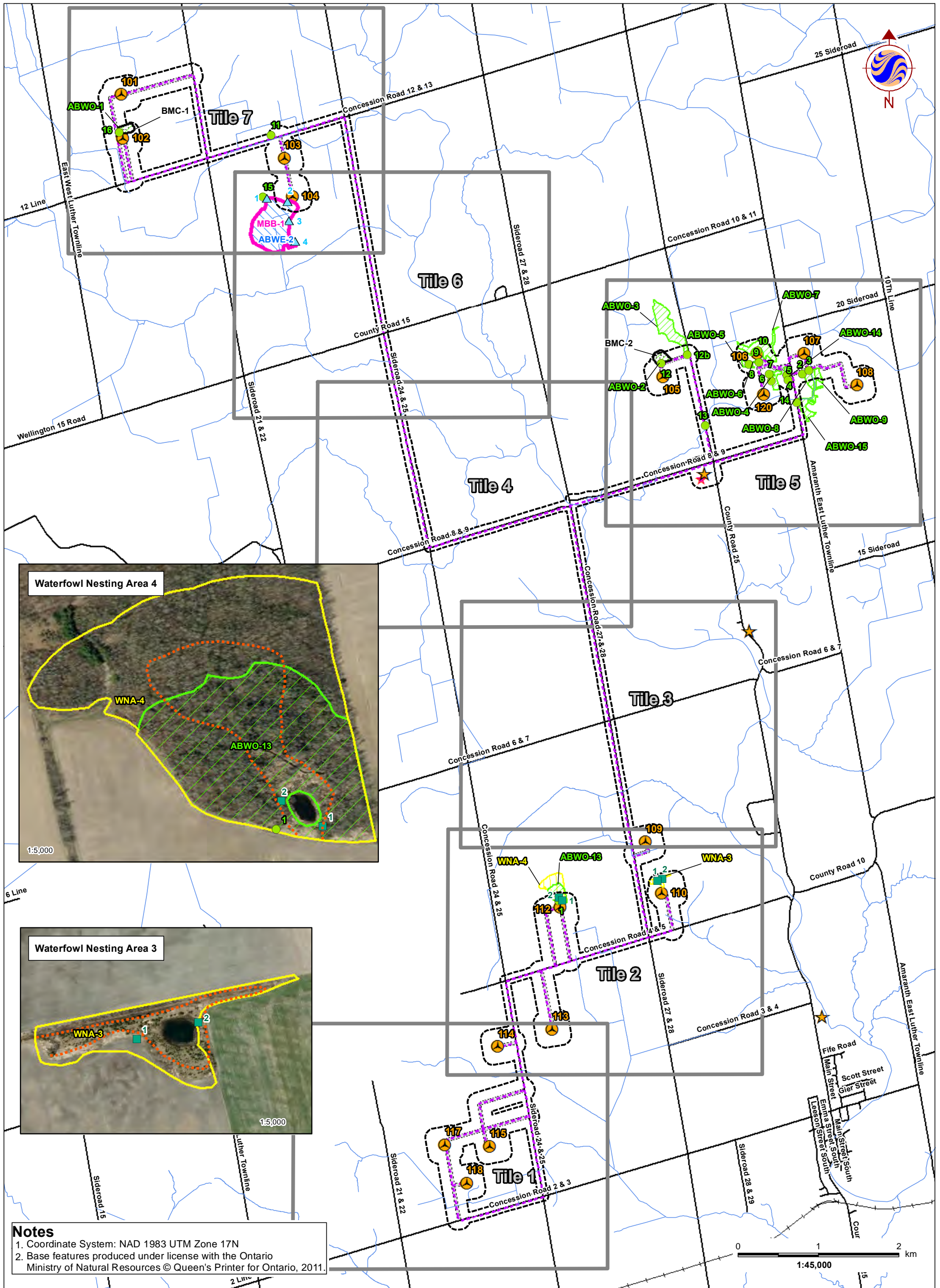
Grand Valley Phase 3
Veresen Inc.

Figure No.

5.2

Title

**Significant Wetlands and
Woodlands – Map Book
Tile 7 of 7**



Notes
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 Revised: 2013-05-16 By: dharvey

May, 2013
 160960698



Legend

120m Zone of Investigation

Proposed Project Components

- Turbines
- Access Roads
- Collector Lines
- Construction Trailer/ Parking Area (Previously Disturbed)

Transformer Location/HONI Connection Point/Met Tower/Construction Laydown

Existing Features

- Road
- Railway
- Waterbody
- Watercourse

Wildlife Habitat

- Amphibian Breeding (Wetland)- ABWE
- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA

Wildlife Survey Stations

- Amphibian Call Count
- Marsh Breeding Bird Point Count
- Waterfowl Nesting Point Count
- Waterfowl Nesting Transect

Client/Project

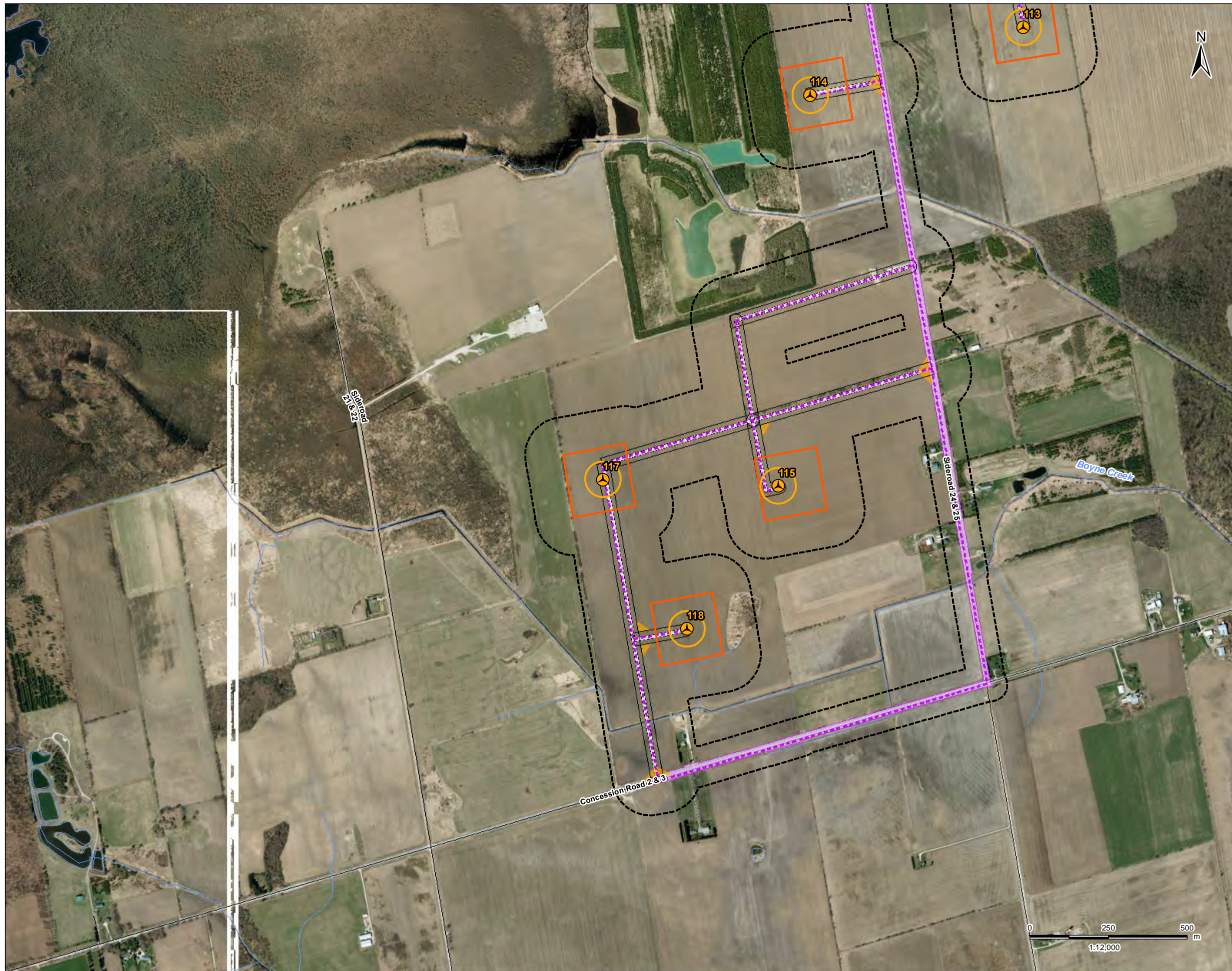
Grand Valley Phase 3
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Figure No.

6.1

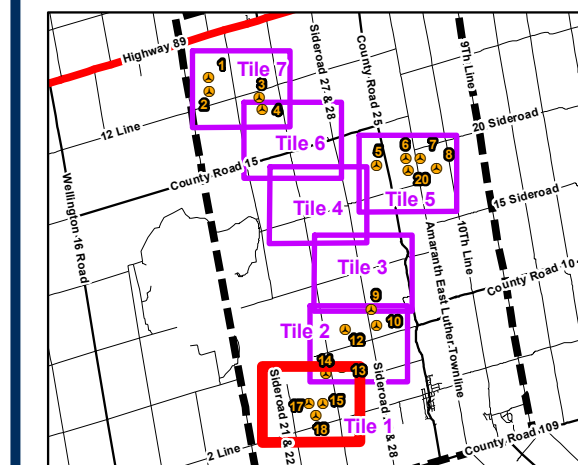
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Preconstruction Survey Locations – Overview



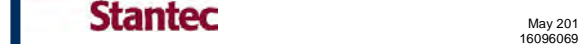
Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optioned Property
- Existing Features**
- Road
- Watercourse
- Waterbody
- Wildlife Habitat**
- Amphibian Breeding (Wetland)- ABWE
- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA
- Wildlife Survey Stations**
- Amphibian Call Count
- Marsh Breeding Bird Point Counts
- Waterfowl Nesting Point Counts
- Waterfowl Nesting Transect



lots

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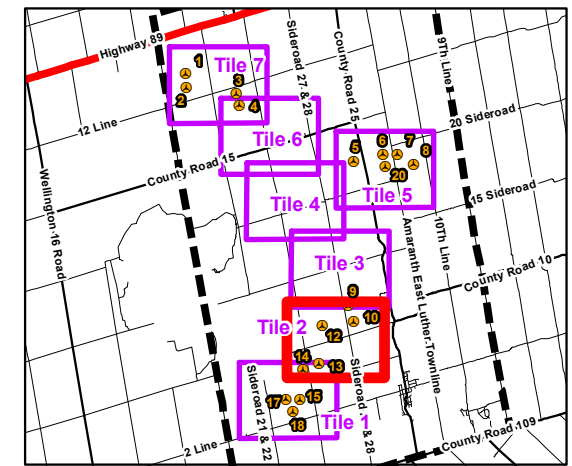
Figure No.
 6.2

Title
Preconstruction Survey Locations – Map Book
 Tile 1 of 7



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
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- Existing Features**
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- Watercourse
- Waterbody
- Wildlife Habitat**
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- Amphibian Breeding (Woodland)- ABWO
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- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA
- Wildlife Survey Stations**
- Amphibian Call Count
- ▲ Marsh Breeding Bird Point Counts
- Waterfowl Nesting Point Counts
- Waterfowl Nesting Transect



lots

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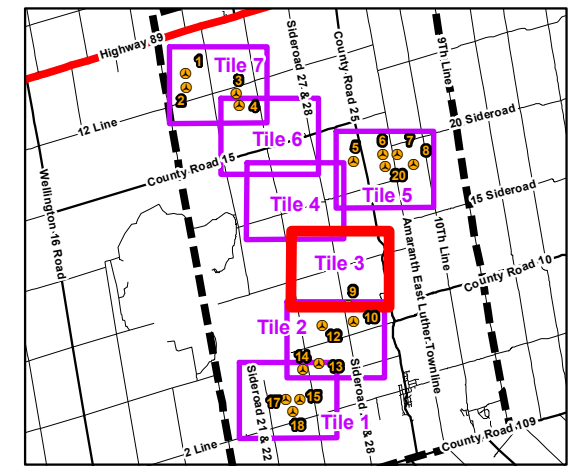
Figure No.
6.2

Title
**Preconstruction Survey
Locations – Map Book
Tile 2 of 7**



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optioned Property
- Existing Features**
- Road
- Watercourse
- Waterbody
- Wildlife Habitat**
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- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA
- Wildlife Survey Stations**
- Amphibian Call Count
- Marsh Breeding Bird Point Counts
- Waterfowl Nesting Point Counts
- Waterfowl Nesting Transect



lots

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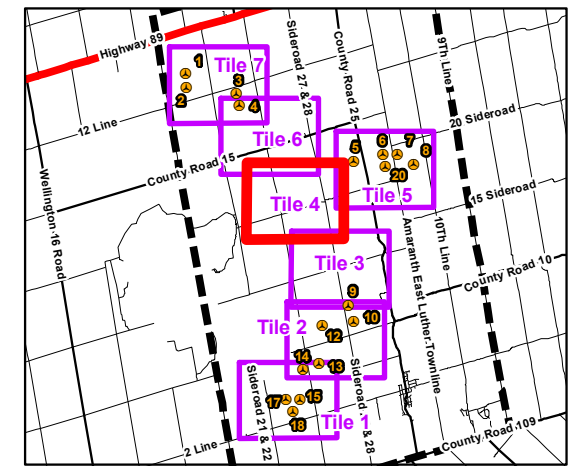
Figure No.
6.2

Title
Preconstruction Survey Locations – Map Book
Tile 3 of 7



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optioned Property
- Existing Features**
- Road
- Watercourse
- Waterbody
- Wildlife Habitat**
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- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA
- Wildlife Survey Stations**
- Amphibian Call Count
- Marsh Breeding Bird Point Counts
- Waterfowl Nesting Point Counts
- Waterfowl Nesting Transect



lots

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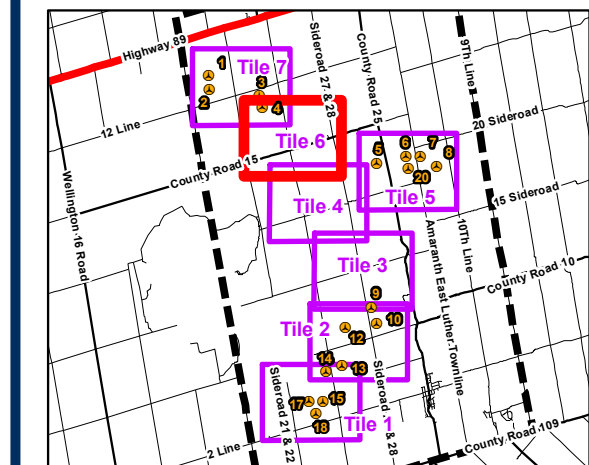
Figure No.
6.2

Title
Preconstruction Survey Locations – Map Book
Tile 4 of 7



Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optional Property
- Existing Features**
- Road
- Watercourse
- Waterbody
- Wildlife Habitat**
- Amphibian Breeding (Wetland)- ABWE
- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA
- Wildlife Survey Stations**
- Amphibian Call Count
- Marsh Breeding Bird Point Counts
- Waterfowl Nesting Point Counts
- Waterfowl Nesting Transect



lots

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2011.
3. Orthographic imagery provided by Grand River Conservation Authority © First Base Solutions, 2011. Imagery taken in Spring 2010.

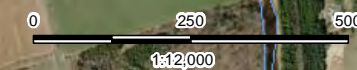
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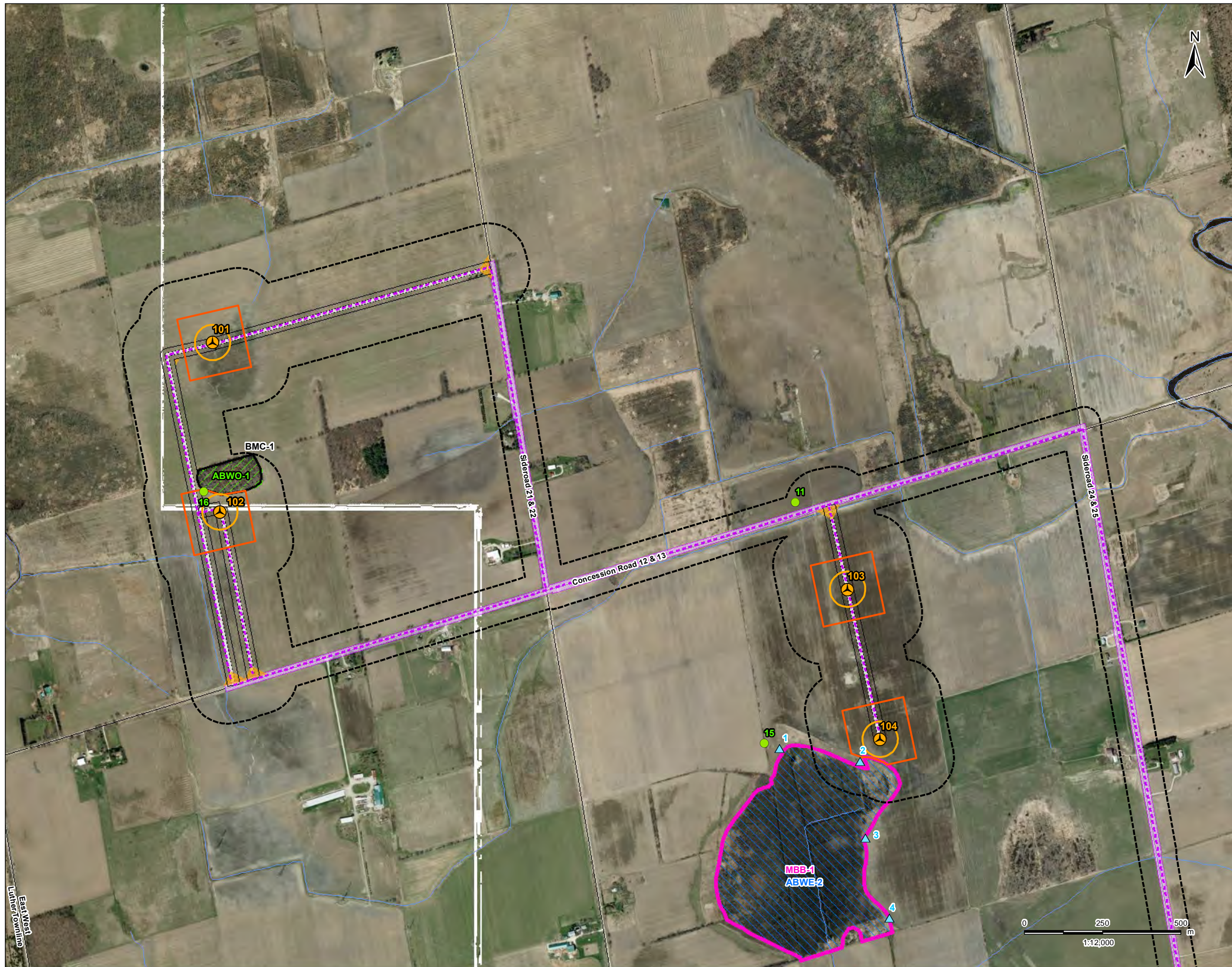
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Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
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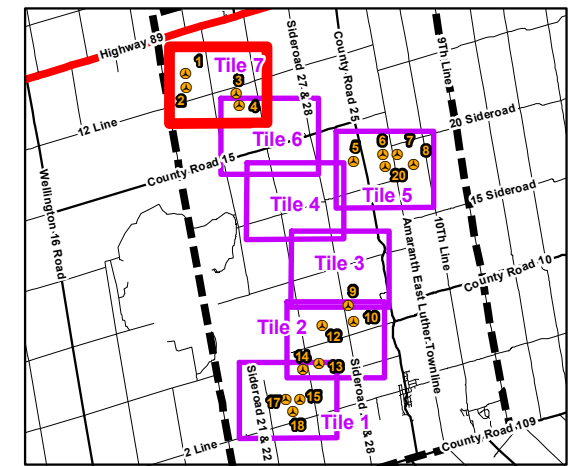
Title
**Preconstruction Survey
Locations – Map Book
Tile 6 of 7**





Legend

- 120m Zone of Investigation
- Proposed Project Components**
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Station Site
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area
- Optioned Property
- Existing Features**
- Road
- Watercourse
- Waterbody
- Wildlife Habitat**
- Amphibian Breeding (Wetland)- ABWE
- Amphibian Breeding (Woodland)- ABWO
- Bat Maternity Colonies- BMC
- Marsh Bird Breeding- MBB
- Waterfowl Nesting Area- WNA
- Wildlife Survey Stations**
- Amphibian Call Count
- ▲ Marsh Breeding Bird Point Counts
- Waterfowl Nesting Point Counts
- Waterfowl Nesting Transect



lots

1. Coordinate System: NAD 1983 UTM Zone 17N
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Title
**Preconstruction Survey
Locations – Map Book
Tile 7 of 7**

Appendix B

Tables

Table B1: Agencies Contacted, Records Requested and Records Received

Information Source and Contact Information	Records Requested	Records Received
<p><u>Source:</u> Ministry of Natural Resources</p> <p><u>Name, position of contact:</u> Erin Cotnam, Renewable Energy Project Manager, Southern Region MNR.</p> <p><u>Date(s) contacted:</u> November 9, 2012</p>	<p>Natural heritage features, rare species and species at risk within the Project Study Area and NHA workplan.</p>	<p>Rare species and species at risk records for the Guelph District portion of the Study Area.</p>
<p><u>Source:</u> Ministry of Natural Resources</p> <p><u>Name, position of contact:</u> Megan Eplett, Species at Risk Biologist, Midhurst District.</p> <p><u>Date(s) contacted:</u> November 9, 2012</p>	<p>Natural heritage features, rare species and species at risk within the Project Study Area and NHA workplan.</p>	<p>Rare species and species at risk records for the Midhurst District portion of the Study Area.</p>
<p><u>Source:</u> Ministry of Natural Resources</p> <p><u>Name, position of contact:</u> Emily Gryck, Renewable Energy Project Manager, Southern Region MNR.</p> <p><u>Date(s) contacted:</u> November 9, 2012</p>	<p>Records Review report.</p>	<p>Records review received December 13, 2012.</p>
<p><u>Source:</u> Grand River Conservation Authority</p> <p><u>Name, position of contact:</u> Nathan Garland, Regulations Officer</p> <p><u>Date(s) contacted:</u> November 9, 2012</p>	<p>Natural heritage data, including information pertaining to vegetation communities and wildlife habitat, wetlands, regulated areas and rare species.</p>	<p>Mapping of regulatory limits, Luther Marsh management plans.</p>

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSAR O)	National Status (COSEW IC)	Source	Species Requirements/ Limiting Factors
PLANTS						
A Moss	<i>Grimmia olneyi</i>	S2	--	--	NHIC	Grows in cracks and exposed faces of dry to periodically wet, acidic or calcareous rocks. It is common along streams or splash zones of lake shores and occurs in low to moderate elevations (20-60 m) (Flora of North America, 2007).
Hart's Tongue Fern	<i>Asplenium scolopendrium americanum</i>	S3	SC	SC	MNR Midhurst	Grows in rocky areas, particularly on limestone rock outcrops deciduous forest. Established plants can grow in exposed, rocky crevices and outcrops, but moist, mossy areas seem to be essential for spore germination and early plant development. (ROM/OMNR, 2009)
Hill's Pondweed	<i>Potamogeton hillii</i>	S2	SC	SC	MNR Guelph	Clear, cold ponds and slow-moving streams; alkaline water (ROM/OMNR, 2006)
Tuberous Indian-plantain	<i>Arnoglossum plantagineum</i>	S3	SC	SC	MNR Guelph	Wet, sandy areas along river banks and wetlands (ROM/OMNR, 2005) including fens, prairies, sedge meadows and calcareous shores (Michigan Flora On-line, 2013)
BUTTERFLIES						
Monarch	<i>Danaus plexippus</i>	S4B, S2N	SC	SC	MNR Midhurst/ Guelph	<p>Caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats where they feed on nectar from a variety of wildflowers.</p> <p>The Study Area is not located within 5km of a Great Lakes shoreline and is not considered to be in an area that would serve as a significant butterfly stopover site.</p> <p>Consideration of Monarch to is provided via Migratory Butterfly Stopover Areas.</p>
West Virginia White	<i>Pieris virginiensis</i>	S3	SC	-	MNR Guelph	<p>Moist, deciduous woodlands; the larvae feed only on the leaves of toothwort (<i>Dentaria diphylla</i>; <i>Dentaria X maxima</i>) (ROM/OMNR, 2005).</p> <p>Consideration of West Virginia White is provided via Migratory</p>

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSAR O)	National Status (COSEW IC)	Source	Species Requirements/ Limiting Factors
						Butterfly Stopover Areas.
AMPHIBIANS						
Western Chorus Frog (Great Lakes – Shield)	<i>Pseudacris triseriata</i>	S3	NAR	THR	HA	<p>Western chorus frogs inhabit a range of habitat types including woodlands, meadows and cultivated land. They overwinter in leaf litter and shallow soil and breed in open ponds or ditches; eggs are laid in small clumps attached to submerged vegetation. The western chorus frog will often move into grassy or weedy fields during the non-breeding summer season.</p> <p>Consideration of Western Chorus Frog is provided via Amphibian Breeding Habitat (woodland and wetland).</p>
REPTILES						
Snapping Turtle	<i>Chelydra serpentina</i>	S3	SC	SC	MNR Guelph	<p>Occurrence indicated as 'suspected' by Guelph District MNR. Occurring in a variety of wetland habitats, the Snapping Turtle inhabits areas of large water bodies, ponds or creeks; areas with standing water and dense vegetation are also preferred. Nesting occurs in loose soils in the proximity of wetlands.</p> <p>Consideration of Snapping Turtle is provided via Turtle Wintering Areas and Turtle Nesting Areas.</p>
Eastern Ribbon Snake	<i>Thamnophis sauritus</i>	S3	SC	SC	MNR Guelph	<p>Semi-aquatic and will utilize a variety of habitats, but rarely ventures far from streams, ponds, bogs, or swamps. This species may hibernate in mammal burrows, ant mounds, underground and occasionally underwater.</p> <p>Consideration of Eastern Ribbon Snake is provided via Snake Hibernaculum.</p>
Eastern Milksnake	<i>Lampropeltis triangulum</i>	S3	SC	SC	MNR Midhurst/ Guelph	<p>Occurrence indicated as 'suspected' by Guelph District MNR. This species prefers farmlands, meadows, hardwood or aspen stands; pine forest with brushy or woody cover, river bottoms or bog woods; hides under logs, stones, or boards or in outbuildings; often uses communal nest sites (OMNR 2000)</p>

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSARO)	National Status (COSEWIC)	Source	Species Requirements/ Limiting Factors
						Consideration of Eastern Ribbon Snake is provided via Snake Hibernaculum.
BIRDS						
Canvasback	<i>Aythya valisineria</i>	S1B,S2N	--	--	LMWMP	<p>Prefers small lakes, ponds, or marshes with ample emergent vegetation for nesting and an abundance of submergent vegetation (either Sago Pondweed or Wild Celery) for feeding. Remains a very rare breeder in Ontario, at the extreme eastern edge of its range (Cadman et al. 2007).</p> <p>Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration to migratory habitat is provided via Waterfowl Stopover and Staging Areas (Aquatic).</p>
Wilson's Phalarope	<i>Phalaropus tricolor</i>	S3B	--	--	OBBA	<p>Wilson's phalarope breeds in shallow, freshwater marshes or in grasses and sedges near water, including swales and sewage lagoons. It prefers nesting areas with 30cm tall grass and will avoid vegetation above 60cm, as well as woody cover at or greater than 25%.</p> <p>Consideration of Wilson's Phalarope is provided via March Breeding Bird Habitat.</p>
Redhead	<i>Aythya americana</i>	S2B,S4N	--	--	LMWMP	<p>Prefers shallow cattail/bulrush marshes, lakes and ponds and fens; preferred nesting usually close to shallow water (most within 2 m), but can be found as far as 266 m from water's edge (MNR 2010).</p> <p>Consideration of Redhead is provided via Waterfowl Stopover and Staging Areas (Aquatic).</p>
Long-tailed Duck	<i>Clangula hyemalis</i>	S3B	--	--	LMWMP	<p>Breeds in ponds, streams, and other arctic wetlands. Winters on open ocean or on large freshwater lakes. (Cornell Lab of Ornithology undated)</p> <p>Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration to migratory habitat is provided via Waterfowl Stopover and Staging Areas (Aquatic).</p>

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSARO)	National Status (COSEWIC)	Source	Species Requirements/ Limiting Factors
Horned Grebe	<i>Podiceps auritus</i>	S1B, SZN	--	--	LMWMP	<p>Prefers deep water marshes or sloughs with a mix of open water, emergent vegetation; small freshwater ponds or protected bays of larger lakes with emergent vegetation; territories are about 1 ha, but birds are very territorial (MNR 2010).</p> <p>Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations.</p>
Red-necked Grebe	<i>Podiceps grisegena</i>	S3B, S4N	--	--	NHIC	<p>Widespread but uncommon in Ontario, the Red-necked Grebe has been recorded nesting around southern Lake Ontario but primarily nests much further north in the Canadian Shield region. It is most commonly encountered as a migrant in the southern Great Lakes. Nesting generally occurs in shallow lakes and bays of 2 ha or greater and surrounded by bulrushes, cattail, sedges and other emergent species (Cadman et al., 2007).</p> <p>Consideration of Red-necked Grebe is provided via Marsh Bird Breeding Habitat.</p>
Great Egret	<i>Podiceps grisegena</i>	S2B	--	--	LMWMP	<p>Prefers open swamp woods or willow thickets, offshore islands, mudflats for feeding; nests in standing trees in open water, thickets, sometimes low vegetation on islands or in rookeries of other herons and egrets (MNR 2010).</p> <p>Consideration of Great Egret is provided via Colonially Nesting Bird Breeding Habitat (Tree/Shrubs).</p>
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	S3B, S3N	--	--	OBBA	<p>Breeding colonies are most often located on islands and shores of the Great Lakes but the Black-crowned Night-Heron has been known to occasionally nest inland. It has been recorded nesting in a variety of habitats including low shrubs (dogwood and elderberry), small and large trees, wetlands with emergent vegetation, and on bare rock islands (Cadman et al., 2007).</p> <p>Consideration of Black-crowned Night Heron is provided via Colonially Nesting Bird Breeding Habitat (Tree/Shrubs).</p>
Bald Eagle	<i>Haliaeetus</i>	S1S2	SC	NAR	MNR	Requires large continuous area of

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSARO)	National Status (COSEWIC)	Source	Species Requirements/ Limiting Factors
	<i>leucocephalus</i>	N,S4B			Guelph	deciduous or mixed woods around large lakes, rivers; requires area of 255 ha for nesting, shelter, feeding, roosting; prefer open woods with 30 to 50% canopy cover; nest in tall trees 50 to 200 m from shore; requires tall, dead, partially dead trees within 400 m of nest for perching; sensitive to toxic chemicals. Consideration of Bald Eagle is provided via Bald Eagle and Osprey Nesting Habitat.
Rough-legged Hawk	<i>Buteo lagopus</i>	S1B,S4N	NAR	NAR	LMWMP	Open coniferous forest, tundra and generally barren country, breeding on cliffs or in trees, wintering also in grasslands and open cultivated areas. (Cornell Lab of Ornithology undated). Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration is provided via Winter Raptor Areas and Landbird Migratory Stopover Areas.
American Golden-plover	<i>Pluvialis dominica</i>	S2S3B	--	--	LMWMP	Breeds on Arctic tundra, especially in low vegetation on rocky slopes. Winters in grazed grasslands. On migration found in prairie, pastures, tilled farmland, golf courses, airports, mudflats, shorelines, and beaches. (Cornell Lab of Ornithology undated). Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration is provided via Shorebird Migratory Stopover Area.
Whimbrel	<i>Numenius phaeopus</i>	S3S4B,SZN	--	--	LMWMP	Breeds in various tundra habitat, from wet lowlands to dry heath. In migration, frequents various coastal and inland habitats, including fields and beaches. Winters in tidal flats and shorelines, occasionally visiting inland habitats. (Cornell Lab of Ornithology undated). Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration is provided via Shorebird Migratory Stopover Area.
Hudsonian Godwit	<i>Limosa haemastica</i>	S2S3B,SZN	--	--	LMWMP	Breeds on grassy tundra near water. Winters and migrates along marshes, beaches, flooded fields and tidal

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSARO)	National Status (COSEWIC)	Source	Species Requirements/ Limiting Factors
						<p>mudflats. (Cornell Lab of Ornithology undated).</p> <p>Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration is provided via Shorebird Migratory Stopover Area.</p>
Semipalmated Sandpiper	<i>Calidris pusilla</i>	S3B	--	--	LMWMP	<p>Coastal and shoreline habitats (Cornell Lab of Ornithology undated).</p> <p>Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration is provided via Shorebird Migratory Stopover Areas.</p>
Short-billed Dowitcher	<i>Limnodromus griseus</i>	S2S3 B,SZN	--	--	LMWMP	<p>Breeds in muskegs of taiga to timberline, and barely onto subarctic tundra. Winters on coastal mud flats and brackish lagoons. In migration prefers saltwater tidal flats, beaches, and salt marshes. Found in freshwater mud flats and flooded agricultural fields. (Cornell Lab of Ornithology undated)</p> <p>Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration is provided via Shorebird Migratory Stopover Areas.</p>
Red-necked Phalarope	<i>Phalaropus lobatus</i>	S3S4 B,SZN	--	--	LMWMP	<p>Breeds in Arctic (Cornell Lab of Ornithology undated).</p> <p>Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration is provided via Shorebird Migratory Stopover Areas.</p>
Caspian Tern	<i>Hydroprogne caspia</i>	S3B	NAR	NAR	LMWMP	<p>The Caspian Tern generally nests in colonies and prefers sparsely vegetated flat rocky islands, beaches, and sandy shores of James Bay and the Great Lakes in Ontario (Cuthbert and Wires, 1999). It usually nests on the more elevated areas of islands and it often found nesting with Ring-billed Gulls (Cadman et al., 2007).</p> <p>Consideration of Caspian Tern is</p>

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSAR O)	National Status (COSEWIC)	Source	Species Requirements/ Limiting Factors
						provided via Colonially Nesting Breeding Bird Habitat (ground).
Black Tern	<i>Chilodrias niger</i>	S3B	SC	--	MNR Guelph	The Black Tern nests semi-colonially in freshwater marshes with emergent vegetation. This species prefers marshes or marsh complexes of more than 20 ha in size for breeding (Dunn and Agro, 1995), with a preferred ratio of 50% open water and 50% emergent vegetation. (Cadman et al., 2007). Consideration of Black Tern is provided via Marsh Bird Breeding Habitat.
Short-eared Owl	<i>Asio flammeus</i>	S2N, S4B	SC	SC	MNR Midhurst/ Guelph	These owls inhabit open habitats such as agricultural lands, wetlands, and grasslands. This area sensitive species nests on the ground usually in tall vegetation and typically requires 75 hectares of suitable habitat in order for nesting to occur. Breeding area in any given year is strongly correlated to small rodent abundances (Clark, 1975). Consideration of Short-eared Owl is provided via Open Country Bird Breeding Habitat.
Common Nighthawk	<i>Chordeiles minor</i>	S4B	SC	THR	MNR Midhurst/ Guelph	The Common Nighthawk is an aerial insectivore and forages at dawn and dusk. Common Nighthawks nest on the ground in open habitats preferably with rocky or gravel substrate. MNR (factsheet, 2009) identifies habitat as open areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings. Succession of forest clearings and the destruction of grassland habitat appear to play a major role in this species' decline along with the non-selective spraying for mosquitoes (Cadman et al., 2007). Other potential limiting factors include an increase in predators such as domestic cats, striped skunks, raccoons, American crows and common ravens, as well as road-associated mortality (COSEWIC, 2007).

