

August 2011



NORTHLAND POWER

McLean's Mountain Wind Farm

Evaluation of Significance Report



Submitted by:



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1. Introduction

Northland Power Inc. (Northland Power) and Mnidoo Mnising Power (MMP) propose to develop a wind facility with a maximum name plate capacity of 60 megawatts (MW) located south of Little Current in the Municipality of Northeastern Manitoulin and the Islands, Ontario (**Figure 1**). The renewable energy facility will be known as the McLean's Mountain Wind Farm and will be rated as a Class 4 wind facility. Northland Power has received a contract from the Ontario Power Authority (OPA) for the purchase of electricity generated by wind turbines from this renewable facility through the Province's Feed-in-Tariff (FIT) program (enabled by the Green Energy and Green Economy Act). The project will require approval under *Ontario Regulation 359/09 – Renewable Energy Approval (REA or Ontario Regulation 359/09)* under Section V.0.1 of the *Ontario Environmental Protection Act*.

Ontario Regulation 359/09 requires that all renewable energy projects conduct an evaluation of significance for all natural heritage features that fall within the project location or the prescribed setback area (*REA* Section 27). This Evaluation of Significance Report was completed in partial fulfilment of the regulatory requirements for the *REA* process. Additional details regarding the potential impacts and mitigation measures required to protect significant natural features will be provided in a separate Environmental Impact Study Report. These reports will be submitted to the Ministry of Natural Resources (MNR) for review and comment, as required in *Ontario Regulation 359/09* and will provide for the protection of natural features within and adjacent to the project location. Discussion of species at risk, fish habitat and other information needs, as outlined in the MNR's Approval and Permitting Requirements Document for Renewable Energy (MNR 2009), are discussed in a separate report, under direction from the MNR and in compliance with the *REA*.

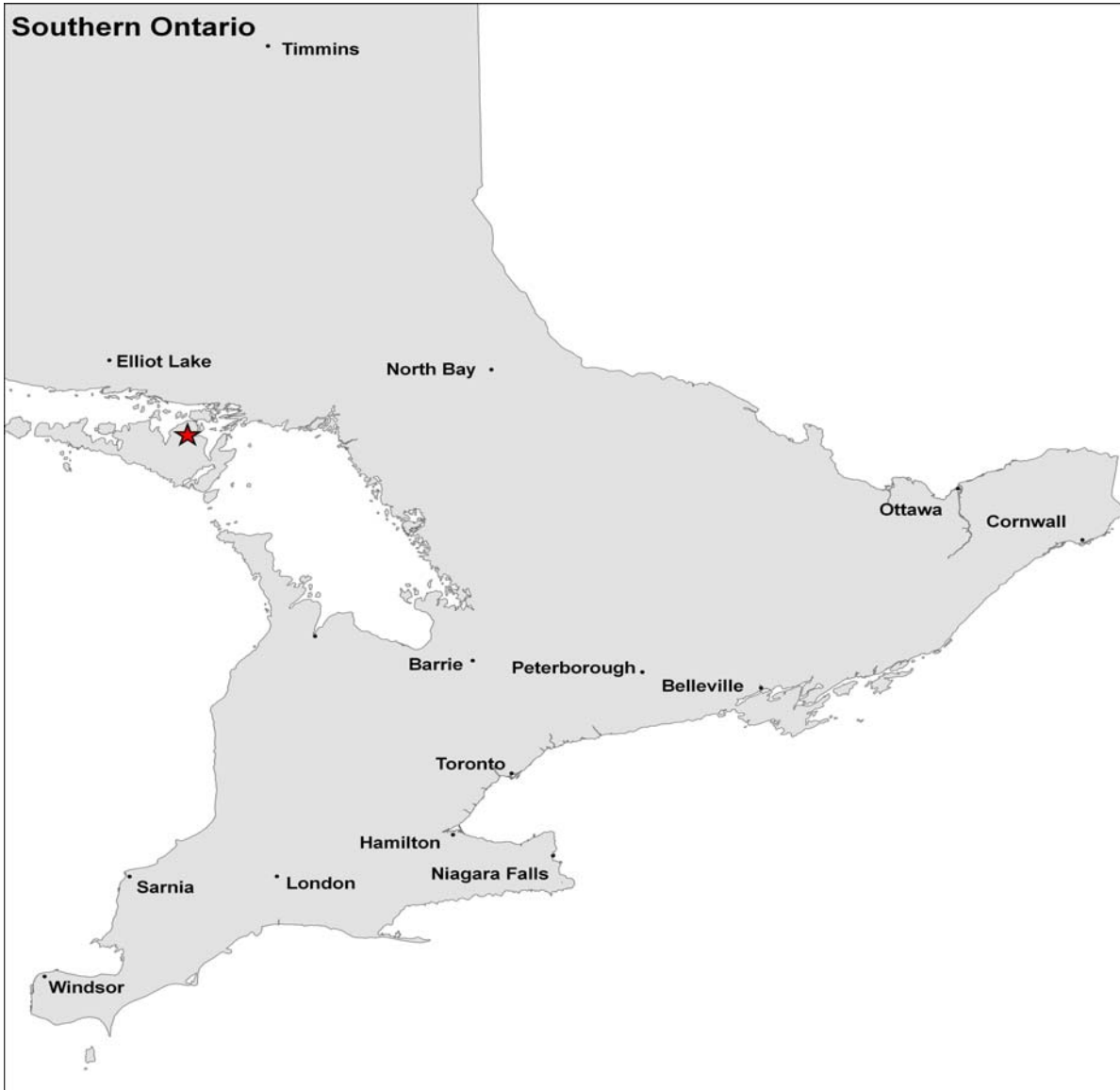


Figure 1: General Location of the McLean's Mountain Wind Farm Project in Ontario

2. The Proponent

Northland Power, founded in 1987, is an experienced developer, owner and operator of renewable power generation in Canada and abroad. Company activities include developing, managing, financing and owning renewable energy facilities. In the course of developing renewable energy projects, Northland Power satisfies various environmental approval requirements and obtains regulatory approvals that vary depending on the jurisdiction, project capacity and site location. In addition, Northland Power builds long-term relationships with the communities that host its' projects. Northland Power is committed to the health and welfare of the community of Little Current and the Town of Northeastern Manitoulin and the Islands.

Contact information for the Proponent is as follows:

Full Name of Company: Northland Power Incorporated
Address: 30 St. Clair Avenue West, 17th Floor
Telephone: (705) 271-5358, (705) 368-0303
Prime Contact: Rick Martin - Project Manager
Email: rickmartin@northlandpower.ca

Dillon Consulting Limited is the prime contractor for the preparation of this Evaluation of Significance Report. The contact at Dillon is:

Full Name of Company: Dillon Consulting Limited
Address: 235 Yorkland Blvd, Suite 800
Toronto, Ontario, M2J 4Y8
Telephone: (416) 229-4646 ext 2355
Fax: (416) 229-4692
Prime Contact: Don McKinnon, REA Project Manager
Email: DPMckinnon@dillon.ca









3. Project Location

The proposed Class 4 wind facility is located in the Municipality of Northeastern Manitoulin and the Islands in northeastern Ontario, covering approximately 8,200 ha of land south of the Town of Little Current. **Figure 1** shows the general location of the project. **Figure 2** shows the project location as defined in *Ontario Regulation 359/09*, which is the location encompassing all project components and includes the 120 m setbacks. Project components, including wind turbines, construction areas and electrical facilities such as transmission line, inverters, transformers, substations and electrical feeder lines, will be located on private land or municipal rights-of-way. **Figure 2** outlines the baseline natural features in the project location and adjacent lands, in accordance with the requirements of Section 26 of *Ontario Regulation 359/09*. The planned wind facility will occur primarily within lands currently zoned as rural, with small areas zoned as agricultural and hazard lands (Municipality of Northeastern Manitoulin and the Islands 2002; see **Appendix A1**).










Turbines 31, 34, 39, 40, 43 are being permitted as alternate sites (listed as Five Extra Permitted Sites in the legend of report mapping). While construction of turbines at these sites is not anticipated, it is desirable to have approved alternate sites in the event that any of the other turbines sites proves not to be constructible. It is recognized that no access road is provided for alternate turbine sites in the southwest corner of the project location (Turbine 31, 39, 40 and 43). If turbine construction at one or more of these alternate sites in the southwest portion of the project location is determined necessary, NPI will obtain any additional approvals as required for the access road, prior to construction.

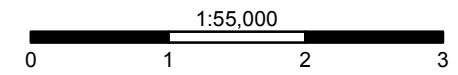
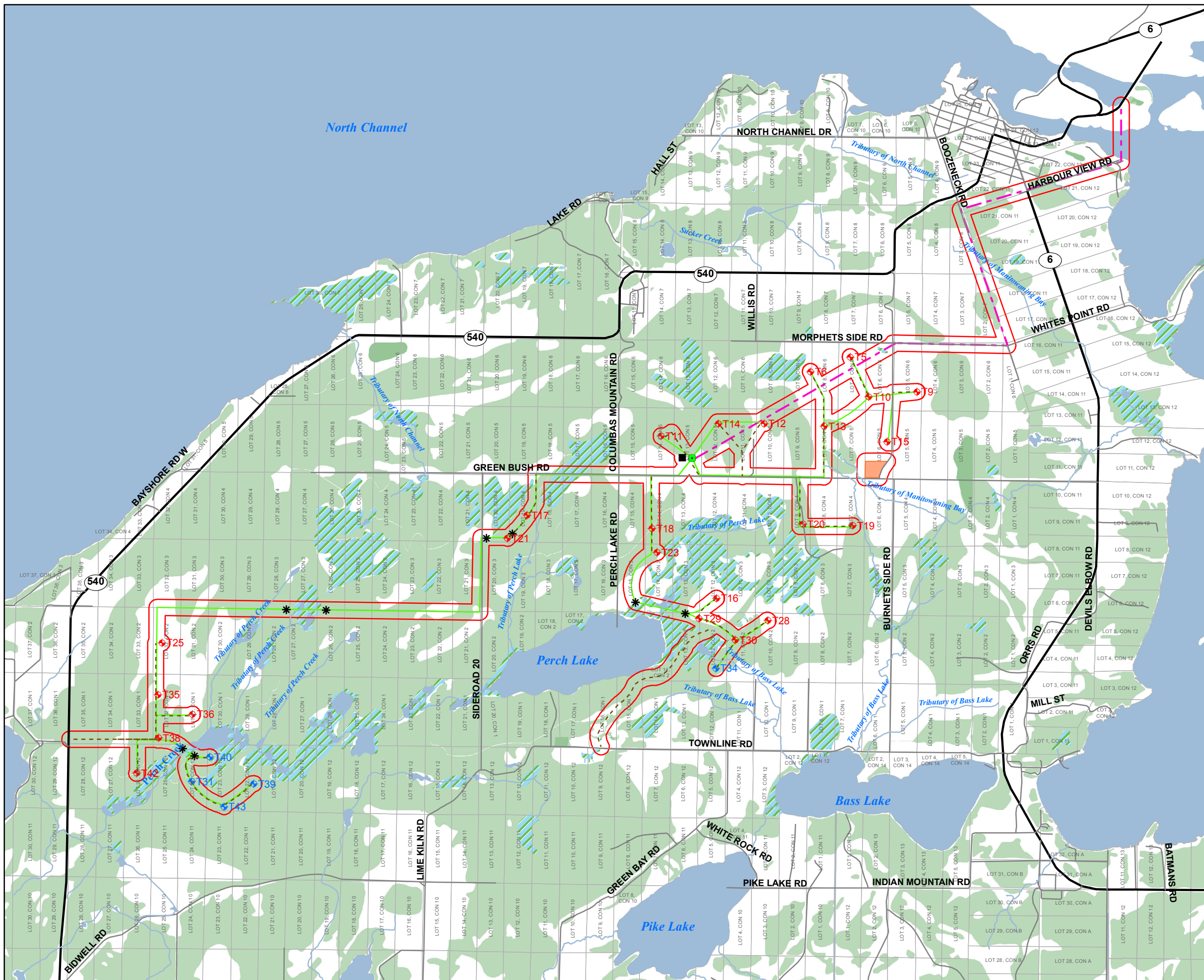
McLean's Mountain Wind Farm Figure 2: Project Location

Legend

-  Local Roads
-  Highway
-  120 m Project Component Setback
-  Lots/Concessions
-  Water Body
-  Watercourse
-  Woodland
-  Unevaluated Wetland

Project Components

-  24 Wind Turbine Locations
-  Five Extra Permitted Sites
-  Substation
-  Operations Building
-  Horizontal Directional Drilling Access/Exit Pit
-  Access Road
-  Feeder Lines
-  Transmission Line
-  Construction Staging Area



4. Summary of Site Investigation

Table 1 provides a summary of site investigation findings completed according to Section 26 of *Ontario Regulation 359/09*.

Table 1: Summary of Site Investigation Results

| Natural Feature ID | Feature in Relation to Project Location | | Evaluation of Significance Status | | |
|---|---|---------------------------|-----------------------------------|----------------------|-------------------------|
| | Within | Within Prescribed Setback | Requires Evaluation | Previously Evaluated | Evaluation Not Required |
| PROVINCIAL PARKS AND CONSERVATION RESERVES | | | | | |
| Not applicable to project location | | | | | |
| ANSI, LIFE SCIENCE | | | | | |
| Not applicable to project location | | | | | |
| ANSI, EARTH SCIENCE | | | | | |
| Not applicable to project location | | | | | |
| VALLEYLANDS | | | | | |
| Not applicable to project location | | | | | |
| WETLANDS | | | | | |
| 1 | --- | ✓ | ✓ | --- | --- |
| 2 | --- | ✓ | ✓ | --- | --- |
| 3 | --- | ✓ | ✓ | --- | --- |
| 4 | --- | ✓ | ✓ | --- | --- |
| 5 | --- | ✓ | ✓ | --- | --- |
| 6 | --- | ✓ | ✓ | --- | --- |
| 7 | --- | ✓ | ✓ | --- | --- |
| 8 | --- | ✓ | ✓ | --- | --- |
| 9 | --- | ✓ | ✓ | --- | --- |
| 10 | --- | ✓ | ✓ | --- | --- |
| 11 | --- | ✓ | ✓ | --- | --- |

| Natural Feature ID | Feature in Relation to Project Location | | Evaluation of Significance Status | | |
|---|---|---------------------------|-----------------------------------|----------------------|-------------------------|
| | Within | Within Prescribed Setback | Requires Evaluation | Previously Evaluated | Evaluation Not Required |
| 12 | ✓ | ✓ | ✓ | --- | --- |
| CANDIDATE WILDLIFE HABITAT | | | | | |
| <i>Seasonal Concentration Areas</i> | | | | | |
| Waterfowl Nesting Area – WNA 1 | ✓ | ✓ | ✓ | --- | --- |
| Waterfowl Nesting Area – WNA 2 | ✓ | ✓ | --- | --- | ✓ |
| Waterfowl Nesting Area – WNA 3 | ✓ | ✓ | --- | --- | ✓ |
| Waterfowl Nesting Area – WNA 4 | ✓ | ✓ | ✓ | --- | --- |
| Waterfowl Nesting Area – WNA 5 | --- | ✓ | ✓ | --- | --- |
| Raptor Wintering Feeding and Roosting Area - RWFR 1 | ✓ | ✓ | --- | --- | ✓ |
| Raptor Wintering Feeding and Roosting Area - RWFR 2 | ✓ | ✓ | --- | --- | ✓ |
| Raptor Wintering Feeding and Roosting Area - RWFR 3 | ✓ | ✓ | ✓ | --- | --- |
| Raptor Wintering Feeding and Roosting Area - RWFR 4 | ✓ | ✓ | ✓ | --- | --- |
| Bullfrog Concentration Area – BCA 1 | --- | ✓ | ✓ | --- | --- |
| Bullfrog Concentration Area – BCA 2 | --- | ✓ | ✓ | --- | --- |
| Bullfrog Concentration Area – BCA 3 | --- | ✓ | ✓ | --- | --- |
| Bullfrog Concentration Area – BCA 4 | --- | ✓ | ✓ | --- | --- |
| Bullfrog Concentration Area – BCA 5 | --- | ✓ | ✓ | --- | --- |
| Bullfrog Concentration Area – BCA 6 | --- | ✓ | ✓ | --- | --- |

| Natural Feature ID | Feature in Relation to Project Location | | Evaluation of Significance Status | | |
|--|---|---------------------------|-----------------------------------|----------------------|-------------------------|
| | Within | Within Prescribed Setback | Requires Evaluation | Previously Evaluated | Evaluation Not Required |
| Bullfrog Concentration Area – BCA 7 | --- | ✓ | ✓ | --- | --- |
| <i>Rare Vegetation Communities</i> | | | | | |
| Alvar – ALV 1 | ✓ | ✓ | ✓ | --- | --- |
| Alvar – ALV 2 | ✓ | ✓ | ✓ | --- | --- |
| Alvar – ALV 3 | ✓ | ✓ | ✓ | --- | --- |
| Alvar – ALV 4 | ✓ | ✓ | ✓ | --- | --- |
| Alvar – ALV 5 | ✓ | ✓ | --- | --- | ✓ |
| <i>Specialised Wildlife Habitat</i> | | | | | |
| Woodland Amphibian Breeding Habitat – WABH 1 | --- | ✓ | ✓ | --- | --- |
| Woodland Amphibian Breeding Habitat – WABH 2 | --- | ✓ | ✓ | --- | --- |
| Woodland Amphibian Breeding Habitat – WABH 3 | --- | ✓ | ✓ | --- | --- |
| Woodland Amphibian Breeding Habitat – WABH 4 | --- | ✓ | ✓ | --- | --- |
| Woodland Amphibian Breeding Habitat – WABH 5 | --- | ✓ | ✓ | --- | --- |
| Woodland Amphibian Breeding Habitat – WABH 6 | --- | ✓ | ✓ | --- | --- |
| Woodland Amphibian Breeding Habitat – WABH 7 | --- | ✓ | ✓ | --- | --- |
| Woodland Amphibian Breeding Habitat – WABH 8 | --- | ✓ | ✓ | --- | --- |
| Woodland Amphibian Breeding Habitat – WABH 9 | ✓ | ✓ | --- | --- | ✓ |
| Turtle Over-Wintering Areas – TOA 1 | --- | ✓ | ✓ | --- | --- |
| Turtle Over-Wintering Areas – TOA 2 | --- | ✓ | ✓ | --- | --- |

| Natural Feature ID | Feature in Relation to Project Location | | Evaluation of Significance Status | | |
|---|---|---------------------------|-----------------------------------|----------------------|-------------------------|
| | Within | Within Prescribed Setback | Requires Evaluation | Previously Evaluated | Evaluation Not Required |
| Turtle Over-Wintering Areas – TOA 3 | --- | ✓ | ✓ | --- | --- |
| Turtle Over-Wintering Areas – TOA 4 | --- | ✓ | ✓ | --- | --- |
| Turtle Over-Wintering Areas – TOA 5 | --- | ✓ | ✓ | --- | --- |
| Turtle Over-Wintering Areas – TOA 6 | --- | ✓ | ✓ | --- | --- |
| Turtle Over-Wintering Areas – TOA 7 | --- | ✓ | ✓ | --- | --- |
| Sites Supporting Area-Sensitive Species: Forest Birds – FB1 | ✓ | ✓ | ✓ | --- | --- |
| Sites Supporting Area-Sensitive Species: Forest Birds – FB2 | ✓ | ✓ | ✓ | --- | --- |
| Sites Supporting Area-Sensitive Species: Forest Birds – FB3 | ✓ | ✓ | --- | --- | ✓ |
| Sites Supporting Area-Sensitive Species: Forest Birds – FB4 | ✓ | ✓ | --- | --- | ✓ |
| Sites Supporting Area-Sensitive Species: Forest Birds – FB5 | ✓ | ✓ | --- | --- | ✓ |
| Sites Supporting Area-Sensitive Species: Open Country Breeding Birds – OCBB 1 | ✓ | ✓ | --- | --- | ✓ |
| Sites Supporting Area-Sensitive Species: Open Country Breeding Birds – OCBB 2 | ✓ | ✓ | --- | --- | ✓ |
| Sites Supporting Area-Sensitive Species: Open Country Breeding Birds – OCBB 3 | --- | ✓ | ✓ | --- | --- |
| Sites Supporting Area-Sensitive Species: Open Country Breeding Birds – OCBB 4 | ✓ | ✓ | ✓ | --- | --- |

| Natural Feature ID | Feature in Relation to Project Location | | Evaluation of Significance Status | | |
|---|---|---------------------------|-----------------------------------|----------------------|-------------------------|
| | Within | Within Prescribed Setback | Requires Evaluation | Previously Evaluated | Evaluation Not Required |
| Sites Supporting Area-Sensitive Species: Open Country Breeding Birds – OCBB 5 | ✓ | ✓ | --- | --- | ✓ |
| <i>Habitat of Species of Conservation Concern</i> | | | | | |
| Northern Shrike | --- | ✓ | ✓ | --- | --- |
| Rough-legged Hawk | --- | ✓ | ✓ | --- | --- |
| Short-eared Owl | --- | ✓ | ✓ | --- | --- |
| Bald Eagle | --- | ✓ | ✓ | --- | --- |
| Canada Warbler | --- | ✓ | ✓ | --- | --- |
| Common Nighthawk | --- | ✓ | ✓ | --- | --- |
| Olive-sided Flycatcher | --- | ✓ | ✓ | --- | --- |
| Red-headed Woodpecker | --- | ✓ | ✓ | --- | --- |
| Common Snapping Turtle | --- | ✓ | ✓ | --- | --- |
| Cooper's Milkvetch | --- | ✓ | ✓ | --- | --- |
| Slender Blazing Star | --- | ✓ | ✓ | --- | --- |
| Green Arrow-arum | --- | ✓ | ✓ | --- | --- |
| Clustered Broomrape | --- | ✓ | ✓ | --- | --- |
| Prairie Dropseed | --- | ✓ | ✓ | --- | --- |

5. Evaluation of Significance Purpose

This Evaluation of Significance Report is consistent with Section 27 of *Ontario Regulation 359/09*, which states that a person who proposes to engage in a renewable energy project shall evaluate any information available to the person relating to natural features, including all information obtained during the records review, site investigation and in consultation with regulatory agencies, stakeholders and other interested and relevant parties. This Evaluation of Significance Report assesses the results of the records review and site investigation information, which is summarized in **Table 1**, in order to determine:

- If a natural features is significant if it is a valleyland or a wildlife habitat; and,
- If a natural feature is provincially significant if it is a southern wetland, a northern wetland, a coastal wetland, an area of natural and scientific interest (earth science) or an area of natural and scientific interest (life science).

Natural features that have not previously been evaluated by the MNR require an evaluation using criteria and procedures established or accepted by the MNR. Woodlands and valleylands are only assessed for significance if they are south and east of the Canadian Shield as shown in Figure 1 in the *Provincial Policy Statement, 2005*.

6. Evaluation of Significance Methodology

The planning and development of this project has been ongoing since 2004 and an Environmental Assessment under the previous renewable energy process was completed and released for review. Methods used to document existing natural environment conditions in the project location adhered to previous MNR guidance documents and were developed through consultation with the MNR and Environment Canada. This Evaluation of Significance Report uses this previously collected information and applies it to the format prescribed by the REA process.

The following sections provide evaluation criteria and procedures used to evaluate the natural features determined to be in the project location or within 120 metres during the records review and site investigation. All criteria and procedures used are those that are currently accepted by the MNR.

6.1 Wetland Evaluation

Wetlands on Manitoulin Island are defined as southern wetlands. Southern wetlands are those located south of the northern limit of Ecoregions 5E, 6E and 7E as shown in Figure 1 of the Provincial Policy Statement, 2005. The evaluation of wetlands within or within 120m of the project location was completed using the Wetland Characteristics and Ecological Functions Assessment for Renewable Energy Projects. The criteria and procedures found within are based on sections of the Ontario Wetland Evaluation System (OWES) guidelines (MNR 2002) and were applied by a qualified professional, who has received MNR training in the use of the Province of Ontario's wetland evaluation system.

6.2 Woodland Evaluation

The Municipality of Northeastern Manitoulin and the Islands is located on the Canadian Shield. Based on the definition of woodlands in *Ontario Regulation 359/09*, only lands south and east of the Canadian Shield can be evaluated as significant woodland. Therefore, an evaluation of significance for the woodland areas within the project location and adjacent 120 m is not required under *Ontario Regulation 359/09*.

6.3 Evaluating Candidate Wildlife Habitat

The Significant Wildlife Habitat Technical Guide (MNR 2000), supported by the Significant Wildlife Habitat Decision Support System, is the authoritative source for the identification and evaluation of significant wildlife habitat. Information collected to evaluate wildlife habitat as significant often requires specific studies targeted to either the species, the habitat, or both. Methodologies used to investigate the candidate wildlife habitat identified during the site investigation (see **Table 1** and **Figures 3-9**) are further outlined in **Sections 6.3.1 to 6.3.4**.

6.3.1 Seasonal Concentration Areas

6.3.1.1 Waterfowl Nesting Area

Breeding bird surveys were conducted according to the methods outlined in Environment Canada's *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (2007a) and the *Ontario Breeding Bird Atlas Guide for Participants* (OBBA 2001). Surveys were conducted in June and July of 2007, 2008 and 2010. Timing for the surveys generally occurred between dawn and 5 hours after sunrise, though sometimes extending in to the early afternoon to ensure additional coverage of all habitat types. Combined 10-minute fixed/non-fixed radius interior point count methodology (>100 m from road/habitat edge) was used to establish quantitative estimates of bird abundance in major habitat types of the project location (see **Figures 3**). Where land access was insufficient to facilitate interior point counts, roadside point counts were spaced appropriately to provide sufficient coverage of major habitat type within the project location. Point counts were repeated twice over the course of each breeding season (Visit 1 – late May to mid-June; Visit 2 – mid-June to early July) to ensure that both early and late breeders were detected.

In addition to point counts, breeding bird surveys employed area search methodology which involved visiting each potential waterfowl nesting habitat type (**Figures 3**). In some cases, area searches were conducted along the roadside and by car, noting species observed between point count locations.

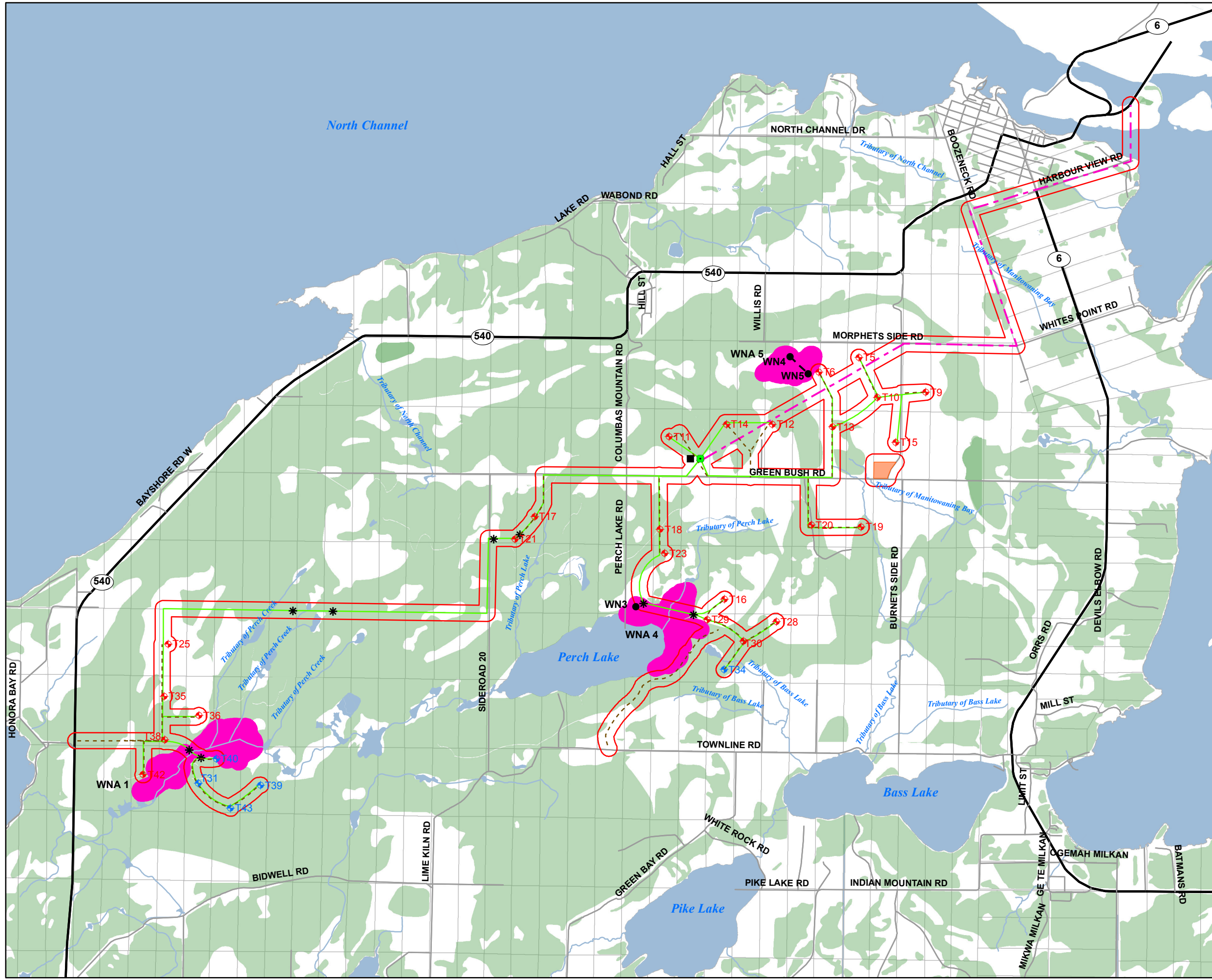


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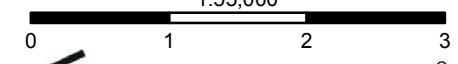
McLean's Mountain Wind Farm Figure 3: Waterfowl Nesting Area Survey Locations

Legend

- Local Roads
 - Highway
 - Watercourse
 - 120 m Project Location Setback
 - Lots/Concessions
 - Water Body
 - Unclassified Woodland Community
 - Waterfowl Nesting Areas
(Including: MAMM1, MAMM3, MASM1, MASM1-1, MASM1-14, ME, SWDM2, SWDM2-1, SWDM2-2, SWDM3, SWDM4-5, SWTM2-5, SWTM3)
 - Waterfowl Nesting Point Counts
 - Transect Routes
- #### Project Components
- 24 Wind Turbine Locations
 - Five Extra Permitted Sites
 - Substation
 - Operations Building
 - Horizontal Directional Drilling Access/Exit Pit
 - Transmission Line
 - Access Road
 - Feeder Lines
 - Construction Staging Area

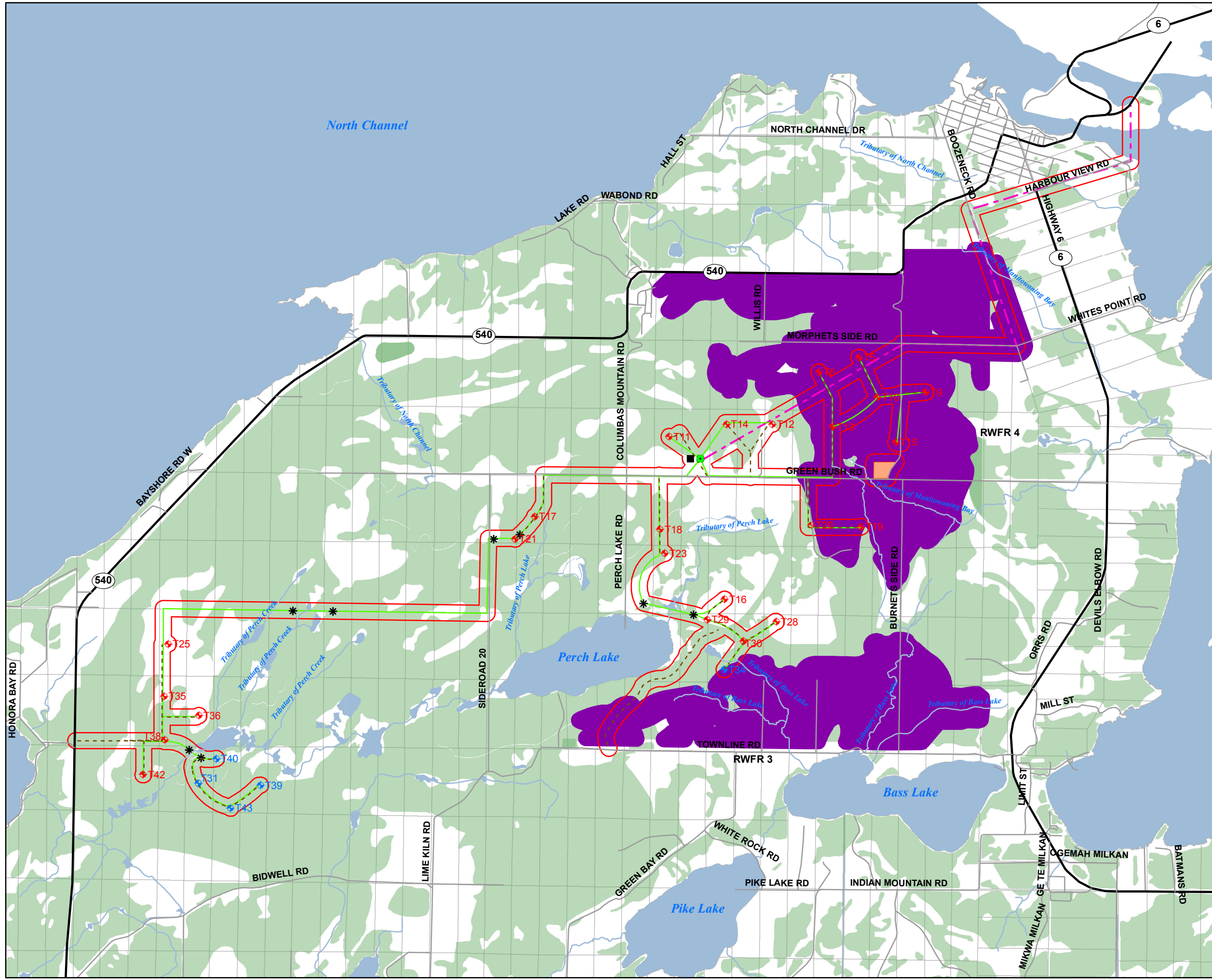


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**McLean's Mountain Wind Farm
Figure 4: Raptor Winter Feeding
and Roosting Area**



Legend

- Local Roads
- Highway
- Watercourse
- 120 m Project Location Setback
- Lots/Concessions
- Water Body
- Unclassified Woodland Community
- Raptor Winter Feeding and Roosting Area (120m Buffer) (Including: OAGM4)

