

**Grand Bend Wind Farm**  
**Water Assessment and**  
**Water Body Draft Report**

**Grand Bend Wind Limited Partnership,**  
**c/o Northland Power Inc.**



**NEEGAN BURNSIDE**

**August 2012**

**Grand Bend Wind Limited Partnership  
Water Assessment and  
Water Body Draft Report**

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Grand Bend Wind Limited Partnership  
c/o Northland Power Inc.

August 2012

File No: PIA 019991

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### Record of Revisions

<b>Revision</b>	<b>Date</b>	<b>Description</b>
0	August 27, 2012	Initial Submission to the Ministry of Environment, Municipal and Aboriginal Communities as well as Selected Government Agencies

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## Executive Summary

The Grand Bend Wind Limited Partnership, c/o Northland Power Inc. (“Northland”) is proposing to develop, construct and operate a 100 MW wind facility located north of Grand Bend, Ontario. An application for approval is being prepared under Ontario Regulation 359/09 of the *Environmental Protection Act*. The project is classified as a Class 4 Wind facility under the Regulation. The Grand Bend Wind Farm (“the Project”) is located in Huron County, spanning the lower-tier municipalities of Bluewater and South Huron. Portions of the transmission line also traverse the municipality of Huron East and municipality of West Perth in Perth County.

Under Section 29, 30, 31, 39 and 40 of O.Reg. 359/09, a Water Assessment is a required component of a REA Application for a Class 4 Wind Facility. The Water Assessment is to be completed in three stages as follows:

- Stage 1: Water Assessment, Records Review;
- Stage 2: Water Assessment, Site Investigation; and,
- Stage 3: Water Body Report.

Based on the review of existing information, agency records and in-person meetings with agency staff, a number of water bodies are present, or may be present within 120 m of the Project location. A detailed description of these features is presented in this report.

Watercourses within the Turbine and Transmission Line Study Area are generally small and characteristic of drains in highly agricultural landscapes. A total of 64 permanent and intermittent watercourses are within 120 m of the Project Location. Only six of these watercourses will require in-water works for Access Road culverts and of the six watercourse most are intermittent or seasonal. Specifically, most have been straightened and deepened to some extent. Those identified as municipal drains are typically cleaned out regularly depending on the drainage report and maintenance requirements. In addition, many agricultural fields in the area appear to have been tiled for drainage with tile drains flowing into the nearest watercourse or municipal drain.

All proposed construction methodology is covered under Operational Statements (Ontario Operational Statement Habitat Management Program) provided by DFO. The Proponent and Contractor(s) will follow the “Measures to Protect Fish and Fish Habitat” outlined in the Operational Statement, so that no impacts to water quality, or fish and fish habitat will occur.

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## 1.0 Introduction

### 1.1 Project Overview

The Grand Bend Wind Limited Partnership, c/o Northland Power Inc. (“Northland”) is proposing to develop, construct and operate a 100 MW wind facility located north of Grand Bend, Ontario. An application for approval is being prepared under Ontario Regulation 359/09 of the *Environmental Protection Act*. The project is classified as a Class 4 Wind facility under the Regulation. The Grand Bend Wind Farm (“the Project”) is located in Huron County, spanning the lower-tier municipalities of Bluewater and South Huron. Portions of the transmission line also traverse the municipality of Huron East and municipality of West Perth in Perth County. The project location and study area is provided in **Figure 1** in **Appendix A**.

The basic project components will include approximately 48 turbines (Siemens SWT-2.3-113 direct drive wind turbine generators with a total name plate capacity of 100 MW), turbine access roads, a 36 kV electrical collection system, substation and a new transmission line within municipal road Right-Of-Ways (“ROWs”) along Rodgerville Road, Line 17 and Road 183 with connection to the provincial power grid at the 230 kV transmission line south of the Seaforth Transformer Station. During construction temporary components will include crane pads and work/storage areas at the turbine locations and construction of the transmission connections.

Under Section 29, 30, 31, 39 and 40 of O.Reg. 359/09, a Water Assessment is a required component of a REA Application for a Class 4 Wind Facility. The Water Assessment is to be completed in three stages as follows:

- Stage 1: Water Assessment, Records Review;
- Stage 2: Water Assessment, Site Investigation; and,
- Stage 3: Water Body Report.

This report presents the findings of all three stages in order to provide a comprehensive review and assessment of water bodies in the vicinity of the Project location.

### 1.2 Project Location

The proposed Project is located in Huron County, spanning the lower-tier municipalities of Bluewater and South Huron as well as a portion of Huron East and the municipality of West Perth in Perth County. The Project Location shown in **Figure 1** in **Appendix A**, is bounded by:

- The Bluewater Highway (Highway 21) to the west;

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- Main Street East/Grand Bend Line to the south;
- Blackbush and Shipka Lines with a small section of the study area in the central section of the project extending to Bronson Line and to the east; and,
- Staffa Road to the north.

Two transmission line routing options were originally studied, a northern route and a southern route, as described in the Project Description Report. The northern route was identified as having fewer natural heritage as well as social, aesthetic and technical impacts constraints as was thus selected as the preferred route. This route runs from a transformer station on Lot 14, Concession 13, former Hay Township, and follows Sararas/Rodgerville Road to Line 17 and Road 183, connecting to the existing 230 kV Hydro One transmission line just south of the Seaforth Transformer Station ("TS"). The southern route was discarded as an option and was not studied any further.

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

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

For the purposes of this Project, the Project Location includes the footprint of the facility components, plus any temporary work and storage locations. The boundary of the Project Location is used for defining setback and site investigation distances according to O.Reg. 359/09. The buildable area, which includes the footprint of the facility components, plus any temporary work and storage locations, will be staked on private lands. All construction and installation activities will be conducted within these designated areas; this includes construction vehicles and personnel. Similarly, all installation activities related to collector lines within the municipal road allowance will be contained within the boundaries of the road allowance.

### **1.3 Project Study Area**

An initial Project Study Area of 300 m around the Project Location was identified and used as the boundary of a search for potential lake trout lakes. None were found and thus the Study Area was reduced to 120 m from the Project Location for the remainder of the study.



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For convenience, the Study Area was broken into two separate units, as follows:

- Turbine Study Area, including all structures associated with the turbines, access roads, below ground collector lines and the transformer station; and,
- The Transmission Line Study Area, including the overhead transmission line from the transformer station to the interconnection point with the existing 230 kV line.

All collector lines within the Turbine Study area will be constructed primarily under ground unless conditions are not suitable for proposed construction methods. Transmission lines are proposed to be overhead or underground depending on the sensitivity of areas or features encountered along the proposed line. No-in water works will be required.

The Project Study Area is presented on **Figure 1, Appendix A.**

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## 2.0 Water Assessment, Records Review

### 2.1 Scope of the Review

The Records Review was conducted in accordance with Sections 29 and 30 of O.Reg. 359/09 and the Technical Guide to Renewable Energy Approvals (MOE, 2012).

The Records Review must determine whether the project location is:

- In a water body;
- Within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity;
- Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity;
- Within 120 m of the average annual high water mark of a permanent or intermittent stream; and,
- Within 120 m of a seepage area.

The definition of a water body provided in O.Reg. 359/09, is as follows:

“...a lake, a permanent stream, an intermittent stream and a seepage area but does not include, a) grassed waterways, b) temporary channels for surface drainage, such as furrows or shallow channels that can be tilled and driven through, c) rock chutes or spillways, d) roadside ditches that do not contain a permanent or intermittent stream, e) temporarily ponded areas that are normally farmed, f) dugout ponds, or g) artificial bodies of water intended for the storage, treatment or recirculation of runoff from farm animal yards, manure storage facilities and sites and outdoor confinement areas”.

Information was collected to determine the potential presence of:

- Lakes;
- Lake trout lakes;
- Permanent or intermittent streams; and,
- Seepage areas.

The Records Review Results is presented in Section 2.3 below.

### 2.2 Publicly Available Data Sources

A summary of information sources reviewed is provided in **Table 2.1**.

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**Table 2.1 Publicly Available Data Sources Reviewed**

Data Source	Information Provided	Reference
<b>Policy Documents</b>		
County of Huron Official Plan	Water bodies	<a href="http://www.huroncounty.ca/plandev/officialplan.php">http://www.huroncounty.ca/plandev/officialplan.php</a>
Municipality of Bluewater Official Plan	Water bodies	<a href="http://www.town.bluewater.on.ca/innerpage.aspx?x=LS%2b0pdZgZIsIJ8Tz%2bz1DzNrJJrRYLtgyp9xQd167M2wO384%2bNQ8V0hUDc5Hf9XC">http://www.town.bluewater.on.ca/innerpage.aspx?x=LS%2b0pdZgZIsIJ8Tz%2bz1DzNrJJrRYLtgyp9xQd167M2wO384%2bNQ8V0hUDc5Hf9XC</a>
Municipality of South Huron Official Plan	Water bodies	<a href="http://southhuron.iwebz.com/siteengine/ActivePage.asp?PageID=242">http://southhuron.iwebz.com/siteengine/ActivePage.asp?PageID=242</a>
Municipality of Huron East Official Plan	Water bodies	<a href="http://www.huroneast.com/index.php?sltb=plan">http://www.huroneast.com/index.php?sltb=plan</a>
Perth County Official Plan	Water bodies	<a href="http://www.perthcounty.ca/page/County_of_Perth_Official_Plan">http://www.perthcounty.ca/page/County_of_Perth_Official_Plan</a>
<b>Interactive Mapping Sites</b>		
Ausable Bayfield Conservation Authority interactive mapping site	Water bodies; floodplains and regulation limits	<a href="http://www.camaps.ca/Geocortex/Essentials/Web/Viewer.aspx?Site=ABCAPubBing">http://www.camaps.ca/Geocortex/Essentials/Web/Viewer.aspx?Site=ABCAPubBing</a>
County of Huron interactive mapping site	Water bodies	<a href="http://gis.huroncounty.ca/imf/imf.jsp?site=Huron_County">http://gis.huroncounty.ca/imf/imf.jsp?site=Huron_County</a>
Department of Fisheries and Oceans and Conservation Ontario Aquatic Species at Risk mapping	Aquatic species at risk	<a href="http://www.conservation-ontario.on.ca/projects/DFO.html">http://www.conservation-ontario.on.ca/projects/DFO.html</a>
Land Information Ontario ("LIO") publicly available datasets	Drain classifications	<a href="http://www.mnr.gov.on.ca/en/Business/LIO/index.html">http://www.mnr.gov.on.ca/en/Business/LIO/index.html</a>
<b>Other Reports and Background Documents</b>		
Ausable Bayfield Conservation Authority, South Gullies Watershed Report Card	Water quality and aquatic habitat	<a href="http://www.abca.on.ca/downloads/reportcard/South_Gullies.pdf">http://www.abca.on.ca/downloads/reportcard/South_Gullies.pdf</a>

### 2.2.1 Requests for Information and Records

Letters were sent to a number of federal, provincial, municipal and other agencies and organizations in order to request additional information and records not publicly available through web searches. In addition, several phone calls and follow-up emails were

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Municipality of Bluewater Official Plan	Water bodies	<a href="http://www.town.bluewater.on.ca/innerpage.aspx?x=LS%2b0pdZgZIsIJ8Tz%2bz1DzNrJJrRYLtgyp9xQd167M2wO384%2bNQ8V0hUDc5Hf9XC">http://www.town.bluewater.on.ca/innerpage.aspx?x=LS%2b0pdZgZIsIJ8Tz%2bz1DzNrJJrRYLtgyp9xQd167M2wO384%2bNQ8V0hUDc5Hf9XC</a>
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Municipality of Huron East Official Plan	Water bodies	<a href="http://www.huroneast.com/index.php?sltb=plan">http://www.huroneast.com/index.php?sltb=plan</a>
Perth County Official Plan	Water bodies	<a href="http://www.perthcounty.ca/page/County_of_Perth_Official_Plan">http://www.perthcounty.ca/page/County_of_Perth_Official_Plan</a>
<b>Interactive Mapping Sites</b>		
Ausable Bayfield Conservation Authority interactive mapping site	Water bodies; floodplains and regulation limits	<a href="http://www.camaps.ca/Geocortex/Essentials/Web/Viewer.aspx?Site=ABCAPubBing">http://www.camaps.ca/Geocortex/Essentials/Web/Viewer.aspx?Site=ABCAPubBing</a>
County of Huron interactive mapping site	Water bodies	<a href="http://gis.huroncounty.ca/imf/imf.jsp?site=Huron_County">http://gis.huroncounty.ca/imf/imf.jsp?site=Huron_County</a>
Department of Fisheries and Oceans and Conservation Ontario Aquatic Species at Risk mapping	Aquatic species at risk	<a href="http://www.conservation-ontario.on.ca/projects/DFO.html">http://www.conservation-ontario.on.ca/projects/DFO.html</a>
Land Information Ontario ("LIO") publicly available datasets	Drain classifications	<a href="http://www.mnr.gov.on.ca/en/Business/LIO/index.html">http://www.mnr.gov.on.ca/en/Business/LIO/index.html</a>
<b>Other Reports and Background Documents</b>		
Ausable Bayfield Conservation Authority, South Gullies Watershed Report Card	Water quality and aquatic habitat	<a href="http://www.abca.on.ca/downloads/reportcard/South_Gullies.pdf">http://www.abca.on.ca/downloads/reportcard/South_Gullies.pdf</a>

### 2.2.1 Requests for Information and Records

Letters were sent to a number of federal, provincial, municipal and other agencies and organizations in order to request additional information and records not publicly available through web searches. In addition, several phone calls and follow-up emails were



completed. A copy of correspondence with agencies (MOE and MNR) is provided in **Appendix B** and summarized in **Table 2.2**.

**Table 2.2 Summary of Agencies Contacted, Records Requested and Records Received**

Source and Contact Information	Records Requested	Agency Response/Records Reviewed
<b>Source:</b> Huron County <b>Contact:</b> Mike Burroughs, GIS Technician <b>Dates Contacted:</b> April 4, 2011	<ul style="list-style-type: none"> <li>Aerial photography.</li> </ul>	<ul style="list-style-type: none"> <li>2006 orthorectified aerial photography.</li> <li>2010 orthorectified aerial photography.</li> </ul>
<b>Source:</b> Environment Canada-Canadian Wildlife Service <b>Contact:</b> John Fischer, Environmental Assessment Coordinator <b>Dates Contacted:</b> December 16, 2011	<ul style="list-style-type: none"> <li>Federal species at risk records.</li> </ul>	<ul style="list-style-type: none"> <li>Email of Jan 3, 2012 indicated that CWS does not maintain spatial database of records.</li> <li>referred to publicly available data on NHIC, OBBA and SARA Registry for further info.</li> </ul>
<b>Source:</b> Fisheries and Oceans Canada Southern Ontario District Office <b>Contact:</b> Rick Kiriluk, Fish Habitat Biologist <b>Dates Contacted:</b> December 16, 2011	<ul style="list-style-type: none"> <li>Fish habitat information.</li> <li>Aquatic Species at Risk records.</li> </ul>	<ul style="list-style-type: none"> <li>Informed that information could be provided at a later date once project details were known.</li> <li>Informed that watercourse crossing locations should be sent by mail to Referrals Coordinator at the Harvester Road office.</li> </ul>
<b>Source:</b> Huron County <b>Contact:</b> Claire Dodds, County Planner <b>Dates Contacted:</b> October 24, 2011	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> </ul>	<ul style="list-style-type: none"> <li>No response provided; meeting arranged to discuss municipal concerns and interests.</li> </ul>
<b>Source:</b> Huron County <b>Contact:</b> Craig Metzger, Senior Planner <b>Dates Contacted:</b> October 24, 2011	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> </ul>	<ul style="list-style-type: none"> <li>No records of natural heritage features provided.</li> <li>Provided copy of Municipality of Bluewater's zoning bylaw for commercial scale wind turbines.</li> </ul>

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<b>Source and Contact Information</b>	<b>Records Requested</b>	<b>Agency Response/Records Reviewed</b>
<p><b>Source:</b> Municipality of South Huron <b>Contact:</b> Dwayne McNab, Manager of Building and Development <b>Dates Contacted:</b> October 24, 2011</p>	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> </ul>	<ul style="list-style-type: none"> <li>No response provided; meeting arranged to discuss municipal concerns and interests.</li> </ul>
<p><b>Source:</b> Municipality of Bluewater <b>Contact:</b> Arlene Parker, Planning Coordinator <b>Dates Contacted:</b> October 24, 2011</p>	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> </ul>	<ul style="list-style-type: none"> <li>Letter received from CAO. Directed to contact ABCA for natural heritage data.</li> </ul>
<p><b>Source:</b> Ministry of the Environment <b>Contact:</b> Scott Abernethy, Surface Water Group Leader, Southwestern Region <b>Dates Contacted:</b> May 23, 2012</p>	<ul style="list-style-type: none"> <li>Process and scope of work for conducting the Site Investigation.</li> </ul>	<ul style="list-style-type: none"> <li>Confirmation on scope of work received via e-mail (May 24, 2012).</li> </ul>
<p><b>Source:</b> Ministry of Natural Resources <b>Contact:</b> Chris Godwin, Area Biologist <b>Dates Contacted:</b> May 25, 2012</p>	<ul style="list-style-type: none"> <li>Fish records for watercourses where in-water work is proposed</li> </ul>	<ul style="list-style-type: none"> <li>Fish records for proposed culvert crossings received May 28<sup>th</sup>, 2012.</li> </ul>
<p><b>Source:</b> Ausable Bayfield Conservation Authority <b>Contact:</b> Geoff Cade, Supervisor of Water and Planning; Tracy Boitsen, GIS Technician <b>Dates Contacted:</b> April 19, 2011; October 24, 2011; November 24, 2011; December 15, 2011; February 22, 2012</p>	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> <li>Regulation Limit mapping;</li> <li>Aquatic habitat mapping;</li> <li>Aquatic species at risk records.</li> </ul>	<ul style="list-style-type: none"> <li>Regulation Limit;</li> <li>Records of Species at Risk.</li> <li>Drinking water source protection features (highly vulnerable aquifers and groundwater recharge areas).</li> </ul>

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<b>Source and Contact Information</b>	<b>Records Requested</b>	<b>Agency Response/Records Reviewed</b>
<p><b>Source:</b> Upper Thames River Conservation Authority  <b>Contact:</b> Karen Winfield, Land Use Regulations Officer; Phil Simm, GIS Technician  <b>Dates Contacted:</b> February 7, 2012</p>	<ul style="list-style-type: none"> <li>• General records of known natural heritage features and water bodies.</li> <li>• Regulation Limit mapping.</li> <li>• Drain Classifications.</li> <li>• Aquatic habitat mapping.</li> <li>• Aquatic species at risk records.</li> </ul>	<ul style="list-style-type: none"> <li>• Regulation Limit mapping;</li> <li>• Drinking water source protection features (highly vulnerable aquifers and groundwater recharge areas).</li> </ul>
<p><b>Source:</b> Aamjiwnaang First Nation  <b>Contact:</b> Chief Christopher Plain  <b>Dates Contacted:</b> February 21, 2012</p>	<ul style="list-style-type: none"> <li>• General records of known natural heritage features and water bodies.</li> <li>• Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>• No response received.</li> </ul>
<p><b>Source:</b> Bkejwanong Territory (Walpole Island First Nation)  <b>Contact:</b> Chief Joseph Gilbert  <b>Dates Contacted:</b> February 21, 2012</p>	<ul style="list-style-type: none"> <li>• General records of known natural heritage features and water bodies.</li> <li>• Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>• No response received.</li> </ul>
<p><b>Source:</b> Chippewas of Kettle &amp; Stony Point  <b>Contact:</b> Chief Elizabeth Cloud  <b>Dates Contacted:</b> February 21, 2012</p>	<ul style="list-style-type: none"> <li>• General records of known natural heritage features and water bodies.</li> <li>• Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>• No response received.</li> </ul>
<p><b>Source:</b> Delaware Nation, Moravian of the Thames  <b>Contact:</b> Chief Gregory Peters  <b>Dates Contacted:</b> February 21, 2012</p>	<ul style="list-style-type: none"> <li>• General records of known natural heritage features and water bodies.</li> <li>• Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>• No response received.</li> </ul>
<p><b>Source:</b> Chippewas of the Thames First Nation  <b>Contact:</b> Chief Richard Miskokomon  <b>Dates Contacted:</b> February 21, 2012</p>	<ul style="list-style-type: none"> <li>• General records of known natural heritage features and water bodies.</li> <li>• Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>• No response received.</li> </ul>

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Source and Contact Information	Records Requested	Agency Response/Records Reviewed
<b>Source:</b> Caldwell First Nation <b>Contact:</b> Chief Louise Hillier <b>Dates Contacted:</b> February 21, 2012	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> <li>Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>No response received.</li> </ul>
<b>Source:</b> Muncee-Delaware First Nation <b>Contact:</b> Dan Miskokomon, Band Manager <b>Dates Contacted:</b> February 21, 2012	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> <li>Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>No response received.</li> </ul>
<b>Source:</b> Six Nations of the Grand Territory <b>Contact:</b> Chief William Montour <b>Dates Contacted:</b> February 21, 2012	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> <li>Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>No response received.</li> </ul>
<b>Source:</b> Grand River Community Metis Council <b>Contact:</b> Cora Bunn, President <b>Dates Contacted:</b> February 21, 2012	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> <li>Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>No response received.</li> </ul>
<b>Source:</b> Windsor-Essex-Kent Metis Council <b>Contact:</b> Robert Leboeuf, President <b>Dates Contacted:</b> February 21, 2012	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> <li>Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>No response received.</li> </ul>
<b>Source:</b> Metis Nation of Ontario <b>Contact:</b> Melanie Paradis, Director <b>Dates Contacted:</b> February 21, 2012	<ul style="list-style-type: none"> <li>General records of known natural heritage features and water bodies.</li> <li>Aboriginal Traditional Knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>No response received.</li> </ul>

### 2.2.2 Agency Meetings

In-person meetings were held with a number of agencies to obtain additional information, records and to review areas of concern requiring additional study during the Site Investigation. Meetings are summarized in **Table 2.3**.

**Table 2.3 Summary of Agency Meetings**

Agency	Date	Location	Topic of Discussion
Ministry of Natural Resources, Renewable Energy Provincial Field Program Staff	August 25, 2011	Neegan Burnside Guelph Office	<ul style="list-style-type: none"> <li>Review results of MNR's records review;</li> <li>Discussion regarding significant features and species;</li> <li>Review of protocols for surveying and identifying features of significance.</li> </ul>
Ausable Bayfield Conservation Authority (ABCA)	March 1, 2012	ABCA Office	<ul style="list-style-type: none"> <li>Flood Regulation Limit</li> <li>Level II Agreement with DFO</li> <li>Proposed crossing designs and mitigation measures</li> <li>Potential for Aquatic Species at Risk</li> <li>Available information on water body types, fish habitat and species records.</li> </ul>
Perth County, West Perth, Huron East, South Huron	February 13, 2012	West Perth Office in Mitchell	<ul style="list-style-type: none"> <li>Discussion of municipal concerns;</li> <li>Request made for natural heritage feature data.</li> </ul>
Huron County, South Huron	February 27, 2012	South Huron Office in Exeter	<ul style="list-style-type: none"> <li>Discussion of municipal concerns;</li> <li>Request made for natural heritage feature data.</li> </ul>
Huron County	March 2, 2012	Huron County Office in Goderich	<ul style="list-style-type: none"> <li>Discussion of municipal concerns;</li> <li>Request made for natural heritage feature data.</li> </ul>

## 2.3 Records Review Results

Based on the review of existing information, agency records and in-person meetings with agency staff, a number of water bodies are present, or may be present within 120 m of the Project location. A detailed description of these features is presented in the following sections. Data provided by ABCA and MNR (fish collection records) is summarized in **Appendix C**. Features and water body locations are shown on **Figures 2, 2a through 2h, Appendix A**.

### 2.3.1 Watershed

The Project Study Area is located entirely within Ausable Bayfield Conservation Authority ("ABCA") governed watersheds. The Turbine Study Area is within a

subwatershed known as the “South Gullies”. This area is comprised of numerous small watercourses and drains that outlet directly to Lake Huron.

Based on a review of the ABCA Fish Habitat Management Plan the “Gullies” is a sub-basin comprised of numerous tributary systems flowing west to Lake Huron. A gully is defined as a water erosion feature, having a head and a mouth and constant or intermittent discharge. The sub-basin drains over the St. Joseph till with agriculture being the dominant land use. In the southern gullies basin, soils are dominated by silty-clay tills which experience periods of low base flows. Fish communities are typically limited in these intermittent streams (ABCA, April 2001).

The Transmission Line Study Area begins within the South Gullies area and extends to the east where it traverses the Black Creek subwatershed. This creek is a tributary of the Ausable River system which flows southward and to the west, flowing into Lake Huron at Port Franks, south of the Study Area.

At Road 183, the transmission line crosses into the Bannockburn subwatershed in the vicinity of the Shephard Creek Drain. The drain flows into the Bannockburn River and subsequently to the Bayfield River and Lake Huron at the Town of Bayfield, north of the Study Area.

### **2.3.2 Lakes and Lake Trout Lakes**

The Lake Huron shoreline is approximately 150 m from the Project Location at the nearest point assuming the Bluewater Highway as a temporary access road for construction. All turbines are greater than 300 m from Lake Huron although some access roads start from the Bluewater Highway and travel east. Lake Huron is not considered a lake trout lake that is at or above development capacity. The project thus meets the required setback from lakes.

No other lakes or lake trout lakes were identified within 300 m of the Project Location.

### **2.3.3 Permanent and Intermittent Watercourses**

There are 64 permanent and intermittent watercourses within 120 m of the Project Location. Watercourses within the Turbine and Transmission Line Study Area are generally small and characteristic of drains in highly agricultural landscapes. Specifically, most have been straightened and deepened to some extent. Those identified as municipal drains are typically cleaned out regularly depending on the drainage report and maintenance requirements. In addition, many agricultural fields in the area appear to have been tiled for drainage with tile drains flowing into the nearest watercourse or municipal drain.

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Watercourses listed below have been separated into the Turbine Study Area (includes Collector Line crossings) and the Transmission Line Study Area. Additional information on the watercourses within the Turbine and Transmission Line Study Areas is also provided in Section 3.0.

A summary of the watercourses and municipal drains within 120 m of the Project Location is provided in **Table 2.4**. The location of watercourses is provided on **Figures 2a through 2h, Appendix A**.

**Table 2.4 Permanent and Intermittent Watercourses within 120 m of the Project Location**

Watercourse Name	Drain Class	Thermal Regime	Fish Community
<b>Turbine Study Area</b>			
"G"	-	N/A	N/A
Adams Drain	C	Warm	Bait Fish
Adams Drain	F	N/A	N/A
Charette Drain	F	N/A	N/A
Charette Drain Trib.	F	N/A	N/A
Datars Millers Drain	C	Warm	Bait Fish
Drysdale Drain	F	N/A	N/A
Fahner Drain	*closed drain	N/A	N/A
Fourcier Drain	F	N/A	N/A
from Pepper Drain	F	N/A	N/A
Geiger Drain	C	Warm	Bait Fish
Glazier Drain	F	N/A	N/A
Kading Drain	C	Warm	Bait Fish
Maple Grove Branch	C	Warm	Bait Fish
Masse Drain	C	Warm	Bait Fish
Miller Drain	-	N/A	N/A
Pepper Drain	F	N/A	N/A
Pepper Drain Branch A	F	N/A	N/A
Pergel Drain	F	N/A	N/A
Pergel Drain Branch b	F	N/A	N/A
Ratz Drain Ext	C	Warm	Bait Fish
Ratz Municipal Drain 1999	C	Warm	Bait Fish
St Joseph Airport South Drain	F	N/A	N/A
Truemner Drain	C	Warm	Bait Fish
Turnbull Drain	F	N/A	N/A

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<b>Watercourse Name</b>	<b>Drain Class</b>	<b>Thermal Regime</b>	<b>Fish Community</b>
Unknow Hay F	C	Warm	Bait Fish
Unknown Hay A	C	Warm	Bait Fish
Unknown Hay A	F	N/A	N/A
Unknown Hay B	F	N/A	N/A
Unknown Hay C	F	N/A	N/A
Unknown Hay D	F	N/A	N/A
Unknown Hay D Trib	F	N/A	N/A
Unknown Hay E	F	N/A	N/A
Unknown Hay G	F	N/A	N/A
Unknown Hay H	A	Cold	Bait Fish
Unknown Stan L	C	Warm	Bait Fish
Unknown Stan M	F	N/A	N/A
Webb Drain	C	Warm	Bait Fish
<b>Transmission Line Study Area</b>			
Big Drainage Works	-	N/A	N/A
Black Creek Drain Branch West	C	Warm	Bait Fish
Black Creek Drain, aka Black Creek	E	Warm	Top Predators
Branch "A"	-	N/A	N/A
Branch "F"	-	N/A	N/A
Branderhorst Drainage Works	-	N/A	N/A
Brock Drainage Works	-	N/A	N/A
Geary Creek Drainage Works	A	Cold	Not Known
Geiger Drain, aka Black Creek	D	Cold	Trout/Salmon
Gieger Drainage Works	D	Cold	Trout/Salmon
Glenn Drain	A	Cold	Not Known
Glen-Somerville Drain	F	N/A	N/A
Hoggarth Drainage Works	C	Warm	Bait Fish
Kading Drain	C	Warm	Bait Fish
McDonald Drainage Works	F	N/A	N/A
Mitchell Drainage Works	A	Cold	Not Known
Norris Municipal Drain 2002	-	N/A	N/A
Rowcliffe Drain	-	N/A	N/A
Rowcliffe-Geiger Drain	-	N/A	N/A
Shephard Creek Drainage Works	A	Cold	Not Known
Stephan Drain	C	Warm	Bait Fish
Truemner Drain	C	Warm	Bait Fish
Tyndall Drainage Works	C	Warm	Bait Fish



Watercourse Name	Drain Class	Thermal Regime	Fish Community
Unnamed	-	N/A	N/A
Zurich Drain South, aka St Joseph	F	N/A	N/A
Zurich Drain Trib. B.	F	N/A	N/A

### 2.3.4 Floodplain

The ABCA regulates land within the floodplain of water bodies and wetlands in its jurisdiction. A total of six watercourse crossings will be within the flood regulated area and therefore require a permit under the ABCA's Generic Flood Regulation (*Ontario Regulation 174/06*). Components of the project (i.e., access roads) may also fall within the flood regulated limit although are proposed to be designed in a way that does not effect the watercourses ability to convey flow. ABCA Regulation Limit mapping is provided on **Figures 2a through 2h, Appendix A**.

### 2.3.5 Water Quality

According to ABCA Watershed Report Cards (2007), water quality indicators generally show that water quality in the South Gullies, Bannockburn and Black Creek subwatersheds "need to be enhanced", each having an overall "C" grade. Water quality conditions are summarized in **Table 2.5**.

**Table 2.5 Water Quality**

Water Quality Indicator	Total Phosphorus	E. coli	Benthic Invertebrates	Overall Grade
Water Quality Target	0.03 mg/L	100 cfu ("colony forming units"/100 mL	Rated according to the Family Biotic Index which ranges from 1 (healthy) to 10 (degraded)	Graded A (Excellent) to F (Degraded and needs considerable improvement)
South Gullies Actual Findings	0.07 mg/L	236 cfu/100 mL	5.2	C
Black Creek Actual Findings	0.09 mg/L	933 cfu/100 mL	5.9	C
Bannockburn Actual Findings	0.06 mg/L	355 cfu/100 mL	5.1	C

### 2.3.6 Fish and Fish Habitat

Within the Turbine Study Area, fish habitat is primarily limited to small drains, most of which are intermittent or are providing habitat for bait fish only, as noted in **Table 2.4**. Only the “Unknown Hay H Drain” provides cold water habitat conditions within the Turbine Study Area with a fish community consisting of white sucker (*Catostomus commersoni*), creek chub (*Semotilus atromaculatus*), and blacknose dace (*Rhinichthys atratulus*) based on ABCA 2011 fish collection data. No in-water works are proposed for the Unknown Hay H drain although an access road to the south west of Turnbull Road is required for Turbine T-40 although no crossing is required.

Within the Transmission Line Study Area, there are a variety of watercourse types, providing permanent, intermittent, warm and cold water habitats. The Black Creek and its tributaries, including the Geiger Drain provide the highest quality fish habitat, including habitat for top predators and cold water conditions suitable for salmonids. The Shephard Creek Drainage Works, near Chiselhurst and Mitchell Drainage Works, west of McTaggart Line and Rogerville Road, also provides coldwater habitat conditions.

All transmission lines are proposed to be overhead, no poles will be located within the watercourses. Any underground collection and/or transmission lines will be installed by punch and bore or directional drilling (no-in water works required).

No major rivers or lakes are found within 120 m of the Project Location.

#### 2.3.6.1 MNR Fish Collection Records for Permanent Crossings

Fish records were obtained from the MNR (Guelph District, Clinton Office) for water bodies that require permanent crossings (culverts) and are presented in **Table 2.6** below:

**Table 2.6 MNR Fish Collection Records**

Water Body	Crossing ID	Fish Species
Hay G	CR-013	No Data
Kading Drain	CR-018	Brook stickleback, bluntnose minnow, white sucker, creek chub, rainbow darter, northern redbelly dace, blacknose dace, Johnny darter, common shiner, brook trout
Hay E	CR-023	No Data

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Water Body	Crossing ID	Fish Species
Hay B (north and south crossings)	CR-031 and CR-032	Northern redbelly dace, blacknose dace, creek chub
Saint Joseph Drain South	CR-041	No Data

Based on the species listed above, brook trout (*Salvelinus fontinalis*) are the most sensitive and have been captured by MNR in the Kading drain. Detailed information was not provided by MNR and the capture of brook trout may be an old record. All other species listed above are regionally common and are considered to be low sensitivity. A copy of the correspondence with MNR is provided in **Appendix B**.

### 2.3.6.2 ABCA Fish Collection Information

As part of the Records Review, Burnside contacted ABCA and requested information on historical fish collection records and any other information pertaining to fish and fish habitat. ABCA provided fish collection information for the areas within the Project Location including the proposed transmission line along Rogerville Road. Only one station was provided for the Unknown Hay H Drain on Turnbull Road and six stations along the proposed transmission line.

Fish records obtained from the ABCA for the following water bodies that require overhead or underground transmission line crossings are presented in **Table 2.7** below.

**Table 2.7 ABCA Fish Collection Information**

Water Body (ABCA Station Number)	Project Location	Collection Date (mm/dd/yy)	Fish Species
Unknown Hay H Drain (GUL-19)	Collector Line along Turnbull Road	6/14/2011	White sucker, creek chub, blacknose dace

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Water Body (ABCA Station Number)	Project Location	Collection Date (mm/dd/yy)	Fish Species
Black Creek Drain – aka Black Creek (775-AB)	Transmission Line along Rogerville Road	8/29/02	Common carp, blackside darter, bluntnose minnow, fathead minnow, rock bass, white sucker, brook stickleback, northern redbelly dace, johnny darter, common shiner, creek chub, greenside darter, blacknose dace
Black Creek (HABLA1)	Transmission Line along Rogerville Road	6/18/10	Observation: Brook trout, rainbow trout
Geiger Drain (DD04)	Transmission Line along Rogerville Road	6/17/2012	fathead minnow, rainbow trout, creek chub, bluntnose minnow, brook trout, johnny darter, blacknose dace, white sucker, brook stickleback
Mitchell Drainage Works (387-AB and 498-AB)	Transmission Line along Rogerville Road	6/1/2003	Observation: Brook trout
Shepard Creek Drainage Works	Transmission Line along Rogerville Road	10/31/2001	blacknose dace, bluntnose minnow, brook stickleback, johnny darter

Of the species listed, brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*) and greenside darter (*Etheostoma blennioides*) are the most sensitive and have been captured in the watercourses listed above. All other species listed by ABCA are regionally common and are considered to be low sensitivity. No fish collection information was available for the watercourses that will require permanent culverts within the Turbine Study area.

A copy of the fish collection Information provided by ABCA is found in **Appendix C**.

### 2.3.7 Habitat of Endangered and Threatened Species

Aquatic species designated as Endangered and Threatened under the *Ontario Endangered Species Act* are not present in the Study Area. See MNR meeting minutes on April 10, 2012 in Appendix B.

### 2.3.8 Groundwater Recharge and Discharge Areas/Seepage Areas

Information for Drinking and Source Water Protection in the ABCA watershed was limited to recharge area mapping within the project location (see **Appendix E**). Source protection zones were also illustrated for the protection of drinking water supply areas. Mapping showing areas of discharge was not available from ABCA. One area was noted for seepage by NSE during their ELC fieldwork and was located east of a pond on the Charette Drain tributary. This area is up-gradient of any proposed works. No discharge or seepage areas were noted by Burnside during the site investigation other than those areas associated with tile drain outlets.

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### 3.0 Site Investigation

The Records Review was conducted in accordance with Section 31 of O.Reg. 359/09 and the Technical Guide to Renewable Energy Approvals (MOE, 2012).

The purpose of the Site Investigation is to determine:

- Whether the results of the Records Review are correct or require correction;
- Whether any additional water bodies exist, other than those identified in the Records Review; the boundaries, located within 120 m of the project location, of any water body that was identified in the records review or site investigation; and,
- The distance from the project location to the boundaries determined above.