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSARO)	National Status (COSEWIC)	Source	Species Requirements/ Limiting Factors
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	S4B	SC	THR	MNR Midhurst/ Guelph	The Red-headed Woodpecker Occupies a wide range of habitats, but most are characterized by open areas for feeding; snags for roosting, and a secure food supply. This species requires cavity trees with at least 40 cm dbh in 4 ha of habitat for a territory (OMNR, 2000). Some of the habitats used are open deciduous and riparian woodlands, orchards, parks, agricultural lands, savanna-like grasslands, beaver ponds with snags, forest edges, burned forests, and flooded bottomland forests. Habitats are similar in both breeding and wintering range, but winter distribution most determined by presence of food. Have been known to move north in winter if mast is heavy (N.A.S., 2012; Smith et al, 2000).
Hooded Warbler	<i>Setophaga citrina</i>	S3B	SC	NAR	MNR Midhurst	The Hooded Warbler can be found in mature, upland deciduous or mixed forest, with an area of more than 15 hectares, where clearings have been created naturally or by logging (Evans Ogden and Stutchbury, 1994). It prefers clearings with low, dense, shrubby vegetation less than two meters in height. Large tracts of relatively undisturbed forest interior are preferred due to its area sensitive nature and the higher potential for predation and parasitism closer to forest edges (COSEWIC, 2000). The 2001-2005 Ontario Breeding Bird Atlas indicated a significant increase in probability of observation from the first atlas and although it is most common in the Carolinian region, it has expanded its range north, west and east. These changes may be owing to more targeted surveys, an increase in available habitat due to forest maturation as well as climate change (Cadman, 2007).
Canada Warbler	<i>Cardellina Canadensis</i>	S4B	SC	THR	MNR Midhurst/ Guelph	The Canada Warbler is usually found in moist mixed deciduous-coniferous forests with a well-developed understory. It may also occur in shrub marshes, red maple stands, coniferous riparian woodlands, ravines and steep brushy slopes, and regenerating forests.
Gray-cheeked	<i>Catharus minimus</i>	S2S4B	--	--	LMWMP	Breeds in areas with closed canopy of small shrubs and a dense understory,

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSAR O)	National Status (COSEW IC)	Source	Species Requirements/ Limiting Factors
Thrush						<p>up to the edge of the tundra. Winters in the understory of tropical forests. On migration it uses wooded sites with a thick understory. (Cornell Lab of Ornithology undated).</p> <p>Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration to migratory habitat is provided via Landbird Migratory Stopover Areas.</p>
Lapland Longspur	<i>Calcarius lapponicus</i>	S3B	--	--	LMWMP	<p>Breeds in Arctic tundra in wet meadows, grassy tussocks, and scrub; in migration and winter in plowed fields, stubble, and open grasslands. (Cornell Lab of Ornithology undated).</p> <p>Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration is provided via Landbird Migratory Stopover Areas.</p>
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	S2B	--	--	LMWMP	<p>The Yellow-headed Blackbird breeds in prairie wetlands and along other western lakes and marshes where tall reeds and rushes are present. The Yellow-headed Blackbird is a polygynous species of permanent marshes and sloughs, nesting in large colonies. These birds can be seen foraging in wetlands and in surrounding grasslands and croplands. In winter large flocks forage in agricultural areas. The breeding range for this species in Ontario is limited, but extends west to British Columbia (Cadman et al, 2007).</p> <p>Records are for migration only. There are no known breeding occurrences; therefore not carried forward to Site Investigations. Consideration is provided via Landbird Migratory Stopover Areas.</p>
Olive-sided Flycatcher	<i>Contopus borealis</i>	S4B	SC	THR	MNR Guelph	<p>Occurrence indicated as 'suspected' by Guelph District MNR. The Olive-sided Flycatcher is provincially ranked apparently secure and is designated a species of special concern provincially and threatened federally. It breeds in the boreal forest, where it primarily uses coniferous trees to support its cup-shaped nest. This species prefers semi-open, conifer forest; prefers</p>

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSAR O)	National Status (COSEWIC)	Source	Species Requirements/ Limiting Factors
						<p>spruce; near pond, lake or river; treed wetlands for nesting; burns with dead trees for perching (MNR, 2000).</p> <p>Only a handful of Olive-sided flycatchers have been found to breed below the Canadian Shield in Ontario. This species is known to have the lowest reproductive rate of all Canadian flycatchers. This may be attributed to its later breeding date.</p>
Louisiana Waterthrush	<i>Parkesia motacilla</i>	S3B	SC	SC	MNR Midhurst	<p>Species prefers wooded ravines with running streams, woodlands swamps, and large tracts of mature deciduous or mixed forests.</p> <p>Consideration of Louisiana Waterthrush is provided via Woodland Area-Sensitive Bird Breeding Habitat.</p>
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	S4B	SC	THR	MNR Midhurst/ Guelph	<p>Golden-winged Warbler is a provincial species of special concern and a federally threatened species. The Golden-winged warbler is confined to southern Ontario with local concentrations along the southern edge of the Canadian Shield, primarily around southeastern Georgian Bay and north of Kingston. This species has experienced a rapid decline in population size over the past decade likely due to natural succession of habitat and hybridization with the Blue-winged warbler. Breeding occurs in successional scrub habitats bordered by forests and nests are constructed on the ground.</p> <p>Consideration of Golden-winged Warbler is provided via Shrub/Early Successional Bird Breeding Habitat.</p>
Eastern Wood-Pewee	<i>Contopus virens</i>	S4B	--	SC	OBBA	<p>The Eastern Wood-Pewee is a federal species of special concern. The Eastern Wood-Pewee breeds in every type of wooded community in the East, including both deciduous and coniferous forest. The bird is usually associated with forest clearings and edges. During spring and fall migration, the species use a variety of habitats with trees and shrubs, including edges, early successional clearings, and primary and secondary forest (Birds of North America Online, 2012).</p>

Acronyms

Table B2: Records Review – Potential Species of Conservation Concern

Common Name	Scientific Name	S-RANK	Provincial Status (COSSAR O)	National Status (COSEWIC)	Source	Species Requirements/ Limiting Factors
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AMO – Atlas of Mammals of Ontario; J. Dobbyn, 1994

HA – Ontario Herpetofaunal Atlas; Oldham and Weller, 2000

MA – Atlas of the Mammals of Ontario; Dobbyn, 1994

MNR – Ministry of Natural Resources; correspondence with Laura Melvin June 20, 2011

NHIC – Natural Heritage Information Centre; NHIC, 2011

OBBA – Ontario Breeding Bird Atlas; Cadman et al., 2007

Statuses

S2 – Imperiled

S3 – Vulnerable

S4 – Apparently secure

S#B – Breeding Status

S#N – Non-breeding Status

? – Rank uncertain

Table B3: Grand Valley 3 Wind Project Site Investigation and Evaluation of Significance Record

Survey Date	Survey Type	Completed By	Time	Weather Conditions*
October 6, 2011	ELC, Woodland and Wildlife Habitat Assessment Surveys, Turtle Habitat Assessment Survey	J. Leslie	N/A	18°C, Wind of 1-3, 0-5% cloud cover, no participation during survey; no participation in past 24 hours
October 7, 2011	ELC, Woodland and Wildlife Habitat Assessment Surveys	J. Leslie	N/A	7-11°C, Wind of 2-3, 100% cloud cover, none to intermittent drizzle; rain in past 24 hours
October 17, 2011	ELC, Woodland and Wildlife Habitat Assessment Surveys, Turtle Habitat Assessment Survey	J. Leslie and M. Ross	N/A	7-11°C, Wind of 3-4, 100% cloud cover, light rain during survey; rain in past 24 hours
October 18, 2011	ELC, Woodland and Wildlife Habitat Assessment Surveys	M. Ross	N/A	7-11°C, Wind of 2-3, 100% cloud cover, none to intermittent drizzle; rain in past 24 hours
October 25, 2011	ELC, Woodland and Wildlife Habitat Assessment Surveys	J. Leslie and M. Ross	N/A	7-9°C, Wind of 1, 100% cloud cover, rain during survey; rain in past 24 hours
October 25, 2011	Turtle Habitat Assessment Survey	M. Ross	N/A	7°C, Wind of 3-4, 90-100% cloud cover, no participation during survey; rain in past 24 hours
November 11, 2011	ELC, Woodland and Wildlife Habitat Assessment Surveys	J. Leslie	9:00 – 16:20	6°C, Wind of 1-2, 0% cloud cover, no precipitation during survey; no precipitation in past 24 hours
February 13, 2012	Winter Raptor Roost Survey	C. Payette and B. Holden	10:05 – 12:20	-3°C, Wind of 3-5, 30-40% cloud cover, no precipitation during survey; no precipitation in past 24 hours; 2-5cm average snow depth
February 28, 2012	Winter Raptor Roost Survey	C. Payette and B. Holden	N/A	-2°C, Wind of 0-2, 90% cloud cover, no precipitation during survey; no precipitation in past 24 hours; 1-5cm average snow depth
June 6, 2012	Breeding Bird Survey, Birding Point Counts Survey	B. Stamp	5:35 – 10:00	10°C, no wind, 70% cloud cover, no precipitation during survey; rain in past 24 hours
June 7, 2012	Breeding Bird Survey, Birding Point Counts Survey	B. Stamp	5:50 – 10:30	11°C, Wind of 1, 50% cloud cover, no precipitation during survey; precipitation in past 24 hours
June 20, 2012	Breeding Bird Survey, Birding Point Counts Survey	J. Heslop and B. Stamp	5:45 – 10:00	21-24°C, Wind of 0-1, 0-5% cloud cover, no precipitation during survey; no precipitation in past 24 hours
June 21, 2012	Breeding Bird Survey, Birding Point Counts Survey	B. Stamp	5:45 – 9:08	21-27°C, Wind of 2-4, 0% cloud cover, no precipitation during survey; no participation in past 24 hours
July 4, 2012	Breeding Bird Survey, Birding Point Counts Survey,	J. Heslop and B. Stamp	5:45 – 10:15	18-24°C, Wind of 2-3, 15-100% cloud cover, no precipitation during survey; rain in past 24 hours
July 5, 2012	Breeding Bird Survey, Birding Point Counts Survey	B. Stamp	6:00 – 9:30	15°C, Wind of 1, 5-40% cloud cover, no precipitation during survey; no participation in past 24 hours
August 21, 2012	ELC, Woodland and Wildlife Habitat Assessment Surveys	N. Leava and A. Orr	11:10 - 16:00	20-24°C, Wind of 2-3, 25-50% cloud cover, no precipitation during survey; no participation in past 24 hours
August 27, 2012	ELC, Woodland and Wildlife Habitat	A. Orr	10:00 – 15:30	20-25°C, Wind of 2-3, 100% cloud cover, light rain during survey;

Table B3: Grand Valley 3 Wind Project Site Investigation and Evaluation of Significance Record

Survey Date	Survey Type	Completed By	Time	Weather Conditions*
	Assessment Surveys			thunder showers in past 24 hours
September 14, 2012	ELC, Woodland and Wildlife Habitat Assessment Surveys	A. Orr	11:00 – 13:40	20°C, Wind of 1, 100% cloud cover, rain during survey; rain in past 24 hours
October 25, 2012	ELC, Woodland and Wildlife Habitat Assessment Surveys	N. Leava and B. Miller	N/A	13-19°C, Wind of 2, 5-10% cloud cover, no precipitation during survey; fog in past 24 hours
January 8, 2013	Winter Raptor Survey	B. Holden and N. Leava	9:15 – 17:00	-2°C, Wind of 2, 100% cloud cover, no precipitation during survey; no precipitation in past 24 hours; Snow Depth of 30cm.
January 15, 2013	Winter Raptor Survey	B. Holden and A. Orr	9:30 – 17:00	-5°C, Wind of 3, 70-80% cloud cover, light flurries during survey; no precipitation in past 24 hours; no snow depth.
January 24, 2013	Winter Raptor Survey	B. Holden and N. Leava	10:00 – 17:05	-17°C, Wind of 3-4, 10% cloud cover, no precipitation during survey; snow in past 24 hours; Snow Depth of 5cm.
March 14, 2013	Bat Maternity Roost – Cavity Trees	N. Leava and A. Orr	11:30 – 1:30	-7°C, Wind of 4-5, 0% cloud cover, no precipitation during survey; snow in past 24 hours; Snow Depth of 5cm.
April 9, 2013	Waterfowl Migration	B. Stamp	7:00 – 12:00	4°C, Wind of 0, 100% cloud cover, no precipitation during survey; thunderstorm in past 24 hours.
April 16, 2013	Amphibian Call Survey	N. Leava and M. Cameron	19:45 – 20:15	9°C, Wind of 3-4, 50% cloud cover, no precipitation during survey; snow in past 24 hours.
April 17, 2013	Waterfowl Migration; Snake Coverboards	B. Stamp and A. Orr	7:00 – 12:00	2-10°C, Wind of 1, 0% cloud cover, no precipitation during survey; no rain in past 24 hours.
April 17, 2013	Snake Coverboards, Marsh Breeding Bird habitat assessment	S. Spisani	16:40 – 19:10	12°C, Wind of 1, partial cloud cover, no precipitation during survey; no rain in past 24 hours.
April 22, 2013	Waterfowl Migration; Snake Coverboards	A. Orr	2:15 – 7:30	11°C, Wind of 3, 0% cloud cover, no precipitation during survey; no rain in past 24 hours.
April 29, 2013	Amphibian Call Survey	N. Leava and J. Leslie	20:30 – 24:00	11°C, Wind of 2-3, 100% cloud cover, no precipitation during survey/heavy fog; rain in past 24 hours.
May 1, 2013	Waterfowl Migration; Snake Coverboards	B. Stamp	7:55 – 1:00; 18:40-19:40	14°C, Wind of 5, 40% cloud cover, no precipitation during survey; rain in past 24 hours.
May 6, 2013	Waterfowl Migration; Snake Coverboards	A. Orr; B. Stamp	7:00 – 1:00; 18:18 – 19:45	15-20°C, Wind of 1, 0-40% cloud cover, no precipitation during survey; no rain in past 24 hours.
May 8, 2013	Snake Coverboards	A. Orr	7:00 – 9:00	10-15°C, Wind of 0, 70% cloud cover, no precipitation during survey; no rain in past 24 hours.

* Wind conditions expressed using Beaufort Scale:

0 – calm, <2km/hr 2 – light, 7-12 km/hr 4 – moderate, 20-30 km/hr 6 – strong, 41-51 km/hr
1 – light, 2-6 km/hr 3 – moderate, 13-19 km/hr 5 – fresh, 31-40 km/hr

Table B4: Summary of Updates to Records Review Based on Field Investigations for the ZOI

Feature	Carried Forward to SI (Y/N)	Known Recorded Information	Update from Field Investigations (Zone of Investigation)	Feature identified for the Project Location
Wetlands	Y	Seven unevaluated wetlands	23 additional were wetlands identified in the ZOI (none in the Project Location). None of the field identified wetlands are contiguous with known PSW features. Therefore, no boundary adjustments to PSWs are required.	No corrections.
Woodlands	Y	The LIO database identified 41 woodlands in the ZOI	Field investigations confirmed and revised the boundaries of 33 woodlands identified in the ZOI (none in the Project Location).	No corrections.
Wildlife Habitat				
<i>Seasonal Concentration Area</i>				
• Waterfowl stopover and staging areas (terrestrial)	Y	No records	No corrections.	No corrections.
• Waterfowl stopover and staging areas (aquatic)	Y	No records	No corrections.	No corrections.
• Shorebird migratory stopover areas	N	Project Study Area is not within 5km of a Great Lakes shoreline	No corrections.	No corrections.
• Raptor wintering areas	Y	No records	No corrections.	No corrections.
• Bat hibernacula	Y	No records	No corrections.	No corrections.
• Bat maternity colonies	Y	No records	Candidate suitable habitat identified. (BMC 1 and BMC-2); none in the Project Location.	No corrections.
• Bat migratory stopover areas	N	No records	No corrections.	No corrections.
• Turtle wintering areas	Y	No records	No corrections.	No corrections.
• Snake hibernaculum	Y	No records	No corrections.	No corrections.
• Colonial bird nesting sites (bank and cliff)	Y	No records	No corrections.	No corrections.
• Colonial bird nesting sites (tree/shrub)	Y	No records	No corrections.	No corrections.
• Colonial bird nesting sites (ground)	Y	No records	No corrections.	No corrections.

Table B4: Summary of Updates to Records Review Based on Field Investigations for the ZOI

Feature	Carried Forward to SI (Y/N)	Known Recorded Information	Update from Field Investigations (Zone of Investigation)	Feature identified for the Project Location
<ul style="list-style-type: none"> Migratory butterfly stopover areas 	N	Project Study Area is not within 5km of a Great Lakes shoreline	No corrections.	No corrections.
<ul style="list-style-type: none"> Landbird migratory stopover areas 	N	Project Study Area is not within 5km of a Great Lakes shoreline	No corrections.	No corrections.
<ul style="list-style-type: none"> Deer yarding areas 	N	No records	No corrections.	No corrections.
<ul style="list-style-type: none"> Deer winter congregation areas 	Y	One known areas in the ZOI immediately north of T112 (none in Project Location)	No corrections.	No corrections.
<i>Rare Vegetation Communities or Specialized Habitat for Wildlife</i>				
Rare Vegetation Communities: <ul style="list-style-type: none"> Cliffs and talus slopes Sand barren Alvar Old growth forests Savannah Tallgrass prairie Other rare vegetation communities listed in Appendix M of the SWHTG 	Y	No records	No corrections.	No corrections.
<i>Specialized Habitat for Wildlife</i>				
<ul style="list-style-type: none"> Waterfowl nesting area 	Y	No records	Candidate suitable habitat identified (WNA 3 and WNA-4); none in the Project Location.	One Waterfowl Nesting No corrections.
<ul style="list-style-type: none"> Bald Eagle and Osprey nesting, foraging, and perching habitat 	Y	No records	No corrections.	No corrections.
<ul style="list-style-type: none"> Woodland raptor nesting habitat 	Y	No records	No corrections.	No corrections.
<ul style="list-style-type: none"> Turtle nesting habitat 	Y	No records	No corrections.	No corrections.
<ul style="list-style-type: none"> Seeps and springs 	Y	No records	No corrections.	No corrections.
<ul style="list-style-type: none"> Amphibian breeding habitat (woodland) 	Y	Suitable habitat exists based E review of airphotos	Candidate suitable habitat identified (ABWO 1 – ABWO 9, and ABWO 13-15); none in the Project Location.	No corrections.
<ul style="list-style-type: none"> Amphibian breeding habitat (wetland) 	Y	Suitable habitat exists based review of airphotos	One candidate suitable habitat identified (ABWE 2); not in Project Location.	No corrections.
<i>Habitat for Species of Conservation Concern</i>				
<ul style="list-style-type: none"> Marsh Bird 	Y	No records	Candidate suitable habitat identified (MBB)	No corrections.

Table B4: Summary of Updates to Records Review Based on Field Investigations for the ZOI

Feature	Carried Forward to SI (Y/N)	Known Recorded Information	Update from Field Investigations (Zone of Investigation)	Feature identified for the Project Location
Breeding Habitat			1); not in Project Location	
<ul style="list-style-type: none"> Bird Breeding Habitat (woodland area-sensitive) 	Y	Numerous woodlands; site investigations are required to confirm the presence and boundaries of these features	Candidate suitable habitat identified based on ELC (Woodland Features 13 and 30); none in Project Location.	No corrections
<ul style="list-style-type: none"> Bird Breeding Habitat (open country) 	Y	No records	No corrections.	No corrections.
<ul style="list-style-type: none"> Bird Breeding Habitat (shrub/early successional) 	Y	No records	No corrections.	No corrections.
<ul style="list-style-type: none"> Terrestrial Crayfish 	Y	No records	No corrections.	No corrections.
<ul style="list-style-type: none"> Special Concern and Rare Wildlife Species 	Y	Known species for the Project Study Area (Table B2, Appendix B)	Candidate habitat for Special Concern and Rare Wildlife Species identified; occurrences to be assessed during EOS; none in Project Location.	No corrections.
<i>Animal Movement Corridors</i>				
<ul style="list-style-type: none"> Amphibian Movement 	Y	Suitable breeding habitat exists based on background review	Amphibian breeding (woodland and wetland) features identified; movement corridors to be assessed during EOS; none in Project Location.	No corrections.
<ul style="list-style-type: none"> Deer Movement 	N	One known area, located immediately north of T112	No corrections.	No corrections.
Areas of Natural and Scientific Interest (ANSI): <ul style="list-style-type: none"> Life Science ANSI Earth Science ANSI 	Y	No records	No corrections	No corrections
Specified Provincial Plan Areas	N	No records	No corrections.	No corrections
Provincial Parks and Conservation Reserves	N	No records	No corrections.	No corrections

TABLES B5.1.1 TO B5.1.12 ELC TABLE DESCRIPTIONS FOR ROADSIDE COLLECTOR LINES

TILE 1

Sideroad 24&25 (Between Concession Road 2&3 and Concession Road 4&5)

Table B5.1.1 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Cultural (CU)	
Cultural Plantation (CUP)	
CUP3-12* Norway Spruce – European Larch Coniferous Plantation	This community was assessed from the roadside and generally consisted of mid-age Norway spruce trees.
CUP3-13* White Spruce Coniferous Plantation	This young plantation consisted entirely of white spruce. No ground vegetation could be seen from the road.
Marsh (MA)	
Meadow Marsh (MAM)	
MAM2-2 Reed Canary Grass Mineral Meadow Marsh	This open meadow marsh community was dominated by a layer of reed canary-grass and was associated with a creek/drainage feature.

TILE 2 & 3

Sideroad 27/28 (Between Conc. Rd. 4/5 and Conc. Rd. 6/7)

Table B5.1.2 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Forest (FO)	
Deciduous Forest (FOD)	
FOD7-2 Fresh – Moist Ash Lowland Deciduous Forest	This mid-age community was relatively diverse, with the dense canopy composed primarily of green ash, American basswood and sugar maple, with rarer occurrences of black cherry and paper birch. A dense sub-canopy was composed of green ash, white elm and ironwood. Alternate leaved dogwood, with highbush cranberry, red-osier dogwood, and chokecherry associates made up the moderately dense shrub layer. The most abundant ground layer species was Canada goldenrod, with occasional to rare occurrences of common heal-all, scarlet strawberry, violet species, and spinulose wood fern, among others. The community sloped towards a creek channel and transitioned from upland to lowland slope positions. Soils were loamy clay.
FOD8-1 Fresh – Moist Poplar Deciduous Forest	The canopy of this mid-age forest contained trembling aspen, balsam poplar and green ash. The understory and ground layers could not be seen from the road. Snags were evident throughout the community.

Table B5.1.2 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Cultural (CU)	
Cultural Woodland (CUW)	
CUW1-4* American Elm Cultural Woodland	This elm woodland was primarily composed of a dense canopy dominated by white elm, with occasional occurrences of trembling aspen and, less frequently, balsam poplar. The sparse shrub layer mainly consisted of red-osier dogwood with rare occurrences of trembling aspen. The ground layer contained an equal mix of Canada goldenrod and reed-canary grass. This community bordered a drain feature, where joe-pye weed was an occasional occurrence in the ground layer.
Marsh (MA)	
Meadow Marsh (MAM)	
MAM2-2 Reed-canary Grass Mineral Meadow Marsh	This community was generally characterized by a herbaceous ground layer, where reed-canary grass was dominant, with less frequent occurrences of tall goldenrod, joe-pye weed, Canada anemone, and bitter nightshade. There were sparse occurrences of green ash, white elm, and shrubs such as willow species and red-osier dogwood. This community was associated with a stream.

TILE 3 & 4

Sideroad 27/28 (Between Conc. Rd. 6/7 and Conc. Rd. 8/9)

Table B5.1.3 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Cultural (CU)	
Cultural Meadow (CUM)	
CUM1-1 Dry – Moist Old Field Meadow	These open communities contained a sparse shrub layer of wild apple and common buckthorn, with a dense ground layer of herbaceous species that included Canada goldenrod, awnless brome, new England aster, wild carrot, and orchard grass.
Cultural Plantation (CUP)	
CUP3-2 White Pine Coniferous Plantation	This young to mid-age community consisted of canopy and understory layers dominated by white pine. Ground vegetation was moderately dense and contained Canada goldenrod with occasional occurrences of reed-canary grass.
CUP3-18* White Pine – White Spruce Coniferous Plantation	White pine dominated the tall canopy of this mid-age plantation, with frequent occurrences of white spruce. Both species were present in nearly equal proportions in the sub-canopy, along with rare occurrences of black walnut. No shrubs were present, but Carolina poplar was a rare understory occurrence. Ground vegetation was similarly sparse, consisting of scattered rare occurrences of wild carrot.
Marsh (MA)	
Meadow Marsh (MAM)	
MAM2-2 Reed-canary Grass Mineral Meadow Marsh	These open communities generally consisted of a single herbaceous layer more or less dominated reed-canary grass, and were generally associated with drainage features and low topography.

TILE 4 & 5

Concession Road 8/9 (Between SdRd 27/28 and County Rd. 25)

Table B5.1.4 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Forest	
Coniferous Forest	
FOC2-2 Dry – Fresh White Cedar Coniferous Forest	The canopy layers of this mid-age forest were dominated by white cedar, with white spruce becoming abundant in the sub-canopy. Scattered occurrences of black cherry, jack pine, balsam poplar and Norway maple were observed throughout. The shrub layer was sparse and consisted of chokecherry, red-osier dogwood, and common buckthorn. The ground layer was not visible from the road.
Mixed Forest	
FOM4-2 Dry – Fresh White Cedar – Poplar Mixed Forest	This young to mid-age mixed forest consisted of a canopy containing equal proportions of eastern white cedar and trembling aspen. These species along with chokecherry formed the moderately dense understory, while Canada goldenrod, flat-topped bushy goldenrod, and reed-canary grass formed the ground layer.
Cultural (CU)	
Cultural Plantation (CUP)	
CUP3-3 Scotch Pine Coniferous Plantation	These mid-age plantations consisted of canopies dominated by scotch pine with occasional occurrences of green ash, white spruce, and eastern white cedar, with eastern white cedar in the understories. Ground vegetation could not be observed from the road.
Cultural Meadow (CUM)	
CUM1-1 Dry – Moist Old Field Meadow	This open community consisted of a dense ground layer with grasses, especially reed-canary grass, the most abundant, followed by Canada goldenrod, tall goldenrod, wild carrot, Canada thistle, and occasional occurrences of sweet white clover.
Marsh (MA)	
Meadow Marsh (MAM)	
MAM2-2 Reed-canary Grass Mineral Meadow Marsh	This open meadow marsh community was dominated by a layer of reed canary-grass and was associated with a creek/drainage feature.

TILE 5

County Road 25 (Between Conc. Rd. 8/9 and Turbine 5 Access)

Table B5.1.5 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Cultural	
Cultural Thicket (CUT)	
C UW1 Mineral Cultural Woodland	This young community contained varying associations of Scot's pine, white elm, white birch, white spruce, and trembling aspen. The canopy of this community was generally open, while the understory composition was similar to that of the canopy but denser.
Cultural Plantation (CUP)	
	- REMOVE -
CUP3-17* White Spruce – Norway Spruce Coniferous Plantation	This mature plantation consisted of a tall canopy made up of Norway spruce and white spruce, with rare occurrences of black cherry. No understory was present and the ground layer was not visible from the road.
CUP3-15* White Cedar Coniferous Plantation	This young to mid-age community was moderately dense and dominated entirely by a canopy of eastern white cedar.
Marsh (MA)	
Meadow Marsh (MAM)	
MAM2-2 Reed-canary Grass Mineral Meadow Marsh	This open meadow marsh community was dominated by a layer of reed canary-grass and was associated with a creek/drainage feature.

TILE 5

Concession Road 8/9 (Between County Rd. 25 and Amaranth E Luther Townline)

Table B5.1.6 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Cultural (CU)	
Cultural Plantation (CUP)	
CUP3-17* White Spruce – Norway Spruce Coniferous Plantation	This mature plantation consisted of a tall canopy made up of Norway spruce and white spruce, with rare occurrences of black cherry. No understory was present and the ground layer was not visible from the road.
Swamp (SW)	
Deciduous Swamp (SWD)	
SWD4-7* (complex MAM2-2) Balsam Poplar Mineral Deciduous Swamp with complex of Meadow Marsh	This mid-age swamp had a relatively open canopy dominated by balsam poplar with rare occurrences of white elm. Bebb's willow was the most abundant understory species, followed by red-osier dogwood. The ground layer was dominated by reed canary grass along with an abundance of narrow-leaved cattail and an aster species.

TILE 5

Amaranth East Luther Townline (Between Conc. Rd. 8/9 and Turbine 6 Access)

Table B5.1.7 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Cultural (CU)	
Cultural Plantation (CUP)	
CUP1 Deciduous Plantation	This community was a young deciduous plantation consisting of trees approximately 3m in height. Species could not be determined from the road.
CUP3-3 Scotch Pine Coniferous Plantation	This mid-age plantation consisted of a canopy dominated by scotch pine with occasional occurrences of green ash, white spruce, and eastern white cedar, with eastern white cedar in the understories. Ground vegetation could not be observed from the road.
CUP3-17* White Spruce – Norway Spruce Coniferous Plantation	This mature plantation consisted of a tall canopy made up of Norway spruce and white spruce, with rare occurrences of black cherry. No understory was present and the ground layer was not visible from the road.
Cultural Meadow (CUM)	
CUM1-1 Dry – Moist Old Field Meadow	This open community contained a mixture of herbaceous species typically found in such communities, including European eyebright, Canada goldenrod, timothy grass, white paniced aster, wild carrot, and Canada bluegrass. Several other species were less commonly observed, including common milkweed, tufted vetch, wild basil, and goat's beard. A sparse shrub layer consisted of wild red raspberry, serviceberry species, and red-osier dogwood.
Swamp (SW)	
Thicket Swamp (SWT)	
SWT2-2 Willow Mineral Thicket Swamp	This swamp community contained a sparse canopy of Trembling Aspen and Willow species. The understory was comprised of mainly Willow shrubs, with sparse occurrences of Red-osier Dogwood and Narrow-leaved Meadowsweet. The ground cover consisted of Sedge species, Moss species, Spotted Joe-pye-weed and Flat-topped bushy goldenrod. Small pockets of poplar lowland occurred around the edges of this community. No surface water was present.
Marsh (MA)	
Meadow Marsh (MAM)	
MAM2-2 Reed-canary Grass Mineral Meadow Marsh	This marsh community consisted of a sparse shrub layer of Willow species, while the ground cover included Reed Canary Grass, Canada Goldenrod, Narrow-leaved Meadowsweet and Aster species. A drainage feature occurred within this community with approximately 18cm of surface water present. (See Turbine 7 summary)
Shallow Marsh (MAS)	
MAS2-3 Narrow-leaved Sedge Mineral Shallow Marsh	This Marsh community consisted of Sedge species, perfoliate thoroughwort, Eleocharis species and Woolgrass, with sparse occurrences of Narrow-leaved Cattail and Nodding Beggar-ticks. Approximately 15% of the community had 10cm of surface water present.