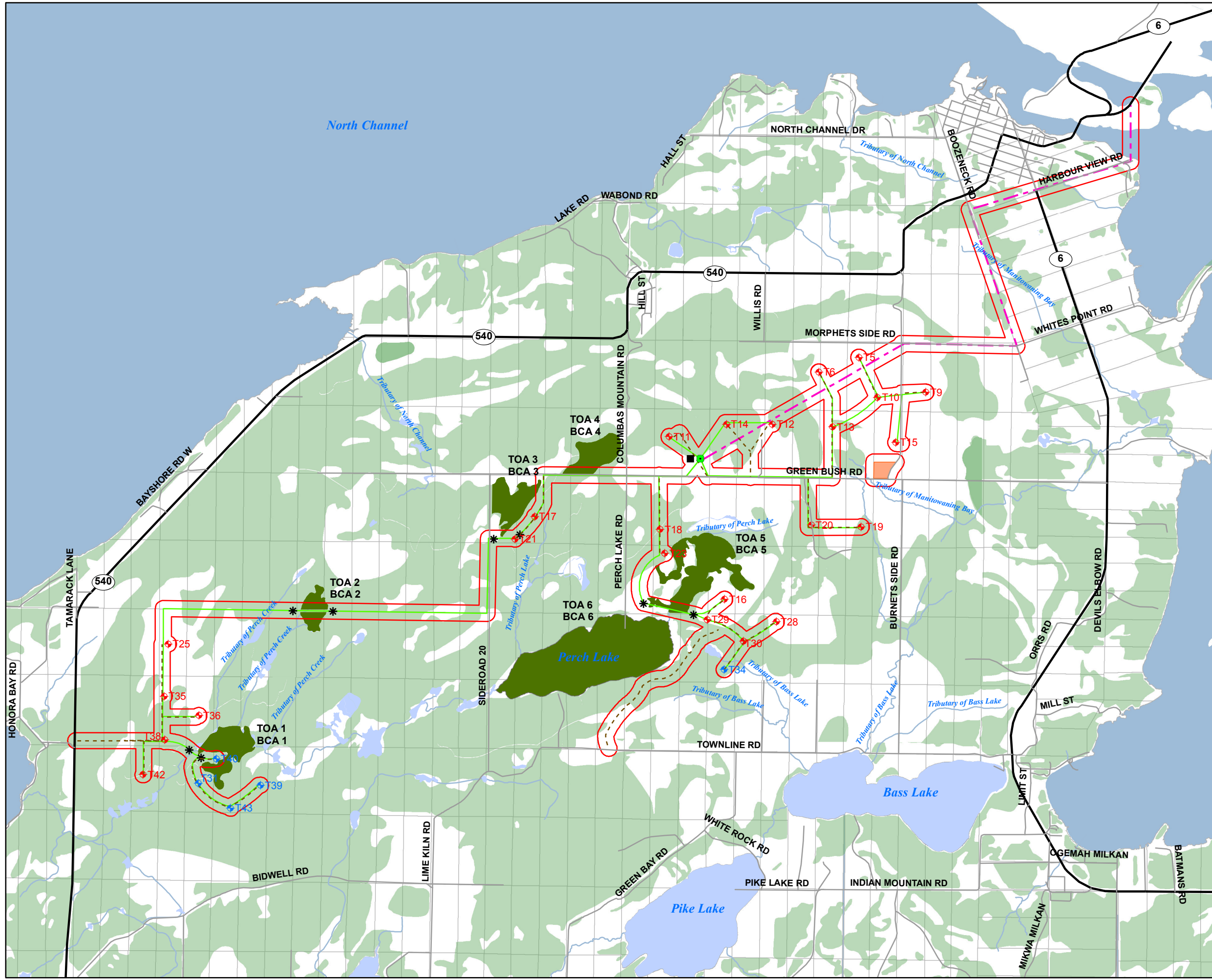
Project Components

- ◆ 24 Wind Turbine Locations
- ◆ Five Extra Permitted Sites
- Substation
- Operations Building
- * Horizontal Directional Drilling Access/Exit Pit
- Transmission Line
- - - Access Road
- Feeder Lines
- Construction Staging Area



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**McLean's Mountain Wind Farm
Figure 5: Bullfrog Concentration
Areas & Turtle Overwintering Area**



Legend

- Local Roads
- Highway
- Watercourse
- 120 m Project Location Setback
- Lots/Concessions
- Water Body
- Unclassified Woodland Community
- Turtle Overwintering Area & Bullfrog Concentration Areas

Project Components

- ◆ 24 Wind Turbine Locations
- ◆ Five Extra Permitted Sites
- Substation
- Operations Building
- * Horizontal Directional Drilling Access/Exit Pit
- Transmission Line
- - - Access Road
- Feeder Lines
- Construction Staging Area

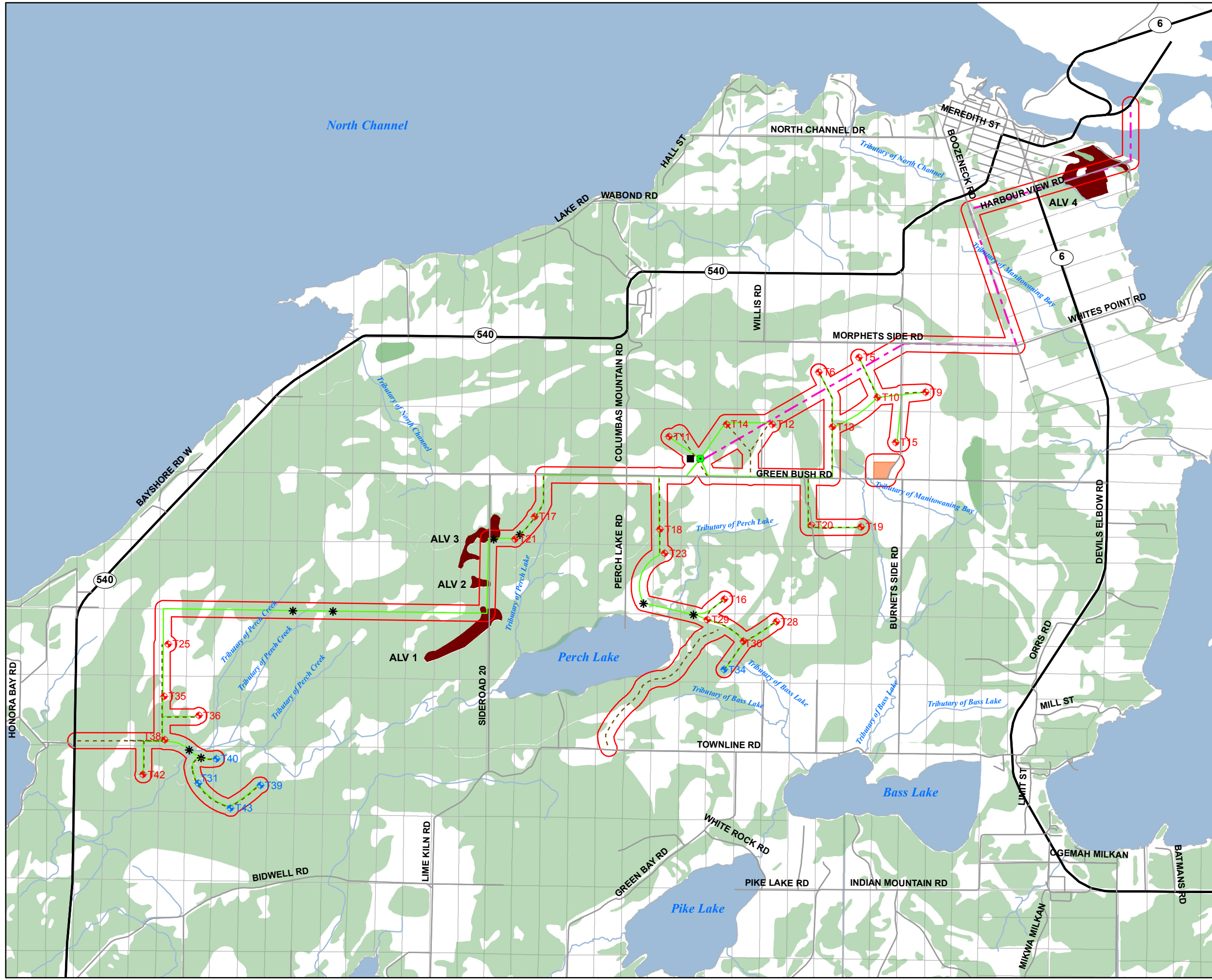


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McLean's Mountain Wind Farm Figure 6: Rare Vegetation Communities



Legend

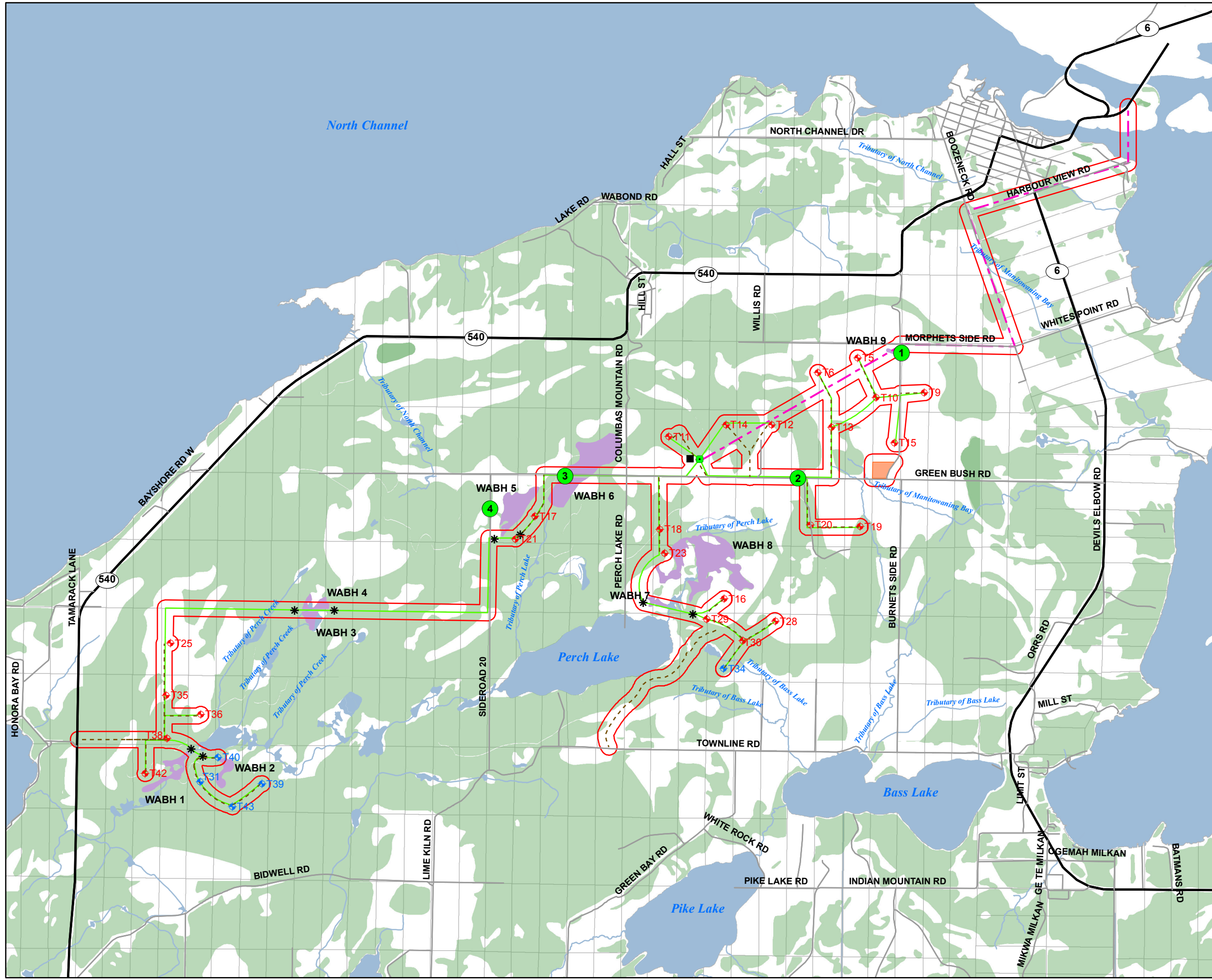
- Local Roads
 - Highway
 - Watercourse
 - 120 m Project Location Setback
 - Lots/Concessions
 - Water Body
 - Unclassified Woodland Community
 - RBSA1-1: Common Juiper Shrub Alvar
- Project Components**
- 24 Wind Turbine Locations
 - Five Extra Permitted Sites
 - Substation
 - Operations Building
 - Horizontal Directional Drilling Access/Exit Pit
 - Transmission Line
 - Access Road
 - Feeder Lines
 - Construction Staging Area












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**McLean's Mountain Wind Farm
Figure 7: Woodland Amphibian
Breeding Habitat**

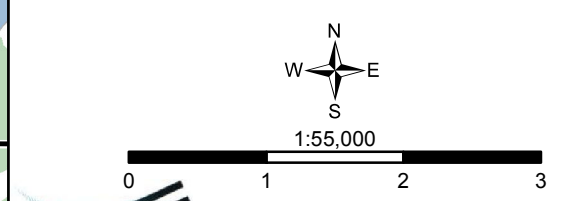


Legend

-  Amphibian Survey Points
-  Local Roads
-  Highway
-  Watercourse
-  120 m Project Location Setback
-  Lots/Concessions
-  Water Body
-  Unclassified Woodland Community
-  Woodland Amphibian Breeding Habitat
(Including: SWDM2, SWDM2-1, SWDM2-2, SWDM3, SWDM4-5, SWMM1-1, SWMM3-2, SWMM4)











Project Components

-  24 Wind Turbine Locations
-  Five Extra Permitted Sites
-  Substation
-  Operations Building
-  Horizontal Directional Drilling Access/Exit Pit
-  Transmission Line
-  Access Road
-  Feeder Lines
-  Construction Staging Area












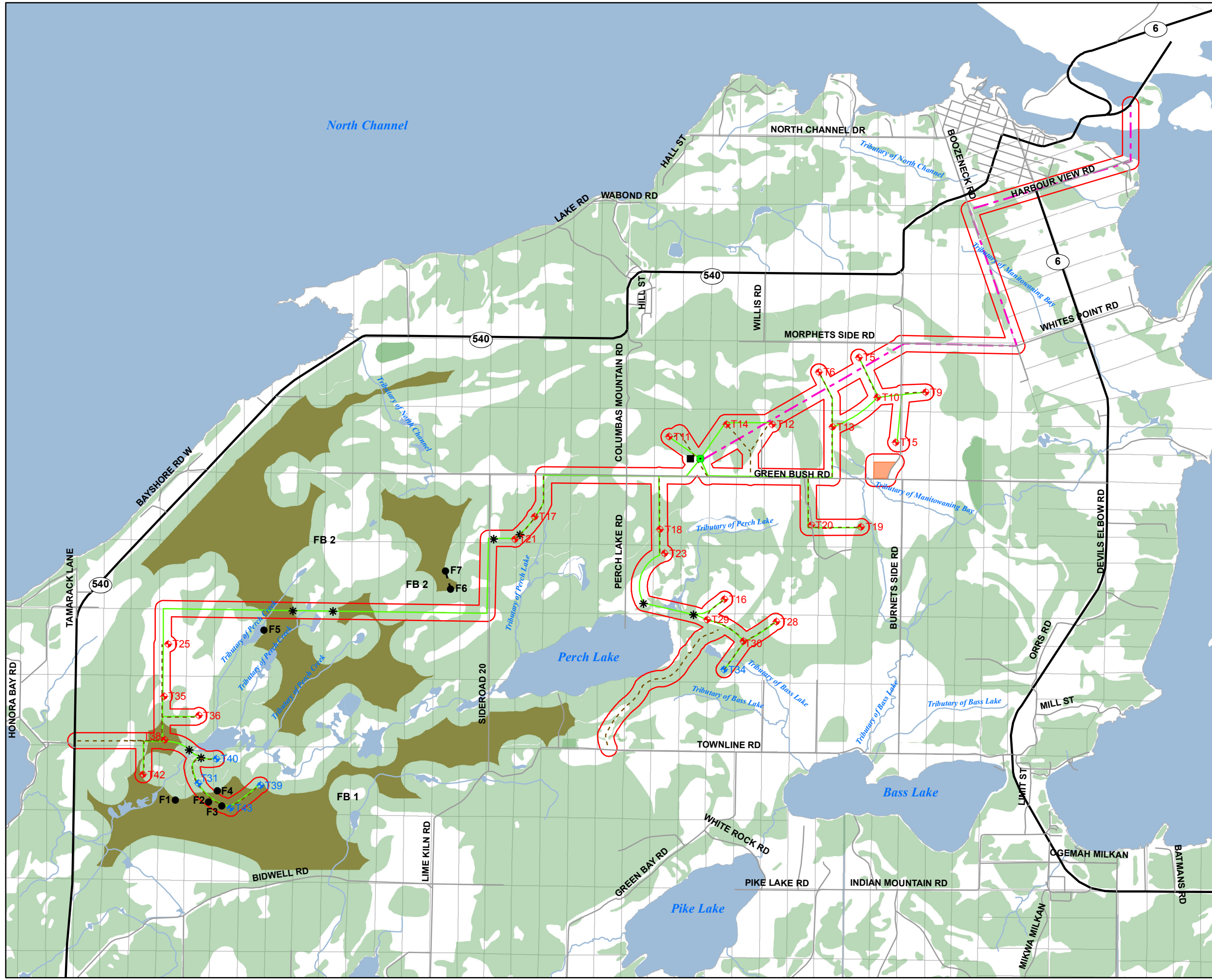
**McLean's Mountain Wind Farm
Figure 8: Sites Supporting Area-
Sensitive Species: Forest Bird
Surveys**

Legend

-  Local Roads
-  Highway
-  Watercourse
-  120 m Project Location Setback
-  Lots/Concessions
-  Water Body
-  Unclassified Woodland Community (< 200m from edge)
-  Unclassified Woodland Community (Interior > 200 m from edge)
(Including: FOD, FODM1, FODM5-1, FODM8-1,
FOMM10, FOMM4, FODM5-1, SWCM1-2, SWDM2-1,
SWDM2-1, SWDM2-2, SWDM2, SWDM3, SWDM4-5,
SWMM1-1, SWMM3-2, SWMM4)
-  Interior Forest Point Counts
-  Transect Routes

Project Components

-  24 Wind Turbine Locations
-  Five Extra Permitted Sites
-  Substation
-  Operations Building
-  Horizontal Directional Drilling Access/Exit Pit
-  Transmission Line
-  Access Road
-  Feeder Lines
-  Construction Staging Area



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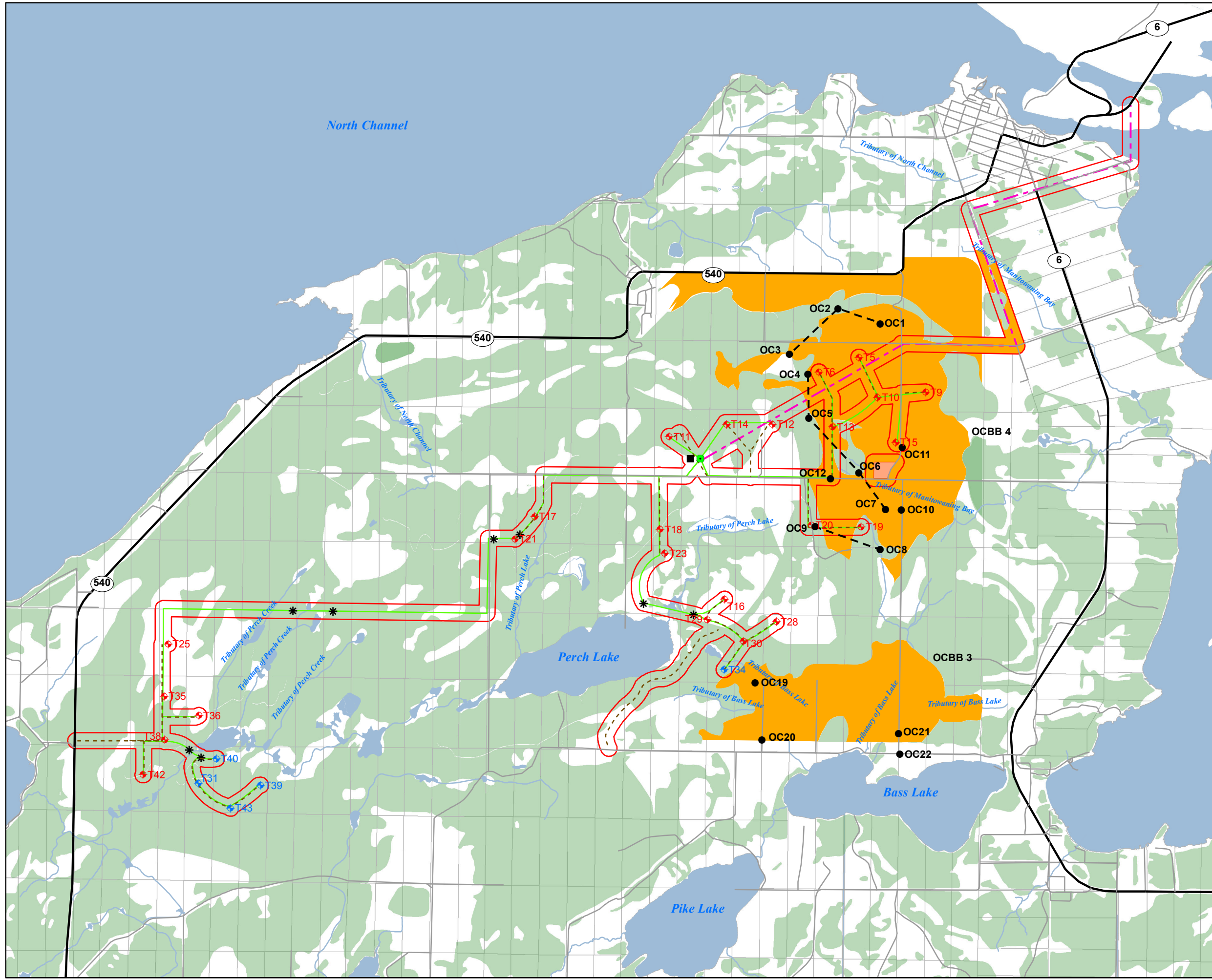


**NORTHLAND
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McLean's Mountain Wind Farm Figure 9: Sites Supporting Area-Sensitive Species: Open Country Breeding Bird Surveys

Legend

- Local Roads
 - Highway
 - Watercourse
 - 120 m Project Location Setback
 - Lots/Concessions
 - Water Body
 - Unclassified Woodland Community
 - Open Country Breeding Bird Habitat > 30 ha (Including: OAGM4, ME)
 - Open Country Breeding Bird Habitat Point Counts
 - — Transect Routes
- #### Project Components
- ◆ 24 Wind Turbine Locations
 - ◆ Five Extra Permitted Sites
 - Substation
 - Operations Building
 - * Horizontal Directional Drilling Access/Exit Pit
 - Transmission Line
 - — Access Road
 - Feeder Lines
 - Construction Staging Area



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6.3.1.2 *Raptor Winter Feeding and Roosting Area*

Wintering raptor surveys were generally focused on the large open pasture areas with interspersed woodland habitat located along Green Bush Road and McLean's Mountain Road. Six area searches were conducted throughout January, February and March of 2007 (see **Figure 4**). On average, each area search consisted of approximately 30km of road transect or 8.5 hr of observation. Where access to major habitat types was available, transects were walked. Any areas observed to contain concentrations of a single species or group were identified. Where no access was permissible, or inclement weather prevented access, observations were collected from the road. Local roads were driven slowly with windows down; occasional stops were made to record all birds seen or heard.

6.3.1.3 *Bullfrog Concentration Area*

Potentially significant bullfrog concentration areas (**Figure 5**) were assessed through the use nocturnal points counts and diurnal areas searches. Diurnal area searches were performed within bullfrog concentration area units 1, 2, 5 and 6 to observe evidence of bullfrogs in the form of eggs, individual sightings and calls. Nocturnal surveys were based on the marsh monitoring program at 4 locations throughout the project location which correlates with woodland amphibian breeding habitat surveys (see **Figure 7**). In addition, the diversity and abundance of amphibians encountered during fieldwork was noted and considered during the evaluation of significance.

6.3.2 **Rare Vegetation Communities, Alvar**

Ecological Land Classification was initially used to identify the alvar communities in the general area of the project location (**Figure 6**). Vegetation surveys focusing on open habitats, as outlined in **Section 6.3.4.1** below, were undertaken to identify alvar plant indicator species as part of the evaluation of significance for the communities.

6.3.3 **Specialised Wildlife Habitat**

6.3.3.1 *Woodland Amphibian Breeding Habitat*

Potentially significant amphibian breeding habitat was assessed through the use of Ecological Land Classification and an OWES evaluation of wetlands in the general area of the project location to delineate suitable habitat. Diurnal area searches were performed within woodland

amphibian breeding habitat units 1 – 4, 7 and 8 to observe evidence of salamander, frog and toad species in the form of eggs, individual sightings and calls. Nocturnal surveys were used to assess species diversity and used the marsh monitoring protocol at 4 locations throughout the project location (see **Figure 7**). In addition, the diversity and abundance of incidental amphibians encountered during fieldwork was noted and considered during the evaluation of significance.

6.3.3.2 *Turtle Over-wintering Areas*

Potentially significant over-wintering habitat features were evaluated by performing visual encounter searches and a habitat assessment in areas where planned wind farm infrastructure fell within 120 m of identified natural features (see **Figure 5**). Potentially significant turtle over-wintering habitat was also assessed through the use of Ecological Land Classification and an OWES evaluation of wetlands in the study area to delineate suitable habitat. In addition, the diversity and abundance of turtles incidentally encountered during fieldwork was noted and considered during the evaluation of significance.

6.3.3.3 *Sites Supporting Area-sensitive Species: Forest Birds*

Sites supporting area-sensitive forest bird species was conducted according to the methods outlined in Environment Canada's Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds (2007a) and the Ontario Breeding Bird Atlas Guide for Participants (OBBA 2001). Surveys were conducted in June and July of 2007, 2008 and 2010. Timing for the surveys generally occurred between dawn and 5 hours after sunrise, though sometimes extending in to the early afternoon to ensure additional coverage of all habitat types. Combined 10-minute fixed/non-fixed radius interior point count methodology (>100 m from road/habitat edge) was used to establish quantitative estimates of bird abundance of interior forest areas of the project location (see **Figures 8**). Point counts were repeated twice over the course of each breeding season (Visit 1 – late May to mid-June; Visit 2 – mid-June to early July) to ensure that both early and late breeders were detected. Average species density for all visits per hectare are calculated based on Blancher et al. 2007 formula ($Density = (n * P * T) / (Pi * DD)$), Ontario Breeding Bird Atlas detection distances and time of day adjustment Blancher and Couturier 2007.

6.3.3.4 Sites Supporting Area-Sensitive Species: Open Country Breeding Birds

Similar to above, site supporting area-sensitive open country species was conducted according to the methods outlined in Environment Canada's Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds (2007a) and the Ontario Breeding Bird Atlas Guide for Participants (OBBA 2001). Surveys were conducted in June and July of 2007, 2008 and 2010. Timing for the surveys generally occurred between dawn and 5 hours after sunrise, though sometimes extending in to the early afternoon to ensure additional coverage of all habitat types. Combined 10-minute fixed/non-fixed radius interior point count methodology (>100 m from road/habitat edge) was used to establish quantitative estimates of bird abundance of interior forest areas of the project location (see Figures 9). Point counts were repeated twice over the course of each breeding season (Visit 1 – late May to mid-June; Visit 2 – mid-June to early July) to ensure that both early and late breeders were detected. Average species density for all visits per hectare are calculated based on Blancher et al. 2007 formula ($Density = (n * P * T) / (Pi * DD)$), Ontario Breeding Bird Atlas detection distances and time of day adjustment Blancher and Couturier 2007.

6.3.4 Habitat of Species of Conservation Concern

6.3.4.1 Species of Conservation Concern

Observations of species of conservation concern were primarily completed as part of other surveys outlined above. In order to assess the potential occurrence of certain plant species, a more in-depth assessment of vegetation in the project location was undertaken. Vegetation surveys consisted of wandering transects through dominant habitat types to determine species diversity, presence, relative abundance and geographic coverage within the project location. Vegetation surveys were conducted in the general area of the project location in October 2008 and in August 2009. These surveys covered the general range of habitats present, focusing on areas in proximity to infrastructure as planned at the time of surveys. Specific attention was paid to identifying species indicative of alvar vegetation communities and plant species of conservation concern with historical occurrence records.

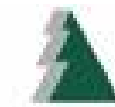
With exception to Olive-sided Flycatcher (*Contopus cooperi*), Red-headed Woodpecker (*Melanerpes erythrocephalus*), Cooper's Milkvetch (*Astragalus neglectus*), Clustered Broomrape (*Orobanche fasciculata*) and Prairie Dropseed (*Sporobolus heterolepis*), species of conservation concern are evaluated as part of other wildlife habitat categories listed above in Section 6.3.1.

6.4 Access to Adjacent Lands

As outlined in Ontario Regulation 359/09, natural features within 120 m of a project component must be assessed for their significance. For this project, the vast majority of project components and natural features within 120 m of them are contained within leased lands (**Figure 10**). In a few places, non-participating landowner lands and associated natural features are within 120 m of a project component occurring as a result of feeder lines or the transmission line, which follow an existing road right-of-way; or, in approximately 3 cases, a turbine and its access road.

Northland Power is active within the local community and maintains communication with participating landowners and non-participating landowner to the degree possible. Requests were made by Northland Power on several occasions to gain access to adjacent lands over the years. Access to property outside of leased lands was not granted by non-participating landowners and therefore direct evaluation of natural features within 120 m of a project component was confined to results obtained from fence line and roadside surveys.

Natural features on non-participating landowner land are part of much larger features which overlap lease areas and are well documented through the studies reported herein. Site investigations confirmed that adjacent natural features on non-participating lands within 120 m of a project component are consistent with the surrounding landscape matrix.



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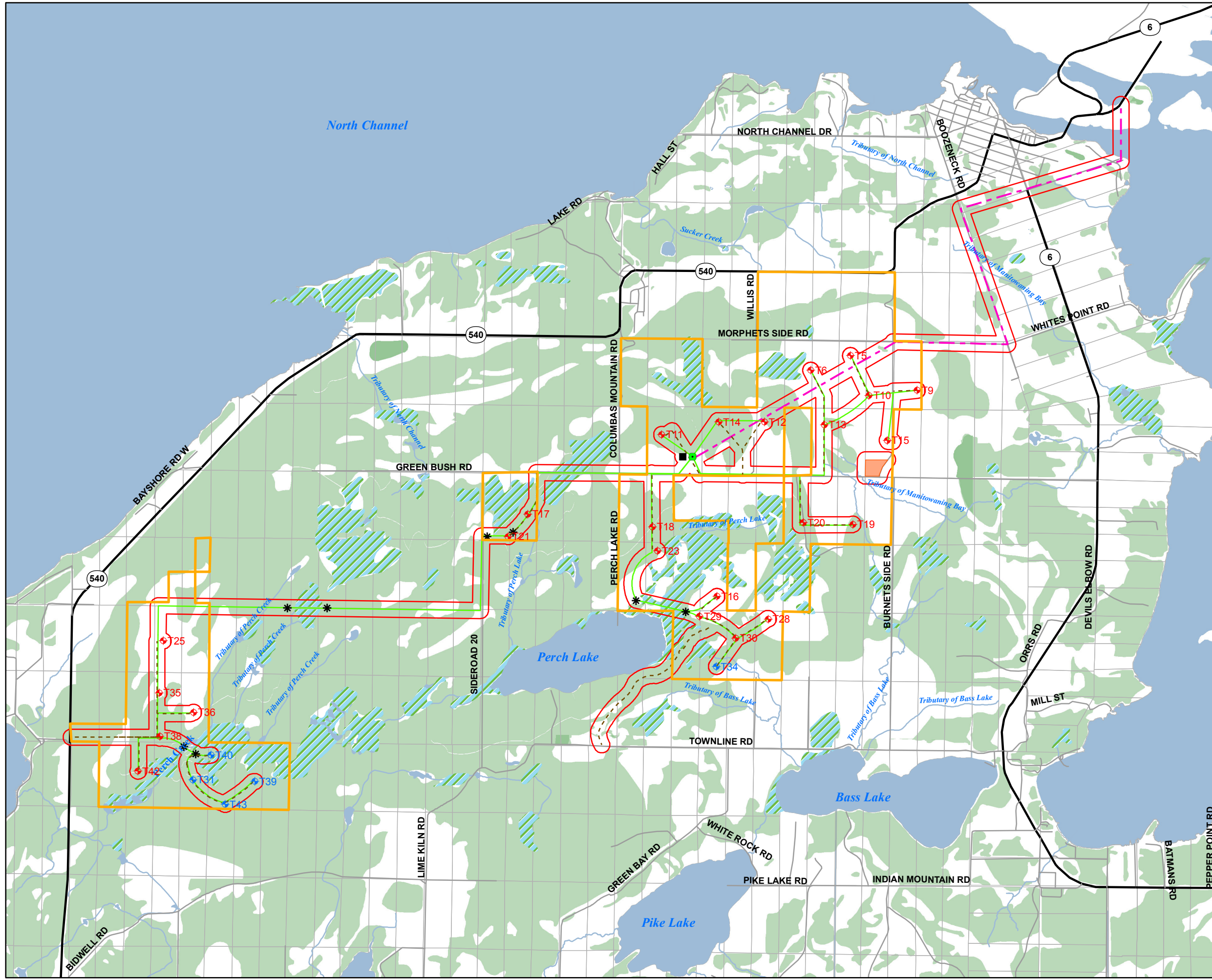
McLean's Mountain Wind Farm Figure 10: Participating Properties

Legend

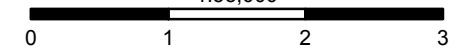
- Local Roads
- Highway
- 120 m Project Location Setback
- Participating Properties
- Lots/Concessions
- Water Body
- Watercourse
- Woodland
- Unevaluated Wetland

Project Components

- 24 Wind Turbine Locations
- Five Extra Permitted Sites
- Substation
- Operations Building
- Horizontal Directional Drilling Access/Exit Pit
- Access Road
- Feeder Lines
- Transmission Line
- Construction Staging Area



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 Figure 3 Participating Properties.mxd

7. Details of Evaluation and Qualifications of Evaluators

The names and qualifications of evaluators are outlined in **Table 2** below. Curriculum vitae's (CVs) for each evaluator has also been included in **Appendix B**. All evaluators listed below have been involved with the McLean's Mountain Wind Farm project for a number of years and are also involved in numerous renewable energy projects that are seeking approval under *Ontario Regulation 359/09*.

Table 2: Names and Qualifications of Site Evaluators

| Name | Degrees and Professional Designations | Years of Experience | McLean's Mountain Wind Farm Project Role | Relevant Certifications |
|--------------------|--|---------------------|--|--|
| David Restivo | <ul style="list-style-type: none"> B.Sc. (Honours) Biology and Psychology Diploma of Engineering Technology and Applied Science – Environmental Protection Technology ECO Canada/CECAB - Certified Environmental Professional | 7 | <ul style="list-style-type: none"> Dillon Biologist Bird and Wildlife Surveys Wetlands Surveys Ecological Land Classification | <ul style="list-style-type: none"> Butternut Health Assessor ISA Certified Arborist OWES Certified ELC certification |
| Richard Baxter | <ul style="list-style-type: none"> B.Sc. in Resource Management – Fish and Wildlife Major Fish and Wildlife Technologists Diploma | 4 | <ul style="list-style-type: none"> Dillon Biologist Bird and Wildlife Surveys Botanical Surveys Wetlands Surveys Ecological Land Classification | <ul style="list-style-type: none"> OWES Certified ELC certification |
| Jennifer Sylvester | <ul style="list-style-type: none"> B.Sc. (Conservation Biology) Ecosystem Restoration Post-Diploma Program Environmental Engineering Technology Diploma Program | 6 | <ul style="list-style-type: none"> Dillon Biologist Botanical Surveys Ecological Land Classification | <ul style="list-style-type: none"> ELC certification |
| Ben Gottfried | <ul style="list-style-type: none"> Fish and Wildlife Technologists Diploma | 3 | <ul style="list-style-type: none"> Dillon Technician Wildlife Surveys | --- |

The evaluation of significance was completed in two stages: the first involved a review of applicable resources and records for the project location and site investigation work; the second involved summarizing the determinations and results of the work completed to evaluate each natural feature for significance. Where necessary, targeted field studies were conducted to supplement the existing information previously collected. Overall, data collected from field studies of the project location took place from June 2004 to June 2011 (see **Table 3**).