#### 3.1 Project Site Plan

A Project Site Plan was issued on April 18, 2012, identifying the location of turbines, access roads, construction areas, underground collector lines, a transformer station and overhead transmission line. As a result, the locations of new culverts, below-ground crossings of electrical lines and crossing of over-head transmission lines were identified.

The Site Plan is shown on **Figure 2a through 2h** in **Appendix A**.

**Table 3.1** below indicates the type of watercourse crossings proposed.

#### 3.2 Scope of the Investigation

The scope of the Site Investigation was based on the level of impact predicted. As such, the Site Investigation was focused primarily on water bodies directly affected by in-water work where new culverts are required. The investigation included observations and measurements at each proposed crossing, as described in **Section 3.3** below.

The remaining watercourses were studied using an Alternative Investigation that involved the use of aerial photography, a windshield survey and general observations from the nearest road crossing to confirm the findings of the Records Review.

**Table 3.1 Type of Water Course Crossings Proposed**

Crossing ID	Watercourse Name	In-water Work Proposed	Crossing Methodology	Watercourse Type	Drain Class	Thermal Regime	Fish Community	Easting	Northing
CR-013	Unknown Hay G	Y	Install New Culvert	Natural Watercourse	F	N/A	N/A	442208	4799740
CR-018	Kading Drain	Y	Install New Culvert	Municipal Drain	C	Warm	Bait Fish	442525	4800257
CR-023	Unknown Hay E	Y	Install New Culvert	Natural Watercourse	F	N/A	N/A	443145	4802294
CR-031	Unknown Hay B (north)	Y	Install New Culvert	Natural Watercourse	F	N/A	N/A	443948	4809699
CR-032	Unknown Hay B (south)	Y	Install New Culvert	Natural Watercourse	F	N/A	N/A	443982	4809441
CR-041	St Joseph Airport South Drain	Y	Replace Existing Culvert	Municipal Drain	F	N/A	N/A	444196	4807925

### 3.3 Methodology

The locations where new culverts are proposed were visited on December 13 and 14, 2011, March 22, and June 27, 2012. Information was collected in accordance with the MTO/DFO/MNR Protocol (MTO 2006). This protocol involves collecting detailed information about the watercourse including location, channel dimensions, morphology, fish observations, riparian habitat and fish habitat mapping. This protocol is accepted for all watercourse crossings and is recognized by Conservation Authorities (CAs), Ministry of Natural Resources (MNR) and Department of Fisheries and Oceans (DFO).

The MTO Protocol was used since it is the most accepted method of assessment for culvert crossings and provides a thorough documentation of existing aquatic conditions. Habitat mapping was also conducted at the proposed crossing locations along with visual observations of aquatic life (fish, crayfish, macrophytes, etc.). Fish collections were not part of the Site Investigation since all proposed culvert crossings are considered direct fish habitat. Weather conditions, survey times and locations are provided in the MTO Watercourse Field Record Form in **Appendix F**.

A search for seepage areas was conducted as part of the Natural Heritage Assessment during Ecological Land Classification mapping. Seepage areas are locations where groundwater comes to the surface and are typically present at the base of a slope. Searches focused on the presence of indicators such as iron staining and vegetation types including jewelweed, skunk cabbage, and watercress.

A description of the existing conditions along with completed MTO/DFO/MNR protocol forms are provided in **Appendix F**.

#### 3.3.1 Qualifications

Burnsides' Aquatic Resources Specialist (Christopher Pfohl, C.E.T.) conducted all site investigations and records review for the water bodies within the Project Location. Mr. Pfohl's CV is provided in **Appendix G**.

### 3.4 Site Investigation Results

#### 3.4.1 Changes to the Records Review

Based on the Site Investigation, no changes were made to the Records Review. No additional water bodies were identified within 120 m of the Project and the drain classifications provided appeared to be accurate.



### **3.4.2 Watercourses with Proposed New Culverts**

Six watercourses will be crossed by new access roads requiring the installation of new culverts. Each watercourse is described below and summarized in **Table 3.2**.

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**Table 3.2 Summary of Watercourses at Proposed Culvert Locations**

Crossing ID	Watercourse Name	Easting	Northing	Watercourse Type	Drain Class	Thermal Regime	Fish Community	Mean Wetted Width	Mean Wetted Depth	Substrate	Riparian Vegetation
CR-013	Unknown Hay G	442208	4799740	Natural Watercourse	F	N/A	N/A	0.20m	0.30m	SA	Grasses and shrubs, limited width
CR-018	Kading Drain	442525	4800257	Municipal Drain	C	Warm	Bait Fish	1.60m	0.30m	SA/GR/Co	Grasses and shrubs, limited width
CR-023	Unknown Hay E	443145	4802294	Natural Watercourse	F	N/A	N/A	0.50m	0.15m	SA	Grasses and shrubs, limited width
CR-031	Unknown Hay B (north)	443948	4809699	Natural Watercourse	F	N/A	N/A	1.30m	0.15m	SA/GR/Co	Grasses and shrubs, limited width, some mature trees
CR-032	Unknown Hay B (south)	443982	4809441	Natural Watercourse	F	N/A	N/A	1.30m	0.27m	SA/GR/Co	Grasses and shrubs, limited width
CR-041	St Joseph Airport South Drain	444196	4807925	Municipal Drain	F	N/A	N/A	0.80m	0.20m	SA/GR	Grasses and shrubs, limited width

Based on the six watercourses proposed for culvert crossings, two are municipal drains and four are natural watercourses based on the Records Review. A description of each watercourse or drain based on site conditions is provided below.

### **Unknown Hay G**

This drain will need to be crossed by an access road for construction and future maintenance of T-37 and T-38. The Unknown Hay G drain originates from closed tile drains approximately 240 m upstream of the proposed culvert crossing (CR-013). The drain is an open channel from the tile drain outlets downstream to Lake Huron and flows east to west under the Bluewater Highway 21. It is classified as an F Drain and receives intermittent flows depending on seasonal conditions and precipitation. At the time of the site visit this drain was dry with no visible standing water. The channel was U-shaped, typical of an agricultural drain with steep banks. Underground tile outlets discharge to the drain upstream of the proposed crossing location. Overhanging vegetation was present and comprised of grasses along a limited riparian width. Numerous seasonal and impassable barriers were identified due to low water levels. Long enclosed sections of watercourse were also observed at Highway 21.

### **Kading Drain**

The Kading Drain will need to be crossed to access and construct turbines T-34, 35, 36, 37 and 38. This is a municipal drain that flows east to west, under the Bluewater Highway and outlets to Lake Huron. The Kading Drain is classified as a C Drain providing fish habitat for primarily warmwater baitfish. It is a permanent watercourse with active erosion observed along both banks within the proposed crossing location (CR-018). Channel morphology is trapezoidal with a linear alignment and a low flow channel meandering within the base. A limited riparian width exists within the crossing location consisting primarily of grasses and shrubs. The upstream reaches have a mature riparian corridor that provides good habitat within the adjacent woodlot to the east. Water clarity was good during the survey and numerous (>100) cyprinids were observed. Substrate consisted of sand and gravel with sporadic cobble in riffle sections. Stream morphology was comprised of primarily runs with a limited number of small pools and short riffle sections. Large woody debris was associated with erosion and mature deciduous riparian areas. A farm access culvert was observed upstream of the proposed crossing location consisting of a large corrugated steel pipe (CSP).

### **Unknown Hay E**

This drain will need to be crossed (CR-023) by an access road for construction and future maintenance of T-27. The Unknown Hay E drain flows east to west and outlets to Lake Huron. It is classified as an F Drain and provides seasonal habitat for small cyprinids and receives intermittent flows depending on seasonal conditions and weather. At the time of the site visit this drain did have flow with good clarity. The channel was U-shaped, typical of an agricultural drain with steep banks. Two underground tile outlets

discharge to the drain upstream of the proposed crossing location. Overhanging vegetation was present and comprised of grasses along a limited riparian width. Fish (cyprinids) were observed in March and April 2012.

#### **Unknown Hay B (North)**

The north branch of the Hay B Drain will need to be crossed (CR-031) to access and construct turbine T-05. The drain flows east to west to the Bluewater Highway and runs south along the east side of the highway and flows into the south branch of the Hay B Drain. The mainstem of the Hay B Drain flows west under the Bluewater Highway and into Lake Huron. The Hay B Drain is classified as an F Drain providing seasonal intermittent flows. This drain may provide seasonal fish habitat depending on downstream barriers. Channel morphology is trapezoidal with a linear alignment and a low flow channel meandering within the base. A limited riparian width exists with primarily grasses lining the banks and sporadic mature deciduous trees that provide shade. Water clarity was good during the survey although no fish were observed. A culvert was observed downstream of the proposed crossing location although it is on a non-participating landowner's property.

#### **Unknown Hay B (South)**

The south branch of the Hay B Drain will need to be crossed (CR-032) to access and construct turbine T-06. The mainstem of the Hay B Drain flows west under the Bluewater Highway and into Lake Huron. The Hay B Drain is classified as an F Drain providing seasonal intermittent flows. This drain may provide seasonal fish habitat depending on downstream barriers. Channel morphology is trapezoidal with a linear alignment and a low flow channel meandering within the base. Some large woody debris was observed upstream of the proposed crossing location along with a tile outlet entering from the south. Moderate erosion was noted on the left bank looking downstream. A limited riparian width exists with primarily grasses lining the banks and sporadic mature deciduous trees that provide shade. Water clarity was good during the survey although no fish were observed in December 2011.

#### **Saint Joseph Airport South Drain**

The Saint Joseph Airport South Drain (SJASD) will need to be crossed to access and construct turbines T-11, 12, and 13. This is a municipal drain that flows east to west, under the Bluewater Highway and outlets to Lake Huron. The SJASD is classified as an F Drain providing seasonal fish habitat for primarily warmwater baitfish. It is classified as an intermittent watercourse with minor erosion observed along left bank looking downstream. There is an existing culvert/farm equipment crossing at the proposed crossing location (CR-041). Channel morphology is trapezoidal with a linear alignment and a low flow channel meandering within the base. A plunge pool exists at the outlet of the culvert with primarily runs upstream and short riffle sections downstream. A limited riparian width exists within the crossing location consisting primarily of grasses and

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some mature trees and shrubs. Substrate consisted of sand and gravel with sporadic cobble and boulder in downstream sections. Large woody debris was associated with erosion and mature deciduous riparian areas.

#### 3.4.2.1 Collector Line Crossings

Watercourses within the Project Location that require collector line crossings are not discussed in detail based on the proposed crossing methodology. Collector lines will be placed in the road Right of Way (ROW) within the road shoulder or, if required, a punch and bore method, directional drill, dry open-cut crossing or/and isolated open-cut crossing of watercourses will be determined based on site conditions.

The watercourses that will be crossed by the collector lines are listed in **Table 3.3** along with watercourse/drain classifications by ABCA. Collector line watercourse crossing locations are shown on **Figures 2, 2a through 2h, Appendix A.**

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**Table 3.3 Summary of Watercourses at Collector Line Crossings**

Crossing ID	Watercourse Name	Drain Class	In-Water Work Proposed	Crossing Methodology	Approvals	Easting	Northing
CR-002	Adams Drain	C	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	441556	4796626
CR-003	Turnbull Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	441632	4797658
CR-008	Webb Drain	C	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	441740	4796929
CR-010	Unknown Hay H	A	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	441857	4798894
CR-014	Turnbull Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	442262	4797737
CR-015	Unknown Hay E	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	442337	4802138
CR-024	Unknown Hay A	C	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	443206	4810475
CR-025	Drysdale Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	443279	4811035
CR-026	Charette Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	443394	4804267
CR-027	Adams Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	443623	4800400
CR-030	Pepper Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	443856	4802884
CR-034	Datars Millers Drain	C	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444017	4801745
CR-037	"G"	-	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444084	4801412
CR-039	Miller Drain	-	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444129	4800952
CR-040	Unknow Hay F	C	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444140	4800871
CR-042	Adams Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444223	4800280
CR-043	Unknown Stan M	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444253	4811191
CR-045	Unknown Stan M	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444773	4811070
CR-046	Drysdale Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444817	4810772
CR-047	Unknown Hay A	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444929	4810017
CR-049	Unknown Hay B	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444999	4809540
CR-050	Unknown Hay B	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	445043	4809244
CR-051	Unknown Hay C	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	445125	4808691
CR-053	Pergel Drain Branch b	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	445342	4807233
CR-054	Pergel Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	445394	4806868
CR-055	Fourcier Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	445459	4806406
CR-056	Geiger Drain	C	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	445505	4806086
CR-057	Truemner Drain	C	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	445585	4805517
CR-059	Charette Drain Trib.	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	445710	4804628
CR-060	Charette Drain	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	445806	4803950
CR-061	Unknown Hay D	F	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	445847	4803522
CR-204	Kading Drain	C	N	Punch & Bore or Directional Drill	DFO (Op. Statement)	444330	4799512

### 3.4.2.2 Transmission Line Crossings

Watercourses within the Project Location that require overhead transmission line crossings are not discussed in detail based on the proposed crossing methodology (overhead). Transmission lines will be constructed within the road ROW (buried in roadside shoulder) or along roadside ditches utilizing existing hydro ROW and infrastructure. The main concern or potential impacts with overhead line construction is associated with riparian vegetation removal next to watercourses within an overhead corridor. Hydro pole bases would be constructed outside of the flood regulated areas where possible.

The watercourses that will be crossed by the transmission lines are listed in **Table 3.4** along with watercourse/drain classifications by ABCA. Collector line watercourse crossing locations are shown on **Figures 2, 2a through 2h, Appendix A.**

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**Table 3.4 Summary of Watercourses at Transmission Line Crossings**

Crossing ID	Drain Name	Drain Class	In-Water Work Proposed	Crossing Methodology	Approvals	Easting	Northing
CR-062	Truemner Drain	C	N	Overhead Line Construction	DFO (Op. Statement)	446724	4805341
CR-063	Truemner Drain	C	N	Overhead Line Construction	DFO (Op. Statement)	447664	4805426
CR-100	Truemner Drain	C	N	Overhead Line Construction	DFO (Op. Statement)	448727	4805624
CR-101	Zurich Drain South, aka St Joseph	F	N	Overhead Line Construction	DFO (Op. Statement)	450280	4805827
CR-102	Black Creek Drain Branch West	C	N	Overhead Line Construction	DFO (Op. Statement)	452247	4806097
CR-103	Stephan Drain	C	N	Overhead Line Construction	DFO (Op. Statement)	453100	4806219
CR-104	Black Creek Drain, aka Black Creek	E	N	Overhead Line Construction	DFO (Op. Statement)	455354	4806535
CR-105	Branch "F"	-	N	Overhead Line Construction	DFO (Op. Statement)	457904	4806864
CR-106	Rowcliffe Drain	-	N	Overhead Line Construction	DFO (Op. Statement)	460000	4807167
CR-107	Geiger Drain, aka Black Creek	D	N	Overhead Line Construction	DFO (Op. Statement)	460380	4807223
CR-108	Gieger Drainage Works	D	N	Overhead Line Construction	DFO (Op. Statement)	462196	4807491
CR-109	Mitchell Drainage Works	A	N	Overhead Line Construction	DFO (Op. Statement)	462795	4807579
CR-110	Mitchell Drainage Works	A	N	Overhead Line Construction	DFO (Op. Statement)	463164	4807633
CR-111	Mitchell Drainage Works	A	N	Overhead Line Construction	DFO (Op. Statement)	463454	4807676
CR-112	Mitchell Drainage Works	A	N	Overhead Line Construction	DFO (Op. Statement)	464042	4807877
CR-113	Brock Drainage Works	-	N	Overhead Line Construction	DFO (Op. Statement)	464296	4808271
CR-114	Brock Drainage Works	-	N	Overhead Line Construction	DFO (Op. Statement)	464574	4808696
CR-115	Brock Drainage Works	-	N	Overhead Line Construction	DFO (Op. Statement)	464741	4808954
CR-116	Shephard Creek Drainage Works	A	N	Overhead Line Construction	DFO (Op. Statement)	465144	4809596
CR-117	Shephard Creek Drainage Works	A	N	Overhead Line Construction	DFO (Op. Statement)	465439	4810102
CR-118	Hoggarth Drainage Works	C	N	Overhead Line Construction	DFO (Op. Statement)	465615	4810380
CR-119	McDonald Drainage Works	F	N	Overhead Line Construction	DFO (Op. Statement)	466513	4811771
CR-120	Norris Municipal Drain 2002	-	N	Overhead Line Construction	DFO (Op. Statement)	466754	4812156
CR-121	Geary Creek Drainage Works	A	N	Overhead Line Construction	DFO (Op. Statement)	467268	4812979
CR-122	Big Drainage Works	-	N	Overhead Line Construction	DFO (Op. Statement)	467870	4813992
CR-123	Unnamed	-	N	Overhead Line Construction	DFO (Op. Statement)	468667	4815281
CR-124	Unnamed	-	N	Overhead Line Construction	DFO (Op. Statement)	468934	4815715
CR-125	Unnamed	-	N	Overhead Line Construction	DFO (Op. Statement)	469366	4816381
CR-126	Tyndall Drainage Works	C	N	Overhead Line Construction	DFO (Op. Statement)	469680	4816890



### 3.4.3 Remaining Watercourses within 120 m of the Project Location

Based on the Records Review, numerous watercourses exist within 120 m of the project location. Correspondence with the MOE REA Team (Scott Abernethy, personal communication) to confirm the appropriate level of detail required for the Water Assessment and Water Bodies Report including water bodies/watercourses found within 120 m of the project location that are not proposed to be impacted. Burnside provided an approach to MOE regarding confirmation of the water bodies found within the 120 m boundary to document the location (based on the records review), type and sensitivity. MOE confirmed in an e-mail (dated May 24, 2012) that this would be a sufficient level of detail for water bodies that would not be impacted and/or altered as a result of the project (see **Appendix B** for correspondence with MOE). Any water bodies that require alteration (i.e., culvert crossings) have been described above.

Water bodies listed in the records review have been identified and confirmed using the 2010 Ortho Imagery (SWOOP 2010), field observations or by roadside access. Some of the water bodies that exist within the 120 m boundary are also located on non-participating land owner properties and are not directly accessible due to private property.

During the layout phase of the project, a number of watercourses were observed that will not require crossings for access roads although detailed information was collected. This information is provided below for some of the watercourses within the 120 m boundary where access to private property was available.

#### 3.4.3.1 Turbine Study Area

##### **Stan L Drain**

The Stan L Drain flows south east to northwest and outlets to Lake Huron. A limited section of this drain will be within 120 m of the access road for the T-01 turbine. Based on the mapping, the Stan L drain is considered to be a C Drain and provides permanent warm water habitat for baitfish.

##### **Stan M Drain**

This drain may need to be crossed by an access road for construction and future maintenance of two turbines (T-01 and T-02). The Stan M drain flows east to west and outlets to Lake Huron. It is classified as an F Drain and may provide seasonal habitat for fish and provide intermittent flows depending on seasonal conditions and weather. At the time of the site visit this drain did have flow although clarity was low due to previous rain events. The channel was U-shaped, typical of an agricultural drain with steep banks. Overhanging vegetation was present and comprised of grasses along a limited

riparian width. Macrophytes consist of small patches of watercress. No fish were observed due to water clarity and depth.

### **Hay C Drain**

The Hay C Drain is located south of Danceland Road and flows east to west towards Lake Huron. It is classified as an F Drain that is intermittent with seasonal flows. Like other F Drains it may provide seasonal habitat for cyprinids depending on the potential for downstream barriers. Channel morphology is trapezoidal with a linear alignment and a low flow channel meandering within the base. A macrophyte bed was observed at the crossing location and appeared to be a *veronica spp.* or commonly called Speedwell. Veronica is an aquatic macrophyte that typically grows along edges of shallow sandy watercourses. Substrate consisted of sand and gravel with sporadic cobble.

Some large woody debris was observed upstream of the proposed crossing location along with a tile outlet entering from the south. Some erosion was noted on the left bank looking downstream. A limited riparian width exists with primarily grasses lining the banks and sporadic mature deciduous trees that provide shade. Water clarity was good during the survey although no fish were observed.

### **Fahner Drain**

Based on the records review and 2010 Ortho imagery (SWOOP 2010) received from MNR this drain is classified as a closed drain therefore does not provide direct fish habitat. The closed drain provides a source of water to the open portion of the Fahner drain approximately 770 m downstream where it has been daylighted and is an open channel. Based on the definition provided in the Regulation this is not considered to be a water body and measures to protect the closed portion of the drain will be incorporated into the design.

### **Maple Grove B**

The Maple Grove B drain flows east to west and outlets to Lake Huron. Proposed turbines T-45 and T-46 encroach on this drain within the 120 m project location although no project components will cross this drain. It is classified as a C Drain and provides permanent fish habitat for warm water baitfish species. At the time of the site visit this drain did have moderate flow with good clarity. The channel was U-shaped, typical of an agricultural drain with steep banks. Morphology was similar to most drains observed within the region consisting of short riffles and long flats. Overhanging vegetation was present and comprised of grasses and mature deciduous trees along a limited riparian width. Substrate consisted of sand with some gravelly sections and macrophytes were not observed. Fish were observed (white sucker and cyprinids) in riffle sections and appeared to be remnants of previous spawning activity.

### **Ratz Drain**

The Ratz Drain flows east to west and outlets to Lake Huron. Proposed turbine T-48 encroaches on this drain within the 120 m project location, although no project components will cross this drain. It is classified as a C Drain and provides permanent fish habitat for warm water baitfish species. At the time of the site visit this drain did have moderate flow with good clarity. The channel was U-shaped, typical of an agricultural drain with steep banks. Morphology consisted of an irregular meandering channel, steep banks with short riffles, long flats and sporadic pools. Moderate erosion was observed on both banks and may be a result of tile drain outlets increasing flows during precipitation periods. Overhanging vegetation was present and comprised of grasses and mature deciduous trees along a riparian area that varied in width. Substrate consisted of sand with some gravelly sections and macrophytes were not observed. Fish were observed (creek chub and cyprinids) in riffle sections and appeared to be remnants of previous spawning activity.

#### **3.4.4 Seepage Areas**

No seepage areas were identified during the Site Investigation. Seepage areas are typically present at the base or along a slope and are characterized by vegetation such as jewelweed, skunk cabbage, and watercress. Iron staining of the soils around seeps is often an indicator of the presence of groundwater.

According to base mapping for the area, watercourses generally originate to the east of the turbine and road access areas, and not within any of the woodlands immediately adjacent to the project. No evidence of seeps or springs, such as the indicators noted above, was observed during field investigations in areas that are proposed for access road crossings.

Groundwater discharge in the base of the drains found within the project location may occur due to the invert of the constructed drain or tile influence within the local area. Seeps or springs were not observed as seen in typical discharge areas based on the location of the study area and the flat topography associated with this region.

A seepage area identified during the Ecological Land Classification (ELC) study by North South Environmental (NSE) was located east of the Charette Drain crossing (underground crossing of a collector line). Based on a review of NSE field notes, seepage was observed approximately 350 m east and up-gradient of the proposed underground collector line crossing (CR-026).

A review of the Drinking Water Source Protection mapping for groundwater recharge areas in the ABCA watershed illustrated that major recharge zones are southeast or east

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of the study area and outside of the project locations 120 m boundary. A copy of the Source Protection mapping for the ABCA watershed is provided in **Appendix E**.

As such, it was concluded that seepage areas are not present within the 120 m project location and proposed watercourse crossings.

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## 4.0 Water Body Report

Based on the Technical Guide to Renewable Energy Approvals, a water body report must be completed if the construction, installation or expansion of a renewable energy facility is within the setback distances set out in O.Reg. 359/09 of any water body outlined in the Water Assessment Report. If water bodies are confirmed to be in the project location that are within the setbacks outlined in the Technical Guide, an assessment of potential negative environmental effects related to the project (construction, operation and decommissioning) on water bodies and the 30 m of land surrounding the feature. Once the potential for negative effects are determined, mitigation measures to avoid negative effects or impacts must be developed along with an Environmental Effects Monitoring Plan to measure success.

### 4.1 Potential Negative Environmental Effects and Mitigation Measures

All watercourses within the project location are considered low sensitivity and are comprised of mainly agricultural drains that are intermittent with regionally common fish species. Mitigation measures have been developed to avoid potential impacts to fish and fish habitat during construction of access roads and culverts. Effects and mitigation measures are addressed below and summarised in Table 4.1. Monitoring measures are also summarised in Table 4.1.

Site specific impacts have been determined based on proposed construction methods and proximity to the water body and the sensitivity of that water body. The main potential for impact is at access road culverts during construction and are the most likely to cause negative environmental effects. A total of six watercourse crossings are required for access roads and turbine construction. Information regarding the existing conditions of each water body has been discussed in detail in **Section 3.4.2 and Table 3.2** above.

The federal Fisheries Act governs the protection of fish and aquatic habitat, including the harmful alteration, disruption or destruction (HADD) of fish habitat (Section 35), and the deposition of deleterious substances into fisheries waters (Section 36). DFO has signed agreements with 35 of the 36 Conservation Authorities in Ontario to review proposed projects under Section 35 of the Fisheries Act. The ABCA have a Level 2 Agreement with DFO, therefore they can determine how the proponent can mitigate any potential impacts to fish and fish habitat.

Based on the current Project layout and proposed environmental mitigation measures, in-water work would potentially affect fish or fish habitat, or areas that contain fish habitat, at six locations. Although specific Operational Statements are referenced in this

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report, consultation with the ABCA and/or DFO may result in site-specific construction methods and mitigation measures for some locations.

If impacts to fish and fish habitat can be fully mitigated, a Letter of Advice (LOA) will be issued by the ABCA indicating that the proposed activities will not likely cause a HADD if the proposed set of mitigation measures is followed. If the ABCA determines that impacts cannot be fully mitigated, the project is forwarded to the local DFO office for further review.

General mitigation measures and potential negative effects to water bodies and associated habitat are provided below.

#### **4.1.1 General Mitigation Measures**

General mitigation measures are provided below with respect to all components of the project within the Turbine and Transmission Line Study Areas.

##### **4.1.1.1 Fish and Fish Habitat**

###### ***Effect***

- a) In-water works will be required and negative effects to local fish populations may occur
- b) Direct impacts to fish and fish habitat from construction activities. In-water works for culverts. Six culverts will be constructed as a result of the project and need for access roads to turbine locations.

###### ***Mitigation***

- a) No in-water works will occur outside of the warmwater timing window from July 1 to March 30 (no in-water works from April 1 to June 30)
- b) All fish will be salvaged prior to in-water works and all improvement/enhancement will be conducted in the dry. Any areas adjacent to the immediate work area will be protected using standard mitigation measures as discussed above (silt fencing, segregation of the work area, fish salvage, etc.). Suitably sized substrate will be placed inside culverts to provide similar conditions. A fish collection permit will be acquired from MNR that will also have conditions related to the salvage of fish at the proposed culvert crossings.

Sediment and erosion control measures (such as silt fence barriers, turbidity curtains, etc.) will be installed and maintained during the work phase and until the

site has been stabilized. Control measures will be inspected daily to ensure they are functioning and are maintained as required. If control measures are not functioning properly, no further work will occur until the problem is resolved. All temporary erosion and sediment control measures will be installed in accordance with recognized provincial standards. Extra silt fence/turbidity curtain will be on site, should additional sediment control be required.

Minimize any in-water operation of heavy equipment and minimize operation of the same on the banks of the watercourse. All equipment fueling and maintenance will be done a safe distance (30 m) from the edge of the water to ensure that no deleterious substances enter the water.

Any stockpiled material will be stored and stabilized away from the watercourse. All materials and equipment used for the purpose of site preparation and project completion should be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering the water.

Incorporate mitigation measures covered under DFO Operational Statements (Ontario Operational Statement Habitat Management Program: Punch and Bore Crossings, Directional Drill, Dry Open-cut Crossing or/and Isolated Open-cut Crossing). If the proponent and contractors follow the "Measures to Protect Fish and Fish Habitat" outlined in the Operational Statement, no impacts to water quality, or fish and fish habitat are expected. A copy of the Operational Statement accepted by DFO in Ontario is provided in **Appendix H**.

All disturbed areas of the work site should be stabilized immediately and re-vegetated as soon as conditions allow. During detailed design, correspondence will be maintained with ABCA. It is of note that ABCA confirmed (meeting of March 1, 2012) that they anticipate that a LOA will be issued for this project.

No in-water works are to be conducted between April 1 to June 30. All disturbed areas of the work site should be stabilized immediately and re-vegetated as soon as conditions allow.

### ***Residual Net Effects***

No residual net effects are expected if the above noted mitigation measures are incorporated into the construction and design.

#### 4.1.1.2 Vegetation Removal

##### *Effect*

- a) Bank work will be required for access road culverts and negative effects to riparian vegetation may occur.
- b) Negative effects to riparian vegetation may occur along collector and transmission lines during construction works in and around water bodies.

##### *Mitigation*

- a) No in-water works will occur outside of the warmwater timing window from July 1 to March 30 (no in-water works from April 1 to June 30).

Vegetation clearing along banks where access road culverts will be constructed is limited to the maximum width of the access road. The contractor will ensure that excess vegetation removal does not occur. Construction staging (materials and equipment storage) will be placed outside of the riparian corridor to avoid excessive trampling of native vegetation along watercourses.

- b) Areas where vegetation has been removed as a result from construction works will be replanted with native vegetation and seeded with approved seed mix based on approval from ABCA.

Disturbance to areas within the drip line of mature trees will be avoided using hoarding or construction fencing.

Incorporate mitigation measures covered under DFO Operational Statements (Ontario Operational Statement Habitat Management Program: Punch and Bore Crossings, Directional Drill, Dry Open-cut Crossing or/and Isolated Open-cut Crossing) for riparian vegetation. If the proponent and contractors follow the "Measures to Protect Fish and Fish Habitat" outlined in the Operational Statement, no impacts to water quality, or fish and fish habitat are expected. A copy of the Operational Statement accepted by DFO in Ontario is provided in **Appendix H**.

##### *Residual Net Effects*

No residual net effects are expected if the above noted mitigation measures are incorporated into the construction and design.



#### 4.1.1.3 Surface Water and Soils

##### **Effect**

- a) Potential for sediments to enter watercourse as a result of the following project activities:
  - stockpiling
  - excavation
  - construction
- b) Potential water quality impairments (sediment loading; fuels and lubricants from machinery). Potential for localized water quality impacts as a result of spills.

##### **Mitigation**

- a) The footprint of disturbed area will be minimized as much as possible, for example, vegetated buffers/setbacks will be left in place adjacent to watercourses/ water bodies to the maximum extent possible.

An erosion and sediment control plan will be developed during detailed design prior to construction. Implementation of the erosion and sediment control measures will conform to recognized standard specifications such as Ontario Provincial Standards Specification (OPSS) and the requirements of ABCA.

Prevent any in-water operation of heavy equipment and minimize operation of the same on the banks of the watercourse. Any stockpiled material will be stored and stabilized away from the watercourse. All materials and equipment used for the purpose of site preparation and project completion should be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering the water.

Sediment and erosion control measures (silt curtains, silt fence, rock check dams) will be installed and will be maintained during the work phase and until the site has been stabilized. Control measures should be inspected daily to ensure they are functioning and are maintained as required. If control measures are not functioning properly, no further work will occur until the problem is resolved.

Any temporary mitigation measures will be installed prior to the commencement of any clearing, grubbing, excavation, filling or grading works and will be maintained on a regular basis, prior to and after runoff events.

Water quality impacts related to surface water run-off should be mitigated to avoid downstream impacts to water bodies by controlling surface water run-off within the boundaries of the site.

All disturbed areas of the work site should be stabilized immediately and re-vegetated as soon as conditions allow.

- b) All equipment fuelling and maintenance will be done at a safe distance (30 m) from the watercourses to ensure that no deleterious substances enter the waterway.

The contractor will be required to develop spill prevention and contingency plans for construction and operational phases of the project. Personnel will be trained in how to apply the plans and the plans will be reviewed to strengthen their effectiveness and ensure continuous improvement. Spills will be immediately contained and cleaned up in accordance with provincial regulatory requirements and the contingency plan. A hydrocarbon spill response kit will be on site at all times during the work. Spills will be reported to the Ontario Spills Action Center at 1-800-268-6060.

### ***Residual Net Effects***

No residual net effects are expected if the above noted mitigation measures are incorporated into the construction and design.

#### **4.1.1.4 Groundwater**

##### ***Effect***

- a) Potential for localized groundwater quality impacts as a result of spills.
- b) Potential dewatering of the work area may be required that may effect local waterbodies (reduction in base flow).

##### ***Mitigation***

- a) Refuelling of equipment and fuel storage should be conducted in designated areas away from the watercourses with spill protection provided.
- b) If applicable, work area will be dewatered as per recognised provincial standards and pumped into acceptable dewatering traps. Based on a review of local hydrogeology, proposed dewatering techniques, and turbine footings, no more

than 50,000 L/day will be extracted therefore no impacts to local residents or water bodies is expected. A monitoring plan will be developed to avoid any localized impacts to groundwater.

### ***Residual Net Effects***

No residual net effects are expected if the above noted mitigation measures are incorporated into the construction and design.

#### **4.1.2 Proposed Culvert Crossings**

Proposed construction methodology to avoid impacts to fish and fish habitat is covered under an Operational Statements (Ontario Operational Statement Habitat Management Program: Dry Open-cut Crossing or/and Isolated Open-cut Crossing) provided by DFO. The Proponent and Contractor(s) will follow the "Measures to Protect Fish and Fish Habitat" outlined in the Operational Statement, therefore no impacts to water quality, or fish and fish habitat are expected. A copy of the Operational Statement accepted by DFO is provided in **Appendix H**.

#### **4.1.3 Underground Collection Lines**

All proposed construction methodology (listed above in order of preference) is covered under Operational Statements (Ontario Operational Statement Habitat Management Program: Punch and Bore Crossings) provided by DFO. The Proponent and Contractor(s) will follow the "Measures to Protect Fish and Fish Habitat" outlined in the Operational Statement, therefore no impacts to water quality, or fish and fish habitat are expected. A copy of the Operational Statement accepted by DFO is provided in **Appendix H**.

#### **4.1.4 Overhead Transmission Lines**

All proposed construction methodology to avoid impacts to fish and fish habitat is covered under an Operational Statements (Ontario Operational Statement Habitat Management Program: Overhead Line Construction) provided by DFO. The Proponent and Contractor(s) will follow the "Measures to Protect Fish and Fish Habitat" outlined in the Operational Statement, therefore no impacts to water quality, or fish and fish habitat are expected. A copy of the Operational Statement accepted by DFO is provided in **Appendix H**.