Tile 4

Concession Road 8/9 (Between SdRd 27/28 and SdRd 24/25)

Table B5.1.8 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Forest (FO)	
Coniferous Forest (FOC)	
FOC4-1 Fresh – Moist White Cedar Coniferous Forest	This mid-age forest consisted entirely of eastern white cedar in dense canopy and sub-canopy layers. No ground vegetation or understory species were observed.
Cultural (CU)	
Cultural Meadow (CUM)	
CUM1 Mineral Cultural Meadow	This open community was dominated by herbaceous species, with sparse occurrences of young eastern white cedars and common buckthorn. The most abundant species were awnless brome, quack grass, musk thistle, and wild carrot, with less frequent observations of species such as dandelion, timothy grass, and Canada goldenrod.
Cultural Plantation (CUP)	
CUP3-8 White Spruce – Tamarack Coniferous Plantation	The canopy of this mid-age plantation was dense and dominated by white spruce, while eastern white cedar was abundant in the understory and shrub layer. No ground vegetation was observed.
CUP3-18* White Pine – White Spruce Coniferous Plantation	White pine dominated the tall canopy of this mid-age plantation, with frequent occurrences of white spruce. Both species were present in nearly equal proportions in the sub-canopy, along with rare occurrences of black walnut. No shrubs were present, but Carolina poplar was a rare understory occurrence. Ground vegetation was similarly sparse, consisting of scattered rare occurrences of wild carrot.
CUP1 Deciduous Plantation	This community was a young deciduous tree farm. Species could not be determined from the road.
Swamp (SW)	
Thicket Swamp (SWT)	
SWT2-5 Red-osier Dogwood Mineral Thicket Swamp	This community consisted of a dense shrub layer composed mainly of red-osier dogwood. A thin canopy of young white elm trees overtopped this layer. Reed-canary grass was the most abundant ground species, along with less frequent occurrences of flat-topped bushy goldenrod and a sedge species.

Tile 4 & 6

Sideroad 24/25 (Between Conc. Rd. 8/9 and County Rd. 15)

Table B5.1.9 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Cultural (CU)	
Cultural Woodland (CUW)	
CUW1-4* American Elm Cultural Woodland	This elm woodland was made up of a dense canopy dominated by white elm, with occasional occurrences of trembling aspen and, less frequently, balsam poplar. The sparse shrub layer mainly consisted of red-osier dogwood with rare occurrences of trembling aspen. The ground layer contained an equal mix of Canada goldenrod and reed-canary grass. This community bordered a drain feature, where joe-pye weed was an occasional occurrence in the ground layer.
Cultural Plantation (CUP)	
CUP1-11* Norway Maple – Ash Deciduous Plantation	This young plantation consisted of a moderately dense canopy layer of Norway maple and an ash species. No other vegetation was observed.

Tile 6 & 7

Sideroad 24/25 (Between County Rd 15 and Conc. Rd. 12/13)

Table B5.1.10 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Cultural (CU)	
Cultural Meadow (CUM)	
CUM1-1 Dry – Moist Old Field Meadow	This open community consisted of a dense ground layer with grasses, especially reed-canary grass, the most abundant, followed by Canada goldenrod, tall goldenrod, wild carrot, Canada thistle, and occasional occurrences of sweet white clover.
Swamp (SW)	
Thicket Swamp (SWT)	
SWT2-2 Willow Thicket Swamp	This young thicket swamp contained a relatively sparse canopy of young white spruce and white pine trees overtopping a denser shrub layer where willow species predominated along with white cedar and red-osier dogwood associates. The ground layer was represented by a complex of complex of moist old-field meadow and reed-canary grass mineral meadow marsh. Ground vegetation was generally dominated by reed-canary grass, with frequent occurrences of aster species, Canada goldenrod, and flat-topped bushy goldenrod.

Tile 7

Concession Road 12/13 (*Between SdRd 24/25 and Turbine 3 Access*)

Table B5.1.11 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Cultural (CU)	
Cultural Meadow (CUM)	
CUM1-1 Moist Old-Field Meadow	Reed-canary grass dominated the ground layer in this open community, with frequent occurrences of aster species, Canada goldenrod, and flat-topped bushy goldenrod. Red-osier dogwood was a rare occurrence.
Swamp (SW)	
Thicket Swamp (SWT)	
SWT2-2 Willow Thicket Swamp	These young thicket swamps contained sparse canopies of young balsam poplar and willow trees overtopping shrub layers dominated by willow species, with red-osier dogwood and bebb's willow associates. The ground layers were dense and mainly composed of reed-canary grass and goldenrod species, with less common occurrences of cattail, flat-topped bushy goldenrod, and common water plantain.

Tile 7

Concession Road 12/13 (*Turbine 3 Access and Turbine 2 Access*)

Table B5.1.12 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Cultural (CU)	
Cultural Meadow (CUM)	
CUM1-1 Moist Old-Field Meadow	Reed-canary grass dominated the ground layer in this open community, with frequent occurrences of aster species, Canada goldenrod, and flat-topped bushy goldenrod. Red-osier dogwood was a rare occurrence.
Marsh (MA)	
Meadow Marsh (MAM)	
MAM2-2 Reed-canary Grass Mineral Meadow Marsh	This open meadow marsh community was dominated by a layer of reed canary-grass.

TABLES B5.2.1 TO B5.2.11: ELC TABLE DESCRIPTIONS FOR TURBINES AND ACCESS ROADS

TILE 1

Turbine 15, 17, 18

Table B5.2.1 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Cultural (CU)	
Cultural Plantation (CUP)	
CUP3-15* White Cedar Coniferous Plantation	This mid-age plantation contained a moderately dense canopy composed entirely of white cedar, with an average height of 4-6m. The moderately dense understory also consisted of white cedar. The ground layer was fairly diverse, with Canada goldenrod, Canada bluegrass, and scarlet strawberry the most abundant, and tufted vetch, common dandelion, and other common herbaceous meadow species occurring less frequently.
CUP3-12* Norway Spruce Coniferous Plantation	There were several occurrences of this mid-age plantation throughout the zone of investigation. The canopy consisted of a dense layer composed entirely of Norway spruce. There was no understory, and the sparse ground layer was primarily made up of tall goldenrod with less frequent occurrences of common dandelion, New-England aster, wild carrot, scarlet strawberry, among others. The occurrence to the east of Sideroad 24 & 25 contained a complex of willow mineral thicket swamp.
CUP3-14* Tamarack Coniferous Plantation	The canopy of this mature plantation was dense and dominated by tamarack, with infrequent occurrences of Norway spruce. Norway spruce, eastern white cedar, and balsam fir made up a sparse sub-canopy. Ground vegetation was also fairly dense, consisting mainly of tall goldenrod with fewer occurrences of common burdock, coltsfoot, common helleborine, bitter nightshade, and scarlet strawberry.
CUP3-13* White Spruce Coniferous Plantation	This mid-age plantation contained a dense canopy dominated by white spruce, with less frequent occurrences of white pine. Tree heights averaged 8-10m. No understory was present, and the ground layer was relatively sparse, containing a mix of Canada thistle, bitter nightshade, northern water-horehound, and prickly cucumber.
Cultural Meadow (CUM)	
CUM1-1 Dry-Moist Old Field Meadow	This open community contained a mixture of herbaceous species typically found in such communities, including Canada goldenrod, timothy grass, white paniced aster, wild carrot, and Canada bluegrass. Several other species were less commonly observed, including common milkweed, tufted vetch, wild basil, and goat's beard. A sparse shrub layer consisted of wild red raspberry, and red-osier dogwood.
CUM1-1 (complex SWT2-2) Old Field Mineral Cultural Meadow with Thicket Swamp complex	This property was assessed from the roadside and consisted of drier cultural meadow habitat, with a complex of evidently moister shrub thicket dominated areas toward the interior.
Swamp (SW)	
Thicket Swamp (SWT)	
SWT2-5 Red-osier Dogwood Mineral Swamp Thicket	This swamp thicket was made up of a very sparse canopy of trembling aspen and white elm above a moderately dense shrub layer consisting of a mix of Missouri willow and Bebb's willow. The ground layer consisted of a dense layer of red-osier dogwood, with

Table B5.2.1 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
	reed-canary grass and narrow-leaved meadowsweet.
Marsh (MA)	
Meadow Marsh (MAM)	
MAM2-2 Reed-canary Grass Mineral Meadow Marsh	These open communities had thick ground layers dominated by reed-canary grass, with rare occurrences of other herbaceous species such as asters and bitter nightshade. They contained very sparse canopies with scattered occurrences of various deciduous shrubs and trees such as willow species and red-osier dogwood.
Shallow Water (SA)	
Mixed Shallow Aquatic (SAM)	
SAM1 Mixed Shallow Aquatic Ecosite	This shallow aquatic community consisted of herbaceous plants, including common floating pondweed, a water-milfoil species, and water horsetail. The bottom consisted of a mucky substrate and water depth was greater than 40cm.
Submerged Shallow Aquatic (SAS)	
SAS1 Submerged Shallow Aquatic Ecosite	Coontail was the most abundant species in this community, followed by rare occurrences of algae and common floating pondweed. Snags and deadfall were abundant.

TILE 1

Turbine 14

Table B5.2.2 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Cultural (CU)	
Cultural Plantation (CUP)	
CUP3-17* White Spruce – Norway Spruce Coniferous Plantation	This community was similar to those described under Turbines 15-18, where some areas were dominated by white spruce, and other areas dominated by Norway spruce. The CUP3-13* here showed slightly more mature trees, averaging 10-12m in height with a DBH of approximately 15cm.
CUP3-6 European Larch Coniferous Plantation	This mid-age to mature plantation had a moderately dense canopy composed of European larch above a subcanopy of eastern white cedar and a smaller proportion of European larch. The most abundant species in the ground layer were grasses and tall goldenrod, and less frequent species included calico aster, field horsetail, Canada thistle, and common milkweed. Average tree height was 12-15m with a diameter of 18-20cm.

TILE 2

Turbine 12

Table B5.2.3 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Swamp (SW)	
Deciduous Swamp (SWD)	
SWD4 Mineral Deciduous Swamp Ecosite	This canopy of this deciduous swamp was composed of trembling aspen, green ash, and paper birch. It contained thick understory of red-osier dogwood, with wild currant species and narrow-leaved meadowsweet associates. Ground vegetation was similarly dense and consisted mainly of reed-canary grass, fowl meadow grass, and rare to occasional occurrences of other herbaceous species such as field horsetail, bitter nightshade, and rough goldenrod. A small offline pond was observed in the south half of this community.
Cultural (CU)	
Cultural Plantation (CUP)	
CUP3-16* Red Pine – White Spruce Coniferous Plantation	This mid-age plantation consisted of a dense canopy of red pine and white spruce, with red pine distributed near the road and white spruce continuing further north. The canopy contained a smaller component of ash species, Norway spruce and white elm. The understory and ground layer could not be seen from the road, although species observed at the edge included red-osier dogwood, willow species, and buckthorn. An inclusion of MAM2-10 occurred at the roadside.

TILE 2

Turbine 10

Table B5.2.5 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Cultural (CU)	
Cultural Plantation (CUP)	
CUP3 (complex CUM1-1) Coniferous Plantation with Old Field Meadow complex	This community was a young cultural plantation with a canopy of eastern white cedar and white spruce. Interspersed throughout was a ground layer consisting of species typical of old field meadow habitats, including species such as scarlet strawberry, Canada goldenrod, asters, and common heal-all. A small offline pond was present in this community.

TILE 2 & 3

Turbine 9

Table B5.2.6 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Swamp (SW)	
Deciduous Swamp (SWD)	
SWD4-6* Trembling Aspen Mineral Deciduous Swamp	The canopy in this mid-age swamp consisted primarily of trembling aspen with white elm, and the rare occurrence of green ash and paper birch. The dense understory was made up of red-osier dogwood and chokecherry. Scarlet strawberry, white avens, Canada goldenrod, and asters were among the most abundant species in the ground layer.
Thicket Swamp (SWT)	
SWT2-2 Willow Mineral Swamp Thicket	A sparse canopy of balsam poplar occurred above a dense shrub understory of willow species and a smaller component of red-osier dogwood. The most abundant ground vegetation included goldenrods, wild carrot and common milkweed, in a taller layer, and lower growing tufted vetch and white clover. This community ran parallel on both sides of a drainage ditch.

TILE 5

Turbine 5

Table B5.2.7 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Forest (FO)	
Deciduous Forest (FOD)	
FOD3-1 Dry-Fresh Poplar Deciduous Forest	This community was assessed remotely but generally consisted of mid-age trembling aspen with infrequent associations of ash species, white birch, and sugar maple.
Cultural (CU)	
Cultural Plantation (CUP)	
CUP3-2 White Pine Coniferous Plantation	This community was assessed remotely was dominated by a mid-age white pine canopy with a generally open understory. Ground cover appeared sparse, likely a result restricted sunlight exposure.
Cultural Woodland (CUW)	
CUW1-3* Sugar Maple Cultural Woodland	The canopy in this mid-age woodland consisted entirely of sugar maple. Common buckthorn was abundant in the understory, while grass species made up the sparse ground layer.
Cultural Meadow (CUM)	
CUM1-1 Dry-Moist Old Field Meadow	This open community contained a mixture of herbaceous species typically found in such communities, including European eyebright, Canada goldenrod, timothy grass, white paniced aster, wild carrot, and Canada bluegrass. Several other species were less commonly observed, including common milkweed, tufted vetch, wild basil, and goat's beard. A sparse shrub layer consisted of wild red raspberry, serviceberry species, and red-osier dogwood.

TILE 5

Turbine 6

Table B5.2.8 Ecological Land Classification (ELC) Vegetation Types	
ELC TYPE	Community Description
Cultural (CU)	
Cultural Plantation (CUP)	
CUP3-3 Scotch Pine Coniferous Plantation	This young plantation was composed of a canopy of scotch pine, with red-osier dogwood and goldenrod in the understory, and a ground layer primarily made up of scarlet strawberry and a sedge species.
Cultural Meadow (CUM)	
CUM1-1 Moist Old Field Meadow	This community contained a very sparse shrub layer of willow, above a dense herbaceous ground layer with an abundance of goldenrod and grass, and with slightly less frequent occurrences of flat-topped bushy goldenrod, rush species, and New-England aster.
Swamp (SW)	
Deciduous Swamp (SWD)	
SWD4-5* Poplar Mineral Deciduous Swamp	Three occurrences of this community type occurred within the zone of investigation for the proposed turbine 6. The largest community, located closer to Amaranth East Luther Townline, contained trembling aspen with balsam poplar and white birch associates in the canopy. The two smaller occurrences contained canopies composed of a higher amount of balsam poplar with trembling aspen as an associate. All three communities generally contained understories with abundant red-osier dogwood, goldenrod, and joe-pye weed, and ground layers consisting primarily of trailing raspberry, grasses, and scarlet strawberry. The largest community contained an inclusion of SWT2-2.
SWD4-3 White Birch – Poplar Mineral Deciduous Swamp	This community had a moderately dense canopy of primarily mid-age trembling aspen with paper birch and balsam poplar associates. Tamarack, black ash, and balsam fir were occasional components of the subcanopy. A relatively dense understory consisted of red-osier dogwood, nannyberry, winterberry and joe-pye weed, while sedges, goldenrod, trailing raspberry, and scarlet strawberry were most abundant in the ground layer. Small pockets exist throughout that appear to flood seasonally. A stick nest was observed within the community.
Coniferous Swamp (SWC)	
SWC4-2 Tamarack Organic Coniferous Swamp	This mature community consisted of a moderately dense canopy dominated by tamarack, with much less frequent occurrences of trembling aspen and paper birch. The dense understory consisted of shrubs and tall herbaceous species, including joe-pye weed, nannyberry, winterberry, and rare occurrences of common buckthorn. The equally dense ground layer consisted of lower-growing sedges, a goldenrod species, red-osier dogwood, and trailing raspberry. Soils were organic at a depth greater than 80cm.
Thicket Swamp (SWT)	
SWT2-2 Willow Mineral Thicket Swamp	Trembling aspen and balsam poplar formed a sparse canopy above the dense shrub layer of willows and red-osier dogwood. Sedge species were most abundant, followed by grasses and trailing raspberry in the ground layer.
Fen (FE)	
Shrub Fen (FES)	
FES1 Shrub Fen	This shrub fen contained a sparse canopy composed primarily of tamarack with a smaller amount of trembling aspen. The shrub layer contained a mix of species, the most

Table B5.2.8 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
	abundant of which included speckled alder, chokeberry, nannyberry and winterberry. The ground layer was dense and made up of a goldenrod species, trailing raspberry, grasses, and sphagnum moss. Labrador tea was a rare occurrence although may increase in abundance toward the interior. Soils were organic, reaching a depth greater than 80cm.

TILE 5

Turbine 7 & 8

Table B5.2.9 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Cultural (CU)	
Cultural Meadow (CUM)	
CUM1-1 Dry-Moist Old Field Meadow	These open communities contained a mixture of herbaceous species typically found in such communities, including European eyebright, Canada goldenrod, timothy grass, white paniced aster, wild carrot, and Canada bluegrass. Several other species were less commonly observed, including common milkweed, tufted vetch, wild basil, and goat's beard. These communities often contain infrequent and sparse occurrences of woody species such as willows, wild red raspberry, red-osier dogwood, or deciduous tree species.
Swamp (SW)	
Deciduous Swamp (SWD)	
SWD4-5* Poplar Mineral Deciduous Swamp	This community had a canopy dominated by Trembling Aspen, while the sub-canopy contained Trembling Aspen with sparse occurrences of Willow species. The understory consisted of Red-osier dogwood, Wild Red Raspberry, with less frequent occurrences of Common Buckthorn and Willow species. The ground cover included Grass species, Tall Goldenrod, Field Horsetail and Common Dandelion.
Marsh (MA)	
Meadow Marsh (MAM)	
MAM2-2 Reed Canary Grass Mineral Meadow Marsh	This marsh community consisted of a sparse shrub layer of Willow species, while the ground cover included Reed Canary Grass, Canada Goldenrod, Narrow-leaved Meadowsweet and Aster species. A drainage feature occurred within this community with approximately 18cm of surface water present.

TILE 7

Turbine 3 & 4

Table B5.2.10 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Swamp (SW)	
Thicket Swamp (SWT)	
SWT2-2 Willow Mineral Thicket Swamp (with an inclusion of an SWD4-3 White Birch – Poplar Deciduous Swamp)	This community was comprised largely of a canopy of willow shrubs and red-osier dogwood, with ground cover consisting of cattail species, sedge species, Poa species and fowl meadow grass. A drainage feature was present in this community and surface water was visible. An inclusion of a White Birch – Poplar Deciduous Swamp was identified at the southern end of the above community. The canopy of this community was comprised of balsam poplar, with balsam poplar, white birch and eastern white cedar present in the sub-canopy. The understory contained raspberry species and red-osier dogwood, while the ground layer was comprised of reed canary grass and goldenrod species.
Marsh (MA)	
Meadow Marsh (MAM)	
MAM2-2 Reed Canary Grass Mineral Meadow Marsh	This Meadow Marsh community was comprised of reed canary grass with cattail species, woolgrass and Juncus species. Surface water was present in 5-10% of the community.
Cultural (CU)	
Cultural Meadow (CUM)	
CUM1-1 Dry-Moist Old Field Meadow	This cultural meadow community located to the east of the SWT2-2, contained common plantain, red clover, red-top grass, and reed canary grass.
CUM1-1 Dry-Moist Old Field Meadow (with an inclusion of MAM2-2 Reed Canary Mineral Meadow Marsh)	This community, located north of the SWT2-2, consisted of a sparse canopy of red-osier dogwood and willow species, while the ground cover was comprised of aster species, goldenrod species, Poa species, Juncus species and woolgrass. An inclusion of a Reed Canary Grass Mineral Meadow Marsh was identified in the northwest of the above community and contained mainly reed canary grass with sparse goldenrod species.

Tile 7

Turbine 1 & 2

Table B5.2.11 Ecological Land Classification (ELC) Vegetation Types

ELC TYPE	Community Description
Forest (FO)	
Deciduous Forest (FOD)	
FOD6-5 Fresh – Moist Sugar Maple Hardwood Deciduous Forest	The canopy of this mid-age forest was composed mainly of sugar maple, with less frequent occurrences of green ash and yellow birch. American basswood, white elm, American beech and black cherry were additional rare occurrences in the subcanopy. The understory was dense and typically composed of sugar maple and green ash saplings, with a smaller component of wild red raspberry. Wild leek, white paniced aster, and field horsetail were the most abundant species in the sparse ground layer. Soils were very fine sandy clay loam with mottles at 50cm. Evidence of historical logging was observed.

Table B6: Wetland Characteristics and Ecological Functions Assessment for Wetlands found within the ZOI of the Project Location

Tile #	Wetland #	Size (ha)	Wetland Type	Site Type	Vegetation Forms (dominant, sub-dominant)	Proximity to other wetlands	Interspersion	Flood Attenuation	Open Water Types	Water Quality Improvement (short term)	Water Quality Improvement (long term nutrient trap)	Water Quality Improvement (groundwater discharge)	Shoreline Erosion	Groundwater Recharge	Summary of Hydrology	Rare Species	Significant Features	Fish Habitat
1	31	1.5	Marsh	Palustrine	ts, ls, gc	610m	46	Headwater; 16 hectare catchment	No open water	No inflow and intermittent outflow; over 50% agricultural landscape; high proportion of live herbs.	Marsh with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly loam soil	Palustrine marsh on loam soil with intermittent outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	- None confirmed - Potential for Waterfowl Staging	Not present
	30	2.1	Marsh	Riverine	gc	100m	43	Mid-reach; 1048 hectare catchment	Type 1	Permanent inflow and outflow; over 50% agricultural landscape; high proportion of live herbs.	Marsh with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline herbs	Riverine feature with predominantly fine sandy loam soil	Riverine marsh on sandy loam soil with permanent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Present
	29	6.8	Swamp	Palustrine	ts, gc, ne	146m	73	Mid-reach; 537 hectare catchment	No open water	No inflow and intermittent outflow; over 50% agricultural landscape; high proportion of live shrubs.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly loam soil	Palustrine swamp on loam soil with intermittent outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	- None confirmed - Potential for Waterfowl breeding	Intermittent presence
2	28	0.1	Swamp	Palustrine	N/A	30m	49	Mid-reach; 0.9 hectare catchment	No open water	Intermittent inflow and outflow; over 50% agricultural landscape; high proportion of live trees.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly fine sandy loam soil	Palustrine swamp on fine sandy loam soil with intermittent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on	None known to be present	None confirmed	Not present

Table B6: Wetland Characteristics and Ecological Functions Assessment for Wetlands found within the ZOI of the Project Location

Tile #	Wetland #	Size (ha)	Wetland Type	Site Type	Vegetation Forms (dominant, sub-dominant)	Proximity to other wetlands	Interspersion	Flood Attenuation	Open Water Types	Water Quality Improvement (short term)	Water Quality Improvement (long term nutrient trap)	Water Quality Improvement (groundwater discharge)	Shoreline Erosion	Groundwater Recharge	Summary of Hydrology	Rare Species	Significant Features	Fish Habitat
															site surveys, air photo interpretation, and soil mapping*			
	27	13.1	Swamp	Palustrine	h, ts, gc, ne	376m	65	Mid-reach; 162 hectare catchment	No open water	Intermittent inflow and outflow; over 50% agricultural landscape; high proportion of live trees.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly loam soil	Palustrine swamp on loam soil with intermittent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	- None confirmed - Potential for Waterfowl breeding - Potential deer wintering yard	Not present
	26	13.1	Swamp	Palustrine	h, ts, gc, ne	376m	65	Mid-reach; 162 hectare catchment	No open water	Intermittent inflow and outflow; over 50% agricultural landscape; high proportion of live trees.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly loam soil	Palustrine swamp on loam soil with intermittent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	- None confirmed - Potential for Waterfowl breeding - Potential deer wintering yard	Not present
3	25	2.7	Swamp	Palustrine	h, ts, gc	330m	40	Headwater; 6 hectare catchment	No open water	No inflow and intermittent outflow; over 50% agricultural landscape; high proportion of live trees.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly loam soil	Palustrine swamp on loam soil with intermittent outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	Willow Flycatcher	None confirmed	Not present

Table B6: Wetland Characteristics and Ecological Functions Assessment for Wetlands found within the ZOI of the Project Location

Tile #	Wetland #	Size (ha)	Wetland Type	Site Type	Vegetation Forms (dominant, sub-dominant)	Proximity to other wetlands	Interspersion	Flood Attenuation	Open Water Types	Water Quality Improvement (short term)	Water Quality Improvement (long term nutrient trap)	Water Quality Improvement (groundwater discharge)	Shoreline Erosion	Groundwater Recharge	Summary of Hydrology	Rare Species	Significant Features	Fish Habitat
															mapping*			
	24	0.7	Marsh	Riverine	gc, ne	25m	40	Mid-reach; 562 hectare catchment	Type 1	Permanent inflow and outflow; over 50% agricultural landscape; high proportion of live herbs.	Marsh with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline herbs	Riverine feature with predominantly loam soil	Riverine marsh on loam soil with permanent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Present
4	23	0.9	Marsh	Palustrine	gc	18m	32	Lower-reach; 30 hectare catchment	No open water	Intermittent inflow and outflow; over 50% agricultural landscape; high proportion of live herbs.	Marsh with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly fine sandy loam soil	Palustrine marsh on fine sandy loam soil with intermittent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Potentially present
5	22	46.2	Fen	Palustrine	ts, ne, ls, h, c, gc	4m	84	Headwater; 101 hectare catchment	No open water	No inflow and intermittent outflow; over 50% agricultural landscape; high proportion of live trees.	Fen with >50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly organic soil, buffered by loam	Palustrine fen on primarily organic soil with no inflow and intermittent outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	- Fen Habitat - Potential for Waterfowl Staging	Not present
	21	0.9	Swamp	Palustrine	h, ts, gc, ne	56m	43	Headwater; 0.5 hectare catchment	No open water	No inflow and intermittent diffuse overland outflow; over 50% agricultural landscape; high proportion	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly fine sandy loam soil	Palustrine swamp on fine sandy loam soil with intermittent outflow. Situated in a predominantly agricultural watershed.	None known to be present	None confirmed	Not present

Table B6: Wetland Characteristics and Ecological Functions Assessment for Wetlands found within the ZOI of the Project Location

Tile #	Wetland #	Size (ha)	Wetland Type	Site Type	Vegetation Forms (dominant, sub-dominant)	Proximity to other wetlands	Interspersion	Flood Attenuation	Open Water Types	Water Quality Improvement (short term)	Water Quality Improvement (long term nutrient trap)	Water Quality Improvement (groundwater discharge)	Shoreline Erosion	Groundwater Recharge	Summary of Hydrology	Rare Species	Significant Features	Fish Habitat
										of live trees.					Data based on site surveys, air photo interpretation, and soil mapping*			
	20	0.2	Swamp	Palustrine	h, ts, gc	56m	36	Headwater; 0.9 hectare catchment	No open water	No inflow and intermittent diffuse overland outflow; over 50% agricultural landscape; high proportion of live trees.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly fine sandy loam soil	Palustrine swamp on fine sandy loam soil with intermittent outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	- None confirmed - Potential for Waterfowl Staging	Not present
	19	0.4	Swamp	Palustrine	ts, gc	44m	46	Headwater; 2.1 hectare catchment	No open water	No inflow and intermittent diffuse overland outflow; over 50% agricultural landscape; high proportion of live shrubs	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly fine sandy loam soil	Palustrine swamp on fine sandy loam soil with intermittent outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Not present
	18	0.3	Swamp	Palustrine	ts, gc	7m	46	Headwater; 1.1 hectare catchment	No open water	No inflow and intermittent diffuse overland outflow; over 50% agricultural landscape; high proportion of live shrubs	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly fine sandy loam soil	Palustrine swamp on fine sandy loam soil with intermittent outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Not present
	17	3.5	Swamp	Riverine	h, ts, gc	7m	62	Lower-reach; 936 hectare catchment	Type 1	Permanent inflow and outflow; over 50% agricultural landscape;	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline trees	Riverine feature with predominantly fine sandy loam soil	Riverine swamp on fine sandy loam soil with permanent inflow and outflow. Situated	None known to be present	None confirmed	Present

Table B6: Wetland Characteristics and Ecological Functions Assessment for Wetlands found within the ZOI of the Project Location

Tile #	Wetland #	Size (ha)	Wetland Type	Site Type	Vegetation Forms (dominant, sub-dominant)	Proximity to other wetlands	Interspersion	Flood Attenuation	Open Water Types	Water Quality Improvement (short term)	Water Quality Improvement (long term nutrient trap)	Water Quality Improvement (groundwater discharge)	Shoreline Erosion	Groundwater Recharge	Summary of Hydrology	Rare Species	Significant Features	Fish Habitat
										high proportion of live shrubs.					in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*			
	16	43.2	Swamp	Riverine	h, ts, ne, gc	22m	85	Lower-reach; 928 hectare catchment	Type 3	Permanent inflow and outflow; over 50% agricultural landscape; high proportion of live trees.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline trees	Riverine feature with predominantly fine sandy loam soil	Riverine swamp on fine sandy loam soil with permanent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Present
	15	29.6	Swamp	Palustrine	h, ts, ne, c, gc	15m	83	Headwater; 53 hectare catchment	Type 2	Intermittent inflow and outflow; over 50% agricultural landscape; high proportion of live trees.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly sandy loam soil	Palustrine swamp on sandy loam soil with intermittent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Unknown
	14	1.4	Marsh	Riverine	gc, ts	10m	49	Mid-reach; 1354 hectare catchment	Type 1	Permanent inflow and outflow; over 50% agricultural landscape; high proportion of live herbs.	Marsh with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline herbs	Riverine feature with predominantly fine sandy loam soil	Riverine marsh on fine sandy loam soil with permanent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Present

Table B6: Wetland Characteristics and Ecological Functions Assessment for Wetlands found within the ZOI of the Project Location

Tile #	Wetland #	Size (ha)	Wetland Type	Site Type	Vegetation Forms (dominant, sub-dominant)	Proximity to other wetlands	Interspersion	Flood Attenuation	Open Water Types	Water Quality Improvement (short term)	Water Quality Improvement (long term nutrient trap)	Water Quality Improvement (groundwater discharge)	Shoreline Erosion	Groundwater Recharge	Summary of Hydrology	Rare Species	Significant Features	Fish Habitat
															mapping*			
	13	0.4	Marsh	Riverine	gc, ts	16m	51	Mid-reach; 1381 hectare catchment	Type 1	Permanent inflow and outflow; over 50% agricultural landscape; high proportion of live herbs.	Marsh with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline herbs	Riverine feature with predominantly fine sandy loam soil	Riverine marsh on fine sandy loam soil with permanent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Present
	12	0.5	Marsh	Riverine	gc	10m	37	Mid-reach; 1436 hectare catchment	Type 1	Permanent inflow and outflow; over 50% agricultural landscape; high proportion of live herbs.	Marsh with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline herbs	Riverine feature with predominantly loam soil	Riverine marsh on loam soil with permanent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Present
	11	2.6	Marsh	Riverine	gc	10m	41	Lower-reach; 1589 hectare catchment	Type 1	Permanent inflow and outflow; over 50% agricultural landscape; high proportion of live herbs.	Marsh with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline herbs	Riverine feature with predominantly loam soil	Riverine marsh on loam soil with permanent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Present
4	10	1.2	Marsh	Riverine	gc	50m	53	Mid-reach; 37808 hectare catchment	Type 1	Permanent inflow and outflow; over 50% agricultural landscape; high proportion of live herbs.	Marsh with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline herbs	Riverine feature with predominantly loam soil	Riverine marsh on loam soil with permanent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on	None known to be present	None confirmed	Present

Table B6: Wetland Characteristics and Ecological Functions Assessment for Wetlands found within the ZOI of the Project Location

Tile #	Wetland #	Size (ha)	Wetland Type	Site Type	Vegetation Forms (dominant, sub-dominant)	Proximity to other wetlands	Interspersion	Flood Attenuation	Open Water Types	Water Quality Improvement (short term)	Water Quality Improvement (long term nutrient trap)	Water Quality Improvement (groundwater discharge)	Shoreline Erosion	Groundwater Recharge	Summary of Hydrology	Rare Species	Significant Features	Fish Habitat
															site surveys, air photo interpretation, and soil mapping*			
	9	0.5	Swamp	Riverine	ts, gc	12m	30	Mid-reach; 6306 hectare catchment	Type 1	Permanent inflow and outflow; over 50% agricultural landscape; high proportion of live shrubs.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline shrubs	Riverine feature with predominantly loam soil	Riverine swamp on loam soil with permanent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Present
	8	3.8	Swamp	Riverine	ts, gc	12m	46	Mid-reach; 6295 hectare catchment	Type 1	Permanent inflow and outflow; over 50% agricultural landscape; high proportion of live shrubs.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Abundance of shoreline shrubs	Riverine feature with predominantly loam soil	Riverine swamp on loam soil with permanent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Present
7	7	1.1	Swamp	Palustrine	ts, gc	130m	37	Headwater; 5 hectare catchment	No open water	No inflow and intermittent diffuse overland outflow; over 50% agricultural landscape; high proportion of live shrubs	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly loam soil	Palustrine swamp on loam soil with intermittent outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Not present
	6	5.9	Swamp	Palustrine	ts, gc	16m	42	Mid-reach; 42 hectare catchment	No open water	Intermittent inflow and outflow; over 50% agricultural landscape; high proportion	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly loam soil	Palustrine swamp on loam soil with intermittent inflow and outflow. Situated in a	None known to be present	None confirmed	Unknown