Table 3: Site Investigation Dates, Times, Duration and Weather Conditions

| Date | Survey Type | Site Investigator * | Time | Duration (hours) | Weather Conditions+ |
|--|----------------------|-------------------------------|-----------------------------|------------------|--|
| June 2-5, July 11-13, 2004. | Breeding bird survey | Ross James | 6:00-10:00 & Daylight hours | 4 | Temp: 15-17°C Clear skies Wind: 6-17 km/hr |
| September 19-22, October 21, 23, 2004 | Fall Bird Survey | Ross James | Daylight hours | 25 | Temp: 10-25°C Sun and cloud Mix Wind: 6-22 km/hr |
| April 18-21, May 3-6, May 23-26, 2005 | Spring Bird Survey | Ross James | Daylight & evening hours | 79.5 | Temp: 6-25°C Sun and cloud Mix Wind: 13-32 km/hr Occasional rain and snow |
| Jan 25-26, February 20-21, March 15-16, 2007 | Winter Bird Survey | David Restivo | 7:45-18:30 | 28 | Temp: -18--3°C, Cloud: 10-100%, Wind: B3-4 |
| June 21-22, July 3-6, 2007 | Breeding bird survey | David Restivo | 5:30-11:15 | 31.5 | Temp: 12-15 °C, Cloud: 0-100%, Wind: B2-6 |
| April 23, 30, May 8, 16, 2008 | Spring Bird Survey | David Restivo, Richard Baxter | 6:00-14:00 | 21 | Temp:0-19 °C, Cloud: 30-50%, Wind:B0-4 |
| June 10-12, July 2-4, 2008 | Breeding Bird Survey | Richard Baxter | 5:45-16:30 | 57 | Temp: 8-25 °C Cloud: 5-100% Wind: B2-5 |

| Date | Survey Type | Site Investigator * | Time | Duration (hours) | Weather Conditions+ |
|--------------------------------------|---|--|--------------------------------------|------------------|---|
| September 29-October 1, 2008 | Botanical Survey | Jen Sylvester, Richard Baxter | 8:00- 19:00 | 29.5 | Temp: 6-11 °C Wind: 15-19 km/hr Cloudy with occasional rain |
| October 13-15, 22-23, 28-30, 2009 | Fall bird surveys | Richard Baxter | 8:00- 18:30 | 38.5 | Temp 0-1°C, Cloud: 5-100%, Wind: B 0-3 |
| May 3-4, June 2-3, July 7-8, 2010 | Breeding Bird surveys, interior forest and crepuscular species | Richard Baxter | 5:30- 23:00 | 49.5 | Temp: 15-25 °C, Cloud: 0-100 %, Wind: B 0-3 |
| December 2-4, 2010 | Wetland Evaluation | David Restivo, Richard Baxter | 9:00- 17:00 | 24 | Temp: 0 to -5 °C Cloud: 100% Wind: B 0-2 |
| January 7 and 8, 2011 | Wetland Evaluation | Richard Baxter | 9:00- 17:00 | 16 | Temp: -10 °C Sun and cloud mix, Occasional light snow, Wind: B 1-2 |
| May 4-5 2011 | Spring Wildlife Habitat Survey | Richard Baxter | 9:20 – 21:10 | 10.5 | Temp: 15 - 16 °C Cloud: 0 – 10% Wind: B 1 |
| May 10, 11, 12, 13, 2011 | Stick Nest and Cavity nest assessment | Ben Gottfried | 7:00 – 17:00 | 40 | Temp: 10 °C Cloud: Variable Wind: B 2-3 |
| May 30-31, 2011 | Spring Wildlife Habitat Survey | Richard Baxter | 13:45- 22:40 | 7.5 | Temp: 22 - 25 °C Cloud: 10 - 70% Wind: B 1 |
| June 14-15, 2011 | Wetland Delineation/ Evaluation | David Restivo | 10:00 – 6:00 & 9:00 – 11:00 | 10 | Temp: 22 - 24 °C Cloud: 10 - 40% Wind: B 1 - 2 |
| June 24, 2011 | Wetland Evaluation | David Restivo | 9:00 – 6:00 | 9 | Temp: 15 - 20 °C Cloud: 100% Wind: B 2 Light Rain |
| June 28-29 2011 | Wetland Evaluation | David Restivo and Richard Baxter | 9:00 – 6:00 | 20 | Temp: 16 - 22 °C Cloud: 50 - 90% Wind: B 2 -4 |

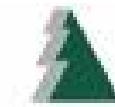
8. Evaluation of Significance Results

The following sections summarize the results of the evaluation criteria and procedures used to make determinations of the significance of natural features within the project location and surrounding 120 m.

8.1 Wetlands

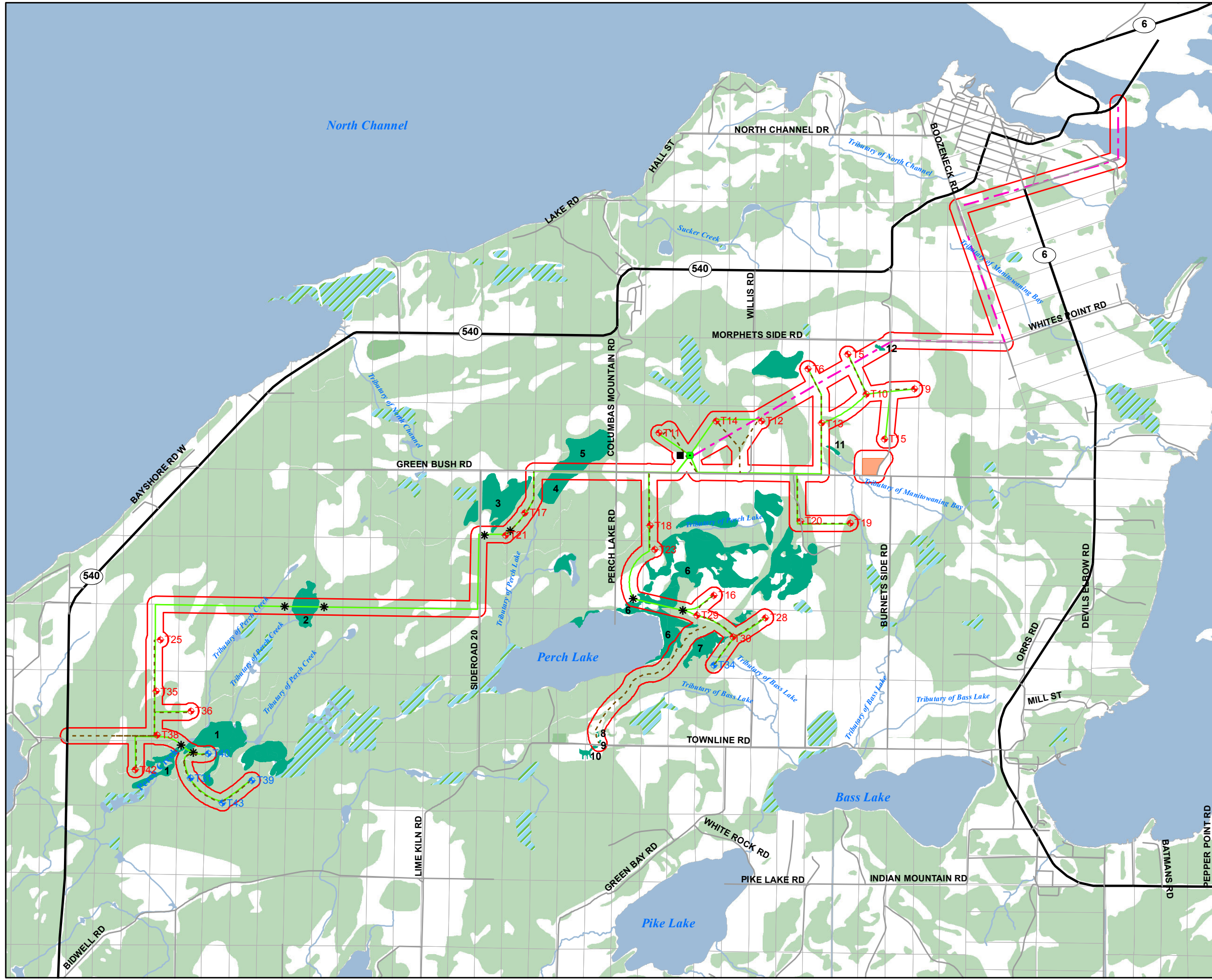
As outlined in **Section 6.1**, wetlands that met the minimum size criteria (i.e., ≥ 2 hectares) for evaluation as possible provincially significant wetlands under OWES and were not part of a wetland complex were assumed provincially significant and evaluated using the wetlands characteristics and ecological functions rapid assessment protocol created by the MNR for renewable energy projects (MNR 2010). The applicable wetland units that met the size and complexing criteria include wetland units 1-10. Wetlands units 11 and 12 were under 2 ha and were greater than 750 m from the nearest wetland unit. As such, wetland units 11 and 12 were determined to be non-provincially significant under OWES guidelines.

The rapid assessment protocol is based on select OWES procedures and was undertaken by qualified OWES evaluators (**Tables 2 and 3**). The wetland characteristics and ecological functions rapid assessment summary for the wetlands located adjacent to the project location is available in **Table 4**. Wetlands are identified by Wetland ID number on **Figure 11**.



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McLean's Mountain Wind Farm Figure 11: Wetland Identification



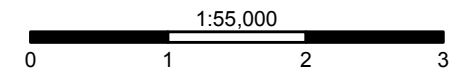
Legend

- Local Roads
- Highway
- 120 m Project Location Setback
- Lots/Concessions
- Water Body
- Watercourse
- Delineated Unevaluated Wetlands
- Woodland*
- Unevaluated Wetland Outside of the 120m Project Component Setback*

Project Components

- 24 Wind Turbine Locations
- Five Extra Permitted Sites
- Substation
- Operations Building
- Horizontal Directional Drilling Access/Exit Pit
- Transmission Line
- Access Road
- Feeder Lines
- Construction Staging Area

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 Figure 10 Wetland and Woodland Identification 070611.mxd

Table 4: Wetland Characteristics and Ecological Functions Assessment

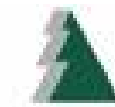
| Wetland ID | Field Visit | Actual Wetland Size | Wetland Type | Site Type | Vegetation Communities | Proximity to Other Wetlands | Interspersion | Open Water Types | Flood Attenuation Score | Water Quality Improvement | | Shoreline Erosion Control | | Groundwater Recharge | | Species Rarity | | Significant Features and Habitats | | Fish Habitat | | Project Components within 120m | Nearest Distance from project location |
|------------|-------------|---------------------|--------------|-------------------------|---|-----------------------------------|--|------------------|-------------------------|---------------------------|--------------------------------|---------------------------|---------------------|----------------------|---------------------------|----------------|--|-----------------------------------|--|--------------|--|---|--|
| | | | | | | | | | | Score | Details | Score | Details | Score | Details | Score | Details | Score | Details | Score | Details | | |
| 1 | Yes | 49.0 | Swamp/ Marsh | Riverine | tall shrubs, deciduous trees, coniferous trees, robust emergents, narrow-leaf emergents | 15 m from an unevaluated wetland | Score for wetland complex = 18 (101 intersections) | Type 2 | 16 | 30 | WIF=1 LUF=0.6 PUT=0.84 | 15 | Trees & shrubs | 20 | Entirely riverine | 250 | Blanding's Turtle (Threatened) | 30 | Winter cover for wildlife; Waterfowl staging/ breeding | 13 | Low marsh, high marsh & seasonal swamp | Feeder line, access road, Turbine 40 | 30 m |
| 2 | Yes | 17.7 | Swamp/ Marsh | Palustrine | coniferous trees, narrow-leaf emergents | 122 m from an unevaluated wetland | Score for wetland complex = 18 (101 intersections) | Type 1 | 64 | 21 | WIF=0.7 LUF=0.6 PUT=0.85 | 0 | Entirely palustrine | 50 | Entirely palustrine | 0 | No species observed | 10 | Winter cover for wildlife | 8 | High marsh & seasonal swamp | Feeder line | 30 m |
| 3 | Yes | 31.6 | Swamp | Isolated | tall shrubs, coniferous trees, | 5 m from an unevaluated wetland | Score for wetland complex = 18 (101 intersections) | Type 1 | 81 | 14 | WIF=0.5 LUF=0.6 PUT=0.75 | 0 | Entirely isolated | 50 | Entirely isolated | 50 | Common Snapping Turtle (Prov. Significant) | 10 | Winter cover for wildlife | 0 | No fish habitat observed | Feeder line, access road | 25 m |
| 4 | Yes | 13.9 | Swamp | Palustrine | coniferous trees, | 6 m from unit 5 | Score for wetland complex = 18 (101 intersections) | Type 1 | 60 | 27 | WIF=1.0 LUF=0.6 PUT=0.75 | 0 | Entirely palustrine | 50 | Entirely palustrine | 0 | No species observed | 10 | Winter cover for wildlife | 6 | Seasonal swamp | Feeder line, access road (existing road abuts wetland, no construction to occur beyond existing road width into wetland) | 0 m |
| 5 | Yes | 29.3 | Swamp | Palustrine | coniferous trees, | 6 m from unit 4 | Score for wetland complex = 18 (101 intersections) | Type 1 | 100 | 19 | WIF=0.7 LUF=0.6 PUT=0.75 | 0 | Entirely palustrine | 50 | Entirely palustrine | 0 | No species observed | 10 | Winter cover for wildlife | 6 | Seasonal swamp | Feeder line, access road (existing road abuts wetland, no construction to occur beyond existing road width into wetland) | 0 m |
| 6 | Yes | 106.6 | Swamp/ Marsh | Palustrine & Lacustrine | tall shrubs, deciduous trees, coniferous | 28 m from an unevaluated wetland | Score for wetland complex = 18 (101 intersections) | Type 2 | 100 | 29 | WIF=1.0 LUF=0.6 PUT=0.8 | 8 | Emergent vegetation | 45 | FA palustrine = 0.9 FA | 250 | Blanding's Turtle (Threatened) | 30 | Winter cover for wildlife; Waterfowl | 14 | High marsh & seasonal swamp | Feeder line, access road, | 30 m |

| Wetland ID | Field Visit | Actual Wetland Size | Wetland Type | Site Type | Vegetation Communities | Proximity to Other Wetlands | Interspersion | Open Water Types | Flood Attenuation Score | Water Quality Improvement | | Shoreline Erosion Control | | Groundwater Recharge | | Species Rarity | | Significant Features and Habitats | | Fish Habitat | | Project Components within 120m | Nearest Distance from project location |
|------------|-------------|---------------------|--------------|------------|--|-----------------------------|---|------------------|-------------------------|---------------------------|--------------------------------|---------------------------|-----------------------|----------------------|---------------------|----------------|--------------------------------|-----------------------------------|---------------------------------|--------------|--------------------------|--------------------------------------|--|
| | | | | | | | | | | Score | Details | Score | Details | Score | Details | Score | Details | Score | Details | Score | Details | | |
| | | | | | trees, robust emergents, narrow-leaf emergents, ground cover | | intersections) | | | | | | | lacustrine = 0.10 | | | | staging/ breeding | | | Turbine 23 | | |
| 7 | Yes | 20.6 | Swamp/ Marsh | Palustrine | deciduous trees, coniferous trees, robust emergents, narrow-leaf emergents, ground cover | 158 m from unit 5 | Score for wetland complex = 12 (65 intersections) | Type 1 | 89 | 32 | WIF=1.0 LUF=0.6 PUT=0.9 | 0 | Entirely palustrine | 50 | Entirely palustrine | 250 | Blanding's Turtle (Threatened) | 10 | Winter cover for wildlife | 0 | No fish habitat observed | Feeder line, access road, Turbine 39 | 52 m |
| 8 | Yes | 0.1 | Marsh | Riverine | narrow-leaf emergents, ground cover | 11 m from unit 7 | Score for wetland complex = 12 (65 intersections) | Type 4 | 4 | 60 | WIF=1.0 LUF=1.0 PUT=1.0 | 8 | Emergent vegetation | 20 | Entirely riverine | 0 | No species observed | 0 | No significant habitat observed | 1 | High marsh | Access road | 5 m |
| 9 | Yes | 0.3 | Marsh | Riverine | submerged plants, narrow-leaf emergents, robust emergents, | 11 m from unit 8 | Score for wetland complex = 12 (65 intersections) | Type 1 | 23 | 60 | WIF=1.0 LUF=1.0 PUT=1.0 | 6 | Submergent vegetation | 20 | Entirely riverine | 0 | No species observed | 0 | No significant habitat observed | 1 | Low marsh | Access road | 2 m |
| 10 | Yes | 2.0 | Swamp | Palustrine | tall shrub, narrow-leaf emergents | 39 m from unit 8 | Score for wetland complex = 12 (65 intersections) | Type 4 | 56 | 32 | WIF=0.7 LUF=1.0 PUT=0.75 | 0 | Entirely palustrine | 50 | Entirely palustrine | 0 | No species observed | 0 | No significant habitat observed | 2 | Seasonal swamp | Access road | 40 m |

8.2 Wildlife Habitat

As discussed in **Section 6.3**, wildlife habitat was assessed using the Significant Wildlife Habitat Technical Guide (MNR 2000). Candidate wildlife habitat was evaluated by applying the criteria found within the above technical guide and its' associated appendices, to the site conditions in the project location and surrounding lands. Details of this evaluation are outlined in **Table 5** in connection with the ELC mapping provided in **Figure 12** and candidate wildlife habitat mapping in **Figures 3 - 9**. Significant wildlife habitat within 120 m of the project location includes:

- Seasonal Concentration Areas
 - Waterfowl Nesting Areas
 - Raptor Winter Feeding and Roosting Areas;
- Rare Vegetation Communities
 - Common Juniper Shrub Alvar;
- Specialised Habitat for Wildlife
 - Woodland Amphibian Breeding Habitat;
 - Turtle Over-wintering Area;
 - Sites Supporting Area-sensitive Species: Forest Birds; and
 - Sites Supporting Area-Sensitive Species: Open Country Breeding Birds.
- Habitat of Species of Conservation Concern
 - Cooper's Milkvetch
 - Slender Blazing Star
 - Clustered Broomrape
 - Prairie Dropseed



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McLean's Mountain Wind Farm Figure 12: Ecological Land Classification

Legend

- Local Roads
- Highway
- Watercourse
- 120m Project Component Setback
- Lots/Concessions
- Water Body
- Woodland

Ecological Land Classification (Based on Community Code)

- 1) BO: Bog
- 2) CVC_2: Light Industrial
- 3) CVL_3: Sewage and Water Treatment
- 4) CVR_1: Low Density Residential
- 5) FOD: Deciduous forest
- 6) FODM1: Dry-Fresh Oak Deciduous Forest
- 7) FODM5-1: Dry-Fresh Sugar Maple Deciduous Forest
- 8) FODM8-1: Fresh-Moist Poplar Deciduous Forest
- 9) FOMM10: Fresh-Moist Spruce Fir – Hardwood Mixed Forest
- 10) FOMM4: Dry-Fresh White Cedar Mixed Forest
- 11) MAMM1: Graminoid Mineral Meadow Marsh
- 12) MAMM3: Mixed Mineral Meadow Marsh
- 13) MASM1: Graminoid Mineral Shallow Marsh
- 14) MASM1-1: Cattail Mineral Shallow Marsh
- 15) MASM1-14: Reed Canary Grass Mineral Shallow Marsh
- 16) ME: Meadow
- 17) OAGM4: Open Pasture
- 18) OAO: Open Water
- 19) RBSA1-1: Common Juniper Shrub Alvar
- 20) SWCM1-2: White Cedar-Conifer Coniferous Swamp
- 21) SWDM2: Ash Mineral Deciduous Swamp
- 22) SWDM2-1: Black Ash Deciduous Swamp
- 23) SWDM2-2: Green Ash Deciduous Swamp
- 24) SWDM3: Maple Mineral Deciduous Swamp
- 25) SWDM4-5: Poplar Deciduous Swamp
- 26) SWMM1-1: White Cedar-Hardwood Mixed Swamp
- 27) SWMM3-2: Poplar-Conifer Mixed Swamp
- 28) SWMM4: Ash Mixed Swamp
- 29) SWTM2-5: Red-Osier Dogwood Mineral Deciduous Swamp
- 30) SWTM3: Willow Mineral Deciduous Thicket Swamp
- 31) TAGM4: Treed Pasture
- 32) WODM5-1: Fresh-Moist Poplar Deciduous Woodland

Project Components

- 24 Wind Turbine Locations
- Five Extra Permitted Sites
- Substation
- Operations Building
- Horizontal Directional Drilling Access/Exit Pit
- Transmission Line
- Access Road
- Feeder Lines
- Construction Staging Area



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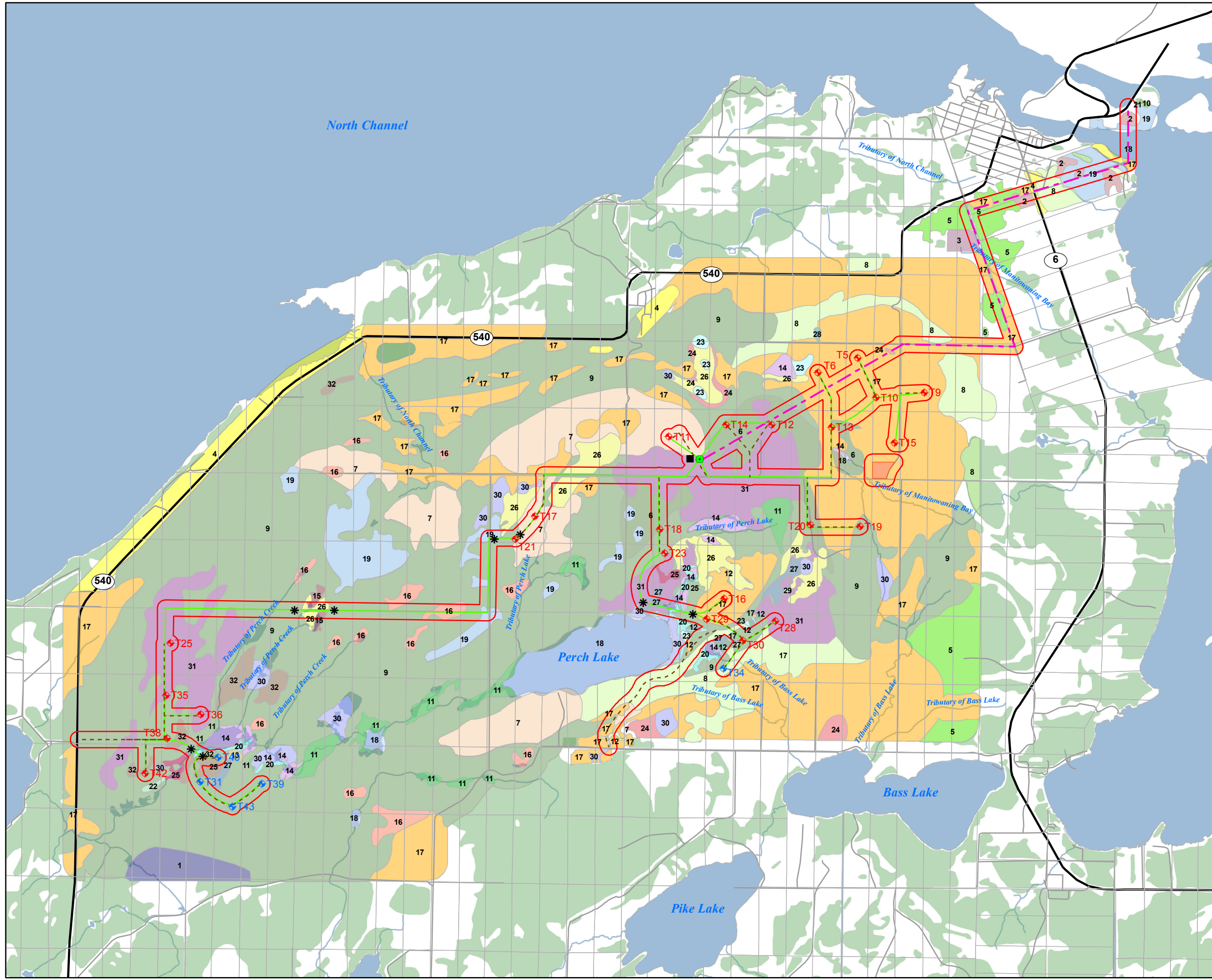


Table 5: Evaluation of Candidate Wildlife Habitat in the Project Location and Surrounding 120 metres