**Table 4.1 Summary of Environmental Effects, Mitigation, Performance Objectives, Monitoring and Contingency Measures**

Affected Environmental Feature(s)	Project Phase	Potential Effects	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
Aquatic Species and Aquatic Habitat  Watercourse Crossings:  CR-013, CR-018, CR-023, CR-031, CR-032, CR-041	Construction Decommissioning	<ul style="list-style-type: none"> <li>Potential direct effects to aquatic habitat quality from sedimentation during construction activities (i.e. culverts for access roads).</li> <li>Effects to riparian vegetation during construction</li> <li>Effects to fish during in-water works</li> <li>Potential failure of slopes – impacts to bed/banks of stream during culvert construction.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize indirect effects from dust, sedimentation and erosion.</li> <li>Minimize direct effects to fish and fish habitat during construction</li> </ul>	<ul style="list-style-type: none"> <li>Erosion and sediment control measures (i.e., silt fence, straw bales, wooden stakes, sand bags, filters, pumps, snow fencing) will be installed and will be maintained during the construction work phase and until the site has been stabilized. Implementation of the erosion and sediment control measures will conform to industry best management practices and recognized standard specifications such as Ontario Provincial Standards Specifications (OPSS).</li> <li>Minimize footprint for culvert crossings at access roads.</li> <li>Culvert construction will take place outside fish and fish habitat timing windows, and will be designed and installed according to the requirements of the Ausable Bayfield Conservation Authority.</li> <li>Directional drilling and/or punch and bore operations will be designed with launching and receiving pits with appropriate setbacks from watercourses wherever possible.</li> <li>Dewatering from open excavations will take place on tile-drained agricultural land to promote infiltration and settling of suspended solids prior to entering a watercourse.</li> <li>Fish salvage will be conducted by a qualified biologist under a Scientific Collection Permit from MNR and all fish captured within the work area will be released downstream unharmed.</li> <li>Operational Statements (OS) provided by DFO will be used where appropriate to ensure that no impact to fish and fish habitat will occur during construction (i.e., punch and bore, directional drilling, open-cut watercourse crossings and isolated dam and pump).</li> </ul>	<ul style="list-style-type: none"> <li>Regular weekly site inspection will occur by designated Environmental Monitor for sediment and erosion control measures. Severe weather conditions may require additional site visits depending on the proximity of the watercourse.</li> <li>The level of monitoring and reporting would be based on the severity of the spill and may be discussed with the MOE Spills Action Center and MNR.</li> </ul> <p><b>Contingency Measures</b></p> <ul style="list-style-type: none"> <li>Environmental Monitor will be responsible for “stop works” if mitigation measures are not incorporated into the construction activities or performance objectives are not achieved</li> <li>Changes to the mitigation measures to best suit the current conditions will be adopted to achieve overall performance objective.</li> </ul>
Aquatic Species and Aquatic Habitat	Construction Operation Decommissioning	<ul style="list-style-type: none"> <li>Potential contamination from accidental spills.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize potential for indirect effects from accidental spills.</li> </ul>	<ul style="list-style-type: none"> <li>Hazardous material transportation and application will occur in designated areas according to operational procedures. Proper spill containment equipment will be used and maintained on site.</li> <li>No fuelling within 30 m of any watercourse.</li> <li>No fuel storage within 30 m of any watercourse.</li> <li>A spill containment kit will be available during construction for every location that heavy equipment is operated.</li> </ul>	<ul style="list-style-type: none"> <li>Regular site inspections will occur by designated Environmental Monitors for in-water works and work adjacent to sensitive areas.</li> <li>The level of monitoring and reporting would be based on the severity of the spill and may be discussed with the MOE Spills Action Center and MNR.</li> </ul> <p><b>Contingency Measures</b></p> <ul style="list-style-type: none"> <li>Additional sediment and erosion control measure (silt fence, erosion control blankets, etc) will be on site a ready for use if original measures are not suitable</li> <li>Refer to Spill Contingency Plan.</li> <li>Contaminated soil will be removed and disposed of at an approved facility.</li> </ul>

Affected Environmental Feature(s)	Project Phase	Potential Effects	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
Surface Water/Soils	Construction Operation Decommissioning	<ul style="list-style-type: none"> <li>Short-term degradation of soil/water quality and fisheries habitat due to accidental spills or releases.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize indirect effects from dust, sedimentation and erosion.</li> <li>Minimize potential for indirect effects from accidental spills.</li> </ul>	<ul style="list-style-type: none"> <li>Erosion and sediment control measures (i.e., silt fence, straw bales, wooden stakes, sand bags, filters, pumps, snow fencing) will be installed and will be maintained during the construction work phase and until the site has been stabilized. Implementation of the erosion and sediment control measures will conform to industry best management practices and recognized standard specifications such as Ontario Provincial Standards Specifications (OPSS).</li> <li>Culvert construction will take place outside fish and fish habitat timing windows, and will be designed and installed according to the requirements of the Ausable Bayfield Conservation Authority.</li> <li>Directional drilling and/or punch and bore operations will be designed with launching and receiving pits with appropriate setbacks from watercourses wherever possible.</li> <li>Dewatering from open excavations will take place on tile-drained agricultural land to promote infiltration and settling of suspended solids prior to entering a watercourse.</li> <li>Hazardous material transportation and application will occur in designated areas according to operational procedures. Proper spill containment equipment will be used and maintained on site.</li> </ul>	<ul style="list-style-type: none"> <li>Regular site inspection will occur by designated Environmental Monitors. The level of monitoring and reporting would be based on the severity of the occurrence and may be discussed with the MOE Spills Action Center and MNR.</li> </ul> <p><b>Contingency Measures</b></p> <ul style="list-style-type: none"> <li>Contaminated soil will be removed and disposed of at an approved facility.</li> </ul>
Groundwater	Construction Operation Decommissioning	<ul style="list-style-type: none"> <li>Potential direct impacts to groundwater quality and quantity due to water taking at Parts and Storage Building.</li> <li>Water quality impacts due to potential fuel and oil spills.</li> <li>Dewatering operations during construction are not expected to impact groundwater quantity or quality. Refer to the Construction Plan Report for further details.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize impacts to groundwater quality and quantity.</li> <li>No spills.</li> </ul>	<ul style="list-style-type: none"> <li>Confirmation of water supply needs and capacity for the Part and Storage Building will be verified at the detailed design phase. If required, detailed design and implementation plans will include measures for water storage and/or water treatment.</li> <li>An Emergency Response and Communications Plan will be developed during detailed design to ensure proper mitigation and notification procedures are in place regarding groundwater quality during Project operation.</li> </ul>	<ul style="list-style-type: none"> <li>Regular site inspection will occur by designated Environmental Monitors. The level of monitoring and reporting would be based on the severity of the occurrence and may be discussed with the MOE Spills Action Center and MNR.</li> </ul> <p><b>Contingency Measures</b></p> <ul style="list-style-type: none"> <li>All spills that could potentially have an adverse environmental effect, are outside the normal course of events, or are in excess of the prescribed regulatory levels would be reported to the MOE's Spills Action Centre.</li> </ul>

## 4.2 Construction Plan Report

As part of the Water Body Report a description of how the Construction Plan Report will address any negative impacts to water bodies and the 30 m of land surrounding the water body within the project location. Based on a review of the Construction Plan Report with regards to construction, operation and decommissioning, potential effects related to the project phase along with appropriate mitigation measures and monitoring have been determined in **Table 4.1** above.

## 4.3 Environmental Effects Monitoring Plan

Based on a review of the mitigation table in the Environmental Effects Monitoring Plan the table above provides a list of potential environmental effects, mitigation measures and monitoring to avoid impacts to water bodies and the 30 m of land surrounding the project location have been determined in **Table 4.1** above.

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## 5.0 Conclusion

The Grand Bend Wind Farm is located within the vicinity of water bodies and components of the project will require crossings that allow for the construction of access roads, collection and transmission lines. Based on the Records Review, Site Investigation and determination of potential impacts to these water bodies, accepted mitigation measures have been proposed. The mitigation measures that have been proposed will protect and limit impacts to the low sensitivity water bodies described within this report.

The project layout was designed to avoid impacts to these features as much as possible. Performance objectives have been set with the goal of avoiding impacts to all water bodies. With the mitigation, monitoring and contingency measures described in this report, it is anticipated that performance objectives can be met.

Respectfully submitted,

**Neegan Burnside Ltd.**

Prepared by:

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Approved by:

Jim Mulvale  
Manager of Environment Health & Safety  
Northland Power Inc.

Draft Water Assessment and Water Body Report  
August 2012

## 6.0 References

Ausable Bayfield Conservation Authority. 2007 Watershed Report Cards. Retrieved May 25, 2012 from [http://www.abca.on.ca/reportcard\\_map.php](http://www.abca.on.ca/reportcard_map.php)

Ausable Bayfield Conservation Authority. 2001 Fish Habitat Management Plan. Retrieved May 25, 2012 from <http://www.abca.on.ca>

Department of Fisheries and Ocean Canada, Operational Statements for Ontario, <http://www.dfo-mpo.gc.ca/regions/central/habitat/os-ao/provinces-territoires-territoires/on/index-eng.htm>

Drinking Source Water Protection, 2012 Ausable Bayfield and Maitland Valley Conservation Authorities, Retrieved July 30, 2012, Figures 3.19 and 4.3 for ABCA recharge areas from <http://www.sourcewaterinfo.on.ca/content/assessmentReports.php>

Ministry of the Environment, Technical Guide to Renewable Energy Approvals, Guidance for Preparing the Water Assessment and Water Body Reports, Queens Printer, 2011

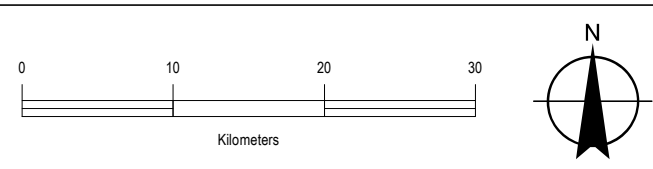
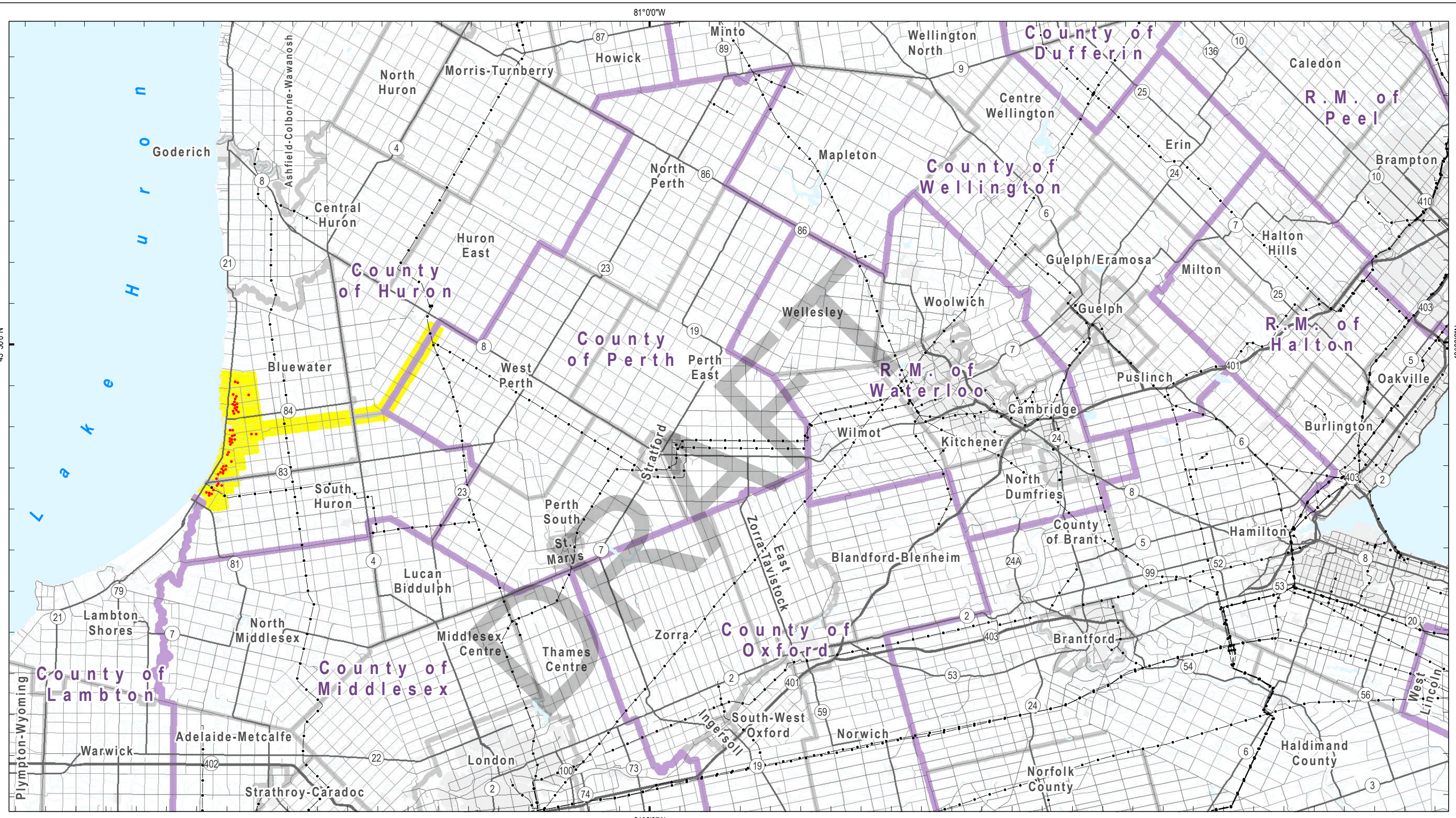
Ministry of Transportation, MNR Protocol for Watercourse Crossings, MTO/DFO/MNR Protocol 2006



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**Appendix A**  
**Figures**

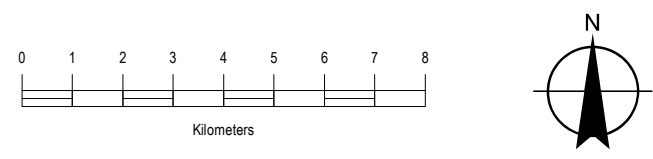
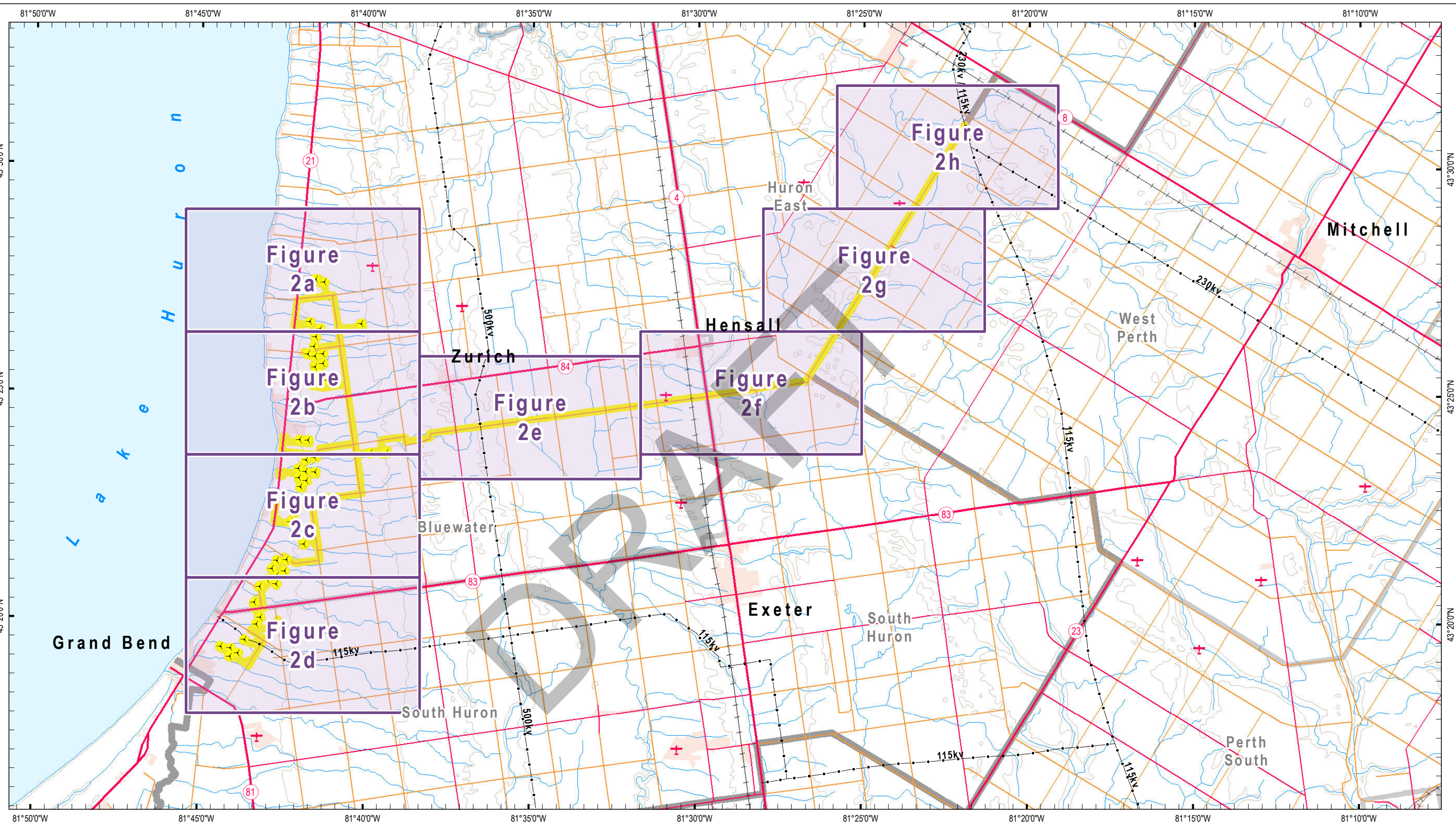
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- Wind Turbine Location
- Project Area



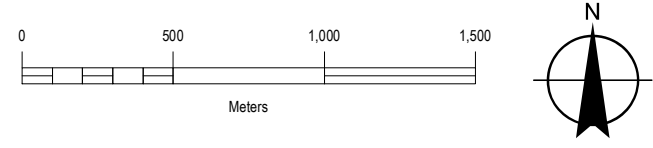
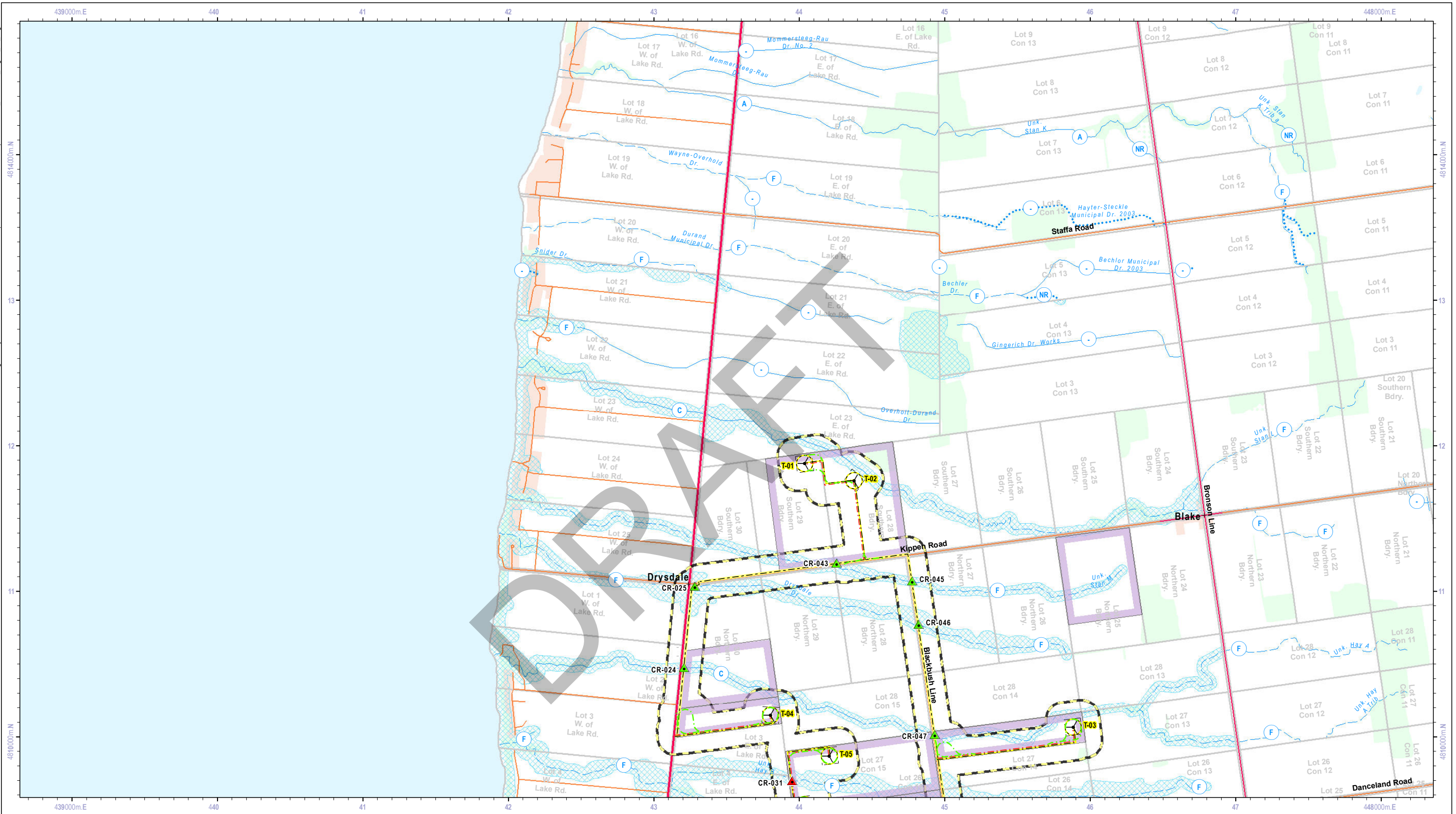
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Prepared	P. Stubbert	Checked	C. Pfohl
Scale	1:150,000	Project	PIA019991
			Map Number <b>1</b>



-  Wind Turbine Location
-  120m From Project Location



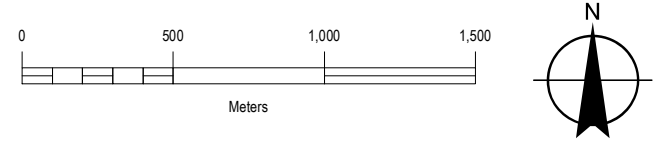
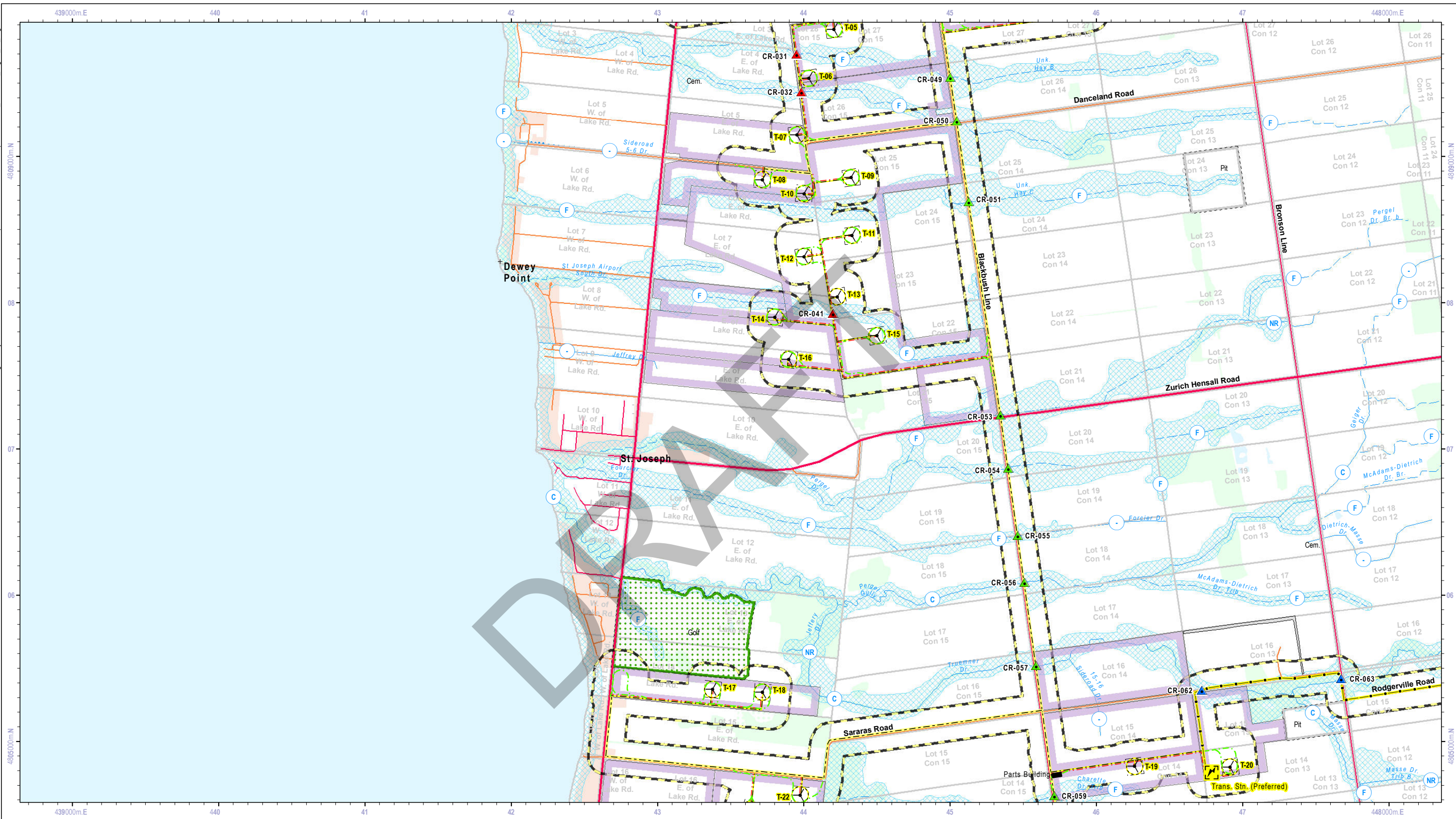
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Prepared	P. Stubbert	Checked	C. Pfohl
Scale	1:150,000	Project	PIA019991
Figure Number			2 - Key Map



Wind Turbine Location & Blade Radius	Access Road: For Construction (Temporary)	CR-002 Watercourse Crossing Access Road: Permanent (in-water work)	Not Classified / Not Recorded
Transformer Sub-Station; Switch Yard	Overhead 230kV Transmission Line	CR-123 Watercourse Crossing Transmission / Collector Line: Underground	Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
Participating Property	Underground 36kV Collector Line or 230kV Transmission Line	CR-034 Watercourse Crossing Transmission Line: Overhead	Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
Access Road & Underground Collector Line	Assembly Site Area Boundary	Flood Regulation Limit	Permanent: Warm Top Predators/Ecosystem Indicator Species Project Specific Authorization
Access Road: Permanent	120m From Project Location		Intermittant: No Authorization Required
			Permanent: Warm Sensitive Species Present Class B Authorization
			Permanent: Warm Fish Community Composed of Baitfish Class C Authorization



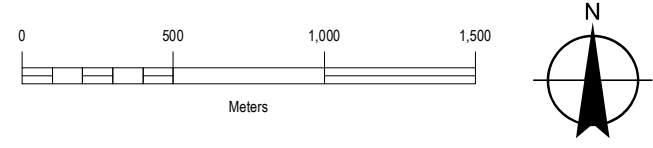
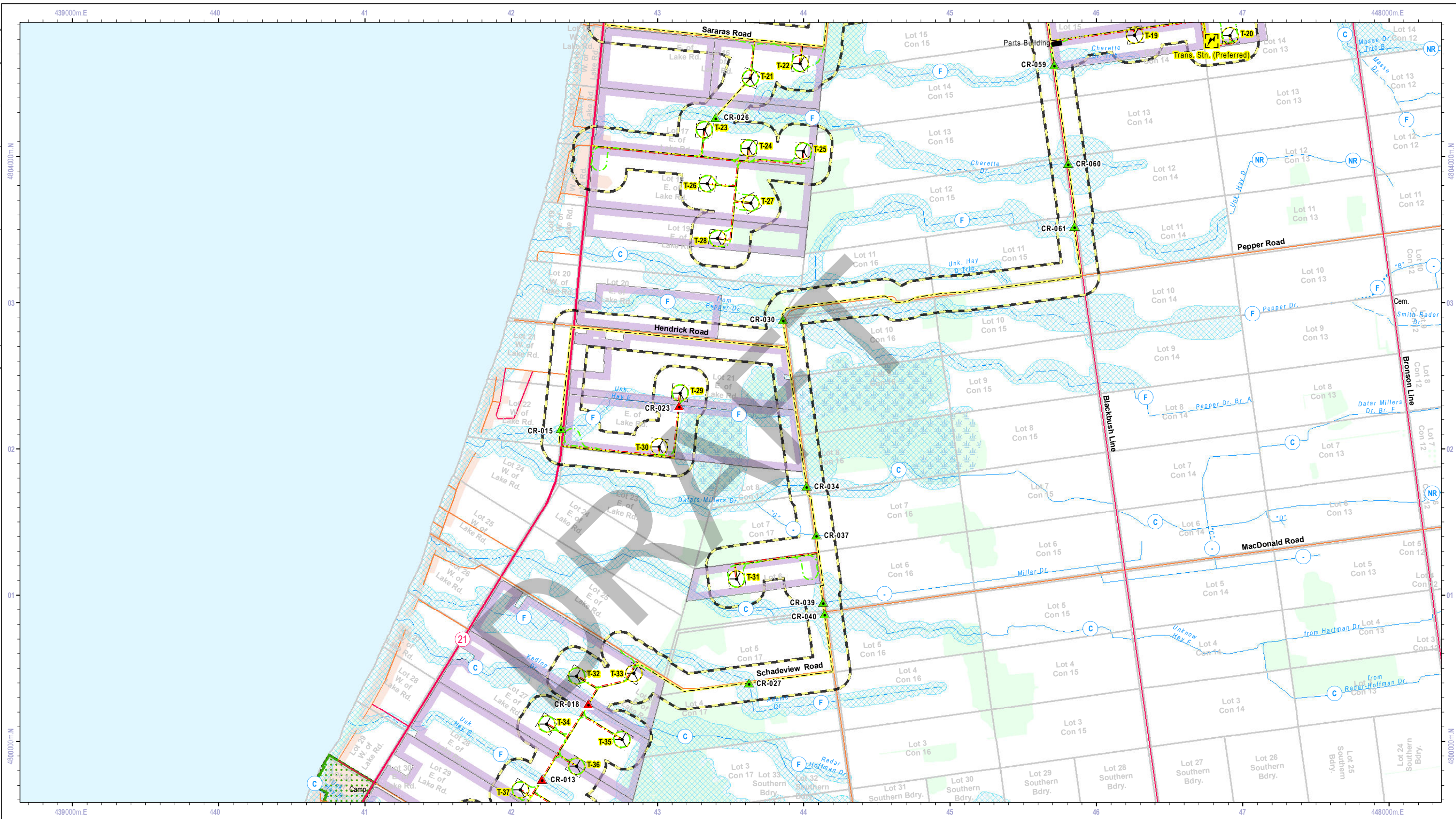
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Prepared P. Stubbert	Checked C. Pfohl	Map Number <b>2a</b>
Scale 1:25,000	Project PIA019991	



Wind Turbine Location & Blade Radius	Access Road: For Construction (Temporary)	Watercourse Crossing Access Road: Permanent (in-water work)	Not Classified / Not Recorded
Transformer Sub-Station; Switch Yard	Overhead 230kV Transmission Line	Watercourse Crossing Transmission / Collector Line: Underground	Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
Participating Property	Underground 36kV Collector Line or 230kV Transmission Line	Watercourse Crossing Transmission Line: Overhead	Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
Access Road & Underground Collector Line	Assembly Site Area Boundary	Flood Regulation Limit	Permanent: Warm Top Predators/Ecosystem Indicator Species Project Specific Authorization
Access Road: Permanent	120m From Project Location		Intermittant: No Authorization Required
			Permanent: Warm Sensitive Species Present Class B Authorization
			Permanent: Warm Fish Community Composed of Baitfish Class C Authorization



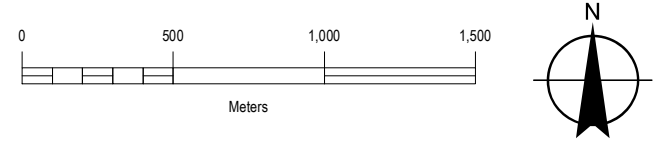
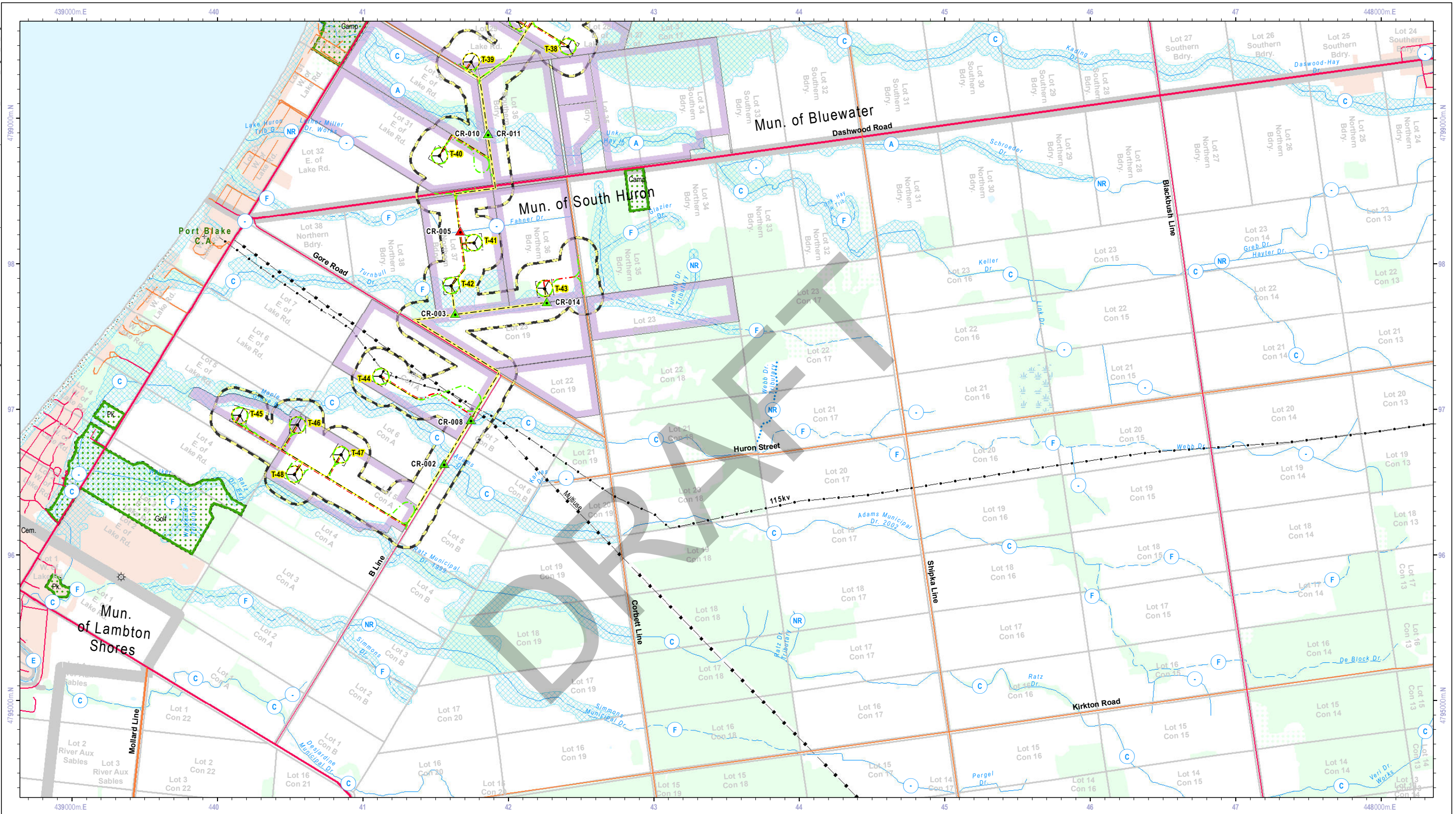
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		Map Number	<b>2b</b>



Wind Turbine Location & Blade Radius	Access Road: For Construction (Temporary)	CR-002 Watercourse Crossing Access Road: Permanent (in-water work)	Not Classified / Not Recorded
Transformer Sub-Station; Switch Yard	Overhead 230kV Transmission Line	CR-123 Watercourse Crossing Transmission / Collector Line: Underground	Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
Participating Property	Underground 36kV Collector Line or 230kV Transmission Line	CR-034 Watercourse Crossing Transmission Line: Overhead	Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
Access Road & Underground Collector Line	Assembly Site Area Boundary	Flood Regulation Limit	Permanent: Warm Sensitive Species Present Top Predators/Ecosystem Indicator Species Project Specific Authorization
Access Road: Permanent	120m From Project Location		Permanent: Warm Fish Community Composed of Baitfish Class B Authorization
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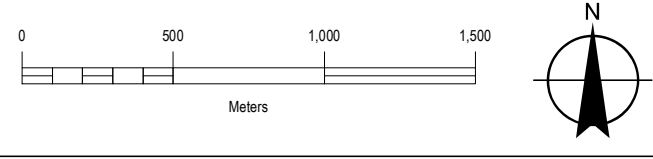
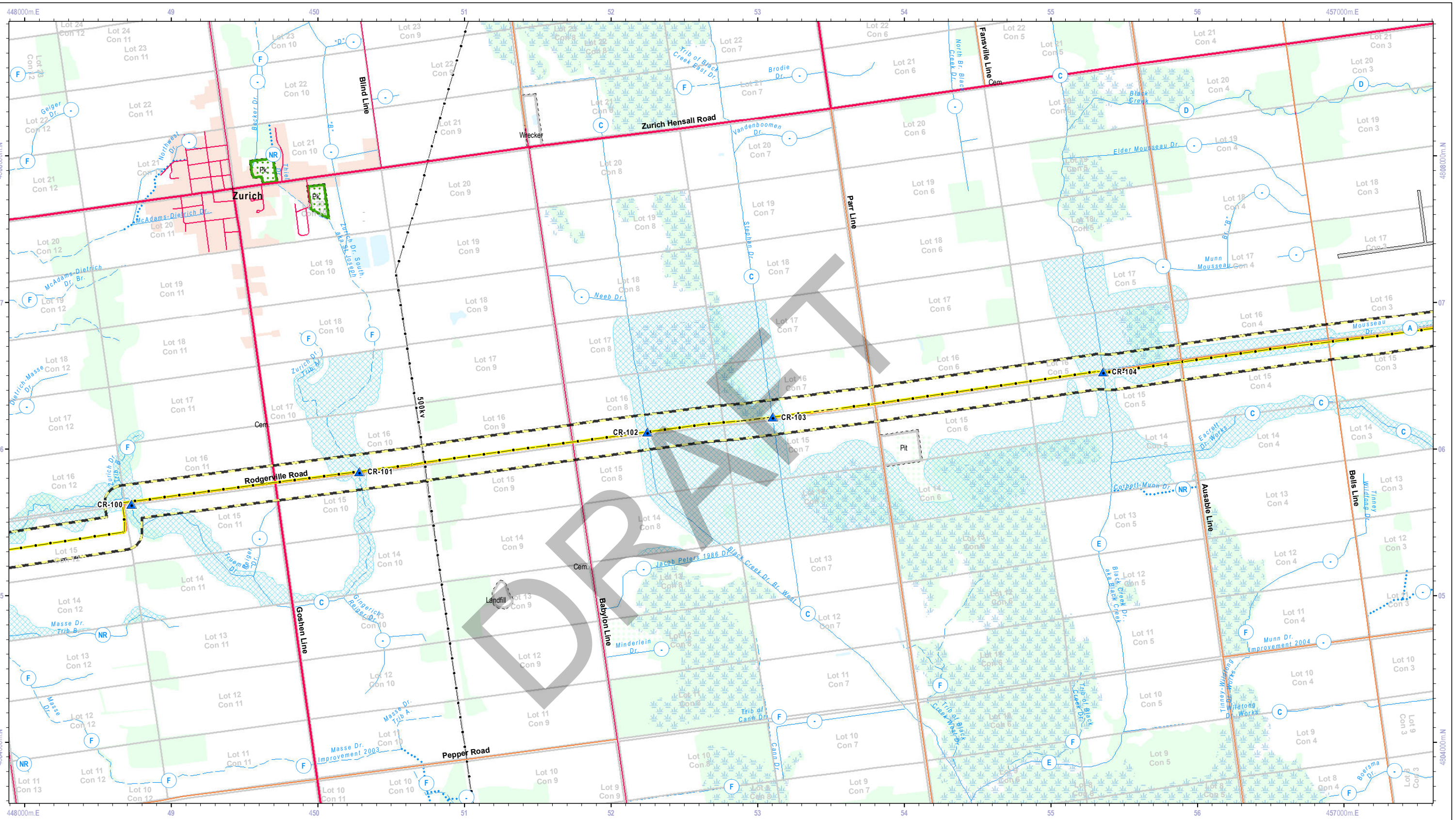
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Map Number	<b>2c</b>		