Table B6: Wetland Characteristics and Ecological Functions Assessment for Wetlands found within the ZOI of the Project Location

Tile #	Wetland #	Size (ha)	Wetland Type	Site Type	Vegetation Forms (dominant, sub-dominant)	Proximity to other wetlands	Interspersion	Flood Attenuation	Open Water Types	Water Quality Improvement (short term)	Water Quality Improvement (long term nutrient trap)	Water Quality Improvement (groundwater discharge)	Shoreline Erosion	Groundwater Recharge	Summary of Hydrology	Rare Species	Significant Features	Fish Habitat
										of live shrubs.					predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*			
	5	1	Swamp	Palustrine	ts, gc	16m	42	Mid-reach; 161 hectare catchment	No open water	Intermittent inflow and outflow; over 50% agricultural landscape; high proportion of live shrubs.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly loam soil	Palustrine swamp on loam soil with intermittent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	None confirmed	Present
	3	27.7	Swamp	Palustrine	ts, gc, ne	14m	54	Headwater; 71 hectare catchment	No open water	Intermittent inflow and outflow; over 50% agricultural landscape; high proportion of live shrubs.	Swamp with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly loam soil	Palustrine swamp on loam soil with intermittent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	- None confirmed - Potential for Waterfowl Staging	Present
	2	0.4	Marsh	Palustrine	gc	14m	34	Headwater; 2 hectare catchment	No open water	No inflow and intermittent outflow; over 50% agricultural landscape; high proportion of live shrubs.	Marsh with <50% coverage of organic soil	No evidence of discharge observed	Not applicable	Palustrine feature with predominantly loam soil	Palustrine marsh on loam soil with intermittent outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	None known to be present	- None confirmed - Potential for Waterfowl Staging	Not present
	1	4.7	Marsh	Palustrine	gc, ts	28m	44	Headwater;	No	Intermittent	Marsh with	No evidence	Not	Palustrine	Palustrine	None	None confirmed	Present

Table B6: Wetland Characteristics and Ecological Functions Assessment for Wetlands found within the ZOI of the Project Location

Tile #	Wetland #	Size (ha)	Wetland Type	Site Type	Vegetation Forms (dominant, sub-dominant)	Proximity to other wetlands	Interspersion	Flood Attenuation	Open Water Types	Water Quality Improvement (short term)	Water Quality Improvement (long term nutrient trap)	Water Quality Improvement (groundwater discharge)	Shoreline Erosion	Groundwater Recharge	Summary of Hydrology	Rare Species	Significant Features	Fish Habitat
								11 hectare catchment	open water	inflow and outflow; over 50% agricultural landscape; high proportion of live herbs.	<50% coverage of organic soil	of discharge observed	applicable	feature with predominantly loam soil	marsh on loam soil with intermittent inflow and outflow. Situated in a predominantly agricultural watershed. Data based on site surveys, air photo interpretation, and soil mapping*	known to be present		

Table B7: Woodland Characteristics and Assessment of Significance for Woodlands found within 120 m of the Project Location

				Ecological Functions Criteria						
Natural Feature Number	Size (Ha)	ELC Type(s) within 120m of Project Location	Woodland Size Criteria	Woodland Interior	Proximity to other Significant Woodlands or Habitats ¹	Linkages ²	Water Protection ³	Woodland Diversity Representation ⁴	Uncommon Characteristics Criteria ⁵	Woodland is Considered Significant (meets at least 1 criteria)
1	1.8	FOD6-5	N	N	N	N	N	Y	N	Y
2	0.8	CUW1-3*/Drain	N	N	N	N	Y	N	N	Y
3	0.8	CUP1-11*	N	N	N	N	N	N	N	N
4	0.4	CUP3-8	N	N	N	N	N	N	N	N
5	2.2	CUP1	N	N	N	N	Y	N	N	Y
6	7.4	CUP3-12*	Y	N	Y	N	N	N	N	Y
7	6.2	CUP3-12*	Y	N	Y	N	Y	N	N	Y
8	3.7	FOC4-1,FOC2-2,FOM4-2	N	N	N	N	Y	N	N	Y
9	0.9	CUP3-3,CUP3-3	N	N	N	N	N	N	N	N
10	1.8	CUP3-3,CUP3-13*,CUP3-3,CUP3-14*	N	N	N	N	Y	N	N	Y
11	1.2	CUW1	N	N	N	N	Y	N	N	Y
12	8.9	CUW1-4*	Y	Y	Y	N	N	N	N	Y
13	18.2	FOD3-1,FOM,CUP3-2	Y	Y	Y	N	N	N	N	Y

Table B7: Woodland Characteristics and Assessment of Significance for Woodlands found within 120 m of the Project Location

				Ecological Functions Criteria						
Natural Feature Number	Size (Ha)	ELC Type(s) within 120m of Project Location	Woodland Size Criteria	Woodland Interior	Proximity to other Significant Woodlands or Habitats ¹	Linkages ²	Water Protection ³	Woodland Diversity Representation ⁴	Uncommon Characteristics Criteria ⁵	Woodland is Considered Significant (meets at least 1 criteria)
14	45.4	CUP3,CUP3-13*,CUP3-3,CUP3-13*, CUP3-13*,CUP3-13*,CUP3-12*,SWD4-N5*,SWD,CUP3-1N3*	Y	N	N	N	Y	N	N	Y
15	2.1	SWND4-5*,CUNP3-3	N	N	Y	N	N	N	N	Y
16	0.8	SWD4-N5*	N	N	N	N	N	N	N	N
17	0.2	SWD4-5*N	N	N	N	N	N	N	N	N
18	13.5	SWC4-2,SWD4-3	Y	Y	Y	N	Y	N	N	Y
19	1.7	SWD4-5*	N	N	N	N	Y	N	N	Y
20	1.2	SWD4-5*	N	N	N	N	Y	N	N	Y
21	1.0	CUP3-2	N	N	Y	N	N	N	N	Y
22	17.1	CUP3-12*	Y	Y	Y	N	N	N	N	Y
23	23.2	FOD7-2	Y	Y	Y	N	Y	N	N	Y
24	2.7	SWD4-5*	N	N	N	N	Y	N	N	Y
25	1.5	CUP3/CUM1	N	N	N	N	Y	N	N	Y
26	5.4	FOD8-1	Y	Y	Y	N	Y	N	N	Y

Table B7: Woodland Characteristics and Assessment of Significance for Woodlands found within 120 m of the Project Location

Natural Feature Number	Size (Ha)	ELC Type(s) within 120m of Project Location	Woodland Size Criteria	Ecological Functions Criteria					Uncommon Characteristics Criteria ⁵	Woodland is Considered Significant (meets at least 1 criteria)
				Woodland Interior	Proximity to other Significant Woodlands or Habitats ¹	Linkages ²	Water Protection ³	Woodland Diversity Representation ⁴		
29	2.8	CUP3-13*	N	N	N	N	N	N	N	N
30	79.6	SWD4	Y	Y	Y	N	Y	N	N	Y
31	26.7	CUP3-13*/CUP3-12*,CUP3-6	Y	Y	Y	N	N	N	N	Y
32	38.4	CUP/SWT	Y	Y	Y	N	Y	N	N	Y
33	0.4	CUP3-12*	N	N	N	N	N	N	N	N
34	0.5	CUP3-9	N	N	N	N	N	N	N	N
37	13.9	CUP3-15*, CUP3-12*, CUP3-13*, CUP3-14*	Y	N	Y	Y	N	N	N	Y

1- Woodlands are considered significant if they are located within 30m of an identified significant feature or fish habitat *and* the woodland is 1 ha or larger.

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

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

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

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

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
Wetlands						
Significant Wetlands	Direct disturbance to wetlands	Prevent inadvertent encroachment into wetlands	All construction and maintenance activity is to be restricted to the construction envelope as detailed in Figures 5.1-5.2.	Construction envelope and other work zones. For those work areas within 1m of a wetland, silt fencing is to be placed at a minimum, at the edge of the wetland as defined by the 50/50 wetland vegetation rule (OWES) conducted by a qualified biologist.	Construction contractor to ensure no work occurs outside of the limits of construction envelope on an on-going basis.	Construction contractor to ensure no work occurs outside of the limits of construction envelope as detailed in Figures 5.1 to 5.2 Workers will be advised not to trespass beyond the boundary of the marked area Clearly delineate work area using a barrier such as a silt fence to avoid accidental encroachment on the feature that would lead to damage of wetland.
	Degradation of wetland through changes in water flow or surface water contamination.	Prevent contamination through surface flow during construction and spills.	All maintenance activities, vehicle refueling or washing and chemical storage will be located more than 30m from wetlands.	Culvert locations.	Construction Supervisor to regularly visually monitor culvert installations to ensure flow conveyance, with no restrictions or ponding.	Keep emergency spill kits on site.
		Maintain existing surface water flow patterns.	Maintain surface flow patterns to wetlands by			Implement MOE spill action plan if necessary.

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
			installing properly designed and sited culverts under access roads or in other areas, as required.			Dispose of waste material by authorized and approved offsite vendors.
	Wetland desiccation or drying resulting from removal of riparian or buffering vegetation.	Minimize removal of riparian and buffering vegetation.	Implement Vegetation Removal measures (see Section 5.4).	All areas of disturbance.	Once after revegetation.	Replant/Reseed areas where plantings/seed does not become adequately reestablish to ensure stabilizing vegetative cover establishes within the growing season.
			Re-vegetate disturbed areas with fast growing native species as soon as practical after construction activity within the disturbed areas is completed.			In the event of event of accidental damage to trees, or unexpected vegetation removal, may require re-planting of similar, native species.
	Degradation of wetland through sedimentations.	Prevent contamination by sediment and erosion.	Implement Sediment and Erosion control measures (see Section 5.4). Silt barriers will be erected along woodland boundaries located within 30m of construction areas. Silt barriers will be erected along wetland boundaries located within 30m	All E&S control points.	All E&S control measures checked when inclement weather events anticipated (i.e., high winds, rain events).	Sediment will be removed if it is found to accumulate.
					All E&S control measures to be regularly monitored by Construction Supervisor to ensure they are	If siltation of surface water is identified, the source of siltation will be isolated, contained, and controlled and

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation

Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
			of construction areas.		functioning as intended.	sediment control measures increased as required to prevent additional sedimentation.
						Erosion control measures will remain in place until disturbed soils have stabilized. Suspend work if high runoff volume is noted or excessive sediment discharge occurs.
			Stockpile materials >30m from wetland edge. Where this is not possible stockpiles will be covered when not in use, especially during rain events or high wind events.	All stockpiles within 30m of wetlands (if applicable).	All covers on stockpiles to be put in place and checked when inclement weather events anticipated (i.e., high winds, rain events).	Sediment will be removed if it is found to accumulate.
					Stockpiles to be regularly monitored by Construction Supervisor and any deficiencies will be rectified as soon as practicable.	If covers over stockpile are found not to be effectively preventing sediment transport, additional E&S control measures employed as necessary.

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation

Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
	Degradation of wetland during Horizontal Directional Drilling Frac-out.	Prevent/minimize contamination by implementing a Frac-out Response Plan immediately if a Frac-out occurs during Horizontal Directional Drilling.	Keep emergency spills equipment close by in case Frac-out occurs.	Check for evidence of Frac-out during Horizontal Directional Drilling.	During Horizontal Directional Drilling.	Implement Frac-out Response Plan as follows:
						Isolate the area with hay bales, sand bags, or silt fencing to surround and contain the drilling mud.
						Consult with MOE regarding next appropriate action
			Implement Frac-out Response Plan immediately if Frac-out occurs.	At the site of revegetation after a Frac-out incident.	Twice per year for 2 years.	Once excess drilling mud is removed, the area will be seeded and/or replanted using native species similar to those in the adjacent area, or allowed to re-grow from existing vegetation.
						Monitor re-vegetated areas twice per year for two years subsequent to frac-out to confirm re-vegetation is successful. If re-vegetation is unsuccessful, additional

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation

Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
						measures will be taken to restore the vegetation, including removal and replacement (using local soils) of existing substrate in the affected area.
	Disturbances to Wildlife	Limit noise/light disturbances to wildlife.	Construction activities within 30m of significant woodlands will consider and select construction equipment with lower sound levels where available during the bird breeding period of May 1 to July 31 AND construction activities within 30m of a feature will occur during daylight hours to avoid excessive noise and light disturbance.	Not required.	Not required.	Not required.
Woodlands						

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
Significant Woodlands	Direct disturbance to woodlands	Prevent inadvertent encroachment into woodlands	All construction and maintenance activity is to be restricted to the construction envelope as detailed in Figures 5.1-5.2.	Construction envelope and other work zones. Wildlife barrier fencing to be in place for all components within 30 m of a feature. For those work areas within 1m of a woodland, silt fencing is to be placed at a minimum, at the edge of the woodland as defined by the outer edge of the canopy (i.e. drip line) by a qualified biologist.	Construction contractor to ensure no work occurs outside of the limits of construction envelope on an on-going basis.	Construction contractor to ensure no work occurs outside of the limits of construction envelope as detailed in Figures 5.1 to 5.2 Workers will be advised not to trespass beyond the boundary of the marked area Clearly delineate work area using a barrier such as a silt fence to avoid accidental encroachment on the feature that would lead to damage of wetland.
	Accidental damage to critical root zones AND accidental loss of trees or damage to limbs.	Prevent damage to the critical root zones AND prevent accidental loss of trees or damage to limbs.	Clearly delineate work area using a barrier such as a silt fence to avoid accidental encroachment on the feature that would lead to damage of trees and root zones.	Check silt fencing along the periphery of significant woodlands.	Daily when construction activities occur within the immediate vicinity of significant woodlands and when inclement weather is anticipated (i.e. rain events).	Any tree limbs or root zones that are accidentally damaged by construction activities will be pruned using proper arboricultural techniques. A certified arborist will evaluate tree health one year later.

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation

Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
			Workers will be advised not to trespass beyond the boundary of the marked area.			Pruning will be avoided during leaf fall (Sep-Nov) and not during the breeding season for migratory birds (May 1 - July 31) unless presence/absence surveys are conducted by a qualified biologist. If a nest is found, a buffer will be implemented to protect the nest while it is active.
			All construction vehicles and personnel must stay within the construction envelope.			
			Erect silt fencing as far away as possible from the significant woodland and no closer than the dripline to prevent sedimentation within critical root zones.	Check silt fencing along the periphery of feature significant woodlands to make sure it is fully functional.	Daily when construction activities occur within the immediate vicinity of significant woodlands and when inclement weather is anticipated (i.e. rain events).	Any build up of sediment beyond the silt fence will be cleaned up and removed to avoid risk of further spread of sediment.
			Implement Sediment and Erosion control measures (see Section 5.4). Silt barriers will be erected along woodland boundaries located within 30m of construction areas.			Repair silt fencing immediately if not functional.

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
			Any issues will be resolved in a timely fashion.			
			Stockpile materials >30m from woodland edge. Where this is not possible stockpiles will be covered when not in use, especially during rain events or high wind events.	All stockpiles within 30m of significant woodlands (if applicable).	All covers on stockpiles to be put in place and checked when inclement weather events anticipated (i.e. high winds, rain events).	Not required.
			Re-vegetate disturbed areas with fast growing native species as soon as construction activity within the disturbed areas is complete.	Check that seed grows in areas of disturbance within one growing season.	Once after seeding area.	Replant areas where seed does not grow to ensure vegetation establishes within the growing season.
			All maintenance activities, vehicle refueling or washing and chemical storage will be located more than 30m from significant woodlands.	Not required.	Not required.	Keep emergency spill kits on site.
		Implement MOE spill action plan if necessary.				
		Dispose of waste material by authorized and approved offsite vendors.				
			Implement infiltration (i.e. minimize paved surfaces and design roads to promote infiltration) techniques to the maximum extent	Not required.	Not required.	Not required.

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation

Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
			possible to avoid changes in soil moisture and compaction.			
Degradation of woodland during Horizontal Directional Drilling	Prevent/minimize degradation of woodland during Horizontal Directional Drilling		Implement mitigation measures as follows:	Check silt fencing along the periphery of the feature.	During Horizontal Directional Drilling.	Any build up of sediment beyond the silt fence will be cleaned up and removed to avoid risk of further spread of sediment.
			No clearing of vegetation to occur for drilling.			
			Drilling equipment will be set up and drilling will be conducted a minimum of 30 m from the edge of the woodland.			
			Drilling will occur at a depth of 3 m (or as close to this depth as the site allows).			
			Sedimentation control fencing to be installed prior to drilling.			
			Topsoil stripped from the drill exit site must be stockpiled in a location designated by the inspector and as far as possible from the feature.			
			Repair silt fencing immediately if not functional.			

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation

Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
			Any required dewatering associated with this process will follow the mitigation measures outlined in Section 5.4.			
			Check construction machinery for presence of wildlife prior to operating machinery.			
	Degradation of woodland during Horizontal Directional Drilling Frac-out.	Prevent/minimize contamination by implementing a Frac-out Response Plan immediately if a Frac-out occurs during Horizontal Directional Drilling.	Keep emergency spills equipment close by in case Frac-out occurs.	Check for evidence of Frac-out during Horizontal Directional Drilling.	During Horizontal Directional Drilling.	Implement Frac-out Response Plan as follows:
						Isolate the area with hay bales, sand bags, or silt fencing to surround and contain the drilling mud.
						Consult with MOE regarding next appropriate action
			Implement Frac-out Response Plan immediately if Frac-out occurs.	At the site of revegetation after a Frac-out incident.	Twice per year for 2 years.	Once excess drilling mud is removed, the area will be seeded and/or replanted using native species similar to those in the adjacent area, or allowed to re-grow from existing

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation

Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
						vegetation.
						Monitor re-vegetated areas twice per year for two years subsequent to frac-out to confirm re-vegetation is successful. If re-vegetation is unsuccessful, additional measures will be taken to restore the vegetation, including removal and replacement (using local soils) of existing substrate in the affected area.
	Disturbances to Wildlife	Limit noise/light disturbances to wildlife.	Construction activities within 30m of significant woodlands will consider and select construction equipment with lower sound levels where available during the bird breeding period of May 1 to July 31.	Not required.	Not required.	Not required.

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
Significant Wildlife Habitat						
Bat Maternity Colonies (BMC-1 and BMC-2)	Direct disturbance to feature	Prevent inadvertent encroachment into wetlands	All construction and maintenance activity is to be restricted to the construction envelope as detailed in Figures 5.1-5.2. For those work areas within 1m this habitat feature, silt fencing is to be placed at a minimum, at the edge of the woodland as defined by the outer edge of the canopy (i.e. drip line) by a qualified biologist.	Construction envelope and other work zones.	Construction contractor to ensure no work occurs outside of the limits of construction envelope on an on-going basis.	Construction contractor to ensure no work occurs outside of the limits of construction envelope as detailed in Figures 5.1 to 5.2 Workers will be advised not to trespass beyond the boundary of the marked area Clearly delineate work area using a barrier such as a silt fence to avoid accidental encroachment on the feature that would lead to damage of wetland.
	Shifts in species abundance, avoidance and behaviour during wind farm operation.	Monitor potential impacts of wind farm operation.	Monitor for bat mortality according to the Environmental Effects Monitoring Plan	Bat monitoring at 10 Turbine Locations	Bat monitoring will be conducted twice weekly (3-4 day intervals) mortality monitoring of birds and bats at 30% (23 of 77) of the wind turbines from May 1 to October 31. Searcher efficiency and	An Environmental Effects Monitoring Plan identifies performance objectives to assess the effectiveness of the proposed mitigation measures and describes a response and contingency plan that will be

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
					scavenger trials will be conducted each year according to current guidance documents.	implemented if performance objectives cannot be met.
					3 years post construction.	
					Report the findings of all monitoring programs to MNR on an annual basis for the first 3 years of operation. If a permanent disturbance has been noted within this wildlife habitat, the MNR will be contacted to determine whether additional mitigation measures will be needed	

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
Waterfowl Nesting Areas (WNA-3 and WNA-4)	Direct disturbance to feature	Prevent inadvertent encroachment into feature AND prevent waterfowl from walking into work zones	All construction and maintenance activity is to be restricted to the construction envelope as detailed in Figures 5.1-5.2. AND wildlife barrier fencing to be in place for all components within 30 m of a feature	Construction envelope and other work zones.	Construction contractor to ensure no work occurs outside of the limits of construction envelope on an on-going basis.	Construction contractor to ensure no work occurs outside of the limits of construction envelope as detailed in Figures 5.1 to 5.2 Workers will be advised not to trespass beyond the boundary of the marked area Clearly delineate work area using a barrier such as a silt fence to avoid accidental encroachment on the feature that would lead to damage of feature, and to exclude wildlife.
	Habitat avoidance, disturbance and mortality from construction activities.	Minimize disturbance, including noise disturbance, especially during sensitive periods when waterfowl are emerging from their overwintering habitat to nest (May 1 to July 31).	Construction activities within 30m of significant woodlands will consider and select construction equipment with lower sound levels where available during the bird breeding period of May 1 to July 31.	Not required.	Not required.	Not required.

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
		Prevent vehicle strikes, especially during sensitive periods.	Restrict vehicle speeds to 30 km or less on roads near waterfowl nesting habitat (including signage) during sensitive periods.			
	Degradation of waterfowl nesting habitat through changes in water flow or surface water drainage patterns.	Maintain existing surface water flow patterns.	Maintain surface flow patterns in vicinity of turtle nesting habitat by installing properly designed and sited culverts under access roads or in other areas, as required.	Culvert locations.	Construction Supervisor to regularly visually monitor culvert installations to ensure flow conveyance, with no restrictions or ponding.	If flow conveyance is impeded, determine cause (i.e., blocked by debris, beaver activity etc.) and physically clear problematic material from culvert opening.
	Degradation of waterfowl nesting habitat through surface flow contamination.	Prevent contamination through surface flow during construction and spills.	Implement Sediment and Erosion control measures (see Section 5.4). Silt barriers will be erected along habitat boundaries located within 30m of construction areas.	All E&S control points.	All E&S control measures to be regularly monitored by Construction Supervisor, particularly when inclement weather events anticipated (i.e., high winds, rain events) to ensure they are functioning as intended.	Sediment will be removed if it is found to accumulate.
Implement Dewatering measures if applicable (see Section 5.4).			Keep emergency spill kits on site.			
All maintenance activities, vehicle refueling or washing and chemical storage will be located more than 30m			Implement MOE spill action plan if necessary.			

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation

Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
			from habitat.			
			Fuel storage will be in properly protected and sealed areas.			Dispose of waste material by authorized and approved offsite vendors.
	Shifts in species abundance, avoidance and behaviour during wind construction	Monitor potential impacts of construction	Monitor for waterfowl disturbance	At Significant habitats within 30m of an access road	1 year post construction monitoring	If a disturbance has been noted within this wildlife habitat, monitoring will be extended to 3 years post construction. If disturbance is determined to be permanent, the MNR will be contacted to determine if additional mitigation measures will be needed

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
Amphibian Breeding Habitat (woodland and wetland):ABWO-1 to ABWO-9, AWBO-13-15, and ABWE-2	Direct disturbance to feature	Prevent inadvertent encroachment into feature AND prevent amphibians from entering work zones	All construction and maintenance activity is to be restricted to the construction envelope as detailed in Figures 5.1-5.2. AND wildlife barrier fencing to be in place for all components within 30 m of a feature	Construction envelope and other work zones.	Construction contractor to ensure no work occurs outside of the limits of construction envelope on an on-going basis.	Construction contractor to ensure no work occurs outside of the limits of construction envelope as detailed in Figures 5.1 to 5.2Workers will be advised not to trespass beyond the boundary of the marked areaClearly delineate work area using a barrier such as a silt fence to avoid accidental encroachment on the feature that would lead to damage of feature, and to exclude wildlife.
	Degradation of breeding ponds through surface flow contamination.	Prevent contamination through surface flow during construction and spills.	Implement Dewatering measures (see Section 5.4.3).	Not required.	Not required.	Keep emergency spill kits on site.
			All maintenance activities, vehicle refueling or washing and chemical storage will be located more than 30m from habitat.			Implement MOE spill action plan if necessary.
						Dispose of waste material by authorized and approved offsite vendors.
	Degradation of breeding ponds through sedimentation.	Prevent contamination by sediment and erosion.	Implement Sediment and Erosion control measures (see Section 5.4). Silt	All E&S control points.	All E&S control measures checked when inclement weather events	Sediment will be removed if it is found to accumulate.

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
			barriers will be erected along habitat boundaries located within 30m of construction areas.		anticipated (i.e., high winds, rain events).	
					All E&S control measures to be regularly monitored by Construction Supervisor to ensure they are functioning as intended.	If siltation of surface water is identified, the source of siltation will be isolated, contained, and controlled and sediment control measures increased as required to prevent additional sedimentation.
						Erosion control measures will remain in place until disturbed soils have stabilized.
	Degradation of breeding ponds through changes in water flow or surface water drainage patterns.	Maintain existing surface water flow patterns.	Maintain surface flow patterns to breeding ponds by installing properly designed and sited culverts under access roads or other locations, as required..	Culvert locations.	Construction Supervisor to regularly visually monitor culvert installations to ensure flow conveyance, with no restrictions or ponding.	If flow conveyance is impeded, determine cause (i.e., blocked by debris, beaver activity etc.) and physically clear problematic material from culvert opening.

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
	Road mortality	March 15 to June 30 April-June).	Restrict vehicle traffic to daytime hours, and limit speeds to 30 km or less on roads near woodland amphibian breeding ponds (including signage). Limit construction within 120 m of significant amphibian habitats to daylight hours between March 15 and June 30 (for significant frog breeding habitats), to avoid excessive noise and vehicle caused mortality.	Not required.	Not required.	Not required.
	Shifts in species abundance, avoidance and behaviour during wind construction	Monitor potential impacts of construction	Monitor for amphibian disturbance	At Significant habitats within 30m of an access road	1 year post construction monitoring	If a disturbance has been noted within this wildlife habitat, monitoring will be extended to 3 years post construction. If disturbance is determined to be permanent, the MNR will be contacted to determine if additional mitigation measures will be needed

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
	Disturbances to Wildlife	Limit light/noise disturbances to wildlife.	Limit construction within 120 m of significant amphibian habitats to daylight hours between March 15 and June 30 (for significant frog breeding habitat), to avoid excessive noise and light disturbance.	Not required.	Not required.	Not required.
Marsh Bird Breeding Habitat (MBB-1)	Direct disturbance to feature	Prevent inadvertent encroachment into feature	All construction and maintenance activity is to be restricted to the construction envelope as detailed in Figures 5.1-5.2. For those work areas within 1m of a habitat, silt fencing is to be placed at a minimum, at the edge of the habitat as defined by a qualified biologist.	Construction envelope and other work zones.	Construction contractor to ensure no work occurs outside of the limits of construction envelope on an on-going basis.	<p>Construction contractor to ensure no work occurs outside of the limits of construction envelope as detailed in Figures 5.1 to 5.2</p> <p>Workers will be advised not to trespass beyond the boundary of the marked area</p> <p>Clearly delineate work area using a barrier such as a silt fence to avoid accidental encroachment on the feature that would lead to damage of feature, and to exclude wildlife.</p>

Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
	Habitat avoidance, disturbance and mortality from construction activities.	Minimize disturbance, especially during sensitive periods when waterfowl are emerging from their overwintering habitat to nest (May 1 to July 31).	Construction in the vicinity of turtle nesting habitat should avoid sensitive periods to the extent reasonably possible.	Not required.	Not required.	Not required.
		Prevent vehicle strikes, especially during sensitive periods.	Restrict vehicle speeds to 30 km or less on roads near waterfowl nesting habitat (including signage) during sensitive periods.			
	Degradation of marsh bird breeding habitat through changes in water flow or surface water drainage patterns.	Maintain existing surface water flow patterns.	Maintain surface flow patterns in vicinity of habitat by installing properly designed and sited culverts under access roads or in other areas, as required.	Culvert locations.	Construction Supervisor to regularly visually monitor culvert installations to ensure flow conveyance, with no restrictions or ponding.	If flow conveyance is impeded, determine cause (i.e., blocked by debris, beaver activity etc.) and physically clear problematic material from culvert opening.
	Degradation of marsh bird breeding habitat through surface flow contamination.	Prevent contamination through surface flow during construction and spills.	Implement Sediment and Erosion control measures (see Section 5.4). Silt barriers will be erected along habitat boundaries located within 30m of construction areas.	All E&S control points.	All E&S control measures to be regularly monitored by Construction Supervisor, particularly when inclement weather events anticipated (i.e., high winds, rain	Sediment will be removed if it is found to accumulate.

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation

Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
			Implement Dewatering measures if applicable (see Section 5.4).		events) to ensure they are functioning as intended.	Keep emergency spill kits on site.
			All maintenance activities, vehicle refueling or washing and chemical storage will be located more than 30m from habitat.			Implement MOE spill action plan if necessary.
			Fuel storage will be in properly protected and sealed areas.			Dispose of waste material by authorized and approved offsite vendors.
	Shifts in species abundance, avoidance and behaviour during wind construction	Monitor potential impacts of construction	Monitor for waterfowl disturbance	At Significant habitats within 30m of an access road	1 year post construction monitoring	If a disturbance has been noted within this wildlife habitat, monitoring will be extended to 3 years post construction. If disturbance is determined to be permanent, the MNR will be contacted to determine if additional mitigation measures will be needed

Table B8: Summary of Potential Effects and Mitigation Measures for the Project During Construction and Operation						
Unique Feature ID (see Figures 5.1-5.2)	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Construction Monitoring Plan		Contingency Measure
				Monitoring Locations	Frequency of Monitoring	
	Disturbances to Wildlife	Limit light/noise disturbances to wildlife.	Construction activities within 30m of significant woodlands will consider and select construction equipment with lower sound levels where available during the bird breeding period of May 1 to July 31.	Not required.	Not required.	Not required.