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|-------------------------------------|--|---|------------------------|---|-------------|-----------------|-----------------------------------|--------------------------------------|
| SEASONAL CONCENTRATION AREAS | | | | | | | | |
| Waterfowl Nesting Area – WNA 1 | Waterfowl nesting areas are associated with wetland and woodlands located in upland areas. Upland areas associated with ELC ecosites MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, and SWD4. | This 104 ha unit contains 19.9 ha of Cattail Mineral Shallow Marsh, 7 ha of Poplar Deciduous Swamp, 5.9 ha of White-Cedar Conifer Coniferous Swamp, 3.1 ha of Black Ash Deciduous Swamp, 2.8 ha of Graminoid Mineral Shallow Marsh, 2.2 ha of Poplar-Conifer Mixed Swamp and 1.8 ha of Graminoid Mineral Meadow Marsh habitat surrounded by 51.6 ha of Fresh-Moist Spruce Fir – Hardwood Mixed Forest, 7.4 ha of Fresh-Moist Poplar Deciduous Woodland and 1.4 ha of Meadow (Figure 3 and 15). | Waterfowl Nesting Area | Low waterfowl species diversity and low numbers of individuals were observed during 2007, 2008 and 2009 breeding season surveys. No waterfowl species of conservation concern were observed. A large amount of similar habitat is present throughout Manitoulin Island. There is no indication that the project location contains special attributes, composition or function that would make it rare in the planning area. Additional pre-construction surveys will be conducted to further assess the significance of this feature. If the feature continues to be considered significant, mitigation, as detailed in the EIS, is required. Pre-construction surveys to be conducted will be confirmed in consultation with the MNR. | ✓ | | T 40, Feeder Line and Access Road | Within project location |
| Waterfowl Nesting Area – WNA 4 | Waterfowl nesting areas are associated with wetland and woodlands located in upland areas. Upland areas associated with ELC ecosites MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, and SWD4. | This 89 ha unit contains 13.7 ha of Willow Mineral Deciduous Thicket Swamp, 12 ha of White Cedar-Conifer Coniferous Swamp, 5 ha of Cattail Mineral Shallow Marsh, 3.4 ha of Poplar-Conifer Mixed Swamp, 1.7 ha of Green Ash Deciduous Swamp and 1.1 ha of Mixed Mineral Meadow Marsh habitat surrounded by 18.3 ha of Open Water, 16.6 ha of Fresh-Moist Spruce Fir – Hardwood Mixed Forest, 10.5 ha of Tree Pasture, 5.6 ha of Fresh-Moist Poplar Deciduous Forest and 1 ha of Open Pasture (Figure 3 and 15). | Waterfowl Nesting Area | Low waterfowl species diversity and low numbers of individuals were observed during 2007, 2008 and 2009 breeding season surveys. No waterfowl species of conservation concern were observed. A large amount of similar habitat is present throughout Manitoulin Island. There is no indication that the project location contains special attributes, composition or function that would make it rare in the planning area. Additional pre-construction surveys will be conducted to further assess the significance of this feature. If the feature continues to be considered significant, mitigation, as detailed in the EIS, is required. Pre-construction surveys to be conducted will be confirmed in consultation with the MNR. | ✓ | | T29, Access Road, Feeder Line | Within project location |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|--|---|--|------------------------------|--|-------------|-----------------|--|--------------------------------------|
| Waterfowl Nesting Area – WNA 5 | Waterfowl nesting areas are associated with wetland and woodlands located in upland areas. Upland areas associated with ELC ecosites MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, and SWD4. | This 43.8 ha unit contains 10.1 ha of Cattail Mineral Shallow Marsh, 5.8 ha of Green Ash Deciduous Swamp and 4.9 ha of White Cedar – Hardwood Mixed Swamp habitat surrounded by 19.4 ha of Open Pasture, 1.9 ha of Fresh-Moist Spruce Fir – Hardwood Mixed Forest and 1.8 ha of Fresh-Moist Poplar Deciduous Forest (Figure 3 and 15). | Waterfowl Nesting Area | No waterfowl species were observed. A large amount of similar habitat is present throughout Manitoulin Island. There is no indication that the project location contains special attributes, composition or function that would make it rare in the planning area. Additional pre-construction surveys will be conducted to further assess the significance of this feature. If the feature continues to be considered significant, mitigation, as detailed in the EIS, is required. Pre-construction surveys to be conducted will be confirmed in consultation with the MNR. | ✓ | | Turbine 6, Feeder Line and Access Road | 0 m to Turbine 6 |
| Raptor Winter Feeding and Roosting Area RWFR 3 | Open fields, hayfields, pastures and meadows that support large and productive small mammal populations with a diversity of herbaceous vegetation providing food for mammals. Windswept fields that are not covered by snow are preferred for hunting. Roosting sites are likely to be found in mature mixed or coniferous woodlands. Combination of ELC codes from forest class (FOC, FOD, and FOM) and upland class (CUM, CUT, CUS, and CUW). | This unit contains 611.13 ha of open pasture areas and a buffer of 120 m inside adjacent wooded areas (Figure 4 and 12). Cows do graze in this area during certain times of the year. Overall the area is minimally disturbed. Open Pasture: 431.70 ha; surrounded by Deciduous Forest: 29 ha; Fresh-Moist Poplar Deciduous Forest: 97 ha; Fresh-Moist Spruce Fir – Hardwood Mixed Forest: 20.6 ha; Maple Mineral Deciduous Swamp: 17.3 ha; Dry-Fresh Sugar Maple Deciduous Forest: 7 ha; Mixed Mineral Meadow Marsh: 0.2 ha; Open Water: 0.12 ha; and Willow Mineral Deciduous Thicket Swamp; 7.8 ha. Red-tailed Hawk (1) | Winter foraging and roosting | Raptors observed in low numbers during winter surveys. Field observations confirmed that raptor density and use of the project location was extremely low. However, in 2010 Short-eared owls were observed using open country in the area north west of McLean's Mountain Road and Greenbush Road intersection. Observations suggest that this species uses the area infrequently. Additional pre-construction surveys will be conducted to further assess the significance of this feature. If the feature continues to be considered significant, mitigation, as detailed in the EIS, is required. Pre-construction surveys to be conducted will be confirmed in consultation with the MNR. | ✓ | | Turbine 34, Feeder Line and Access Roads | Within project location |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|---|---|--|--|---|-------------|-----------------|---|--------------------------------------|
| Raptor Winter Feeding and Roosting Area RWFR 4 | Open fields, hayfields, pastures and meadows that support large and productive small mammal populations with a diversity of herbaceous vegetation providing food for mammals. Windswept fields that are not covered by snow are preferred for hunting. Roosting sites are likely to be found in mature mixed or coniferous woodlands. Combination of ELC codes from forest class (FOC, FOD, and FOM) and upland class (CUM, CUT, CUS, and CUW). | This 1386.72 ha unit contains open pasture areas and a buffer of 120 m inside adjacent wooded areas (Figure 4 and 12). Cows do graze in this area during certain times of the year. Overall the area is minimally disturbed. Open Pasture: 1001.9 ha surrounded by Deciduous Forest: 21 ha; Dry-Fresh Oak Deciduous Forest: 44 ha; Fresh-Moist Poplar Deciduous Forest: 101.8 ha; Fresh-Moist Spruce Fir – Hardwood Mixed Forest: 99.2 ha; Cattail Mineral Shallow Marsh: 8.7 ha; Green Ash Deciduous Swamp: 5.9 ha; Maple Mineral Deciduous Swamp: 5.5 ha; White Cedar – Hardwood Mixed Swamp: 11.4 ha; and Willow Mineral Deciduous Thicket Swamp: 5.5 ha. Red-tailed Hawk (1); Short-eared Owl (2) | Winter foraging and roosting | Red-tailed hawk and short-eared owl observed in low numbers during winter surveys. Field observations confirmed that raptor density and use of the project location was extremely low. The occurrence of 2 Short-eared Owls in the winter of 2010 represents the first sightings for this species in the study area between 2004 and 2010. Observations suggest that this species uses the area infrequently. Additional pre-construction surveys will be conducted to further assess the significance of this feature. If the feature continues to be considered significant, mitigation, as detailed in the EIS, is required. Pre-construction surveys to be conducted will be confirmed in consultation with the MNR. | ✓ | | Turbines 5, 6, 9, 10, 13, 15, 19 and 20; Feeder Lines and Access Roads. | Within project location |
| Bullfrog Concentration Area - BCA 1 | Aquatic and marsh habitat. Bullfrogs require permanent waterbodies for survival. | This unit contains 37.8 ha of contiguous Cattail Mineral Shallow Marsh, White Cedar-Conifer Coniferous Swamp, Poplar Deciduous Swamp, Poplar-Conifer Mixed Swamp and Willow Mineral Deciduous Thicket Swamp habitat with permanent water (Figure 5 and 12). Deciduous woodland and hardwood mixed forest characterize adjacent lands. A tributary of Perch Creek connects this unit to BCA 2 along Guida's Sideroad. | Breeding and foraging habitat for Bullfrogs. | No evidence or observations of Bullfrogs were made during daytime area searches within this habitat. Manitoulin Island is located at the northern limit of the Bullfrog's range. | | ✓ | Turbine 40, Feeder Line and Access Road | 15 m from Feeder Line |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|-------------------------------------|--|--|--|--|-------------|-----------------|---|--------------------------------------|
| Bullfrog Concentration Area - BCA 2 | Aquatic and marsh habitat. Bullfrogs require permanent waterbodies for survival. | This unit contains 16.3 ha of Reed Canary Grass Mineral Shallow Marsh, White Cedar-Hardwood Mixed Swamp with permanent water (Figure 5 and 12). Hardwood mixed forest characterizes adjacent land. A tributary of Perch Creek connects this unit to BCA 1 to the south. | Breeding and foraging habitat for Bullfrogs. | No evidence or observations of Bullfrogs were made during daytime area searches within this habitat. Manitoulin Island is located at the northern limit of the Bullfrog's range. | | ✓ | Feeder Line | 20 m from Feeder Line |
| Bullfrog Concentration Area - BCA 3 | Aquatic and marsh habitat. Bullfrogs require permanent waterbodies for survival. | This unit contains 31.6 ha of White Cedar-Hardwood Mixed Swamp and Willow Mineral Deciduous Thicket Swamp habitat with permanent water (Figure 5 and 12). Open pasture, Alvar, deciduous forest and hardwood mixed forest characterize adjacent land. | Breeding and foraging habitat for Bullfrogs. | One Bullfrog was heard within this swamp habitat; another was heard calling approximately 200 m outside of the area. No evidence of a large concentration of Bullfrogs was observed. Manitoulin Island is located at the northern limit of the Bullfrog's range. | | ✓ | Feeder Line and Access Road | 25 m from Feeder Line |
| Bullfrog Concentration Area - BCA 4 | Aquatic and marsh habitat. Bullfrogs require permanent waterbodies for survival. | This unit contains 29.3 ha of White Cedar-Hardwood Mixed Swamp habitat with permanent water (Figure 5 and 12). Deciduous forest, Alvar, mixed swamp, open pasture and hardwood mixed forest characterize adjacent land. | Breeding and foraging habitat for Bullfrogs. | No evidence or observations of Bullfrogs were made during nocturnal marsh monitoring surveys in proximity to this habitat. Manitoulin Island is located at the northern limit of the Bullfrog's range. | | ✓ | Feeder Line | 15 m from Feeder Line |
| Bullfrog Concentration Area - BCA 5 | Aquatic and marsh habitat. Bullfrogs require permanent waterbodies for survival. | This unit contains 74.4 ha of Cattail Mineral Shallow Marsh, White Cedar-Conifer Coniferous Swamp, Poplar Deciduous Swamp, White Cedar-Hardwood Mixed Swamp with permanent water (Figure 5 and 12). Open pasture, treed woodland and hardwood mixed forest characterize adjacent lands. A tributary of Perch Lake flows through this unit connecting to BCA 7. | Breeding and foraging habitat for Bullfrogs. | No evidence or observations of Bullfrogs were made during daytime area searches within this habitat. Manitoulin Island is located at the northern limit of the Bullfrog's range. | | ✓ | Turbine 23, Feeder Line and Access Road | 10 m from Feeder Line |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|--|---|---|--|--|-------------|-----------------|---------------------------------|--------------------------------------|
| Bullfrog Concentration Area - BCA 6 | Aquatic and marsh habitat. Bullfrogs require permanent waterbodies for survival. | Perch Lake represents 186.7 ha of contiguous, permanent open water habitat surrounded by deciduous and hardwood mixed forest, treed pasture and mixed mineral marsh (Figure 5 and 12). Minimal shoreline and emergent vegetation is present. A tributary of Perch Lake connects this unit to BCA 5. | Breeding and foraging habitat for Bullfrogs. | No evidence or observations of Bullfrogs were made during daytime area searches within this habitat. Manitoulin Island is located at the northern limit of the Bullfrog's range. | | ✓ | Feeder Line | 85 m from Feeder Line |
| RARE VEGETATION COMMUNITIES | | | | | | | | |
| Alvar - ALV 1 | Naturally open areas of thin soil over flat limestone, dolostone or marble rock supporting a sparse vegetation of shrubs and herbs. Trees are often absent or scattered. Vegetation is adapted to extreme variations in temperature and soil moisture. ELC ecosite ALO1, ALS1 and ALT1. | This unit contains 22.7 ha of Common Juniper Shrub Alvar habitat surrounded by hardwood mixed forest (Figure 6 and 12). | Habitat for alvar adapted species | Considered a rare vegetation community. Prairie smoke (<i>Geum triflorum</i>) was abundant within this habitat unit. This species is listed as a vascular plant indicative of Alvar habitats in Ontario (Appendix M and N of the SWHTG, MNR 2000). | ✓ | | Feeder Line | Within project location |
| Alvar - ALV 2 | | This unit contains 3.6 ha of Common Juniper Shrub Alvar habitat surrounded by hardwood mixed forest (Figure 6 and 12). | Habitat for alvar adapted species | Considered a rare vegetation community. Prairie smoke (<i>Geum triflorum</i>) was observed occasionally within this vegetation community. This species is listed as a vascular plant indicative of Alvar habitats in Ontario (Appendix M and N of the SWHTG, MNR 2000). | ✓ | | Feeder Line | Within project location |
| Alvar - ALV 3 | | This unit contains 15 ha of Common Juniper Shrub Alvar habitat surrounded by hardwood mixed forest (Figure 6 and 12). | Habitat for alvar adapted species | Considered a rare vegetation community. Prairie smoke (<i>Geum triflorum</i>) was observed occasionally within this vegetation community. This species is listed as a vascular plant indicative of Alvar habitats in Ontario (Appendix M and N of the SWHTG, MNR 2000). | ✓ | | Feeder Line and Access Road | Within project location |
| Alvar - ALV 4 | | This unit contains 38.2 ha of Common Juniper Shrub Alvar habitat surrounded by light industrial area, low density residential area and deciduous forest (Figure 6 and 12). | Habitat for alvar adapted species | Considered a rare vegetation community. Prairie smoke (<i>Geum triflorum</i>) was observed occasionally within this vegetation community. This species is listed as a vascular plant indicative of Alvar habitats in Ontario (Appendix M and N of the SWHTG, MNR 2000). Slender blazing star, a species of | ✓ | | Transmission Line | Within project location |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|--|---|--|------------------|--|-------------|-----------------|---|---------------------------------------|
| | | | | conservation concern, was observed along the northeast side of Harbourview Road just outside of the road right-of-way. | | | | |
| SPECIALISED HABITAT FOR WILDLIFE | | | | | | | | |
| Woodland Amphibian Breeding Habitat - WABH1 | Ponds used by several species of frogs and salamanders. The best breeding ponds are unpolluted and contain a variety of vegetation structure in and around the edge of the pond for egg-laying and calling by frogs. Closed-canopy woodlands with rather dense undergrowth maintaining a damp environment are preferred. Moist fallen logs are an important habitat component required for salamanders. Sites with several ponds and/or ponds close to creeks are valuable. Associated with ELC ecosites FOC, FOM, FOD, SWC, SWM and SWD. | This narrow unit contains 9.9 ha of Black Ash Deciduous Swamp and Poplar Deciduous Swamp habitat adjacent to Hardwood Mixed Forest and Fresh-Moist Poplar Deciduous Forest (Figure 7 and 15). A tributary of Perch Creek flows through this unit which provides permanent water and standing pool areas. | Breeding habitat | Suitable habitat was observed upstream of a beaver dam. Habitat downstream is less suitable due to flowing water (Perch Creek). Full chorus of Northern Leopard Frog observed as well as a large population of Spring Peepers. Tadpoles observed in the area (potentially Green Frog). No egg masses observed. | ✓ | | Feeder Line and Access Road | 65 m from Feeder Line and Access Road |
| Woodland Amphibian Breeding Habitat – WABH 2 | | This small unit contains 5.9 ha of Poplar Deciduous Swamp and Poplar-Conifer Mixed Swamp habitat adjacent to Fresh-Moist Poplar Deciduous Woodland and Hardwood Mixed Forest (Figure 7 and 15). This unit contains pockets of permanent open water. | Breeding habitat | Numerous small pools present within swamp habitat, approximately 15 cm deep. Most of these pools do not have dense vegetation but have leaf litter and woody debris. Wood Frog observed. Full chorus of Northern Leopard Frog heard in the area as well as a large population of Spring Peepers during daytime area surveys. | ✓ | | Turbine 40, Feeder Line and Access Road | 40 m from Turbine 40 |
| Woodland Amphibian Breeding Habitat – WABH 3 | | This unit contains 4.1 ha of White Cedar – Hardwood Mixed Swamp habitat adjacent to Hardwood Mixed Forest (Figure 7 and 15). Permanent standing water was observed and presence is dependent on beaver activity. This unit is connected to a tributary of Perch Creek and located south of WABH 4, separated by Guida's Sideroad. | Breeding habitat | Suitable swamp habitat with vernal pools observed however larger areas of habitat supporting a diversity of species are found within the project location. Only Spring Peepers were heard during daytime area surveys. No individuals or eggs were observed | | ✓ | Feeder Line | 20 m from Feeder Line |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|--|-------------|--|------------------|---|-------------|-----------------|---|--------------------------------------|
| Woodland Amphibian Breeding Habitat – WABH 4 | | This unit contains 4.6 ha of White Cedar – Hardwood Mixed Swamp habitat adjacent to Hardwood Mixed Forest (Figure 7 and 15). Presence of standing water is dependent on beaver activity. This unit is separated from WABH 3 by Guida's Sideroad. | Breeding habitat | Suitable swamp habitat with vernal pools observed however larger areas of habitat supporting a diversity of species are found within the project location. Only Spring Peepers were heard during daytime area surveys. No individuals | | ✓ | Feeder Line | 20 m from Feeder Line |
| Woodland Amphibian Breeding Habitat – WABH 5 | | This unit contains 18.6 ha of White Cedar – Hardwood Mixed Swamp habitat adjacent to Dry-Fresh Sugar Maple Deciduous Forest (Figure 7 and 15). This unit contains pockets of permanent open water. | Breeding habitat | Suitable woodland breeding area within swamp habitat. Wood Frogs, Spring Peeper (full chorus), Gray Treefrog (full chorus), Green Frog and a Bullfrog were observed during nocturnal marsh monitoring surveys. | ✓ | | Feeder Line and Access Road | 25 m from Feeder Line |
| Woodland Amphibian Breeding Habitat – WABH 6 | | This unit contains 43.2 ha of White Cedar – Hardwood Mixed Swamp habitat adjacent to Dry-Fresh Sugar Maple Deciduous Forest and Hardwood Mixed Forest (Figure 7 and 15). This unit contains pockets of permanent open water. | Breeding habitat | Suitable woodland breeding area within swamp habitat. Wood Frogs, Spring Peeper (full chorus), Gray Treefrog (full chorus), Green Frog and American Toad observed during nocturnal marsh monitoring surveys. | ✓ | | Feeder Line and Access Road | 30 m from Feeder Line |
| Woodland Amphibian Breeding Habitat – WABH 7 | | This unit contains 2.7 ha of Poplar - Conifer Mixed Swamp habitat adjacent to Treed Pasture (Figure 7 and 15). This unit contains pockets of permanent open water. | Breeding habitat | Suitable woodland breeding area within swamp habitat. Green Frogs, Spring Peepers and Northern Leopard Frogs observed (individuals) during daytime area searches. | ✓ | | Feeder Line | 70 m from Feeder Line |
| Woodland Amphibian Breeding Habitat – WABH 8 | | This unit contains 54.1 ha of White Cedar – Hardwood Mixed Swamp and Poplar Deciduous Swamp habitat adjacent to Treed Pasture and Hardwood Mixed Forest (Figure 7 and 15). This unit contains pockets of permanent open water. | Breeding habitat | Suitable woodland breeding area within swamp habitat. Wood Frog, Green Frog and Northern Leopard Frog observed (individuals) during daytime area searches. | ✓ | | Turbine 23, Feeder Line and Access Road | 95 m from Turbine 23 |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
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| Turtle Overwintering Areas - TOA 1 | Permanent water bodies, large wetlands, bogs or fens with adequate dissolved oxygen. Associated with ELC ecosites MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1 SAM1, SAF1, BOO1 and FEO1. | This unit contains 37.8 ha of contiguous Cattail Mineral Shallow Marsh, White Cedar-Conifer Coniferous Swamp, Poplar Deciduous Swamp, Poplar-Conifer Mixed Swamp and Willow Mineral Deciduous Thicket Swamp habitat with permanent deep water areas (Figure 4 and 10). Deciduous woodland and hardwood mixed forest characterize adjacent lands. A tributary of Perch Creek connects this unit to TOA 2 along Guida's Sideroad. | Turtle Overwintering Habitat | Suitable deep open water areas provided in combined marsh and swamp habitat. An individual common snapping turtle, a species of conservation concern, was observed in the area of Turbine 38 in 2008. | ✓ | | Turbine 40, Feeder Line and Access Road | 15 m from Feeder Line |
| Turtle Overwintering Areas - TOA 2 | Permanent water bodies, large wetlands, bogs or fens with adequate dissolved oxygen. Associated with ELC ecosites MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1 SAM1, SAF1, BOO1 and FEO1. | This unit contains 16.3 ha of Reed Canary Grass Mineral Shallow Marsh, White Cedar-Hardwood Mixed Swamp with permanent deep water areas (Figure 4 and 10). Hardwood mixed forest characterizes adjacent land. A tributary of Perch Creek connects this unit to TOA 1 to the south. | Turtle Overwintering Habitat | Suitable deep open water areas provided in combined marsh and swamp habitat. An individual common snapping turtle, a species of conservation concern, was observed along Guida's Sideroad. A midland painted turtle was also observed. | ✓ | | Feeder Line | 20 m from Feeder Line |
| Turtle Overwintering Areas - TOA 3 | Permanent water bodies, large wetlands, bogs or fens with adequate dissolved oxygen. Associated with ELC ecosites MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1 SAM1, SAF1, BOO1 and FEO1. | This unit contains 31.6 ha of White Cedar-Hardwood Mixed Swamp and Willow Mineral Deciduous Thicket Swamp habitat with permanent deep water areas (Figure 4 and 10). Open pasture, Alvar, deciduous forest and hardwood mixed forest characterize adjacent land. | Turtle Overwintering Habitat | Suitable deep open water areas provided in swamp habitat. Common snapping turtle, a species of conservation concern, was observed in 2008 near the intersection of Greenbush Road and Sideroad 20. | ✓ | | Feeder Line and Access Road | 25 m from Feeder Line |
| Turtle Overwintering Areas - TOA 4 | Permanent water bodies, large wetlands, bogs or fens with adequate dissolved oxygen. Associated with ELC ecosites MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1 SAM1, SAF1, BOO1 and FEO1. | This unit contains 29.3 ha of White Cedar-Hardwood Mixed Swamp habitat with permanent deep water areas (Figure 4 and 10). Deciduous forest, Alvar, mixed swamp, open pasture and hardwood mixed forest characterize adjacent land. | Turtle Overwintering Habitat | Suitable deep open water areas provided in swamp habitat. No direct turtle observations were made in this area. Low numbers of Snapping Turtle and Midland Painted Turtle have been observed throughout the project location. | ✓ | | Feeder Line | 15 m from Feeder Line |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|---------------------------------------|---|---|------------------------------|--|-------------|-----------------|---|--------------------------------------|
| Turtle Overwintering Areas - TOA 5 | Permanent water bodies, large wetlands, bogs or fens with adequate dissolved oxygen. Associated with ELC ecosites MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1 SAM1, SAF1, BOO1 and FEO1. | This unit contains 74.4 ha of Cattail Mineral Shallow Marsh, White Cedar-Conifer Coniferous Swamp, Poplar Deciduous Swamp, White Cedar-Hardwood Mixed Swamp with permanent deep water areas (Figure 4 and 10). Open pasture, treed woodland and hardwood mixed forest characterize adjacent lands. A tributary of Perch Lake flows through this unit connecting to TOA 7. | Turtle Overwintering Habitat | Suitable deep open water areas provided in combined marsh and swamp habitat. An individual Snapping Turtle was observed in the area. | ✓ | | Turbine 23, Feeder Line and Access Road | 10 m from Feeder Line |
| Turtle Overwintering Areas - TOA 6 | Permanent water bodies, large wetlands, bogs or fens with adequate dissolved oxygen. Associated with ELC ecosites MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1 SAM1, SAF1, BOO1 and FEO1. | This unit contains 47 ha of Cattail Mineral Shallow Marsh, White Cedar-Conifer Coniferous Swamp, Poplar Deciduous Swamp and White Cedar-Hardwood Mixed Swamp habitat with permanent deep water areas (Figure 4 and 10). Treed pasture and hardwood mixed forest characterize adjacent land. | Turtle Overwintering Habitat | Suitable deep open water areas provided in combined marsh and swamp habitat. No direct turtle observations were made in this area. Low numbers of Snapping Turtle and Midland Painted Turtle have been observed throughout the project location. | ✓ | | Turbine 20, Feeder Line and Access Road | 119 m from Feeder Line |
| Turtle Overwintering Areas - TOA 7 | Permanent water bodies, large wetlands, bogs or fens with adequate dissolved oxygen. Associated with ELC ecosites MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1 SAM1, SAF1, BOO1 and FEO1. | Perch Lake represents 186.7 ha of contiguous, permanent open water habitat surrounded by deciduous and hardwood mixed forest, treed pasture and mixed mineral marsh habitat (Figure 4 and 6). Minimal shoreline and emergent vegetation is present. A tributary of Perch Lake connects this unit to TOA 5. | Turtle Overwintering Habitat | Largest permanent inland water body in the project location and general area. Suitable deep open water areas provided. An individual Snapping Turtle was observed in the area. | ✓ | | Feeder Line | 85 m from Feeder Line |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|--|--|--|-----------------------|---|-------------|-----------------|--|--------------------------------------|
| Sites Supporting Area-Sensitive Species: Forest Birds FB 1 | Most significant forest stands should contain at least 10 ha of interior forest excluding at least a 200 m buffer around the forest interior. Sites with abundant large, mature trees are more significant. Forests comprised of mainly closed canopy of large trees and a variety of vegetation layers tend to support a greater diversity of species due to the broad range of habitats provided. Minimum forest habitat is at least 100 m away from any edge habitat. | This unit contains 525.7 ha of interior Fresh – Moist Spruce Fir – Hardwood Mixed Forest habitat (Figure 8 and 12). | Breeding bird habitat | Large high quality area of interior forest habitat present. Area-sensitive interior nesting birds, as defined by Appendix G of the Significant Wildlife Habitat Technical Guide (MNR 2000) observed in this wildlife unit along with their average density per hectare include: Black-and-white Warbler (2, 29.55/ha), Black-throated Green Warbler (3, 43.95/ha), Hermit Thrush (2, 15.07/ha), Magnolia Warbler (1, 14.52/ha), Ovenbird (7, 69.11/ha), Red-breasted Nuthatch (1, 14.65/ha), Scarlet Tanager (2, 17.99/ha), and Veery (2, 26.59/ha). | ✓ | | Turbine 39 and 43; Feeder Line and Access Road | Within project location |
| Sites Supporting Area-Sensitive Species: Forest Birds FB 2 | Most significant forest stands should contain at least 10 ha of interior forest excluding at least a 200 m buffer around the forest interior. Sites with abundant large, mature trees are more significant. Forests comprised of mainly closed canopy of large trees and a variety of vegetation layers tend to support a greater diversity of species due to the broad range of habitats provided. Minimum forest habitat is at least 100 m away from any edge habitat. | This unit contains 581.8 ha of interior Fresh – Moist Spruce Fir – Hardwood Mixed Forest habitat (Figure 8 and 12). | Breeding bird habitat | <p>Large high quality area of interior forest habitat present. Area-sensitive interior nesting birds, as defined by Appendix G of the Significant Wildlife Habitat Technical Guide (MNR 2000) observed in this wildlife unit include: American Redstart (3, 54.01/ha), Canada Warbler (1, 21.57/ha), Hermit Thrush (1, 10.05/ha), Magnolia Warbler (2, 38.73/ha), Ovenbird (2, 26.33/ha), Veery (1, 17.73/ha), Winter Wren (2, 32.48/ha) and Hairy Woodpecker (2, 43.82/ha).</p> <p>Canada warbler, a species of conservation concern, was observed in the summer of 2008 and 2010 in the project location (2 individuals). Observations were associated with habitat along Guida's Sideroad, west of Sideroad 20 in open cedar/mixed forest habitat and in association with FB 2.</p> <p>Another species of conservation, common nighthawk (2 individuals) were observed in 2008 during Breeding Bird Surveys in association FB 2 beaver</p> | ✓ | | Feeder Line | Within project location |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|---|---|---|-----------------------|---|-------------|-----------------|---|--------------------------------------|
| | | | | pond/swamp habitat. | | | | |
| Sites Supporting Area-Sensitive Species: Open Country Breeding Birds - OCBB 3 | Large grassland areas are required to be buffered from disturbance and increase the distance between nesting habitats and woody edges as well as nesting potential. Some species require 10 – 30 ha of grassland habitat including Species at Risk. Grasslands with a variety of vegetation structure, density and composition tend to support a greater diversity of nesting bird species. | This unit contains 375.6 ha of Open Pasture habitat, which is used seasonally to graze cows (Figure 4 and 12). | Breeding bird habitat | Large continuous open country habitat suitable for breeding birds. Area-sensitive open country birds, as defined by Appendix G of the Significant Wildlife Habitat Technical Guide (MNR 2000) observed in this wildlife unit include: bobolink (16, 56.15/ha), eastern meadowlark (5, 11.44/ha), northern harrier (2), savannah sparrow (25, 100.57/ha) and sandhill crane (5). | ✓ | | Turbine 34, Feeder Line, and Access Road | 85 m from Turbine 34 |
| Sites Supporting Area-Sensitive Species: Open Country Breeding Birds - OCBB 4 | Large grassland areas are required to be buffered from disturbance and increase the distance between nesting habitats and woody edges as well as nesting potential. Some species require 10 – 30 ha of grassland habitat including Species at Risk. Grasslands with a variety of vegetation structure, density and composition tend to support a greater diversity of nesting bird species. | This unit contains 1071.2 ha of Open Pasture habitat, which is used seasonally to graze cows (Figure 4 and 12). | Breeding bird habitat | Large continuous open country habitat suitable for breeding birds. Area-sensitive open country birds, as defined by Appendix G of the Significant Wildlife Habitat Technical Guide (MNR 2000) observed in this wildlife unit include: bobolink (7 during area search only), eastern meadowlark (4 during area search, 1 on point count or 6.32/ha), northern harrier (5 on area search, 1 on point count), sandhill crane (59 on area search), savannah sparrow (95 on area search, 7 on point count or 66.40/ha), and sharp-tailed grouse (2 during area search). Short-eared Owl, a species of conservation concern, was first observed on McLean's Mountain in the winter of 2010. Additional observations were made in April and May 2011 along McLean's Mountain Road approximately 1 km north of Greenbush Road in association with OCCB 4. Five individuals of common nighthawk, | ✓ | | Turbine 5, 6, 9, 10, 13, 15, 19 and 20; Feeder Line and Access Road | Within project location |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|---|---|---|---|---|-------------|-----------------|---------------------------------|--------------------------------------|
| | | | | another species of conservation concern, were observed in 2010 during Breeding Bird Surveys in open areas near Turbine 25, Turbine 36. An individual species was observed in May 2011 in the wetland along Guida's Sideroad as well as open habitat along McLean's Mountain Sideroad approximately 1 km north of Greenbush Road in association OCB 4. | | | | |
| HABITAT OF SPECIES OF CONSERVATION CONCERN | | | | | | | | |
| Northern Shrike | Nests in taiga habitat and at the border of taiga and tundra, in open country with medium or tall trees or shrubs. Winters in open country habitat with tall perches, including shrubby fields, wetlands and forest edges. Feeds on small birds, mammals and insects ¹ . | Open country, shrub, wetland and forest edge habitat found within the project location (Figure 12). | Habitat for Species Conservation Concern. | A single northern shrike was observed during the fall 2009 migration season. This species was not observed during winter surveys. | | ✓ | --- | --- |
| Rough-legged Hawk | Nests primarily in tundra habitat adjacent to the Hudson Bay coast. Nests in sparsely treed areas such as large bogs and other openings. During migration open agricultural lands are preferred. In the winter, this hawk inhabits open country and marsh habitat. Preferred night roosts are tall conifers, particularly Norway Spruce or White Cedar but small clumps of deciduous trees may also be used. Highly dependent on the Meadow Vole; abundance depends on local populations ² . | Open agricultural lands, open country and marsh habitat found within the project location (Figure 12). | Habitat for Species Conservation Concern. | Two rough-legged hawks were observed during fall 2004. One observation of Rough-legged Hawk was made during a spring site visit along McLean's Mountain Road approximately 1 km north of Greenbush Road. This species was not observed within the project location. This species was not observed during winter surveys. | | ✓ | --- | --- |
| Olive-sided Flycatcher | Semi-open, conifer forest, prefers spruce; near pond, lake or river; treed wetlands for nesting; burns with dead trees for perching. | Coniferous forest, ponds, lakes, rivers as well as treed wetlands are located within the project location (Figure 12). | Habitat for Species Conservation Concern. | This species was not observed during numerous bird and wildlife surveys performed throughout 2004 – 2011 in the project location. | | ✓ | --- | --- |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|-----------------------|--|--|--|--|-------------|-----------------|---------------------------------|--|
| Red-headed Woodpecker | Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory. | Deciduous forest, fields, open pasture and swamps are located within the project location (Figure 12). | Habitat for Species of Conservation Concern. | This species was not observed during numerous bird and wildlife surveys performed throughout 2004 – 2011 in the project location. | | ✓ | --- | --- |
| Cooper's Milkvetch | Found in open woods, frequently on limestone plains. Associated with Alvars, riparian areas, woodlands and woodland edges. This species is indicative of Alvar habitats in southern Ontario. | Multiple units of Common Juniper Shrub Alvar located in project location (see Figure 12). | Habitat for Species of Conservation Concern. | Associated with one vegetation plot completed in Fresh-Moist Spruce-Fir Hardwood Mixed Forest near Turbine 30. This species is known to be rare (S3) in Ontario and only a single occurrence of this species was observed during vegetation surveys. Therefore this occurrence is significant to the continued existence of this species in the local area. | ✓ | | Turbine 30 | Species occurrence is 10 m from Turbine 30 |
| Slender Blazing Star | Found on limestone and dolostone pavement, prairies and open woods. Associated with Alvars, prairie/grassland, savannah and woodland habitat. | Multiple units of Common Juniper Shrub Alvar located in project location (see Figure 12). Woodland habitat is found throughout the project location. | Habitat for Species of Conservation Concern. | Observed in Alvar (ALV 4) along the northeast side of Harbourview Road just outside of the road right-of-way. Further investigations will be required in suitable habitat for this species throughout the project location. | ✓ | | Transmission Line | --- |
| Clustered Broomrape | Habitat consists of shallow soil over limestone. Associated with Alvars. | Multiple units of Common Juniper Shrub Alvar located in project location (see Figure 12). | Habitat for Species of Conservation Concern. | Historical records identified through MNR's NHIC Biodiversity Explorer in the areas of the project location, associated with Alvar communities. Although botanical work was completed in the study area, the project location has been adjusted slightly to avoid disturbances to other known wildlife habitats. Therefore, this species should be carried forward as significant until areas of potential disturbance in proximity to alvar habitat are assessed | ✓ | | --- | --- |

| Wildlife Habitat | Attributes* | Composition | Function | Relevant Evaluation Criteria Determining Status | Significant | Not Significant | Project Components within 120 m | Nearest Distance to project location |
|------------------|--|---|------------------|--|-------------|-----------------|---------------------------------|--------------------------------------|
| | | | | further to confirm this species presence/absence. | | | | |
| Prairie Dropseed | Habitat consists of moist to dry limestone plains and calcareous shores. Associated with Alvars and prairie/grassland. This species is indicative of Alvar habitats in southern Ontario. | Multiple units of Common Juniper Shrub Alvar located in project location (see Figure 12). | Prairie Dropseed | <p>Historical records identified through MNR's NHIC Biodiversity Explorer in the area of the project location, associated with Alvar communities.</p> <p>Although botanical work was completed in the study area, the project location has been adjusted slightly to avoid disturbances to other known wildlife habitats. Therefore, this species should be carried forward as significant until areas of potential disturbance in proximity to alvar habitat are assessed further to confirm this species presence/absence.</p> | ✓ | | --- | --- |

*Based on Significant Wildlife Habitat Technical Guide, MNR 2000

¹Cornell University 2011

²Sandilands, Al. 2005

9. Conclusions

This report evaluated the significance of natural features determined to occur within 120 metres of the project location. The features evaluated for their significance in this report were identified previously as part of the records review, site investigation and consultation with relevant agencies, stakeholders and the public. Evaluation of significance was undertaken according to the criteria and procedures currently accepted by the MNR. **Table 6** below summarizes the results of the evaluations.

This report is intended to fulfill the requirements for the Evaluation of Significance Report under *Ontario Regulation 359/09*. This Evaluation of Significance Report is the third report in a series that will fulfill the natural heritage assessment component of the *REA* process. An Environmental Impact Study Report, which examines potential impacts, mitigation and other relevant items to protect these features will be required for those significant or provincially significant natural features determined to be within 120 metres of the project location.

Table 6: Evaluation of Significance Summary of Natural Features

| Natural Feature ID | Feature in Relation to Project Location | | Evaluation of Significance Status | |
|---|---|---------------------------|--|--|
| | Within | Within Prescribed Setback | Significant/ Provincially Significant | Not Significant/ Provincially Significant |
| PROVINCIAL PARKS AND CONSERVATION RESERVES | | | | |
| Not applicable to project location | | | | |
| ANSI, LIFE SCIENCE | | | | |
| Not applicable to project location | | | | |
| ANSI, EARTH SCIENCE | | | | |
| Not applicable to project location | | | | |
| VALLEYLANDS | | | | |
| Not applicable to project location | | | | |
| WETLANDS | | | | |
| 1 | --- | ✓ | ✓ | --- |
| 2 | --- | ✓ | ✓ | --- |
| 3 | --- | ✓ | ✓ | --- |
| 4 | --- | ✓ | ✓ | --- |
| 5 | --- | ✓ | ✓ | --- |
| 6 | --- | ✓ | ✓ | --- |
| 7 | --- | ✓ | ✓ | --- |
| 8 | --- | ✓ | ✓ | --- |
| 9 | --- | ✓ | ✓ | --- |
| 10 | --- | ✓ | ✓ | --- |
| 11 | --- | ✓ | --- | ✓ |
| 12 | ✓ | ✓ | --- | ✓ |
| WILDLIFE HABITAT | | | | |
| <i>Seasonal Concentration Areas</i> | | | | |
| Waterfowl Nesting Area – WNA 1 | ✓ | ✓ | ✓ | --- |
| Waterfowl Nesting Area – WNA 2 | ✓ | ✓ | --- | ✓ |
| Waterfowl Nesting Area – WNA 3 | ✓ | ✓ | --- | ✓ |
| Waterfowl Nesting Area – WNA 4 | ✓ | ✓ | ✓ | --- |
| Waterfowl Nesting Area – WNA 5 | --- | ✓ | ✓ | --- |
| Raptor Winter Feeding and Roosting Area - RWFR 3 | ✓ | ✓ | ✓ | --- |

| Natural Feature ID | Feature in Relation to Project Location | | Evaluation of Significance Status | |
|--|---|---------------------------|--|--|
| | Within | Within Prescribed Setback | Significant/ Provincially Significant | Not Significant/ Provincially Significant |
| Raptor Winter Feeding and Roosting Area - RWFR 4 | ✓ | ✓ | ✓ | --- |
| Bullfrog Concentration Area - BCA 1 | --- | ✓ | --- | ✓ |
| Bullfrog Concentration Area - BCA 2 | --- | ✓ | --- | ✓ |
| Bullfrog Concentration Area - BCA 3 | --- | ✓ | --- | ✓ |
| Bullfrog Concentration Area - BCA 4 | --- | ✓ | --- | ✓ |
| Bullfrog Concentration Area - BCA 5 | --- | ✓ | --- | ✓ |
| Bullfrog Concentration Area - BCA 6 | --- | ✓ | --- | ✓ |
| Bullfrog Concentration Area - BCA 7 | --- | ✓ | --- | ✓ |
| <i>Rare Vegetation Communities</i> | | | | |
| Alvar – ALV 1 | ✓ | ✓ | ✓ | --- |
| Alvar – ALV 2 | ✓ | ✓ | ✓ | --- |
| Alvar – ALV 3 | ✓ | ✓ | ✓ | --- |
| Alvar – ALV 4 | ✓ | ✓ | ✓ | --- |
| <i>Specialised Wildlife Habitat</i> | | | | |
| Woodland Amphibian Breeding Habitat - WABH1 | --- | ✓ | ✓ | --- |
| Woodland Amphibian Breeding Habitat – WABH 2 | --- | ✓ | ✓ | --- |
| Woodland Amphibian Breeding Habitat – WABH 3 | --- | ✓ | --- | ✓ |
| Woodland Amphibian Breeding Habitat – WABH 4 | --- | ✓ | --- | ✓ |
| Woodland Amphibian Breeding Habitat – WABH 5 | --- | ✓ | ✓ | --- |

| Natural Feature ID | Feature in Relation to Project Location | | Evaluation of Significance Status | |
|--|---|---------------------------|--|--|
| | Within | Within Prescribed Setback | Significant/ Provincially Significant | Not Significant/ Provincially Significant |
| Woodland Amphibian Breeding Habitat – WABH 6 | --- | ✓ | ✓ | --- |
| Woodland Amphibian Breeding Habitat – WABH 7 | --- | ✓ | ✓ | --- |
| Woodland Amphibian Breeding Habitat – WABH 8 | --- | ✓ | ✓ | --- |
| Turtle Overwintering Areas - TOA 1 | --- | ✓ | ✓ | --- |
| Turtle Overwintering Areas - TOA 2 | --- | ✓ | ✓ | --- |
| Turtle Overwintering Areas - TOA 3 | --- | ✓ | ✓ | --- |
| Turtle Overwintering Areas - TOA 4 | --- | ✓ | ✓ | --- |
| Turtle Overwintering Areas - TOA 5 | --- | ✓ | ✓ | --- |
| Turtle Overwintering Areas - TOA 6 | --- | ✓ | ✓ | --- |
| Sites Supporting Area-sensitive Species: Forest Birds - FB 1 | ✓ | ✓ | ✓ | --- |
| Sites Supporting Area-sensitive Species: Forest Birds - FB 2 | ✓ | ✓ | ✓ | --- |
| Sites Supporting Area-sensitive Species: Open Country Breeding Birds - OCBB 3 | --- | ✓ | ✓ | --- |
| Sites Supporting Area-sensitive Species: Open Country Breeding Birds - OCBB 4 | ✓ | ✓ | ✓ | --- |
| <i>Habitat of Species of Conservation Concern</i> | | | | |
| Northern Shrike | --- | ✓ | --- | ✓ |
| Rough-legged Hawk | --- | ✓ | --- | ✓ |
| Olive-sided Flycatcher | --- | --- | --- | ✓ |
| Red-headed Woodpecker | --- | --- | --- | ✓ |

| Natural Feature ID | Feature in Relation to Project Location | | Evaluation of Significance Status | |
|----------------------|---|---------------------------|--|--|
| | Within | Within Prescribed Setback | Significant/ Provincially Significant | Not Significant/ Provincially Significant |
| Cooper's Milkvetch | --- | ✓ | ✓ | --- |
| Slender Blazing Star | --- | ✓ | ✓ | --- |
| Clustered Broomrape | --- | ✓ | ✓ | --- |
| Prairie Dropseed | --- | ✓ | ✓ | --- |

10. References

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APPENDIX A

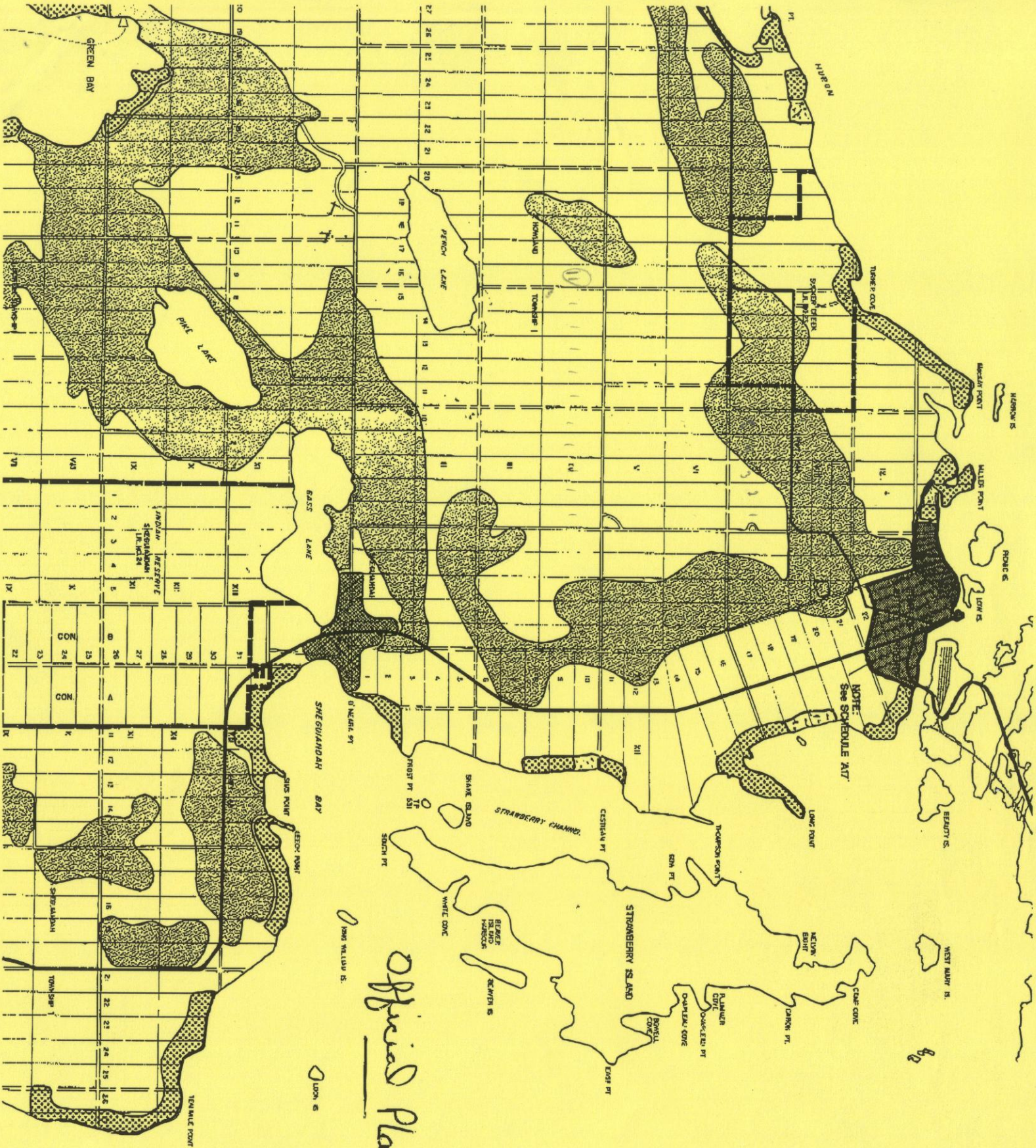
Supplementary Information



APPENDIX A

A1: Official Plan Mapping

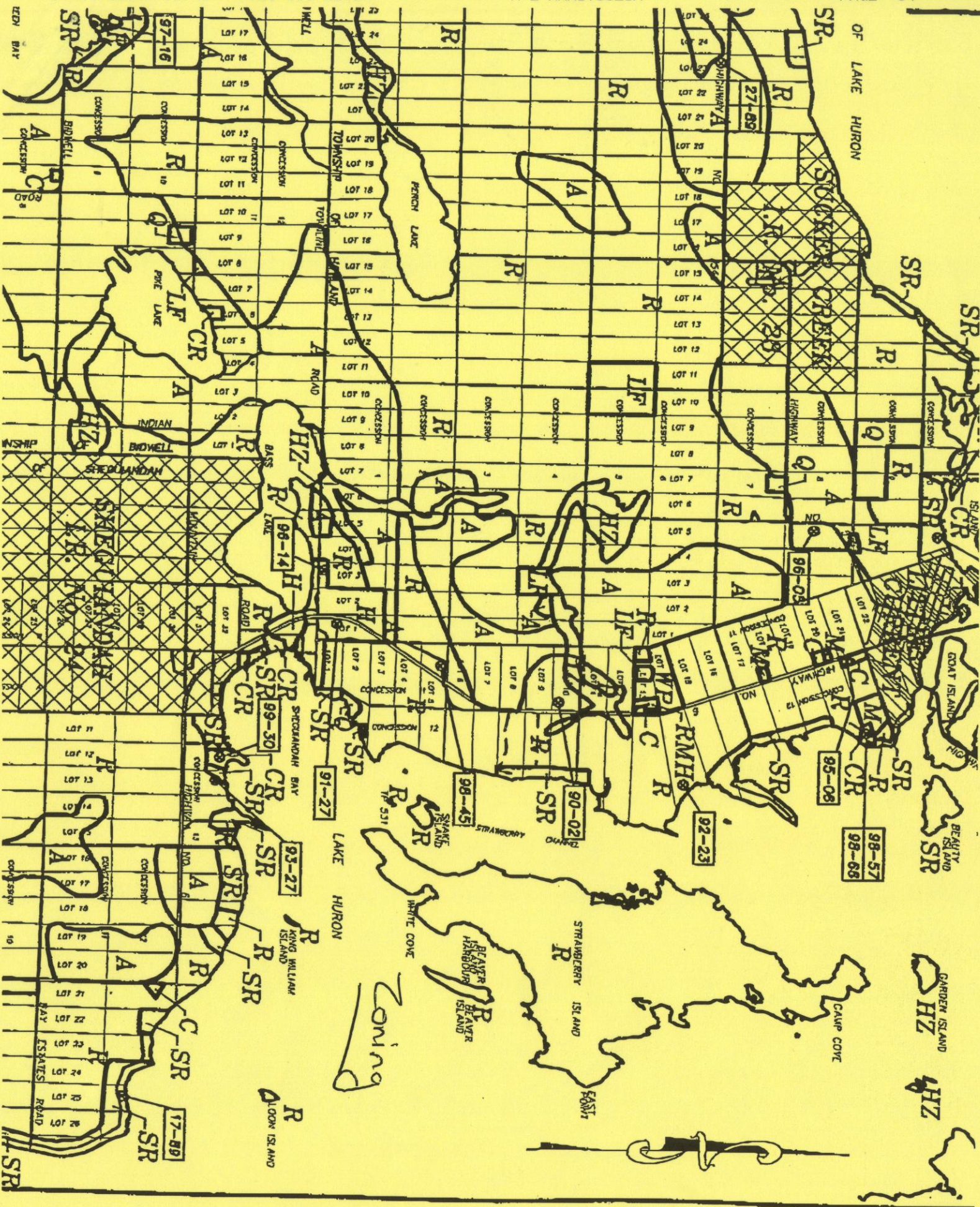




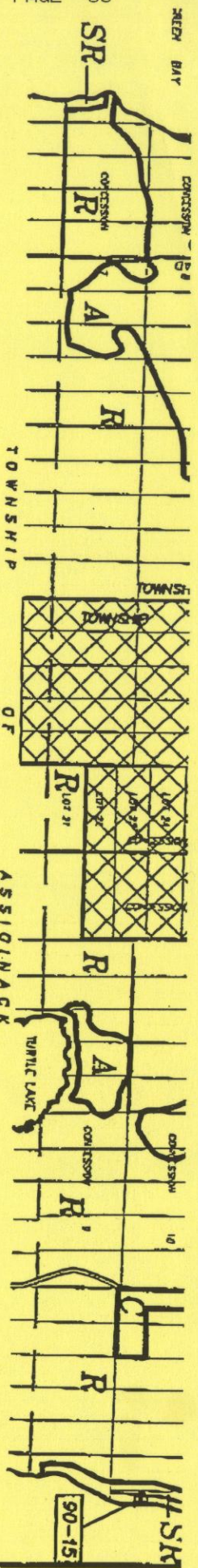
NOTE: See Schedule A17

Official Plan

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Zoning



ZONES

| Zone | Symbol |
|------|--------|
|------|--------|

| | |
|------------------------------|-----|
| Agricultural (A) | A |
| Rural (R) | R |
| Hamlet (H) | H |
| Settlement (S) | S |
| Shoreline Residential (SR) | SR |
| Mobile Home Park (RMH) | RMH |
| Restricted Commercial (C) | C |
| Commercial Recreational (CR) | CR |
| Restricted Industrial (M) | M |
| Pit & Quarry (Q) | Q |
| Recreation (RE) | RE |
| Hazard (HZ) | HZ |
| Landfill (LF) | LF |
| Waste Processing (WP) | WP |
| Special Provision | ⊙ |

NOTE:
 No new habitable structure shall be constructed below the 178.3 metre contour adjacent to Lake Huron unless the setback from the shoreline is a minimum of 81 metres and the structure is flood proofed to the 179.8 metre contour.