Wind Turbine Location & Blade Radius	Access Road: For Construction (Temporary)	CR-002 Watercourse Crossing Access Road: Permanent (in-water work)	Not Classified / Not Recorded
Transformer Sub-Station; Switch Yard	Overhead 230kV Transmission Line	CR-123 Watercourse Crossing Transmission / Collector Line: Underground	Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
Participating Property	Underground 36kV Collector Line or 230kV Transmission Line	CR-034 Watercourse Crossing Transmission Line: Overhead	Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
Access Road & Underground Collector Line	Assembly Site Area Boundary	Flood Regulation Limit	Permanent: Warm Sensitive Species Present Project Specific Authorization
Access Road: Permanent	120m From Project Location		Permanent: Warm Sensitive Species Present Class B Authorization
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			Intermittant: No Authorization Required



Title <b>Grand Bend Wind Farm Grand Bend Wind Limited Partnership Water Assessment &amp; Water Bodies Report Watercourse Crossings</b>			
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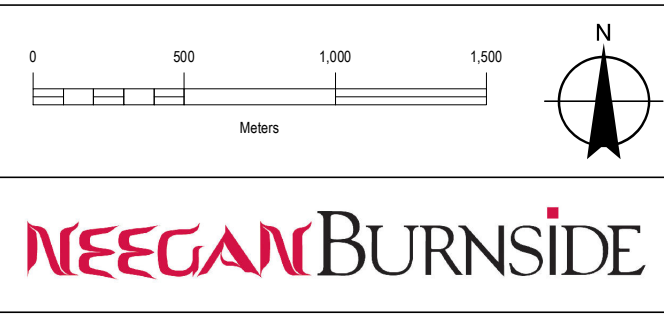
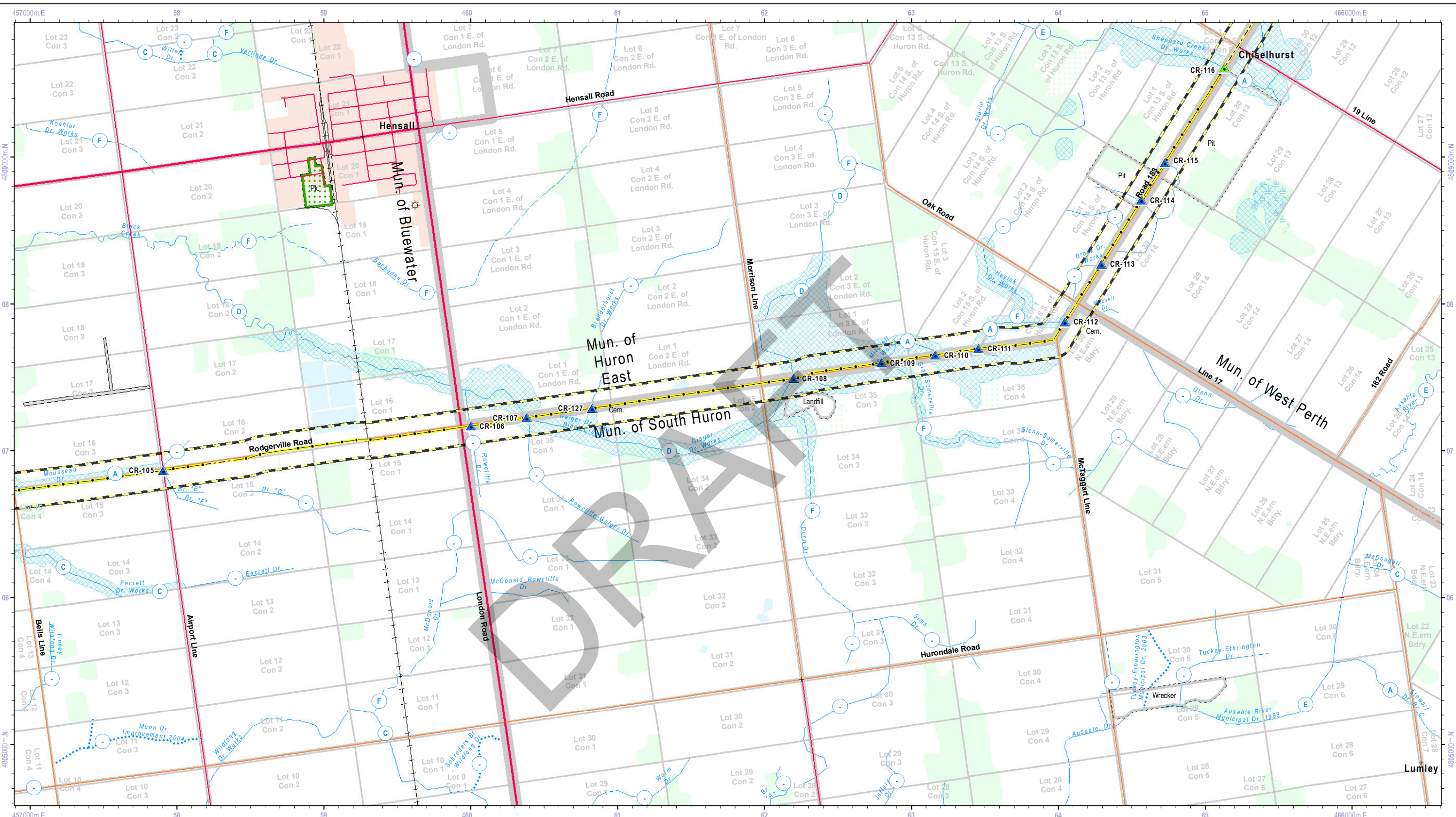


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Transformer Sub-Station; Switch Yard	Overhead 230kV Transmission Line	CR-123 Watercourse Crossing Transmission / Collector Line: Underground	Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
Participating Property	Underground 36kV Collector Line or 230kV Transmission Line	CR-034 Watercourse Crossing Transmission Line: Overhead	Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
Access Road & Underground Collector Line	Assembly Site Area Boundary	Flood Regulation Limit	Permanent: Warm Top Predators/Ecosystem Indicator Species Project Specific Authorization
Access Road: Permanent	120m From Project Location		Intermittant: No Authorization Required
			Permanent: Warm Sensitive Species Present Class B Authorization
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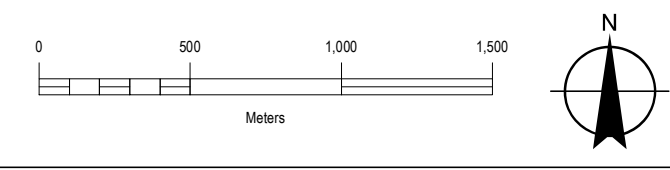
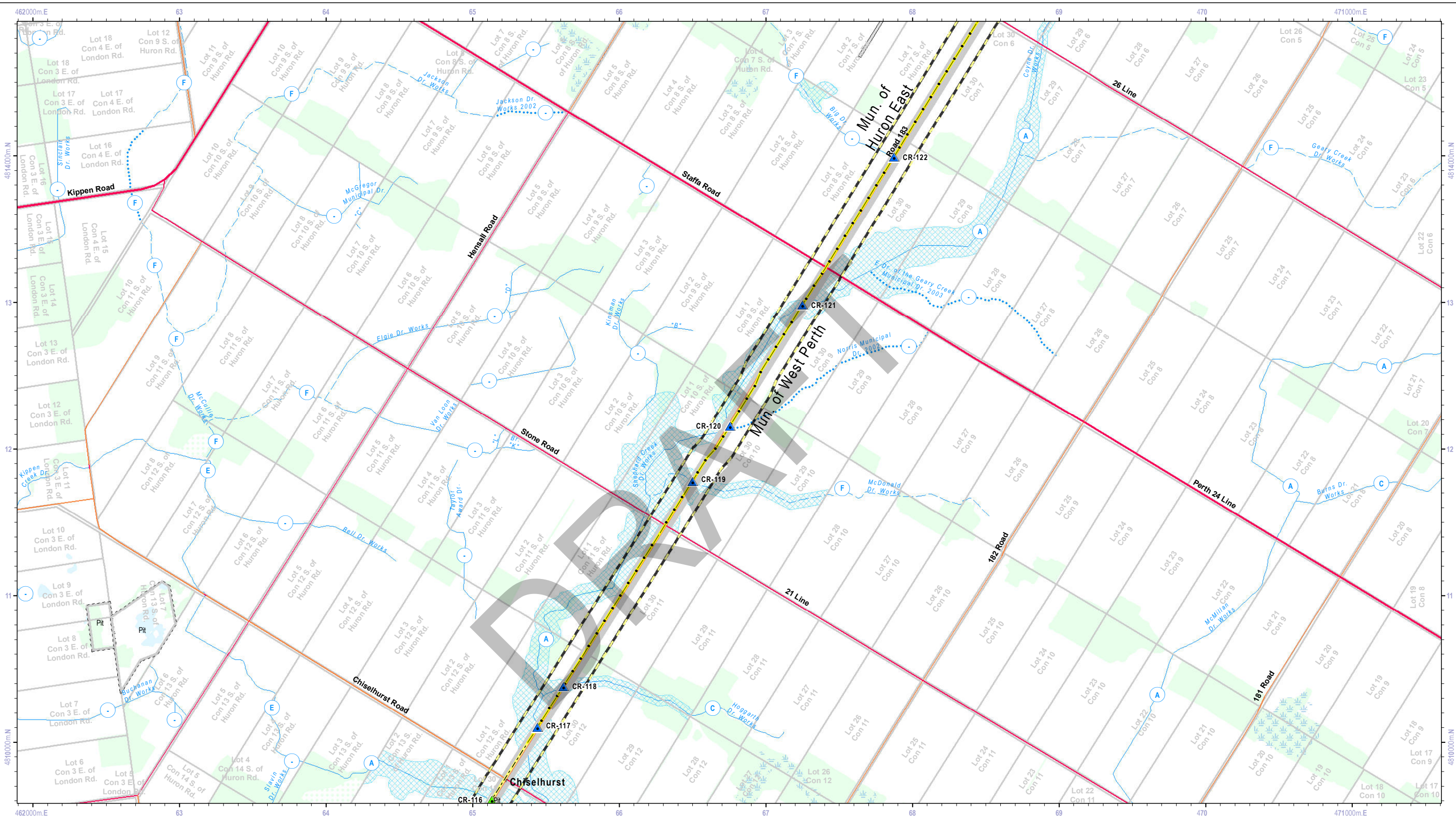






Wind Turbine Location & Blade Radius	Access Road: For Construction (Temporary)	CR-002 Watercourse Crossing Access Road: Permanent (in-water work)	Not Classified / Not Recorded
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Participating Property	Underground 36kV Collector Line or 230kV Transmission Line	CR-034 Watercourse Crossing Transmission Line: Overhead	Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
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Access Road: Permanent	120m From Project Location		Permanent: Warm Sensitive Species Present Class B Authorization
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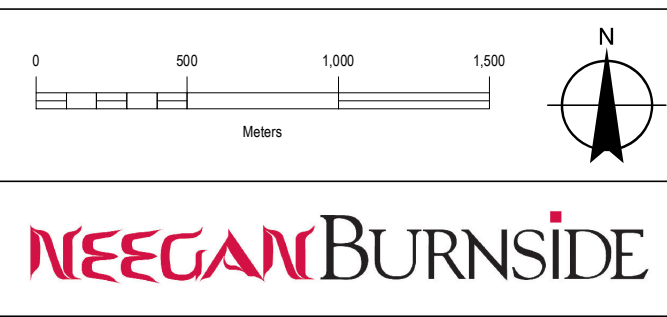
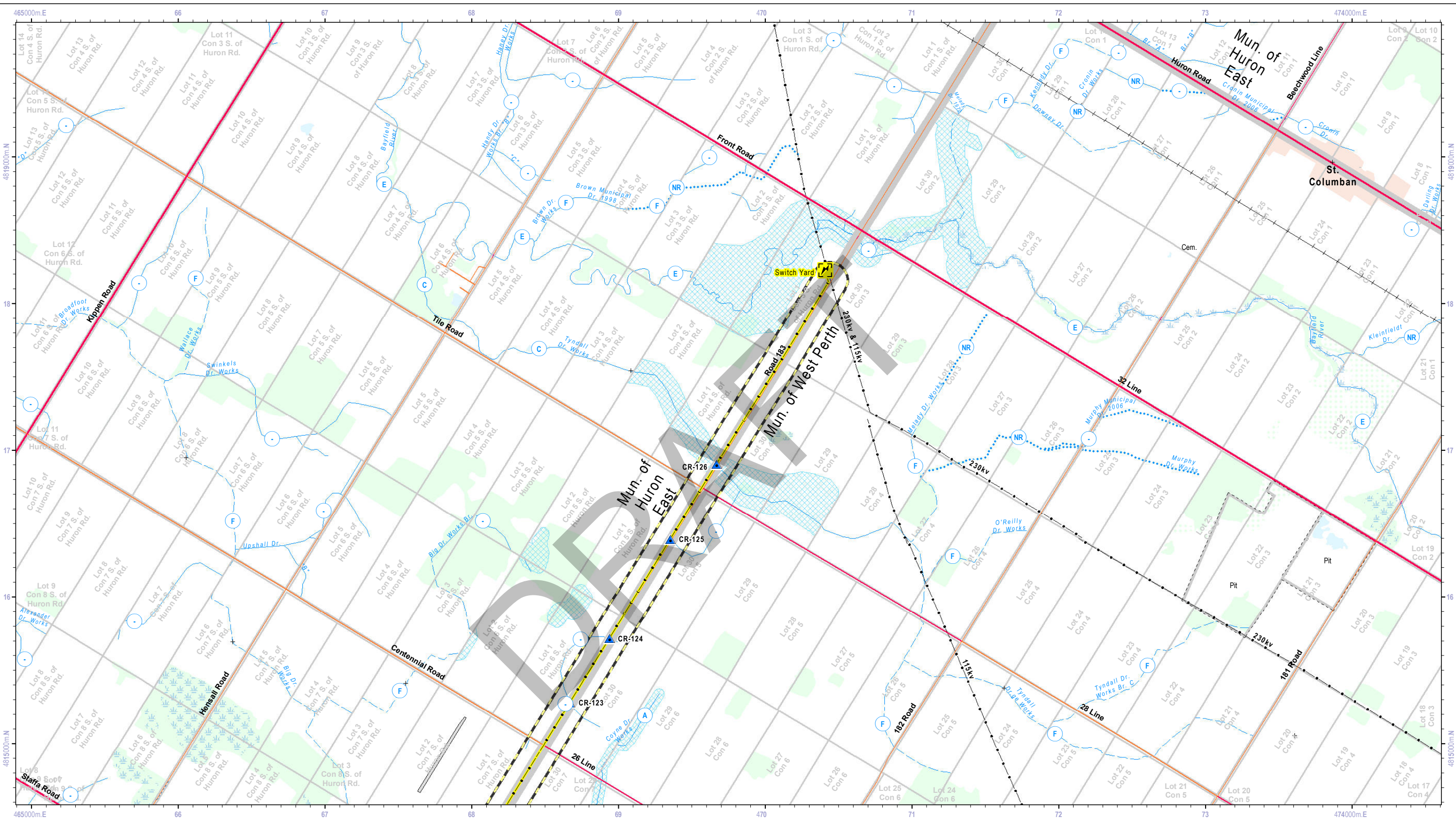
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	Wind Turbine Location & Blade Radius		Access Road: For Construction (Temporary)		Watercourse Crossing Access Road: Permanent (in-water work)		Not Classified / Not Recorded
	Transformer Sub-Station; Switch Yard		Overhead 230kV Transmission Line		Watercourse Crossing Transmission / Collector Line: Underground		Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
	Participating Property		Underground 36kV Collector Line or 230kV Transmission Line		Watercourse Crossing Transmission Line: Overhead		Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
	Access Road & Underground Collector Line		Assembly Site Area Boundary		Flood Regulation Limit		Permanent: Warm Sensitive Species Present Class B Authorization
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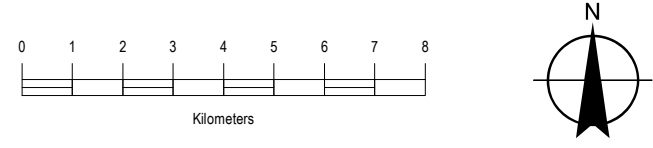
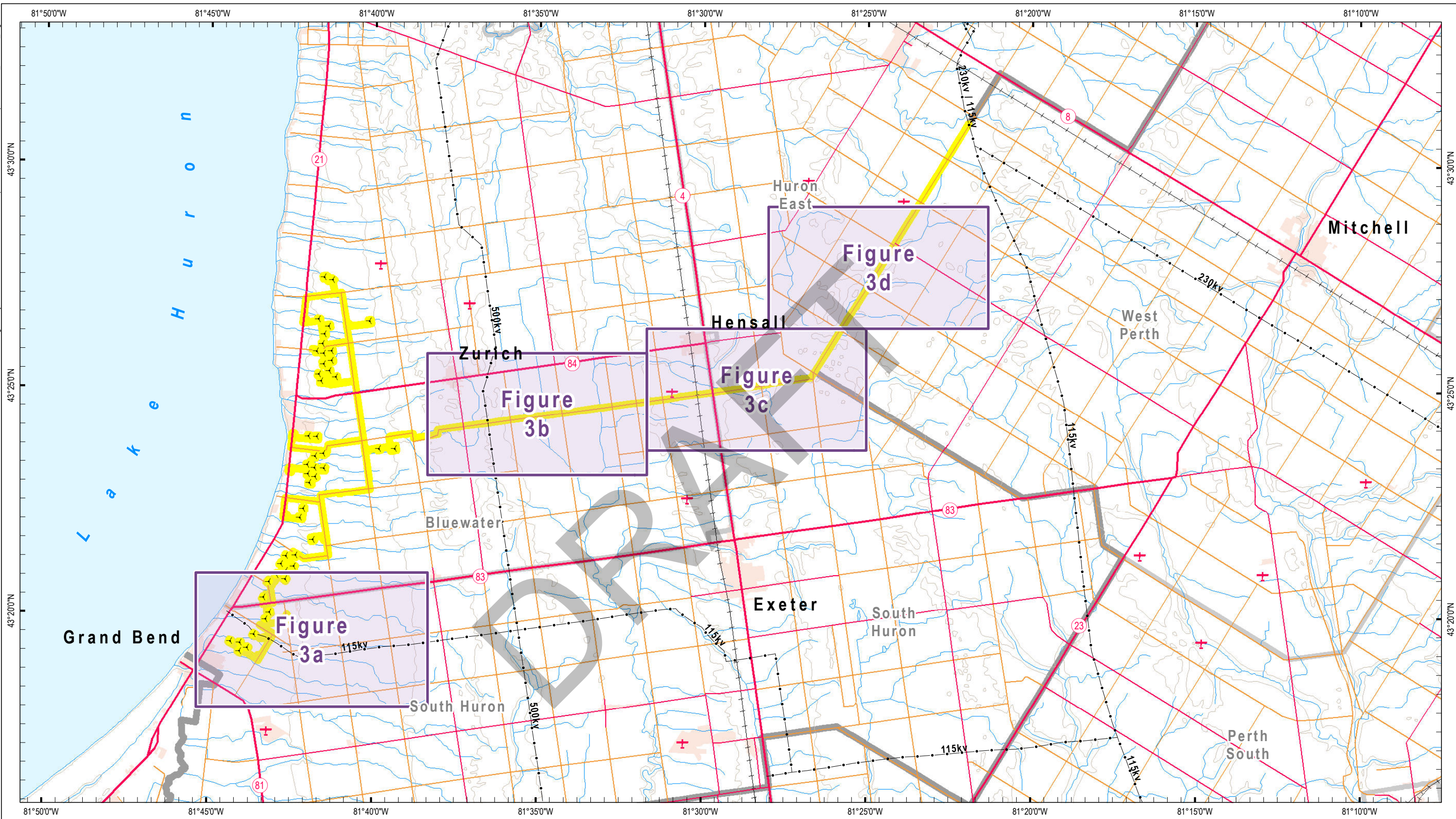




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Scale	1:25,000	Project	PIA019991
Map Number	<b>2g</b>		



Wind Turbine Location & Blade Radius	Access Road: For Construction (Temporary)	Watercourse Crossing Access Road: Permanent	Not Classified / Not Recorded
Transformer Sub-Station; Switch Yard	Overhead 230kV Transmission Line	Watercourse Crossing Transmission / Collector Line: Underground	Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
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			Permanent: Warm Sensitive Species Present Class B Authorization
			Permanent: Warm Fish Community Composed of Baitfish Class C Authorization

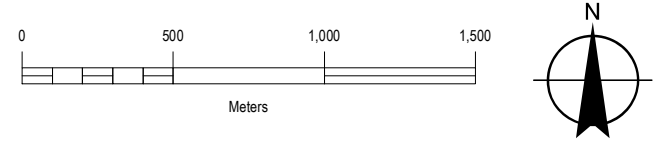
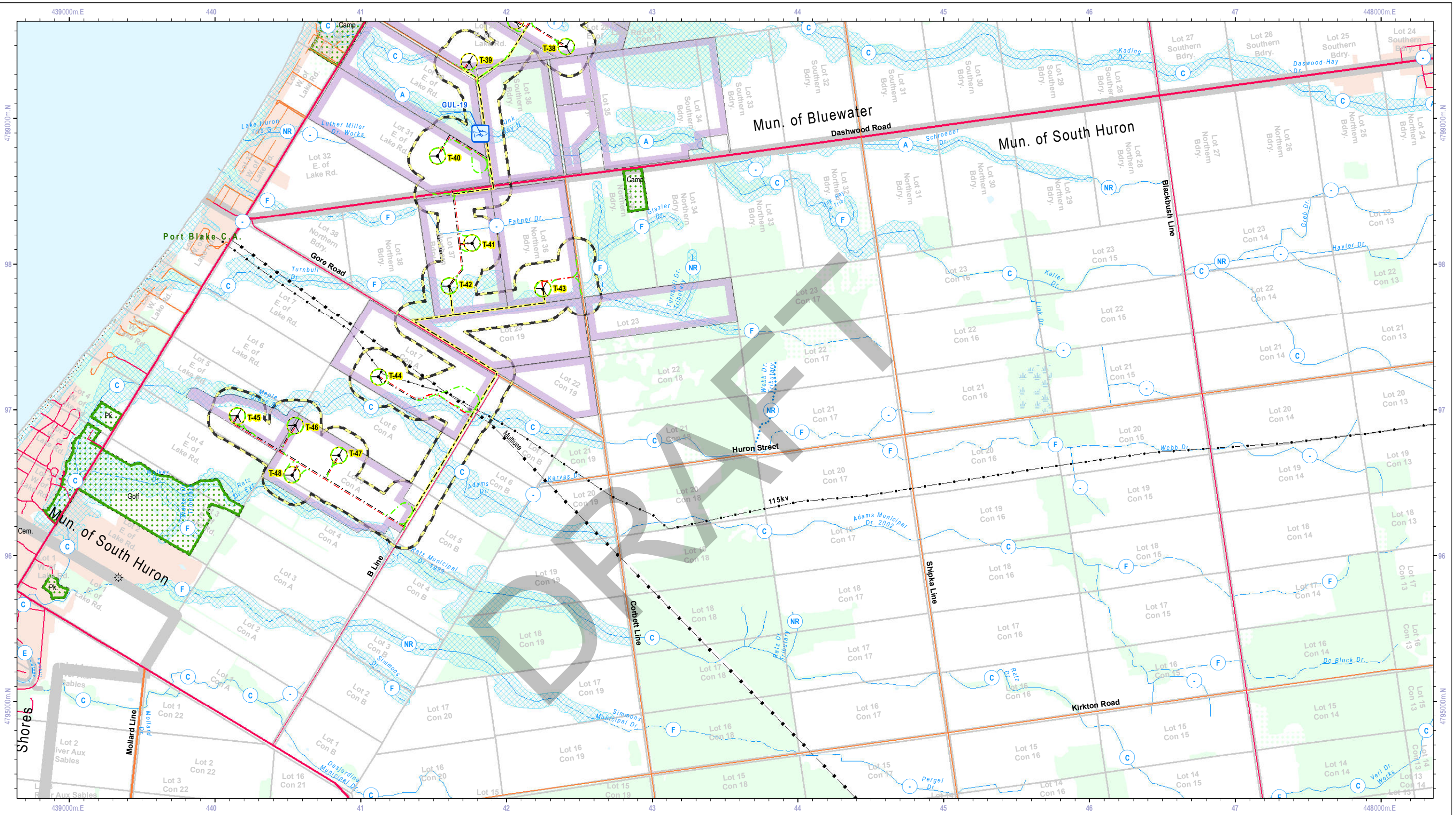
Title <b>Grand Bend Wind Farm Grand Bend Wind Limited Partnership Water Assessment &amp; Water Bodies Report Watercourse Crossings</b>			
Prepared	P. Stubbert	Checked	C. Pfohl
Scale	1:25,000	Project	PIA019991
		Map Number	<b>2h</b>



-  Wind Turbine Location
-  120m From Project Location



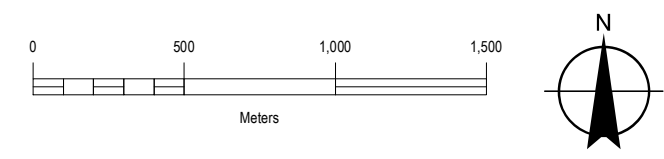
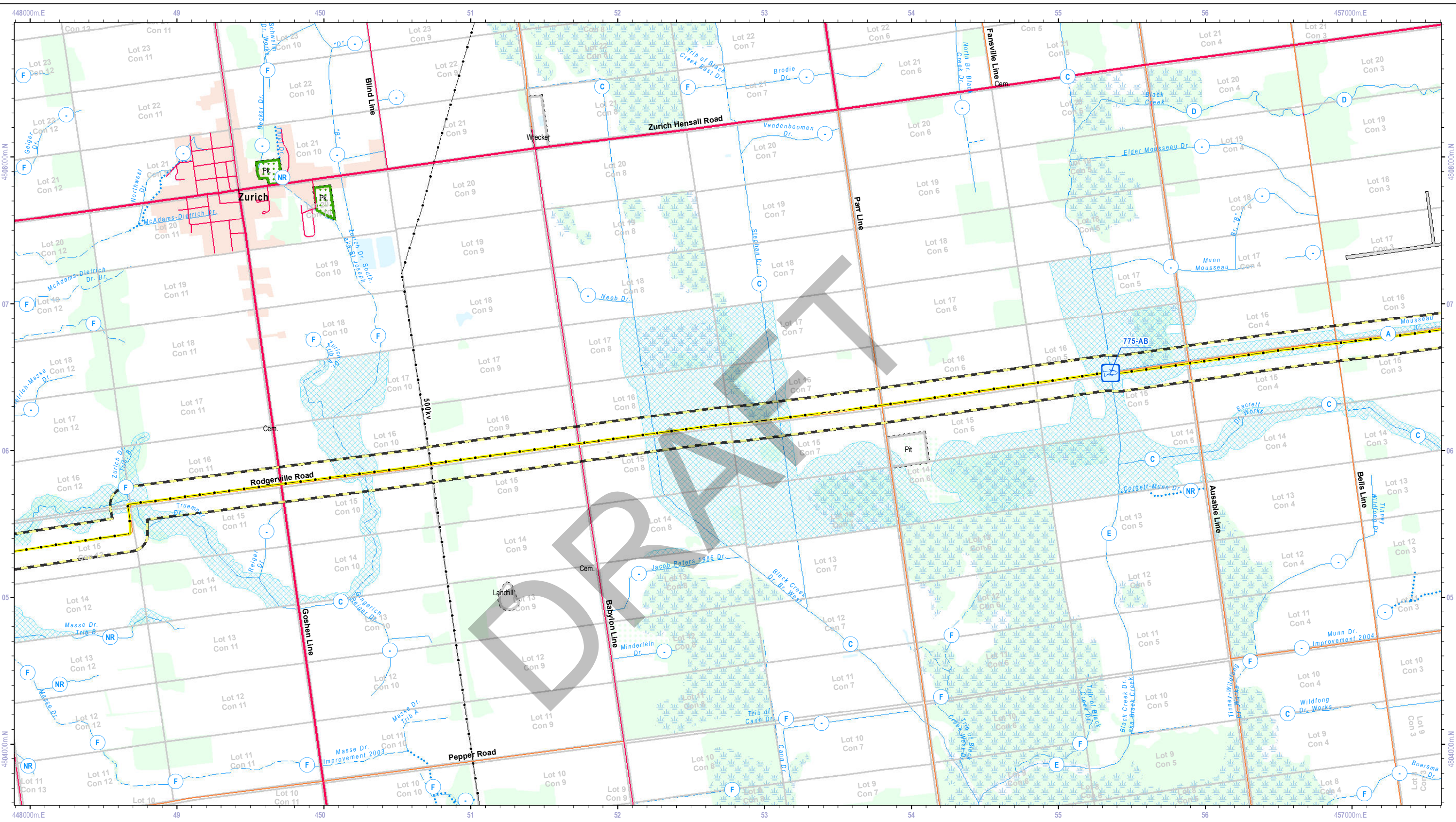
Title			
Grand Bend Wind Farm Grand Bend Wind Limited Partnership Water Assessment & Water Bodies ABCA Fish Survey Information			
Prepared	P. Stubbert	Checked	C. Pfohl
Scale	1:150,000	Project	PIA019991
Figure Number			<b>3 - Key Map</b>



Wind Turbine Location & Blade Radius	Access Road: For Construction (Temporary)	Fish Species Survey Location	Not Classified / Not Recorded
Transformer Sub-Station; Switch Yard	Overhead 230kV Transmission Line	Flood Regulation Limit	Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
Participating Property	Underground 36kV Collector Line or 230kV Transmission Line	Assembly Site Area Boundary	Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
Access Road & Underground Collector Line	120m From Project Location		Permanent: Warm Top Predators/Ecosystem Indicator Species Project Specific Authorization
Access Road: Permanent			Intermittant: No Authorization Required
			Permanent: Warm Sensitive Species Present Class B Authorization
			Permanent: Warm Fish Community Composed of Baitfish Class C Authorization

Title <b>Grand Bend Wind Farm Grand Bend Wind Limited Partnership Water Assessment &amp; Water Bodies Report ABCA Fish Survey Information</b>			
Prepared	P. Stubbert	Checked	C. Pfohl
Scale	1:25,000	Project	PIA019991
Map Number			<b>3a</b>

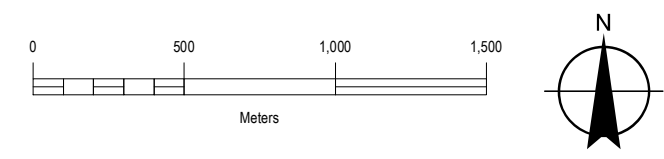
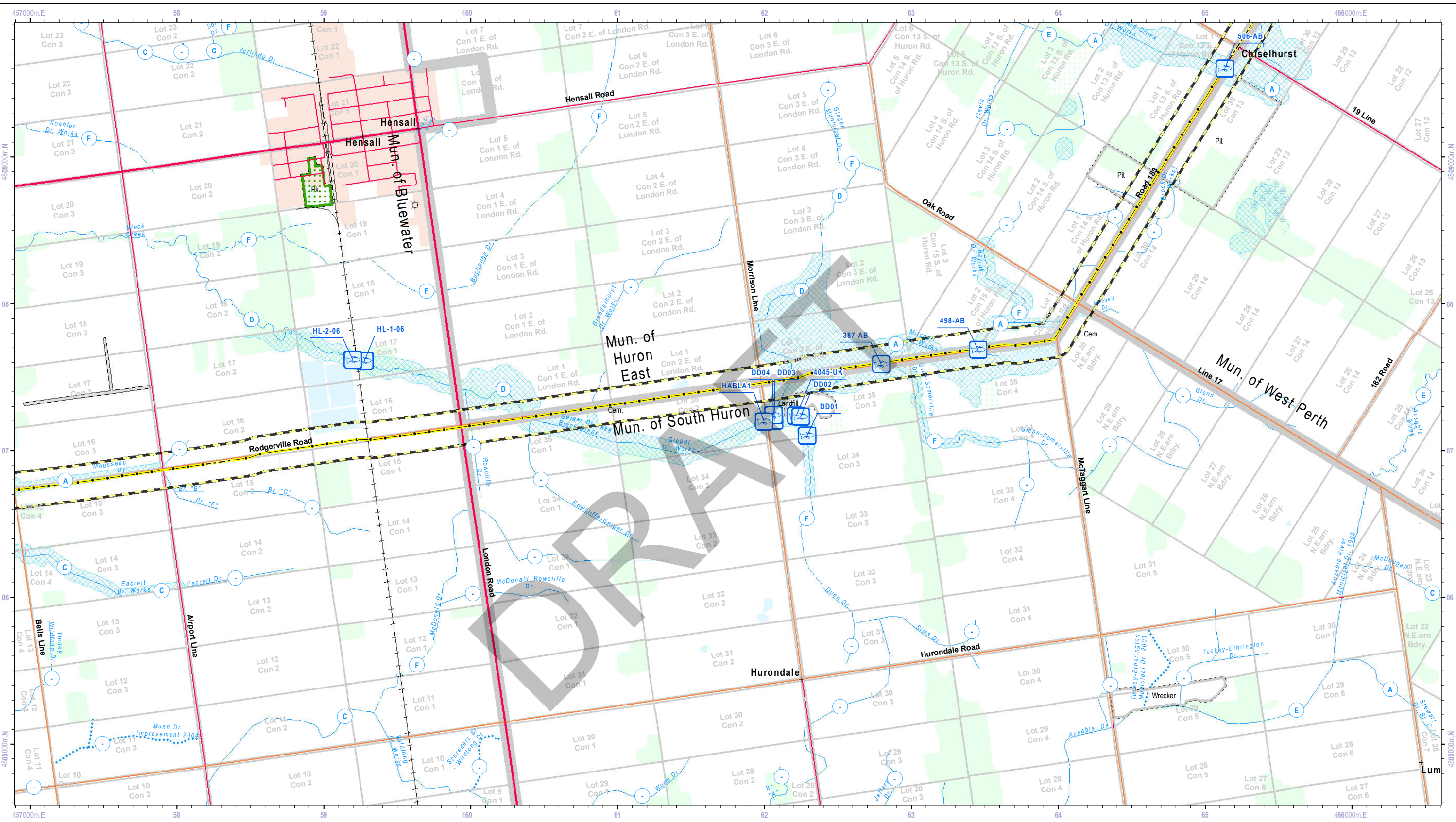




Wind Turbine Location & Blade Radius	Access Road: For Construction (Temporary)	Fish Species Survey Location	Not Classified / Not Recorded
Transformer Sub-Station; Switch Yard	Overhead 230kV Transmission Line	Flood Regulation Limit	Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
Participating Property	Underground 36kV Collector Line or 230kV Transmission Line		Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
Access Road & Underground Collector Line	Assembly Site Area Boundary		Permanent: Warm Top Predators/Ecosystem Indicator Species Project Specific Authorization
Access Road: Permanent	120m From Project Location		Intermittant: No Authorization Required
			Permanent: Warm Sensitive Species Present Class B Authorization
			Permanent: Warm Fish Community Composed of Baitfish Class C Authorization