Table B9. Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within ZOI

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methodology	Monitoring Locations	Frequency and Duration of Sample Collection	Technical and Statistical Value of Data	Reporting Requirements	
Significant Wetlands	Potential disturbance effects to wetland hydrology and potential sedimentation. Indirect impacts such as dust generation, sedimentation and erosion and spills, are mitigated via measures described in Table B8, Appendix B.	Maintain hydrological flows to significant wetlands.	Infrastructure sited outside of all candidate significant bat maternity colonies. Installation of culverts to maintain hydrological conditions. See Table BA, Appendix B for complete mitigation measures.	Inspection of culverts to ensure flow maintained.	The periphery of significant wetlands.	Hydrological conditions will be monitored once seasonally in each of spring and summer during the first year post-construction.	Determine if there is a disturbance to hydrological conditions that could impact provincially significant wetland features.	Notify MNR of hydrological issues and actions taken to resolve the issue. Any negative impacts that occurred to the provincially significant wetland will also be reported to MNR and where necessary will be restored.	Contingency measures will be determined in consultation with MNR.
Significant Woodlands	Indirect impacts related to infrastructure maintenance, such as dust generation, sedimentation and erosion, spills, accidental damage to trees, and noise/light disturbances to wildlife are mitigated via measures described in Table B8, Appendix B.	Minimize potential indirect impacts to the extent possible.	Infrastructure sited outside of all candidate significant bat maternity colonies. Implement mitigation strategies as described in Table B8, Appendix B.	Not required.	Not required.	Not required.	Not required.	Not required.	Not required
Amphibian Breeding Habitat (Woodland and Wetland): ABWO-1 to ABWO-9, AWBO-13-15, and ABWE-2 (Pre-construction survey required to verify significance of these features. If significant the following mitigation measures, monitoring plan and contingency measures will be implemented)	Loss of species diversity and abundance through habitat damage.	Continued use of the habitat by breeding amphibians. No amphibian mortality on access roads.	Infrastructure sited outside of all candidate significant amphibian breeding habitats (woodland and wetlands) Speed limit signage will be erected to restrict vehicle speeds to 30km/hr Restrict vehicle traffic to daytime hours, and limit speeds to 30 km or less on roads near woodland amphibian breeding ponds (including signage). Limit maintenance activity within 120 m of significant amphibian habitats to daylight hours between March 15 and June 30 (for significant frog breeding habitats) to avoid excessive noise and vehicle caused mortality. See Table BA, Appendix B for complete mitigation measures.	Anuran call surveys in April, May, and June. Pre-construction monitoring protocol is detailed in the EIS. Call surveys will be conducted following Bird Studies Canada's <i>Marsh Monitoring Protocol</i> (BSC 2003). See Section 5.3.3.1 of the report for full details. Post-construction monitoring will follow the same methods.	Within features listed. Post-construction monitoring locations will be the same as pre-construction monitoring locations.	Pre-construction Survey (baseline): • Spring 2013 Post-construction Survey: • Spring 2015 (for all significant features) Post-construction Survey if required based on results of Spring 2015 survey and consultation with MNR: • Spring 2016 (for all significant features) • Spring 2017 (for all significant features)	Determine if there is a loss of species abundance through displacement or avoidance effect caused by infrastructure located in proximity to habitat.	Annual Reports submitted to MNR. Estimated Report Submission Dates: 1. Summer 2013 (preconstruction data) 2. Summer 2015 (yr 1 post-construction) If required based on results of Spring 2015 survey and consultation with MNR: 3. Summer 2016 (yr 2 post-construction) 4. Summer 2017 (yr 3 post-construction)	Upon submission of annual post-construction monitoring reports to MNR it will be determined in consultation with MNR whether contingency measures are required and the contingency measures to be undertaken. Because no operational impacts to this habitat are anticipated, if no impacts are observed after one year of post-construction monitoring, monitoring will not continue after one year.
Bat Maternity Colonies (BMC-1 and BMC-2)	Habitat Avoidance/disturbance potentially caused by turbines within 120m:	Continued use of the habitat by the species (Little brown	Infrastructure sited outside of all candidate significant bat maternity colonies.	All features deemed significant will be surveyed post-	A map illustrating selected survey	Exit surveys will be conducted in all significant bat maternity	Determine if there is a displacement or avoidance	Pre-construction: September 2013 (pre-	Upon submission of annual post-construction monitoring reports to MNR it will be

Table B9. Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within ZOI

Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methodology	Monitoring Locations	Frequency and Duration of Sample Collection	Technical and Statistical Value of Data	Reporting Requirements	
(Pre-construction survey required to verify significance of BMC-1. If significant the following mitigation measures, monitoring plan and contingency measures will be implemented). No access to BMC-2, assumed significant	T102 (BMC-1) T105 (BMC-2)	bat, Eastern Small-footed bat, Northern Long-eared bat, Tricolored Bat, or Silver-haired Bat) that currently inhabit the feature. White nose syndrome may have an impact on the abundance of bats, specifically Northern long-eared and Little Brown bats.		construction using the same methods (exit counts). See Section 5.3.3.2 of the report for full details.	trees within candidate significant bat maternity colony habitat will also be provided to MNR.	colony features for a period of 3 years beginning the first year of operation: <ul style="list-style-type: none"> Year 1 - June 2015 Year 2 - June 2016 Year 3 - June 2017 	effect caused by turbines located within 120m of bat maternity colonies.	construction exit survey results) <p>Post-construction Reports:</p> <ol style="list-style-type: none"> Year 1 - September 2015 Year 2 – September 2016 Year 3 – September 2017 	determined in consultation with MNR whether contingency measures are required and the contingency measures to be undertaken.
Waterfowl Nesting Areas (WNA-3 and WNA-4) (Pre-construction survey required to verify significance of these features. If significant the following mitigation measures, monitoring plan and contingency measures will be implemented)	Habitat Avoidance/disturbance potentially caused by turbines within 120m: T110 (WNA-3) T112 (WNA-4)	Continued use of the habitat by breeding waterfowl.	Infrastructure sited outside of all candidate significant waterfowl nesting habitats. See Table BA, Appendix B for complete mitigation measures.	All features deemed significant will be surveyed post-construction monitoring (brood rearing surveys) using the same methods. See Section 5.3.3.4 of the report for full details.	Within features listed. Post-construction monitoring locations will be the same as pre-construction monitoring locations.	Pre-construction Survey (baseline): <ul style="list-style-type: none"> Spring 2013 Post-construction Survey: <ul style="list-style-type: none"> Spring 2015 (for all significant features) Post-construction Survey if required based on results of Spring 2015 survey and consultation with MNR: <ul style="list-style-type: none"> Spring 2016 (for all significant features) Spring 2017 (for all significant features) 	Determine if there is a loss of species abundance through displacement or avoidance effect caused by infrastructure located in proximity to habitat.	Annual Reports submitted to MNR. Estimated Report Submission Dates: <ol style="list-style-type: none"> Summer 2013 (preconstruction data) Summer 2015 (yr 1 post-construction) If required based on results of Spring 2015 survey and consultation with MNR: <ol style="list-style-type: none"> Summer 2016 (yr 2 post-construction) Summer 2017 (yr 3 post-construction) 	Upon submission of annual post-construction monitoring reports to MNR it will be determined in consultation with MNR whether contingency measures are required and the contingency measures to be undertaken. Because no operational impacts to this habitat are anticipated, if no impacts are observed after one year of post-construction monitoring, monitoring will not continue after one year.
Marsh Bird Breeding Habitat (MBB-1) (Pre-construction survey required to verify significance of these features. If significant the following mitigation measures, monitoring plan and contingency measures will be implemented)	Habitat Avoidance/disturbance potentially caused by turbines within 120m: T104 (MBB-1)	Continued use of the habitat by marsh breeding birds	Infrastructure sited outside of all candidate significant marsh bird breeding habitats. See Table BA, Appendix B for complete mitigation measures.	All features deemed significant will be surveyed post-construction monitoring (breeding bird surveys) using the same methods. See Section 5.3.3.3 of the report for full details.	Within features listed. Post-construction monitoring locations will be the same as pre-construction monitoring locations.	Pre-construction Survey (baseline): <ul style="list-style-type: none"> Spring 2013 Post-construction Survey: <ul style="list-style-type: none"> Spring 2015 (for all significant features) Post-construction Survey if required based on results of Spring 2015 survey and consultation with MNR: <ul style="list-style-type: none"> Spring 2016 	Determine if there is a loss of species abundance through displacement or avoidance effect caused by infrastructure located in proximity to habitat.	Annual Reports submitted to MNR. Estimated Report Submission Dates: <ol style="list-style-type: none"> Summer 2013 (preconstruction data) Summer 2015 (yr 1 post-construction) If required based on results of Spring 2015 survey and consultation with MNR: <ol style="list-style-type: none"> Summer 2016 (yr 2 post-construction) Summer 2017 (yr 3 post-construction) 	Upon submission of annual post-construction monitoring reports to MNR it will be determined in consultation with MNR whether contingency measures are required and the contingency measures to be undertaken. Because no operational impacts to this habitat are anticipated, if no impacts are observed after one year of post-construction monitoring, monitoring will not continue after one year.

Table B9. Summary of the Environmental Effects Monitoring Plan for significant/provincially significant natural features in and within ZOI									
Unique Feature ID	Potential Negative Environmental Effects	Performance Objective	Mitigation Strategy	Environmental Effects Monitoring Plan					Contingency Measure
				Methodology	Monitoring Locations	Frequency and Duration of Sample Collection	Technical and Statistical Value of Data	Reporting Requirements	
						(for all significant features) • Spring 2017 (for all significant features)			

Appendix C

Background Wildlife List

Potential Wildlife Occurring within the Study Area – Records Review					
Common Name	Scientific Name	S-Rank/ G-Rank	COSSARO	COSEWIC	Source
BUTTERFLIES					
Monarch	<i>Danaus plexippus</i>	S4B, S2N/G5	SC	SC	MNR
AMPHIBIANS					
Mudpuppy	<i>Necturus maculosus</i>	S4/G5	NAR	NAR	HA
Spotted Salamander	<i>Ambystoma maculatum</i>	S4/G5			HA
American Toad	<i>Anaxyrus americanus</i>	S5/G5			HA
Tetraploid Gray Treefrog	<i>Hyla versicolor</i>	S5/G5			HA
Western Chorus Frog (great lakes - shield)	<i>Pseudacris triseriata</i>	S3/G5	NAR	THR	HA
Spring Peeper	<i>Pseudacris crucifer</i>	S5/G5			HA
Bullfrog	<i>Lithobates catesbeiana</i>	S4/G5			HA
Northern Green Frog	<i>Lithobates clamitans</i>	S5/G5			HA
Pickrel Frog	<i>Lithobates palustris</i>	S4/G5	NAR	NAR	HA
Wood Frog	<i>Lithobates sylvatica</i>	S5/G5			HA
Northern Leopard Frog	<i>Lithobates pipiens</i>	S5/G5	NAR	NAR	HA
Mink Frog	<i>Lithobates septentrionalis</i>	S5/G5			HA
Mudpuppy	<i>Necturus maculosus</i>	S4/G5	NAR	NAR	HA
REPTILES					
Snapping Turtle	<i>Chelydra serpentina</i>	S3/ G5	SC	SC	NHIC
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	S5/ G5T5			HA
Slider	<i>Trachemys scripta</i>	SNA/ G5			HA
Eastern Gartersnake	<i>Thamnophis sirtalis</i>	S5/ G5			HA
Eastern Ribbon Snake	<i>Thamnophis sauritus</i>	S3/ G5	SC	SC	HA
Northern Ribbon Snake	<i>Thamnophis sauritus septentrionalis</i>	S3/ G5			LMMMP
Northern Watersnake	<i>Nerodia sipedon sipedon</i>	S5/ G5T5	NAR	NAR	HA
Redbelly Snake	<i>Storeria occipitomaculata</i>	S5/ G5			HA
Brown Snake	<i>Storeria dekayi</i>	S5/ G5		NAR	LMMMP
Smooth Greensnake	<i>Opheodys vernalis</i>	S4/ G5			HA
Eastern Milksnake	<i>Lampropeltis triangulum</i>	S3/G5	SC	SC	MNR
BIRDS					
Snow Goose	<i>Chen caerulescens</i>	S5B/G5			LMMMP
Brant	<i>Branta bernicla</i>	SNA/G5			LMMMP
Canada Goose	<i>Branta canadensis</i>	S5/G5			OBBA
Mute Swan	<i>Cygnus olor</i>	SNA/G5			LMMMP
Trumpeter Swan	<i>Cygnus buccinator</i>	S4/G4	NAR	NAR	OBBA
Tundra Swan	<i>Cygnus colymbianus</i>	S4/G5			LMMMP
Wood Duck	<i>Aix sponsa</i>	S5/G5			OBBA
Gadwall	<i>Anas strepera</i>	S4/G5			OBBA
Eurasian Wigeon	<i>Anas penelope</i>	SNA/G5			LMMMP
American Wigeon	<i>Anas americana</i>	S4/G5			OBBA
American Black Duck	<i>Anas rubripes</i>	S4/G5			OBBA
Mallard	<i>Anas platyrhynchos</i>	S5/G5			OBBA
Blue-winged Teal	<i>Anas discors</i>	S4/G5			OBBA
Northern Shoveler	<i>Anas clypeata</i>	S4/G5			OBBA
Northern Pintail	<i>Anas acuta</i>	S5/G5			LMMMP
Green-winged Teal	<i>Anas crecca</i>	S4/G5			OBBA
Canvasback	<i>Aythya valisineria</i>	S1B,S2N/ G5			LMMMP
Redhead	<i>Aythya americana</i>	S2B, S4N/G5			LMMMP
Ring-necked Duck	<i>Aythya collaris</i>	S5/G5			OBBA
Greater Scaup	<i>Aythya marila</i>	S4/G5			LMMMP
Lesser Scaup	<i>Aythya affinis</i>	S4/G5			LMMMP
Long-tailed Duck	<i>Clangula hyemalis</i>	S3B/G5			LMMMP
Black Scoter	<i>Melanitta nigra</i>	S4B/G5			LMMMP

Potential Wildlife Occurring within the Study Area – Records Review					
Common Name	Scientific Name	S-Rank/ G-Rank	COSSARO	COSEWIC	Source
Surf Scoter	<i>Melanitta perspicillata</i>	S4B,S4N G5			LMMMP
White-winged Scoter	<i>Melanitta fusca</i>	S4B,S4N G5			LMMMP
Bufflehead	<i>Bucephala albeola</i>	S4/G5			LMMMP
Common Goldeneye	<i>Bucephala clangula</i>	S5/G5			LMMMP
Hooded Merganser	<i>Lophodytes cucullatus</i>	S5B,S5N G5			OBBA
Common Merganser	<i>Mergus merganser</i>	S5B,S5N G5			LMMMP
Red-breasted Merganser	<i>Mergus serrator</i>	S4B,S5N G5			LMMMP
Ruddy Duck	<i>Oxyura jamaicensis</i>	S4B,S4N G5			NHIC
Ring-necked Pheasant	<i>Phasianus colchicus</i>	SNA/G5			
Ruffed Grouse	<i>Bonasa umbellus</i>	S5/G5			OBBA
Wild Turkey	<i>Meleagris gallopava</i>	S5/G5			OBBA
Common Loon	<i>Gavia immer</i>	S5B,S5N G5	NAR	NAR	OBBA
Pied-billed Grebe	<i>Podilymbus podiceps</i>	S4B,S4N G5			LMMMP
Horned Grebe	<i>Podiceps auritus</i>	S1B, S2N/G5			LMMMP
Red-necked Grebe	<i>Podiceps grisegena</i>	S3B,S4N G5			NHIC
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	S5B/G5	NAR	NAR	OBBA
American Bittern	<i>Botaurus lentiginosus</i>	S4B/G4			OBBA
Great Blue Heron	<i>Ardea herodias</i>	S5/G5			LMMMP
Great Egret	<i>Ardea alba</i>	S2B/G5			NHIC
Snowy Egret	<i>Egretta thula</i>	S2B,S2N G5			LMMMP
Cattle Egret	<i>Bubulcus ibis</i>	S2B,S2N G5			LMMMP
Green Heron	<i>Butorides virescens</i>	S4B/G5			OBBA
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	S3B,S3N G5			OBBA
Glossy Ibis	<i>Plegadis falcinellus</i>	SNA/G5			LMMMP
Turkey Vulture	<i>Cathartes aura</i>	S5B/G5			OBBA
Osprey	<i>Pandion haliaetus</i>	S5B/G5			OBBA
Bald Eagle	<i>Haliaeetus leucocephalus</i>	S4B,S2N G4	SC	NAR	NHIC
Northern Harrier	<i>Circus cyaneus</i>	S4B/G5	NAR	NAR	OBBA
Sharp-shinned Hawk	<i>Accipiter striatus</i>	S5/G5	NAR	NAR	OBBA
Cooper's Hawk	<i>Accipiter cooperii</i>	S4/G5	NAR	NAR	OBBA
Northern Goshawk	<i>Accipiter gentilis</i>	S4/G5	NAR	NAR	OBBA
Red-shouldered Hawk	<i>Buteo lineatus</i>	S4B/G5		NAR	OBBA
Broad-winged Hawk	<i>Buteo platypterus</i>	S5B/G5			LMMMP
Red-tailed Hawk	<i>Buteo jamaicensis</i>	S5/G5	NAR	NAR	OBBA
Rough-legged Hawk	<i>Buteo lagopus</i>	S1B, S4N/G5	NAR	NAR	LMMMP
American Kestrel	<i>Falco sparverius</i>	S5B/G5			OBBA
Merlin	<i>Falco columbarius</i>	S5B/G5	NAR	NAR	OBBA
Virginia Rail	<i>Rallus limicola</i>	S5B/G5			OBBA
Sora	<i>Porzana carolina</i>	S4B/G5			OBBA
Common Gallinule	<i>Gallinula chloropus</i>	S4B/G5			OBBA
American Coot	<i>Fulica americana</i>	S4B/G5	NAR	NAR	OBBA
Sandhill Crane	<i>Grus canadensis</i>	S5B/G5	NAR	NAR	OBBA
Black-bellied Plover	<i>Pluvialis squatarola</i>	S4N/G5			LMMMP
American Golden-plover	<i>Pluvialis dominica</i>	S2S3B/G			LMMMP

Potential Wildlife Occurring within the Study Area – Records Review					
Common Name	Scientific Name	S-Rank/ G-Rank	COSSARO	COSEWIC	Source
		5			
Semipalmated Plover	<i>Charadrius semipalmatus</i>	S4B,S2V G5			LMMMP
Killdeer	<i>Charadrius vociferus</i>	S5B, S5N/G5			OBBA
Spotted Sandpiper	<i>Actitis macularia</i>	S5/G5			LMMMP
Solitary Sandpiper	<i>Tringa solitaria</i>	S4B/G5			LMMMP
Greater Yellowlegs	<i>Tringa melanoleuca</i>	S4B,S4N G5			LMMMP
Lesser Yellowlegs	<i>Tringa flavipes</i>	S4B,S4N G5			LMMMP
Willet	<i>Catoptrophorus semipalmatus</i>	SNA/G5			LMMMP
Upland Sandpiper	<i>Bartramia longicauda</i>	S4B/G5			OBBA
Whimbrel	<i>Numerius phaeopus</i>	S3S4B,S ZV/G5			LMMMP
Hudsonian Godwit	<i>Limosa haemastica</i>	S2S3B,S ZV/G4			LMMMP
Ruddy Turnstone	<i>Arenaria interpres</i>	SNA/G5			LMMMP
Semipalmated Sandpiper	<i>Calidris pusilla</i>	S3B/G5			LMMMP
Western Sandpiper	<i>Calidris mauri</i>	SNA/G5			LMMMP
Least Sandpiper	<i>Calidris minutilla</i>	S4B,SZ N/G5			LMMMP
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	SZV/G5			LMMMP
Baird's Sandpiper	<i>Calidris bairdii</i>	SZV/G5			LMMMP
Pectoral Sandpiper	<i>Calidris melanotos</i>	SHB,SZ N/G5			LMMMP
Sanderling	<i>Calidris alba</i>	S5N/G5			LMMMP
Dunlin	<i>Calidris alpina</i>	S4B, S5N/G5			LMMMP
Stilt Sandpiper	<i>Calidris himantopus</i>	S4B/G5			LMMMP
Short-billed Dowitcher	<i>Limnodromus griseus</i>	S2S3B,S ZV/G5			LMMMP
Wilson's Snipe	<i>Gallinago delicata</i>	S5B/G5			OBBA
American Woodcock	<i>Scolopax minor</i>	S4B/G5			OBBA
Wilson's Phalarope	<i>Phalaropus tricolor</i>	S3B/G5			OBBA
Red-necked Phalarope	<i>Phalaropus lobatus</i>	S3S4B,S ZV/G4G5			LMMMP
Bonaparte's Gull	<i>Larus philadelphia</i>	S4B,S4N G5			LMMMP
Ring-billed Gull	<i>Larus delawarensis</i>	S5B,S4N G5			LMMMP
Herring Gull	<i>Larus argentatus</i>	S5B,S5N G5			LMMMP
Caspian Tern	<i>Hydroprogne caspia</i>	S3B/G5	NAR	NAR	LMMMP
Black Tern	<i>Chlidonias niger</i>	S3B/G4	SC	NAR	NHIC
Common Tern	<i>Sterna hirundo</i>	S4B/G5	NAR	NAR	LMMMP
Rock Pigeon	<i>Columba livia</i>	SNA/G5			OBBA
Mourning Dove	<i>Zenaidura macroura</i>	S5/G5			OBBA
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	S4B/G5			LMMMP
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	S5B/G5			OBBA
Eastern Screech-Owl	<i>Megascops asio</i>	S5/G5	NAR	NAR	OBBA
Great Horned Owl	<i>Bubo virginianus</i>	S5/G5			OBBA
Snowy Owl	<i>Bubo scandiaca</i>	SNA/G5	NAR	NAR	LMMMP
Long-eared Owl	<i>Asio otus</i>	S4/G5			LMMMP
Short-eared Owl	<i>Asio flammeus</i>	S2N, S4B/G5	SC	SC	NHIC
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	S4/G5			LMMMP
Common Nighthawk	<i>Chordeiles minor</i>	S4B/G5	SC	THR	OBBA

Potential Wildlife Occurring within the Study Area – Records Review					
Common Name	Scientific Name	S-Rank/ G-Rank	COSSARO	COSEWIC	Source
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	S5B/G5			OBBA
Belted Kingfisher	<i>Ceryle alcyon</i>	S4B/G5			OBBA
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	S4B/G5	SC	THR	LMMMP
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	S4/G5			LMMMP
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	S5B/G5			OBBA
Downy Woodpecker	<i>Picoides pubescens</i>	S5/G5			OBBA
Hairy Woodpecker	<i>Picoides villosus</i>	S5/G5			OBBA
Northern Flicker	<i>Colaptes auratus</i>	S4B/G5			OBBA
Pileated Woodpecker	<i>Dryocopus pileatus</i>	S5/G5			OBBA
Olive-sided Flycatcher	<i>Contopus borealis</i>	S4B/G5	SC	THR	LMMMP
Eastern Wood-Pewee	<i>Contopus virens</i>	S4B/G5		SC	OBBA
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	S5B/G5			LMMMP
Alder Flycatcher	<i>Empidonax alnorum</i>	S5B/G5			OBBA
Willow Flycatcher	<i>Empidonax traillii</i>	S5B/G5			OBBA
Least Flycatcher	<i>Empidonax minimus</i>	S4B/G5			OBBA
Eastern Phoebe	<i>Sayornis phoebe</i>	S5B/G5			OBBA
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	S4B/G5			OBBA
Eastern Kingbird	<i>Tyrannus tyrannus</i>	S4B/G5			OBBA
Northern Shrike	<i>Lanius excubitor</i>	SNA/G5			LMMMP
Yellow-throated Vireo	<i>Vireo flavifrons</i>	S4B/G5			LMMMP
Blue-headed Vireo	<i>Vireo solitarius</i>	S5B/G5			OBBA
Warbling Vireo	<i>Vireo gilvus</i>	S5B/G5			OBBA
Philadelphia Vireo	<i>Vireo philadelphicus</i>	S5B/G5			LMMMP
Red-eyed Vireo	<i>Vireo olivaceus</i>	S5B/G5			OBBA
Blue Jay	<i>Cyanocitta cristata</i>	S5/G5			OBBA
American Crow	<i>Corvus brachyrhynchos</i>	S5B/G5			OBBA
Common Raven	<i>Corvus corax</i>	S5/G5			OBBA
Horned Lark	<i>Eremophila alpestris</i>	S5B/G5			OBBA
Purple Martin	<i>Progne subis</i>	S4B/G5			LMMMP
Tree Swallow	<i>Tachycineta bicolor</i>	S4B/G5			OBBA
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	S4B/G5			OBBA
Bank Swallow	<i>Riparia riparia</i>	S4B/G5			OBBA
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	S4B/G5			OBBA
Black-capped Chickadee	<i>Poecile atricapillus</i>	S5/G5			OBBA
Boreal Chickadee	<i>Poecile hudsonica</i>	S5/G5			LMMMP
Red-breasted Nuthatch	<i>Sitta canadensis</i>	S5/G5			OBBA
White-breasted Nuthatch	<i>Sitta carolinensis</i>	S5/G5			OBBA
Brown Creeper	<i>Certhia americana</i>	S5B/G5			OBBA
House Wren	<i>Troglodytes aedon</i>	S5B/G5			OBBA
Winter Wren	<i>Troglodytes hiemalis</i>	S5B/G5			OBBA
Sedge Wren	<i>Cistothorus platensis</i>	S4B/G5	NAR	NAR	OBBA
Marsh Wren	<i>Cistothorus palustris</i>	S4B/G5			OBBA
Golden-crowned Kinglet	<i>Regulus satrapa</i>	S5B/G5			OBBA
Ruby-crowned Kinglet	<i>Regulus calendula</i>	S4B/G5			LMMMP
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	S4B/G5			LMMMP
Eastern Bluebird	<i>Sialia sialis</i>	S5B/G5	NAR	NAR	OBBA
Veery	<i>Catharus fuscescens</i>	S4B/G5			OBBA
Gray-cheeked Thrush	<i>Catharus minimus</i>	S2S4B/G5			LMMMP
Swainson's Thrush	<i>Catharus ustulatus</i>	S4B/G5			LMMMP
Hermit Thrush	<i>Catharus guttatus</i>	S5B/G5			OBBA
Wood Thrush	<i>Hylocichla mustelina</i>	S4B/G5		THR	OBBA
American Robin	<i>Turdus migratorius</i>	S5B/G5			OBBA
Gray Catbird	<i>Dumetella carolinensis</i>	S4B/G5			LMMMP
Northern Mockingbird	<i>Mimus polyglottos</i>	S4/G5			LMMMP
Brown Thrasher	<i>Toxostoma rufum</i>	S4B/G5			OBBA
European Starling	<i>Sturnus vulgaris</i>	SNA/G5			OBBA
American Pipit	<i>Anthus rubescens</i>	S4/G5			LMMMP

Potential Wildlife Occurring within the Study Area – Records Review					
Common Name	Scientific Name	S-Rank/ G-Rank	COSSARO	COSEWIC	Source
Cedar Waxwing	<i>Bombycilla cedrorum</i>	S5B/G5			OBBA
Lapland Longspur	<i>Calcarius lapponicus</i>	S3B/G5			LMMMP
Snow Bunting	<i>Plectrophenax nivalis</i>	SNA/G5			LMMMP
Ovenbird	<i>Seiurus aurocapilla</i>	S4B/G5			OBBA
Louisiana Waterthrush	<i>Parkesia motacilla</i>	S3B/G5	SC	SC	MNR
Northern Waterthrush	<i>Parkesia noveboracensis</i>	S5B/G5			OBBA
Connecticut Warbler	<i>Oporornis agilis</i>	S4B/G5			LMMMP
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	S4B/G4	SC	THR	LMMMP
Blue-winged Warbler	<i>Vermivora cyanoptera</i>	S4B/G5			LMMMP
Black-and-white Warbler	<i>Mniotilta varia</i>	S5B/G5			OBBA
Tennessee Warbler	<i>Oreothlypis peregrina</i>	S5B/G5			LMMMP
Orange-crowned Warbler	<i>Oreothlypis celata</i>	S4B/G5			LMMMP
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	S5B/G5			OBBA
Mourning Warbler	<i>Geothlypis philadelphia</i>	S4B/G5			OBBA
Common Yellowthroat	<i>Geothlypis trichas</i>	S5B/G5			OBBA
Hooded Warbler	<i>Setophaga citrina</i>	S3B/G5	SC	NAR	MNR
American Redstart	<i>Setophaga ruticilla</i>	S5B/G5			OBBA
Cape May Warbler	<i>Setophaga tigrina</i>	S5B/G5			LMMMP
Magnolia Warbler	<i>Setophaga magnolia</i>	S5B/G5			OBBA
Bay-breasted Warbler	<i>Setophaga castanea</i>	S5B/G5			LMMMP
Blackburnian Warbler	<i>Setophaga fusca</i>	S5B/G5			LMMMP
Yellow Warbler	<i>Setophaga petechia</i>	S5B/G5			OBBA
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	S5B/G5			OBBA
Blackpoll Warbler	<i>Setophaga striata</i>	S4B/G5			LMMMP
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>	S5B/G5			LMMMP
Palm Warbler	<i>Setophaga palmarum</i>	S5B/G5			LMMMP
Pine Warbler	<i>Setophaga pinus</i>	S5B/G5			OBBA
Yellow-rumped Warbler	<i>Setophaga coronata</i>	S5B/G5			OBBA
Black-throated Green Warbler	<i>Setophaga virens</i>	S5B/G5			OBBA
Canada Warbler	<i>Cardellina canadensis</i>	S4B/G5	SC	THR	OBBA
Wilson's Warbler	<i>Cardellina pusilla</i>	S4B/G5			LMMMP
Yellow-breasted Chat	<i>Icteria virens</i>	S2B/G5	SC	SC	NHIC
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	S4B/G5			OBBA
American Tree Sparrow	<i>Spizella arborea</i>	S4B/G5			LMMMP
Chipping Sparrow	<i>Spizella passerina</i>	S5B/G5			OBBA
Clay-colored Sparrow	<i>Spizella pallida</i>	S4B/G5			OBBA
Field Sparrow	<i>Spizella pusilla</i>	S4B/G5			OBBA
Vesper Sparrow	<i>Poocetes gramineus</i>	S4B/G5v			OBBA
Savannah Sparrow	<i>Passerculus sandwichensis</i>	S4B/G5			OBBA
Grasshopper Sparrow	<i>Ammodramus saviannarum</i>	S4B/G5			OBBA
Fox Sparrow	<i>Passerella iliaca</i>	S4B/G5			LMMMP
Song Sparrow	<i>Melospiza melodia</i>	S5B/G5			OBBA
Lincoln's Sparrow	<i>Melospiza lincolni</i>	S5B/G5			OBBA
Swamp Sparrow	<i>Melospiza georgiana</i>	S5B/G5			OBBA
White-throated Sparrow	<i>Zonotrichia albicollis</i>	S5B/G5			OBBA
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	S4B/G5			LMMMP
Dark-eyed Junco	<i>Junco hyemalis</i>	S5B/G5			LMMMP
Scarlet Tanager	<i>Piranga olivacea</i>	S4B/G5			OBBA
Northern Cardinal	<i>Cardinalis cardinalis</i>	S5/G5			OBBA
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	S4B/G5			OBBA
Indigo Bunting	<i>Passerina cyanea</i>	S4B/G5			OBBA
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	S5/G5			OBBA
Western Meadowlark	<i>Sturnella neglecta</i>	S3B/G5			LMMMP
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	S2B/G5			LMMMP
Rusty Blackbird	<i>Euphagus carolinus</i>	S4B/G5		SC	LMMMP
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	S4B/G5			LMMMP
Common Grackle	<i>Quiscalus quiscula</i>	S5B/G5			OBBA
Brown-headed Cowbird	<i>Molothrus ater</i>	S4B/G5			OBBA

Potential Wildlife Occurring within the Study Area – Records Review					
Common Name	Scientific Name	S-Rank/ G-Rank	COSSARO	COSEWIC	Source
Orchard Oriole	<i>Icterus spurius</i>	S4B/G5			LMMMP
Baltimore Oriole	<i>Icterus galbula</i>	S4B/G5			OBBA
Pine Grosbeak	<i>Pinicola enucleator</i>	S4B/G5			LMMMP
Purple Finch	<i>Haemorhous purpureus</i>	S4B/G5			OBBA
House Finch	<i>Haemorhous mexicanus</i>	SNA/G5			OBBA
Red Crossbill	<i>Loxia curvirostra</i>	S4B/G5			LMMMP
White-winged Crossbill	<i>Loxia leucoptera</i>	S5B/G5			LMMMP
Common Redpoll	<i>Carduelis flammea</i>	S4B/G5			LMMMP
Pine Siskin	<i>Carduelis pinus</i>	S4B/G5			LMMMP
American Goldfinch	<i>Carduelis tristis</i>	S5B/G5			OBBA
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	S4B/G5			LMMMP
House Sparrow	<i>Passer domesticus</i>	SNA/G5			OBBA
MAMMALS					
Virginia Opossum	<i>Didelphis virginiana</i>	S4/G5			MA
Masked Shrew	<i>Sorex cinereus</i>	S5/G5			LMMMP
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	S5/G5			LMMMP
Hairy-tailed Mole	<i>Parascalops breweri</i>	S4/G5			LMMMP
Star-nosed Mole	<i>Condylura cristata</i>	S5/G5			MA
Little Brown Bat	<i>Myotis lucifugus</i>	S5/G5		END-NS	MA
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	S4/G5			LMMMP
Red Bat	<i>Lasiurus borealis</i>	S4/G5			MA
Big Brown Bat	<i>Eptesicus fuscus</i>	S5/G5			MA
Hairy Bat	<i>Lasiurus cinereus</i>	S4/G5			MA
Eastern Cottontail	<i>Sylvilagus floridanus</i>	S5/G5			MA
Snowshoe Hare	<i>Lepus americanus</i>	S5/G5			MA
European Hare	<i>Lepus europaeus</i>	SNA/G5			MA
Eastern Chipmunk	<i>Tamias striatus</i>	S5/G5			MA
Woodchuck	<i>Marmota monax</i>	S5/G5			MA
Grey Squirrel	<i>Sciurus carolinensis</i>	S5/G5			MA
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	S5/G5			MA
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	S5/G5			LMMMP
Beaver	<i>Castor canadensis</i>	S5/G5			MA
White-footed Mouse	<i>Peromyscus leucopus</i>	S5/G5			LMMMP
Deer Mouse	<i>Peromyscus maniculatus</i>	S5/G5			LMMMP
Muskrat	<i>Ondatra zibethicus</i>	S5/G5			MA
Meadow Vole	<i>Microtus pennsylvanicus</i>	S5/G5			MA
Norway Rat	<i>Rattus norvegicus</i>	SNA/G5			MA
Porcupine	<i>Erethizon dorsatum</i>	S5/G5			MA
Coyote	<i>Canis latrans</i>	S5/G5			MA
Red Fox	<i>Vulpes vulpes</i>	S5/G5			MA
Black Bear	<i>Ursus americanus</i>	S5/G5	NAR	NAR	LMMMP
Raccoon	<i>Procyon lotor</i>	S5/G5			MA
Marten	<i>Martes americana</i>	S5/G5			LMMMP
Fisher	<i>Martes pennanti</i>	S5/G5			MA
Ermine	<i>Mustela erminea</i>	S5/G5			MA
Long-tailed Weasel	<i>Mustela frenata</i>	S4/G5			LMMMP
Mink	<i>Mustela vison</i>	S4/G5			MA
Striped Skunk	<i>Mephitis mephitis</i>	S5/G5			MA
Bobcat	<i>Lynx rufus</i>	S4/G5			LMMMP
White-tailed Deer	<i>Odocoileus virginianus</i>	S5/G5			MA
COSSARO – Committee on the Status of Species at Risk in Ontario					
COSEWIC – Committee on the Status of Endangered Wildlife in Canada					
Acronyms					
HA – Ontario Herpetofaunal Atlas; Oldham and Weller, 2000					
MA – Atlas of the Mammals of Ontario; Dobbyn, 1994					
LMWMP – Luther Marsh Wildlife Management Plan 2010-2019; Grand River Conservation Authority					