This is Schedule A
 to By-Law No. 2092-32
 Passed this day of 18/12/2002.
 Mayor *[Signature]*
 Clerk *[Signature]*

By-Law No. 2092-32

APPENDIX B

CVs



**DAVID
RESTIVO**

**BIOLOGIST /
ISA CERTIFIED
ARBORIST**

Education

Diploma of Engineering
Technology and Applied
Science – Environmental
Protection Technology,
Centennial College,
Scarborough, Ontario, 2004

B.Sc. (Honours) Biology and
Psychology, McMaster
University, Hamilton, Ontario,
1999

Affiliations

ECO Canada/CECAB -
Certified Environmental
Professional

Butternut Health Assessor

ISA Certified Arborist

Languages

English

Spanish (Intermediate Level)

PERSONAL PROFILE

David is a biologist and ISA Certified Arborist with experience in ecological assessment, environmental effects monitoring, natural heritage planning and biological sampling/surveying in both terrestrial and aquatic environments. As an experienced naturalist and arborist, David brings a broad level of knowledge in several environmental disciplines to every infrastructure development project.

RELEVANT EXPERIENCE

INFRASTRUCTURE

Project coordination and management, renewable energy approvals, environmental assessment, evaluation procedures and land use planning related to the planning and environmental assessment of infrastructure development projects. Examples of assignments are:

Renewable Energy

Renewable Energy Canada, Athelstane and North Wellington Wind

Natural environment coordinator for two wind energy Background Review and Constraint Analysis projects.

Invenergy LLC, Conestogo Wind Farm REA Project

Natural environment coordinator for the Natural Heritage Assessment (NHA) and Water Assessment (WA) reports required under *Ontario Regulation 359/09* as mandated under Section V.0.1 of the *Ontario Environmental Protection Act*.

Youil PV, Tecumseh Solar REA Project

Natural environment coordinator for the field program and the NHA and WA reports required under *Ontario Regulation 359/09*.

Invenergy LLC, Simcoe Solar REA Projects

Natural environment coordinator for the NHA and WA reports required under *Ontario Regulation 359/09*.

Peterborough Utility Incorporated, Peterborough Landfill Thermal Treatment Facility

Natural environment coordinator for the NHA and WA reports required under *Ontario Regulation 359/09*.

Renewable Energy Systems Canada, Coboconk Solar Project

Natural environment coordinator of the environmental due diligence study for a solar development.

Renewable Energy Systems Canada, Greenwich Wind Farm

Conducted Forest Ecosystem Classification, Wetland Ecosystem Classification and botanical surveys for the Greenwich Wind Farm site in northwestern Ontario in order to conform to the Federal Environmental Assessment regulatory approvals process.

Canadian Shield Wind Power, Gore Bay Wind EA

Fulfilled the role of natural environment coordinator/lead ornithologist for an EA of a proposed 10 MW wind farm in Gore Bay, Manitoulin Island, Ontario. Conducted breeding, winter and migratory bird surveys, documenting significant wildlife habitat for species at risk and other species of conservation concern.

DAVID
RESTIVO

BIOLOGIST /
ISA CERTIFIED
ARBORIST

Northland Power Inc., Manitoulin Wind Farm

Conducted bird surveys and habitat evaluation for the purpose of assessing the impact of wind turbine infrastructure on the local environment and avian populations. This study was completed for the purpose of identifying groups of birds and their habitat that may require further study as part of the former Federal EA process for a proposed wind farm.

Invenergy LLC, Talbot Wind Farm

Conducted breeding bird surveys, migration monitoring surveys, winter bird surveys and wildlife habitat assessments at three sites as part of a wind power pre-feasibility study. This study was completed for the purpose of identifying groups of birds and their habitat that may require further study as part of the former Federal EA process for a proposed wind farm.

Enbridge Wind Farm

Conducted breeding bird surveys, migration monitoring surveys, species at risk (Henslow Sparrow) surveys and habitat evaluations for the purpose of assessing the impact of wind turbine infrastructure on the local environment and avian populations. Submitted observations, recommendations and summary report in support of a Canadian Environmental Assessment Act screening.

Energy Supply

Ontario Power Generation, Darlington Nuclear Campus Plan

Natural environment lead for the Darlington Nuclear Campus Plan Update and Refurbishment environmental impact assessment. This project involved identifying opportunity and constraints to DN Refurbishment development as well as an effects assessment of the proposed development options.

Pritine Power Inc., York Energy Centre EA/EIS

Conducted an Environmental Assessment pursuant to Ontario Regulation 116/01 for electricity projects under the *Ontario Environmental Assessment Act*, as well as an Environmental Impact Study for the York Energy Centre, a natural gas-fired, simple cycle, 350 MW peaking generation power plant in northern York Region. The project involved inventory of the natural heritage features, an impact/mitigation analysis and the restoration of the Ansnorveldt Creek and associated riparian and wetland habitat.

Hydro One, Holland Transformer Station EA

Completed the natural environment component for the Holland Transformer Station EA in Holland Landing, Ontario. This work included documenting the existing conditions, determining the relative levels of impact and designing mitigation measures for the identified impacts. Particular issues that arose on this project included the presence of the Ansnorveldt provincially significant wetland complex.

Kiewit Corporation, Toba Inlet Hydroelectric Project

Conducted bird nest searches in the Toba Inlet Hydro Project electrical transmission line corridor that extended from the Toba Inlet to the Sunshine Coast in British Columbia.

Transportation

City of Ottawa, Terry Fox Drive Extension

Terrestrial lead for the Terry Fox Drive Extension CEAA Approval project. This project involved MNR Species at Risk Agreements, mitigation plans, agency consultation and terrestrial natural environment field surveys.

DAVID
RESTIVO

BIOLOGIST /
ISA CERTIFIED
ARBORIST

Town of LaSalle, Laurier Parkway Class EA

Terrestrial natural environment coordinator for the Transportation Municipal Class EA for the Laurier Parkway Extension project in LaSalle, Ontario.

Ministry of Transportation, Ontario, Highway 7/8 Class EA

Terrestrial natural environment coordinator for the Transportation Municipal Class EA for the Highway 7/8 project (road improvements) in Kitchener, Ontario.

County of Middlesex, Dorchester Bridge Class EA

Terrestrial natural environment coordinator for the Transportation Municipal Class EA for a bridge replacement project in Dorchester, Ontario. The scope of work included assisting the County in obtaining an Overall Net Benefit Permit under the provincial Endangered Species Act, Section 17.2(c).

Ministry of Transportation, Ontario, Highway 7 Class EA

Terrestrial natural environment coordinator for the Transportation Municipal Class EA for the Highway 7 project (road improvements) in Rockwood, Ontario

Ministry of Transportation, Ontario, Highway 21 Class EA

Terrestrial natural environment coordinator for the Transportation Municipal Class EA of the Highway 21 project (road/bridge improvements) in Lambton Shores, Ontario.

CP Rail

Conducted terrestrial wildlife habitat assessments for breeding bird and amphibian communities in rail line expansion areas in Banff and Yoho National Parks, located in Alberta and British Columbia respectively.

City of Ottawa, Eagleson Road Municipal Class EA

Completed a natural heritage evaluation for the Class EA road expansion project in Ottawa, Ontario.

Town of Tecumseh, Manning Road Class EA

Completed a natural heritage evaluation for the Manning Road (CR19 to CR22) Municipal Class EA road expansion project.

York Region, Bathurst Street Class EA

Completed a natural features inventory for the Bathurst Street Municipal Class EA road project in Newmarket, Ontario.

City of London, Cathcart Street/Bond Street Reconstruction

Completed an arborist assessment of a municipal servicing reconstruction project in London, Ontario. The arborist assessment included an impact and mitigation analysis designed to prevent injury to public trees.

Water Supply

Halton Region, Halton Boyne Trunk Sanitary Sewer Class EA

Completed a natural environment assessment for the Halton Boyne Trunk Sanitary Sewer Class EA from Boyne SPS to the intersection of Dundas Street and Third Line in Oakville, Ontario.

Regional Municipality of Niagara, Wainfleet Municipal Servicing EA

Conducted terrestrial field studies for a municipal water and wastewater infrastructure EA project in Wainfleet, Ontario.

DAVID
RESTIVO

BIOLOGIST /
ISA CERTIFIED
ARBORIST

Halton Region, Cedarvale Well Field Study

Monitored aquatic features for the Cedarvale Well Field Impact Assessment in Georgetown, Ontario. A pumping test was used to examine the potential impacts on surface water features, including Silver Creek and the Hungry Hollow ESA, from increased pumping at the Cedarvale Well Field.

Halton Region, Acton Water Supply EA

Completed a long-term aquatic health monitoring program.

Waste Management

City of Sault Ste. Marie, Sault Ste Marie Municipal Landfill Monitoring Program

Coordinator of the biological monitoring program for the SSM Municipal Landfill Monitoring Program, involving surface water quality analysis determined using the benthic invertebrate community.

District Municipality of Muskoka, Muskoka Landfill Planning

Completed aquatic and terrestrial field evaluations of potential landfill expansion sites in Huntsville, Bracebridge and Gravenhurst, Ontario.

Grand Bend Sewage Treatment Facility Master Plan

Produced an aquatic resources review report from secondary source data for the Grand Bend Sewage Treatment Facility Master Plan Study.

URBAN DEVELOPMENT

Project direction and management, land use planning, administrative systems/organizational design, community design, environmental analysis and policy formulation on comprehensive planning programs and development projects. The following are representative:

Residential Development

Lakewood Beach Properties EIS

Completed an EIS for a proposed development site in Wainfleet, Ontario. The site, located on northern Lake Erie shoreline, required an impact and mitigation analysis and a Fowler's toad Species at Risk habitat assessment and permit application submission under the provincial Endangered Species Act.

Senator Homes, Dreamwood Development

Designed and coordinated a wetland monitoring study of the Dreamwood wetland in Vaughan, Ontario, located in proximity to a residential development site. The study involved monitoring water quality, wildlife, hydrology, thermal effects, vegetation community and other potential impacts. The data collected was summarized in three annual Wetland Monitoring Reports.

Norquay Developments Limited, London, Ontario

Carried out avian and herptofauna pre and post construction environmental effects monitoring program.

Senator Homes, Discovery III Development

Designed and coordinated a wetland monitoring study of the Heart Lake (Discovery III) wetland in Brampton, Ontario, located in proximity to a residential development site. The data collected was summarized in an annual Wetland Monitoring Report.

DAVID
RESTIVO

BIOLOGIST /
ISA CERTIFIED
ARBORIST

Orlando Corporation, Streetsville Quarry Redevelopment EIS

Conducted an Environmental Impact Study (EIS) of the Streetsville Quarry, a decommissioned (Mississauga shale) quarry site in the City of Mississauga formerly operated by Canada Brick. The project involved inventory of the natural heritage features, quarry reclamation recommendations, an impact/mitigation analysis and the restoration/naturalization of the Wabukayne Creek Valley and associated upland habitat.

Mademont Investments, Mademont Newmarket

Completed a Development Opportunity and Constraints Report for a settlement area in the Oak Ridges Moraine Plan. Assessments included ELC, wetland delineation, rare species surveys and aquatic resources evaluation.

Durham Homes, Oshawa

Conducted field assessments using ELC and OWES techniques to evaluate and refine the historic delineation of a PSW in Oshawa, Ontario.

King Cole Duck Ltd.

Completed a Development Opportunity and Constraints Report for a proposed development site in Aurora, Ontario, with a variety of natural heritage features.

Monarch Corporation, Mayfield West Community MESP

Conducted terrestrial field assessments, the results of which were incorporated into the Mayfield West Community Master Environmental Servicing Plan of a proposed development area in Caledon, Ontario.

DiPoce Management Limited, DiPoce EIS

Produced an Ontario Greenbelt Act Opportunity and Constraints report for a residential development.

Office/Commercial/Mixed-Use Projects

Metrus Properties Limited, Former Kodak Site Redevelopment NHIS

Undertook a Natural Heritage Impact Study (NHIS) and Arborist Study of a brownfield development property in Toronto, Ontario, to satisfy regulatory permitting requirements. These studies involved detailed tree inventories, ELC, natural heritage impact and mitigation analysis and conceptual ecological restoration planning.

Guelph Smartcentre

Completed an Environmental Due Diligence Report for a development project with an adjacent PSW in Guelph, Ontario, to satisfy company environmental due diligence requirements.

Russel Metals EIS

Completed an EIS to satisfy development permitting requirements at the Russel Metals factory in Ottawa, Ontario.

Official Plans/Master Plans

Halton Region, Conservation Halton Park Master Plan

Completed Conservation Area Master Plans for three conservation areas in Halton Region.

DAVID
RESTIVO

BIOLOGIST /
ISA CERTIFIED
ARBORIST

Secondary Plans

Block 18 Master Environmental Services Plan

Identified environmentally sensitive aquatic features and established a monitoring program and fish compensation plan.

Transportation Plans

City of Hamilton, Waterdown/Aldershot Transportation Master Plan

Completed a detailed natural environment evaluation for Phase 3 of a cross-jurisdictional Municipal Class EA in Waterdown, Ontario.

EMPLOYMENT HISTORY

Dillon Consulting Limited

2005-Present Biologist / ISA Certified Arborist

2004-2005 Fish and Wildlife Technologist

Bird Studies Canada, Long Point, Ontario

2004 Migration Monitor / Banding Assistant (volunteer)

Toronto and Region Conservation Authority, Downsview, Ontario

2004 Fisheries Technician

2003 Environmental Engineering Technician

McMaster University, Department of Biology, Hamilton, Ontario

1999 Research Assistant

PROFESSIONAL DEVELOPMENT

Ministry of Natural Resources Butternut Health Assessment Certification, 2010

Grassland Bird/Loggerhead Shrike SAR Survey (Carden Alvar), Wildlife Preservation Canada, Bird Studies Canada and Canadian Wildlife Service, 2009

Joint Health and Safety Committee Certification Part I & II, 2009

International Society of Arboriculture (ISA) Certified Arborist, 2008

2008 OUFC Conference, The Urban Forest – A Place to Evolve, 2008

Emergency First Aid (Level A CPR Training) – Lifetech Canada, 2008

Project Management 101 & 201 – Dillon U, 2006-2007

Ontario Wetland Evaluation System Certification Course, MNR, 2006

Class 1 Electrofishing Certification Course, OMNR, 2005

Great Lakes Marsh Monitoring Program, Environment Canada, 2005

Nocturnal Owl Survey (Livingstone Lake), Bird Studies Canada, 2005-present

Environmental Assessment Seminar – Dillon U, 2005

Christmas Bird Count (Hamilton), Bird Studies Canada, 2004-present

*DAVID
RESTIVO*

BIOLOGIST /
ISA CERTIFIED
ARBORIST

Ecological Land Classification for Southern Ontario, OMNR, 2004

SEPTEMBER 2010

(20)

**RICHARD
BAXTER**

BIOLOGIST

Education

Bachelor of Science in
Resource Management – Fish
and Wildlife Major, University
of Northern British Columbia,
2007

Fish and Wildlife
Technologists Diploma, Sir
Sandford Fleming College,
2001

Languages

English

PERSONAL PROFILE

Richard is a biologist with experience in ecological risk assessment, environmental effects monitoring and biological sampling/surveying in both terrestrial and aquatic environments. As an experienced naturalist, Richard brings a broad level of knowledge in several environmental disciplines to every project.

RELEVANT EXPERIENCE

ENVIRONMENTAL ASSESSMENT: LINEAR INFRASTRUCTURE

Ministry of Transportation, Ontario

Conducted background reviews and natural environment fieldwork reporting for highway improvements along a section of Highway 7/8 in Kitchener, Ontario.

Ministry of Transportation, Ontario

Conducted background reviews and natural environment fieldwork reporting for a bridge replacement project in Dorchester, Ontario.

Ministry of Transportation, Ontario

Conducted background reviews and field surveys to determine the potential for breeding bird and Species at Risk habitat, as well as rare vegetation, located along a section of Highway 7 in Rockwood, Ontario.

Ministry of Transportation, Ontario

Conducted background reviews and field surveys to determine the potential for breeding bird and Species at Risk habitat, as well as rare vegetation, located along a section of Highway 21 in Lambton Shores, Ontario.

Ontario Hydro One

Conducted background reviews relating to terrestrial natural heritage features for a proposed transmission station installation near Tremaine Road, Oakville, Ontario.

Regional Municipality of Halton

Conducted background reviews and field surveys to assess breeding bird community, amphibian community and the ecological composition of vegetation communities located along the proposed Halton-Boyer trunk sewer line route.

Regional Municipality of Niagara

Conducted background reviews and field surveys to assess breeding bird community, amphibian community and the ecological composition of vegetation communities located along a proposed sewer line route between Wainfleet and Port Colborne, Ontario.

City of Ottawa, Ontario

Conducted background reviews and field surveys to assess breeding bird community and the ecological composition of vegetation communities located along the approved route of the Terry Fox Drive Extension during the Detailed Design Phase.

City of Hamilton, Ontario

Conducted background reviews and field surveys to determine the potential for breeding bird habitat and the ecological composition of vegetation communities located along a proposed route for a light rail transit system along the Main and King Street corridors in downtown Hamilton, Ontario.

**RICHARD
BAXTER**

BIOLOGIST

Ministry of Transportation, Ontario

Conducted background reviews and field surveys to determine the potential for breeding bird habitat located at intersections scheduled for improvement, along a section of Highway 6 in Guelph, Ontario.

Plutonic Power, Peter Kiewit and Sons

Conducted nest searches during clearing operations for a power line right-of-way near Powell River and the Toba Inlet in British Columbia.

Cities of Hamilton and Burlington, and Regional Municipality of Halton, Ontario

Completed breeding bird surveys for the Waterdown Road municipal class environmental assessment road expansion project.

ENVIRONMENTAL ASSESSMENT: WIND ENERGY

Melancthon Wind Farm - 401 Energy; McLean's Mountain Wind Farm - Northland Power; Dover Wind Farm - Invenergy Canada; and Greenwich Lake Wind Farm - RES Canada

Completed natural environment related Renewable Energy Approvals documentation for several Ontario wind farm projects

Raleigh Wind Farm Project, Invenergy

Developed post-construction monitoring plans for identified potentially sensitive bird and bat resources located on Lake Erie's north shore west of Rondeau Provincial Park.

McLean's Mountain Wind Farm Project, Northland Power

Conducted botanical surveys as part of the Federal Environmental Assessment approvals process for a proposed wind farm.

McLean's Mountain Wind Farm Project, Northland Power

Conducted breeding bird surveys and habitat assessments at one site as part of a wind power pre-feasibility study. This study identified groups of birds and their habitat that may require further study as part of the Federal Environmental Assessment approvals process for a proposed wind farm.

Positive Power, Windy Hills

Compiled secondary source background data for natural environment reports for two proposed wind farm sites in different regions of southwestern Ontario. These reports summarized the potential natural heritage resources for the study area in preparation for the Federal Environmental Assessment approvals process for a proposed wind farm.

401 Energy, Positive Power, Windy Hills

Conducted fall migration bird surveys to assess the impact of wind turbine infrastructure on the local environment and avian populations. This study was undertaken to identify groups of birds that may require further study as part of the Federal Environmental Assessment approvals process for three proposed wind farms.

401 Energy, Positive Power

Conducted breeding bird surveys and habitat assessments at two sites as part of a wind power pre-feasibility study. This study identified groups of birds and their habitat that may require further study as part of the Federal Environmental Assessment approvals process for a proposed wind farm.

**RICHARD
BAXTER**

BIOLOGIST

ENVIRONMENTAL ASSESSMENT: SOLAR ENERGY

Invenergy Canada

Conducted breeding bird and vegetation studies for solar power developments near Woodville, Ontario.

EDF EN Canada

Conducted site investigations and a natural heritage background evaluation for a solar power development near Smiths Falls, Ontario.

EDF EN Canada

Conducted natural heritage background evaluations for solar power developments near Smiths Falls and St. Isidore, Ontario.

ENVIRONMENTAL MONITORING – DEVELOPMENT PROJECTS

Cedarvale Well Field, Town of Halton Hills, Ontario

Conducted vernal pool surveys to assess potential amphibian breeding habitat conditions in a well field south of Georgetown, Ontario.

Beaver Creek Stormwater Management Project

Conducted environmental monitoring and assessed site conditions in compliance with the *Federal Fisheries Act*. Monitored water turbidity conditions.

TERRESTRIAL ENVIRONMENTAL PLANNING: DEVELOPMENT PROJECTS

City of London, Ontario

As part of the Thames Valley Corridor Plan, ELC work was conducted on several patches of city-owned land within the City of London. This information will be used for future planning activities by the City.

St. George Industrial Park; Gormley; Holland Landing; Mayfield West and Mademont Investments in southern Ontario

Conducted breeding bird surveys at these development project sites.

TERRESTRIAL AND AQUATIC BACKGROUND: HYDRO-POWER PROJECTS

Yunnan Huaneng Lancang River Hydropower Co., LTD

Conducted background environmental research on natural heritage features of the area and the possible impacts on these features relating to planned development of hydro power projects on the Mekong River in southeast Asia.

EMPLOYMENT HISTORY

Dillon Consulting Limited

2007-Present Biologist

Bird Studies Canada

2006 Migration Monitor / Banding Assistant

University of Alberta

2006 Research Assistant, cavity nester study

**RICHARD
BAXTER**

BIOLOGIST

2006

Royal British Columbia Museum

Botany Collections Assistant

2005

British Columbia Conservation Foundation

River Guardian on the Dean River, British Columbia

2004

Ducks Unlimited Canada

Biological Technician

2001

Grand River Conservation Authority

Field Technician

PROFESSIONAL DEVELOPMENT

MNR Wind Energy and Bats Seminar, 2010.

ATV Safety Training, 2001.

Bear and Shotgun Safety Training, 2001.

Electrofishing Certification, Back Pack Unit, MNR, 2001.

CERTIFICATIONS

Ontario MNR-sponsored Ecological Land Classification certification

ATV Safety Training

Pleasure Craft Operator Safety Training

Bear Safety Training

WHMIS

First Aid/CPR

JULY 2010

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**JENNIFER
SYLVESTER**

BIOLOGIST

Education

B.Sc. (Conservation Biology),
Dean's Honour List, Trent
University, Peterborough,
Ontario, 2006

Ecosystem Restoration Post-
Diploma Program, Niagara
College of Applied Arts &
Technology, Niagara-on-the-
Lake, Ontario, 2002

Environmental Engineering
Technology Diploma
Program, Humber College of
Applied Arts & Technology,
Toronto, Ontario, 2001

Affiliations

Field Botanists of Ontario

Entomological Society of
Ontario

Guelph Field Naturalists

Language

English

RELEVANT EXPERIENCE

ENVIRONMENTAL PLANNING

2006 – Conducted a three-season botanical inventory for a proposed development area in Caledon, Ontario. The assessment included the identification and mapping of rare vegetation and was incorporated into the Mayfield West Community Master Environmental Servicing Plan.

2006 – Conducted a three-season botanical inventory for a proposed development area in the town of Innisfil, Ontario. The assessment included the identification and mapping of rare vegetation and was incorporated into the LeFroy Secondary Plan Environmental Report.

2006 – Sampled for benthic invertebrates in an aquatic health monitoring program for the Sault Ste. Marie landfill creek realignment.

2006 – Conducted a vegetation community survey as part of an ecological restoration project along Spring/Etobicoke Creek. The survey was conducted to evaluate the survival rate of plantings and to classify the vegetation community present within the creek channel area.

2006 – Conducted a vegetation community survey as part of an ecological restoration project along Mimico Creek. The survey was conducted to evaluate the survival rate of plantings and to classify the vegetation community present within the creek channel area.

2006 – Conducted terrestrial field assessments of a potential development area in the city of Ottawa, Ontario. Assessments included Ecological Land Classification, botanical inventories, and rare plant identification and mapping and was incorporated into the Constance Bay Environmental Management Plan.

2006 – Conducted habitat mapping and natural features inventories for a proposed wind farm in Beaverton, Ontario.

2006 – Conducted terrestrial field assessments for the Halton Power Station Environmental Assessment. Assessments included Ecological Land Classification, vegetation surveys, and mapping.

2006 – Conducted habitat mapping and natural features inventories for a proposed wind farm in Southgate, Ontario.

2006 – Conducted terrestrial field assessments along a Hydro One corridor for the proposed Hurontario switching station. Assessment included Ecological Land Classification and habitat mapping.

2006 – Conducted terrestrial field assessments for the proposed Muskoka Long Range Solid Waste Management Plan in Bracebridge, Ontario. Assessments included Ecological Land Classification, vegetation assessments, haul route, and pipeline route assessments.

2006 – Conducted a three-season botanical inventory for a private property in Vaughan, Ontario.

2006 – Conducted quadrant sampling of planted and existing vegetation for the St. Mary's Cement wetland monitoring program.

**JENNIFER
SYLVESTER**

BIOLOGIST

2006 – Conducted terrestrial field assessments for a proposed development area in Windsor, Ontario. Assessments included Ecological Land Classification, botanical inventories, and rare plant identification and mapping for the Roxborough property.

2006 – Identified, assessed, and mapped existing trees that may need to be removed along a hydro corridor for a proposed pipeline in Scarborough, Ontario.

EMPLOYMENT HISTORY

Dillon Consulting Limited

2006-2008 Biologist

Kawartha Heritage Conservancy

2005-2006 Conservation Biology Intern

Credit Valley Conservation Authority

2004 Terrestrial Field Technician (summer)

Royal Botanical Gardens

2003 Assistant Field Botanist (summer)

Chicago Botanic Gardens

2002 Conservation Ecologist (summer)

Ontario Ministry of Natural Resources

2002 Wetland Biologist/GIS Technician (summer)

PROFESSIONAL DEVELOPMENT COURSES AND SEMINARS

Volunteered at a biological reserve in a cloud forest in Ecuador.

Participated in sedge identification course.

Participated in air photo interpretation workshop.

Conducted a site level restoration project on the Niagara Glen Nature Reserve.

OCTOBER 2006

(34)

**BENJAMIN P.
GOTTFRIED**

FISH AND WILDLIFE
TECHNICIAN

Education

Fish and Wildlife Technician
Diploma, Sir Sandford Fleming
College, Lindsay, Ontario,
2006

Language

English

PERSONAL PROFILE

Ben is a fish and wildlife technician with experience in fish habitat assessment and restoration, fish community sampling, creek realignment design and benthic studies. He is actively involved in numerous aquatic management projects and as a skilled field technician he brings a broad level of understanding in several aquatic and environmental disciplines to every project.

RELEVANT EXPERIENCE

Erosion Control Monitoring (Mayfield)

Weekly and rainfall sampling events. Monitored a residential development and the off-site transport of sediment to a section of the downstream Etobicoke Creek. Weekly reports are submitted and on-site issues were resolved through coordination with the contractor, client and TRCA.

Sediment Removal and Fish Salvage (Barker Business Park, Vaughan)

Completed a dewatering of an on-site stormwater pond outfall channel which included installation of mitigation measures, dewatering, fish recovery and relocation, sediment removal and flow reinstatement.

Sediment Sampling (Public Works, Owen Sound, Sarnia, Cornwall)

Sediment samples were collected from the potentially affected harbours and off-site reference locations from a boat via Ponar grab for analysis of contaminants.

Fish Sampling (Public Works, Owen Sound, Sarnia, Cornwall)

Fish tissue samples were collected from the potentially affected harbours and off-site reference locations via gill nets, seine nets and minnow traps for analysis of contaminants.

Fisheries Assessments (Terry Fox Drive, Ottawa)

Conducted field research and fisheries assessments along the future highway extension at watercourse crossings and nearby aquatic habitat along the right-of-way.

Initial Field Research and Reconnaissance (Pristine Power, Thunder Bay)

Conducted initial site condition research and general habitat assessment for potential wind turbine locations for Pristine Power.

Fisheries Review (Town of Markham)

Researched and completed reporting on fish species requirements including habitat, water quality, spawning preferences and food supply.

Fisheries Assessments (MTO, Thunder Bay, Guelph, Kitchener, Brampton)

Successfully live captured, assessed and released fish using MTO protocol for backpack electrofishing to determine species identification, population estimates, overall health and success in natural habitats.

Fisheries Assessments (St. Marys Cement)

Conducted a five-day fish inventory of Westside Marsh using 3', 4' and 6' trap nets. All fish were measured, identified, assessed for overall health and population dynamics and released.

Sediment Sampling (St. Marys Cement)

Collected creek bed sediment samples throughout the year from Westside Creek for analysis of abundance of phosphorus.

**BENJAMIN P.
GOTTFRIED**

FISH AND WILDLIFE
TECHNICIAN

Habitat Assessments (MTO, Thunder Bay, Guelph, Kitchener, Brampton)

Assessed and mapped according to MTO standard protocol

Carp Relocation (St. Marys Cement)

Relocation consisted of carp removal from largemouth bass and northern pike spawning habitat using 3' and 4' trap nets. The carp were then released into their intended habitat.

Fish Removal (MTO, Town of Bethany)

Exercised skills necessary to capture, process and release fish from habitats lost to development.

Carp Control (St. Marys Cement)

Exercised, installed and repaired common carp control measures initiating the prevention of carp influence and degradation on the mature spawning populations of northern pike and largemouth bass in Westside Marsh in Bowmanville, Ontario.

Benthic Invertebrate Sampling (Sault Ste. Marie Landfill)

Performed benthic invertebrate sampling for the town of Sault Ste Marie on Canon Creek and the Root River.

Water Quality Testing

Performed numerous water quality monitoring tasks including habitat loss prevention to Etobicoke Creek in Brampton and productivity monitoring to Westside Creek and Marsh in Bowmanville.

Creek Surveying (City of Brampton)

Performed complete survey of a stretch of Fletcher's Creek in the City of Brampton.

Maplewood Creek Realignment Design (Department of North Vancouver)

Completed a preliminary design of a proposed realignment of Maplewood Creek in North Vancouver, British Columbia, where migratory salmon spawning habitat and manageable park lands were of concern.

Invertebrate Sampling (City of Brampton)

Collected benthic samples of aquatic invertebrates according to standard protocol within Etobicoke Creek in the City of Brampton.

Amphibian Monitoring Survey (Town of Newmarket, Richmond Hill, and London)

Completed amphibian monitoring surveys in appropriate habitat areas according to the Ontario Marsh Monitoring Protocol.

EMPLOYMENT HISTORY

Dillon Consulting Limited

2008-Present Fisheries Technician

Peregrine Lodge

2007 Fishing Guide

Waterloo Marine

2006 Mechanic Apprentice

Laurel Creek Conservation Area

2005 Park Maintenance

**BENJAMIN P.
GOTTFRIED**

FISH AND WILDLIFE
TECHNICIAN

PROFESSIONAL DEVELOPMENT

WHMIS, 2008

Standard First Aid and CPR, 2007

Marine Emergency Duties A3, 2007

VHF Marine Radio Operator, 2007

Ontario Ministry of Natural Resources Class 1 Backpack Electrofishing, 2006

Radio and Ultrasonic Telemetry, 2005

Boater's Competency Certification, 2001

NOVEMBER 2009

(34)

Ross D. JAMES

Personal: Born June 1943, Ontario; Canadian citizen.
Married (1966), with two grown children.

Education: B.Sc. (1966) University of Guelph.
M.Sc. (1968) University of Toronto.
Ph.D. (1973) University of Toronto (Zoology – Ornithology).

Employment: For 29 years with the Dept. of Ornithology at the Royal Ontario Museum, in various capacities; as a curator (1973-1996) with several short periods as acting dept. head in the absence of the dept. head.

Also as Adjunct Professor of Forest Ecology and Wildlife, Faculty of Forestry, University of Toronto (1985-1993).

Involved with research, academic and popular publication (both as author, and reviewer), exhibit development (both large long term installations and temporary or travelling shows), public speaking (naturalists groups, provincial parks, public forums, and schools), university and outreach teaching, graduate student supervision, identification of birds and their parts (from identification courses to forensic identification), sound recording, collections maintenance, answering queries from callers and visitors, providing advice to government ministries, industries, publishers, conservation authorities etc., media interviews, and as a member of provincial and national committees and boards. Several times subpoenaed as an expert witness on behalf of the Ontario Ministry of Natural Resources.

Held a position of responsibility, planning and carrying out my own program, but also cooperating with others in committees and projects. Had to be reliable, self-motivated, honest, and well organized.

Since 1996, as an independent consultant to various agencies including: Ontario Power Generation, AIM PowerGen Corporation (now International Power Canada Inc.), Toronto Hydro, Toronto Renewable Energy Cooperative, Ontario Sustainable Energy Association, Canadian Wildlife Service, Ontario Ministry of Natural Resources, Committee on the Status of Endangered Wildlife in Canada, Ducks Unlimited Canada, Prescott/Russell Stewardship Council, L.G.L. Environmental Research Associates, Bird and Hale Consulting Engineers and Biologists, Bird Studies Canada, Lone Pine Publishing, Georgian Bay Osprey Society, the Canadian Peregrine Fund Foundation, the Royal Ontario Museum, General Motors of Canada, Dillon Consulting, Brascan Power Wind, Environment Canada and Gengrowth.

Research: Conducted fieldwork in most Canadian provinces, several states in the United States, in Mexico, Costa Rica and Belize. Most fieldwork was in Ontario, at many locations, including remote northern situations.

Of particular interest has been the status, distribution, habitat requirements, and nesting habits of Ontario birds.

Studied community structure and population densities of birds in various habitats, the habitat requirements of specific species, their foraging behaviour, the affects of

forestry practices on populations, and the evolution of communication and display in vireos.