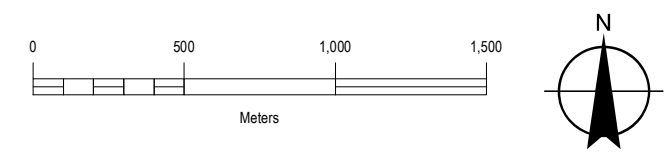
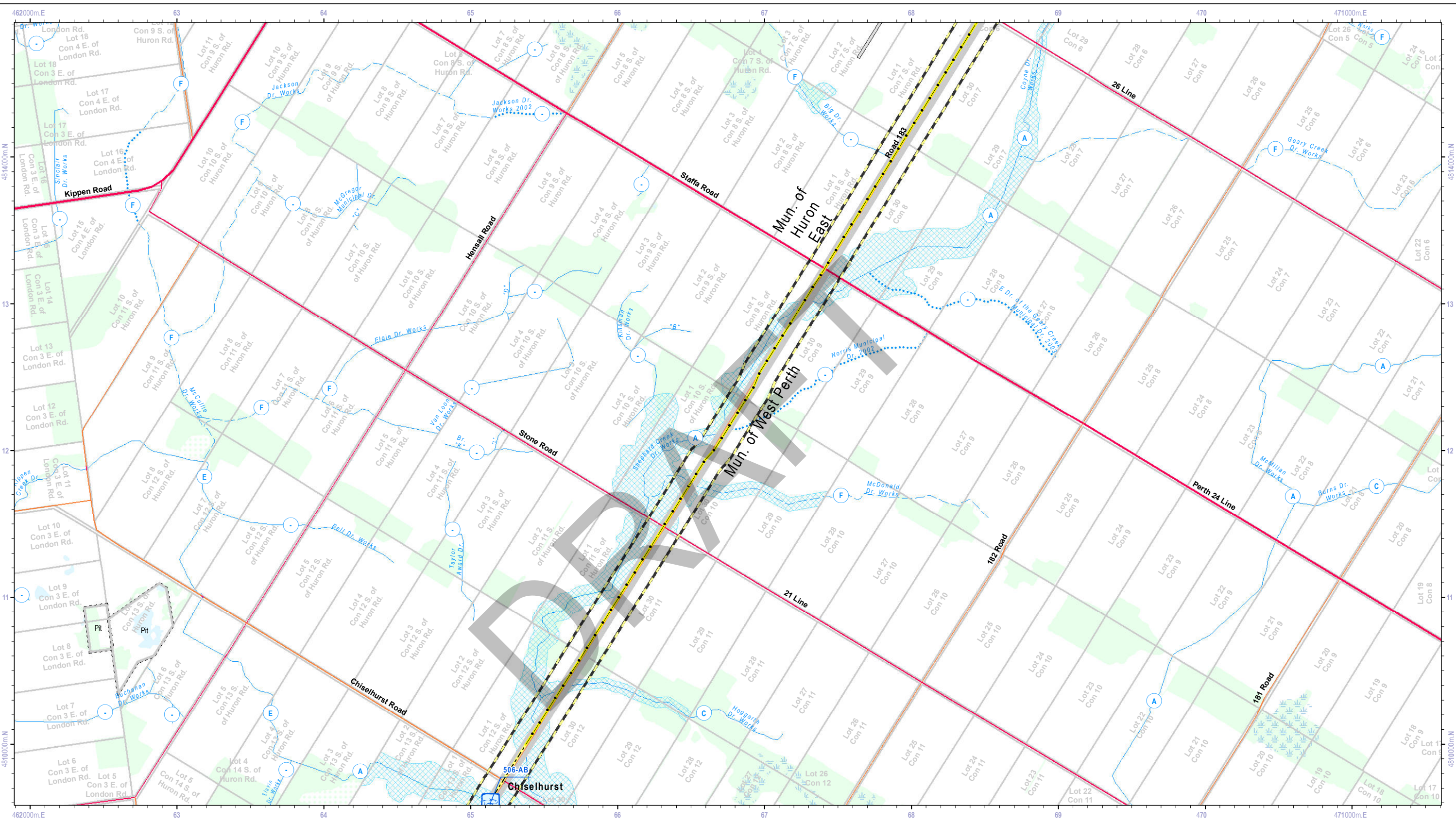
Title <b>Grand Bend Wind Farm Grand Bend Wind Limited Partnership Water Assessment &amp; Water Bodies Report ABCA Fish Survey Information</b>			
Prepared	P. Stubbert	Checked	C. Pfohl
Scale	1:25,000	Project	PIA019991
		Map Number	<b>3b</b>





Wind Turbine Location & Blade Radius	Access Road: For Construction (Temporary)	Fish Species Survey Location	Not Classified / Not Recorded
Transformer Sub-Station; Switch Yard	Overhead 230kV Transmission Line	Flood Regulation Limit	Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
Participating Property	Underground 36kV Collector Line or 230kV Transmission Line		Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
Access Road & Underground Collector Line	Assembly Site Area Boundary		Permanent: Warm Sensitive Species Present Class B Authorization
Access Road: Permanent	120m From Project Location		Permanent: Warm Top Predators/Ecosystem Indicator Species Project Specific Authorization
			Intermittant: No Authorization Required
			Permanent: Warm Fish Community Composed of Baitfish Class C Authorization

Title <b>Grand Bend Wind Farm Grand Bend Wind Limited Partnership Water Assessment &amp; Water Bodies Report ABCA Fish Survey Information</b>			
Prepared	P. Stubbert	Checked	C. Pfohl
Scale	1:25,000	Project	PIA019991
Map Number			<b>3c</b>



Wind Turbine Location & Blade Radius	Access Road: For Construction (Temporary)	Fish Species Survey Location	Not Classified / Not Recorded
Transformer Sub-Station; Switch Yard	Overhead 230kV Transmission Line	Flood Regulation Limit	Permanent: Cold/Cool No Known Sensitive Fish Species Class A Authorization
Participating Property	Underground 36kV Collector Line or 230kV Transmission Line	Permanent: Warm Sensitive Species Present Class B Authorization	Permanent: Cold/Cool Trout or Salmon Populations Project Specific Authorization
Access Road & Underground Collector Line	Assembly Site Area Boundary	Permanent: Warm Fish Community Composed of Baitfish Class C Authorization	Permanent: Warm Top Predators/Ecosystem Indicator Species Project Specific Authorization
Access Road: Permanent	120m From Project Location	Intermittant: No Authorization Required	

Title  
**Grand Bend Wind Farm  
 Grand Bend Wind Limited Partnership  
 Water Assessment & Water Bodies Report  
 ABCA Fish Survey Information**

Prepared	P. Stubbert	Checked	C. Pfohl	Map Number	3d
Scale	1:25,000	Project	PIA019991		



**Appendix B**  
**Correspondence**

DRAFT



## Minutes of Meeting

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### Grand Bend Wind Farm Ministry of Natural Resources Project Status Meeting

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Meeting Date: April 10, 2012

Date Prepared: April 17, 2012

Time: 10:00 am – 12:00 pm (noon)

Location: Neegan Burnside Ltd., Guelph Office

File No.: PIA019991

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#### Those in attendance were:

Jim Beal	MNR
Amy Cameron	MNR
Graham Buck	MNR Guelph District Office
Erin Harkins	MNR Guelph District Office
Sarah Mainguy	North-South Environmental
Gordon Potts	Northland Power Inc.
Carol-Ann Fletcher	Northland Power Inc.
Lyle Parsons	Neegan Burnside Ltd.
Chris Pfohl	Neegan Burnside Ltd.
Tricia Radburn	Neegan Burnside Ltd.
Paul Stubbert	Neegan Burnside Ltd.
Kristy Ramkissoon	Neegan Burnside Ltd.

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#### The following items were discussed:

#### Action by

1. **Project Status, work completed to date, proposed timelines**
  - 1.1 Lyle provided a status of the Project to date following issuance of a FIT Contract by the OPA in 2011. He indicated that some fieldwork was carried out last year; however noted that with ongoing changes to the rules and protocols it is becoming somewhat difficult to keep up to date.
  - 1.2 Jim noted that regarding the Endangered Species Act (ESA), a scientific panel decides which species should be on or off the Species

**Action by**

at Risk in Ontario (SARO) list. Northland is responsible for addressing any Endangered or Threatened species that get listed during the approval process.

- 1.3 Lyle indicated that if there is a number of species being considered by the scientific panel for this year it would be helpful if this information can be provided to Neegan Burnside. Tricia confirmed that Neegan Burnside has a copy of the species list.
- 1.4 Lyle indicated that the study team is working towards completing the NHA & EIS by end of June 2012 and subsequently will be submitted to MNR. He noted that the second set of Public Information Centres will be held in October 2012. He informed the attendees that the REA application will be submitted to the Ministry of Environment at the end of December 2012 or early 2013.
- 1.5 Tricia provided an outline of the fieldwork completed to date. She indicated that a preliminary layout was completed and stated that there are two transmission line route options and the preferred option will be selected shortly. Tricia indicated that studies are to be completed for both transmission lines.
- 1.6 Amy indicated that she did not have digital copies of the preliminary reports submitted by Neegan Burnside to provide comments. Tricia noted that work is ongoing on the reports and they will be re-submitted at a later date once they are in a more complete state.
- 1.7 Lyle and Gordon both indicated that the northern transmission route is the preferred option for the Project.
- 1.8 Jim noted that there are 48 turbine locations shown on the map provided for this Project; however inquired as to how many turbines are considered as optional and whether any additional turbines were being considered. Gordon indicated that the Project will consist of 48 turbines; however 45 turbines will provide a maximum capacity of 100 MW.
- 1.9 Jim questioned whether further changes to the layout are expected due to noise studies. Lyle indicated that noise studies have been undertaken and the layout is generally considered to be final with the exception of minor "tweaking".
- 1.10 Jim advised that a broad study area should be included in the NHA to allow for flexibility in the layout if required.
- 1.11 Lyle noted that the transmission line will be on a single pole approximately 85 feet high and the intent is to install these poles close to the road side within road allowance. Gordon indicated that it is expensive to bury road cable. He noted that the final design will determine whether directional drilling will be undertaken.
- 1.12 Lyle noted that directional drilling may be anticipated under wetlands. Tricia confirmed that Hay Swamp Provincially Significant Wetland (PSW) is located in the study area. Amy advised that if the wetland

**Action by**

comes close up to the road, directional drilling should be undertaken under the road or on the opposite side of the road if possible. \*In a follow-up email after the meeting it was clarified that directional drilling may be permitting under a PSW. The area below the wetland is considered to be “adjacent” to the wetland. Mitigation such as a frac out plan would be required.

**2. MNR Guidance Documents/Ecoregion Criteria Schedules**

- 2.1 Tricia asked about the MNR’s draft schedule of Significant Wildlife Habitat (SWH) for Ecoregion 6. She inquired as to whether the document is still “Draft” and if any changes are anticipated to the criteria. Amy advised that Neegan Burnside use the draft version that is posted on the EBR website and indicated that the MNR does not anticipate any significant changes to the criteria. Amy noted that if there are changes, Northland would be obligated to address them but could use the option of conducting pre-construction surveys after the REA submission.
- 2.2 Gordon inquired about surveys required prior to construction and whether the project could be denied after the REA application if that option was used. Amy indicated that the proponent is allowed to build in a SWH. She noted that MNR reviews to make sure the correct study methodologies were used. SWH can be treated as significant and brought forward to the Environmental Impact Study (EIS). She noted that the EIS will address significant habitats and appropriate mitigation measures must be included. For pre-construction surveys, mitigation must be given at the time of the REA application and then only applied if necessary, based on the findings of the pre-construction surveys.

**3. Bats**

- 3.1 Tricia inquired about the Bat Migratory Stopover Areas. Jim indicated that the criteria for confirming Bat Migratory Stopover Areas are not currently defined in the SWH Technical Guide and therefore in the absence of such criteria, the MNR is unable to evaluate this habitat.
- 3.2 Tricia noted COSEWIC listed 3 bats species as Species of Conservation concern and questioned how these should be addressed. Amy indicated that bat hibernacula and bat colonies should be considered; however there is not enough information presently to determine whether these species are considered Species at Risk. She noted that the Eastern Small-footed Bat is also listed as a candidate species at risk expected to be assessed by COSARRO.
- 3.3 Tricia indicated that there are karst features present along the northern transmission line route but no known sink holes and asked whether the karst should be treated as significant. Noted that it is difficult to survey for bats from the roadside. Both Amy and Graham noted that karst is not necessarily bat habitat. Sinkholes may be bat habitat. Graham noted that he will provide a list of species to be reviewed by COSSARO including bats. Tricia noted that she has a copy of the list already.

**Action by**

Graham indicated once there is enough information these species will be assessed by COSSARO and will be included in the June 2012 schedule.

**4. Species at Risk**

4.1 Tricia inquired about information required for the APRD document.

4.2 Graham noted that information will be sent to Tricia providing guidance on the forms required for submission. He noted that the SAR template should be used as a guide when completing the SAR Report. Amy advised that the SAR Report and Information Gathering Form be sent to Graham for review

MNR

4.3 Erin noted that there is a 3 month review period for the SAR report and following this a decision will be made. Indicated that this decision is timed with MOE's decision regarding the REA application.

**5. Species-specific survey protocols**

5.1 Erin asked whether there were any specific questions relating to ESA and habitat.

5.2 Sara inquired about the Barn Owl protocol and whether they should be looking for pellets.

5.3 Graham indicated that the team should be looking for Barn owl roosting areas such as barns and or hollow trees. He noted that the team should examine pellets in and around built structures. Graham indicated that roadside surveys were done in the past; however this type of survey is not always effective.

5.4 Tricia provided hard copies of a table reproduced listing the protocols followed for each survey. She indicated that the ELC was completed for the project area and is yet to be done for both transmission line routes. Tricia also indicated that aquatic habitat mapping was completed.

5.5 Tricia requested information on Redside Dace. Advised that all in-water works will occur in intermittent drains only. The overhead transmission line will cross other watercourses but there will be no in-water work associated with this. Graham noted that the watercourse crossings would not be considered Redside Dace habitat and thus there is no need for sampling or permits. This will be confirmed upon submission of the Information Gathering Form.

5.6 Tricia indicated that in the spring of 2011, some bird surveys were completed but the SWH criterion was not followed. She noted that bird surveys to be conducted this year will follow the criteria and will be part of the site investigation.

5.7 Graham asked if surveys were completed for Chimney Swift, Common Nighthawk and Whip-poor-will. Sarah noted Whip-poor-will inhabit open areas; however these areas are not found in the study area.

**Action by**

- 5.8 Graham noted that for the species mentioned above, the field specialists should be looking for turbines located close to buildings that are slated for removal. Lyle indicated that majority of the buildings in the study area are approximately 500 m away. He noted that barns and houses are fairly close to each other. Graham indicated that if there are no buildings slated for removal or modification then there is no need to survey for these species.
- 5.9 Tricia inquired as to whether SAR habitats should be treated as “significant” along the transmission line routes. Tricia noted that it is somewhat difficult to determine the habitat since only roadside surveys can be conducted. Amy asked whether any trees will be removed and/or directional drilling under wetlands will be undertaken. Gordon indicated that some trees may be removed. Graham noted that if habitat is being removed, SAR will be affected as there is the potential for the habitat to exist. Gordon indicated that there is the possibility of installing cable underground and asked whether there would be any implications regarding the permitting.
- 5.10 Amy noted that the NHA process considers Deer and Raptor Wintering Areas. Tricia indicated that these areas exist in the study area. Lyle inquired as to the relation between deer yard and underground lines. Amy indicated that Deer Yards provide shelter or protection for deer from winter conditions. She noted that Deer yards are dominated by coniferous species and if a portion of the trees is taken out ultimately the habitat is removed.
- 5.11 Tricia noted that Blanding’s Turtles may be present in the Hay Swamp. She indicated that Chris conducted surveys in and around the swamp and roadside surveys along the transmission line routes. Tricia inquired as to whether the habitat should be considered as generalized. Graham advised that Section 9 of the ESA prohibits killing, harming or harassing Blanding’s turtles. He indicated that habitat regulations should be finalized in 2013. Noted that depending on the project’s construction date the habitat may or may not have protection; however advised to be aware of Section 9 of the ESA if the turtle is identified. Graham noted that detailed surveys are not required if the habitat does not have protection. Chris indicated confirmation is needed if Blanding’s turtles have been using the area and thus he will re-visit the area in April when there is a warm spell.
- 5.12 Tricia noted that West Virginia White is found in deciduous forest. Amy advised that if a portion of the habitat is being removed recommended that a survey be conducted. She indicated that the survey window for West Virginia White is short. Amy indicated that if no habitat is being removed, the habitat should be considered as generalized and the mitigation measure should read “no woodland habitat will be removed”. Graham noted that Garlic Mustard (an invasive plant species) is a problem for West Virginia White. Amy inquired as to how many acres of woodland and or branches will be removed. Gordon indicated 10 m

**Action by**

- from the road shoulder and ditch.
- 5.13 Sarah asked about bird breeding areas along the transmission line routes and indicated that grassland habitat may exist along these routes. Graham advised that with the introduction of a predator-perch (hydro pole), the habitat for grassland birds will shrink as raptors feed from along the roadside. This potential loss of habitat should be considered.
- 5.14 Chris indicated that on March 30, 2012 surveys for Salamanders were undertaken by visual inspection of vernal pools during the day to look for egg masses. He noted that no egg masses were observed. Chris indicated that he will be conducting another survey during the week of April 18 to April 30, 2012.
- 5.15 Chris asked about the next suitable time to survey for snakes in the study area. Graham noted three days with temperatures over 20°C.
- 5.16 Tricia inquired about deer migration corridors areas. Amy noted that the impacts will be negligible because the road already exists which poses a constraint to movement and the impacts associated with a transmission line in the road right-of-way would be negligible.
- 5.17 Sarah asked whether a permit was required for playback surveys for Least Bittern. Graham advised that a permit is not required for this survey.
- 5.18 Tricia indicated that a ESA permit application was submitted for surveys for rusty-patched bumblebee. There was a discussion regarding the need to complete these surveys. No meadow areas will be disturbed with the exception of narrow roadside and field edges. Larger meadow areas cannot be surveyed due to site restrictions. Graham suggested submission of the Information Gathering Form and ELC mapping to map a determination.
- 5.19 Graham noted that Chimney Swift surveys if necessary should not be conducted every week but using methodology; one hour before dusk and one hour after sunset. He noted that the Information Gathering Report should also include Eastern Hog-nosed snake which is listed as threatened on the SARO list. Graham indicated that this species was observed in close proximity to Pinery Provincial Park and there has been one known population in the Huron County. He noted that this species is difficult to detect; however can be surveyed in the spring for potential wintering habitat.
- 5.20 Amy noted that if hibernaculum is identified a 30 m buffer protection is required and mitigation measures should be provided. Amy indicated that if the Eastern Hog-nosed snake is identified, Neegan Burnside should engage in discussions with Graham to discuss impacts and mitigation measures.
- 5.21 Tricia indicated that regarding Red-headed Woodpeckers, if not removing woodland habitat or habitat is not located within 120 m of

**Action by**

- project location asked whether the habitat should be considered as generalized habitat. Amy confirmed that the habitat should be considered as generalized and treated as significant even if within 120 m of project location.
- 5.22 Amy indicated that there has been a known occurrence of Bald eagles in the Grand Bend area. Graham advised that Neegan Burnside should view Bird Studies Canada website where Bald eagles are tracked and recorded. Erin indicated that she would send the web address.
- 5.23 Tricia questioned how to address Raptor nesting areas in locations where only a portion of a forest is accessible and large areas cannot be searched for nests due to site access restrictions. Amy advised that if no infrastructure is proposed at or within 120 m, the habitat should be considered as generalized.
- 5.24 Tricia noted that the public expressed concern regarding wildlife mortality. Amy advised that pre- and post-construction requirements should include bird and bat monitoring at the wind site and follow Ontario's Bird and Bat guidelines for Wind Power. She noted that the NHA process focuses on habitat, not individual animals.
- 5.25 Graham asked if an analysis of petroleum wells were completed and inquired as to whether Neegan Burnside have a copy of the petroleum guidance documents. He advised that the analysis involves a 2 step process; indicated that the MNR Oil & Gas Resources library provides information on petroleum resources within 75 m of the project location. He also noted that the Guelph District Office surveys land that the MNR is not aware of for petroleum facilities. Jim indicated that if petroleum resources exist within 75 m of project location, the MNR intends to review the results as part of the NHA report but noted that Health & Safety issues will be dealt with by the proponent.
- 5.26 Graham noted that regarding Crown land, the information submitted by Neegan Burnside will be forwarded to the MNR's Crown Lands Technician for review. He indicated that crown land issues may relate to water crossings. Neegan will be informed of any issues or the need for further information. Chris indicated that temporary and permanent culvert crossings are being considered.
- 5.27 Lyle asked whether the MNR had experiences where turbines had to be relocated and/or removed as a result of MNR concerns. Amy advised that the regulation allows the proponent to build in a Significant Wildlife Habitat and Significant woodland provided there are mitigation measures; however noted that renewable energy projects are not permitted within Provincially Significant Wetlands. She indicated that she has not seen situations where a wind farm cannot be constructed due to MNR concerns.
- 5.28 Graham also noted that he has never seen a situation where a turbine had to be dropped as a result of a SAR issue. He also made reference to Section 9 Prohibition on killing of the Endangered Species Act if



**Action by**

- exceeding thresholds. Noted that turbines would have to be shut down if exceeding mortality thresholds. Also made reference to Section 10 of the ESA which speaks to Prohibition on damage to habitat.
- 5.29 Lyle inquired as to whether there are any updates regarding bird and bat mortality associated with Wolfe Island Wind Farm. Amy indicated that the Wolfe Island Wind Farm mortality rates will be considered under different guidelines than current wind energy projects. Graham noted that there are other wind energy projects such as Kingsbridge I and near the Goderich area that have reported high mortality rates; however the figures are not known to date.
- 5.30 Tricia inquired about mitigation measures for Bobolink. Erin indicated that possible measures include avoidance and or habitat compensation. Gordon indicated that work will be done along the roadside and asked that if a portion of bobolink habitat is removed would it be possible to offset habitat elsewhere. Graham noted that Northland Power can restore a piece of land or work with NGO's or the Conservation Authorities to assist with this work. He indicated that habitat creation is good but not required under the regulation.
- 5.31 Sarah noted that Bobolinks primary nesting habitat is active hayfields. Tricia indicated that Bobolinks have been observed during bird studies completed last year. She noted that additional surveys will be done this year again and to the locations where they were observed last year. Graham advised that Neegan Burnside look for potential habitat and survey for Bobolinks in that location. He suggested a brief consultation with the landowners asking whether there are any hayfields in the area. There was a discussion regarding the fact that most farms have a crop rotation and hay fields may be present one year and not the next. Graham suggested doing surveys in one year rather than over several years as habitat may change.
- 5.32 Graham asked whether culverts were being replaced or added as Barn Swallows usually nest in culverts. Chris indicated that there will be no replacement of large box culverts; however approximately 4-5 new small size CSP culverts will be installed at associated water crossings.
- 5.33 Following this discussion, Lyle asked if there were any additional comments or issues.
- 5.34 Amy indicated that Neegan Burnside continue working on the NHA and provide reports to the MNR in Microsoft word documents so as to ensure changes are tracked. NB
- 5.35 Lyle thanked everyone for attending and the meeting was adjourned.

The preceding are the minutes of the meeting as observed by the undersigned. Should there be a need for revision, please advise within seven days. In the absence of notification to the contrary, these minutes will be deemed to be an accurate record of the meeting.

**Action by**

Minutes prepared by:

**Neegan Burnside Ltd.**

Kristy Ramkissoon  
Environmental Technologist

*Distribution:*

*Carol-Ann Fletcher, Northland  
Lyle Parsons, Neegan Burnside  
Chris Pfohl, Neegan Burnside  
Sarah Mainguy, North-South Environmental  
Jim Beal, MNR  
Amy Cameron, MNR  
Graham Buck, MNR  
Erin Harkin, MNR*

019991\_ MNR Project Status Meeting Minutes.docx  
13/03/2012 9:20 AM

DRAFT



RE: Information Requirements for Waterbodies and Assessment Reports based on REA Guidelines - PIA019991

Abernethy, Scott (ENE)

to:

Chris Pfohl

05/24/2012 08:29 AM

Cc:

"Tricia Radburn", "Lyle Parsons"

Show Details

History: This message has been replied to.

2 Attachments



image001.gif image002.gif

**This level of detail is acceptable REA information for the project described below.**

Scott Abernethy

Surface Water Group Leader, MOE Southwestern Region

733 Exeter Road, London, Ontario, N6E 1L3

Phone: (519) 873-4779

---

**From:** Chris Pfohl [<mailto:Chris.Pfohl@rjburnside.com>]

**Sent:** May 23, 2012 3:41 PM

**To:** Abernethy, Scott (ENE)

**Cc:** Tricia Radburn; Lyle Parsons

**Subject:** RE: Information Requirements for Waterbodies and Assessment Reports based on REA Guidelines - PIA019991

Hi Scott,

Neegan Burnside is currently working on a wind power project north east of Grand Bend and are looking for clarification from MOE on the information requirements based on the REA Guidelines for Waterbodies and Assessment reports.

We have completed detailed assessments of any watercourses that will require a culvert for access roads (or other infrastructure) and includes the information required under the REA Guidelines for the Waterbodies and Assessment reports.

For watercourses that are within the 120m of a "project location" that will not have potential to be impacted from construction or can be protected using mitigation measures (i.e. sediment and erosion control, no in-water works, avoidance), we have completed a records review that includes detailed information provided by the ABCA Drainage Mapping, MNR and 2010 ortho imagery collected by MNR (Southwestern Ontario Orthoimagery Project - SWOOP 2010) to confirm the location of the watercourse (or waterbody).

Based on the proposed layout, numerous drains are within the 120m project location although will not be impacted by construction or in-water works. The need for detailed information on these low sensitivity

watercourses seems excessive if there is no potential for impact.

We agree that a general description is warranted due to it's proximity to the project although access to reaches of these drains where they encroach on the 120m boundary is very time consuming (due to distances off the main roads).

This has been our approach to date, please clarify if your comfortable with the level of detail and it complies with the information requirements for the Waterbodies and Assessment Report under the REA Information Guidelines.

Thanks for your time Scott, it is greatly appreciated.

regards,

Chris

**NEEGAN BURNSIDE**

Christopher Pfohl, C.E.T.  
Aquatic Resources Specialist

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\*\*\*\*\*

From: "Abernethy, Scott (ENE)" <Scott.Abernethy@ontario.ca>  
To: "Chris Pfohl" <Chris.Pfohl@rjburnside.com>  
Cc: "Harman, Bruce (ENE)" <Bruce.Harman@ontario.ca>  
Date: 05/18/2012 11:06 AM  
Subject: RE: Information Requirements for Waterbodies and Assessment Reports based on REA Guidelines

---

**If a waterbody is at the edge of the 120m and the potential for impact can be shown to be minimal then I would suggest a scaled-back or more cursory (desktop?) investigation be done compared to the detailed investigation required for closer waterbodies. If you would like to suggest an outline for a scaled-back assessment I could give you some feedback about its acceptability.**

Scott Abernethy  
Surface Water Group Leader, MOE Southwestern Region  
733 Exeter Road, London, Ontario, N6E 1L3  
Phone: (519) 873-4779

---

**From:** Chris Pfohl [<mailto:Chris.Pfohl@rjburnside.com>]  
**Sent:** May 16, 2012 1:51 PM  
**To:** Abernethy, Scott (ENE)  
**Cc:** Harman, Bruce (ENE)  
**Subject:** Information Requirements for Waterbodies and Assessment Reports based on REA Guidelines

Hi Scott,

As discussed with Bruce, I would like to discuss the information requirements regarding waterbodies and site investigation based on the REA Technical Guidelines. I need to determine the requirement to do a site investigation on every waterbody within 120m of the "project location". For waterbodies that are on the edge of the 120m boundary that will not be impacted or have the potential to be impacted, is there still a need to do a physical site investigation even though no components of the project will have an impact on that particular waterbody?

We have a site that has numerous small drains that are similar in size and condition that are setback from main access points and the requirement to look at every watercourse could be time consuming and costly.

Just looking for clarification on the Technical Guidelines and referring to a wind power project in the Grand Bend area.

thanks and regards,

Chris



Christopher Pfohl, C.E.T.  
Aquatic Resource Specialist

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**Appendix C**  
**Records Review Results**

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# ABCA Fish Collection Data

Site	FirstOfUTM	FirstOfU_1	FirstOfwtr	Date_	Method	Fish_Count	Fish_speci	FMA	Scientific
10003-AB	461866.000000000000	4800451.000000000000	Ausable River	8/28/2003	Backpack Electrofishing	0	common shiner	Abundant	Luxilus cornutus
10003-AB	461866.000000000000	4800451.000000000000	Ausable River	8/28/2003	Backpack Electrofishing	0	creek chub	Many	Semotilus atromaculatus
10003-AB	461866.000000000000	4800451.000000000000	Ausable River	8/28/2003	Backpack Electrofishing	0	hornyhead chub	Many	Nocomis biguttatus
10003-AB	461866.000000000000	4800451.000000000000	Ausable River	8/28/2003	Backpack Electrofishing	0	rainbow darter	Many	Etheostoma caeruleum
10003-AB	461866.000000000000	4800451.000000000000	Ausable River	8/28/2003	Backpack Electrofishing	0	striped shiner	Abundant	Luxilus chrysocephalus
10003-AB	461866.000000000000	4800451.000000000000	Ausable River	8/28/2003	Backpack Electrofishing	0	white sucker	Many	Catostomus commersoni
10003-AB	461866.000000000000	4800451.000000000000	Ausable River	8/28/2003	Backpack Electrofishing	1	longear sunfish		Lepomis megalotis
10003-AB	461866.000000000000	4800451.000000000000	Ausable River	8/28/2003	Backpack Electrofishing	1	smallmouth bass		Micropterus dolomieu
10003-AB	461866.000000000000	4800451.000000000000	Ausable River	8/28/2003	Backpack Electrofishing	1	stonecat		Noturus flavus
10003-AB	461866.000000000000	4800451.000000000000	Ausable River	8/28/2003	Backpack Electrofishing	2	rock bass		Ambloplites rupestris
387-AB	462794.000000000000	4807588.000000000000	Mitchell Drainage Works	6/1/2003	Observation	0	brook trout		Salvelinus fontinalis
4045-UK	462216.000000000000	4807236.000000000000	Dunn Drain	9/16/2005	Backpack Electrofishing	2	creek chub		Semotilus atromaculatus
4045-UK	462216.000000000000	4807236.000000000000	Dunn Drain	9/16/2005	Backpack Electrofishing	2	white sucker		Catostomus commersoni
4045-UK	462216.000000000000	4807236.000000000000	Dunn Drain	9/16/2005	Backpack Electrofishing	4	brook stickleback		Culaea inconstans
4045-UK	462216.000000000000	4807236.000000000000	Dunn Drain	9/16/2005	Backpack Electrofishing	6	brook trout		Salvelinus fontinalis
4045-UK	462216.000000000000	4807236.000000000000	Dunn Drain	9/16/2005	Backpack Electrofishing	16	blacknose dace		Rhinichthys atratulus
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	1	fathead minnow		Pimephales promelas
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	2	bluntnose minnow		Pimephales notatus
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	2	iowa darter		Etheostoma exile
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	3	smallmouth bass		Micropterus dolomieu
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	4	stonecat		Noturus flavus
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	5	blacknose dace		Rhinichthys atratulus
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	5	northern hog sucker		Hypentelium nigricans
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	5	shiner sp.		Notropis sp.
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	6	johnny darter		Etheostoma nigrum
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	6	striped shiner		Luxilus chrysocephalus
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	57	rock bass		Ambloplites rupestris
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	60	white sucker		Catostomus commersoni
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	70	creek chub		Semotilus atromaculatus
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	74	common shiner		Luxilus cornutus
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	89	rainbow darter		Etheostoma caeruleum
4048-UK	462808.000000000000	4800733.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	104	hornyhead chub		Nocomis biguttatus
4050-UK	460610.000000000000	4800715.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	1	smallmouth bass		Micropterus dolomieu
4050-UK	460610.000000000000	4800715.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	2	rock bass		Ambloplites rupestris
4050-UK	460610.000000000000	4800715.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	6	common shiner		Luxilus cornutus
4050-UK	460610.000000000000	4800715.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	6	hornyhead chub		Nocomis biguttatus
4050-UK	460610.000000000000	4800715.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	6	northern hog sucker		Hypentelium nigricans
4050-UK	460610.000000000000	4800715.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	19	creek chub		Semotilus atromaculatus
4050-UK	460610.000000000000	4800715.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	56	rainbow darter		Etheostoma caeruleum
4050-UK	460610.000000000000	4800715.000000000000	Ausable River	6/10/2005	Backpack Electrofishing	137	white sucker		Catostomus commersoni
4051-UK	460728.000000000000	4800481.000000000000	Ausable River	10/5/2005	Backpack Electrofishing	1	common carp		Cyprinus carpio
4051-UK	460728.000000000000	4800481.000000000000	Ausable River	10/5/2005	Backpack Electrofishing	1	creek chub		Semotilus atromaculatus
4051-UK	460728.000000000000	4800481.000000000000	Ausable River	10/5/2005	Backpack Electrofishing	1	striped shiner		Luxilus chrysocephalus
4051-UK	460728.000000000000	4800481.000000000000	Ausable River	10/5/2005	Backpack Electrofishing	2	river chub		Nocomis micropogon
4051-UK	460728.000000000000	4800481.000000000000	Ausable River	10/5/2005	Backpack Electrofishing	3	darter sp.		Etheostoma sp.