Potential Wildlife Occurring within the Study Area – Records Review					
Common Name	Scientific Name	S-Rank/ G-Rank	COSSARO	COSEWIC	Source
<p>NHIC – Natural Heritage Information Centre; NHIC, 2011 OBBA – Ontario Breeding Bird Atlas; Cadman et al., 2007 <u>Statuses</u> S2 – Imperiled S3 – Vulnerable S4 – Apparently secure S#B – Breeding Status S#N – Non-breeding Status ? – Rank uncertain END – Endangered THR - Threatened SC – Special Concern</p>					

Appendix D

Field Forms

Appendix E

Vascular Plant List

Fall Vascular Plant Inventory

Overall	Fall	LATIN NAME	LOCAL STATUS SOURCE LAST UPDATE/ INITIALS	COMMON NAME	COEFFICIENT OF CONSERVATION	WETNESS INDEX	WEEDESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS DUFF	AUTHOR
		PTERIDOPHYTES		FERNS & ALLIES									
		Dennstaedtiaceae		Bracken Fern Family									
x	x	<i>Pteridium</i>	<i>aquilinum var. latiusculum</i>	Eastern Bracken-fern	2	3		S5			G5T	X	(L.) Kuhn
		Dryopteridaceae		Wood Fern Family									
x	x	<i>Athyrium</i>	<i>filix-femina var. angustum</i>	Northern Lady Fern	4	0		S5			G5T5	X	(L.) Roth ex Mart.
x	x	<i>Dryopteris</i>	<i>carthusiana</i>	Sainlose Wood Fern	5	-2		S5			G5	X	(Vill.) H.P. Fuchs
x	x	<i>Dryopteris</i>	<i>cristata</i>	Crested Wood Fern	7	-5		S5			G5	X	(L.) A. Gray
x	x	<i>Dryopteris</i>	<i>marginalis</i>	Marginal Wood Fern	5	3		S5			G5	X	(L.) A. Gray
x	x	<i>Matteuccia</i>	<i>struthiopteris var. pennsylvanica</i>	Ostrich Fern	5	-3		S5			G5	X	(L.) Tod.
x	x	<i>Orioclea</i>	<i>sensibilis</i>	Sensitive Fern	4	-3		S5			G5	X	L.
x	x	<i>Polystichum</i>	<i>acrostichoides</i>	Christmas Fern	5	5		S5			G5	X	(Michx.) Schott
		Equisetaceae		Horsetail Family									
x	x	<i>Equisetum</i>	<i>arvense</i>	Field Horsetail	0	0		S5			G5	X	L.
x	x	<i>Equisetum</i>	<i>fluviatile</i>	Water Horsetail	7	-5		S5			G5	X	L.
x	x	<i>Equisetum</i>	<i>hyemale ssp. affine</i>	Scouring-rush	2	-2		S5			G5T5	X	L.
x	x	<i>Equisetum</i>	<i>scirpoides</i>	Dwarf Scouring-rush	7	-1		S5			G5	X	Michx.
		Pteridaceae		Maidenhair Fern Family									
x	x	<i>Adiantum</i>	<i>pedatum</i>	Northern Maidenhair Fern	7	1		S5			G5	X	L.
		GYMNOSPERMS		CONIFERS									
		Cupressaceae		Cedar Family									
x	x	<i>Thuja</i>	<i>occidentalis</i>	Eastern White Cedar	4	-3		S5			G5	X	L.
		Pinaceae		Pine Family									
x	x	<i>Abies</i>	<i>balsamea</i>	Balsam Fir	5	-3		S5			G5	X	(L.) Miller
x	x	<i>Larix</i>	<i>decidua</i>	European Larch	5	5	-1	SE2			G?	I	Miller
x	x	<i>Larix</i>	<i>laricina</i>	Tamarack	7	-3		S5			G5	X	(Du Roi) K. Koch
x	x	<i>Picea</i>	<i>abies</i>	Norway Spruce	6	5	-1	SE3			G?	I	(L.) Karsten
x	x	<i>Picea</i>	<i>glauca</i>	White Spruce	6	3		S5			G5	X	(Moench) Voss
x	x	<i>Pinus</i>	<i>banksiana</i>	Jack Pine	9	3		S5			G5	X	Lamb.
x	x	<i>Pinus</i>	<i>resinosa</i>	Red Pine	8	3		S5			G5	X	Sol. ex Alton
x	x	<i>Pinus</i>	<i>strobus</i>	Eastern White Pine	4	3		S5			G5	X	L.
x	x	<i>Pinus</i>	<i>sylvestris</i>	Scotch Pine	5	5	-3	SE5			G?	I	L.
		DICOTYLEDONS		DICOTS									
		Amaranthaceae		Amaranth Family									
x	x	<i>Amaranthus</i>	<i>retroflexus</i>	Green Amaranth	2	-1		SE5			G?	I	L.
x	x	<i>Chenopodium</i>	<i>album var. album</i>	Lamb's Quarters	1	-1		SE5			G5T5	I	L.
		Anacardiaceae		Sumac or Cashew Family									
x	x	<i>Toxicodendron</i>	<i>radicans var. radicans</i>	Eastern Poison-ivy	5	-1		S5			G5T		(Linnaeus) Kuntze
		Apiaceae		Carrot or Parsley Family									
x	x	<i>Cicuta</i>	<i>bubifera</i>	Bulb-bearing Water-hemlock	5	-5		S5			G5	X	L.
x	x	<i>Daucus</i>	<i>carota</i>	Wild Carrot		5	-2	SE5			G?	I	L.
		Apocynaceae		Dogbane Family									
x	x	<i>Asclepias</i>	<i>incarnata ssp. incarnata</i>	Swamp Milkweed	6	-5		S5			G5T5	X	L.
x	x	<i>Asclepias</i>	<i>syriaca</i>	Common Milkweed	0	5		S5			G5	X	L.
		Aquifoliaceae		Holly Family									
x	x	<i>Ilex</i>	<i>verticillata</i>	Winterberry	5	-4		S5			G5	X	(L.) A. Gray
		Araliaceae		Ginseng Family									
x	x	<i>Aralia</i>	<i>nudicaulis</i>	Wild Sarsaparilla	4	3		S5			G5	X	L.
		Aristolochiaceae		Duchman's-pipe Family									
x	x	<i>Asarum</i>	<i>canadense</i>	Wild Ginger	6	5		S5			G5	X	L.
		Asteraceae		Composite or Aster Family									
x	x	<i>Achillea</i>	<i>millefolium ssp. millefolium</i>	Common Yarrow		3	-1	SE?			G5T?	I	L.
x	x	<i>Ambrosia</i>	<i>artemisiifolia</i>	Common Ragweed	0	3		S5			G5	X	L.
x	x	<i>Arctium</i>	<i>minus</i>	Common Burdock		5	-2	SE5			G?	I	(Hill) Bernh.
x	x	<i>Bidens</i>	<i>cernua</i>	Nodding Beggar-ticks	2	-5		S5			G5	X	L.
x	x	<i>Bidens</i>	<i>frondosa</i>	Devil's Beggar-ticks	3	-3		S5			G5	X	L.
x	x	<i>Carduus</i>	<i>nutans ssp. nutans</i>	Musk Thistle		5	-1	SE?			G?	I	L.
x	x	<i>Cichorium</i>	<i>intybus</i>	Chicory		5	-1	SE5			G?	I	L.
x	x	<i>Cirsium</i>	<i>arvense</i>	Canada Thistle		3	-1	SE5			G?	I	(L.) Scop.
x	x	<i>Erigeron</i>	<i>annuus</i>	Annual Fleabane	0	1		S5			G5		(L.) Pers.
x	x	<i>Erigeron</i>	<i>strigosus</i>	Daisy Fleabane	0	1		S5			G5	X	Muhlent. ex Willd.
x	x	<i>Eupatorium</i>	<i>perfoliatum</i>	Perfoliate Thoroughwort	2	-4		S5			G5	X	L.
x	x	<i>Eupatorium</i>	<i>maculatum var. maculatum</i>	Spotted Joe-pye-weed	3	-5		S5			G5T5	X	L.
x	x	<i>Euthamia</i>	<i>graminifolia</i>	Flat-topped Bushy Goldenrod	2	-2		S5			G5	X	(L.) Nutt.
x	x	<i>Hieracium</i>	<i>speciosum</i>	Hawkweed species									
x	x	<i>Inula</i>	<i>helenium</i>	Elecampane		5	-2	SE5			G?	I	L.
x	x	<i>Leucanthemum</i>	<i>ulgare</i>	Ox-eye Daisy		5	-1	SE5			G?	I	Lam.
x	x	<i>Rudbeckia</i>	<i>hirta</i>	Black-eyed Susan	0	3		S5			G5	X	L.
x	x	<i>Solidago</i>	<i>altissima ssp. altissima</i>	Tall Goldenrod	1	3		S5			G5	X	L.
x	x	<i>Solidago</i>	<i>canadensis var. canadensis</i>	Canada Goldenrod	1	3		S5			G5	X	L.
x	x	<i>Solidago</i>	<i>flexicaulis</i>	Zig-zag Goldenrod	6	3		S5			G5	X	L.
x	x	<i>Solidago</i>	<i>gigantea</i>	Giant Goldenrod	4	-3		S5			G5	X	Alton
x	x	<i>Solidago</i>	<i>memoralis var. nemoralis</i>	Gray Goldenrod	2	5		S5			G5T?	X	Alton
x	x	<i>Solidago</i>	<i>rugosa ssp. rugosa</i>	Rough Goldenrod	4	-1		S5			G5T?	X	Alton
x	x	<i>Sonchus</i>	<i>arvensis ssp. arvensis</i>	Field Sow-thistle				SE5			G?	I	L.
x	x	<i>Symphoricarum</i>	<i>ericoides var. ericoides</i>	White Heath Aster				S5			G5T5	X	(L.) G.L. Nesom
x	x	<i>Symphoricarum</i>	<i>lanceolatum ssp. lanceolatum</i>	White Panicked Aster	3	-3		S5			G5T5		(Willdenow) G.L. Nesom
x	x	<i>Symphoricarum</i>	<i>lateriflorum var. lateriflorum</i>	Calico Aster	3	-2		S5			G5T5	X	(L.) A. Löve & D. Löve
x	x	<i>Symphoricarum</i>	<i>novae-angliae</i>	New England Aster	2	-3		S5			G5	X	(L.) G.L. Nesom
x	x	<i>Symphoricarum</i>	<i>punicum var. punicum</i>	Purple-stemmed Aster	6	-5		S5			G5	X	(L.) A. Löve & D. Löve
x	x	<i>Tanacetum</i>	<i>ulgare</i>	Common Tansy		5	-1	SE5			G?	I	L.
x	x	<i>Taraxacum</i>	<i>officinale</i>	Common Dandelion		3	-2	SE5			G5	I	G. Weber
x	x	<i>Tragopogon</i>	<i>dubius</i>	Doubtful Goat's-beard		5	-1	SE5			G?	I	Scop.
x	x	<i>Tripleurospermum</i>	<i>perforata</i>	Scantless Chamomile		5	-1	SE?			G?		(Merat) M. Lainz
x	x	<i>Tussilago</i>	<i>farfara</i>	Coltsfoot		3	-2	SE5			G?	I	L.
		Balsaminaceae		Touch-me-not Family									
x	x	<i>Impatiens</i>	<i>capensis</i>	Spotted Touch-me-not	4	-3		S5			G5	X	Meerb.
		Berberidaceae		Barberry Family									
x	x	<i>Caulophyllum</i>	<i>giganteum</i>	Blue Cohosh				S5			G	X	(Farw.) Leconte & Blackwell

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				Birch Family									
x	x	<i>Alnus</i>	<i>incana</i> ssp. <i>rugosa</i>	Speckled Alder	6	-5		S5			G5T5	X	(L.) Moench
x	x	<i>Betula</i>	<i>alleghaniensis</i>	Yellow Birch	6	0		S5			G5	X	Britton
x	x	<i>Betula</i>	<i>papyrifera</i>	White Birch		2		S5			G5	X	Marshall
x	x	<i>Carpinus</i>	<i>caroliniana</i> ssp. <i>virginiana</i>	Blue Beech	6	0		S5			G5T	X	Walter
x	x	<i>Ostrya</i>	<i>virginiana</i>	Hop Hornbeam	4	4		S5			G5	X	(Miller) K. Koch
				Mustard Family									
x	x	<i>Alliaria</i>	<i>petiolata</i>	Garlic Mustard		0	-3	SE5			G5	I	(M. Bieb.) Cavara & Grande
x	x	<i>Hesperis</i>	<i>matronalis</i>	Dame's Rocket		5	-3	SE5			G4G5	I	L.
				Honeysuckle Family									
x	x	<i>Lonicera</i>	<i>tatarica</i>	Tartarian Honeysuckle		3	-3	SE5			G?	I	L.
x	x	<i>Sambucus</i>	<i>canadensis</i>	Common Elderberry	5	-2		S5			G5	X	L.
x	x	<i>Sambucus</i>	<i>racemosa</i> ssp. <i>pubens</i>	Red-berried Elderberry	5	2		S5			G5T4T5	X	L.
x	x	<i>Viburnum</i>	<i>lentago</i>	Nannyberry	4	-1		S5			G5	X	L.
x	x	<i>Viburnum</i>	<i>trilobum</i>	High Bush Cranberry	5	-3		S5			G5T5	X	Marshall
				Pink Family									
x	x	<i>Silene</i>	<i>nocchiflora</i>	Night-flowering Catchfly		5	-1	SE5			G?		L.
				Hornwort Family									
x	x	<i>Ceratophyllum</i>	<i>demersum</i>	Common Coontail	4	-5		S5			G5	X	L.
				Dogwood Family									
x	x	<i>Cornus</i>	<i>alternifolia</i>	Alternate-leaved Dogwood	6	5		S5			G5	X	L. f.
x	x	<i>Cornus</i>	<i>stolonifera</i>	Red-osier Dogwood	2	-3		S5			G5	X	Michx.
				Gourd Family									
x	x	<i>Echinocystis</i>	<i>lobata</i>	Prickly Cucumber	3	-2		S5			G5	X	(Michx.) Torr. & A. Gray
				Heath Family									
x	x	<i>Ledum</i>	<i>groenlandicum</i>	Labrador-tea	9	-5		S5			G5	X	Oeder
				Pea Family									
x	x	<i>Lotus</i>	<i>corniculatus</i>	Bird's-foot Trefoil		1	-2	SE5			G?	I	L.
x	x	<i>Medicago</i>	<i>lupulina</i>	Black Medick		1	-1	SE5			G?	I	L.
x	x	<i>Melilotus</i>	<i>alba</i>	White Sweet-clover		3	-3	SE5			G?	I	Medik.
x	x	<i>Trifolium</i>	<i>hybridum</i> ssp. <i>elegans</i>	Alsike Clover		1	-1	SE5			G?	I	L.
x	x	<i>Trifolium</i>	<i>pratense</i>	Red Clover		2	-2	SE5			G?	I	L.
x	x	<i>Trifolium</i>	<i>repens</i>	White Clover		2	-1	SE5			G?	I	L.
x	x	<i>Vicia</i>	<i>cracca</i>	Tufted Vetch		5	-1	SE5			G?	I	L.
				Beech Family									
x	x	<i>Fagus</i>	<i>grandifolia</i>	American Beech	6	3		S5			G5	X	Ehrh.
				Geranium Family									
x	x	<i>Geranium</i>	<i>robertianum</i>	Herb-robert		5	-2	SE5			G5	I	L.
				Currant Family									
x	x	<i>Ribes</i>	<i>speciosum</i>	Gooseberry species									
x	x	<i>Ribes</i>	<i>americanum</i>	Wild Black Currant	4	-3		S5			G5	X	Miller
x	x	<i>Ribes</i>	<i>cynosbati</i>	Prickly Gooseberry	4	5		S5			G5	X	L.
x	x	<i>Ribes</i>	<i>triste</i>	Wild Red Currant	6	-5		S5			G5	X	Pall.
				St. John's-wort Family									
x	x	<i>Hypericum</i>	<i>perforatum</i>	Common St. John's-wort		5	-3	SE5			G?	I	L.
				Water-milfoil Family									
x	x	<i>Myriophyllum</i>	<i>spicatum</i>	Water-milfoil species									
				Water-leaf Family									
x	x	<i>Hydrophyllum</i>	<i>virginianum</i>	Virginia Water-leaf	6	-2		S5			G5	X	L.
				Walnut Family									
x	x	<i>Juglans</i>	<i> nigra</i>	Black Walnut	5	3		S4			G5	X	L.
				Mint Family									
x	x	<i>Clinopodium</i>	<i> vulgare</i>	Wild Basil	4	5		S5			G?	X	L.
x	x	<i>Lycopus</i>	<i> americanus</i>	Cut-leaved Water-horehound	4	-5		S5			G5	X	Muhlentb. ex Bartram
x	x	<i>Lycopus</i>	<i> uniflorus</i>	Northern Water-horehound	5	-5		S5			G5	X	Michx.
x	x	<i>Mentha</i>	<i> arvensis</i> ssp. <i>borealis</i>	American Wild Mint	3	-3		S5			G?	X	L.
x	x	<i>Prunella</i>	<i> vulgans</i> ssp. <i>vulgans</i>	Common Heal-all		0	-1	SE3			G5T?	I	L.
				Loosestrife Family									
x	x	<i>Lythrum</i>	<i> salicaria</i>	Purple Loosestrife		-5	-3	SE5			G5	X	L.
				Olive Family									
x	x	<i>Fraxinus</i>	<i> americana</i>	White Ash	4	3		S5			G5	X	L.
x	x	<i>Fraxinus</i>	<i> nigra</i>	Black Ash	7	-4		S5			G5	X	Marshall
x	x	<i>Fraxinus</i>	<i> pennsylvanica</i>	Red Ash	3	-3		S5			G5	X	Marshall
				Evening-primrose Family									
x	x	<i>Circaea</i>	<i> lutelana</i> ssp. <i>canadensis</i>	Yellowish Enchanter's Nightshade	3	3		S5			G5T5	X	L.
x	x	<i>Epiobium</i>	<i> species</i>	Willow-herb species		3	3	S5			G5T?	X	Raf.
x	x	<i>Epiobium</i>	<i> ciliatum</i> ssp. <i>ciliatum</i>	Ciliate Willow-herb	3	3		S5			G5	X	Raf.
x	x	<i>Epiobium</i>	<i> leptophyllum</i>	Narrow-leaved Willow-herb	7	-5		S5			G5	X	Raf.
x	x	<i>Epiobium</i>	<i> parviflorum</i>	Sparse-flowered Willow-herb		3	-1	SE4			G?	I	Schreb.
x	x	<i>Oenothera</i>	<i> biennis</i>	Common Evening-primrose	0	3		S5			G5	X	L.
				Poppy Family									
x	x	<i>Sanguinaria</i>	<i> canadensis</i>	Bloodroot	5	4		S5			G5	X	L.
				Plantain Family									
x	x	<i>Plantago</i>	<i> lanceolata</i>	Ribgrass		0	-1	SE5			G5	I	L.
x	x	<i>Plantago</i>	<i> major</i>	Common Plantain		-1	-1	SE5			G5	I	L.
				Smartweed Family									
x	x	<i>Polygonum</i>	<i> species</i>	Knotweed species									
x	x	<i>Rumex</i>	<i> crispus</i>	Curly-leaf Dock		-1	-2	SE5			G?	I	L.
				Primrose Family									
x	x	<i>Lysimachia</i>	<i> thysiflora</i>	Tufted Loosestrife	7	-5		S5			G5	X	L.

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x				Wintergreen Family									
x	x	<i>Pyrola</i>	species	Pyrola species									
x				Buttercup Family									
x		<i>Actaea</i>	<i>pachypoda</i>	White Baneberry	6	5		S5			G5	X	Elliott
x		<i>Actaea</i>	<i>rubra</i>	Red Baneberry	5	5		S5			G5	X	(Aiton) Willd.
x	x	<i>Anemone</i>	<i>canadensis</i>	Canada Anemone	3	-3		S5			G5	X	L.
x	x	<i>Clematis</i>	<i>virginiana</i>	Virgin's-bower	3	0		S5			G5	X	L.
x	x	<i>Ranunculus</i>	<i>acris</i>	Tall Buttercup			-2	SE5			G5	I	L.
x				Buckthorn Family									
x	x	<i>Rhamnus</i>	<i>cathartica</i>	Common Buckthorn		3	-3	SE5			G?	I	L.
x				Rose Family									
x	x	<i>Agrimonia</i>	<i>gryposepala</i>	Tall Hairy Agrimony	2	2		S5			G5	X	Wallr.
x	x	<i>Amelanchier</i>	species	Juneberry species									
x	x	<i>Crataegus</i>	species	Hawthorn species									
x	x	<i>Fragaria</i>	<i>vesca</i> ssp. <i>americana</i>	Woodland Strawberry	4	4		S5			G5?	X	L.
x	x	<i>Fragaria</i>	<i>virginiana</i> ssp. <i>virginiana</i>	Scarlet Strawberry	2	1		SU			G5?	X	Miller
x	x	<i>Geum</i>	<i>alepicum</i>	Yellow Avens	2	-1		S5			G5	X	Jacq.
x	x	<i>Geum</i>	<i>canadense</i>	White Avens	3	0		S5			G5	X	Jacq.
x	x	<i>Malus</i>	species	Crabapple species									
x	x	<i>Malus</i>	<i>pumila</i>	Common Crabapple		5	-1	SE5			G5	I	Miller
x	x	<i>Potentilla</i>	<i>anserina</i> ssp. <i>anserina</i>	Silverweed	5	-4		S5				X	L.
x	x	<i>Prunus</i>	<i>pensylvanica</i>	Pin Cherry	3	4		S5			G5	X	L. f.
x	x	<i>Prunus</i>	<i>serotina</i>	Black Cherry	3	3		S5			G5	X	Ehrh.
x	x	<i>Prunus</i>	<i>virginiana</i> ssp. <i>virginiana</i>	Choke Cherry	2	1		S5			G5?	X	L.
x	x	<i>Rubus</i>	<i>idaeus</i> ssp. <i>idaeus</i>	Red Raspberry				SE1			G5?	I	L.
x	x	<i>Rubus</i>	<i>idaeus</i> ssp. <i>strigosus</i>	Wild Red Raspberry	0	-2		S5			G5?	X	(Michaux) Focke
x	x	<i>Rubus</i>	<i>pubescens</i>	Dwarf Raspberry	4	-4		S5			G5	X	Raf
x	x	<i>Spiraea</i>	<i>alba</i>	Narrow-leaved Meadow-sweet	3	-4		S5			G5	X	Du Roi
x				Madder Family									
x	x	<i>Galium</i>	<i>mollugo</i>	White Bedstraw		5	-2	SE5			G?	I	L.
x				Willow Family									
x	x	<i>Populus</i>	<i>alba</i>	Silver Poplar		5	-3	SE5			G5		L.
x	x	<i>Populus</i>	<i>balsamifera</i> ssp. <i>balsamifera</i>	Balsam Poplar	4	-3		S5			G5?	X	L.
x	x	<i>Populus</i>	<i>deltoides</i> ssp. <i>deltoides</i>	Eastern Cottonwood	4	-1		SU			G5?	X	Bartram ex Marshall
x	x	<i>Populus</i>	<i>grandidentata</i>	Large-tooth Aspen	5	3		S5			G5	X	Michx.
x	x	<i>Populus</i>	<i>tremuloides</i>	Trembling Aspen		0		S5			G5	X	Michx.
x	x	<i>Populus</i>	<i>canadensis</i>	Carolina Poplar				SE1			HYB	I	Moench
x	x	<i>Salix</i>	<i>bebbiana</i>	Long-beaked Willow	4	-4		S5			G5	X	Sarg.
x	x	<i>Salix</i>	<i>ericophala</i>	Missouri Willow	4	-3		S5			G5	X	Michx.
x	x	<i>Salix</i>	<i>ouxina</i>	Crack Willow				SE			G?		I.V. Belyaeva
x	x	<i>Salix</i>	<i>lucida</i>	Shining Willow	5	-4		S5			G5	X	Muhlent.
x	x	<i>Salix</i>	<i>petiolaris</i>	Slender Willow	3	-4		S5			G4	X	Sm.
x	x	<i>Salix</i>	<i>fragilis</i>	Hybrid Crack Willow		-1	-3	SE5			G?		L.
x				Maple Family									
x	x	<i>Acer</i>	<i>negundo</i>	Manitoba Maple	0	-2		S5			G5	X	L.
x	x	<i>Acer</i>	<i>platanoides</i>	Norway Maple		5	-3	SE5			G?	I	L.
x	x	<i>Acer</i>	<i>rubrum</i>	Red Maple	4	0		S5			G5	X	L.
x	x	<i>Acer</i>	<i>saccharum</i>	Sugar Maple	4	3		S5			G5?	X	Marshall
x				Saxifrage Family									
x	x	<i>Mitella</i>	<i>nuda</i>	Naked Mitrewort	6	-3		S5			G5		L.
x	x	<i>Tiarella</i>	<i>cordifolia</i>	False Mitrewort	6	1		S5			G5	X	L.
x				Figwort Family									
x	x	<i>Mimulus</i>	<i>ringens</i>	Square-stemmed Monkey-flower	6	-5		S5			G5	X	L.
x	x	<i>Veronica</i>	<i>americana</i>	American Speedwell	6	-5		S5			G5	X	(Raf.) Schwein. ex Benth.
x	x	<i>Veronica</i>	<i>anagallis-aquatica</i>	Water Speedwell		-5	-1	SE5			G5	I	L.
x	x	<i>Veronica</i>	<i>officinalis</i>	Common Speedwell		5	-2	SE5			G5	I	L.
x				Nightshade Family									
x	x	<i>Solanum</i>	<i>dulcamara</i>	Bitter Nightshade		0	-2	SE5			G?	I	L.
x				Linden Family									
x	x	<i>Tilia</i>	<i>americana</i>	American Basswood	4	3		S5			G5	X	L.
x				Elm Family									
x	x	<i>Ulmus</i>	<i>americana</i>	White Elm	3	-2		S5			G5?	X	L.
x				Nettle Family									
x	x	<i>Urtica</i>	<i>dioica</i> ssp. <i>dioica</i>	European Stinging Nettle		-1	-1	SE2			G5?		L.
x				Violet Family									
x	x	<i>Viola</i>	species	Violet species									
x				Grape Family									
x	x	<i>Vitis</i>	<i>riparia</i>	Riverbank Grape	0	-2		S5			G5	X	Michx.
x				MONOCOTYLEDONS									
x				Water-plantain Family									
x	x	<i>Alisma</i>	<i>plantago-aquatica</i>	Common Water-plantain	3	-5		S5			G5	X	L.
x				Arum Family									
x	x	<i>Arisaema</i>	<i>triphylum</i> ssp. <i>triphylum</i>	Small Jack-in-the-pulpit	5	-2		S5			G5?	X	(L.) Schott
x				Sedge Family									
x	x	<i>Carex</i>	<i>flava</i>	Yellow Sedge	5	-5		S5			G5	X	L.
x	x	<i>Carex</i>	<i>lacustris</i>	Lake-bank Sedge	5	-5		S5			G5	X	Willd.
x	x	<i>Carex</i>	<i>lupulina</i>	Hop Sedge	6	-5		S5			G5	X	Muhlent. ex Willd.
x	x	<i>Carex</i>	<i>pedunculata</i>	Long-stalked Sedge	5	5		S5			G5	X	Muhlent. ex Willd.
x	x	<i>Carex</i>	<i>pseudocyperus</i>	Cyperus-like Sedge	6	-5		S5			G5	X	L.
x	x	<i>Carex</i>	<i>retrofracta</i>	Retrorse Sedge	5	-5		S5			G5	X	Schwein.
x	x	<i>Carex</i>	<i>c.f. sterilis</i>	Sterile Sedge	10	-5		S4			G4		Willd.
x	x	<i>Carex</i>	<i>viridula</i> ssp. <i>viridula</i>	Greenish Sedge	5	-5		S5			G5		Michx.
x	x	<i>Carex</i>	<i>vulpinoidea</i>	Fox Sedge	3	-5		S5			G5	X	Michx.
x	x	<i>Dulichium</i>	<i>arundinaceum</i> var. <i>arundinaceum</i>	Reed-like Three-way Sedge	7	-5		S5			G5		(L.) Britton
x	x	<i>Eleocharis</i>	species	Spike-rush species									
x	x	<i>Schoenoplectus</i>	<i>tabernaemontani</i>	Soft-stemmed Bulrush	5	-5		S5			G5	X	(K.C. Gmel.) Palla

Fall Vascular Plant Inventory

Overall	Fall	LATIN NAME	LOCAL STATUS SOURCE LAST UPDATE/ INITIALS	COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDNESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS DUFF	AUTHOR
x	x	<i>Scirpus</i>	<i>atrovirens</i>	Dark-green Bulrush	3	-5		S5			G5?	X	Wild.
x	x	<i>Scirpus</i>	<i>cyperinus</i>	Wool-grass	4	-5		S5			G5	X	(L.) Kurth
x		<i>Scirpus</i>	<i>microcarpus</i>	Small-fruited Bulrush	4	-5		S5			G5	X	C. Presl
x		Iridaceae		Iris Family									
x	x	<i>Iris</i>	<i>species</i>	Iris species									
x	x	<i>Seyrinchium</i>	<i>montanum</i>	Montane Blue-eyed-grass		-1		S5			G5	X	Greene
x		Juncaceae		Rush Family									
x	x	<i>Juncus</i>	<i>effusus</i> ssp. <i>solutus</i>	Soft Rush	4	-5		S5			G5?	X	L.
x	x	<i>Juncus</i>	<i>tenus</i>	Path Rush	0	0		S5			G5	X	Wild.
x		Lemnaceae		Duckweed Family									
x	x	<i>Lemna</i>	<i>minor</i>	Lesser Duckweed	2	-5		S5			G5	X	L.
x		Liliaceae		Lily Family									
x	x	<i>Allium</i>	<i>triccocum</i>	Wild Leek	7	2		S5			G5	X	Alton
x	x	<i>Maianthemum</i>	<i>racemosum</i> ssp. <i>racemosum</i>	False Solomon's Seal	4	3		S5			G5T	X	(L.) Link
x	x	<i>Streptopus</i>	<i>roseus</i>	Rose Twisted-stalk	7	0		S5			G5	X	Michx.
x		Orchidaceae		Orchid Family									
x	x	<i>Epipactis</i>	<i>helleborine</i>	Common Helleborine		5	-2	SE5			G?	I	(L.) Crantz
x		Poaceae		Grass Family									
x	x	<i>Agrostis</i>	<i>stolonifera</i>	Redtop		-3		S5			G5	X	L.
x	x	<i>Bromus</i>	<i>inermis</i> ssp. <i>inermis</i>	Awless Brome		5	-3	SE5			G4G5?	I	Leys.
x	x	<i>Bromus</i>	<i>pubescens</i>	Hairy Brome	7	3		S4			G5		Muhl. ex Willd.
x	x	<i>Calamagrostis</i>	<i>canadensis</i> var. <i>canadensis</i>	Blue-joint Grass	4	-5						X	(Michx.) P. Beauv.
x	x	<i>Dactylis</i>	<i>glomerata</i>	Orchard Grass		3	-1	SE5			G?	I	L.
x	x	<i>Elymus</i>	<i>repens</i>	Quack Grass		3	-3	SE5			GNR	I	(L.) Gould
x	x	<i>Glyceria</i>	<i>striata</i>	Fowl Meadow Grass	3	-5		S4S5			G5T5	X	(Lam.) A. Hitchc.
x	x	<i>Leersia</i>	<i>oryzoides</i>	Rice Cut Grass	3	-5		S5			G5	X	(L.) Sw.
x	x	<i>Panicum</i>	<i>capillare</i> ssp. <i>capillare</i>	Witch Grass	0	0		S5			G5	X	L.
x	x	<i>Phalaris</i>	<i>arundinacea</i>	Reed Canary Grass	0	-4		S5			G5	X	L.
x	x	<i>Phleum</i>	<i>pratense</i> ssp. <i>pratense</i>	Timothy		3	-1	SE5			G?	I	L.
x	x	<i>Poa</i>	<i>compressa</i>	Canada Blue Grass		2		SE			GNR	I	L.
x	x	<i>Poa</i>	<i>palustris</i>	Fowl Meadow Grass	5	-4		S5			G5	X	L.
x	x	<i>Poa</i>	<i>pratensis</i> ssp. <i>pratensis</i>	Kentucky Bluegrass	0	1		S5			G5T5	X	L.
x	x	<i>Schedonorus</i>	<i>arundinaceus</i>	Tall Fescue		2	-1	SE5			G?		(Schreber) Dumortier
x	x	<i>Setaria</i>	<i>viridis</i> var. <i>viridis</i>	Green Foxtail			-1	SE5			G?	I	(L.) P. Beauv.
x		Potamogetonaceae		Pondweed Family									
x	x	<i>Potamogeton</i>	<i>natans</i>	Common Floating Pondweed	5	-5		S5			G5	X	L.
x		Typhaceae		Cattail Family									
x	x	<i>Typha</i>	<i>angustifolia</i>	Narrow-leaved Cattail	3	-5		S5			G5	X	L.
x	x	<i>Typha</i>	<i>latifolia</i>	Broad-leaved Cattail	3	-5		S5			G5	X	L.
x	x	<i>Typha</i>	<i>glauca</i>	Glaucous Cattail	3	-5		S5			HYB		Godron
FLORISTIC SUMMARY & ASSESSMENT													
Species Diversity													
Total Species: 211													
Native Species: 151 72%													
Exotic Species: 60 28%													
Regionally Significant Species													
Locally Significant Species													
S1-S3 Species: 0 0%													
S4 Species: 4 3%													
S5 Species: 145 97%													
Co-efficient of Conservatism and Floristic Quality Index													
Co-efficient of Conservatism (CC) (average)													
CC 0 to 3 lowest sensitivity: 54 37%													
CC 4 to 6 moderate sensitivity: 76 52%													
CC 7 to 8 high sensitivity: 13 9%													
CC 9 to 10 highest sensitivity: 3 2%													
Floristic Quality Index (FQI): 49													
Presence of Weedy & Invasive Species													
mean weediness: -1.7													
weediness = -1 low potential invasiveness: 28 51%													
weediness = -2 moderate potential invasiveness: 14 25%													
weediness = -3 high potential invasiveness: 13 24%													
Presence of Wetland Species													
average wetness value: -4.1													
upland: 34 17%													
facultative upland: 48 24%													
facultative: 37 18%													
facultative wetland: 43 21%													
obligate wetland: 42 21%													

Appendix F

Curricula Vitae

Sean Spisani B.Sc., ERGC

Senior Ecologist



Sean Spisani is a Senior Terrestrial Ecologist with expertise in the fields of plant community ecology, wetland science and ecological restoration. He has practiced in southern Ontario for over ten years, assuming project management roles on various projects, including environmental impact studies, environment assessments, habitat mapping, ecological management plans, and research oriented projects. Sean's client base includes municipal, provincial and federal governments, as well as private industry and land developers. He has acquired experience with a number of government and non-government organizations, including positions with Credit Valley Conservation, Rouge Park, Royal Botanical Gardens, and the Canadian International Development Agency.