Involvement: Committee on the Status of Endangered Wildlife in Canada (COSEWIC); chair of the Birds Subcommittee 1982-1996; and subsequent author of several status reports.

Wildlife Working Group of the Minister of Natural Resources 1989-1991, proposing a wildlife strategy for Ontario.

Wildlife in Captivity Policy Development Committee of the Ministry of Natural Resources – Falconry Subcommittee 1992-1993.

Ontario Breeding Bird Atlas Technical Advisory Committee 1981-1987; Data Review Subcommittee 1982-1986; Publications Committee 1985-1987; Atlas Management Committee for Ontario 1988-1994.

Chair of the Ontario Rare Breeding Bird Program Technical Committee 1988-1993.

Associate editor of the Ontario Field Biologist 1981-1987.

Contributor to Ontario mammal atlas, Ontario herpetology atlas, Maritimes breeding bird atlas, British Columbia, Prairie, Ontario, Maritime, and North American nest records schemes.

Trustee of the J.L. Baillie Memorial Fund 1987-1994; Chair of the Trustees in 1992.

Board of Directors of Long Point Bird Observatory 1992-1996.

Ontario Bird Records Committee (and its predecessor) most years from 1976-1995, as member, secretary, and chairperson.

Member of the Society of Canadian Ornithologists since its inception (1981), as well as an officer and its first newsletter editor.

Member of the Ontario Field Ornithologists since founding (1982), and recipient of their Distinguished Ornithologists Award for contributions to knowledge through research and service to the organization.

Member of the Significant Species Committee of the second Ontario Breeding Bird Atlas project 1999-2007.

Member of Federation of Ontario Naturalists Important Bird Areas Site Referral Steering Committee 1999-2001.

Co-editor of the journal Ontario Birds 2007 - 2010.

Memberships:

Society of Canadian Ornithologists

Ontario Field Ornithologists

Federation of Ontario Naturalists

Bird Studies Canada

Seeds of Diversity Canada

Canadian Organic Growers Association

Consulting work: Ministry of Natural Resources: 1984-1985 preparation of habitat management guidelines for Ontario raptors, warblers, wetland birds, and cavity nesters; 1997 workshop to prepare a list of wildlife species as indicators of forest sustainability.

Fasken-Campbell-Godfrey, Barristers and Solicitors: 1991 Altona forest report review and bird survey; 1993-1994 survey of Doon South Creek forest, Kitchener.

Bird and Hale, Consulting Engineers and Biologists: 1992 Marsh Hill wetland survey; 1995 Taplow Creek woodlot survey, Oakville; 1996 Cedar Point, Simcoe County, consultation; 1999 Gan Eden nesting bird survey, Uxbridge, Oak Ridges Moraine; 2000 review of the status of the birds of north Durham R.M.; 2001 breeding bird survey at Port Perry site; 2002 amphibian and breeding bird surveys in north Oakville; 2004 revision of the list of vertebrates found in the north Oakville planning area.

COSEWIC, Ottawa: 1997-1998 status report preparation for Common Tern, Least Bittern, Caspian Tern, Kirtland's Warbler, and Prairie Warbler; 1999-2000 status report preparation for Northern Bobwhite, King Rail, Acadian Flycatcher, Loggerhead Shrike, Hooded Warbler, and Henslow's Sparrow.

Bird Studies Canada: 1998 preparation of 25 site nomination forms for Important Bird Areas in the Hudson Bay Lowland and Lake of the Woods.

L.G.L. Ltd., Environmental Research Associates: 1998 nesting bird surveys in north Oakville planning area, two sites in Whitby, and one near Keswick; 1999 nesting bird surveys in Oakville, Milton area, Mississauga, Puslinch Township, Bolton area, five sites in Ajax-Oshawa area, along highways 6 in Flamborough Twp., 404 in York County, and Lloydstown to Aurora Road and Major Mackenzie Drive in York County; Canada Goose counts in Mississauga and along the Lake Ontario shoreline from Clarington to Burlington; 2000 amphibian survey in Puslinch Township, nesting bird surveys in Uxbridge, Schomberg, Ayr, and the Kingston area; 2001 breeding bird surveys in Puslinch Twp., Acton, two sites near Guelph, Simcoe County, Cannington, Audley, and Brampton; 2002 breeding bird surveys in Brampton, 2003 Toronto Harbour bird populations and potential impact of construction of the fixed link to Toronto City Centre Airport and increased air traffic at the airport.

Lone Pine Publishers, Alberta: 1999 review of manuscript for a Birds of Ontario.

Prescott/Russell Stewardship Council: 1999 review of wildlife/habitat suitability matrices for eastern Ontario model forests.

Royal Ontario Museum: 2000-2001 review of a Birds of Ontario manuscript.

Toronto Renewable Energy Cooperative and Ontario Hydro: 1999-2000 review of literature and assessment of potential bird mortality or other interactions of birds with wind turbines, and assistance in the preparation of an environmental assessment for the Toronto sites; 2001 preparation of a mortality search and a bird behavioural observation protocol for the Toronto wind turbine site.

Canadian Wildlife Service: 1999-2000 preparation of a publication on Common Tern movements in western Lake Erie.

General Motors of Canada: 2000 avian survey of an Oshawa site.

Georgian Bay Osprey Society and the Canadian Peregrine Fund Foundation: 2000-2001 preparation of a students guide to Canada's wildlife at risk – Osprey unit, for use as a teaching manual in Ontario schools.

Canadian Wildlife Service/ Ministry of Natural Resources/ Ducks Unlimited Canada: 1999-2000 preparation of an annotated bibliography and review of the state of

knowledge relating to shorebirds in Ontario; 1999-2000 preparation of a Shorebird Conservation Plan for Ontario.

AI Sandilands: 2001 review of manuscripts and preparation of 166 illustrations for publication in a book on habitat requirements, limiting factors, and status of the birds of Ontario.

ESG International: 2000 breeding bird surveys at two large sites near Stouffville, and two sites in York County.

Ontario Power Generation and Dillon Consulting: 2001: report on the potential impact of a proposed wind farm on Bald Eagles near the Bruce Nuclear Generating Station; preparation of a report on the potential impact to wildlife of a wind turbine at the Pickering Nuclear Generating Station; preparation of a mortality monitoring protocol for the Pickering NGS wind turbine.

Ontario Power Generation: 2001 report on the potential impact to Bald Eagles of the proposed construction of a 5th generating unit at the Ear Falls Generating Station.

Canadian Wildlife Service and the International Joint Commission Environmental Working Group: 2001-2002 report and recommendations with respect to avian use of nearshore habitats of the Great Lakes and St. Lawrence River, and the effects of water level changes on them.

Ontario Power Generation: 2002 fieldwork and report on observations of Bald Eagles in the vicinity of the Ear Falls Generating Station, and the potential impact of the proposed construction at the station on the eagles.

AIM PowerGen Corporation: 2002 preparing a monitoring plan for both offshore and onshore fieldwork in connection with their Lake Erie wind farm development; 2003 background data gathering and preinstallation field surveys of migrant and breeding birds to assess the potential for problems at the Lake Erie wind farm development area, and preparation of a report on findings.

Ontario Power Generation: 2002 preparing a monitoring plan for the Lake Huron wind farm; 2002 mortality monitoring at the Pickering wind turbine and preparation of a report on the results.

Toronto Hydro: 2003 preparation of a mortality monitoring protocol for the CNE wind turbine in Toronto, and preparation of the final report on the monitoring.

Ontario Sustainable Energy Association, Rankin Construction and Regional Municipality of Niagara: 2003 background data gathering and preinstallation field surveys of migrant and breeding birds for a Wainfleet township wind farm proposal, and preparation of a report on findings.

Environment Canada: 2003 review of Draft II of Wind Turbines and Birds: a guidance document for environmental assessment; 2004 review of Draft III of Wind Turbines and Birds.

Gowlings: 2004 review of background and preparation of a response regarding the potential effect of management plans for a development on nesting Ospreys.

Dillon Consultants Ltd: 2004 preliminary assessments of potential effects to birds and bats of proposed wind farms at three sites: north of Grand Bend, near Kincardine, and near Little Current; fieldwork on breeding bird populations at two wind energy sites: near Kincardine and near Port Burwell; fieldwork on autumn migrants at two wind energy sites: near Kincardine and near Little Current. 2004 advising on surveys and reporting for a wind energy project near Halifax, Nova Scotia.

MacViro Consultants Ltd: 2004 additional fieldwork and reporting on wintering birds and autumn migrants at the eastern extension of the Erie Shores wind energy project area near Port Burwell; 2004 fieldwork and reporting on potential effects to birds of a proposed wind energy project near Port Maitland, ON. 2004 fieldwork and reporting on the potential impact to birds and bats of a proposed wind farm near Spring Bay, Manitoulin Island.

Ontario Sustainable Energy Association: 2004 fieldwork and reporting on the potential impact to autumn migrant birds of a proposed wind farm near Goderich, ON.

McCarron and Associates Ltd.: 2005 preliminary assessment of the potential impact to birds and bats of a proposed wind farm at Eagle Lake, near Dryden, ON.

Northland Power Alliance: 2005 spring field surveys for migrant and early nesting birds at McLean's Mountain wind Energy Project, Manitoulin Island, and preparation of a summary report.

AIM PowerGen Corp.: 2005 late winter, spring, summer and autumn, and early winter field surveys at a Lowbanks wind energy project proposal site; preparation of an assessment of potential impacts to birds.

AIM PowerGen Corp.: 2005 preparation of a monitoring plan for the Erie Shores Wind Energy Project; participant in several meetings dealing with local interest concerns.

Brascan Power Wind: 2005 review of reports from Superior Wind Power project, Sault Ste Marie, ON, and recommendations for future work and reporting.

Environment Canada: 2005 review and comment on interim drafts of their guidance document for environmental assessment – wind turbines and birds, May and July drafts.

Ontario Sustainable Energy Association and Countryside Energy Cooperative: 2005 autumn field survey and proposed fieldwork for assessing potential impact to birds of a proposed wind power development near Bervie, ON.

Gartner Lee Ltd.: 2005 breeding bird inventory of part of Duffin's and Little Rouge river valleys, "southeast collector" project area.

Schneider Power Inc.: 2006 breeding birds surveys and assessment of potential impacts to birds of proposed wind farms at Innisfil and Trout Creek, ON.

Countryside Energy Cooperative: 2006 breeding bird surveys and assessment of potential impact to birds of a proposed wind energy project at Bervie, ON.

Gartner Lee Ltd.: 2005 breeding bird inventory and assessment of potential impact to birds and other wildlife of a proposed realignment of the 15th sideroad at Keele Street, King Township, ON.

AIM PowerGen. Corp.: 2005 – 2006 breeding bird surveys and migration studies and an assessment of potential impact to birds at a proposed wind energy project near Beaverton, ON.

Erie Shores Wind Farm LP: 2006 mortality monitoring, breeding bird surveys, and behaviour studies of resident and migrant birds during the first year of operation of a 66 turbine wind energy facility near Port Burwell, ON.

Schneider Power Inc.: 2007 breeding bird surveys and assessment of potential impact to birds from a proposed wind energy project near Arthur, ON.

Erie Shores Wind Farm LP: 2007 mortality monitoring, breeding bird surveys, and behaviour studies of resident and migrant birds, March, May-June, Aug.- Nov., for a second year of operation of the 66 turbine wind energy facility near Port Burwell, ON.

AIM PowerGen Corp: 2007 Attended three open house events for three proposed wind farm projects in southwestern Ontario, as a consultant on birds and wind turbines.

AIM PowerGen Corp: 2007 Attended an Essex County Council meeting as resource consultant on birds and wind turbines.

Windfall Ecology Centre: 2007 Fieldwork at a proposed Pukwis Wind Farm to assess potential problems for birds, including breeding bird surveys, and preparation of a report on findings.

Gengrowth: 2008 Reviewed reports on four wind farm projects proposed in southwestern Ontario and attended a Chatham-Kent County Council meeting prepared to answer questions about potential problems for birds.

Gengrowth: 2008 Attended 4 Chatham-Kent County Council meetings making a presentation on Erie Shores Wind Farm and answering questions on birds and wind turbines for a proposed wind farm in the county.

Windfall Ecology Centre: 2008 Fieldwork at proposed Pukwis Wind Farm site to conduct more breeding bird surveys and to report on potential problems for birds there.

AIM PowerGen Corp: 2008 Early spring waterfowl monitoring at Clear Creek, Cultus and Frogmore Wind Farms and reporting on findings.

AIM PowerGen Corp: 2008 Early spring waterfowl monitoring at Mohawk Wind Farm and reporting on findings.

AIM PowerGen Corp: 2008 Breeding bird surveys at Clear Creek, Cultus and Frogmore Wind Farms and reporting on findings.

AIM PowerGen Corp: 2008 Spring and autumn bird and bat mortality monitoring at Mohawk Wind Farm, and reporting on findings.

AIM PowerGen Corp: 2009 Fieldwork at Clear Creek, Cultus and Frogmore Wind Farms in early spring for waterfowl monitoring, and reporting on findings.

Other interests: Painting and drawing, photography, organic gardening.

Publications: Author and coauthor of more than 100 papers and books about birds, and related subjects, a selection of which follows.

James, R.D. 1976. Foraging behavior and habitat selection of three species of vireos in southern Ontario. *Wilson Bull.* 88:62-75.

James, R.D. 1976. Unusual songs with comments on song learning among vireos. *Canadian J. Zool.* 54:1223-1226.

James, R.D. 1978. Pairing and nest site selection in Solitary and Yellow-throated Vireos with a description of a ritualized nest building display. *Can. J. Zool.* 56:1163-1169.

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James, R.D. 1979. Flycatching as a deceptive behaviour in Solitary Vireos (*Vireo solitarius*). *Can. J. Zool.* 57:1139-1140.

James, R.D. 1981. Factors affecting variation in the primary song of North American Solitary Vireos (Aves: Vireonidae). *Can. J. Zool.* 59:2001-2009.

Peck, G.K. and R.D. James. 1983. *Breeding Birds of Ontario: nidiology and distribution.* Vol. 1: nonpasserines. Life Sciences Misc. Publ., Royal Ont. Museum. 321 pp.

- James, R.D., J.A. Dick, S.V. Nash, M.K. Peck, and B.E. Tomlinson.** 1983. Avian breeding and occurrence records from the Sutton Ridges of northern Ontario. *Can. Field-Naturalist* 97:187-193.
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- Fowle, C.D., R.D. James, S. McAfee-Ryan, K. Mckeever, D. Ogston, D. Prebble, F. Ribordy, R. Stewart, J. Straatman, D. Watton, and C. Wren.** 1991. Looking ahead: a wild life strategy for Ontario. *Ont. Ministry Natural Resources.* 172pp.
- James, R.D.** 1994. Museums in Ontario. *In* McNicholl, M.K. and J.L. Cranmer-Byng, eds., *Ornithology in Ontario.* *Ont. Field Ornithologists and Hawk Owl Publ., Whitby.* Pp. 101-112.
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A photograph of several white wind turbines in a field, viewed from a low angle. The turbines are tall and slender, with three blades each. The background is a clear, light blue sky. A large green curved shape is on the left side of the image, partially overlapping the turbines.

APPENDIX C

Wetland Characteristics and Ecological Functions Assessment Data

3.0 HYDROLOGICAL COMPONENT

3.1 FLOOD ATTENUATION

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

Step 1 Determination of Maximum Score

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

Step 2. Determination of Upstream Detention Factor (DF)

- (a) Wetland area (ha) 49.0
- (b) Total area (ha) of upstream detention areas (include the wetland itself) 554.636
- (c) Ratio of (a):(b) 0.088
- (d) Upstream detention factor: (c) x 2 = (maximum allowable factor = 1) 0.177

Step 3 Determination of Wetland Attenuation Factor (AF)

- (a) Wetland area (ha) 49.6
- (b) Size of catchment basin (ha) upstream of wetland (include wetland itself in catchment area) 3619.9
- (c) Ratio of (a):(b) 0.014
- (d) Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1) 0.14

Step 4. Calculation of final score

- (a) Wetlands on large lakes or major rivers 0
- (b) Wetland entirely isolated 100
- (b) All other wetlands -- calculate as follows:
 - Initial score 100*
 - Upstream detention factor (DF) (Step 2) 0.177
 - Wetland attenuation factor (AF) (Step 3) 0.14
 - Final score: ((DF + AF)/2) x Initial score = 75.8

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

Flood Attenuation Score (maximum 100 points) 16

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

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

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

| (FA = area of site type/total area of wetland) | Fractional Area |
|--|--------------------------|
| FA of isolated wetland | _____ x 0.5 = _____ |
| FA of riverine wetland | <u>1.0</u> x 1.0 = _____ |
| FA of palustrine wetland with no inflow | _____ x 0.7 = _____ |
| FA of palustrine wetland with inflows | _____ x 1.0 = _____ |
| FA of lacustrine on lake shoreline | _____ x 0.2 = _____ |
| FA of lacustrine at lake inflow or outflow | _____ x 1.0 = _____ |

Sum (WIF cannot exceed 1.0) 1.0

Step 3: Determination of catchment land use factor (LUF)

(Choose the first category that fits upstream landuse in the catchment.)

- | | | |
|--|---|-----|
| 1) _____ | Over 50% agricultural and/or urban | 1.0 |
| 2) _____ | Between 30 and 50% agricultural and/or urban | 0.8 |
| 3) <input checked="" type="checkbox"/> | Over 50% forested or other natural vegetation | 0.6 |

LUF (maximum 1.0) 0.6

Step 4: Determination of pollutant uptake factor (PUT)

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

| | Fractional Area |
|---|------------------------------------|
| FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m) | <u>0.45</u> x 0.75 = <u>0.3375</u> |
| FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,ff) | <u>0.46</u> x 1.0 = <u>0.45</u> |
| FA of wetland with little or no vegetation (u) | <u>0.10</u> x 0.5 = <u>0.05</u> |

Sum (PUT cannot exceed 1.0) 0.8375

Step 5: Calculation of final score

| | | |
|-----|---|---------------|
| (a) | Wetland on large lakes or major rivers | 0 |
| (b) | All other wetlands - calculate as follows | |
| | Initial score | 60 |
| | Water quality improvement factor (WQF) | <u>1.0</u> |
| | Land use factor (LUF) | <u>0.6</u> |
| | Pollutant uptake factor (PUT) | <u>0.8375</u> |

Final score: 60 x WQF x LUF x PUT = _____

Short Term Water Quality Improvement Score (maximum 60 points) 30

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

| | | |
|-------|--|----------|
| _____ | Wetland on large lakes or 5 major rivers | 0 points |
| _____ | All other wetlands (Proceed to Step 2) | |

Step 2:

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

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

Long Term Nutrient Trap Score (maximum 10 points) _____

3.2.3 GROUNDWATER DISCHARGE

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

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

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) _____

3.3 CARBON SINK

Choose only one of the following

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

Carbon Sink Score (maximum 5 points) _____

3.4 SHORELINE EROSION CONTROL

| | |
|--|-------|
| Step 1: | Score |
| <input type="checkbox"/> Wetland entirely isolated or palustrine | 0 |
| <input checked="" type="checkbox"/> Any part of the wetland riverine, or lacustrine (proceed to Step 2) | |

Step 2:

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

| | |
|--|-------|
| | Score |
| 1) <input type="checkbox"/> Trees and shrubs | 15 |
| 2) <input type="checkbox"/> Emergent vegetation | 8 |
| 3) <input type="checkbox"/> Submergent vegetation | 6 |
| 4) <input type="checkbox"/> Other shoreline vegetation | 3 |
| 5) <input type="checkbox"/> No vegetation | 0 |

Shoreline Erosion Control Score (maximum 15 points) 15

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

| | |
|---|-------|
| | Score |
| (a) Wetland > 50% lacustrine (by area) or located on one of the five major rivers | 0 |
| (b) Wetland not as above. Calculate final score as follows: (FA = area of site type/total area of wetland) | |

| | |
|--|--|
| | Fractional Area |
| FA of isolated or palustrine wetland | <u> </u> x 50 = <u> </u> |
| FA of riverine wetland | <u>1.0</u> x 20 = <u>20</u> |
| FA of lacustrine wetland (wetland <50% lacustrine) | <u> </u> x 0 = <u> </u> |

Ground Water Recharge, Wetland Site Type Component Score (maximum 50 points) 20

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

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

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

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

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

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

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

Step 1:

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

Step 2: Choose only one option

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

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

- 1) Significant in Site Region 100 points
- 2) Significant in Site District 50
- 3) Locally Significant Habitat (5.0+ ha) 25
- 4) Locally Significant Habitat (<5.0 ha) 15

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

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

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

- Low marsh not present (Continue to Step 5)
- Low marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

| Vegetation Group Number | Vegetation Group Name | Present as a Dominant Form (check) | Total Area (ha) | Area Factor (see Table 5) | Score | Final Score (area factor x score) |
|---------------------------------|-----------------------------|------------------------------------|-----------------|---------------------------|-------|-----------------------------------|
| 1 | Tallgrass | | 1 | | 6 pts | |
| 2 | Shortgrass-Sedge | | | | 11 | |
| 3 | Cattail-Bulrush-Burreed | ✓ | 19.9 | 0.8 | 5 | 4.0 |
| 4 | Arrowhead-Pickerelweed | | | | 5 | |
| 5 | Duckweed | | | | 2 | |
| 6 | Smartweed-Waterwillow | | | | 6 | |
| 7 | Waterlily-Lotus | | | | 11 | |
| 8 | Waterweed-Watercress | | | | 9 | |
| 9 | Ribbongrass | | | | 10 | |
| 10 | Coontail-Naiad-Watermilfoil | | | | 13 | |
| 11 | Narrowleaf Pondweed | | | | 5 | |
| 12 | Broadleaf Pondweed | | | | 8 | |
| Total Score (maximum 75 points) | | | | | | 4.0 |

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

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

Scoring for Presence of Key Vegetation Groups

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

| Vegetation Group Number | Vegetation Group Name | Present as a Dominant Form (check) | Total Area (ha) | Area Factor (see Table 5) | Score | Final Score (area factor x score) |
|---------------------------------|-------------------------|------------------------------------|-----------------|---------------------------|-------|-----------------------------------|
| 1 | Tallgrass | | | | 6 pts | |
| 2 | Shortgrass-Sedge | ✓ | 2.8 | 0.2 | 11 | 0.56 |
| 3 | Cattail-Bulrush-Burreed | | | | 5 | |
| 4 | Arrowhead-Pickerelweed | | | | 5 | |
| Total Score (maximum 25 points) | | | | | | 0.6 |

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently.)
 Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

- _____ Swamp containing fish habitat not present (Continue to Step 7)
- _____ Swamp containing fish habitat present (Score as follows)

| Swamp containing fish habitat | Present (check) | Total area (ha) | Area Factor (see Table 5) | Score | TOTAL SCORE (factor x score) |
|-------------------------------|-----------------|-----------------|---------------------------|-------|------------------------------|
| seasonally flooded | ✓ | 17.7 | 0.8 | 10 | 8.0 |
| permanently flooded | | | | 10 | |
| SCORE (maximum 20 points) | | | | | 8.0 |

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = 4.0

Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = 0.6

Score for Swamp Containing Fish Habitat (maximum 20) = 8.0

Sum (maximum score 100 points) = 13

4.2.6.2 Migration and Staging Habitat

Step 1:

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

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

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

| | | Score |
|-----------------------------|---|-----------|
| 1) <input type="checkbox"/> | Significant in Site Region | 25 points |
| 2) <input type="checkbox"/> | Significant in Site District | 15 |
| 3) <input type="checkbox"/> | Locally Significant | 10 |
| 4) <input type="checkbox"/> | Fish staging and/or migration habitat present, but not as above | 5 |

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

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

| | | Score |
|--|---|-----------|
| 1) <input type="checkbox"/> | Wetland is riverine at rivermouth or lacustrine at rivermouth | 25 points |
| 2) <input type="checkbox"/> | Wetland is riverine, within 0.75 km of rivermouth | 15 |
| 3) <input type="checkbox"/> | Wetland is lacustrine, within 0.75 km of rivermouth | 10 |
| 4) <input checked="" type="checkbox"/> | Fish staging and/or migration habitat present, but not as above | 0 |

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

3.0 HYDROLOGICAL COMPONENT3.1 FLOOD ATTENUATION

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

Step 1 Determination of Maximum Score

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

Step 2. Determination of Upstream Detention Factor (DF)

- | | | |
|-----|--|-------------|
| (a) | Wetland area (ha) | <u>17.7</u> |
| (b) | Total area (ha) of <u>upstream</u> detention areas (include the wetland itself) | <u>17.7</u> |
| (c) | Ratio of (a):(b) | <u>1.0</u> |
| (d) | Upstream detention factor: (c) x 2 = (maximum allowable factor = 1) | <u>1.0</u> |

Step 3 Determination of Wetland Attenuation Factor (AF)

- | | | |
|-----|---|--------------|
| (a) | Wetland area (ha) | <u>17.7</u> |
| (b) | Size of catchment basin (ha) <u>upstream</u> of wetland (include wetland itself in catchment area) | <u>639.7</u> |
| (c) | Ratio of (a):(b) | <u>0.028</u> |
| (d) | Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1) | <u>0.28</u> |

Step 4. Calculation of final score

- | | | |
|-----|--|-------------|
| (a) | Wetlands on large lakes or major rivers | 0 |
| (b) | Wetland entirely isolated | 100 |
| (b) | All other wetlands -- calculate as follows: | |
| | Initial score | 100* |
| | Upstream detention factor (DF) (Step 2) | <u>1.0</u> |
| | Wetland attenuation factor (AF) (Step 3) | <u>0.28</u> |
| | Final score: ((DF + AF)/2) x Initial score = | <u>64</u> |

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

Flood Attenuation Score (maximum 100 points) 64

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: Determination of maximum initial score

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

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

| | |
|--|-------------------------------|
| (FA = area of site type/total area of wetland) | Fractional Area |
| FA of isolated wetland | _____ x 0.5 = _____ |
| FA of riverine wetland | _____ x 1.0 = _____ |
| FA of palustrine wetland with no inflow | <u>1.0</u> x 0.7 = <u>0.7</u> |
| FA of palustrine wetland with inflows | _____ x 1.0 = _____ |
| FA of lacustrine on lake shoreline | _____ x 0.2 = _____ |
| FA of lacustrine at lake inflow or outflow | _____ x 1.0 = _____ |

Sum (WIF cannot exceed 1.0) 0.7

Step 3: Determination of catchment land use factor (LUF)

(Choose the first category that fits upstream landuse in the catchment.)

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

LUF (maximum 1.0) 0.6

Step 4: Determination of pollutant uptake factor (PUT)

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

| | |
|---|----------------------------------|
| FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m) | Fractional Area |
| | <u>0.60</u> x 0.75 = <u>0.45</u> |
| FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,f,ff) | <u>0.40</u> x 1.0 = <u>0.40</u> |
| FA of wetland with little or no vegetation (u) | _____ x 0.5 = _____ |

Sum (PUT cannot exceed 1.0) 0.85

Step 5: Calculation of final score

| | | |
|-----|---|-------------|
| (a) | Wetland on large lakes or major rivers | 0 |
| (b) | All other wetlands - calculate as follows | |
| | Initial score | 60 |
| | Water quality improvement factor (WQF) | <u>0.7</u> |
| | Land use factor (LUF) | <u>0.6</u> |
| | Pollutant uptake factor (PUT) | <u>0.85</u> |

Final score: 60 x WQF x LUF x PUT = _____

Short Term Water Quality Improvement Score (maximum 60 points) 21

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

| | | |
|-------|--|----------|
| _____ | Wetland on large lakes or 5 major rivers | 0 points |
| _____ | All other wetlands (Proceed to Step 2) | |

Step 2:

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

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

Long Term Nutrient Trap Score (maximum 10 points) _____

3.2.3 GROUNDWATER DISCHARGE

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

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

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) _____

3.3 CARBON SINK

Choose only one of the following

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

Carbon Sink Score (maximum 5 points) _____

3.4 SHORELINE EROSION CONTROL

Step 1:

Score

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

0

Step 2:

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

- | | Score |
|--|-------|
| 1) <input type="checkbox"/> Trees and shrubs | 15 |
| 2) <input type="checkbox"/> Emergent vegetation | 8 |
| 3) <input type="checkbox"/> Submergent vegetation | 6 |
| 4) <input type="checkbox"/> Other shoreline vegetation | 3 |
| 5) <input type="checkbox"/> No vegetation | 0 |

Shoreline Erosion Control Score (maximum 15 points) 0

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

- | | Score |
|---|-------|
| (a) Wetland > 50% lacustrine (by area) or located on one of the five major rivers | 0 |
| (b) Wetland not as above. Calculate final score as follows: (FA = area of site type/total area of wetland) | |

Fractional
Area

- | | |
|--|--|
| FA of isolated or palustrine wetland | <u>1.0</u> x 50 = <u>50</u> |
| FA of riverine wetland | <u> </u> x 20 = <u> </u> |
| FA of lacustrine wetland (wetland <50% lacustrine) | <u> </u> x 0 = <u> </u> |

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

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

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

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

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

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

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

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

Step 1:

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

Step 2: Choose only one option

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

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

- 1) Significant in Site Region 100 points
- 2) Significant in Site District 50
- 3) Locally Significant Habitat (5.0+ ha) 25
- 4) Locally Significant Habitat (<5.0 ha) 15

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

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

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

- Low marsh not present (Continue to Step 5)
- Low marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

| Vegetation Group Number | Vegetation Group Name | Present as a Dominant Form (check) | Total Area (ha) | Area Factor (see Table 5) | Score | Final Score (area factor x score) |
|---------------------------------|-----------------------------|------------------------------------|-----------------|---------------------------|-------|-----------------------------------|
| 1 | Tallgrass | | | | 6 pts | |
| 2 | Shortgrass-Sedge | | | | 11 | |
| 3 | Cattail-Bulrush-Burreed | | | | 5 | |
| 4 | Arrowhead-Pickerelweed | | | | 5 | |
| 5 | Duckweed | | | | 2 | |
| 6 | Smartweed-Waterwillow | | | | 6 | |
| 7 | Waterlily-Lotus | | | | 11 | |
| 8 | Waterweed-Watercress | | | | 9 | |
| 9 | Ribongrass | | | | 10 | |
| 10 | Coontail-Naiad-Watermilfoil | | | | 13 | |
| 11 | Narrowleaf Pondweed | | | | 5 | |
| 12 | Broadleaf Pondweed | | | | 8 | |
| Total Score (maximum 75 points) | | | | | | 0 |

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

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

Scoring for Presence of Key Vegetation Groups

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

| Vegetation Group Number | Vegetation Group Name | Present as a Dominant Form (check) | Total Area (ha) | Area Factor (see Table 5) | Score | Final Score (area factor x score) |
|---------------------------------|-------------------------|------------------------------------|-----------------|---------------------------|-------|-----------------------------------|
| 1 | Tallgrass | | | | 6 pts | |
| 2 | Shortgrass-Sedge | ✓ | 7.7 | 0.4 | 11 | 4.4 |
| 3 | Cattail-Bulrush-Burreed | | | | 5 | |
| 4 | Arrowhead-Pickerelweed | | | | 5 | |
| Total Score (maximum 25 points) | | | | | | 4.4 |

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently.)
 Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

- Swamp containing fish habitat not present (Continue to Step 7)
- Swamp containing fish habitat present (Score as follows)

| Swamp containing fish habitat | Present (check) | Total area (ha) | Area Factor (see Table 5) | Score | TOTAL SCORE (factor x score) |
|-------------------------------|-----------------|-----------------|---------------------------|-------|------------------------------|
| seasonally flooded | ✓ | 8.6 | 0.4 | 10 | 4.0 |
| permanently flooded | | | | 10 | |
| SCORE (maximum 20 points) | | | | | |

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = 0

Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = 4.4

Score for Swamp Containing Fish Habitat (maximum 20) = 4.0

Sum (maximum score 100 points) = 8.0

4.2.6.2 Migration and Staging Habitat

Step 1:

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

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

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

| | Score |
|---|-----------|
| 1) <input type="checkbox"/> Significant in Site Region | 25 points |
| 2) <input type="checkbox"/> Significant in Site District | 15 |
| 3) <input type="checkbox"/> Locally Significant | 10 |
| 4) <input type="checkbox"/> Fish staging and/or migration habitat present, but not as above | 5 |

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

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

| | Score |
|---|-----------|
| 1) <input type="checkbox"/> Wetland is riverine at rivermouth or lacustrine at rivermouth | 25 points |
| 2) <input type="checkbox"/> Wetland is riverine, within 0.75 km of rivermouth | 15 |
| 3) <input type="checkbox"/> Wetland is lacustrine, within 0.75 km of rivermouth | 10 |
| 4) <input type="checkbox"/> Fish staging and/or migration habitat present, but not as above | 0 |

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

3.0 HYDROLOGICAL COMPONENT3.1 FLOOD ATTENUATION

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

Step 1 Determination of Maximum Score

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

Step 2. Determination of Upstream Detention Factor (DF)

- | | | |
|-----|--|-------------|
| (a) | Wetland area (ha) | <u>31.6</u> |
| (b) | Total area (ha) of <u>upstream</u> detention areas (include the wetland itself) | <u>81.3</u> |
| (c) | Ratio of (a):(b) | <u>0.39</u> |
| (d) | Upstream detention factor: (c) x 2 = (maximum allowable factor = 1) | <u>0.78</u> |

Step 3 Determination of Wetland Attenuation Factor (AF)

- | | | |
|-----|---|---------------|
| (a) | Wetland area (ha) | <u>31.6</u> |
| (b) | Size of catchment basin (ha) <u>upstream</u> of wetland (include wetland itself in catchment area) | <u>381.57</u> |
| (c) | Ratio of (a):(b) | <u>0.083</u> |
| (d) | Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1) | <u>0.83</u> |

Step 4. Calculation of final score

- | | | |
|-----|--|-------------|
| (a) | Wetlands on large lakes or major rivers | 0 |
| (b) | Wetland entirely isolated | 100 |
| (b) | All other wetlands -- calculate as follows: | |
| | Initial score | 100* |
| | Upstream detention factor (DF) (Step 2) | <u>0.78</u> |
| | Wetland attenuation factor (AF) (Step 3) | <u>0.83</u> |
| | Final score: ((DF + AF)/2) x Initial score = | <u>80.5</u> |

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

Flood Attenuation Score (maximum 100 points) 81

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: Determination of maximum initial score

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

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

| | |
|--|---------------------------------------|
| (FA = area of site type/total area of wetland) | Fractional Area |
| FA of isolated wetland | <u> 1.0 </u> x 0.5 = <u> 0.5 </u> |
| FA of riverine wetland | _____ x 1.0 = _____ |
| FA of palustrine wetland with no inflow | _____ x 0.7 = _____ |
| FA of palustrine wetland with inflows | _____ x 1.0 = _____ |
| FA of lacustrine on lake shoreline | _____ x 0.2 = _____ |
| FA of lacustrine at lake inflow or outflow | _____ x 1.0 = _____ |

Sum (WIF cannot exceed 1.0) 0.5

Step 3: Determination of catchment land use factor (LUF)

(Choose the first category that fits upstream landuse in the catchment.)