# ABCA Fish Collection Data

Site	FirstOfUTM	FirstOfU_1	FirstOfwtr	Date_	Method	Fish_Count	Fish_speci	FMA	Scientific
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	4	bluntnose minnow		Pimephales notatus
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	4	shiner sp.		Notropis sp.
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	5	white sucker		Catostomus commersoni
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	6	stonecat		Noturus flavus
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	10	common shiner		Luxilus cornutus
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	10	iowa darter		Etheostoma exile
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	12	northern hog sucker		Hypentelium nigricans
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	12	rock bass		Ambloplites rupestris
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	39	greenside darter		Etheostoma blennioides
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	45	central stoneroller		Campostoma anomalum
4051-UK	460728.00000000000	4800481.00000000000	Ausable River	10/5/2005	Backpack Electrofishing	63	rainbow darter		Etheostoma caeruleum
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	1	bluntnose minnow		Pimephales notatus
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	1	Chinook salmon		Oncorhynchus tshawytscha
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	1	hornyhead chub		Nocomis biguttatus
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	3	rock bass		Ambloplites rupestris
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	4	central stoneroller		Campostoma anomalum
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	5	blacknose dace		Rhinichthys atratulus
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	5	stonecat		Noturus flavus
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	5	white sucker		Catostomus commersoni
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	24	greenside darter		Etheostoma blennioides
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	24	river chub		Nocomis micropogon
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	28	common shiner		Luxilus cornutus
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	62	creek chub		Semotilus atromaculatus
4052-UK	458738.00000000000	4801154.00000000000	Ausable River	6/29/2004	Backpack Electrofishing	73	rainbow darter		Etheostoma caeruleum
4053-UK	459596.60702900000	4800898.62635000000	Ausable River	6/28/2005	Backpack Electrofishing	1	northern pike		Esox lucius
4053-UK	459596.60702900000	4800898.62635000000	Ausable River	6/28/2005	Backpack Electrofishing	2	rainbow darter		Etheostoma caeruleum
4053-UK	459596.60702900000	4800898.62635000000	Ausable River	6/28/2005	Backpack Electrofishing	5	rock bass		Ambloplites rupestris
4053-UK	459596.60702900000	4800898.62635000000	Ausable River	6/28/2005	Backpack Electrofishing	5	white sucker		Catostomus commersoni
4053-UK	459596.60702900000	4800898.62635000000	Ausable River	8/25/2009	Backpack Electrofishing	3	johnny darter		Etheostoma nigrum
4053-UK	459596.60702900000	4800898.62635000000	Ausable River	8/25/2009	Backpack Electrofishing	5	rainbow darter		Etheostoma caeruleum
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	1	creek chub		Semotilus atromaculatus
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	1	largemouth bass		Micropterus salmoides
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	1	white crappie		Pomoxis annularis
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	2	johnny darter		Etheostoma nigrum
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	4	common carp		Cyprinus carpio
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	5	longear sunfish		Lepomis megalotis
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	5	pumpkinseed		Lepomis gibbosus
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	6	blackside darter		Percina maculata
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	10	greenside darter		Etheostoma blennioides
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	13	smallmouth bass		Micropterus dolomieu
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	19	rock bass		Ambloplites rupestris
4054-UK	458694.00000000000	4801067.00000000000	Ausable River	10/3/2005	Backpack Electrofishing	26	rainbow darter		Etheostoma caeruleum
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	1	golden shiner		Notemigonus crysoleucas
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	1	smallmouth bass		Micropterus dolomieu
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	2	johnny darter		Etheostoma nigrum

# ABCA Fish Collection Data

Site	FirstOfUTM	FirstOfU_1	FirstOfwtr	Date_	Method	Fish_Count	Fish_speci	FMA	Scientific
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	2	least darter		Etheostoma microperca
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	3	striped shiner		Luxilus chrysocephalus
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	6	bluntnose minnow		Pimephales notatus
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	9	pumpkinseed		Lepomis gibbosus
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	9	rock bass		Ambloplites rupestris
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	11	largemouth bass		Micropterus salmoides
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	11	longear sunfish		Lepomis megalotis
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	17	white sucker		Catostomus commersoni
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	24	yellow perch		Perca flavescens
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	32	white crappie		Pomoxis annularis
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	35	yellow bullhead		Ameiurus natalis
4055-UK	463161.00000000000	4800718.00000000000	Ausable River	5/9/2005	Seine - wading	118	common shiner		Luxilus cornutus
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	1	blackside darter		Percina maculata
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	1	bluntnose minnow		Pimephales notatus
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	1	longear sunfish		Lepomis megalotis
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	1	mimic shiner		Notropis volucellus
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	1	yellow bullhead		Ameiurus natalis
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	2	black bullhead		Ameiurus melas
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	2	common shiner		Luxilus cornutus
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	2	white sucker		Catostomus commersoni
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	3	black crappie		Pomoxis nigromaculatus
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	3	redfin shiner		Lythrurus umbratilis
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	4	bluegill		Lepomis macrochirus
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	4	johnny darter		Etheostoma nigrum
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	8	pumpkinseed		Lepomis gibbosus
423-AB	456087.00000000000	4800440.00000000000	Ausable River	8/29/2002	Backpack Electrofishing	10	spotfin shiner		Cyprinella spiloptera
498-AB	463454.00000000000	4807685.00000000000	Mitchell Drainage Works	7/1/2003	Observation	0	brook trout		Salvelinus fontinalis
506-AB	465134.00000000000	4809603.00000000000	Shephard Creek Drainage Works	10/31/2001	Backpack Electrofishing	0	blacknose dace	Many	Rhinichthys atratulus
506-AB	465134.00000000000	4809603.00000000000	Shephard Creek Drainage Works	10/31/2001	Backpack Electrofishing	0	bluntnose minnow	Few	Pimephales notatus
506-AB	465134.00000000000	4809603.00000000000	Shephard Creek Drainage Works	10/31/2001	Backpack Electrofishing	0	brook stickleback	Few	Culaea inconstans
506-AB	465134.00000000000	4809603.00000000000	Shephard Creek Drainage Works	10/31/2001	Backpack Electrofishing	0	johnny darter	Few	Etheostoma nigrum
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	1	common carp		Cyprinus carpio
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	2	blackside darter		Percina maculata
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	3	bluntnose minnow		Pimephales notatus
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	3	fathead minnow		Pimephales promelas
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	4	rock bass		Ambloplites rupestris
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	5	white sucker		Catostomus commersoni
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	7	brook stickleback		Culaea inconstans
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	11	northern redbelly dace		Phoxinus eos
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	13	johnny darter		Etheostoma nigrum
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	15	common shiner		Luxilus cornutus
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	44	creek chub		Semotilus atromaculatus
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	52	greenside darter		Etheostoma blennioides
775-AB	455355.00000000000	4806527.00000000000	Black Creek Drain, aka Black Creek	8/29/2002	Backpack Electrofishing	192	blacknose dace		Rhinichthys atratulus
AUSR-12-04	458419.00000000000	4801232.00000000000	Ausable River	7/15/2004	Backpack Electrofishing	1	bluegill		Lepomis macrochirus

# ABCA Fish Collection Data

Site	FirstOfUTM	FirstOfU_1	FirstOfwtr	Date_	Method	Fish_Count	Fish_speci	FMA	Scientific
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	1	common shiner		Luxilus cornutus
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	1	mimic shiner		Notropis volucellus
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	1	smallmouth bass		Micropterus dolomieu
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	1	stonecat		Noturus flavus
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	2	brown bullhead		Ameiurus nebulosus
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	5	hornyhead chub		Nocomis biguttatus
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	6	pumpkinseed		Lepomis gibbosus
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	7	blackside darter		Percina maculata
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	7	northern pike		Esox lucius
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	8	white sucker		Catostomus commersoni
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	9	rainbow darter		Etheostoma caeruleum
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	10	longear sunfish		Lepomis megalotis
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	12	rock bass		Ambloplites rupestris
AUSR-12-04	458419.0000000000	4801232.0000000000	Ausable River	7/15/2004	Backpack Electrofishing	13	greenside darter		Etheostoma blennioides
DD01	462289.8700000000	4807102.1100000000	Dunn Drain	6/18/2010	Backpack Electrofishing	1	brook trout		Salvelinus fontinalis
DD01	462289.8700000000	4807102.1100000000	Dunn Drain	6/18/2010	Backpack Electrofishing	1	creek chub		Semotilus atromaculatus
DD01	462289.8700000000	4807102.1100000000	Dunn Drain	6/18/2010	Backpack Electrofishing	2	brook stickleback		Culaea inconstans
DD01	462289.8700000000	4807102.1100000000	Dunn Drain	6/18/2010	Backpack Electrofishing	34	blacknose dace		Rhinichthys atratulus
DD02	462245.5900000000	4807230.4300000000	Dunn Drain	6/16/2010	Backpack Electrofishing	7	brook stickleback		Culaea inconstans
DD02	462245.5900000000	4807230.4300000000	Dunn Drain	6/16/2010	Backpack Electrofishing	11	blacknose dace		Rhinichthys atratulus
DD02	462245.5900000000	4807230.4300000000	Dunn Drain	6/16/2010	Backpack Electrofishing	16	brook trout		Salvelinus fontinalis
DD03	462065.0400000000	4807203.1100000000	Dunn Drain	6/17/2010	Backpack Electrofishing	1	creek chub		Semotilus atromaculatus
DD03	462065.0400000000	4807203.1100000000	Dunn Drain	6/17/2010	Backpack Electrofishing	7	brook trout		Salvelinus fontinalis
DD03	462065.0400000000	4807203.1100000000	Dunn Drain	6/17/2010	Backpack Electrofishing	13	blacknose dace		Rhinichthys atratulus
DD04	462059.8500000000	4807241.1600000000	Geiger Drain	6/17/2010	Backpack Electrofishing	1	fathead minnow		Pimephales promelas
DD04	462059.8500000000	4807241.1600000000	Geiger Drain	6/17/2010	Backpack Electrofishing	1	rainbow trout		Oncorhynchus mykiss
DD04	462059.8500000000	4807241.1600000000	Geiger Drain	6/17/2010	Backpack Electrofishing	2	creek chub		Semotilus atromaculatus
DD04	462059.8500000000	4807241.1600000000	Geiger Drain	6/17/2010	Backpack Electrofishing	4	bluntnose minnow		Pimephales notatus
DD04	462059.8500000000	4807241.1600000000	Geiger Drain	6/17/2010	Backpack Electrofishing	5	brook trout		Salvelinus fontinalis
DD04	462059.8500000000	4807241.1600000000	Geiger Drain	6/17/2010	Backpack Electrofishing	6	johnny darter		Etheostoma nigrum
DD04	462059.8500000000	4807241.1600000000	Geiger Drain	6/17/2010	Backpack Electrofishing	12	blacknose dace		Rhinichthys atratulus
DD04	462059.8500000000	4807241.1600000000	Geiger Drain	6/17/2010	Backpack Electrofishing	20	white sucker		Catostomus commersoni
DD04	462059.8500000000	4807241.1600000000	Geiger Drain	6/17/2010	Backpack Electrofishing	25	brook stickleback		Culaea inconstans
GUL-19	441821.5400000000	4798894.1000000000	Unknown Hay H	6/14/2011	Backpack Electrofishing	11	white sucker		Catostomus commersoni
GUL-19	441821.5400000000	4798894.1000000000	Unknown Hay H	6/14/2011	Backpack Electrofishing	26	creek chub		Semotilus atromaculatus
GUL-19	441821.5400000000	4798894.1000000000	Unknown Hay H	6/14/2011	Backpack Electrofishing	35	blacknose dace		Rhinichthys atratulus
HABLA1	461996.5500000000	4807199.6500000000	Black Creek	6/18/2010	Observation	0	brook trout		Salvelinus fontinalis
HABLA1	461996.5500000000	4807199.6500000000	Black Creek	6/18/2010	Observation	0	rainbow trout		Oncorhynchus mykiss
HL-1-06	459275.0900000000	4807608.9900000000	Black Creek	7/12/2006	Backpack Electrofishing	5	brook stickleback		Culaea inconstans
HL-1-06	459275.0900000000	4807608.9900000000	Black Creek	7/12/2006	Backpack Electrofishing	7	rainbow trout		Oncorhynchus mykiss
HL-1-06	459275.0900000000	4807608.9900000000	Black Creek	7/12/2006	Backpack Electrofishing	15	Minnow family		Cyprinidae
HL-1-06	459275.0900000000	4807608.9900000000	Black Creek	7/12/2006	Backpack Electrofishing	24	bluntnose minnow		Pimephales notatus
HL-1-06	459275.0900000000	4807608.9900000000	Black Creek	7/12/2006	Backpack Electrofishing	32	white sucker		Catostomus commersoni
HL-1-06	459275.0900000000	4807608.9900000000	Black Creek	7/12/2006	Backpack Electrofishing	51	creek chub		Semotilus atromaculatus
HL-1-06	459275.0900000000	4807608.9900000000	Black Creek	7/12/2006	Backpack Electrofishing	59	johnny darter		Etheostoma nigrum

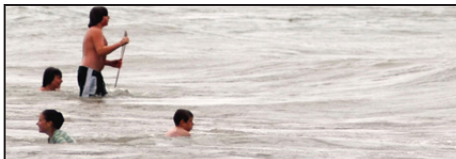
# ABCA Fish Collection Data

Site	FirstOfUTM	FirstOfU_1	FirstOfwtr	Date_	Method	Fish_Count	Fish_speci	FMA	Scientific
HL-1-06	459275.09000000000	4807608.99000000000	Black Creek	7/12/2006	Backpack Electrofishing	123	blacknose dace		Rhinichthys atratulus
HL-1-06	459275.09000000000	4807608.99000000000	Black Creek	11/2/2006	Backpack Electrofishing	1	Minnow family		Cyprinidae
HL-1-06	459275.09000000000	4807608.99000000000	Black Creek	11/2/2006	Backpack Electrofishing	2	brook stickleback		Culaea inconstans
HL-1-06	459275.09000000000	4807608.99000000000	Black Creek	11/2/2006	Backpack Electrofishing	2	rainbow trout		Oncorhynchus mykiss
HL-1-06	459275.09000000000	4807608.99000000000	Black Creek	11/2/2006	Backpack Electrofishing	2	white sucker		Catostomus commersoni
HL-1-06	459275.09000000000	4807608.99000000000	Black Creek	11/2/2006	Backpack Electrofishing	16	bluntnose minnow		Pimephales notatus
HL-1-06	459275.09000000000	4807608.99000000000	Black Creek	11/2/2006	Backpack Electrofishing	22	creek chub		Semotilus atromaculatus
HL-1-06	459275.09000000000	4807608.99000000000	Black Creek	11/2/2006	Backpack Electrofishing	28	johnny darter		Etheostoma nigrum
HL-1-06	459275.09000000000	4807608.99000000000	Black Creek	11/2/2006	Backpack Electrofishing	77	blacknose dace		Rhinichthys atratulus
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	7/12/2006	Backpack Electrofishing	1	rainbow trout		Oncorhynchus mykiss
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	7/12/2006	Backpack Electrofishing	3	northern redbelly dace		Phoxinus eos
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	7/12/2006	Backpack Electrofishing	5	johnny darter		Etheostoma nigrum
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	7/12/2006	Backpack Electrofishing	17	blacknose dace		Rhinichthys atratulus
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	7/12/2006	Backpack Electrofishing	24	brook trout		Salvelinus fontinalis
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	7/12/2006	Backpack Electrofishing	36	brook stickleback		Culaea inconstans
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	7/12/2006	Backpack Electrofishing	46	creek chub		Semotilus atromaculatus
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	7/12/2006	Backpack Electrofishing	55	white sucker		Catostomus commersoni
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	10/31/2006	Backpack Electrofishing	7	brook trout		Salvelinus fontinalis
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	10/31/2006	Backpack Electrofishing	8	bluntnose minnow		Pimephales notatus
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	10/31/2006	Backpack Electrofishing	10	brook stickleback		Culaea inconstans
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	10/31/2006	Backpack Electrofishing	14	johnny darter		Etheostoma nigrum
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	10/31/2006	Backpack Electrofishing	35	white sucker		Catostomus commersoni
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	10/31/2006	Backpack Electrofishing	49	blacknose dace		Rhinichthys atratulus
HL-2-06	459197.91000000000	4807617.56000000000	Black Creek	10/31/2006	Backpack Electrofishing	50	creek chub		Semotilus atromaculatus

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**Appendix D**  
**ABCA South Gullies Watershed Report**  
**Card**

DRAFT



# South Gullies Watershed Report Card

## Grades:

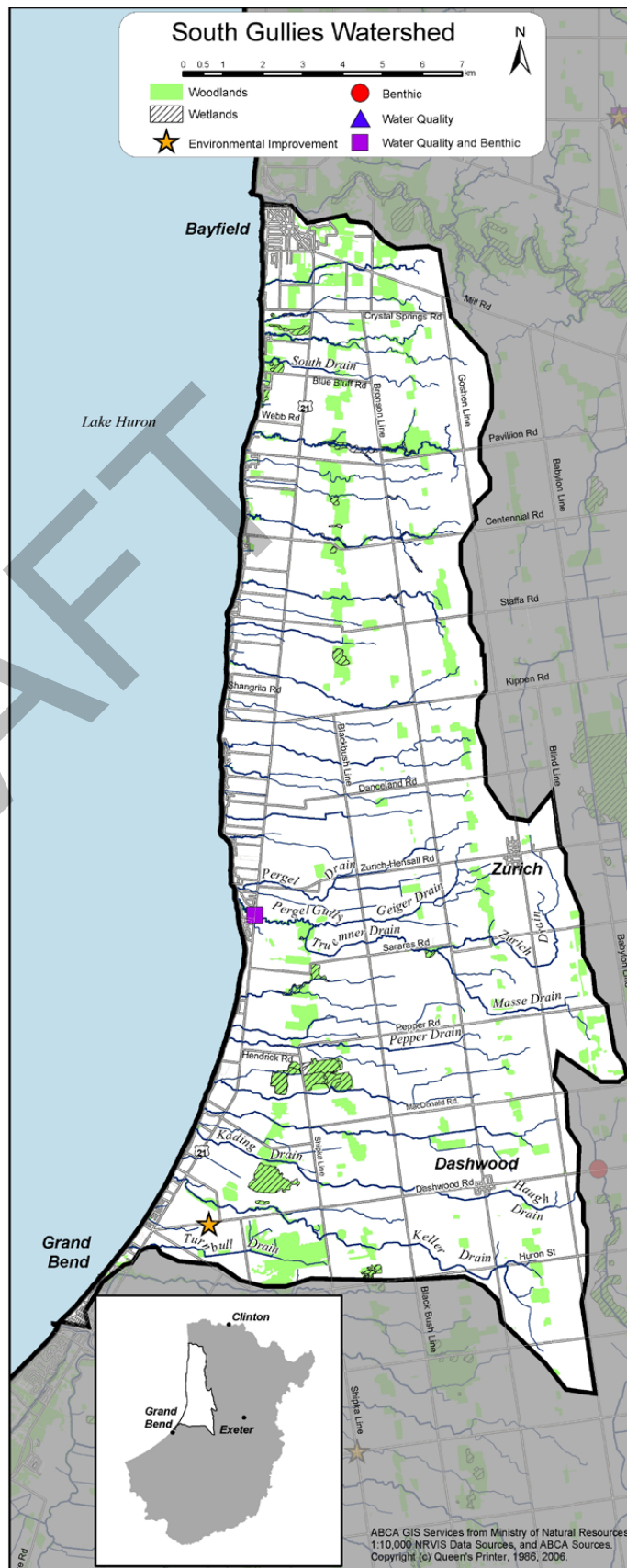
Forest Conditions

**D**

Surface Water Quality

**C**

This report card summarizes water quality and forestry information for the South Gullies watershed (*the highlighted area on the map at right*). This map also shows water quality stations and example environmental improvement locations. For consistency across watersheds, Conservation Ontario has recommended the use of specific water quality and forestry indicators that are described in the following tables. The summary is intended to provide landowners, groups, municipalities and agencies with information to protect, enhance and improve natural features of the watershed. The ongoing monitoring will be reported on a five-year cycle which will help local people manage their natural features. This report card is part of a larger report entitled **The Ausable Bayfield Conservation Authority Watershed Report Card** available at: [www.abca.on.ca](http://www.abca.on.ca). Further information, including methodology, comparisons to the other 15 Ausable Bayfield watersheds and references are also found in the report.



## Priority Strategy for South Gullies Watershed

**Improve:**

Develop an assessment of shoreline tributary contaminant loading and erosion potential.



# South Gullies Watershed Features



**Area:** 201 km<sup>2</sup>    **Municipalities:** Bluewater, Lambton Shores, South Huron

**Geology**    56% Bevelled Till Plains; 27% Till Moraines; 13% Sand Plains; 4% Beaches and Shorecliffs (GIS derived using physiographic maps) (Chapman and Putnam 1984)

**Soils**    60% Clay Loam; 27% Sandy Loam; 7% Loam; 6% Bottomland (County Soils Maps 1951-1991)

**Land Use**    85% agriculture; 10% woodlot; 3% urban; 2% other (OMAFRA 1983)

**Streamside Cover**    22% of the 15 metre area on both sides of open streams is vegetated (OMNR 1986, ABCA 1999)

**Wetlands**    Existing: 1% (OMNR 2003, ABCA 2004); Potential: 13% (ABCA 2005)

**Natural Areas**    Bayfield South, Dashwood Area Earth Science, St. Joseph Till (Area of Natural and Scientific Interest); Datars-Miller Swamp, Keller Swamp (Locally Significant Wetland); Hay Environmentally Significant Areas 6 to 9; Stanley Environmentally Significant Areas 1 to 3; Stanley Environmentally Significant Area 8; Zurich Conservation Area

**Groundwater**    Both shallow (Former Lake Warren Shoreline Aquifer and the Wyoming Moraine Aquifer) and bedrock aquifers are found in this watershed. The bedrock aquifer is the most common source of drinking water and is part of a large aquifer system in southwestern Ontario. The shallow aquifers are possibly a rare source of drinking water for dug or bored wells in the area and are most likely a minor source of the flow for the small streams and gullies that drain into Lake Huron. In this area, only the bedrock aquifer has been sampled and nitrate, chloride concentrations are well below provincial drinking water standards, while levels of fluoride are naturally elevated. A thick sequence of mostly fine-grained glacial sediment separates the small streams and gullies from the bedrock aquifer in this area.

**Fishes**    Fish community dominated by warm water baitfish

## Species at Risk

(As determined by the Committee on the Status of Endangered Wildlife in Canada )

(SOURCE: Natural Heritage Information Centre, 2006)

- Vegetation:**    None identified at this time.
- Reptiles:**    None identified at this time.
- Birds:**    None identified at this time.
- Fishes:**    None identified at this time.
- Mussels:**    None identified at this time.
- Mammals:**    None identified at this time.

**Wastewater Treatment Plants**    Zurich



# South Gullies

## Forest Cover, Surface Water Quality

	Indicator and Description	South Gullies		Ausable Bayfield Area	
		Result	Grade	Result	Grade
Forest Conditions	<b>Forest Cover</b> is the percentage of the watershed that is forested. Environment Canada recommends <b>30%</b> of a watershed should be in forest cover.	<b>9.8%</b>	<b>D</b>	<b>12.6%</b>	<b>C</b>
	<b>Forest Interior</b> is the area inside a woodlot that some bird species need for breeding. Environment Canada recommends <b>10%</b> of a watershed should be in forest cover that is at least 100 m from the forest edge.	<b>1.7%</b>	<b>F</b>	<b>2.8%</b>	<b>D</b>
Water Quality	<b>Total Phosphorus</b> is an element that enhances plant growth and contributes to excess algae and low oxygen in streams and lakes. The Ministry of the Environment has established an environmental health objective concentration of <b>0.03 mg/L</b> .	<b>0.07</b>	<b>B</b>	<b>0.08</b>	<b>B</b>
	<b>E. coli (<i>Escherichia coli</i>)</b> are bacteria found in human and animal waste. Their presence in water indicates the potential for the water to have other disease-causing organisms. The Ministry of Health has established a guideline of <b>100 cfu</b> (colony forming units)/ <b>100 mL</b> in recreational waters.	<b>236</b>	<b>C</b>	<b>233</b>	<b>C</b>
	<b>Benthic Invertebrates</b> are small animals without backbones that live in stream or lake sediments. The Family Biotic Index ( <b>FBI</b> ) summarizes the information about the numbers and types of these animals in a sediment sample. FBI values provide stream health information and values range from <b>1 (healthy) to 10 (degraded)</b> .	<b>5.2</b>	<b>C</b>	<b>5.6</b>	<b>C</b>

Grade	Explanation
A	Indicates excellent ecosystem conditions and protection may be required. Some areas may require enhancement.
B	Indicates good ecosystem conditions. Some areas may require enhancement.
C	Indicates ecosystem conditions that need to be enhanced.
D	Indicates poor ecosystem conditions that need to be improved.
F	Indicates degraded ecosystem conditions that need considerable improvement.





# South Gullies Next Steps and Local Successes



## To improve forest conditions ...

- Dogwood, wild rose, and honey locust are native shrubs/trees that help to prevent erosion yet not block lake views.
- More forests required in headwater areas.

## To improve water quality ...

- Protect all wetlands.
- The drinking water intake located north of Grand Bend services approximately 500,000 people. A committee comprised of both agricultural and lakeshore representatives would be one long-term strategy that might provide a forum to discuss specific water quality issues.
- Short but severe rain events that occur in the small watersheds that drain directly to Lake Huron can cause downstream erosion problems. To address this issue, a first step is to assess the gullies to determine which tributary has potential to have the most severe erosion issues. A second step is to determine what storm water retention options exist upstream in these most severe cases.
- Plant windbreaks and practise conservation tillage on erosion-prone soils (Programs available through ABCA).
- Fix faulty septic systems and establish a septic maintenance plan.
- Decommission abandoned wells and upgrade existing wells to prevent groundwater contamination.
- Upgrade Zurich sewage lagoons.
- Manure Management:
  - Apply manure at rates and times to optimize crop uptake of nutrients and prevent runoff.
  - Monitor tile outlets for contaminants during and following manure application and implement spill contingency plans if necessary.
  - Ensure manure storage facilities are adequate and properly functioning.
  - Keep records; develop a nutrient management plan (Environmental Farm Plan funding may be available).

## Other recommendations

- Continue to support the province's natural heritage policies through local official plans and zoning by-laws (i.e., storm water management, tree cutting bylaw).
- Complete Environmental Action Plans (Farmers see Environmental Farm Plan; Lakeshore residents see Lakeshore Stewardship Manual). A stewardship manual for rural non-farm landowners should be completed by 2007. Contact the ABCA for more information.



## Thumbs up!

The local community through the Huron County Water Protection Steering Committee continues to facilitate dialogue about water quality issues in the lakeshore and agricultural communities.

*This is just one example in the watershed – give us a call and tell us about your project.*



### Ausable Bayfield Conservation Authority

71108 Morrison Line, RR 3 Exeter, ON N0M 1S5

E-mail: [info@abca.on.ca](mailto:info@abca.on.ca)

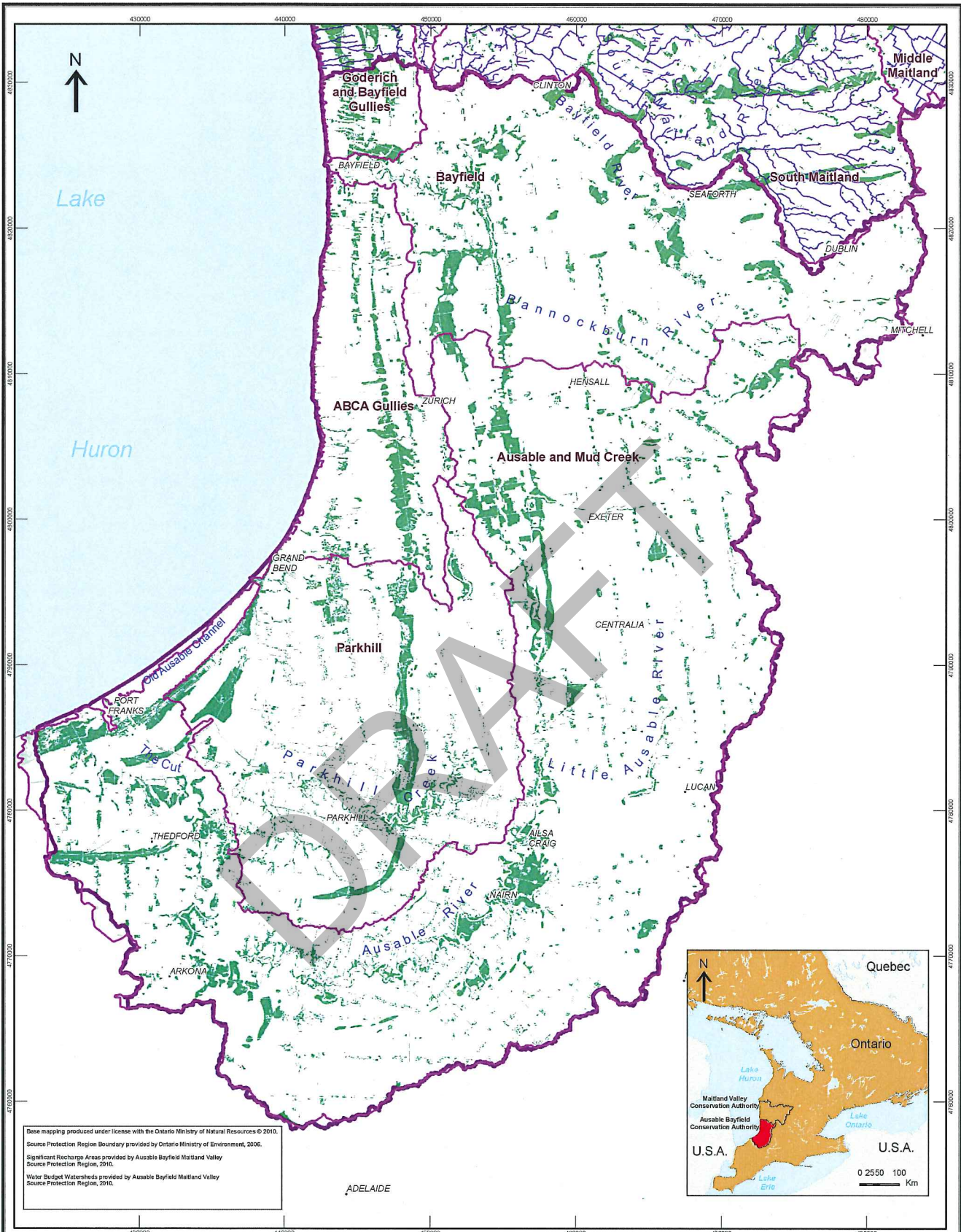
Web site: [www.abca.on.ca](http://www.abca.on.ca)

Phone (519) 235-2610, 1-888-286-2610

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**Appendix E**  
**ABCA Source Protection Maps**

DRAFT



Base mapping produced under license with the Ontario Ministry of Natural Resources © 2010.  
 Source Protection Region Boundary provided by Ontario Ministry of Environment, 2006.  
 Significant Recharge Areas provided by Ausable Bayfield Maitland Valley Source Protection Region, 2010.  
 Water Budget Watersheds provided by Ausable Bayfield Maitland Valley Source Protection Region, 2010.



**LEGEND**

- Water Budget Watersheds
- Source Protection Area
- Watercourse
- Cities and Towns
- Significant Groundwater Recharge Area

Map Projection: UTM NAD83 Zone 17



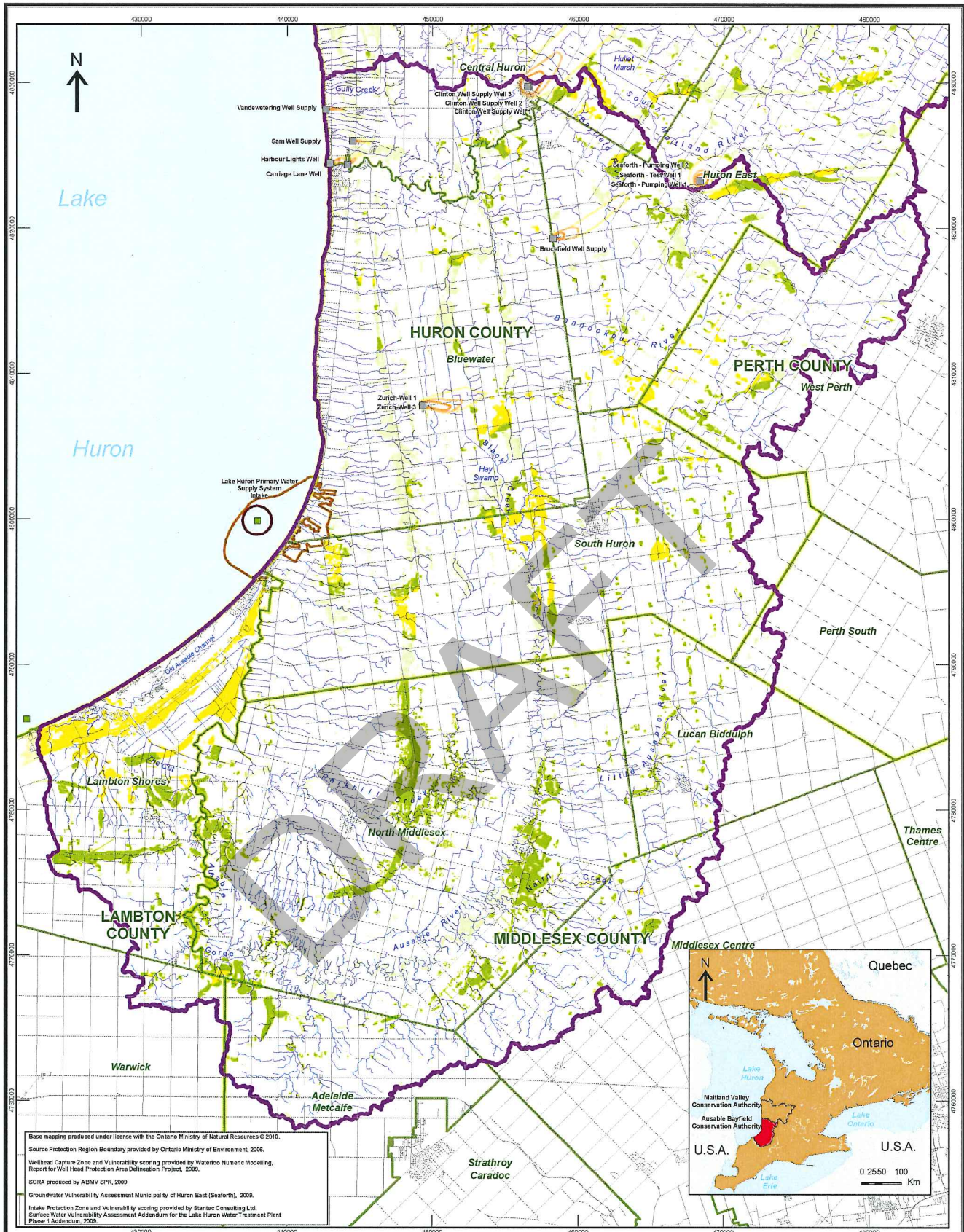
**DRINKING WATER**  
**SOURCE PROTECTION**  
ACT FOR CLEAN WATER

Ausable Bayfield & Maitland Valley Source Protection Region

**Map 3.19 - Ausable Bayfield Significant Groundwater Recharge Areas**

File: C:\swp\mapping\assessment\_report\swp\_AB\_WB\_map3\_19\_abmv\_v3.mxd  
 Date: May 17, 2011  
 Produced By: Darrell Innes ABCAMVCA DWSP Region

ABCAMVCA GIS Services  
 Copyright © Queen's Printer, 2010  
 This map is for illustrative purposes only. It is not a legal survey.



Base mapping produced under license with the Ontario Ministry of Natural Resources © 2010.  
 Source Protection Region Boundary provided by Ontario Ministry of Environment, 2006.  
 Wellhead Capture Zone and Vulnerability scoring provided by Waterloo Numeric Modeling, Report for Well Head Protection Area Delineation Project, 2009.  
 SGRA produced by ABMV SPR, 2009.  
 Groundwater Vulnerability Assessment Municipality of Huron East (Seaforth), 2009.  
 Intake Protection Zones and Vulnerability scoring provided by Stantec Consulting Ltd. Surface Water Vulnerability Assessment Addendum for the Lake Huron Water Treatment Plant Phase 1 Addendum, 2009.



LEGEND		
Source Protection Area	Wellhead Protection Zone	Significant Groundwater Recharge Area
Municipal Boundary	Zone A - 100m	Vulnerability Scoring
County Boundary	Zone B - 2yr tot	GWVA 6
Municipal Well	Zone C - 5yr tot	GWVA 4
Surface Water Intake	Zone D - 25yr tot	GWVA 2
Watercourse	Zone E - GUDI zone	
Road	Intake Protection Zone	
	IPZ1	
	IPZ2	

Ausable Bayfield & Maitland Valley Source Protection Region

**Map 4.3 - Ausable Bayfield SPA Significant Groundwater Recharge Areas**

Map Projection: UTM NAD83 Zone 17

ABCA/MVCA GIS Services  
 Copyright © Queen's Printer, 2011  
 This map is for illustrative purposes only. It is not a legal survey.