Sean maintains memberships with scientific organizations, including Halton Region Ecological and Environmental Advisory Committee (2011), Society for Ecological Restoration (2001-2010), and Field Botanists of Ontario (2003-2010). He is trained in ELC protocols for Southern Ontario and certified under OWES. In 2008, Sean co-instructed his first ELC training course on behalf of the MNR. In 2006, he served as an expert witness at the Ontario Municipal Board for natural heritage matters regarding a site plan application.

Sean is a graduate of Wilfrid Laurier University with a Bachelor of Science in Biology and Physical Geography, and Niagara College with a Post-Graduate Certificate in Ecosystem Restoration. These provide a foundation to assess key biophysical components of ecological planning and management, including surficial geology, landform, hydrology, soil texture, soil moisture, vegetation cover and flora composition.

EDUCATION

B.Sc., Wilfrid Laurier University / Biology and Physical Geography, Waterloo, Ontario, 2001

ERGC, Niagara College / Ecosystem Restoration, Niagara-on-the-Lake, Ontario, 2002

Certificate, Canadian Environmental Assessment Agency / Screenings Under the Environmental Assessment Act, Ottawa, Ontario, 2011

Certificate, Canadian Environmental Assessment Agency / Orientation to the Canadian Environmental Assessment Act, Ottawa, Ontario, 2011

Certificate, Link to Life / First Aid and CPR, Markham, Ontario, 2010

Certificate, Trent University / Temperate Wetland Restoration Training Course, Peterborough, Ontario, 2007

Certificate, Ontario Ministry of Natural Resources / Ontario Wetland Evaluation System (OWES), North Bay, Ontario, 2005

Certificate, Ontario Ministry of Natural Resources / Ecological Land Classification (ELC) for Southern Ontario, Peterborough, Ontario, 2004

MEMBERSHIPS

Member, Society for Ecological Restoration, Ontario Chapter

Member, Halton Region Ecological and Environmental Advisory Committee

Member, Field Botanists of Ontario

* denotes projects completed with other firms

PROJECT EXPERIENCE

Assessments, Permitting, and Compliance

York Region, 9th Line and 16th Avenue Trunk Sewer Construction Monthly Monitoring for Water Taking*, Markham, Ontario (Terrestrial Ecologist)

Terrestrial ecologist responsible for monitoring wetland health along dewatering influence zones during construction phase of two separate sewer lines (9th Line and 16th Avenue).

Peel Region, Credit Valley Sanitary Trunk Sewer Extension Monitoring for Water Taking*, Mississauga, Ontario (Terrestrial Ecologist)

Terrestrial ecologist responsible for monitoring vegetation community health during dewatering activities associated with test pumping activities and sewer construction.

York Region, Rainbow Creek Ecological Needs Assessment for PTTW*, Ontario (Ecology Lead)

Ecology lead for wetland monitoring components of PTTW in support of sewer construction.

Halton Region, Impacts to Hospital Tributary Study, Ecological Needs Assessment for Water Taking*, Georgetown, Ontario (Ecologist)

Ecologist responsible for wetland needs assessment to inform municipal water-taking requirements in proximate well fields. Groundwater sensitive features include organic soils and calciphile flora.

Walker Brothers Quarries, Ecological Needs Assessment for PTTW*, Niagara Region, Ontario (Ecologist)

Ecologist responsible for wetland monitoring program, including eleven permanent and temporary ponds and springs. Several groundwater sensitive features were identified in the analysis area, including productive amphibian habitat and calciphile flora species.

York and Durham Regions, Southeast Collector EMP, Ecological Needs Assessment for Water Taking*, Markham and Pickering, Ontario (Lead Ecologist)

Lead ecologist responsible for wetland monitoring program to address water-taking construction requirements. The program included over 40 wetlands in York and Durham regions. Multidisciplinary approach incorporated input from the fields of wetland hydrology, soil science, and ecology.

Ecological Monitoring

Royal Botanical Gardens, Species at Risk and Sensitive Habitat Monitoring*, Hamilton, Ontario (Field Botanist)

*Field botanist responsible for implementation of field monitoring for populations of the nationally endangered *Scirpus verecundus* and *Morus rubra*. Implemented prairie ecosystem management plans.*

Rouge Park, ESA Inventory and Species at Risk Assessment*, Aurora, Ontario (Ecologist)

*Completed forest inventory of the Little Rouge environmentally significant area and population assessments of the nationally endangered *Scirpus verecundus*.*

Rouge Park, Forest Succession Monitoring*, Aurora, Ontario (Ecologist)

Ecologist responsible for design and implementation of terrestrial restoration monitoring protocol to track watershed-wide restoration initiatives and forest inventories.

Credit Valley Conservation, Terrestrial Monitoring Program, Credit River Watershed*, Ontario (Lead Ecologist)

Lead ecologist for collection of data according to ecological monitoring assessment network (EMAN) protocol for the watershed-wide monitoring program.

Peel Region, Credit Valley Sanitary Trunk Sewer Extension Monitoring*, Mississauga, Ontario (Terrestrial Ecologist)

Terrestrial ecologist responsible for monitoring vegetation community health during dewatering activities associated with test pumping activities and sewer construction.

Municipality of Clarington, Robinson and Tooley Watershed Management Plans*, Clarington, Ontario (Ecologist)

Ecologist responsible for inventory of watershed scale vegetation inventory and ELC mapping.

Niagara Region, Glenridge Naturalization Site Forest Sensitivity Study*, Ontario (Ecologist)

Monitored the effect of increased salt concentration on vegetation health associated with the former Glenridge Quarry.

* denotes projects completed with other firms

Peel Region, Assessment of Woody Vegetation on Various Landfill Sites*, Ontario (Project Manager)

Project manager responsible for five-year monitoring program to assess woody vegetation response to methane leachate on seven landfills throughout the region.

Environment Canada, Big Creek National Wildlife Area Detailed Habitat Mapping*, Port Rowan, Ontario (Project Manager)

Project manager responsible for habitat mapping of the Big Creek Marsh to inform species at risk habitat mapping initiatives.

Awenda Provincial Park Life Science Inventory*, Penetanguishene, Ontario (Ecologist)

Co-author of the Life Science Inventory for the park on behalf of the Ontario Ministry of Natural Resources. Research included over 30 days of field inventory.

Slokker Wetland Monitoring Program*, Nobleton, Ontario (Terrestrial Ecologist)

Terrestrial ecologist responsible for the design, implementation, and reporting of a program to track wetland function within a developing landscape.

Ecosystem, Conservation and Reclamation Planning and Design

City of Hamilton Professional and Consultant Services Roster 2011-2012 (C12-06-10); Eastern Flowering Dogwood (*Cornus florida*) Survey, Hamilton, Ontario (Senior Ecologist)

Conducted a flora inventory for Eastern Flowering Dogwood along the proposed East Mountain Trail Loop on an 8 ha property, to address requirements of the City of Hamilton and Hamilton Conservation Authority.

Niagara Parks Commission, Paradise Grove Restoration*, Niagara-on-the-Lake, Ontario (Ecologist)

Ecologist responsible for development of strategies to restore a 20-hectare degraded woodlot to Black Oak Savannah.

Fundacion Pro-Bosque, Habitat Rehabilitation*, Guayaquil, Ecuador (Ecologist)

Ecologist responsible for implementation of habitat rehabilitation strategies for the endangered Great Green Macaw, including the collection and interpretation of baseline data, and the development of habitat rehabilitation.

Royal Botanical Gardens Sensitive Habitat Restoration*, Hamilton, Ontario (Ecologist)

Ecologist responsible for implementation and reporting on tallgrass restoration, including the planning and communication of a prescribed burn on a 3-hectare remnant of Oak Savannah.

Yukon Construction Property Assessment*, King City, Ontario (Terrestrial Ecologist)

Terrestrial lead for monitoring of wetland and terrestrial vegetation communities pre-, during-, and post- construction of a new regional pumping station, including the development of a post-construction restoration plan.

Pretty River Academy Environmental Impact Study*, Collingwood, Ontario (Project Coordinator)

Project coordinator for the competition of an impact study to address the proposed construction of a private school complex near the Silver Creek Wetland Complex provincially significant wetland, including the design and implementation of wetland restoration plan.

Deacon Property Environmental Impact Study*, Markham, Ontario (Terrestrial Ecologist)

Terrestrial ecologist responsible for the production of a scoped impact study for a proposed plan of subdivision and Valley Corridor restoration plan to restore manicured portions of the Bruce Creek floodplain and valley slope to a naturalized condition and improve the ecological functions of the valley corridor.

Holy Cross Cemetery Restoration Plan*, Markham, Ontario (Ecologist)

Developed a plan to restore banks of a tributary of the Don River eroded during a large storm event in August 2005.

Kolter Property Environmental Management Plan*, Toronto, Ontario (Project Manager)

Project manager responsible for production of environmental management plan/ravine stewardship plan in support of a redevelopment plan on Bayview Avenue.

* denotes projects completed with other firms

Sean Spisani B.Sc., ERGC

Senior Ecologist

City of Brampton, Citywide Lake Assessment*, Brampton, Ontario (Ecologist)

Ecologist responsible for terrestrial input into a citywide lake atlas and the production of a management recommendations report to document lake-specific restoration plans to improve the features and functions littoral and riparian vegetation communities.

City of Hamilton, Windermere Basin Wetland Enhancement Environmental Assessment*, Hamilton, Ontario (Ecologist)

Responsible for ecological input into wetland design, including documentation of existing conditions, planting plans, water-level operating guidelines, and stakeholder correspondence.

York Region, 16th Avenue Trunk Sewer Environmental Enhancement Initiative*, Markham, Ontario (Ecologist)

Ecologist responsible for contract administration of over 20 ecological restoration projects in York Region.

York and Durham Regions, Southeast Collector Environmental Enhancements Initiative*, Markham and Pickering, Ontario (Ecologist)

Ecologist responsible for the evaluation and design of more than 50 ecological enhancement projects, including the coordination of a government and non-government of stakeholders.

Municipality of Clarington, Robinson and Tooley Natural Heritage System*, Clarington, Ontario (Ecologist)

Ecologist responsible for landscape analysis and modeling to identify a targeted natural heritage system, within the context of future land use objectives.

Environmental Assessments

City of Toronto, Dragonboat Feasibility Study*, Toronto, Ontario (Ecologist)

Completed background review and discussions with federal, provincial, and municipal agencies to determine the viability from a fisheries perspective for the design and construction of a dragonboat racing course on the Toronto waterfront.

Halton Region, Highway 6 Widening - Highway 403 to Highway 5*, Flamborough, Ontario (Terrestrial Ecologist)

Provided vegetation and wildlife habitat inventory and assessment for the preliminary design study.

Rainbow Creek Sanitary Trunk Sewer Environmental Assessment*, York Region, Ontario (Terrestrial Ecologist)

Terrestrial lead for environmental input for Schedule C requirements of the MEA class EA process.

Town of Oakville Cornwall Road Improvements Class Environmental Assessment*, Oakville, Ontario (Terrestrial Ecologist)

Responsible for documentation of terrestrial features in the study area, including two environmentally sensitive areas, and preparation of an environmental study report and tree audit and management report.

York Region East Holland Trunk Sewer Class Environmental Assessment*, Aurora, Ontario (Terrestrial Ecologist)

Terrestrial ecologist responsible for inventory of the provincially significant East Aurora wetland complex, including an impact assessment for the proposed dewatering and construction of the East Holland trunk sewer.

New North Oakville Transportation Corridor Class Environmental Assessment*, Halton Region, Ontario (Terrestrial Ecologist)

Project manager for natural environment input to the Schedule C class EA, reporting as a subconsultant to the prime EA management firm.

Southeast Collector Trunk Sewer Environmental Assessment*, York and Durham Regions, Ontario (Terrestrial Ecologist)

Responsible for ELC and flora inventories for the purposes of generating a more detailed description and understanding of the environment, including the screening, analysis, and evaluation of alternatives and impact assessment.

Ministry of Transportation Ontario, New Highway Transportation Corridor Environmental Assessment*, Kitchener to Stratford, Ontario (Terrestrial Ecologist)

Ecologist responsible for coordination of natural heritage components of the individual EA.

* denotes projects completed with other firms

Ministry of Transportation Ontario, New Highway Transportation Corridor Environmental Assessment*, Brantford to Cambridge, Ontario (Terrestrial Ecologist)
Project manager responsible for natural heritage components of the transportation class EA, reporting as a subconsultant to the prime EA management firm.

SkyPower Ltd., Renewable Energy Act Records Review*, Southern Ontario (Terrestrial Ecologist)
Ecologist responsible for desktop and field review of environmental constraints under the REA for development of solar power infrastructure at various sites.

International Power, Renewable Energy Act Records Review*, Southern Ontario (Terrestrial Ecologist)
Ecologist responsible for desktop and field review of environmental constraints under the REA for development of wind power infrastructure at various sites.

NextERA, Renewable Energy Act Environmental Assessment*, Huron and Lambton Counties, Ontario (Terrestrial Ecologist)
Ecologist responsible for terrestrial components of environmental assessment study under the REA for development of wind power infrastructure.

Environmental Impact Assessments

Grovetree Road Natural Heritage Impact Study*, Toronto, Ontario (Terrestrial Ecologist)
Provided terrestrial ecology input into an environmental impact study for the proposed development of seven single detached residential dwellings and a road allowance in support of an Ontario Municipal Board (OMB) hearing on behalf of the city.

Jackson Property Environmental Impact Study*, Dunnville, Ontario (Project Manager)
Project manager responsible for the completion of an environmental impact study for a proposed single-family development along the Grand River Marsh provincially significant wetland complex.

Kinsale Property Environmental Impact Study*, Pickering, Ontario (Project Manager)
Project manager responsible for the completion of an impact study to address the proposed development of a 12-hole golf course.

Various Lake Eugenia Environmental Impact Studies*, Flesherton, Ontario (Project Coordinator)
Project coordinator of four separate lot severance and impact studies to address proposed development of single-family residences at various lake front properties along Lake Eugenia.

Lefroy Harbour Natural Area Inventory*, Innisfil, Ontario (Project Manager)
Project manager responsible for ELC, wetland delineation, and flora inventory of subject property and development of existing conditions report including a constraints analysis.

Old Mill Road Natural Heritage Impact Study*, Toronto, Ontario (Project Manager)
Project manager of an environmental impact study for the proposed development located at property along a ravine feature of the Humber River.

Marcy's Woods Environmental Impact Study*, Fort Erie, Ontario (Terrestrial Ecologist)
Terrestrial input to an environmental impact study (EIS) for the proposed development of a single residence on the subject property that includes Marcy's Woods, Point Abino provincially significant wetland, and the Point Abino environmentally sensitive area.

Huttonville Cemetery Environmental Impact Study, Credit River Watershed*, Ontario (Project Manager)
Project coordinator for the production of an environmental implementation report for a proposed cemetery in the headwaters of Huttonville Creek on behalf of the Catholic Cemeteries Archdiocese.

Sandringham Drive Natural Heritage Impact Study*, Toronto, Ontario (Project Manager)
Project manager of an environmental impact study for the proposed development located at the above noted property along a ravine feature of the Don River Valley.

Edgewood Environmental Impact Study*, Orangeville, Ontario (Terrestrial Ecologist)
Terrestrial ecologist responsible for ELC and wetland delineation in support of a plan of subdivision.

* denotes projects completed with other firms

Sean Spisani B.Sc., ERGC

Senior Ecologist

Expert Testimony

Ontario Municipal Board, 56 Grovetree Road
Development within Ravine* (Expert Witness)

*Represented City of Toronto, including preparation of
Environmental Impact Study.*

Ontario Municipal Board, Bloorview Children's Hospital
Development Adjacent to Ravine* (Expert Witness)

*Represented private landowner, including preparation of
Environmental Impact Study.*

* denotes projects completed with other firms

PUBLICATIONS

Leadbeater, D. and S. Spisani. Twilight to 2000: The Evolution of Ontario's Flora. *Presentation: Society for Ecological Restoration (Ontario Chapter) Symposium and Annual General Meeting, 2011.*

Spisani, S. and J. Cole. Robinson Creek and Tooley Creek Watershed Management Plan. *Presentation: Municipality of Clarington Open House, 2011.*

Spisani, S. and B. Valve. Natural Heritage Systems: A Systems Approach to Restoration Planning. *Presentation: Niagara College, 2011.*

Spisani, S. Southeast Collector (IEA) Environmental Management Plan: Wetland Hydrology. *Presentation: Toronto and Region Conservation Authority, 2010.*

Spisani, S. Awenda Provincial Park Life Science Inventory, Penetanguishene, Ontario. *Presentation: Field Botanists of Ontario, 2010.*

Spisani, S. Humber River Valley Restoration Plan at The Old Mill. *Presentation: Community Meeting, Toronto, Ontario, 2009.*

Spisani, S. and J. Paterson. Talus Slope Disturbance and Flora Composition: Silver Creek Area of Natural and Scientific Interest. *Presentation: Field Botanists of Ontario, 2008.*

Leadbeater, D., K. Ursic and S. Spisani. Ecological Land Classification Certification Course. *Presentation: Ontario Ministry of Natural Resources, 2008.*

Spisani, S. Southeast Collector (IEA) Ecological Enhancement Workshop: Designing a Natural Heritage Systems Approach. *Presentation: Toronto and Region Conservation Authority, 2008.*

James Leslie B.E.S.

Terrestrial Ecologist



James Leslie has over six years of experience as a Terrestrial Ecologist with Stantec and is the Technical Lead for vegetation field studies. While James has acquired a diverse skill set, he has become a specialist in vegetation ecology with expertise in plant identification, Ecological Land Classification (ELC), wetland delineation, and vegetation monitoring. Additionally, he has gained extensive experience conducting and leading herpetofauna field surveys.

James completed his Bachelor of Environmental Studies at the University of Waterloo with a focus on applied ecology and environmental policy. He has obtained certification for Ecological Land Classification (ELC), Ontario Wetland Evaluation System (OWES), Ecological Monitoring and Assessment Network (EMAN), and is a Ministry of Natural Resources (MNR) designated Butternut Health Assessor for the endangered Butternut tree. He is RAQS-certified by the Ontario Ministry of Transportation (MTO), and can lead natural heritage assessments for MTO projects. James is familiar with legislation that applies to natural heritage assessment, including the Provincial Policy Statement (PPS), the *Endangered Species Act, 2007* and the federal *Species at Risk Act (SARA)*.

James provides expertise in a variety of sectors including aggregate extraction, infrastructure, energy, and urban land development. He has gained extensive experience conducting and leading vegetation related surveys for renewable energy and highway infrastructure projects. He has authored a variety of reports, including natural heritage components of Environmental Impact Studies, Environmental Assessments, and Natural Environment Technical Reports.

EDUCATION

B.E.S., University of Waterloo / Environmental Studies / Geography, Waterloo, Ontario, 2006

Certificate, Humboldt Field Research Institute / Applied Field Identification of Grasses and Sedges, Steuben, Maine, 2010

Certificate, Butternut Health Assessment, Burlington, Ontario, 2009

Certificate, Ontario Wetland Evaluation System, North Bay, Ontario, 2009

Certificate, Ecological Monitoring and Assessment Network, Turkey Point, Ontario, 2008

Certificate, Ecological Land Classification for Southern Ontario, Kingston, Ontario, 2007

MEMBERSHIPS

Member, Botanical Society of America

Member, Field Botanists of Ontario

PROJECT EXPERIENCE

Aggregate Services

Proposed Duntroon Quarry Expansion, Duntroon, Ontario (Terrestrial Ecologist)

Designed and conducted a multi-year research program to assess the habitat characteristics of American hart's-tongue fern – a federal and provincial Special Concern species. Research examined various features of soil, ambient air, tree canopy cover, associate species, and snow depth. The purpose of this research was to compare and contrast known habitat with potential transplant locations. A preliminary transplant of over 500 ferns was conducted where post-transplant monitoring studies are ongoing. Unrelated surveys conducted onsite include butternut health assessments and forest plot assessments using protocols outlined in the Ecological Monitoring and Assessment Network (EMAN).

Proposed Flamborough Quarry, Hamilton, Ontario (Ecologist)

Aquatic surveys included stream flow discharge and uploading of data loggers. Terrestrial surveys included winter wildlife surveys and health assessments of over 100 butternut trees using 2009 OMNR guidelines.

* denotes projects completed with other firms

James Leslie B.E.S.

Terrestrial Ecologist

Acton Quarry Environmental Review, Acton, Ontario (Terrestrial Ecologist)

Assist with extensive amphibian surveys to identify significant wildlife habitat, species composition, and presence or absence of pure Jefferson salamander specimens. Surveys included call counts, egg mass surveys, pit and aquatic trapping, and tail clippings of potential Jefferson species (in conjunction with the OMNR). Assisted with surveys in 2007 and thereafter, which remain ongoing.

Environmental Mitigation and Monitoring

Various Urban Lands Projects, Waterloo and Oakville, Ontario (Terrestrial Ecologist)

Monitor vegetation communities using Ecological Monitoring and Assessment Network (EMAN) and local Conservation Authority guidelines. Field surveys consisted of identifying vascular plants growing within pre-determined plots and determining their respective cover; photographic records were compiled each year for temporal comparison. Data analysis included calculation of frequency, dominance, and importance value.

Georgia Pacific PCB Remediation, Thorold, Ontario (Terrestrial Ecologist)

ELC; mapping and evaluation of species at risk (Butternut); develop vegetation monitoring plots to determine density, frequency, dominance, and importance value; data synthesis, and technical memorandum.

Oil & Gas

Union Gas Lobo Compressor Station Expansion, Strathroy, Ontario (Terrestrial Ecologist)

Assist with Project Management of a proposed compressor station expansion, including proposal and budget; conduct/delegate appropriate field surveys; compile background data through review of Official Plan, Significant Wildlife Habitat Technical Guide, Ontario Provincial Policy Statement, etc.; agency consultation. Deliverables consisted of an Environmental Impact Study report.

Power Transmission & Distribution

Bruce to Milton Transmission Project, Milton, Ontario (Terrestrial Ecologist)

180 km linear study area of proposed hydro transmission lines from Bruce Nuclear to Milton, Ontario. Assisted with ELC, butternut health assessments, flora inventories, and winter wildlife surveys.

Renewable Energy

Terrestrial Surveys for Wind and Solar Projects, Various Municipalities, Ontario (Terrestrial Ecologist)

Conducted numerous site assessments based on the Renewable Energy Approvals (REA) process for proposed layouts near Belwood, Port Dover, Sydenham, Whittington, St. Columban, and Prince Edward County. Field work included ELC, wetland delineations and evaluations using the Ontario Wetland Evaluation System (OWES), floral and faunal species inventories, and identification of significant wildlife habitat. Study areas included proposed turbine locations, access roads, and transmission corridors. Data analysis and summaries were provided in the respective Natural Heritage Assessment Reports.

Island Falls Energy Project, Smooth Rock Falls, Ontario (Terrestrial Ecologist)

Field work component of a proposed hydroelectric dam in Northern Ontario. Assist with ELC, botanical inventory, and soil surveys in remote areas.

Avian Surveys for Wind and Solar Projects, Various Municipalities, Ontario (Terrestrial Ecologist)

Avian monitoring was conducted at Kingsbridge, Melancthon, Ostrander, Parkhill, and Plateau wind energy locations. Field work consisted of installation, troubleshooting, and data retrieval of Anabat SD1 monitoring devices. Received training for data interpretation and isolation of bat calls based on digital graph patterns. Post-construction surveys of avian mortality under active wind turbines were completed for the Kingsbridge and Melancthon locations.

Terrestrial Assessments

Master Service Plan, Cayuga and Jarvis, Ontario (Terrestrial Ecologist)

Develop ELC mapping for the towns of Jarvis and Cayuga. The purpose was to update natural heritage data for the respective Master Service Plan revisions. Data analysis included ecological constraints mapping and authoring a technical memorandum.

* denotes projects completed with other firms

Transportation Planning

Highway 3 Rehabilitation, Detail Design, Renton to Jarvis, Ontario (Terrestrial Ecologist)

This work was conducted to identify natural features where road widening and culvert replacement was proposed. Performed ELC and compiled records of local flora and fauna. The study area included Endangered butternut trees and a variety of forested, wetland, and cultural communities. A Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitat. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines.

Highway 69, Preliminary Design, Patrol Yard Selection, Parry Sound to Sudbury, Various Sites, Ontario (Terrestrial Ecologist)

This study was undertaken in order to assess a number of alternative locations for patrol yards within the study area, and to identify preferred alternatives at three locations. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. Natural heritage features consisted of numerous wetland communities, large, contiguous forests, significant wildlife habitat and observations of a Threatened species. Fieldwork and reporting were conducted in accordance with MTO regulations and guidelines.

Highway 17, Preliminary Design, Sudbury Southwest Bypass, Sudbury, Ontario (Terrestrial Ecologist)

The purpose of this study was to identify a four-lane highway plan for a section of Highway 17 through the Sudbury area, with access restricted to interchange locations only. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. The study area included a variety of upland and wetland habitats, including Areas of Natural and Scientific Interest. Fieldwork and reporting were conducted in accordance with MTO regulations and guidelines.

Highway 11, Preliminary Design Study, Access Review from Powassan to Callander, Ontario (Terrestrial Ecologist)

This project was part of a study to upgrade the highway to 'full freeway standard', which included eliminating at-grade intersections and entrances and providing access to highway only at interchanges. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. The study area included a variety of upland and wetland habitats. Fieldwork and reporting were conducted in accordance with MTO regulations and guidelines.

Highway 401 and Highway 8 Improvements, Preliminary Design, Kitchener, Ontario (Terrestrial Ecologist)

This study was undertaken to assess proposed interchange improvements in the cities of Kitchener and Cambridge along Highway 401 and Highway 8. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. The study area included rare flora, Provincially and Locally Significant Wetland, and an Area of Natural and Scientific Interest (ANSI). A Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats. The preliminary impact assessment included constraint ratings of each ELC unit and the calculation of the areas potentially affected by the Preferred Plan. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines.

Highway 11, Preliminary Design Study, Improvements North of Highway 144, Huntsville, Ontario (Terrestrial Ecologist)

The purpose of this study was to undertake the Planning, Preliminary Design and Environmental Assessment for improvements to Highway 11 from 1 km north of Highway 141, northerly for 5.5 km. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. The study area included a rare vegetation community not previously documented and a variety of upland and wetland habitat. A Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats. Fieldwork and reporting were conducted in accordance with MTO regulations and guidelines.

James Leslie B.E.S.

Terrestrial Ecologist

Highway 11, Preliminary Design Study, South Entrance to Powassan, Powassan, Ontario (Terrestrial Ecologist)

This study was carried out to update a Preliminary Design Report that recommended interchange locations for this stretch of Highway 11. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. The study area included significant features, a variety of habitats, and cultural communities. Fieldwork and reporting were conducted in accordance with MTO regulations and guidelines.

Municipal Road Improvement Projects, Various Sites, Ontario (Terrestrial Ecologist)

Conducted ELC and wetland delineations using OMNR protocols. Identified wildlife habitat and determined potential impacts and mitigation options.

- City of London, Southdale Road Widening
- City of London, Hamilton Road Improvements

Victoria Road North Class EA, Guelph, Ontario (Terrestrial Ecologist)

Assist with Task Management for a proposed road widening, including background data review of applicable legislation and guidelines; conduct or delegate appropriate field surveys; agency consultation; prepare a draft Natural Environment Technical Report and constraints analysis for a proposed parking area.

Natalie Leava is a terrestrial ecologist whose practical skills include the identification of grasses, flowering plants, trees, lichens, and bryophytes. She is certified in Ecological Land Classification (ELC) and the Ontario Wetland Evaluation System (OWES). She has performed ELC mapping at various development sites, as well as executed wetland evaluations and delineations. Natalie is familiar with habitat identification and classification, ecological surveying and conservation assessment. She is familiar with the identification of bats, aquatic invertebrates and *Carabidae*, reptiles, and amphibians and has participated in amphibian surveys. Natalie possesses laboratory and technical skills that include surveying techniques, soil sampling, isotopic analysis, water sampling, sediment coring and geochemistry lab analysis. Natalie is familiar with GIS and Remote Sensing techniques for mapping ecological features using ArcVIEW and ER Mapper software. Her undergraduate degree included a minor in psychology, and her experiences through work, education and volunteering have equipped Natalie with an ability to communicate effectively with regulatory authorities and the general public.

EDUCATION

M.Sc., Applied, University College Cork / Ecological Assessment, Cork, Republic of Ireland, 2010

B.Sc., Honours, McMaster University / Earth and Environmental Sciences, Hamilton, Ontario, 2009

Certificate, Ontario Ministry of Natural Resources / Ecological Land Classification (ELC), Lindsay, Ontario, 2011

WHMIS Training Course, Guelph, Ontario, 2011

Boating License & Pleasure Craft Operator, Rosseau, Ontario, 2008

Certificate, Ontario Ministry of Natural Resources / Ontario Wetland Evaluation System, North Bay, Ontario, 2012

PROJECT EXPERIENCE

Education

University College Cork, Environmental & Civil Engineering Department Hydromet Lab*, Cork, Republic of Ireland (Part-time Research Assistant)

Research included forest inventory, destructive tree sampling, biomass pools, fine root analysis, chemical analysis, and soil analysis, to compare net ecosystem balances of an improved grassland with a newly afforested grassland. Proposed research projects to supplement and complement existing eddy covariance data. Executed all associated field and lab work

McMaster University Graduate Student Assistance*, Hamilton, Ontario (Volunteer Assistant)

Assisted Masters student in construction of wood stands for eavestroughs to be used in a forested ecosystem to induce drought. Involved Hydro-Meteorological Lab work at McMaster University, and fieldwork at Turkey Point, Ontario

Natural Sciences & Heritage Resources

Various Species at Risk Habitat Surveys for Transportation Projects, Ministry of Transportation, Sudbury, Simcoe, Cambridge and Chatham, Ontario (Terrestrial Ecologist)

Performed habitat surveys for Queen Snake, Bobolink, Blanding's Turtle

Activa Waterloo East Lands, Kitchener, Ontario (Terrestrial Ecologist)

Responsible for annual photomonitoring, preparation of photolog and reporting. Prepared ecological update on overall health of study area based on monitoring 'during construction'

* denotes projects completed with other firms

Natalie A. Leava M.Sc.

Terrestrial Ecologist

Proposed Melancthon Quarry, The Highland Companies, Melancthon, Ontario (Terrestrial Ecologist)

*Field ecologist and field work coordination assistance.
Compilation of field work records filed since project initiation*

Environmental Consulting Firm in Ontario, Canada* (Junior Botanist)

Assisted and trained under senior biologist. Completed data entry for vegetative species list and ELC mapping. Participated in species at risk surveys and compensation programs

Lake Simcoe Region Conservation Authority*, Newmarket, Ontario (Full-time Stewardship Assistant)

Interacted with homeowners in Simcoe Region to promote source water protection and provide public information regarding government funding programs available. Prepared and distributed information packages to homeowners

Renewable Energy

Cedar Point Wind Project, Municipality of Lambton Shores (Forrest), Ontario (Terrestrial Ecologist)

Field ecologist and assisted with preparation of technical NHA report. Performed ELC, vegetation surveys and mapping. Field work coordination assistance provided to Terrestrial Lead

Sydenham Wind Energy Centre, Lambton County and Municipality of Chatham-Kent, Ontario (Terrestrial Ecologist)

Contributed to composition of tables and figures for NHA report

Adelaide Wind Power Project, Melancthon, Ontario (Terrestrial Ecologist)

*Field ecologist and field work coordination assistance.
Compilation of field work records completed for project from 2004 onward*

Niagara Region Wind Centre, Niagara Peninsula, Ontario (Terrestrial Ecologist)

Field technician and field work coordination assistance. ELC and vegetation field work, winter raptor surveys and general habitat assessments. Prepared field packages and assisted with delineation of areas requiring field work

KEPA Wind Energy Project Post-construction Monitoring, Kruger Wind Energy Chatham LP, Port Alma, Ontario (Terrestrial Ecologist)

*Responsible for conducting monthly searcher efficiency trials.
Weekly mortality results entered and identified*

Dorland Wind Energy Project, Gilead Power Corp., Dorland, Ontario (Terrestrial Ecologist)

Written report components including background data collection and records review. Data entry and data results

* denotes projects completed with other firms

Natalie A. Leava M.Sc.