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

LUF (maximum 1.0) 0.6

Step 4: Determination of pollutant uptake factor (PUT)

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

| | |
|---|---|
| FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m) | Fractional Area |
| | <u> 1.0 </u> x 0.75 = <u> 0.75 </u> |
| FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,f,ff) | _____ x 1.0 = _____ |
| FA of wetland with little or no vegetation (u) | _____ x 0.5 = _____ |

Sum (PUT cannot exceed 1.0) 0.75

Step 5: Calculation of final score

| | | |
|-----|---|-------------|
| (a) | Wetland on large lakes or major rivers | 0 |
| (b) | All other wetlands - calculate as follows | |
| | Initial score | 60 |
| | Water quality improvement factor (WQF) | <u>0.5</u> |
| | Land use factor (LUF) | <u>0.6</u> |
| | Pollutant uptake factor (PUT) | <u>0.75</u> |

Final score: 60 x WQF x LUF x PUT = _____

Short Term Water Quality Improvement Score (maximum 60 points) 14

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

| | | |
|-------|--|----------|
| _____ | Wetland on large lakes or 5 major rivers | 0 points |
| _____ | All other wetlands (Proceed to Step 2) | |

Step 2:

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

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

Long Term Nutrient Trap Score (maximum 10 points) _____

3.2.3 GROUNDWATER DISCHARGE

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

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

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) _____

3.3 CARBON SINK

Choose only one of the following

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

Carbon Sink Score (maximum 5 points) _____

3.4 SHORELINE EROSION CONTROL

Step 1:

Score

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

0

Step 2:

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

- | | Score |
|--|-------|
| 1) <input type="checkbox"/> Trees and shrubs | 15 |
| 2) <input type="checkbox"/> Emergent vegetation | 8 |
| 3) <input type="checkbox"/> Submergent vegetation | 6 |
| 4) <input type="checkbox"/> Other shoreline vegetation | 3 |
| 5) <input type="checkbox"/> No vegetation | 0 |

Shoreline Erosion Control Score (maximum 15 points) 0

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

- | | Score |
|---|-------|
| (a) Wetland > 50% lacustrine (by area) or located on one of the five major rivers | 0 |
| (b) Wetland not as above. Calculate final score as follows: (FA = area of site type/total area of wetland) | |

Fractional
Area

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

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

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

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

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

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

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

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

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

Step 1:

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

Step 2: Choose only one option

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

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

- 1) Significant in Site Region 100 points
- 2) Significant in Site District 50
- 3) Locally Significant Habitat (5.0+ ha) 25
- 4) Locally Significant Habitat (<5.0 ha) 15

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

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

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

_____ Low marsh not present (Continue to Step 5)

_____ Low marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

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

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

_____ High marsh not present (Continue to Step 6)

_____ High marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

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

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently.)
 Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

- Swamp containing fish habitat not present (Continue to Step 7)
- Swamp containing fish habitat present (Score as follows)

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

Step 7: Calculation of final score

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

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

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

Sum (maximum score 100 points) = ____

4.2.6.2 Migration and Staging Habitat

Step 1:

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

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

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

| | Score |
|---|-----------|
| 1) <input type="checkbox"/> Significant in Site Region | 25 points |
| 2) <input type="checkbox"/> Significant in Site District | 15 |
| 3) <input type="checkbox"/> Locally Significant | 10 |
| 4) <input type="checkbox"/> Fish staging and/or migration habitat present, but not as above | 5 |

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

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

| | Score |
|---|-----------|
| 1) <input type="checkbox"/> Wetland is riverine at rivermouth or lacustrine at rivermouth | 25 points |
| 2) <input type="checkbox"/> Wetland is riverine, within 0.75 km of rivermouth | 15 |
| 3) <input type="checkbox"/> Wetland is lacustrine, within 0.75 km of rivermouth | 10 |
| 4) <input type="checkbox"/> Fish staging and/or migration habitat present, but not as above | 0 |

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

3.0 HYDROLOGICAL COMPONENT3.1 FLOOD ATTENUATION

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

Step 1 Determination of Maximum Score

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

Step 2. Determination of Upstream Detention Factor (DF)

- | | | |
|-----|--|-------------|
| (a) | Wetland area (ha) | <u>13.9</u> |
| (b) | Total area (ha) of <u>upstream</u> detention areas (include the wetland itself) | <u>43.2</u> |
| (c) | Ratio of (a):(b) | <u>0.32</u> |
| (d) | Upstream detention factor: (c) x 2 = (maximum allowable factor = 1) | <u>0.64</u> |

Step 3 Determination of Wetland Attenuation Factor (AF)

- | | | |
|-----|---|--------------|
| (a) | Wetland area (ha) | <u>13.9</u> |
| (b) | Size of catchment basin (ha) <u>upstream</u> of wetland (include wetland itself in catchment area) | <u>246.7</u> |
| (c) | Ratio of (a):(b) | <u>0.056</u> |
| (d) | Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1) | <u>0.56</u> |

Step 4. Calculation of final score

- | | | |
|-----|--|-------------|
| (a) | Wetlands on large lakes or major rivers | 0 |
| (b) | Wetland entirely isolated | 100 |
| (b) | All other wetlands -- calculate as follows: | |
| | Initial score | 100* |
| | Upstream detention factor (DF) (Step 2) | <u>0.64</u> |
| | Wetland attenuation factor (AF) (Step 3) | <u>0.56</u> |
| | Final score: ((DF + AF)/2) x Initial score = | <u>60</u> |

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

Flood Attenuation Score (maximum 100 points) 60

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: Determination of maximum initial score

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

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

| | |
|--|---------------------------------------|
| (FA = area of site type/total area of wetland) | Fractional Area |
| FA of isolated wetland | <u> </u> x 0.5 = <u> </u> |
| FA of riverine wetland | <u> </u> x 1.0 = <u> </u> |
| FA of palustrine wetland with no inflow | <u> 1.0 </u> x 0.7 = <u> 0.7 </u> |
| FA of palustrine wetland with inflows | <u> 1.0 </u> x 1.0 = <u> 1.0 </u> |
| FA of lacustrine on lake shoreline | <u> </u> x 0.2 = <u> </u> |
| FA of lacustrine at lake inflow or outflow | <u> </u> x 1.0 = <u> </u> |

Sum (WIF cannot exceed 1.0) 0.7

Step 3: Determination of catchment land use factor (LUF)

(Choose the first category that fits upstream landuse in the catchment.)

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

LUF (maximum 1.0) 0.6

Step 4: Determination of pollutant uptake factor (PUT)

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

| | |
|---|--|
| FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m) | Fractional Area <u> 1.0 </u> x 0.75 = <u> 0.75 </u> |
| FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,f,ff) | <u> </u> x 1.0 = <u> </u> |
| FA of wetland with little or no vegetation (u) | <u> </u> x 0.5 = <u> </u> |

Sum (PUT cannot exceed 1.0) 0.75

Step 5: Calculation of final score

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

Final score: 60 x WQF x LUF x PUT = _____

Short Term Water Quality Improvement Score (maximum 60 points) 27

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

- _____ Wetland on large lakes or 5 major rivers 0 points
- _____ All other wetlands (Proceed to Step 2)

Step 2:

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

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

Long Term Nutrient Trap Score (maximum 10 points) _____

3.2.3 GROUNDWATER DISCHARGE

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

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

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) _____

3.3 CARBON SINK

Choose only one of the following

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

Carbon Sink Score (maximum 5 points) _____

3.4 SHORELINE EROSION CONTROL

Step 1:

Score

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

0

Step 2:

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

Score

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

15
8
6
3
0

Shoreline Erosion Control Score (maximum 15 points) 0

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

Score

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

0

Fractional Area

- FA of isolated or palustrine wetland
- FA of riverine wetland
- FA of lacustrine wetland (wetland <50% lacustrine)

1.0 x 50 = 50
 _____ x 20 = _____
 _____ x 0 = _____

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

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

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

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

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

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

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

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

Step 1:

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

Step 2: Choose only one option

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

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

- 1) Significant in Site Region 100 points
- 2) Significant in Site District 50
- 3) Locally Significant Habitat (5.0+ ha) 25
- 4) Locally Significant Habitat (<5.0 ha) 15

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

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

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

Low marsh not present (Continue to Step 5)

Low marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

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

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

High marsh not present (Continue to Step 6)

High marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

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

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently. Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

- Swamp containing fish habitat not present (Continue to Step 7)
- Swamp containing fish habitat present (Score as follows)

| Swamp containing fish habitat | Present (check) | Total area (ha) | Area Factor (see Table 5) | Score | TOTAL SCORE (factor x score) |
|-------------------------------|-----------------|-----------------|---------------------------|-------|------------------------------|
| seasonally flooded | ✓ | 13.9 | 0.6 | 10 | 6.0 |
| permanently flooded | | | | 10 | |
| SCORE (maximum 20 points) | | | | | 6.0 |

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = 0

Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = 0

Score for Swamp Containing Fish Habitat (maximum 20) = 6

Sum (maximum score 100 points) = 6

4.2.6.2 Migration and Staging Habitat

Step 1:

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

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

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

- | | Score |
|---|-----------|
| 1) <input type="checkbox"/> Significant in Site Region | 25 points |
| 2) <input type="checkbox"/> Significant in Site District | 15 |
| 3) <input type="checkbox"/> Locally Significant | 10 |
| 4) <input type="checkbox"/> Fish staging and/or migration habitat present, but not as above | 5 |

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

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

- | | Score |
|--|-----------|
| 1) <input type="checkbox"/> Wetland is riverine at rivermouth or lacustrine at rivermouth | 25 points |
| 2) <input type="checkbox"/> Wetland is riverine, within 0.75 km of rivermouth | 15 |
| 3) <input type="checkbox"/> Wetland is lacustrine, within 0.75 km of rivermouth | 10 |
| 4) <input checked="" type="checkbox"/> Fish staging and/or migration habitat present, but not as above | 0 |

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

3.0 HYDROLOGICAL COMPONENT

3.1 FLOOD ATTENUATION

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

Step 1 Determination of Maximum Score

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

Step 2. Determination of Upstream Detention Factor (DF)

| | | |
|-----|--|-------------|
| (a) | Wetland area (ha) | <u>29.3</u> |
| (b) | Total area (ha) of <u>upstream</u> detention areas (include the wetland itself) | <u>29.3</u> |
| (c) | Ratio of (a):(b) | <u>1.0</u> |
| (d) | Upstream detention factor: (c) x 2 = (maximum allowable factor = 1) | <u>1.0</u> |

Step 3 Determination of Wetland Attenuation Factor (AF)

| | | |
|-----|---|--------------|
| (a) | Wetland area (ha) | <u>29.3</u> |
| (b) | Size of catchment basin (ha) <u>upstream</u> of wetland (include wetland itself in catchment area) | <u>199.1</u> |
| (c) | Ratio of (a):(b) | <u>0.147</u> |
| (d) | Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1) | <u>1.0</u> |

Step 4. Calculation of final score

| | | |
|-----|--|------------|
| (a) | Wetlands on large lakes or major rivers | 0 |
| (b) | Wetland entirely isolated | 100 |
| (b) | All other wetlands -- calculate as follows: | |
| | Initial score | 100* |
| | Upstream detention factor (DF) (Step 2) | <u>1.0</u> |
| | Wetland attenuation factor (AF) (Step 3) | <u>1.0</u> |
| | Final score: ((DF + AF)/2) x Initial score = | <u>100</u> |

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

Flood Attenuation Score (maximum 100 points) 100

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: Determination of maximum initial score

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

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

| | |
|--|-------------------------------|
| (FA = area of site type/total area of wetland) | Fractional Area |
| FA of isolated wetland | _____ x 0.5 = _____ |
| FA of riverine wetland | _____ x 1.0 = _____ |
| FA of palustrine wetland with no inflow | <u>1.0</u> x 0.7 = <u>0.7</u> |
| FA of palustrine wetland with inflows | _____ x 1.0 = _____ |
| FA of lacustrine on lake shoreline | _____ x 0.2 = _____ |
| FA of lacustrine at lake inflow or outflow | _____ x 1.0 = _____ |

Sum (WIF cannot exceed 1.0) 0.7

Step 3: Determination of catchment land use factor (LUF)

(Choose the first category that fits upstream landuse in the catchment.)

- | | | |
|--|---|-----|
| 1) _____ | Over 50% agricultural and/or urban | 1.0 |
| 2) <input checked="" type="checkbox"/> | Between 30 and 50% agricultural and/or urban | 0.8 |
| 3) _____ | Over 50% forested or other natural vegetation | 0.6 |

LUF (maximum 1.0) 0.6

Step 4: Determination of pollutant uptake factor (PUT)

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

| | |
|---|---------------------------------|
| FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m) | Fractional Area |
| | <u>1.0</u> x 0.75 = <u>0.75</u> |
| FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,f,ff) | _____ x 1.0 = _____ |
| FA of wetland with little or no vegetation (u) | _____ x 0.5 = _____ |

Sum (PUT cannot exceed 1.0) 0.75

Step 5: Calculation of final score

| | | |
|-----|---|-------------|
| (a) | Wetland on large lakes or major rivers | 0 |
| (b) | All other wetlands - calculate as follows | |
| | Initial score | 60 |
| | Water quality improvement factor (WQF) | <u>0.7</u> |
| | Land use factor (LUF) | <u>0.6</u> |
| | Pollutant uptake factor (PUT) | <u>0.75</u> |

Final score: 60 x WQF x LUF x PUT = 19

Short Term Water Quality Improvement Score (maximum 60 points) 19

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

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

Step 2:

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

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

Long Term Nutrient Trap Score (maximum 10 points)

3.2.3 GROUNDWATER DISCHARGE

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

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

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) _____

3.3 CARBON SINK

Choose only one of the following

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

Carbon Sink Score (maximum 5 points) _____

3.4 SHORELINE EROSION CONTROL

- Step 1:** Score
- Wetland entirely isolated or palustrine 0
 - Any part of the wetland riverine, or lacustrine (proceed to Step 2)

Step 2:

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

- | | Score |
|--|-------|
| 1) <input type="checkbox"/> Trees and shrubs | 15 |
| 2) <input type="checkbox"/> Emergent vegetation | 8 |
| 3) <input type="checkbox"/> Submergent vegetation | 6 |
| 4) <input type="checkbox"/> Other shoreline vegetation | 3 |
| 5) <input type="checkbox"/> No vegetation | 0 |

Shoreline Erosion Control Score (maximum 15 points) _____

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

- | | Score |
|---|-------|
| (a) Wetland > 50% lacustrine (by area) or located on one of the five major rivers | 0 |
| (b) Wetland not as above. Calculate final score as follows: (FA = area of site type/total area of wetland) | |

| | Fractional Area |
|--|----------------------------------|
| FA of isolated or palustrine wetland | $\frac{1.0}{1.0} \times 50 = 50$ |
| FA of riverine wetland | _____ x 20 = _____ |
| FA of lacustrine wetland (wetland <50% lacustrine) | _____ x 0 = _____ |

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

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

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

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

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

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

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

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

Step 1:

Fish habitat is not present within the wetland (Score = 0)

Fish habitat is present within the wetland (Go to Step 2)

Step 2: Choose only one option

1) Significance of the spawning and nursery habitat within the wetland is known (Go to Step3)

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

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

1) Significant in Site Region 100 points

2) Significant in Site District 50

3) Locally Significant Habitat (5.0+ ha) 25

4) Locally Significant Habitat (<5.0 ha) 15

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

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

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

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

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

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

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

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

Scoring for Presence of Key Vegetation Groups

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

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

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently. Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

- Swamp containing fish habitat not present (Continue to Step 7)
 Swamp containing fish habitat present (Score as follows)

| Swamp containing fish habitat | Present (check) | Total area (ha) | Area Factor (see Table 5) | Score | TOTAL SCORE (factor x score) |
|-------------------------------|-----------------|-----------------|---------------------------|-------|------------------------------|
| seasonally flooded | ✓ | 29.3 | 1.0 | 10 | 10 |
| permanently flooded | | | | 10 | |
| SCORE (maximum 20 points) | | | | | 10 |

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = 0

Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = 0

Score for Swamp Containing Fish Habitat (maximum 20) = 10

Sum (maximum score 100 points) = 10

4.2.6.2 Migration and Staging Habitat

Step 1:

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

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

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

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

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

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

| | Score |
|--|-----------|
| 1) ___ Wetland is riverine at rivermouth or lacustrine at rivermouth | 25 points |
| 2) ___ Wetland is riverine, within 0.75 km of rivermouth | 15 |
| 3) ___ Wetland is lacustrine, within 0.75 km of rivermouth | 10 |
| 4) <input checked="" type="checkbox"/> Fish staging and/or migration habitat present, but not as above | 0 |

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

3.0 HYDROLOGICAL COMPONENT**3.1 FLOOD ATTENUATION**

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

Step 1 Determination of Maximum Score

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

Step 2. Determination of Upstream Detention Factor (DF)

- | | | |
|-----|--|--------------|
| (a) | Wetland area (ha) | <u>106.6</u> |
| (b) | Total area (ha) of <u>upstream</u> detention areas (include the wetland itself) | <u>138.8</u> |
| (c) | Ratio of (a):(b) | <u>0.768</u> |
| (d) | Upstream detention factor: (c) x 2 = (maximum allowable factor = 1) | <u>1.0</u> |

Step 3 Determination of Wetland Attenuation Factor (AF)

- | | | |
|-----|---|--------------|
| (a) | Wetland area (ha) | <u>106.6</u> |
| (b) | Size of catchment basin (ha) <u>upstream</u> of wetland (include wetland itself in catchment area) | <u>438.6</u> |
| (c) | Ratio of (a):(b) | <u>0.243</u> |
| (d) | Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1) | <u>1.0</u> |

Step 4. Calculation of final score

- | | | |
|-----|--|------------|
| (a) | Wetlands on large lakes or major rivers | 0 |
| (b) | Wetland entirely isolated | 100 |
| (b) | All other wetlands -- calculate as follows: | |
| | Initial score | 100* |
| | Upstream detention factor (DF) (Step 2) | <u>1.0</u> |
| | Wetland attenuation factor (AF) (Step 3) | <u>1.0</u> |
| | Final score: ((DF + AF)/2) x Initial score = | <u>100</u> |

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

Flood Attenuation Score (maximum 100 points) 100

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: Determination of maximum initial score

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

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

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

Fractional Area

| | |
|--|---------------------------------|
| FA of isolated wetland | _____ x 0.5 = _____ |
| FA of riverine wetland | _____ x 1.0 = _____ |
| FA of palustrine wetland with no inflow | _____ x 0.7 = _____ |
| FA of palustrine wetland with inflows | <u>0.90</u> x 1.0 = <u>0.90</u> |
| FA of lacustrine on lake shoreline | _____ x 0.2 = _____ |
| FA of lacustrine at lake inflow or outflow | <u>0.10</u> x 1.0 = <u>0.10</u> |

Sum (WIF cannot exceed 1.0) 1.0

Step 3: Determination of catchment land use factor (LUF)

(Choose the first category that fits upstream landuse in the catchment.)

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

LUF (maximum 1.0) 0.6

Step 4: Determination of pollutant uptake factor (PUT)

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

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

Fractional Area
0.80 x 0.75 = 0.60

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

0.20 x 1.0 = 0.20

FA of wetland with little or no vegetation (u)

_____ x 0.5 = _____

Sum (PUT cannot exceed 1.0) 0.8

Step 5: Calculation of final score

| | | |
|-----|---|------------|
| (a) | Wetland on large lakes or major rivers | 0 |
| (b) | All other wetlands - calculate as follows | |
| | Initial score | 60 |
| | Water quality improvement factor (WQF) | <u>1.0</u> |
| | Land use factor (LUF) | <u>0.6</u> |
| | Pollutant uptake factor (PUT) | <u>0.8</u> |

Final score: $60 \times \text{WQF} \times \text{LUF} \times \text{PUT} =$ 29

Short Term Water Quality Improvement Score (maximum 60 points) 29

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

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

Step 2:

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

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

Long Term Nutrient Trap Score (maximum 10 points)

3.2.3 GROUNDWATER DISCHARGE

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

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

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) _____

3.3 CARBON SINK

Choose only one of the following

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

Carbon Sink Score (maximum 5 points) _____

3.4 SHORELINE EROSION CONTROL

| | |
|--|-------|
| <u>Step 1:</u> | Score |
| <input type="checkbox"/> Wetland entirely isolated or palustrine | 0 |
| <input checked="" type="checkbox"/> Any part of the wetland riverine, or lacustrine (proceed to Step 2) | |

Step 2:

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

| | |
|--|-------|
| | Score |
| 1) <input type="checkbox"/> Trees and shrubs | 15 |
| 2) <input checked="" type="checkbox"/> Emergent vegetation | 8 |
| 3) <input type="checkbox"/> Submergent vegetation | 6 |
| 4) <input type="checkbox"/> Other shoreline vegetation | 3 |
| 5) <input type="checkbox"/> No vegetation | 0 |

Shoreline Erosion Control Score (maximum 15 points) 8

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

| | |
|---|-------|
| | Score |
| (a) Wetland > 50% lacustrine (by area) or located on one of the five major rivers | 0 |
| (b) Wetland not as above. Calculate final score as follows: (FA = area of site type/total area of wetland) | |

| | |
|--|----------------------------|
| | Fractional Area |
| FA of isolated or palustrine wetland | <u>0.90</u> x 50 = _____ |
| FA of riverine wetland | _____ x 20 = _____ |
| FA of lacustrine wetland (wetland <50% lacustrine) | <u>0.10</u> x 0 = <u>0</u> |

Ground Water Recharge, Wetland Site Type Component Score (maximum 50 points) 45

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

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

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

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

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

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

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

Step 1:

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

Step 2: Choose only one option

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

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

- 1) Significant in Site Region 100 points
- 2) Significant in Site District 50
- 3) Locally Significant Habitat (5.0+ ha) 25
- 4) Locally Significant Habitat (<5.0 ha) 15

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

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

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

- Low marsh not present (Continue to Step 5)
 Low marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

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

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

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

Scoring for Presence of Key Vegetation Groups

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

| Vegetation Group Number | Vegetation Group Name | Present as a Dominant Form (check) | Total Area (ha) | Area Factor (see Table 5) | Score | Final Score (area factor x score) |
|---------------------------------|-------------------------|------------------------------------|-----------------|---------------------------|-------|-----------------------------------|
| 1 | Tallgrass | | | | 6 pts | |
| 2 | Shortgrass-Sedge | ✓ | 1.1 | 0.2 | 11 | 2.2 |
| 3 | Cattail-Bulrush-Burreed | ✓ | 7.1 | 0.4 | 5 | 2 |
| 4 | Arrowhead-Pickerelweed | | | | 5 | |
| Total Score (maximum 25 points) | | | | | | 4.2 |

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently. Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

- Swamp containing fish habitat not present (Continue to Step 7)
- Swamp containing fish habitat present (Score as follows)

| Swamp containing fish habitat | Present (check) | Total area (ha) | Area Factor (see Table 5) | Score | TOTAL SCORE (factor x score) |
|-------------------------------|-----------------|-----------------|---------------------------|-------|------------------------------|
| seasonally flooded | ✓ | 24.4 | 1.0 | 10 | 10 |
| permanently flooded | | | | 10 | |
| SCORE (maximum 20 points) | | | | | 10 |

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = 0

Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = 4.2

Score for Swamp Containing Fish Habitat (maximum 20) = 10

Sum (maximum score 100 points) = 14

4.2.6.2 Migration and Staging Habitat

Step 1:

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

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

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

| | | Score |
|-----------------------------|---|-----------|
| 1) <input type="checkbox"/> | Significant in Site Region | 25 points |
| 2) <input type="checkbox"/> | Significant in Site District | 15 |
| 3) <input type="checkbox"/> | Locally Significant | 10 |
| 4) <input type="checkbox"/> | Fish staging and/or migration habitat present, but not as above | 5 |

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

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

| | | Score |
|-----------------------------|---|-----------|
| 1) <input type="checkbox"/> | Wetland is riverine at rivermouth or lacustrine at rivermouth | 25 points |
| 2) <input type="checkbox"/> | Wetland is riverine, within 0.75 km of rivermouth | 15 |
| 3) <input type="checkbox"/> | Wetland is lacustrine, within 0.75 km of rivermouth | 10 |
| 4) <input type="checkbox"/> | Fish staging and/or migration habitat present, but not as above | 0 |

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

3.0 HYDROLOGICAL COMPONENT

3.1 FLOOD ATTENUATION

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

Step 1 Determination of Maximum Score

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

Step 2. Determination of Upstream Detention Factor (DF)

- (a) Wetland area (ha) 20.6
- (b) Total area (ha) of upstream detention areas (include the wetland itself) 52.6
- (c) Ratio of (a):(b) 0.39
- (d) Upstream detention factor: (c) x 2 = 0.78
(maximum allowable factor = 1)

Step 3 Determination of Wetland Attenuation Factor (AF)

- (a) Wetland area (ha) 20.6
- (b) Size of catchment basin (ha) upstream of wetland (include wetland itself in catchment area) 195.1
- (c) Ratio of (a):(b) 0.106
- (d) Wetland attenuation factor: (c) x 10 = 1.0
(maximum allowable factor = 1)

Step 4. Calculation of final score

- (a) Wetlands on large lakes or major rivers 0
- (b) Wetland entirely isolated 100
- (b) All other wetlands -- calculate as follows:
 - Initial score 100*
 - Upstream detention factor (DF) (Step 2) 0.78
 - Wetland attenuation factor (AF) (Step 3) 1.0
 - Final score: ((DF + AF)/2) x Initial score = 89

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

Flood Attenuation Score (maximum 100 points) 89

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: Determination of maximum initial score

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

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

| | |
|--|-------------------------------|
| (FA = area of site type/total area of wetland) | Fractional Area |
| FA of isolated wetland | _____ x 0.5 = _____ |
| FA of riverine wetland | _____ x 1.0 = _____ |
| FA of palustrine wetland with no inflow | _____ x 0.7 = _____ |
| FA of palustrine wetland with inflows | <u>1.0</u> x 1.0 = <u>1.0</u> |
| FA of lacustrine on lake shoreline | _____ x 0.2 = _____ |
| FA of lacustrine at lake inflow or outflow | _____ x 1.0 = _____ |

Sum (WIF cannot exceed 1.0) 1.0

Step 3: Determination of catchment land use factor (LUF)

(Choose the first category that fits upstream landuse in the catchment.)

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

LUF (maximum 1.0) 0.6

Step 4: Determination of pollutant uptake factor (PUT)

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

| | |
|---|---|
| FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m) | Fractional Area <u>0.48</u> x 0.75 = <u>0.3375</u> |
| FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,f,ff) | <u>0.50</u> x 1.0 = <u>0.50</u> |
| FA of wetland with little or no vegetation (u) | <u>0.05</u> x 0.5 = <u>0.025</u> |

Sum (PUT cannot exceed 1.0) 0.9

Step 5: Calculation of final score

| | | |
|-----|---|------------|
| (a) | Wetland on large lakes or major rivers | 0 |
| (b) | All other wetlands - calculate as follows | |
| | Initial score | 60 |
| | Water quality improvement factor (WQF) | <u>1.0</u> |
| | Land use factor (LUF) | <u>0.6</u> |
| | Pollutant uptake factor (PUT) | <u>0.9</u> |

Final score: 60 x WQF x LUF x PUT = 32.4

Short Term Water Quality Improvement Score (maximum 60 points) 32

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

| | | |
|--------------------------|--|----------|
| <input type="checkbox"/> | Wetland on large lakes or 5 major rivers | 0 points |
| <input type="checkbox"/> | All other wetlands (Proceed to Step 2) | |

Step 2:

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

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

Long Term Nutrient Trap Score (maximum 10 points) _____

3.2.3 GROUNDWATER DISCHARGE

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

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

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) _____

3.3 CARBON SINK

Choose only one of the following

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

Carbon Sink Score (maximum 5 points) _____

3.4 SHORELINE EROSION CONTROL

Step 1:

Score

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

0

Step 2:

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

- | | Score |
|--|-------|
| 1) <input type="checkbox"/> Trees and shrubs | 15 |
| 2) <input type="checkbox"/> Emergent vegetation | 8 |
| 3) <input type="checkbox"/> Submergent vegetation | 6 |
| 4) <input type="checkbox"/> Other shoreline vegetation | 3 |
| 5) <input type="checkbox"/> No vegetation | 0 |

Shoreline Erosion Control Score (maximum 15 points) 0

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

Score

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

0

Fractional Area

- | | |
|--|-----------------------------|
| FA of isolated or palustrine wetland | <u>1.0</u> x 50 = <u>50</u> |
| FA of riverine wetland | _____ x 20 = _____ |
| FA of lacustrine wetland (wetland <50% lacustrine) | _____ x 0 = _____ |

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

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

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

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

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

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

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

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

Step 1:

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

Step 2: Choose only one option

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

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

- 1) Significant in Site Region 100 points
- 2) Significant in Site District 50
- 3) Locally Significant Habitat (5.0+ ha) 25
- 4) Locally Significant Habitat (<5.0 ha) 15

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

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

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

_____ Low marsh not present (Continue to Step 5)

_____ Low marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

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

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

_____ High marsh not present (Continue to Step 6)

_____ High marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

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

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently.)
 Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

- _____ Swamp containing fish habitat not present (Continue to Step 7)
- _____ Swamp containing fish habitat present (Score as follows)

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

Step 7: Calculation of final score

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

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

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

Sum (maximum score 100 points) = _____

4.2.6.2 Migration and Staging Habitat

Step 1:

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

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

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

| | | Score |
|-----------------------------|---|-----------|
| 1) <input type="checkbox"/> | Significant in Site Region | 25 points |
| 2) <input type="checkbox"/> | Significant in Site District | 15 |
| 3) <input type="checkbox"/> | Locally Significant | 10 |
| 4) <input type="checkbox"/> | Fish staging and/or migration habitat present, but not as above | 5 |

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

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

| | | Score |
|-----------------------------|---|-----------|
| 1) <input type="checkbox"/> | Wetland is riverine at rivermouth or lacustrine at rivermouth | 25 points |
| 2) <input type="checkbox"/> | Wetland is riverine, within 0.75 km of rivermouth | 15 |
| 3) <input type="checkbox"/> | Wetland is lacustrine, within 0.75 km of rivermouth | 10 |
| 4) <input type="checkbox"/> | Fish staging and/or migration habitat present, but not as above | 0 |

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

3.0 HYDROLOGICAL COMPONENT3.1 FLOOD ATTENUATION

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

Step 1 Determination of Maximum Score

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

Step 2. Determination of Upstream Detention Factor (DF)

- | | | |
|-----|--|-------------|
| (a) | Wetland area (ha) | <u>0.1</u> |
| (b) | Total area (ha) of <u>upstream</u> detention areas (include the wetland itself) | <u>2.4</u> |
| (c) | Ratio of (a):(b) | <u>0.04</u> |
| (d) | Upstream detention factor: (c) x 2 = (maximum allowable factor = 1) | <u>0.08</u> |

Step 3 Determination of Wetland Attenuation Factor (AF)

- | | | |
|-----|---|---------------|
| (a) | Wetland area (ha) | <u>0.1</u> |
| (b) | Size of catchment basin (ha) <u>upstream</u> of wetland (include wetland itself in catchment area) | <u>161.9</u> |
| (c) | Ratio of (a):(b) | <u>0.0006</u> |
| (d) | Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1) | <u>0.006</u> |

Step 4. Calculation of final score

- | | | |
|-----|--|--------------|
| (a) | Wetlands on large lakes or major rivers | 0 |
| (b) | Wetland entirely isolated | 100 |
| (b) | All other wetlands -- calculate as follows: | |
| | Initial score. | 100* |
| | Upstream detention factor (DF) (Step 2) | <u>0.08</u> |
| | Wetland attenuation factor (AF) (Step 3) | <u>0.006</u> |
| | Final score: ((DF + AF)/2) x Initial score = | <u>4.3</u> |

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

Flood Attenuation Score (maximum 100 points) 4

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: Determination of maximum initial score

 ✓

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

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

| | |
|--|---------------------------------------|
| (FA = area of site type/total area of wetland) | Fractional Area |
| FA of isolated wetland | _____ x 0.5 = _____ |
| FA of riverine wetland | <u> 1.0 </u> x 1.0 = <u> 1.0 </u> |
| FA of palustrine wetland with no inflow | _____ x 0.7 = _____ |
| FA of palustrine wetland with inflows | _____ x 1.0 = _____ |
| FA of lacustrine on lake shoreline | _____ x 0.2 = _____ |
| FA of lacustrine at lake inflow or outflow | _____ x 1.0 = _____ |

Sum (WIF cannot exceed 1.0) 1.0

Step 3: Determination of catchment land use factor (LUF)

(Choose the first category that fits upstream landuse in the catchment.)

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

LUF (maximum 1.0) 1.0

Step 4: Determination of pollutant uptake factor (PUT)

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

| | |
|---|---------------------------------------|
| FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m) | Fractional Area |
| | _____ x 0.75 = _____ |
| FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,f,ff) | <u> 1.0 </u> x 1.0 = <u> 1.0 </u> |
| FA of wetland with little or no vegetation (u) | _____ x 0.5 = _____ |

Sum (PUT cannot exceed 1.0) 1.0

Step 5: Calculation of final score

| | | |
|-----|--|------------|
| (a) | Wetland on large lakes or major rivers | 0 |
| (b) | All other wetlands - calculate as follows | |
| | Initial score | 60 |
| | Water quality improvement factor (WQF) | <u>1.0</u> |
| | Land use factor (LUF) | <u>1.0</u> |
| | Pollutant uptake factor (PUT) | <u>1.0</u> |
| | Final score: 60 x WQF x LUF x PUT = | <u>60</u> |

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

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

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

Step 2:

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

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

Long Term Nutrient Trap Score (maximum 10 points) _____

3.2.3 GROUNDWATER DISCHARGE

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

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

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) _____

3.3 CARBON SINK

Choose only one of the following

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

Carbon Sink Score (maximum 5 points) _____

3.4 SHORELINE EROSION CONTROL

| | |
|--|-------|
| Step 1: | Score |
| <input type="checkbox"/> Wetland entirely isolated or palustrine | 0 |
| <input checked="" type="checkbox"/> Any part of the wetland riverine, or lacustrine (proceed to Step 2) | |

Step 2:

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

| | |
|--|-------|
| | Score |
| 1) <input type="checkbox"/> Trees and shrubs | 15 |
| 2) <input checked="" type="checkbox"/> Emergent vegetation | 8 |
| 3) <input type="checkbox"/> Submergent vegetation | 6 |
| 4) <input type="checkbox"/> Other shoreline vegetation | 3 |
| 5) <input type="checkbox"/> No vegetation | 0 |

Shoreline Erosion Control Score (maximum 15 points) 8

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

| | |
|---|-------|
| | Score |
| (a) Wetland > 50% lacustrine (by area) or located on one of the five major rivers | 0 |
| (b) Wetland not as above. Calculate final score as follows: (FA = area of site type/total area of wetland) | |

| | |
|--|--|
| | Fractional Area |
| FA of isolated or palustrine wetland | <u> </u> x 50 = <u> </u> |
| FA of riverine wetland | <u>1.0</u> x 20 = <u>20</u> |
| FA of lacustrine wetland (wetland <50% lacustrine) | <u> </u> x 0 = <u> </u> |

Ground Water Recharge, Wetland Site Type Component Score (maximum 50 points) 20

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

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

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

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

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

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

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

Step 1:

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

Step 2: Choose only one option

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

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

- 1) Significant in Site Region 100 points
- 2) Significant in Site District 50
- 3) Locally Significant Habitat (5.0+ ha) 25
- 4) Locally Significant Habitat (<5.0 ha) 15

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

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

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

Low marsh not present (Continue to Step 5)

Low marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

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

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

High marsh not present (Continue to Step 6)

High marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

| Vegetation Group Number | Vegetation Group Name | Present as a Dominant Form (check) | Total Area (ha) | Area Factor (see Table 5) | Score | Final Score (area factor x score) |
|---------------------------------|-------------------------|------------------------------------|-----------------|---------------------------|-------|-----------------------------------|
| 1 | Tallgrass | | | | 6 pts | |
| 2 | Shortgrass-Sedge | ✓ | 0.1 | 0.1 | 11 | 1.1 |
| 3 | Cattail-Bulrush-Burreed | | | | 5 | |
| 4 | Arrowhead-Pickerelweed | | | | 5 | |
| Total Score (maximum 25 points) | | | | | | 1.1 |

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently. Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

- Swamp containing fish habitat not present (Continue to Step 7)
- Swamp containing fish habitat present (Score as follows)

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

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = 0

Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = 1.1

Score for Swamp Containing Fish Habitat (maximum 20)

= 0
Sum (maximum score 100 points) = 1

4.2.6.2 Migration and Staging Habitat

Step 1:

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

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

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

| | Score |
|---|-----------|
| 1) <input type="checkbox"/> Significant in Site Region | 25 points |
| 2) <input type="checkbox"/> Significant in Site District | 15 |
| 3) <input type="checkbox"/> Locally Significant | 10 |
| 4) <input type="checkbox"/> Fish staging and/or migration habitat present, but not as above | 5 |

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

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

| | Score |
|--|-----------|
| 1) <input type="checkbox"/> Wetland is riverine at rivermouth or lacustrine at rivermouth | 25 points |
| 2) <input type="checkbox"/> Wetland is riverine, within 0.75 km of rivermouth | 15 |
| 3) <input type="checkbox"/> Wetland is lacustrine, within 0.75 km of rivermouth | 10 |
| 4) <input checked="" type="checkbox"/> Fish staging and/or migration habitat present, but not as above | 0 |

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

3.0 HYDROLOGICAL COMPONENT3.1 FLOOD ATTENUATION

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

Step 1 Determination of Maximum Score

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

Step 2. Determination of Upstream Detention Factor (DF)

- | | | |
|-----|--|-------------|
| (a) | Wetland area (ha) | <u>0.3</u> |
| (b) | Total area (ha) of <u>upstream</u> detention areas (include the wetland itself) | <u>2.3</u> |
| (c) | Ratio of (a):(b) | <u>0.13</u> |
| (d) | Upstream detention factor: (c) x 2 = (maximum allowable factor = 1) | <u>0.26</u> |

Step 3 Determination of Wetland Attenuation Factor (AF)

- | | | |
|-----|---|---------------|
| (a) | Wetland area (ha) | <u>0.3</u> |
| (b) | Size of catchment basin (ha) <u>upstream</u> of wetland (include wetland itself in catchment area) | <u>16.9</u> |
| (c) | Ratio of (a):(b) | <u>0.0185</u> |
| (d) | Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1) | <u>0.19</u> |

Step 4. Calculation of final score

- | | | |
|-----|--|-------------|
| (a) | Wetlands on large lakes or major rivers | 0 |
| (b) | Wetland entirely isolated | 100 |
| (b) | All other wetlands -- calculate as follows: | |
| | Initial score | 100* |
| | Upstream detention factor (DF) (Step 2) | <u>0.26</u> |
| | Wetland attenuation factor (AF) (Step 3) | <u>0.19</u> |
| | Final score: ((DF + AF)/2) x Initial score = | <u>22.5</u> |

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

Flood Attenuation Score (maximum 100 points) 23

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: Determination of maximum initial score

 ✓

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

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

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

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

Sum (WIF cannot exceed 1.0)

Step 3: Determination of catchment land use factor (LUF)

(Choose the first category that fits upstream landuse in the catchment.)