File: C:\swplmapping\assessment\_report\swp\_AB\_map\_3\_abmv\_v3.mxd  
 Date: May 17, 2011  
 Produced By: Darrell Innes ABCA/MVCA DWSP Region

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**Appendix F**  
**Field Notes**

DRAFT

GENERAL INFORMATION									
PROJECT #: P1A019991		PROJECT DESCRIPTION: NLWP			DAY: 13	MONTH: 12	YEAR: 2011		
Is STREAM REALIGNMENT required for this section: Yes <input type="radio"/> No <input checked="" type="radio"/> Unknown <input type="radio"/>									
COLLECTORS: CP		WEATHER CONDITIONS: cloudy to sun			TIME STARTED:	TIME FINISHED:			
PHOTOS NUMBERS AND DESCRIPTIONS: see olympus for 2011/12/13 am									
LOCATION									
NAME OF WATERBODY:		DRAINAGE SYSTEM: Turnbull Drain			CROSSING #:	STATION #: CR-003 + CR014			
LOCATION OF CROSSING: Corbett Line(s) head west along drain									
UTM EASTING & NORTHING: 17T 441827.09E 4797683.46mN					MTO CHAINAGE:				
TOWNSHIP: Hwy					MNR DISTRICT: Guelph				
LAND USE AND POLLUTION									
SURROUNDING LAND USE: Agricultural (corn, w. wheat)					SOURCES OF POLLUTION: Agriculture				
EXISTING STRUCTURE TYPE									
Bridge		Box Culvert		Open Foot Culvert		CSP @ Road		N/A	
Other Describe:							Size (w x h) m2 $\approx$ 800mm		
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:				SECTION LOCATION: (include on habitat map)					
TYPE:	Stream / river	Channelized <input checked="" type="checkbox"/>	Permanent	Intermittent <input checked="" type="checkbox"/>	Ephemeral	ASSOCIATED WETLAND: upstream of culvert			
TOTAL SECTION LENGTH (m): $\approx$ 300m					CURRENT VELOCITY (m/s): 0.20 m/s				
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other			
Percentage of area				Drain F 100%					
mean depth wetted (m)				0.20m					
mean width wetted (m)				0.90m					
Mean bankfull width (m)				$\approx$ 7.00m					
Mean bankfull depth (m)				1.80m					
Substrate				SA/GR					
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Ci	Muck Mu	Detritus D	

BANK STABILITY							
	Stable	Slightly Unstable	Moderately Unstable	Unstable			
Left Upstream Bank	✓						
Right Upstream Bank	✓						
HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Large Woody Debris	Organic debris	Vascular plants	None
				Instream 5% Overhanging 2%		Instream 60% Overhanging 30%	
SHORE COVER (% stream shaded):	100 - 90 %	90 - 60% ✓	60- 30%	30 - 1%	None		
VEGETATION TYPE (%) :	Submergent		Floating		Emergent		None
Predominant Species					Grasses		
MIGRATORY OBSTRUCTIONS:	None		Seasonal ✓		Permanent		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
- Deeper pools @ inlet + outlet of culverts - Substrate in culverts							
COMMENTS :							
- Drain classification is F - Possible seasonal habitat - Stable banks - No evidence of recent clean-out - Muskrat, Deer tracks							
Additional Notes Appended?    No    Yes number of pages _____							

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
			PROJECT #: PIA019991
			MAPPER: CP
			NAME OF WATERBODY: Turnbull Drain
			CROSSING #:
			STATION #: CR-003 + CR-014
			DATE: DD-MMM-YY 13-12-2011
<p style="text-align: center;"><b>LEGEND</b></p> <ul style="list-style-type: none"> <li>10d depth (cm)</li> <li>6w width</li> <li>➔ Riffle</li> <li>⇨ Run/Glide</li> <li>○ Pool</li> <li>■ Island/Bar</li> <li>••• Fine Substrate</li> <li>### Gravel Substrate</li> <li>oOooO Cobble /Boulder</li> <li>* * * Debris</li> <li>CT Cattail</li> <li>SV/FV Submerg/Float Veg</li> <li>EV Emergent Vegetation</li> <li>W Watercress</li> <li>Fe Iron Staining</li> <li>///// Eroded Bank</li> <li>XXX Riprap / Other Stabilization</li> <li>○ Instream Log/Tree</li> <li>^^^ Dam/Weir/Obstruction</li> <li>® Riparian Tree</li> <li>└ Seep/Spring</li> <li>----- Undercut Bank</li> <li>— Barrier to Fish Movement</li> <li>-S- Seasonal Barrier</li> <li>-x-x- Fence line</li> <li>┌ Culvert</li> </ul>			
<p><b>PROFILE:</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Horz. Scale 1m</p> </div> <div style="text-align: center;"> <p>Vert. Scale 1m</p> </div> </div>			



GENERAL INFORMATION									
PROJECT #: VIA 019091		PROJECT DESCRIPTION: NLWP			DAY: 27	MONTH: 6	YEAR: 2012		
Is STREAM REALIGNMENT required for this section:									
Yes		<input checked="" type="radio"/> No		Unknown					
COLLECTORS: CP			WEATHER CONDITIONS: Sunny		TIME STARTED:		TIME FINISHED:		
PHOTOS NUMBERS AND DESCRIPTIONS: see olympus									
LOCATION									
NAME OF WATERBODY: Unknown Hay 6			DRAINAGE SYSTEM:		CROSSING #: CR-013		STATION #:		
LOCATION OF CROSSING: East of Hwy 21 for access Roads to T-36, T-37									
UTM EASTING & NORTHING:					MTO CHAINAGE:				
TOWNSHIP: Hay					MNR DISTRICT: Guelph				
LAND USE AND POLLUTION									
SURROUNDING LAND USE: Agricultural					SOURCES OF POLLUTION: Agricultural				
EXISTING STRUCTURE TYPE									
Bridge		Box Culvert		Open Foot Culvert		CSP @ Hwy 21		N/A	
Other Describe:							Size (w x h) m2		
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:					SECTION LOCATION: (include on habitat map)				
TYPE:	Stream / river	Channelized	Permanent	Intermittent <input checked="" type="checkbox"/>	Ephemeral	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m):					CURRENT VELOCITY (m/s): N/A				
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other			
Percentage of area				100% (dry)					
mean depth wetted (m)				≈ 0.05					
mean width wetted (m)				≈ 0.20					
Mean bankfull width (m)				≈ 0.50					
Mean bankfull depth (m)				≈ 0.20					
Substrate				silsa					
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	

BANK STABILITY							
	Stable	Slightly Unstable	Moderately Unstable	Unstable			
Left Upstream Bank	✓						
Right Upstream Bank	✓						
HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Large Woody Debris Instream Overhanging	Organic debris	Vascular plants Instream Overhanging	None
						grasses	
SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None		
				✓			
VEGETATION TYPE (%)	Submergent		Floating		Emergent	None	
					✓		
Predominant Species					grasses		
MIGRATORY OBSTRUCTIONS:	None		Seasonal	Permanent			
			✓ low water				✓ @ Hwy 21
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
- None this is an open channel to convey tile drainage from agricultural fields - tile drainage ± 200m upstream of proposed culvert crossing ⊗ - culvert under Hwy 21 conveys flow underground to Lake Huron							
COMMENTS :							
- use typical culvert crossing design							
Additional Notes Appended?    No    Yes    number of pages _____							

<b>SECTION IDENTIFIER:</b>		<b>SECTION LOCATION:</b>		<b>SECTION LENGTH (m):</b> 20		<b>SCALE (cm / m):</b>	
						<b>PROJECT #:</b> D1A09991	
						<b>MAPPER:</b> CP	
						<b>NAME OF WATERBODY:</b> unknown Hay 6	
						<b>CROSSING #:</b> CR-013	
						<b>STATION #:</b>	
						<b>DATE: DD-MMM-YY</b> 27-06-12	
						<b>LEGEND</b>	
						10d depth (cm) 6w width → Riffle ⇨ Run/Glide ○ Pool ■ Island/Bar ● Fine Substrate ### Gravel Substrate oOooO Cobble /Boulder *** Debris CT Cattail SV/FV Submerg/Float Veg EV Emergent Vegetation W Watercress Fe Iron Staining // // // // // Eroded Bank XXX Riprap / Other Stabilization ○ Instream Log/Tree ^^^ Dam/Weir/Obstruction ® Riparian Tree ↳ Seep/Spring - - - - Undercut Bank — Barrier to Fish Movement -S- Seasonal Barrier -x-x- Fence line ┌ └ Culvert	
<b>PROFILE:</b>		<b>Horz. Scale</b>		<b>Vert. Scale</b>			

GENERAL INFORMATION									
PROJECT #: P1019991		PROJECT DESCRIPTION: NLWP			DAY: 13	MONTH: 12	YEAR: 2011		
Is STREAM REALIGNMENT required for this section:									
Yes		No		Unknown					
COLLECTORS: CP			WEATHER CONDITIONS: overcast/sun		TIME STARTED:		TIME FINISHED:		
PHOTOS NUMBERS AND DESCRIPTIONS: See olympus @ ± 12:50 - 1:20 pm									
LOCATION									
NAME OF WATERBODY:			DRAINAGE SYSTEM: Kading Drain		CROSSING #:		STATION #: CR-018		
LOCATION OF CROSSING: East of Bluewater Hwy 21, South of Shadeview Rd									
UTM EASTING & NORTHING: T17 442380.97mE 4800338.82mN					MTO CHAINAGE:				
TOWNSHIP: Han					MNR DISTRICT: Guelph				
LAND USE AND POLLUTION									
SURROUNDING LAND USE: Agriculture / woodlot					SOURCES OF POLLUTION: Agriculture				
EXISTING STRUCTURE TYPE									
Bridge		Box Culvert		Open Foot Culvert		CSP		N/A	
Other Describe: minor elevation on d/s side						Size (w x h) m2 2100mm <sup>2</sup> <sup>~9m L</sup>			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:				SECTION LOCATION: (include on habitat map)					
TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND: upstream?			
TOTAL SECTION LENGTH (m):					CURRENT VELOCITY (m/s): 0.10 to 0.30 m/s				
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other			
Percentage of area	100%				Farm crossing				
mean depth wetted (m)	0.30m				0.20m				
mean width wetted (m)	1.60m				73.0m				
Mean bankfull width (m)	3.30m				~5.0m				
Mean bankfull depth (m)	1.40m				1.60m				
Substrate	SA/GR/CO				SA/CI/GR				
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Ci	Muck Mu	Detritus D	

BANK STABILITY				
	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank			✓	
Right Upstream Bank			✓	

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Large Woody Debris	Organic debris	Vascular plants	None
	20%			Instream 10% Overhanging 15%		Instream Overhanging 50%	
SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None		
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
Predominant Species							✓
MIGRATORY OBSTRUCTIONS:	None		Seasonal ✓ culvert + depth		Permanent		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
DRAFT							
COMMENTS :							
- active erosion upstream + downstream of CSP - debris jam on upstream side of culvert - cyprinids observed d/s of culvert chub (creek?) adults							
Additional Notes Appended?    No    Yes number of pages _____							

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
			PROJECT #: PIA019991
			MAPPER: CP
			NAME OF WATERBODY: Kading Drain
			CROSSING #: CR018
			STATION #:
			DATE: DD-MMM-YY 13-12-2011
			<p style="text-align: center;"><b>LEGEND</b></p> <p>10d depth (cm) 6w width</p> <p>➔ Riffle              ⇨ Run/Glide              ○ Pool              ■ Island/Bar</p> <p>••• Fine Substrate              ### Gravel Substrate</p> <p>oOoO Cobble /Boulder              *** Debris</p> <p>CT Cattail              SV/FV Submerg/Float Veg</p> <p>EV Emergent Vegetation              W Watercress</p> <p>Fe Iron Staining              // // // Eroded Bank</p> <p>XXX Riprap / Other Stabilization</p> <p>○ Instream Log/Tree              ^^^ Dam/Weir/Obstruction</p> <p>⊗ Riparian Tree</p> <p>┆▶ Seep/Spring              - - - - Undercut Bank</p> <p>— Barrier to Fish Movement              -S- Seasonal Barrier</p> <p>-x-x- Fence line              ┌└┘ Culvert</p>
PROFILE:	Horz. Scale	Vert. Scale	

GENERAL INFORMATION									
PROJECT #: PIA-019991		PROJECT DESCRIPTION: NLWP			DAY: 13	MONTH: 12	YEAR: 2011		
Is STREAM REALIGNMENT required for this section:									
Yes		<input checked="" type="radio"/> No		Unknown					
COLLECTORS: CP			WEATHER CONDITIONS: overcast		TIME STARTED:		TIME FINISHED:		
PHOTOS NUMBERS AND DESCRIPTIONS: see olympus (previous photos are clean out)									
LOCATION									
NAME OF WATERBODY:			DRAINAGE SYSTEM: Hay E drain		CROSSING #: CR-023		STATION #:		
LOCATION OF CROSSING: West of Shipka, South of Hendrick									
UTM EASTING & NORTHING: T17 443075.28mE 4802363.83mN					MTO CHAINAGE:				
TOWNSHIP: Hay					MNR DISTRICT: Guelph				
LAND USE AND POLLUTION									
SURROUNDING LAND USE: Agriculture (winter wheat soybean, corn)					SOURCES OF POLLUTION: Agriculture				
EXISTING STRUCTURE TYPE									
Bridge		Box Culvert		Open Foot Culvert		CSP		<input checked="" type="radio"/> N/A	
Other Describe: <input checked="" type="radio"/> 2 tile outlets on N side of drain						Size (w x h) m2			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:				SECTION LOCATION: (include on habitat map)					
TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND: E of Shipka			
TOTAL SECTION LENGTH (m):					CURRENT VELOCITY (m/s): 0.05m/s				
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other			
Percentage of area				Drain 100%					
mean depth wetted (m)				0.15m					
mean width wetted (m)				0.50m					
Mean bankfull width (m)				1.30m					
Mean bankfull depth(m)				0.60m					
Substrate				sand/leaves grasses					
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	

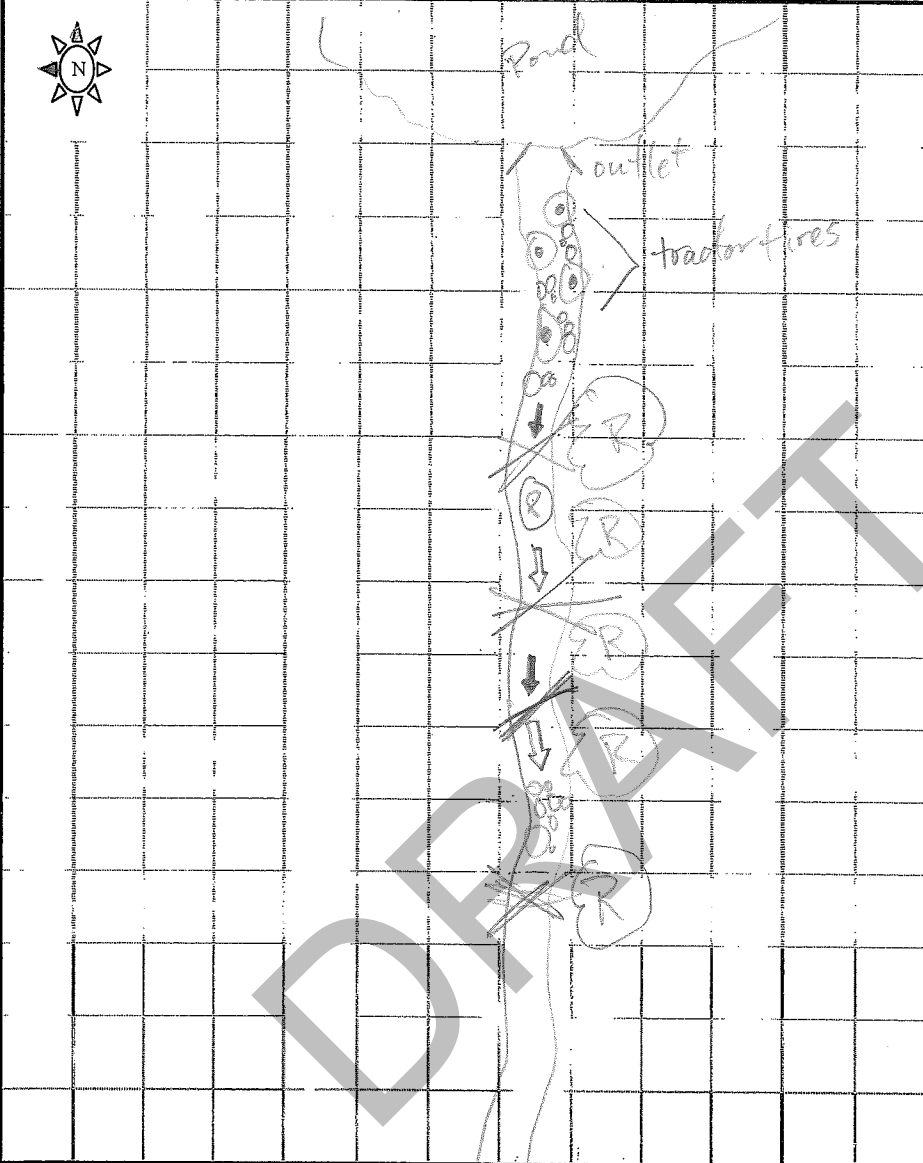
BANK STABILITY							
	Stable	Slightly Unstable	Moderately Unstable	Unstable			
Left Upstream Bank	✓						
Right Upstream Bank	✓						
HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Large Woody Debris Instream Overhanging	Organic debris	Vascular plants Instream Overhanging	None
						grasses 80%	
SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None		
			✓				
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
					10%		
Predominant Species					cattails		
MIGRATORY OBSTRUCTIONS:	None		Seasonal		Permanent		
			✓				
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
<p style="text-align: center; font-size: 48px; opacity: 0.3; transform: rotate(-30deg);">DRAFT</p>							
COMMENTS :							
<p>Shallow drain                  - indirect habitat potential due to depth                  - 2 tile outlets @ crossing                  - access from Shipka going west to crossing, cleared area,                  ⊗ Fish (Cyprinids) observed in March / April 2012</p>							
Additional Notes Appended?				No	Yes number of pages _____		



SECTION IDENTIFIER:		SECTION LOCATION:		SECTION LENGTH (m):		SCALE (cm / m):	
						PROJECT #: PIA019991	
						MAPPER: CP	
						NAME OF WATERBODY: Hau Edrain	
						CROSSING #: CR-023	
						STATION #:	
						DATE: DD-MMM-YY 13-12-2011	
						<b>LEGEND</b>	
10d depth (cm) 6w width							
➔ Riffle							
⇨ Run/Glide							
○ Pool							
■ Island/Bar							
••• Fine Substrate							
### Gravel Substrate							
oOooO Cobble /Boulder							
*** Debris							
CT Cattail							
SV/FV Submerg/Float Veg							
EV Emergent Vegetation							
W Watercress							
Fe Iron Staining							
///// Eroded Bank							
XXX Riprap / Other Stabilization							
○ Instream Log/Tree							
^^^ Dam/Weir/Obstruction							
® Riparian Tree							
└ Seep/Spring							
----- Undercut Bank							
— Barrier to Fish Movement							
-S- Seasonal Barrier							
-x-x- Fence line							
┌ Culvert							
PROFILE:		Horz. Scale		Vert. Scale			

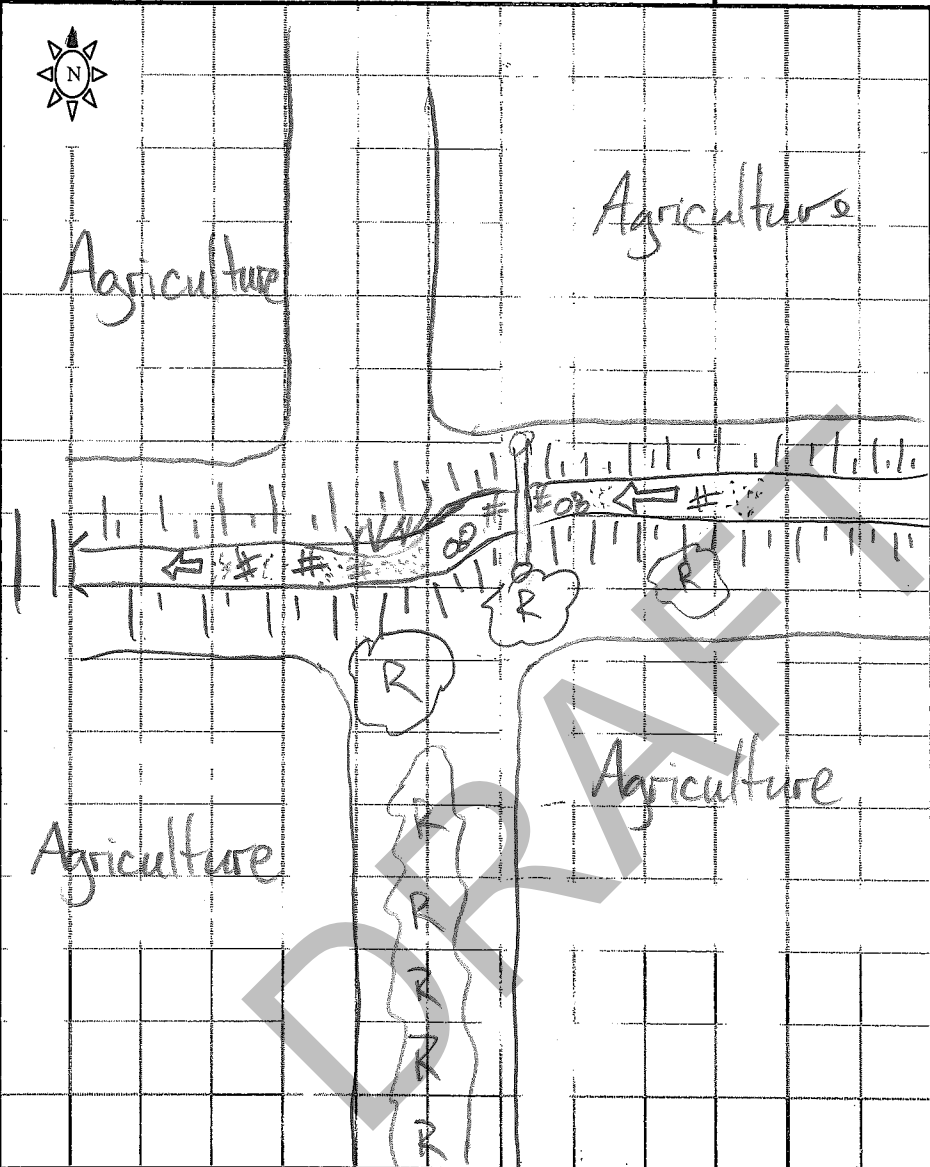
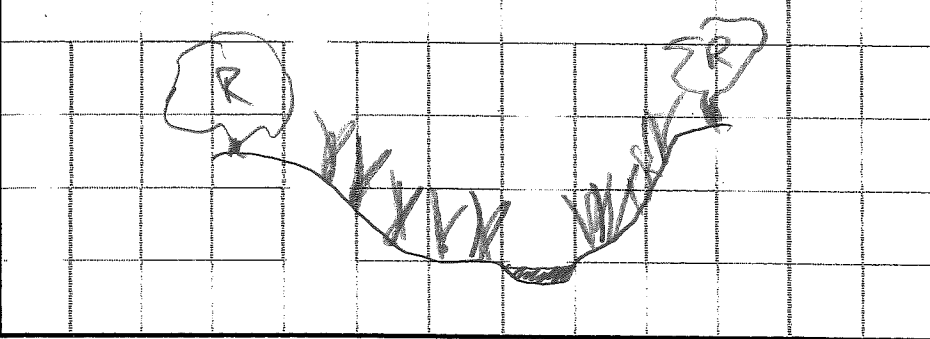
GENERAL INFORMATION									
PROJECT #: PWA019991		PROJECT DESCRIPTION: NLWP			DAY: 22	MONTH: 03	YEAR: 12		
Is STREAM REALIGNMENT required for this section:									
Yes		No <input checked="" type="radio"/>		Unknown					
COLLECTORS: CP			WEATHER CONDITIONS: Sunny - cool		TIME STARTED:		TIME FINISHED:		
PHOTOS NUMBERS AND DESCRIPTIONS: see Olympus									
LOCATION									
NAME OF WATERBODY: Chalette Drain			DRAINAGE SYSTEM:		CROSSING #: CR-026		STATION #:		
LOCATION OF CROSSING: South of Sararas Rd									
UTM EASTING & NORTHING:					MTO CHAINAGE: N/A				
TOWNSHIP: Hay					MNR DISTRICT: Guelph				
LAND USE AND POLLUTION									
SURROUNDING LAND USE: Agricultural					SOURCES OF POLLUTION: Agricultural				
EXISTING STRUCTURE TYPE									
Bridge		Box Culvert		Open Foot Culvert		CSP		N/A <input checked="" type="radio"/>	
Other Describe:							Size (w x h) m2		
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:				SECTION LOCATION: (include on habitat map) d/s of pond					
TYPE:	Stream / river	Channelized	Permanent <input checked="" type="checkbox"/>	Intermittent	Ephemeral	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m): 20m					CURRENT VELOCITY (m/s): ~ 0.20m/s				
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other			
Percentage of area	50%		50%						
mean depth wetted (m)	~ 0.12m	to 0.18m	~ 0.07m	to 0.12m					
mean width wetted (m)	~ 1.00m	to 2.20m	Varies 0.90 to 2.10m						
Mean bankfull width (m)	3.40m		~ 3.30m						
Mean bankfull depth (m)	~ 0.50m	to 0.70	~ 0.50m	to 0.70m					
Substrate	Gr/Co		Gr/Sa						
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	

BANK STABILITY								
	Stable	Slightly Unstable	Moderately Unstable	Unstable				
Left Upstream Bank	✓							
Right Upstream Bank		✓						
HABITAT								
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Large Woody Debris		Organic debris	Vascular plants	None
	2%		2%	Instream 5%			Instream	
				Overhanging 5%			Overhanging 10%	
SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60-30%	30 – 1%		None		
			✓					
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None	
Predominant Species							✓	
MIGRATORY OBSTRUCTIONS:	None		Seasonal		Permanent			
			✓ depth					
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other			
POTENTIAL ENHANCEMENT OPPORTUNITIES:								
<ul style="list-style-type: none"> <li>- pool creation</li> <li>- removal of tractor tire, garbage</li> <li>- bottom draw from farm pond</li> </ul>								
COMMENTS :								
<ul style="list-style-type: none"> <li>- Wood Frog observed d/s of pond</li> <li>- Woody debris within channel</li> <li>⊗ Proposed directional drill location for collector line</li> </ul>								
Additional Notes Appended?    No    Yes number of pages _____								

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
		PROJECT #: PIA00991	
		MAPPER: CP	
		NAME OF WATERBODY: Charette Drain	
		CROSSING #: CR-026	
		STATION #:	
		DATE: DD-MMM-YY 20-03-12	
		<p align="center"><b>LEGEND</b></p> <p>10d depth (cm) 6w width</p> <p>➔ Riffle                  ⇨ Run/Glide                  ○ Pool                  ■ Island/Bar                  ● Fine Substrate                  ### Gravel Substrate                  oOooO Cobble / Boulder                  *** Debris                  CT Cattail                  SV/FV Submerg/Float Veg                  EV Emergent Vegetation                  W Watercress                  Fe Iron Staining                  // // // // Eroded Bank                  xxx Riprap / Other Stabilization                  ○ Instream Log/Tree                  ^^^ Dam/Weir/Obstruction                  ® Riparian Tree                   ▶ Seep/Spring                  - - - - Undercut Bank                  — Barrier to Fish Movement                  -S- Seasonal Barrier                  -x-x- Fence line                  ┌└ Culvert</p>	
PROFILE:	Horz. Scale	Vert. Scale	

GENERAL INFORMATION										
PROJECT #: PIA019991		PROJECT DESCRIPTION:			DAY: 14	MONTH: 12	YEAR: 2011			
Is STREAM REALIGNMENT required for this section:										
Yes		<input checked="" type="radio"/> No		Unknown						
COLLECTORS: CP			WEATHER CONDITIONS: light rain		TIME STARTED:		TIME FINISHED:			
PHOTOS NUMBERS AND DESCRIPTIONS: see olympus photos										
LOCATION										
NAME OF WATERBODY:			DRAINAGE SYSTEM: Hay Drain B <sup>N</sup>		CROSSING #: CR-031		STATION #:			
LOCATION OF CROSSING: North of Danceland R, N Branch of Hay Drain B										
UTM EASTING & NORTHING: 17T 443918.68mE 4809716.61mN					MTO CHAINAGE:					
TOWNSHIP: Hay					MNR DISTRICT: Guelph					
LAND USE AND POLLUTION										
SURROUNDING LAND USE: Agriculture					SOURCES OF POLLUTION: Agriculture					
EXISTING STRUCTURE TYPE										
Bridge		Box Culvert		Open Foot Culvert		CSP/d/s		<input checked="" type="radio"/> N/A		
Other Describe:							Size (w x h) m2			
SECTION TYPE AND MORPHOLOGY										
SECTION IDENTIFIER:				SECTION LOCATION: (include on habitat map)						
TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:				
				<input checked="" type="radio"/> F						
TOTAL SECTION LENGTH (m): 30m				CURRENT VELOCITY (m/s): 0.2 m/s						
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other				
Percentage of area	80%			20%						
mean depth wetted (m)	0.08m			0.15m						
mean width wetted (m)	0.80m			1.30m						
Mean bankfull width (m)	3.20m			3.30m						
Mean bankfull depth (m)	0.90m			0.90m						
Substrate	SA/GRCO			SA/GRCO						
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D		

BANK STABILITY								
	Stable	Slightly Unstable	Moderately Unstable	Unstable				
Left Upstream Bank	✓							
Right Upstream Bank	✓							
HABITAT								
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Large Woody Debris		Organic debris	Vascular plants	None
	10%	5%	5%	Instream 2%	Overhanging 5%		Instream 20% Overhanging 40%	
SHORE COVER (% stream shaded):	100 – 90 %		90 – 60%		60- 30%		30 – 1% ✓	None
VEGETATION TYPE (%)	Submergent		Floating			Emergent 30%		None
Predominant Species						grasses		
MIGRATORY OBSTRUCTIONS:	None			Seasonal ✓ low flow + depth		Permanent		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning			Evidence of Groundwater			Other	
POTENTIAL ENHANCEMENT OPPORTUNITIES:								
DRAFT								
COMMENTS :								
- potential seasonal habitat depending on d/s barriers - culvert d/s on non participating landowner								
Additional Notes Appended?    No    Yes    number of pages _____								

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
			PROJECT #: P1A019991
			MAPPER: CP
			NAME OF WATERBODY: Hay Drain B North
			CROSSING #: CR-031
			STATION #:
			DATE: DD-MMM-YY 14-12-2011
<p style="text-align: center;"><b>LEGEND</b></p> <p>10d depth (cm) 6w width</p> <p>➔ Riffle              ⇨ Run/Glide              ○ Pool              ■ Island/Bar              ● Fine Substrate              ### Gravel Substrate              oOoO Cobble /Boulder              * * * Debris              CT Cattail              SV/FV Submerg/Float Veg              EV Emergent Vegetation              W Watercress              Fe Iron Staining              // // // Eroded Bank              xxx Riprap / Other Stabilization</p>			
PROFILE:	Horz. Scale	Vert. Scale	<p>○ Instream Log/Tree              ^^^ Dam/Weir/Obstruction              ⊗ Riparian Tree               ▶ Seep/Spring              - - - Undercut Bank              — Barrier to Fish Movement              -S- Seasonal Barrier              -x-x- Fence line              □ Culvert</p>
			

GENERAL INFORMATION									
PROJECT #: PA109991		PROJECT DESCRIPTION: NLWP			DAY: 14	MONTH: 12	YEAR: 2011		
Is STREAM REALIGNMENT required for this section:									
Yes <input type="checkbox"/>		No <input checked="" type="checkbox"/>		Unknown <input type="checkbox"/>					
COLLECTORS: CP		WEATHER CONDITIONS: Rain			TIME STARTED:		TIME FINISHED:		
PHOTOS NUMBERS AND DESCRIPTIONS: see olympus									
LOCATION									
NAME OF WATERBODY:			DRAINAGE SYSTEM: Hay B south		CROSSING #: CR-032		STATION #:		
LOCATION OF CROSSING: North of Danceland Rd, Hay B drain south, West of Hwy 21									
UTM EASTING & NORTHING: 17T 443958.75mE 4809441.55mN					MTO CHAINAGE:				
TOWNSHIP: Hay					MNR DISTRICT: Guelph				
LAND USE AND POLLUTION									
SURROUNDING LAND USE: Agricultural					SOURCES OF POLLUTION: Agricultural				
EXISTING STRUCTURE TYPE									
Bridge		Box Culvert		Open Foot Culvert		CSP		N/A	
Other Describe:							Size (w x h) m2		
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:				SECTION LOCATION: (include on habitat map)					
TYPE:	Stream / river	Channelized	Permanent	Intermittent <input checked="" type="checkbox"/>	Ephemeral	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m): ~ 20m				CURRENT VELOCITY (m/s): 0.20m/s					
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other			
Percentage of area	90%	10%							
mean depth wetted (m)	0.10m	0.27m							
mean width wetted (m)	0.60m	1.30m							
Mean bankfull width (m)	3.20m	73.50m							
Mean bankfull depth (m)	0.90m	1.20m							
Substrate	SALGRCo		SALGRCo						
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	



BANK STABILITY								
	Stable	Slightly Unstable	Moderately Unstable	Unstable				
Left Upstream Bank		✓						
Right Upstream Bank			✓					
HABITAT								
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Large Woody Debris		Organic debris	Vascular plants	None
	5%		5%	Instream 100%	Overhanging 20%	5%	Instream	Overhanging 40%
SHORE COVER (% stream shaded):	100 – 90 %		90 – 60%		60- 30% ✓		30 – 1% None	
VEGETATION TYPE (%):	Submergent		Floating			Emergent 40%		None
Predominant Species						grasses		
MIGRATORY OBSTRUCTIONS:	None		Seasonal ✓ low flow + depth			Permanent		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater			Other		
POTENTIAL ENHANCEMENT OPPORTUNITIES:								
- Scour pools @ culvert crossings?								
COMMENTS :								
- Water quality appears good - some bank erosion on upstream right @ tile outlet - metal tile outlet from south bank @ crossing location								
Additional Notes Appended?    No    Yes number of pages _____								

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
			PROJECT #: PTA019921
			MAPPER: CP
			NAME OF WATERBODY: Hay B south
			CROSSING #: CR-032
			STATION #: .
			DATE: DD-MMM-YY 14-12-2011
			<p style="text-align: center;"><b>LEGEND</b></p> <p>10d depth (cm)                  6w width</p> <ul style="list-style-type: none"> <li>➔ Riffle</li> <li>⇨ Run/Glide</li> <li>○ Pool</li> <li>■ Island/Bar</li> <li>••• Fine Substrate</li> <li>### Gravel Substrate</li> <li>oOooO Cobble /Boulder</li> <li>* * * Debris</li> <li>CT Cattail</li> <li>SV/FV Submerg/Float Veg</li> <li>EV Emergent Vegetation</li> <li>W Watercress</li> <li>Fe Iron Staining</li> <li>///// Eroded Bank</li> <li>xxx Riprap / Other Stabilization</li> <li>○ Instream Log/Tree</li> <li>▲▲▲ Dam/Weir/Obstruction</li> <li>Ⓢ Riparian Tree</li> <li>▶ Seep/Spring</li> <li>----- Undercut Bank</li> <li>— Barrier to Fish Movement</li> <li>-S- Seasonal Barrier</li> <li>-x-x- Fence line</li> <li>┌└ Culvert</li> </ul>
PROFILE:	Horz. Scale	Vert. Scale	

GENERAL INFORMATION									
PROJECT #: H1A019991		PROJECT DESCRIPTION: NLWP			DAY: 13	MONTH: 12	YEAR: 2011		
Is STREAM REALIGNMENT required for this section:									
Yes		<input checked="" type="radio"/> No		Unknown					
COLLECTORS: CP		WEATHER CONDITIONS: overcast/cloudy			TIME STARTED:		TIME FINISHED:		
PHOTOS NUMBERS AND DESCRIPTIONS: see olympus									
LOCATION									
NAME OF WATERBODY:			DRAINAGE SYSTEM: St Joseph Airports drain		CROSSING #:		STATION #: CR-041		
LOCATION OF CROSSING: Sof DanceLand Rd, North of Zurich/Hershall Road									
UTM EASTING & NORTHING:					MTO CHAINAGE:				
TOWNSHIP: Han					MNR DISTRICT: Guelph				
LAND USE AND POLLUTION									
SURROUNDING LAND USE: Agriculture (corn)					SOURCES OF POLLUTION: Agriculture				
EXISTING STRUCTURE TYPE									
Bridge		Box Culvert		Open Foot Culvert		<input checked="" type="radio"/> CSP		N/A	
Other Describe:						Size (w x h) m2 = 1800mm <sup>2</sup> <sup>9m L</sup>			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:				SECTION LOCATION: (include on habitat map)					
TYPE:	Stream / river	Channelized	Permanent	<input checked="" type="checkbox"/> Intermittent	Ephemeral	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m): ~ 30m					CURRENT VELOCITY (m/s): Ranges 0.20 to 0.30m/s				
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other			
	50%	30%	20%			⊗ culvert is perched			
Percentage of area	(upstream)	(below culvert)	(below pool)			~ 0.30m			
mean depth wetted (m)	0.20m	0.40m	0.15m						
mean width wetted (m)	0.80m	2.20m	0.35m						
Mean bankfull width (m)	2.5m	3.8m	3.0m						
Mean bankfull depth (m)	1.2m	2.0m	1.8m						
Substrate	SA/GR	Bo/CO/SA GR	CO/BO/SA GR						
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	

BANK STABILITY								
	Stable	Slightly Unstable	Moderately Unstable	Unstable				
Left Upstream Bank	✓	Ld/s ✓						
Right Upstream Bank	✓							
HABITAT								
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Large Woody Debris		Organic debris	Vascular plants	None
		20%	10%	Instream	Overhanging		Instream	
							Overhanging	30%
SHORE COVER (% stream shaded):	100 – 90 %		90 – 60%		60- 30%		30 – 1%	None
							✓	
VEGETATION TYPE (%):	Submergent		Floating			Emergent		None
						40%		
Predominant Species						grassed w/s		
MIGRATORY OBSTRUCTIONS:	None			Seasonal			Permanent	
				✓				
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning			Evidence of Groundwater			Other	
POTENTIAL ENHANCEMENT OPPORTUNITIES:								
- lower culvert - substrate in culvert								
COMMENTS :								
- existing crossing ≈ 9m CSP 1800mm Ø - Barriers to fish movement w/s @ culvert and shallow depth w/s of culvert - Trapezoidal channel								
Additional Notes Appended?    No    Yes number of pages _____								

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
			PROJECT #: P1A019991
			MAPPER: CP
			NAME OF WATERBODY: St. Joseph Airport Drain South
			CROSSING #: CR-041
			STATION #: 12
			DATE: DD-MMM-YY 13-12-2011
<p><b>PROFILE:</b></p> <p>Horz. Scale      Vert. Scale</p>			<p><b>LEGEND</b></p> <p>10d depth (cm) 6w width</p> <ul style="list-style-type: none"> <li>➔ Riffle</li> <li>⇨ Run/Glide</li> <li>○ Pool</li> <li>■ Island/Bar</li> <li>⋯ Fine Substrate</li> <li>### Gravel Substrate</li> <li>oOooO Cobble /Boulder</li> <li>*** Debris</li> <li>CT Cattail</li> <li>SV/FV Submerg/Float Veg</li> <li>EV Emergent Vegetation</li> <li>W Watercress</li> <li>Fe Iron Staining</li> <li>///// Eroded Bank</li> <li>xxx Riprap / Other Stabilization</li> <li>○ Instream Log/Tree</li> <li>^^^ Dam/Weir/Obstruction</li> <li>Ⓡ Riparian Tree</li> <li>└▶ Seep/Spring</li> <li>----- Undercut Bank</li> <li>— Barrier to Fish Movement</li> <li>-S- Seasonal Barrier</li> <li>-x-x- Fence line</li> <li>┌└ Culvert</li> </ul>

GENERAL INFORMATION									
PROJECT #: PIA019991		PROJECT DESCRIPTION: NLWP			DAY: 14	MONTH: 12	YEAR: 2011		
Is STREAM REALIGNMENT required for this section:									
Yes		No <input checked="" type="radio"/>		Unknown					
COLLECTORS: CP			WEATHER CONDITIONS: rain		TIME STARTED:		TIME FINISHED:		
PHOTOS NUMBERS AND DESCRIPTIONS: see olympus camera									
LOCATION									
NAME OF WATERBODY:			DRAINAGE SYSTEM: Stan M (F)		CROSSING #: CR-043		STATION #:		
LOCATION OF CROSSING: North of Kippen R, East of Hwy 21									
UTM EASTING & NORTHING: 17 444254.05mE 4811177.25mN					MTO CHAINAGE:				
TOWNSHIP: Hay					MNR DISTRICT: Guelph				
LAND USE AND POLLUTION									
SURROUNDING LAND USE: Agriculture / Livestock (Pigs) →					SOURCES OF POLLUTION:				
EXISTING STRUCTURE TYPE									
Bridge		Box Culvert <input checked="" type="radio"/>		Open Foot Culvert		CSP		N/A	
Other Describe: @ Kippen Rd (concrete)							Size (w x h) m2		
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER:				SECTION LOCATION: (include on habitat map)					
TYPE:	Stream / river	Channelized	Permanent	Intermittent <input checked="" type="checkbox"/>	Ephemeral <input checked="" type="checkbox"/>	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m):					CURRENT VELOCITY (m/s):				
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other			
Percentage of area	100%								
mean depth wetted (m)	0.08m								
mean width wetted (m)	0.90m								
Mean bankfull width (m)	2.80m								
Mean bankfull depth (m)	1.10m								
Substrate	GR (from road) some sand								
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	

BANK STABILITY							
	Stable	Slightly Unstable	Moderately Unstable	Unstable			
Left Upstream Bank	✓						
Right Upstream Bank	✓						
HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Large Woody Debris	Organic debris	Vascular plants	None
	30%			Instream Overhanging		Instream 10% Overhanging 60%	
SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60-30%	30 – 1%	None		
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
	10%				60%		
Predominant Species	Veronica				Cattails/grasses		
MIGRATORY OBSTRUCTIONS:	None		Seasonal ✓ low flow + depth		Permanent		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater Veronica (N/S of crossing)		Other		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
- improve road culvert and stop road gravel from entering watercourse - scour pools @ new culvert location							
COMMENTS :							
- veronica observed N/S of crossing ~ 30-40m - Livestock south of Kippen Rd.							
Additional Notes Appended?    No    Yes number of pages _____							

SECTION IDENTIFIER: T-01		SECTION LOCATION:		SECTION LENGTH (m):		SCALE (cm / m):	
						PROJECT #: P1A0PP91	
						MAPPER: CP	
						NAME OF WATERBODY: StauM	
						CROSSING #: CR-043	
						STATION #:	
						DATE: DD-MMM-YY 14-12-2011	
						<p style="text-align: center;"><b>LEGEND</b></p> <p>10d depth (cm) 6w width</p> <p>➔ Riffle              ⇨ Run/Glide              ○ Pool              ■ Island/Bar              ● Fine Substrate              ### Gravel Substrate              oOoO Cobble /Boulder              *** Debris              CT Cattail              SV/FV Submerg/Float Veg              EV Emergent Vegetation              W Watercress              Fe Iron Staining              // // // // Eroded Bank              xxx Riprap / Other Stabilization              ○ Instream Log/Tree              ^^^ Dam/Weir/Obstruction              ⊗ Riparian Tree              ▶ Seep/Spring              - - - - Undercut Bank              — Barrier to Fish Movement              -S- Seasonal Barrier              -x-x- Fence line              ┌ └ Culvert</p>	
PROFILE:		Horz. Scale		Vert. Scale			



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**Appendix G**  
**Curriculum Vitae**

DRAFT



**Profession**

Aquatic Resource Specialist

**Education**

Terrain and Water Resources Technologist, Sir Sandford Fleming College, School of Natural Resources, 1996

**Certificates**

CISEC-Certified Inspector for Sediment and Erosion Control, Aug 2011

MNR/TRCA Ontario Stream Assessment Protocol (OSAP), June 2010.