Terrestrial Ecologist

PUBLICATIONS

Leava, N.A. A Baseline Ecological Assessment for Castlefreke, Co. Cork. *M.Sc. Thesis, University College Cork, Cork, Republic of Ireland*, 2010.

Peichl, M., N. Leava, and G. Kiely. Above and below ground ecosystem biomass, carbon and nitrogen allocation in a recently afforested grassland and adjacent intensively managed grassland. *Plant and Soil*, 2010.

Leava, N.A. Bioremediation of Heavy Metal Leachate in Contaminated Oligotrophic Aquifers. *B.Sc. Term Paper. McMaster University, Hamilton, Ontario, Canada*, 2009.

Leava, N. Fractionation of Sulfur Isotopes within Microbial Processes. *B.Sc. Term Paper and Presentation. McMaster University, Hamilton, Ontario, Canada*, 2008.

Leava, N. PAH Contamination of Soils and Remedial Process Available within North America. *B.Sc. Thesis Paper and Presentation. McMaster University, Hamilton, Ontario, Canada*, 2008.

Andrea Orr is a terrestrial ecologist who has practiced in both the public and private sectors. She is a graduate from Trent University with a Bachelor of Science degree in Biology and Environmental Studies, specializing in Environmental Politics, Policy, and Law. She is also a graduate from Sir Sandford Fleming College, School of Natural Resource Sciences as a Forestry Technician.

Andrea is certified in Ontario Ministry of Natural Resources Ecological Land Classification (ELC), and has conducted ecology work in northern and southern Ontario for several years. Her experience includes conducting various forestry practices, vegetation surveys, soil analysis, entomological surveys, bat surveys/monitoring, as well as avian surveys, including breeding birds, migration, forest monitoring plots, Species at Risk (SAR), and wind energy mortality monitoring.

Andrea's experience stems from such key projects as assisting with the Natural Areas Inventory (NAI) program, managing small wind energy development projects throughout Canada, and contributing to research projects focusing on forestry practices and bird communities. She is familiar with environmental policies and regulations, and has participated in Natural Heritage Assessments (NHA), Environmental Impact Studies (EIS) and the Renewable Energy Approval (REA) process.

EDUCATION

B.Sc., Trent University, Peterborough, Ontario, 2008

Forestry Technician Diploma, Sir Sandford Fleming College, Lindsay, Ontario, 2003

MEMBERSHIPS

Member, Field Botanists of Ontario

Member, Ontario Field Ornithologists

PROJECT EXPERIENCE

Natural Sciences & Heritage Resources

Hastings Prince Edward Land Trust*, Picton, Ontario
(Project Coordinator)

Landowner liaison for planning and finalizing reports for Conservation Easements and Managed Forest Tax Incentive Plans (MFTIP). Planned and organized volunteer and fundraising events. Produced bi-annual newsletter

Natural Heritage Education Program, Ministry of Natural Resources*, Kakabeka Falls Provincial Park, Ontario
(Programmer)

Created and conducted environmental programs for children and adults. Conducted interpretive hikes and presentations

Effects of Silvicultural Treatments on Avian Communities and Forest Regeneration in Tolerant Hardwood Forests*, Algonquin Provincial Park, Ontario (Avian Field Biologist)

Conducted nest searches for target bird species and Species at Risk (SAR). Monitored forest bird species and their nests while recording detailed field data. Sampled forest vegetation and nest habitat for wildlife habitat assessment. Performed entomological surveys, including collection of forest insects using tangle-foot and malaise traps. Assisted in bird banding for target species. Used radio-telemetry techniques to attract birds

Natural Areas Inventory (NAI), Credit Valley Conservation*, Mississauga, Ontario (NAI Assistant)

Inventoried natural areas using Ecological Land Classification (ELC) within the Credit Valley watershed. Recorded data while identifying numerous plant and wildlife species. Performed data entry and extraction of large volumes of data from ELC database

* denotes projects completed with other firms

Andrea M. Orr B.Sc., Tech. Dipl.

Terrestrial Ecologist

Renewable Energy

West Cape Wind Farm*, Prince Edward Island
(Biologist)

Organized all terrestrial aspects of post-construction mortality monitoring, which included conducting surveys of carcass searches, scavenger trials, and searcher efficiency tests. Supervised and coordinated other post-construction monitoring field personnel. Co-authored post-construction report and contributed to the Environmental Impact Study

Napier Wind Project, Middlesex County, Ontario
(Terrestrial Ecologist)

Agency liaison with MNR included provision of comments regarding Species at Risk (SAR) report, with focus on wildlife biology and habitat assessment

Grand Valley Wind Project, Phase 3, Dufferin County,
Ontario (Terrestrial Ecologist)

Conducted and mapped Ecological Land Classification (ELC) surveys. Co-authored the Natural Heritage Assessment report

Grand Renewable Energy Park, Haldimand County,
Ontario (Terrestrial Ecologist / Task Manager)

Coordinated terrestrial staff and documentation for various field surveys. Conducted and mapped wetland delineation surveys and migratory bird surveys

* denotes projects completed with other firms

Matthew Ross is an ecologist whose skills include bird, mammal, reptile and plant identification. He is adept at conducting wildlife and wildlife habitat surveys, including those that relate to environmental assessment, conservation and species at risk. Matthew is familiar with provincial and federal guidelines, including Ontario Wetland Evaluation System (OWES), Ecological Land Classification (ELC) and Renewable Energy Approvals (REA). He has conducted surveys for a variety of development projects, including renewable energy, aggregate extraction and residential, and has work experience in both the public and private sector. In addition, Matthew is familiar with wildlife handling, including bird banding and migration monitoring at Selkirk Provincial Park. He has performed native tree species plantings and been involved in exotic plant control efforts as a volunteer at Florida Panther National Wildlife Refuge.

EDUCATION

B.Sc., University of Northern British Columbia / Natural Resources Management Wildlife and Fisheries, Prince George, British Columbia, 2007

Sir Sandford Fleming College / Fish and Wildlife Technologist, Lindsay, Ontario, 2004

Certificate, Ontario Ministry of Natural Resources / Ecological Land Classification System for Southern Ontario, Kemptville, Ontario, 2011

Certificate, Stantec Consulting Ltd. / WHMIS, Guelph, Ontario, 2011

PROJECT EXPERIENCE

Aggregate Services

Proposed Melancthon Quarry, Melancthon, Ontario (Terrestrial Technician)

Conducted habitat assessment and species at risk surveys and performed reporting

Multi-Unit / Family Residential

Clair Creek Meadows, Waterloo, Ontario (Terrestrial Technician)

Matthew conducted an assessment of silt fence integrity

Hammersley, Cambridge, Ontario (Terrestrial Technician)

Conducted snake cover board and amphibian surveys

Buffalo Springs Residential Development, Ontario (Terrestrial Technician)

Matthew conducted habitat assessment and species at risk surveys, and performed project reporting

Natural Sciences & Heritage Resources

Nova 2020 Plant Expansion Project, Corunna, Ontario (Terrestrial Technician)

Conducted snake cover board and amphibian surveys

Woodland Bird Nest Surveys, Ontario Ministry of Natural Resources (MNR), 2006* (Avian Nest Biologist)

Matthew performed surveys that involved finding and monitoring woodland bird nests in southern Ontario, including species at risk, radio tracking and identifying fledgling birds, as well as associated vegetation surveys

Wildlife and Habitat Surveys, 2009* (Biologist)

While working for a private consulting firm, Matthew carried out various wildlife and habitat surveys for several energy related projects, including wind farm mortality monitoring, breeding bird surveys, amphibian, reptile and mammal surveys. He also conducted scientific literature research and data entry, as well as assisted in writing project proposals and presentation to clients

Various Development Projects, 2007, 2008, 2010* (Biologist)

While working for a private consulting firm, Matthew conducted biological field surveys and associated data management and analysis for various developments throughout Ontario and other provinces, including renewable energy. These involved breeding bird surveys, nest searches, amphibian counts, salamander population monitoring for species at risk, wind farm mortality monitoring, bat species and abundance monitoring and wetland evaluation. He also conducted associated research and assisted in reporting

* denotes projects completed with other firms

Matthew Ross B.Sc.

Ecologist

Oil and Gas Pipelines

TransCanada Pipelines Ltd., Eastern Mainline Expansion, Ontario (Terrestrial Technician)

Conducted species at risk breeding bird surveys

Enbridge Integrity Dig Program, Ontario (Terrestrial Technician)

Conducted nesting bird surveys and nest monitoring surveys

Trans-Northern Pipelines Inc., Bronte Creek Risk Assessment, Burlington, Ontario (Terrestrial Technician)

Assisted in conducting an initial site assessment and salamander egg mass survey

Nova Chemicals Genesis Pipeline Extension, Corunna, Ontario (Terrestrial Technician)

Conducted snake cover board and amphibian surveys

St. Clair Pipelines Bluewater River Crossing Replacement, Corunna, Ontario (Terrestrial Technician)

Conducted snake cover board and amphibian surveys

Post-Construction

Victoria Park, Kitchener, Ontario (Terrestrial Technician)

Conducted post-construction migratory waterfowl, botanical inventory and replanting monitoring surveys

Renewable Energy

Solray Renewable Solar Energy Project, Ontario (Terrestrial Technician)

Conducted due diligence site assessment with client to identify project constraints and assisted in reporting

Various Renewable Wind Energy Projects, Ontario (Terrestrial Technician)

Conducted ELC, amphibian, migratory passerine, waterfowl, raptor and crepuscular bird auditory surveys, species at risk habitat assessment and surveys, amphibian surveys, post-construction monitoring, and assisted with technical reporting for various wind energy projects, including Wolfe Island Wind Farm, Amherst Island Wind Farm, White Pines Wind Farm, Niagara Region Wind Centre, Bow Lake Wind Farm, K2 Wind Project, Cedar Point Wind Project, and Dorland Wind Project

Roads and Highways

Detail Design for the Rehabilitation of Highway 6/10 from Chatsworth to Owen Sound, Grey County, Ontario (Terrestrial Technician)

This study included a 15 km stretch of highway through several significant natural habitat features, including the Niagara Escarpment, Life Science ANSI, unevaluated wetlands, and large continuous tracts of mature forest and riparian habitat. Matt's responsibilities on this assignment included Ecological Land Classification, bird surveys and surveys for species at risk, documentation of wildlife species and habitat, and mapping of birds' nests

Cheryl-Anne L. Ross B.Sc., Tech. Dipl.

Terrestrial Ecologist



Cheryl-Anne Ross is a terrestrial ecologist whose skills include bird, mammal, herpetile, and plant identification, with technical experience in both the public and private sectors. Cheryl-Anne is certified in Ecological Land Classification (ELC). She is adept at conducting a variety of wildlife and wildlife habitat surveys, and has been involved development projects in various sectors, including renewable energy (wind) planning, residential, and industrial construction.

EDUCATION

B.Sc., University of Northern British Columbia / Natural Resources and Environmental Management, Wildlife and Fisheries, Prince George, British Columbia, 2007

Tech. Dipl., Sir Sandford Fleming College / Fish and Wildlife Technologist, Lindsay, Ontario, 2004

Certificate, Ontario Ministry of Natural Resources / Ecological Land Classification (ELC), Lindsay, Ontario, 2011

PROJECT EXPERIENCE

Natural Sciences & Heritage Resources

Various Development Projects*, Ontario (Terrestrial Ecologist & Wetland Biologist)

Conducted biological field surveys and associated data management and analysis for various developments throughout Ontario, including renewable energy projects. Included were breeding bird surveys, nest searches, amphibian counts, SAR salamander population monitoring, wind farm mortality monitoring, bat species and abundance monitoring, and wetland evaluation. Also involved associated background research and reporting

NOVA Chemicals Genesis Pipeline Extension, Corunna, Ontario (Terrestrial Ecologist)

Conducted SAR surveys and habitat assessments, including reptile (snake) coverboard surveys and amphibian (frog) call count surveys

Amherst Island Wind Farm, Amherst Island, Ontario (Terrestrial Ecologist)

Conducted winter raptor, staging waterfowl, and SAR surveys; provided assistance with technical reporting and data entry

Waterloo Westside, Vista Hills, Clair Creek Meadows, Waterloo, Ontario (Terrestrial Ecologist)

Conducted an assessment of silt fence integrity and photo-monitoring; assessed impacts of deleterious substance release

NOVA 2020 Plant Expansion, Corunna, Ontario (Terrestrial Ecologist)

Conducted SAR surveys and habitat assessments, including reptile (snake) coverboard and amphibian (frog) call count surveys

Cedar Point Wind Farm, Forest, Ontario (Terrestrial Ecologist)

Conducted habitat assessment, ELC, SAR surveys including reptile (snake) coverboard surveys

Niagara Region Wind Centre, Niagara Peninsula, Ontario (Terrestrial Ecologist)

Conducted habitat assessment, ELC, amphibian surveys, winter raptor surveys, and SAR surveys; aided with coordination of field studies and assisted with technical reporting for the Natural Heritage Assessment

Bow Lake Wind Farm, Montreal River Harbour, Ontario (Terrestrial Ecologist)

Conducted habitat assessment, amphibian surveys, and SAR surveys; aided in coordination of field studies and assisted with technical reporting for the Natural Heritage Assessment

* denotes projects completed with other firms

Brian M. Miller Tech. Dipl.

Botanist / Terrestrial Ecologist



Brian Miller serves as a Botanist and Terrestrial Ecologist whose academic background encompasses various aspects of natural resource management, with a focus on vascular plant identification and vegetation community assessment. Brian has extensive field experience conducting detailed botanical inventories of plant communities throughout southern Ontario, which has provided him with an advanced knowledge of southern Ontario's vascular flora. For over 6 years, Brian has participated in numerous surveys of species at risk (SAR) and other significant plant species, as well as wetland boundary delineations.

Brian's field experience in avian and amphibian identification through sight and sound and their associated habitats complements his botanical expertise. He is familiar with the Natural Heritage Information Centre (NHIC) species databases, and is experienced at the application of principles and guidelines of the Significant Wildlife Habitat Technical Guide, the *Endangered Species Act*, the *Migratory Birds Convention Act* and other applicable federal, provincial and municipal legislation.

EDUCATION

Tech. Dipl., Sault College / Fish and Wildlife Technician (Honours), Sault Ste. Marie, Ontario, 2006

Certificate, University of Guelph / Classification and Morphology of Seed Plants, Guelph, Ontario, 2007

Certificate, Ontario Ministry of Natural Resources / Ecological Land Classification (ELC) for Southern Ontario, Lindsay, Ontario, 2008

Royal Botanical Gardens / Woodland Sedge Identification Workshop, Burlington, Ontario, 2009

Certificate, Ontario Ministry of Natural Resources / Butternut Health Assessor, Hamilton, Ontario, 2009

Field Botanists of Ontario / Spring Hawthorn Identification Workshop, Middlesex County, Ontario, 2010

Toronto and Region Conservation Authority / Carex Sedge Identification Workshop, Toronto, Ontario, 2011

Certified Arborist, International Society of Arboriculture, Guelph, Ontario, 2012

PROJECT EXPERIENCE

Endangered Species/Species at Risk Assessments

Union Gas Easements, Windsor, Ontario (Botanist)
Conducted detailed botanical inventories and mapped numerous SAR and provincially rare species in gas line easements

Enbridge Pipeline Integrity Digs, Thorold and Hamilton, Ontario (Botanist)
Conducted butternut health assessments and SAR surveys within pipeline easements

Windsor Essex Parkway*, Windsor, Ontario (Botanist)
Conducted detailed botanical inventories of SAR-rich remnant prairie sites. Numerous SAR were flagged and mapped using handheld GPS

Highway 407 Extension*, Durham Region (Botanist)
Conducted regionally rare /significant plant species surveys and GPS mapping along new Highway route

Shell Canada Proposed Heavy Oil Refinery Expansion Project*, Lambton County, Ontario (Botanist)
Conducted ELC surveys and GPS mapping of provincially and regionally significant species and vegetation communities

* denotes projects completed with other firms

Brian M. Miller Tech. Dipl.

Botanist / Terrestrial Ecologist

CPA Subwatershed Study*, Township of Centre Wellington, Ontario (Botanist)

Conducted comprehensive biological inventories of vascular flora, vegetation communities, breeding birds, snakes and calling anurans as part of Phase 1 (Existing Conditions) of the subwatershed study. All species of regional and provincial significance were mapped

Mill Pond Park Biological Inventory*, Town of Richmond Hill, Ontario (Botanist)

Conducted detailed biological inventory of vascular flora, vegetation communities and breeding birds for proposed trail improvements. Prepared 64 page 'Ecological Land Classification (ELC) Assessment and Breeding Bird Survey of Mill Pond Park' technical report with appendices and ELC map (Aboud & Associates Inc., 2010)

Block 11 Wetland Vegetation Monitoring*, Vaughan, Ontario (Botanist)

Set-up and conducted wetland vegetation monitoring in two wetlands adjacent to a proposed subdivision

Natural Sciences & Heritage Resources

Hydro One Inc., Proposed Clarington Transformer Station, Durham Region, Ontario (Botanist)

Performed detailed botanical inventory and ELC mapping

Cambridge Hydro North Dumfries at Speed River, North Dumfries, Ontario (Botanist)

Performed detailed botanical inventory and ELC mapping

Enbridge Pipelines Inc., Lines 10 and 11, Thorold and Hamilton, Ontario (Botanist)

Performed Butternut Health Assessments (SAR)

Grand Renewable Energy Park, Haldimand County, Ontario (Botanist)

Performed numerous wetland boundary delineations and mapping

Fairway/Lackner Lands, Kitchener, Ontario (Botanist)

Performed detailed botanical inventory, ELC mapping, and wetland boundary delineation

Detailed Design Services for Leslie Street Realignment, York Region, Ontario (Botanist)

Performed detailed botanical inventory and ELC mapping

Canadian Pacific Site-specific Ecological Risk Assessment, Pointe au Baril Derailment Site, Parry Sound District, Ontario (Botanist)

Performed detailed botanical inventory and herpetofaunal SAR survey

Union Gas Panhandle Replacement, Ojibway Prairie Complex, Windsor, Ontario (Botanist)

Performed detailed botanical inventory and SAR mapping along pipeline corridor

Marigold Homes North Dorchester Servicing Study and EIS, Middlesex County, Ontario (Botanist)

Performed detailed botanical inventory and ELC mapping

Niagara Region Wind Centre, Niagara Peninsula, Ontario (Botanist)

Performed roadside ELC assessment along transmission line route

Walker Industries Holdings, Uppers Lane Quarry, Niagara Falls, Ontario (Botanist)

*Performed fall hawthorn (*Crataegus sp.*) survey and botanical inventory*

Suncor Energy, Cedar Point Wind Project, Lambton County, Ontario (Botanist)

Performed detailed botanical inventory and ELC mapping

Grand Valley 3 Wind Project, Dufferin County, Ontario (Botanist)

Performed roadside ELC assessment

Sunningdale Golf and Country Club, Hole Relocation EIS, London, Ontario (Botanist)

Performed detailed botanical inventory, ELC mapping, and SAR surveys

* denotes projects completed with other firms

Brian M. Miller Tech. Dipl.

Botanist / Terrestrial Ecologist

PUBLICATIONS

Miller, Brian M. Sparrow Lake Aquatics Trip Report, Muskoka. *Field Botanists of Ontario (FBO) Newsletter* 24(1), 2012.

Miller, Brian M. Five Points Forest Trip Report, Ingersoll (June 6th, 2010). *Field Botanists of Ontario (FBO) Newsletter* 23(1), 2011.

Miller, Brian M., Robert J. Aitken, Michael J. Oldham, and Anton A. Reznicek. Slender False Brome (*Brachypodium sylvaticum*, Poaceae), an invasive grass new to Ontario, Canada. *Canadian Field Naturalist* 125(3): 235-240, 2011.

James Heslop

Bird Surveyor



James Heslop has thirty (30) years experience birding and record-keeping experience. He has volunteered with the Audubon Christmas Bird Censuses in Pickering, Hamilton, Fisherville, St. Catharines, and 25 years at Long Point. James was a volunteer for the Ontario Breeding Bird Atlas from 1981 to 1985, and from 2001 to 2005 (including point counts). He has also been involved with Ontario Forest Bird Monitoring of the Dundas Valley, was past recording secretary of the Norfolk Field Naturalists (NFN), past president of the Pickering Field Naturalists (PFN), was a Founding Member and is a Life Member of the Ontario Field Ornithologists (OFO), was the past lead editor of OFO News, past publicity director of the Hamilton Naturalists' Club (HNC), is the current treasurer of the HNC, is the leader of field outings for the NFN, PFN, HNC and OFO, and is a current member of Hamilton Waterfront Trust Eastport Drive Trail Project Advisory Group.

EDUCATION

Birding Courses, Sheridan College, Ontario, 1980

Commerce and Finance, University of Toronto, Ontario, 1972

PROJECT EXPERIENCE

Environmental Management

Migratory and Breeding Bird Surveys*

Migratory and breeding bird surveys for Positive Power Cooperative Inc, Dougan and Associates, Trow Associates

Field Surveys*

Study of hooded warblers, acadian flycatchers and invasive plants for Bird Studies Canada

Bird Strike Surveys*, Burlington Beach, Ontario (Bird Surveying and Monitoring)

Environment Canada

* denotes projects completed with other firms

Robert Stamp

Ornithologist



Bob joined Stantec in 2004 as an avian ecologist. He has been birding for more than 50 years and has compiled an extensive life list. At Stantec, Bob is responsible for carrying out seasonal bird and wildlife field surveys throughout Ontario, including pre and post construction monitoring at wind farms across the province. Bob also has extensive experience conducting bird surveys for development and aggregate projects.

EDUCATION

Bachelor of Science, Honors, McMaster University,
Biology, Hamilton, Ontario.

PROFESSIONAL MEMBERSHIPS

Ontario Field Ornithologists, Member

Hamilton Naturalists Club, Member

PROJECT EXPERIENCE

Port Alma Wind Project, Municipality of Chatham-Kent,
Ontario (Ornithologist)

Pre and post construction bird surveys.

Melancthon Wind Project, Dufferin County, Ontario
(Ornithologist)

breeding bird surveys and post construction monitoring

Wolfe Island Wind Project, Wolfe Island, Ontario
(Ornithologist)

*Pre and post construction breeding, migratory and wintering
birds.*

Port Dover and Nanticoke Wind Project, Ontario
(Ornithologist)

Pre and post construction bird surveys.

* denotes projects completed with other firms

Appendix G

Field Investigation Wildlife List

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	Local Status PIF Priority Species (BCR 13)	Breeding Evidence
BUTTERFLIES							
Monarch	<i>Danaus plexippus</i>	S4B, S2N	G5	SC	SC		
AMPHIBIANS							
Tetraploid Gray Treefrog	<i>Hyla versicolor</i>	S5	G5				
Northern Green Frog	<i>Hyla versicolor</i>	S5	G5				
Wood Frog	<i>Lithobates sylvatica</i>	S5	G5				
Northern Leopard Frog	<i>Lithobates pipiens</i>	S5	G5	NAR	NAR		
REPTILES							
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	S5	G5T5				
BIRDS							
Canada Goose	<i>Branta canadensis</i>	S5	G5				
Green-winged Teal	<i>Anas crecca</i>	S4	G5				
Ruffed Grouse	<i>Bonasa umbellus</i>	S5	G5				
Wild Turkey	<i>Meleagris gallopava</i>	S5	G5				FY
American Bittern	<i>Botaurus lentiginosus</i>	S4B	G4				S
Great Blue Heron	<i>Ardea herodias</i>	S5	G5				X
Turkey Vulture	<i>Cathartes aura</i>	S5B	G5				X
Northern Harrier	<i>Circus cyaneus</i>	S4B	G5	NAR	NAR	X	H
American Kestrel	<i>Falcosparverius</i>	S5B	G5			X	H
Sandhill Crane	<i>Grus canadensis</i>	S5B	G5	NAR	NAR		H
Killdeer	<i>Charadrius vociferus</i>	S5B, S5N	G5				P
Upland Sandpiper	<i>Bartramia longicauda</i>	S4B	G5				S
Wilson's Snipe	<i>Gallinago delicata</i>	S5B	G5				NE
Ring-billed Gull	<i>Larus delawarensis</i>	S5B, S4N	G5				X
Rock Pigeon	<i>Columba livia</i>	SNA	G5				H
Mourning Dove	<i>Zenaida macroura</i>	S5	G5				S
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	S4B	G5				
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	S5B	G5			X	S
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	S4	G5				
Downy Woodpecker	<i>Picoides pubescens</i>	S5	G5				A
Hairy Woodpecker	<i>Picoides villosus</i>	S5	G5				
Northern Flicker	<i>Colaptes auratus</i>	S4B	G5			X	H
Pileated Woodpecker	<i>Dryocopus pileatus</i>	S5	G5				
Eastern Wood-Pewee	<i>Contopus virens</i>	S4B	G5		SC	X	
Alder Flycatcher	<i>Empidonax alnorum</i>	S5B	G5				S
Willow Flycatcher	<i>Empidonax traillii</i>	S5B	G5			X	S
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	S4B	G5				S
Eastern Kingbird	<i>Tyrannus tyrannus</i>	S4B	G5			X	P
Blue-headed Vireo	<i>Vireo solitaries</i>	S5B	G5				

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	Local Status PIF Priority Species (BCR 13)	Breeding Evidence
Warbling Vireo	<i>Vireo gilvus</i>	S5B	G5				S
Red-eyed Vireo	<i>Vireo olivaceus</i>	S5B	G5				S
Blue Jay	<i>Cyanocitta cristata</i>	S5	G5				H
American Crow	<i>Corvus brachyrhynchos</i>	S5B	G5				FY
Common Raven	<i>Corvus corax</i>	S5	G5				H
Horned Lark	<i>Eremophila alpestris</i>	S5B	G5				P
Tree Swallow	<i>Tachycineta bicolor</i>	S4B	G5				H
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	S4B	G5				AE
Black-capped Chickadee	<i>Poecile atricapillus</i>	S5	G5				S
Red-breasted Nuthatch	<i>Sitta canadensis</i>	S5	G5				S
White-breasted Nuthatch	<i>Sitta carolinensis</i>	S5	G5				S
Brown Creeper	<i>Certhia Americana</i>	S5B	G5				
House Wren	<i>Troglodytes aedon</i>	S5B	G5				S
Golden-crowned Kinglet	<i>Regulus satrapa</i>	S5B	G5				
Ruby-crowned Kinglet	<i>Regulus calendula</i>	S4B	G5				
Veery	<i>Catharus fuscescens</i>	S4B	G5			X	S
American Robin	<i>Turdus migratorius</i>	S5B	G5				CF
Gray Catbird	<i>Dumetella carolinensis</i>	S4B	G5				S
European Starling	<i>Sturnus vulgaris</i>	SNA	G5				CF/FY
Cedar Waxwing	<i>Bombycilla cedrorum</i>	S5B	G5				H
Snow Bunting	<i>Plectrophenax nivalis</i>	SNA	G5				
Ovenbird	<i>Seiurus aurocapilla</i>	S4B	G5				S
Mourning Warbler	<i>Geothlypis philadelphia</i>	S4B	G5				A
Common Yellowthroat	<i>Geothlypis trichas</i>	S5B	G5				CF
American Redstart	<i>Setophaga ruticilla</i>	S5B	G5				S
Yellow Warbler	<i>Setophaga petechia</i>	S5B	G5				S
Pine Warbler	<i>Setophaga pinus</i>	S5B	G5				S
Yellow-rumped Warbler	<i>Setophaga coronate</i>	S5B	G5				
Chipping Sparrow	<i>Spizella passerine</i>	S5B	G5				S
Field Sparrow	<i>Spizella pusilla</i>	S4B	G5			X	S
Vesper Sparrow	<i>Poocetes gramineus</i>	S4B	G5			X	S
Savannah Sparrow	<i>Passerculus sandwichensis</i>	S4B	G5			X	S
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	S4B	G5			X	S
Song Sparrow	<i>Melospiza melodia</i>	S5B	G5				A/P/CF
Swamp Sparrow	<i>Melospiza georgiana</i>	S5B	G5				
White-throated Sparrow	<i>Zonotrichia albicollis</i>	S5B	G5				S
Northern Cardinal	<i>Cardinalis cardinalis</i>	S5	G5				S
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	S4B	G5			X	S
Indigo Bunting	<i>Passerina cyanea</i>	S4B	G5				CF
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	S5	G5				CF/FY
Common Grackle	<i>Quiscalus quiscula</i>	S5B	G5				CF/FY
Brown-headed Cowbird	<i>Molonthrus ater</i>	S4B	G5				X
Baltimore Oriole	<i>Icterus galbula</i>	S4B	G5			X	S

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	Local Status PIF Priority Species (BCR 13)	Breeding Evidence
American Goldfinch	<i>Carduelis tristis</i>	S5B	G5				P
House Sparrow	<i>Passer domesticus</i>	SNA	G5				H
MAMMALS							
Eastern Chipmunk	<i>Tamias striatus</i>	S5	G5				
Beaver	<i>Castor Canadensis</i>	S5	G5				
Muskrat	<i>Ondatra zibethicus</i>	S5	G5				
Porcupine	<i>Erethizon dorsatum</i>	S5	G5				
SUMMARY							
Total Butterflies: 1							
Total Amphibians: 4							
Total Reptiles: 1							
Total Birds: 77							
Total Mammals: 4							

Explanation of Status and Acronyms

COSSARO: Committee on the Status of Species at Risk in Ontario

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

REGION: Rare in a Site Region

S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences)

S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer),

S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer)

S4: Apparently Secure—Uncommon but not rare

S5: Secure—Common, widespread, and abundant in the province

SX: Presumed extirpated

SH: Possibly Extirpated (Historical)

SNR: Unranked

SU: Unrankable—Currently unrankable due to lack of information

SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

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

S#B- Breeding status rank

S#N- Non Breeding status rank

?: Indicates uncertainty in the assigned rank

G1: Extremely rare globally; usually fewer than 5 occurrences in the overall range

G1G2: Extremely rare to very rare globally

G2: Very rare globally; usually between 5-10 occurrences in the overall range

G2G3: Very rare to uncommon globally

G3: Rare to uncommon globally; usually between 20-100 occurrences

G3G4: Rare to common globally

G4: Common globally; usually more than 100 occurrences in the overall range

G4G5: Common to very common globally

G5: Very common globally; demonstrably secure

T: Denotes that the rank applies to a subspecies or variety

END: Endangered

THR: Threatened

SC: Special Concern

2, 3 or NS after a COSEWIC ranking indicates the species is either on Schedule 2, Schedule 3 or No Schedule of the Species At Risk Act (SARA)

NAR: Not At Risk

IND: Indeterminant, insufficient information to assign status

DD: Data Deficient

6: Rare in Site Region 6

Explanation of Status and Acronyms

7: Rare in Site Region 7

Area: Minimum patch size for area-sensitive species (ha)

H- highly significant in Hamilton Region (i.e. rare)

m- moderately significant in Hamilton Region (i.e. uncommon)

L1- extremely rare locally (Toronto Region)

L2- very rare locally (Toronto Region)

L3- rare to uncommon locally (Toronto Region)

HR- rare in Halton Region, highly significant

HU- uncommon in Halton Region, moderately significant

* The Pileated Woodpecker will incorporate smaller woodlots into its homerange, therefore it may not be a true area-sensitive species (Naylor et al. 1996)

Atlas of the Breeding Birds of Ontario: Breeding Evidence Codes

X: Species observed in its breeding season (no breeding evidence)

H: Species observed in its breeding season in suitable nesting habitat

S: Singing males (s) present, or breeding calls heard, in suitable nesting habitat in breeding season

M: At least 7 individuals singing or producing other sounds associated with breeding (e.g., calls or drumming), heard during the same visit to a single square and in suitable nesting habitat during the species' breeding season.

P: Pair observed in suitable nesting habitat in nesting season

T: Permanent territory presumed through registration of territorial song, or the occurrence of an adult bird, at the same place, in breeding habitat, on at least two days a week or more apart, during its breeding season. Use discretion when using this code

D: Courtship or display, including interaction between a male and a female or two males, including courtship feeding or copulation

V: Visiting probable nest site

A: Agitated behavior or anxiety calls of an adult

B: Brood patch on adult female or cloacal protuberance on adult male

N: Nest-building or excavation of nest hole, except by a wren or a woodpecker

NB: Nest-building or excavation of nest hole by a species other than a wren or a woodpecker

DD: Distraction display or injury feigning

NU: Used nest or eggs shells found (occupied or laid within the period of the survey)

FY: Recently fledged young (nidicolous species) or downy young (nidifugous species), including incapable of sustained flight

AE: Adult leaving or entering nest site in circumstances indicating occupied nest

FS: Adult carrying fecal sac

CF: Adult carrying food for young

NE: Nest containing eggs

NY: Nest with young seen or heard