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

LUF (maximum 1.0) 1.0

Step 4: Determination of pollutant uptake factor (PUT)

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

| | Fractional Area |
|---|-------------------------------|
| FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m) | _____ x 0.75 = _____ |
| FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,ff) | <u>1.0</u> x 1.0 = <u>1.0</u> |
| FA of wetland with little or no vegetation (u) | _____ x 0.5 = _____ |

Sum (PUT cannot exceed 1.0) 1.0

Step 5: Calculation of final score

| | | |
|-----|---|------------|
| (a) | Wetland on large lakes or major rivers | 0 |
| (b) | All other wetlands - calculate as follows | |
| | Initial score | 60 |
| | Water quality improvement factor (WQF) | <u>1.0</u> |
| | Land use factor (LUF) | <u>1.0</u> |
| | Pollutant uptake factor (PUT) | <u>1.0</u> |

Final score: 60 x WQF x LUF x PUT = 60

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

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

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

Step 2:

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

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

Long Term Nutrient Trap Score (maximum 10 points)

3.2.3 GROUNDWATER DISCHARGE

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

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

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) _____

3.3 CARBON SINK

Choose only one of the following

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

Carbon Sink Score (maximum 5 points) _____

3.4 SHORELINE EROSION CONTROL

| | |
|--|-------|
| <u>Step 1:</u> | Score |
| <input type="checkbox"/> Wetland entirely isolated or palustrine | 0 |
| <input checked="" type="checkbox"/> Any part of the wetland riverine, or lacustrine (proceed to Step 2) | |

Step 2:

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

| | |
|--|-------|
| | Score |
| 1) <input type="checkbox"/> Trees and shrubs | 15 |
| 2) <input type="checkbox"/> Emergent vegetation | 8 |
| 3) <input checked="" type="checkbox"/> Submergent vegetation | 6 |
| 4) <input type="checkbox"/> Other shoreline vegetation | 3 |
| 5) <input type="checkbox"/> No vegetation | 0 |

Shoreline Erosion Control Score (maximum 15 points) 6

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

| | |
|---|-------|
| | Score |
| (a) Wetland > 50% lacustrine (by area) or located on one of the five major rivers | 0 |
| (b) Wetland not as above. Calculate final score as follows: (FA = area of site type/total area of wetland) | |

| | |
|--|--|
| | Fractional Area |
| FA of isolated or palustrine wetland | <u> </u> x 50 = <u> </u> |
| FA of riverine wetland | <u>1.0</u> x 20 = <u>20</u> |
| FA of lacustrine wetland (wetland <50% lacustrine) | <u> </u> x 0 = <u> </u> |

Ground Water Recharge, Wetland Site Type Component Score (maximum 50 points) 20

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

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

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

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

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

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

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

Step 1:

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

Step 2: Choose only one option

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

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

- 1) Significant in Site Region 100 points
- 2) Significant in Site District 50
- 3) Locally Significant Habitat (5.0+ ha) 25
- 4) Locally Significant Habitat (<5.0 ha) 15

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

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

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

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

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

| Vegetation Group Number | Vegetation Group Name | Present as a Dominant Form (check) | Total Area (ha) | Area Factor (see Table 5) | Score | Final Score (area factor x score) |
|---------------------------------|-----------------------------|-------------------------------------|-----------------|---------------------------|-------|-----------------------------------|
| 1 | Tallgrass | | | | 6 pts | |
| 2 | Shortgrass-Sedge | | | | 11 | |
| 3 | Cattail-Bulrush-Burreed | | | | 5 | |
| 4 | Arrowhead-Pickereelweed | | | | 5 | |
| 5 | Duckweed | | | | 2 | |
| 6 | Smartweed-Waterwillow | | | | 6 | |
| 7 | Waterlily-Lotus | | | | 11 | |
| 8 | Waterweed-Watercress | | | | 9 | |
| 9 | Ribongrass | | | | 10 | |
| 10 | Coontail-Naiad-Watermilfoil | <input checked="" type="checkbox"/> | 0.3 | 0.1 | 13 | 1.3 |
| 11 | Narrowleaf Pondweed | | | | 5 | |
| 12 | Broadleaf Pondweed | | | | 8 | |
| Total Score (maximum 75 points) | | | | | | 1.3 |

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

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

Scoring for Presence of Key Vegetation Groups

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

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

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently.)
 Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

- Swamp containing fish habitat not present (Continue to Step 7)
 Swamp containing fish habitat present (Score as follows)

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

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = 1.3
 Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = 0
 Score for Swamp Containing Fish Habitat (maximum 20) = 6
Sum (maximum score 100 points) = 1

4.2.6.2 Migration and Staging Habitat

Step 1:

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

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

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

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

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

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

| | | Score |
|--|---|-----------|
| 1) ___ | Wetland is riverine at rivermouth or lacustrine at rivermouth | 25 points |
| 2) ___ | Wetland is riverine, within 0.75 km of rivermouth | 15 |
| 3) ___ | Wetland is lacustrine, within 0.75 km of rivermouth | 10 |
| 4) <input checked="" type="checkbox"/> | Fish staging and/or migration habitat present, but not as above | 0 |

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

3.0 HYDROLOGICAL COMPONENT3.1 FLOOD ATTENUATION

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

Step 1 Determination of Maximum Score

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

Step 2. Determination of Upstream Detention Factor (DF)

- | | | |
|-----|--|------------|
| (a) | Wetland area (ha) | <u>2.0</u> |
| (b) | Total area (ha) of <u>upstream</u> detention areas (include the wetland itself) | <u>2.0</u> |
| (c) | Ratio of (a):(b) | <u>1.0</u> |
| (d) | Upstream detention factor: (c) x 2 = (maximum allowable factor = 1) | <u>1.0</u> |

Step 3 Determination of Wetland Attenuation Factor (AF)

- | | | |
|-----|---|--------------|
| (a) | Wetland area (ha) | <u>2.0</u> |
| (b) | Size of catchment basin (ha) <u>upstream</u> of wetland (include wetland itself in catchment area) | <u>161.9</u> |
| (c) | Ratio of (a):(b) | <u>0.012</u> |
| (d) | Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1) | <u>0.12</u> |

Step 4. Calculation of final score

- | | | |
|-----|--|-------------|
| (a) | Wetlands on large lakes or major rivers | 0 |
| (b) | Wetland entirely isolated | 100 |
| (b) | All other wetlands -- calculate as follows: | |
| | Initial score | 100* |
| | Upstream detention factor (DF) (Step 2) | <u>1.0</u> |
| | Wetland attenuation factor (AF) (Step 3) | <u>0.12</u> |
| | Final score: ((DF + AF)/2) x Initial score = | <u>56</u> |

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

Flood Attenuation Score (maximum 100 points) 56

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: Determination of maximum initial score

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

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

| | |
|--|--|
| (FA = area of site type/total area of wetland) | Fractional Area |
| FA of isolated wetland | _____ x 0.5 = _____ |
| FA of riverine wetland | _____ x 1.0 = _____ |
| FA of palustrine wetland with no inflow | <u>1.0</u> x 0.7 = <u>0.7</u> |
| FA of palustrine wetland with inflows | _____ x 1.0 = _____ |
| FA of lacustrine on lake shoreline | _____ x 0.2 = _____ |
| FA of lacustrine at lake inflow or outflow | _____ x 1.0 = _____ |
| | Sum (WIF cannot exceed 1.0) <u>0.7</u> |

Step 3: Determination of catchment land use factor (LUF)

(Choose the first category that fits upstream landuse in the catchment.)

- 1) Over 50% agricultural and/or urban 1.0
- 2) Between 30 and 50% agricultural and/or urban 0.8
- 3) Over 50% forested or other natural vegetation 0.6

LUF (maximum 1.0) 0.8

Step 4: Determination of pollutant uptake factor (PUT)

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

| | |
|---|---------------------------------|
| FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m) | Fractional Area |
| | <u>1.0</u> x 0.75 = <u>0.75</u> |
| FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,f,ff) | _____ x 1.0 = _____ |
| FA of wetland with little or no vegetation (u) | _____ x 0.5 = _____ |

Sum (PUT cannot exceed 1.0) 0.75

Step 5: Calculation of final score

| | | |
|-----|--|-------------|
| (a) | Wetland on large lakes or major rivers | 0 |
| (b) | All other wetlands - calculate as follows | |
| | Initial score | 60 |
| | Water quality improvement factor (WQF) | <u>0.7</u> |
| | Land use factor (LUF) | <u>1.0</u> |
| | Pollutant uptake factor (PUT) | <u>0.75</u> |
| | Final score: 60 x WQF x LUF x PUT = | <u>31.5</u> |

Short Term Water Quality Improvement Score (maximum 60 points) 32

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

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

Step 2:

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

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

Long Term Nutrient Trap Score (maximum 10 points) _____

3.2.3 GROUNDWATER DISCHARGE

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

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

(Scores are cumulative, maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) _____

3.3 CARBON SINK

Choose only one of the following

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

Carbon Sink Score (maximum 5 points) _____

3.4 SHORELINE EROSION CONTROL

Step 1:

Score

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

0

Step 2:

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

- | | Score |
|--|-------|
| 1) <input type="checkbox"/> Trees and shrubs | 15 |
| 2) <input type="checkbox"/> Emergent vegetation | 8 |
| 3) <input type="checkbox"/> Submergent vegetation | 6 |
| 4) <input type="checkbox"/> Other shoreline vegetation | 3 |
| 5) <input type="checkbox"/> No vegetation | 0 |

Shoreline Erosion Control Score (maximum 15 points) 0

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

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

Score

0

Fractional Area

- FA of isolated or palustrine wetland
- FA of riverine wetland
- FA of lacustrine wetland (wetland <50% lacustrine)

| | |
|-------------------|-----------|
| <u>1.0</u> x 50 = | <u>50</u> |
| _____ x 20 = | _____ |
| _____ x 0 = | _____ |

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

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

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

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

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

4.2.7 FISH HABITAT

4.2.7.1 Spawning and Nursery Habitat

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

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

Step 1:

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

Step 2: Choose only one option

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

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

- 1) Significant in Site Region 100 points
- 2) Significant in Site District 50
- 3) Locally Significant Habitat (5.0+ ha) 25
- 4) Locally Significant Habitat (<5.0 ha) 15

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

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

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

- Low marsh not present (Continue to Step 5)
- Low marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

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

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

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

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

Scoring for Presence of Key Vegetation Groups

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

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

Step 6: (Swamp: Swamp communities containing fish habitat, either seasonally or permanently.)
 Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

- Swamp containing fish habitat not present (Continue to Step 7)
 Swamp containing fish habitat present (Score as follows)

| Swamp containing fish habitat | Present (check) | Total area (ha) | Area Factor (see Table 5) | Score | TOTAL SCORE (factor x score) |
|-------------------------------|-----------------|-----------------|---------------------------|-------|------------------------------|
| seasonally flooded | ✓ | 2.0 | 0.2 | 10 | 2.0 |
| permanently flooded | | | | 10 | |
| SCORE (maximum 20 points) | | | | | |

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = 0

Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = 0

Score for Swamp Containing Fish Habitat (maximum 20) = 2

Sum (maximum score 100 points) = 2

4.2.6.2 Migration and Staging Habitat

Step 1:

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

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

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

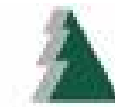
| | | Score |
|--------|---|-----------|
| 1) ___ | Significant in Site Region | 25 points |
| 2) ___ | Significant in Site District | 15 |
| 3) ___ | Locally Significant | 10 |
| 4) ___ | Fish staging and/or migration habitat present, but not as above | 5 |

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

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

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

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



**NORTHLAND
POWER**

McLean's Mountain Wind Farm Wetland Map

Legend

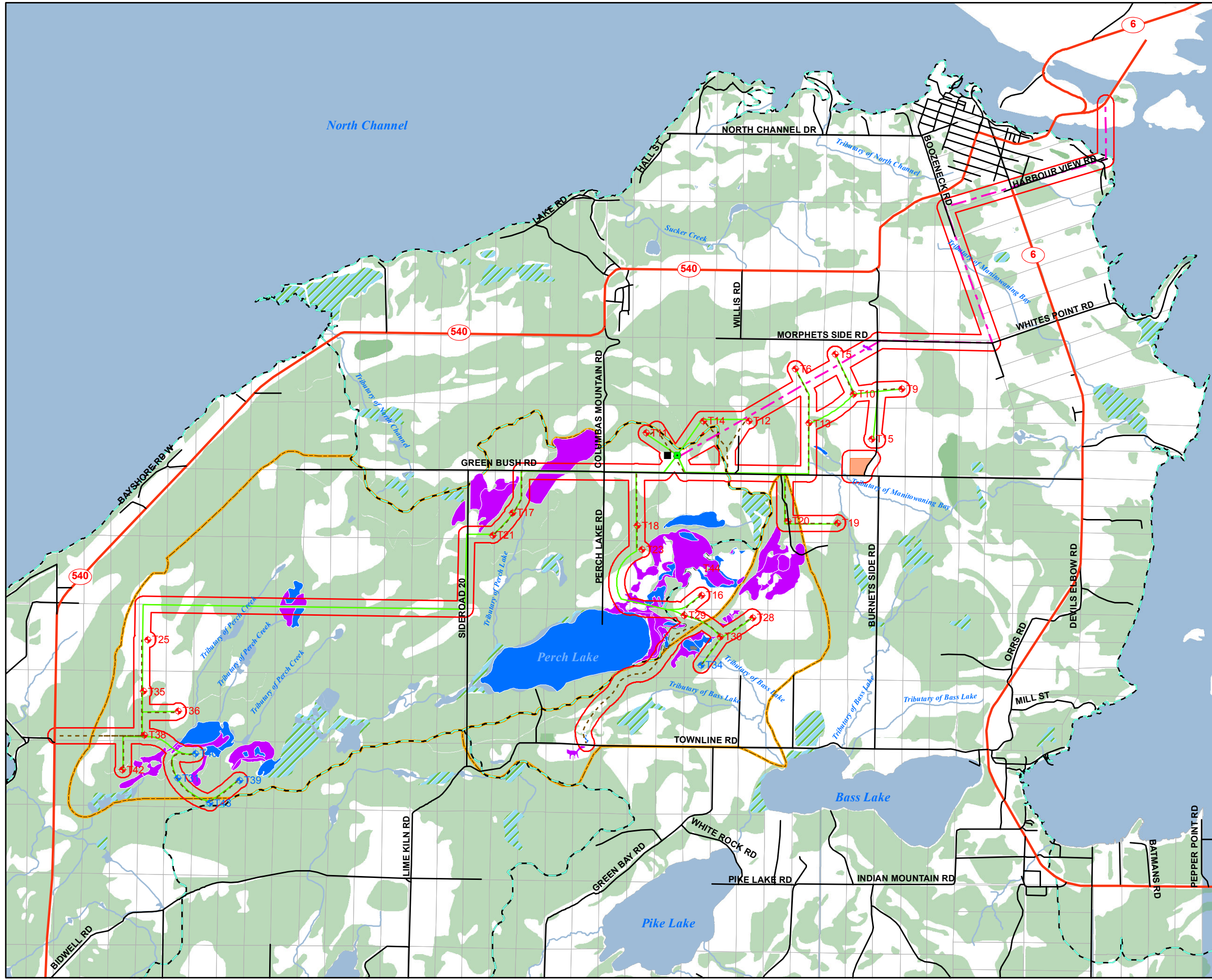
- Local Roads
- Highway
- Lots/Concessions
- Water Body
- Watercourse
- Woodland*
- Unevaluated Wetland *
- Catchment
- Quaternary Watershed

Evaluated Wetlands

- Marsh**
- Swamp**

Project Components

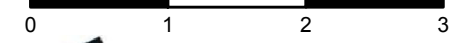
- 24 Wind Turbine Locations
- Five Extra Permitted Sites
- Substation
- Operations Building
- Transmission Line
- Access Road
- Feeder Lines
- Construction Staging Area



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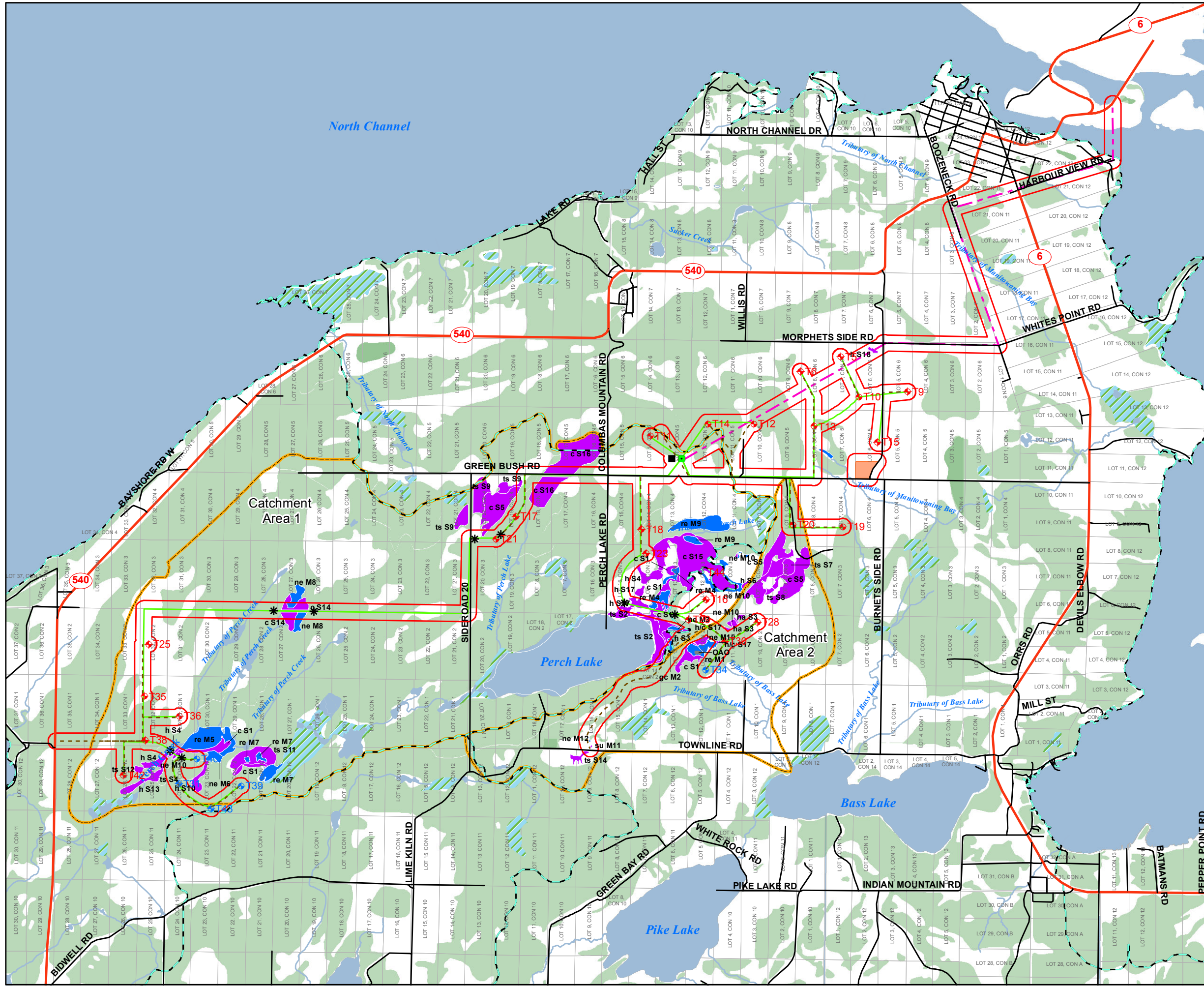


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 Date Modified: July 08, 2011
 File Path: I:\GIS\091983 - Northland
 Power\Mapping\Swamps and Marshes 021011.mxd

NORTHLAND POWER
McLean's Mountain Wind Farm
Wetland Map



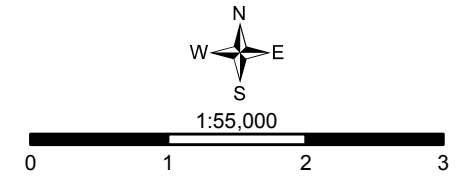
Legend

- Local Roads
- Highway
- Lots/Concessions
- Water Body
- Watercourse
- Woodland*
- Unevaluated Wetland *
- Catchment
- Quaternary Watershed

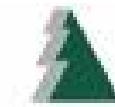
Evaluated Wetlands

- Marsh**
- Swamp**

| Map Code | Vegetation Forms | Dominant Species |
|----------|------------------|--|
| M1 | re, u, dc | <i>Typha latifolia</i> ; dead coniferous |
| M2 | gc, ne | <i>Danthonia spicata</i> ; <i>Plantago lanceolata</i> ; <i>Scirpus spp.</i> |
| M3 | ne, gc, h | <i>Sedge spp.</i> ; <i>Scirpus spp.</i> ; <i>Danthonia spicata</i> ; <i>Populus tremuloides</i> |
| M4 | re, ne | <i>Typha latifolia</i> ; <i>Sedge spp.</i> ; <i>Phalaris arundinacea</i> ; <i>Aster spp.</i> ; <i>Grass spp.</i> |
| M5 | re, ne, ts | <i>Typha latifolia</i> ; <i>Salix spp.</i> ; <i>Thuja occidentalis</i> ; <i>Spirea spp.</i> ; <i>Phalaris arundinacea</i> ; <i>Sedge spp.</i> |
| M6 | ne, ts, h | <i>Sedge spp.</i> ; <i>Grass spp.</i> ; <i>Scirpus spp.</i> ; <i>Salix spp.</i> ; <i>Spirea spp.</i> ; <i>Cornus stolonifera</i> ; <i>Populus tremuloides</i> |
| M7 | re, ne, gc, ts | <i>Typha latifolia</i> ; <i>Phalaris arundinacea</i> ; <i>Eupatorium maculatum</i> ; <i>Alnus incana</i> ; <i>Cornus stolonifera</i> ; <i>Spirea spp.</i> ; <i>Myrica gale</i> ; <i>Salix spp.</i> |
| M8 | ne, dc | <i>Phalaris arundinacea</i> ; dead coniferous trees |
| M9 | re, ts | <i>Typha latifolia</i> ; <i>Alnus incana</i> ; <i>Cornus stolonifera</i> |
| M10 | ne, gc | <i>Carex bebbiana</i> ; <i>C. granularis</i> ; <i>Scirpus atrovirens</i> ; <i>Calamagrostis canadensis</i> ; <i>Hieracium caespitosum</i> ; <i>Senecio pauperculus</i> |
| M11 | su, ne, re | <i>Ceratophyllum spp.</i> ; <i>Scirpus atrovirens</i> ; <i>Carex vulpinoidea</i> ; <i>Typha latifolia</i> ; <i>Scirpus validus</i> |
| M12 | ne, gc | <i>Carex utriculata</i> ; <i>Carex vulpinoidea</i> ; <i>Mentha spicata</i> |
| S1 | c | <i>Thuja occidentalis</i> ; <i>Picea glauca</i> ; <i>Abies balsamea</i> |
| S2 | ts, ts, ne | <i>Salix spp.</i> ; <i>Myrica gale</i> ; <i>Cornus stolonifera</i> ; <i>Sedge spp.</i> ; <i>Scirpus spp.</i> ; <i>Grass spp.</i> |
| S3 | h, ne | <i>Fraxinus pennsylvanica</i> ; <i>Scirpus spp.</i> ; <i>Sedge spp.</i> ; <i>Grass spp.</i> |
| S4 | h, ts | <i>Populus tremuloides</i> ; <i>Populus grandidentata</i> ; <i>Salix spp.</i> ; <i>Cornus stolonifera</i> |
| S5 | c, h | <i>Thuja occidentalis</i> ; <i>Abies balsamea</i> ; <i>Larix laricina</i> ; <i>Populus tremuloides</i> ; <i>Betula papyfera</i> |
| S6 | h, c | <i>Populus tremuloides</i> ; <i>Fraxinus nigra</i> ; <i>Fraxinus pennsylvanica</i> ; <i>Thuja occidentalis</i> ; <i>Picea glauca</i> ; <i>Abies balsamea</i> |
| S7 | ts, re, ne, dc | <i>Salix spp.</i> ; <i>Cornus stolonifera</i> ; <i>Thuja occidentalis</i> ; <i>Scirpus spp.</i> ; <i>Typha latifolia</i> ; <i>Sedge spp.</i> ; <i>Aster spp.</i> ; dead trees |
| S8 | ts, re, ne, gc | <i>Salix spp.</i> ; <i>Fraxinus nigra</i> ; <i>Populus tremuloides</i> ; <i>Fraxinus pennsylvanica</i> ; <i>Thuja occidentalis</i> ; <i>Scirpus spp.</i> ; <i>Typha latifolia</i> |
| S9 | ts, h | <i>Salix spp.</i> ; <i>Fraxinus nigra</i> ; <i>Populus tremuloides</i> |
| S10 | h, ts | <i>Fraxinus pennsylvanica</i> ; <i>Populus tremuloides</i> ; <i>Fraxinus pennsylvanica</i> |
| S11 | h, c | <i>Fraxinus pennsylvanica</i> ; <i>Thuja occidentalis</i> |
| S12 | h, c, ts, ts | <i>Populus tremuloides</i> ; <i>Picea glauca</i> ; <i>Thuja occidentalis</i> ; <i>Salix spp.</i> ; <i>Cornus stolonifera</i> |
| S13 | ts, ne, dh | <i>Salix spp.</i> ; <i>Thuja occidentalis</i> ; <i>Alnus incana</i> ; <i>Spirea spp.</i> ; <i>Cornus stolonifera</i> ; <i>Grass spp.</i> ; dead trees |
| S14 | ts, ne | <i>Salix spp.</i> ; <i>Cornus stolonifera</i> ; <i>Grass spp.</i> ; <i>Sedge spp.</i> |
| S15 | h, ts, gc | <i>Fraxinus nigra</i> ; <i>Populus tremuloides</i> ; <i>Populus grandidentata</i> ; <i>Ulmus americana</i> ; <i>Populus tremuloides</i> ; <i>Oncoclea sensibilis</i> |
| S16 | c, h, ne | <i>Thuja occidentalis</i> ; <i>Abies balsamea</i> ; <i>Picea glauca</i> ; <i>Populus balsamifera</i> ; <i>Fraxinus nigra</i> ; <i>Phalaris arundinacea</i> |
| S17 | h/c, gc, m | <i>Populus tremuloides</i> / <i>Thuja occidentalis</i> ; <i>Abies balsamea</i> ; <i>Rubus pubescens</i> ; <i>Moss spp.</i> |
| S18 | h, re, ne | <i>Acer freemanii</i> ; <i>Fraxinus pennsylvanica</i> ; <i>Typha latifolia</i> ; <i>Phalaris arundinacea</i> |



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 Date Modified: July 8, 2011
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**NORTHLAND
POWER**

McLean's Mountain Wind Farm Upstream Wetland Catchment Areas

Legend

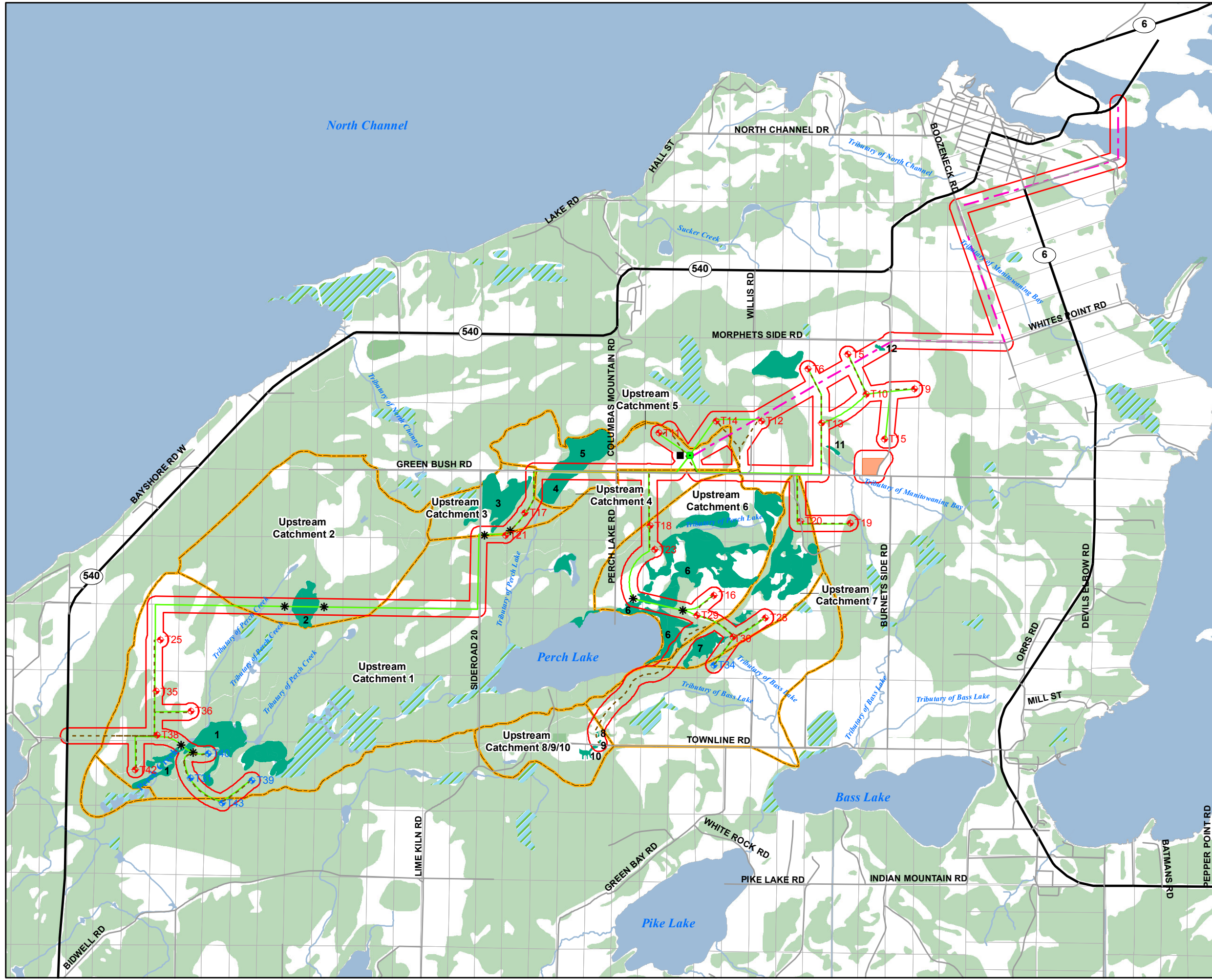
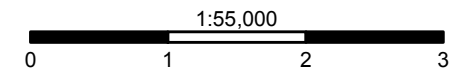
- Local Roads
- Highway
- 120 m Project Location Setback
- Lots/Concessions
- Water Body
- Watercourse
- 1 Delineated Unevaluated Wetlands
- Woodland*
- Unevaluated Wetland Outside of the 120m Project Component Setback*

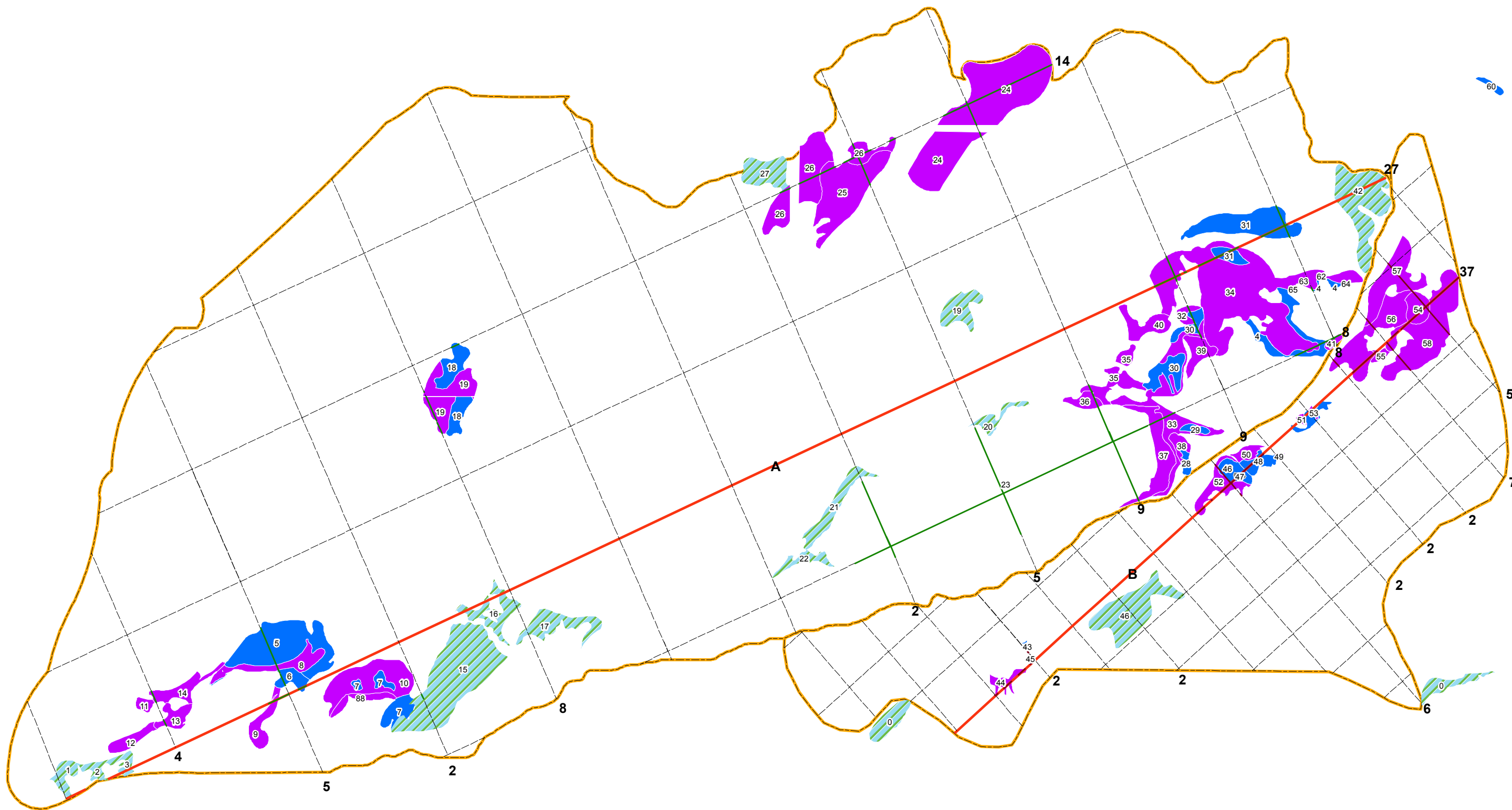
Project Components

- 24 Wind Turbine Locations
- Six Extra Permitted Sites
- Substation
- Operations Building
- Horizontal Directional Drilling Access/Exit Pit
- Transmission Line
- Access Road
- Feeder Lines
- Construction Staging Area

| | Area (Ha) |
|---------------------------|-----------|
| Catchment Area 1 | 3670.256 |
| Catchment Area 2 | 824.989 |
| Sub-Catchment Area 1 | 3619.91 |
| Sub-Catchment Area 2 | 639.72 |
| Sub-Catchment Area 3 | 381.57 |
| Sub-Catchment Area 4 | 246.69 |
| Sub-Catchment Area 5 | 199.07 |
| Sub-Catchment Area 6 | 438.15 |
| Sub-Catchment Area 7 | 195.12 |
| Sub-Catchment Area 8/9/10 | 161.89 |

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Length of Line A: 11km

Length of Line B: 4.7km

$11\text{km} / 12 = 0.917\text{km}$ (917m)

$4.7\text{km} / 12 = 0.392\text{km}$ (392m)

Grid Squares are 0.917 x 0.917km (917 x 917 m)

Grid Squares are 0.392 x 0.392km (392 x 392 m)