OBBN-Ontario Benthos Biomonitoring Network Certification, June 2010

DFO, Ontario Freshwater Mussel Identification Course, 2007

MTO/DFO/MNR Fisheries Protocol, Fisheries Assessment Specialist, Fisheries Contract Specialist (RAQs Certified), 2006

MNR Class 1 Electrofishing Certification and Trainer, 2006

ROM, Ontario Freshwater Fishes Identification Course, 2005

**Professional Societies**

Ontario Association of Certified Engineering Technicians and Technologists (OACETT)

**Employment Record**

Aquatic Resource Specialist, R.J. Burnside & Associates Limited (2007-Present)

Aquatic Resources Technologist, AMEC Earth and Environmental, Mississauga, Ontario (2003-2006)

Environmental Technologist, AMEC Earth and Environmental, Vancouver, British Columbia (1998-2003)

**Citizenship**

Canadian

**Languages**

English

**Christopher Pfohl, C.E.T.**

Christopher has a broad range of experience in Canada and internationally, with 13 years of professional experience in Aquatic Resources including environmental assessment, existing condition studies, habitat restoration, environmental monitoring and protection, determination of fish habitat, Species at Risk, hydrology, hydrogeology and contaminated sites. He has extensive knowledge of the *Fisheries Act*, as it pertains to the protection of fish and fish habitat. Christopher is responsible for obtaining permits from various government agencies, environmental impact assessment, environmental and construction monitoring, developing and conducting sampling programs for fisheries and aquatic habitat inventories, and the preparation of technical reports based on project requirements. He has coordinated and conducted numerous sampling programs for fish, amphibians, invertebrates and sediment, surface and ground water. He is responsible for liaison with government agencies, First Nations, large corporations, and stakeholders.

Christopher has undertaken projects for a wide range of clients throughout the energy, development, transportation and mining sectors in local and remote areas of Canada and overseas. This requires the development and coordination of extensive aquatic investigations and includes the management of logistics, field staff and sub-consultants, data analysis, report and proposal preparation.

Christopher is also a former member of the Canadian Fly Fishing Team (2007 to 2010) and has competed in numerous events across North America and internationally.

**Biological Resources**

**Coves ESA Master Plan and Rehabilitation of the East Pond, City of London, London, Ontario (2011-Ongoing)**

Mr. Pfohl was subcontracted by North South Environmental to provide aquatic support for development of the Coves ESA Master Plan located in an urban environment. He was responsible for background review, confirmation of existing conditions and input to rehabilitation of the Coves ponds and watercourses as it pertains to aquatic resources. A rehabilitation matrix was developed by Mr. Pfohl to determine the best options for improvements to the aquatic conditions in the Coves ponds and watercourses. A rehabilitation concept and plan has been provided for funding approval.

**Bronte Creek Rehabilitation and Natural Channel Design, Trout Unlimited, Lowville, Ontario (2011)**

Aquatic Resources Specialist responsible for natural channel design options and prescriptions for areas that have been impacted by erosion, heavy pedestrian use, and areas of channel widening. Christopher conducted spawning surveys for rainbow trout (steelhead) and Chinook salmon to determine critical habitat areas to be protected during construction. Habitat prescriptions included spawning areas, riffle sections, boulder clusters, large



Christopher Pfohl

woody debris, pool creation, juvenile habitat and retrofit of existing riffle structures. He conducted swim-up counts for steelhead fry and determination of prescription success based on the contractor's rehabilitation works. Trout Unlimited has been overwhelmed with the positive feedback on the construction and design.

#### **Barrier Mitigation for Redside Dace, Don Head West, Town of Richmond Hill, Ontario (2011-Ongoing)**

Aquatic Resource Specialist responsible for collection of Endangered Species (Redside dace) based on the conditions of the Endangered Species Act (ESA) permit. Mr. Pfohl provided support during the application for the ESA permit along with the appropriate animal care protocols. He was required to salvage all aquatic life from a work area planned for barrier mitigation under the conditions set-out in the ESA permit. A "rocky ramp" was constructed to mitigate the impassable barrier for fish movement. A Scientific Collectors Report has been submitted to MNR on behalf of the client and the conditions of the ESA permit. Ongoing monitoring for habitat success is required during 2012.

#### **Siloam Pond Natural Channel Design, Mill Run Golf and Country Club, Uxbridge, Ontario (2010-Ongoing)**

Mr. Pfohl provided aquatic resource input into the final design of more than 350m of brook trout habitat in Uxbridge, Ontario. The Siloam Pond was taken off-line to reduce thermal impacts to a cold water fishery and provide a constant water source for the golf club. Christopher provided suitable habitat designs for large woody debris, riffle sections and over-wintering habitat in strategic locations along the channel and as part of the compensation required for the DFO Authorization. He was also responsible for obtaining the Scientific Collectors Permit from MNR, fish salvage, construction monitoring, and submission of fish collection records as part of the condition of the MNR permit. Mr. Pfohl will be monitoring the new channel for habitat use, substrate movement and naturalization of the riparian corridor as part of the permit conditions provided in the DFO Authorization.

#### **Colgan Well, Determination of Surface Water Impacts, Township of Adjala-Tosorontio, Colgan, Ontario (2011-Ongoing)**

Aquatic Resources Specialist responsible for determination of groundwater areas that may be impacted from a production well located in Colgan, Ontario. Groundwater upwelling and seepage areas were documented to determine potential impacts to receiving watercourses from groundwater extraction and potential effects to the fishery.

#### **Endangered Species Act Approval, King Street Reconstruction, Region of Peel, Bolton, Ontario (2011)**

Mr. Pfohl was responsible for acquiring approval from MNR for an outlet to Cold Creek, a tributary of the Humber River. Cold Creek is designated as potential Redside dace habitat and a Letter of Advice (LOA) was obtained from MNR for the construction works associated with an outlet structure to the watercourse. The LOA was provided by MNR based using approved Best Management Practices and Mitigation measures associated with the construction works.

#### **Erosion and Aquatic Assessment, Upper Rouge River and Beaver Creek, Town of Richmond Hill, Ontario (2010-2011)**

Aquatic Resources Specialist responsible for erosion and aquatic conditions assessment for 18km of the Upper Rouge River, and Beaver Creek, a tributary of the Rouge River, Richmond Hill. Required to identify areas of erosion that may cause impacts to municipal infrastructure, public and private land. Aquatic conditions were assessed in conjunction with erosion areas that may be improved during future works. Collected information was used to determine a level of potential hazard.

#### **GO Transit Class Environmental Assessment, Group B for the Proposed Rail Expansion from Toronto to Milton, GO Transit, Ontario (2011-Ongoing)**

Aquatic Resource Specialist responsible for coordinating existing conditions surveys for all watercourse crossings from Union west to Milton Station. Efforts included site visits to watercourses to document existing and critical fish habitat and determination for potential Fisheries Act Authorizations. Responsible for reporting information under the requirements for Municipal Class Environmental Assessment Projects for the preparation of the Environmental Study Report (ESR).

#### **Environmental Monitoring, Richmond Hill Community Environmental Center, Region of Peel, Richmond Hill, Ontario (2010-2011)**

Environmental Monitor responsible for inspecting erosion and sediment controls required for the construction of the Richmond Hill Community Environmental Center. Receiving waters from the site connect to protect Redside dace habitat that is highly sensitive. Stringent monitoring was required during construction along with weekly reporting.

#### **Species at Risk Monitor, Water Treatment and Distribution System, Moose Deer Point First Nations Reserve, MacTier, Ontario (2009-2011)**

Species at Risk and Environmental monitor for construction of a water treatment and distribution system along the eastern shore of Georgian Bay. Protected Species at Risk include endangered and threatened turtles and snakes. Required to



facilitate and conduct Species at Risk training for First Nations and construction workers based on mandatory requirements from the Environment Canada, Species at Risk permit.

**GO Transit Class Environmental Assessment, Group B for the Proposed Rail Expansion from Hamilton to Niagara Falls, GO Transit, Ontario (2010)**

Aquatic Resource Specialist responsible for coordinating existing conditions surveys for all watercourse crossings in the Hamilton to Niagara region. Efforts included site visits to watercourses to document existing and critical fish habitat and determination for potential Fisheries Act Authorizations. Responsible for reporting information under the requirements for Municipal Class Environmental Assessment Projects for the preparation of the Environmental Study Report (ESR).

**Erosion and Aquatic Assessment, German Mills Creek, Town of Richmond Hill, Ontario (2009-2010)**

Aquatic Resources Specialist responsible for erosion and aquatic conditions assessment for 10km of German Mills Creek, a tributary of the East Don River, Richmond Hill. Required to identify areas of erosion that may cause impacts to municipal infrastructure, public and private land. Aquatic conditions were assessed in conjunction with erosion areas that may be improved during future works. Collected information was used to determine a level of potential hazard.

**Stream Realignment, Upper Nottawasaga River, Township of Mono, Ontario (2009-2010)**

Project Coordinator responsible for stream realignment of 105 linear metres of coldwater habitat in the Upper Nottawasaga River watershed. Project required coordination of contractors, reporting to the Township of Mono and Nottawasaga Valley Conservation Authority and liaison with landowners. Realignment involved creation of suitable habitat for coldwater species (brook trout and migratory rainbow trout) including riffle structures, large woody debris placement, native substrate loading, vegetative mats for undercut and riparian plantings. Responsible for salvage efforts and compliance with the Department of Fisheries and Oceans (DFO) authorization for the "Harmful alteration, disruption or destruction" (HADD) of fish habitat and future monitoring requirements.

**Ribb Dam Supplemental EA, World Bank, Ethiopia (2008-2009)**

Project Coordinator/Aquatic Resource Specialist on a World Bank funded project to undertake a series of studies to update the existing EA in compliance with World Bank guidelines. Assisted in the development of Habitat Suitability Curves for Physical Habitat Simulation (PHABSIM) model to determine potential impacts to habitat for African barb, Nile tilapia, and African catfish of the Ribb River. Studies focused primarily on aquatic and wetland baseline information, potential hydrological effects, and impacts and mitigation measures related to the construction of a large water supply dam.

**GO Transit Class Environmental Assessment, Group B for the Proposed Rail Expansion from Georgetown to Kitchener, GO Transit, Ontario (2008-2009)**

Aquatic Resource Specialist responsible for coordinating existing conditions surveys for over 50 watercourse crossings in the Credit Valley and Grand River watersheds. Efforts included site visits to watercourses to document existing and critical fish habitat and determination for potential Fisheries Act Authorizations. Responsible for reporting information under the requirements for Municipal Class Environmental Assessment Projects for the preparation of the Environmental Study Report (ESR).

**Unexploded Ordnance Clearing, Species at Risk Biologist, XTEC, Former Camp Ipperwash, Ipperwash, Ontario (2007-2009)**

Biologist Team member responsible for adherence to the Environment Canada (EC) Species at Risk Permit required for vegetation clearing on the Former Camp Ipperwash, Military Training Center. EC issued a permit under the Species at Risk Act to protect threatened and endangered species known to exist on site based on previous observations during biological inventories required under the Canadian Environmental Assessment Act. Vegetation clearing was required to conduct electromagnetic (EM) surveys to determine unexploded ordnance locations. The Biologist Team was responsible for identification and avoidance of Federal and Provincial Species at Risk during site operations.

**Fixed Link Project CEAA Screening, Chippewas of Georgina Island First Nation, Sutton West, Ontario (2007-2008)**

Responsible for the preparation of an aquatic existing conditions report for the study area and made recommendations on a preferred alternative route based on potential effects to the aquatic environment. Information prepared was included in the Preliminary Evaluation of Engineering and Environmental Alternatives Study and CEAA Screening Report for the proposed Fixed Link. The proposed Fixed Link is to be a reliable all-weather transportation (vehicle and passenger) link from Georgina Island to the mainland.



**Water Intake Repair, CEAA Screening, Six Nations, Ontario (2007-2008)**

Preparation of a Letter of Intent (LOI) to the Department of Fisheries and Oceans (DFO) for work within hazard lands to repair a communal water intake structure. The intake structure, which is built into the bank of the Grand River, is experiencing erosion around the sheet pile facing walls, as well as movement of the sheet pile walls. The repair must alleviate the sheet pile movement, and erosion around the structure.

**Natural Gas Pipeline Construction, Senior Environmental Monitor, Union Gas, Strathroy, Ontario (2007)**

Lead Environmental Monitor reporting to Union Gas for the construction of an 18km, 48" Natural Gas pipeline loop from Strathroy to Lobo Station. Responsible for all environmental aspects of the project including; protection of Cultural resource sites, fish and wildlife, sediment and erosion control, spill clean-up, and selection of discharge sites for dewatering applications. Also responsible for maintaining adherence to Water Take Permits (MOE), Protection of Fish and Fish Habitat (DFO), Flood/Fill Regulation for St. Clair Regional Conservation Authority (SCRCA), and the reporting requirements based on the conditions of each permit. A total of seven watercourse crossings were completed in the dry, following proper mitigation measures required for sediment and erosion control and fish and wildlife salvage. Also responsible for bank stabilization, riparian area planting, and pipeline cover project on the adjacent 28" pipeline, including associated meetings with DFO and SCRCA.

**Peer Review of MAQ Quarry Natural Environment Report, Township of Grey Highlands, Ontario (June 2008-Ongoing)**

Mr. Pfohl provided a peer review of aquatic existing conditions report to determine if potential impacts to aquatic life was determined and appropriately addressed. He provided a review of the field program for suitable sampling methods and determination of fish habitat. Significant environmental resources were present on, and adjacent to, the proposed below- water table quarry, including a provincially significant wetland, habitat of endangered species and other provincially-rare species. Proponents challenged the identification of Significant Wildlife Habitat and Significant Woodlands on the site. The proposal also created debate over the protection of environmental resources and whether the provision of a supply of aggregate material close to markets should take precedence. Proponents have yet to address outstanding comments.

**Fish Habitat Assessments, Road Crossings, Various Clients across Ontario (2007-Ongoing)**

Responsible for collecting and mapping fish habitat information for over 70 various road crossing and highway twinning projects in Ontario. Habitat Assessments (MTO Protocol 2006) were completed as part of the information requirements based on the Environmental Assessment Act. Information has been presented at Public Information Centers, in Environmental Study Reports and various Environmental Assessment documents for regulatory review.

**Municipal Class Environmental Assessment, Schedule C for the Dissette Street Widening, Town of Bradford West Gwillimbury, Ontario (2007-2010)**

Aquatic Resource Specialist responsible for coordinating the aquatic existing conditions survey to determine potential for fish habitat as defined under the Fisheries Act for future road widening. Consultation with the Lake Simcoe Region Conservation Authority (LSRCA) to develop a program which included sampling of local watercourses, habitat mapping (MTO Protocol 2006) and background review for reporting EA requirements. Submission of a Letter of Intent (LOI) to LSRCA to provide watercourse improvements in conjunction with mitigation and monitoring efforts to avoid a HADD to fish habitat was facilitated.

**Municipal Class Environmental Assessment, Brook Trout Spawning Surveys, Credit River, Orangeville Waste Water Treatment Plant Expansion, Town of Orangeville, Ontario (2007-Ongoing)**

Aquatic Resources Specialist responsible for conducting Brook trout spawning surveys with the Credit Valley Conservation Authority (CVC) on the upper Credit River. Spawning Surveys were required to determine presence/absence of critical habitat for Brook trout in sections of the Credit River downstream from the Orangeville Waste Water Treatment Plant. Concerns from CVC on the proposed expansion of the plant triggered more intense investigations of the Credit River immediately downstream of the outfall.

**Various Wind Energy Projects, Amphibian Monitoring, Confidential Clients, Southern Ontario (2007-Ongoing)**

Responsible for developing and conducting Amphibian Monitoring programs for spring breeding surveys. Breeding surveys were developed based on the Marsh Monitoring program for Ontario. Survey results were reported for each study area and included in the Provincial and Federal Environmental Assessment documents.

**Victor Diamond EIA/Baseline Study, Annual Fisheries Surveys, DeBeers Canada, Attawapiskat, Ontario (2004-2006)**

Field project manager responsible for baseline studies and annual fisheries surveys to quantify Whitefish and Brook trout abundance in potential groundwater drawdown areas for a proposed diamond mine in northern Ontario. Required to obtain



Fish and Wildlife Act "Scientific Collection Permits" and Public Lands Act "Work Permits" from Ministry of Natural Resources (MNR) to conduct annual surveys. Construction of a full span fish fence to determine fall migratory species and abundance in the Nayshkootayow River. Trained First Nations field staff to monitor water quality and fish abundance in potential groundwater drawdown areas. Obtained "Permit to Take Water" from MOE for waterway crossings and provided environmental monitoring during construction. Collection of tissue samples analyzed for the "Sportfish Eating Guide of Ontario" and future reference for Brook trout DNA. Collection of aging structures (otolith and scale) for Lake whitefish, Lake ciscoe and Brook trout. Initiated the first round of benthic collections and water sampling for the Environmental Effects Monitoring (EEM) program based on specific discharge locations. Information collected from baseline studies was included in the EIA and the Comprehensive Study Report for Government Agencies, Public, and First Nations review.

**Aquatic Baseline Study, Howell's River, Lab Mag Services, Schefferville, Quebec (2006)**

Field project manager responsible for baseline aquatic studies pertaining to the construction of an iron ore mine in northern Labrador. Responsible for locating last remaining stocks of *Ounaniche* (land locked Atlantic salmon) on the Howell's River system for a satellite based telemetry program. Conducted morphometrics, anaesthesia and surgical placement of transmitters in adult *Ounaniche*. Responsible for field crew logistics, aquatic data collection, health and safety in remote locations, and client liaison.

**Redhill Creek By-Pass, Environmental Monitor, UMA and Dufferin Construction, City of Hamilton, Ontario (2006)**

Environmental Monitor responsible for compliance to the Environmental Protection and Sediment and Erosion Control Plan related to highway construction works. Required to submit daily environmental monitoring reports to determine non-compliance issues related to contractor performance. Protection of significant habitat adjacent to project construction limits. MTO project number.

**Goreway Road Expansion, Fisheries Assessment, Brampton, Ontario (2006)**

Responsible for collecting field data for fish habitat assessments of approximately 7 water crossings along the proposed ROW using the new MTO/DFO/MNR protocol for future expansion of Goreway Road.

**Lakes and Rivers Improvement Act (LRIA), Permit Application for Dam Construction, Confidential Client, Uxbridge Township, Ontario (2006)**

Project coordinator responsible for the submission of a LRIA permit application to construct a dam on a tributary of Duffins creek. Required to coordinate and fulfill the information requirements set out in the LRIA guidelines for MNR permit applications.

**Hwy 410 Extension, Fisheries Assessment, Brampton, Ontario (2005)**

Responsible for conducting fish habitat assessments and fish inventories for a section of Etobicoke Creek for the Hwy 410 extension. The aquatic ecosystems inventory and assessment was carried out to meet the established criteria set forth by the Ontario Ministry of Transportation (MTO), "*Environmental Reference for Highway Design*", November 2002 (ERD).

**Hwy 5 West of Hwy 6 and East of Hwy 8, Preliminary Design, Hamilton, Ontario (2005)**

Aquatic ecosystem and existing conditions assessment for watercourses along Hwy 5, West of Hwy 6 and East of Hwy 8. The aquatic ecosystems inventory and assessment was carried out to meet the established criteria set forth by the Ontario Ministry of Transportation (MTO), "*Environmental Reference for Highway Design*", November 2002 (ERD).

**GO Transit Rail Line Expansion, URS Corporation, Hamilton to Burlington, Ontario (2005)**

Responsible for determining all waterway crossings and potential impacts to fish habitat associated with the expansion of an existing rail line from Hamilton to Burlington.

**Parry Sound Power Generation, Seguin River Water Management Plan, Fisheries Impacts Associated with Historical Dam Manipulation, Parry Sound, Ontario (2005)**

Responsible for determining potential fisheries habitat impacts for the Seguin River System based on historical information on dam manipulation provided by Parry Sound Power Generation.

**Environmental/Construction Monitoring, Montcalm Mine, Falcon Bridge, Timmins, Ontario (2005)**

Environmental monitor responsible for environmental and construction monitoring for the installation of a pipeline diffuser in the Groundhog river, Timmins, ON. Responsible for contractor supervision, fish and wildlife monitoring, water quality monitoring and the implementation of the Sediment and Erosion Control Plan.



Christopher Pfohl

**Walleye Spawning Survey, Parry Sound Power Generation, Parry Sound, Ontario (2005)**

Responsible for enumeration of spawning Walleye (*Sander vitreus vitreus*) in the Seguin River downstream of the Parry Sound Power Generation, Hydroelectric Dam in Parry Sound. Information collected was presented to stakeholders and public interest groups in conjunction with the Ministry of Natural Resources (MNR) and Department of Fisheries and Oceans (DFO).

**Habitat Suitability for Walleye, Three Nations Lake, Pamour Mine Expansion Project, Porcupine Joint Venture, Timmins, Ontario (2004)**

Conducted an extensive literature review of Suitable Habitat for Walleye (*Sander vitreus vitreus*). The information was used to determine suitable habitat, substrate, depths, and spawning shoal design for a compensation plan for Three Nations Lake. The lake was dyked to provide access to subsurface gold deposits and a new section of the lake was flooded to provide a "no net loss" of fish habitat.

**Site Reconnaissance of the Pembina Pipeline Oil Spill, Pine River, District of Chetwynd, British Columbia (2000-2003)**

Field project manager responsible for coordinating and conducting the 2000-2002 site reconnaissance of the Pine River Oil Spill, the largest oil spill to a fresh water environment in North America which occurred on August 1, 2000. Responsible for coordinating and conducting a fingerprinting program with BC Research to determine the original source of hydrocarbons present in the Pine River. Accessed depositional areas along the river using a canoe, and video documented sampling locations for future legal evidence. Reviewed analytical data for report preparation and submission to regulatory agencies. Information regarding observations, sampling techniques, and analytical data were presented to the District council members, residents of Chetwynd, and Government Officials at public information sessions.

**Kokanee Stranding Assessment, BC Hydro, Duncan River, Nelson, British Columbia (2003)**

Field team member responsible for a Kokanee stranding assessment during a reduction in water flows at a BC Hydro generating dam on the Duncan River in Nelson, BC. Stranded fish were captured using electro-fishing methods for identification and enumeration. Data collected will be used to determine effects on fish during future flow reductions.

**Environmental Monitoring and Fish Salvage, Stanley Park Seawall Undermining Repair, Vancouver Board of Parks and Recreation, Vancouver, British Columbia (2003)**

Environmental monitor required to inspect construction activities including shotcrete applications in a marine environment for the Stanley Park Seawall. Responsible for obtaining specific fish collection permits and approval of work permit extensions from the DFO on behalf of the client. Selected tidal pools were bailed and marine life collected and transported to the Burrard Inlet for release prior to the preparation of undermined locations. An environmental monitoring report including fish collection details was submitted to the DFO for review.

**Environmental Protection Plan, Stanley Park Seawall Undermining Repair, Vancouver Board of Parks and Recreation, Vancouver, British Columbia (2003)**

Responsible for the preparation of an Environmental Protection Plan that was reviewed by DFO prior to gaining approval for the repair works along the Stanley Park Seawall.

**Environmental Monitoring, BC Hydro Substation Construction, Alltec Corporation, Langley, British Columbia (2003)**

Environmental monitor responsible for environmental and construction monitoring for a BC Hydro Substation adjacent to a Restrictive Covenant zone. Responsible for water quality testing and sampling, client liaison, and reporting any infractions to the provincial regulations. A final monitoring report was sent to the Ministry of Water Land and Air Protection, Habitat Protection Branch for final review.

**Fisheries Habitat Overview, Aurora South, Syncrude, Fort MacMurray, Alberta (2003)**

Responsible for conducting a reach break analysis for the Regional Study Area (RSA) selected for future Oil Sands mining in north-eastern Alberta. Potential fisheries and wildlife values have been determined and documented using background information and an aerial photography of the RSA. Information gathered was used for the Environmental Impact Assessment (EIA) for future development.

**Natural Gas Well Feasibility Study, Rosetta Exploration, Hudson's Hope, British Columbia (2002)**

Project manager and coordinator required to determine the feasibility of an exploration well for natural gas. Site investigations were conducted in a remote location in north-eastern BC to determine if previous occupants have impacted an area used for previous oil and gas exploration. Information collected was used to determine future impacts on the local ecology. Information



Christopher Pfohl

presented to the client was reviewed by the Oil and Gas Commission prior to gaining permits for future exploration.

#### **Environmental Effects Monitoring, Equity Mine, Placer Dome, Houston, British Columbia (2002)**

Responsible for conducting and coordinating fieldwork and an Environmental Effects Monitoring (EEM) program for Silver mine in northern BC. A release of tailings effluent into the local watershed from previous spring runoff was investigated using biological indicators and water and sediment quality. Installation of periphyton blocks and invertebrate baskets used were used to monitor downstream conditions. A sediment-sampling program in a lake near the mine was also incorporated into the effects monitoring program to determine concentrations and toxicity to invertebrates from possible metals contamination.

#### **Environmental Protection Plan/Environmental Monitoring for a Culvert Removal and Habitat Restoration, Innovative Housing, Surrey, British Columbia (2002)**

Responsible for final submission of the Environmental Protection Plan to the Ministry of Water Land and Air Protection, Habitat Protection Section, for review and approval for "Working in and about a stream". Christopher was the on-site Environmental monitor for the construction work related to the removal of a culvert to daylight an existing creek and substrate placement to provide habitat restoration. Responsible for documenting construction activities, water quality monitoring, client liaison and final reporting required by Ministry of Water Land and Air Protection.

#### **2000 Follow-up Studies to the Stewart Creek Oil Spill, Confidential Client, Stewart Creek, British Columbia (2000)**

Responsible for conducting sediment and benthic invertebrate sampling program at seven sites in the fall of 2000, five years after a crude oil spill in the Stewart Creek watershed. The project involved comparisons of the hydrocarbon and benthic invertebrate data collected in 1995, 1997, and 2000.

#### **Fish Collection and Sediment Sampling, Translink, Richmond, British Columbia (2000)**

Conducted fish collection and sediment sampling to determine and compare Polycyclic Aromatic Hydrocarbons (PAHs) in fish tissue and sediment samples. Analytical results of the sediment were compared to the fish tissue and the consumption levels presented in the "Guide to Eating Sportfish, 2001", Ministry of Environment, Ontario.

#### **Biological Inventory**

Christopher has been certified by MNR/TRCA under the Ontario Stream Assessment Protocol (OSAP) with addition certification by the Ontario Benthos Biomonitoring Network (OBBN). He has completed the Ontario Fishes Identification Course presented by the Royal Ontario Museum, and is certified by MNR as a Class 1 Electrofishing Crew Leader and trainer. Christopher has been certified under the MTO/DFO/MNR Fisheries Protocol, Fisheries Assessment Specialist, Fisheries Contract Specialist presented by MTO/DFO/MNR in November 2006, and is RAQS certified by MTO. Christopher has completed the Ontario Freshwater Mussel Identification Workshop (DFO), the Marsh Monitoring protocol for Amphibian Breeding surveys and egg mass surveys for breeding salamanders (Species at Risk). He has conducted numerous aquatic inventories in Ontario, Labrador and British Columbia, in local watersheds to very remote areas in northern climates.

#### **Health and Safety**

Christopher has been a Health and Safety Committee member and employee representative for the last 6 years and has completed numerous Health and Safety Plans for a variety of projects.



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**Appendix H**  
**DFO Operational Statements**

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# NOTIFICATION FORM

Fisheries and Oceans Canada  
Ontario Operational Statement

Version 3.1

## PROPONENT INFORMATION

NAME:	STREET ADDRESS:	POSTAL CODE:
CITY/TOWN:	PROVINCE/TERRITORY:	
TEL. NO. (RESIDENCE):	TEL. NO. (WORK):	
FAX NO:	EMAIL ADDRESS:	

## CONTRACTOR INFORMATION (provide this information if a Contractor is working on behalf of the Proponent)

NAME:	STREET ADDRESS:	POSTAL CODE:
CITY/TOWN:	PROVINCE/TERRITORY:	
TEL. NO. (RESIDENCE):	TEL. NO. (WORK):	
FAX NO:	EMAIL ADDRESS:	

## PROJECT INFORMATION

Select Operational Statements that are being used (check all applicable boxes):

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Beach Creation for Residential Use | <input type="checkbox"/> Ice Bridges and Snow Fills                                   | <input type="checkbox"/> Public Beach Maintenance     |
| <input type="checkbox"/> Beaver Dam Removal                 | <input type="checkbox"/> Isolated Pond Construction                                   | <input type="checkbox"/> Punch & Bore Crossings       |
| <input type="checkbox"/> Bridge Maintenance                 | <input type="checkbox"/> Isolated or Dry Open-cut Stream Crossings                    | <input type="checkbox"/> Routine Maintenance Dredging |
| <input type="checkbox"/> Clear-Span Bridges                 | <input type="checkbox"/> Maintenance of Riparian Vegetation in Existing Rights-of-Way | <input type="checkbox"/> Submerged Log Salvage        |
| <input type="checkbox"/> Culvert Maintenance                | <input type="checkbox"/> Mineral Exploration Activities                               | <input type="checkbox"/> Temporary Stream Crossing    |
| <input type="checkbox"/> Dock and Boathouse Construction    | <input type="checkbox"/> Moorings   | <input type="checkbox"/> Underwater Cables            |
| <input type="checkbox"/> High-Pressure Directional Drilling | <input type="checkbox"/> Overhead Line Construction                                   |   |

Select the type of water body or watercourse at or near your project:

- |   |   |                                  |
|---|---|----------------------------------|
| <input type="checkbox"/> River, Stream, Creek         | <input type="checkbox"/> Marine (Ocean or Sea)                          | <input type="checkbox"/> Estuary |
| <input type="checkbox"/> Lake (8 hectares or greater) | <input type="checkbox"/> Pond or wetland (pond is less than 8 hectares) |                                  |

## PROJECT LOCATION (S) (fill out this section if the project location is different from Proponent Information; append multiple project locations on an additional sheet if necessary)

Name of water body or watercourse	Coordinates of the Project (UTM co-ordinate or Degrees, Minutes, Seconds), if available Easting: _____ Northing: _____ Latitude: _____ Longitude: _____
Legal Description (Plan, Block, Lot, Concession, Township)	Directions to Access the Project Site (i.e., Route or highway number, etc.)
Proposed Start Date (YYYY/MM/DD):	Proposed Completion Date (YYYY/MM/DD):

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, this notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to the Operational Statement.

I, \_\_\_\_\_ (print name) certify that the information given on this form is, to the best of my knowledge, correct and complete.

Signature \_\_\_\_\_ Date \_\_\_\_\_

**Note:** If you cannot meet all of the conditions and cannot incorporate all of the measures in the Operational Statement then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list), or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain more information on the possible options you should consider to avoid contravention of the *Fisheries Act*. For activities carried out under the *Crown Forest Sustainability Act*, the requirements of the applicable Operational Statements are addressed through an existing agreement and the Ontario Ministry of Natural Resources is the first point of contact.

Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the fish habitat protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-SCI-605. Under the *Privacy Act*, individuals have a right to, and on request shall be given access to, any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at [www.infosource.gc.ca](http://www.infosource.gc.ca) or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provisions of the *Access to Information Act*.

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## FISHERIES AND OCEANS CANADA OFFICES IN ONTARIO

### Southern Ontario District

#### **Burlington**

Fisheries and Oceans Canada  
3027 Harvester Road, Suite 304  
P.O. Box 85060  
Burlington, ON L7R 4K3  
Telephone: (905) 639-0188  
Fax: (905) 639-3549  
Email: ReferralsBurlington@DFO-MPO.GC.CA

#### **London**

Fisheries and Oceans Canada  
73 Meg Drive  
London, ON N6E 2V2  
Telephone: (519) 668-2722  
Fax: (519) 668-1772  
Email: ReferralsLondon@DFO-MPO.GC.CA

### Eastern Ontario District

#### **Peterborough**

Fisheries and Oceans Canada  
501 Towerhill Road, Unit 102  
Peterborough, ON K9H 7S3  
Telephone: (705) 750-0269  
Fax: (705) 750-4016  
Email: ReferralsPeterborough@DFO-MPO.GC.CA

#### **Prescott**

Fisheries and Oceans Canada  
401 King Street West  
Prescott, ON K0E 1T0  
Telephone: (613) 925-2865  
Fax: (613) 925-2245  
Email: ReferralsPrescott@DFO-MPO.GC.CA

### Northern Ontario District

#### **Parry Sound**

Fisheries and Oceans Canada  
28 Waubeek Street  
Parry Sound, ON P2A 1B9  
Telephone: (705) 746-2196  
Fax: (705) 746-4820  
Email: ReferralsParrySound@DFO-MPO.GC.CA

#### **Sudbury and Sault Ste. Marie**

Fisheries and Oceans Canada  
1500 Paris Street, Unit 11  
Sudbury, ON P3E 3B8  
Telephone: (705) 522-2816  
Fax: (705) 522-6421  
Email: ReferralsSudbury@DFO-MPO.GC.CA

#### **Thunder Bay and Kenora**

Fisheries and Oceans Canada  
Thunder Bay Office  
100 Main Street, Suite 425  
Thunder Bay, ON P7B 6R9  
Telephone: (807) 346-8118  
Fax: (807) 346-8545  
Email: ReferralsThunderBay@DFO-MPO.GC.CA

*Aussi disponible en français*

[http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index\\_f.asp](http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp)



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> [Operational Statements](#) > [Ontario](#) > Punch & Bore Crossings

## Punch & Bore Crossings

Version 3.0

Fisheries and Oceans Canada  
Ontario Operational Statement

For the purpose of this Operational Statement, the term punch and bore refers to a trenchless crossing method which involves the excavation of a vertical bell hole or shallow depression on either side of the watercourse. Horizontal punching or boring between the two points, at an appropriate depth below the watercourse, completes the creation of a passage-way for the crossing. Punch and bore crossings allow cables and pipelines to be installed under watercourses without imparting any disturbance to the bed and banks. Punch and bore crossings differ from high-pressure directional drilled crossings, in that no pressurized mud systems are required, thereby avoiding the risk of sediment release due to frac-out.

Punch and bore crossings can negatively impact fish and fish habitat due to erosion and sedimentation from site disturbance and dewatering of bell holes or the collapse of the punch or bore hole under the stream. Disturbing riparian vegetation can reduce important shoreline cover, shade and food production areas. Machinery fording the stream can disturb bottom and bank substrates, disrupt sensitive fish life stages, and introduce deleterious substances if equipment is not properly maintained. Impacts can be reduced if an emergency response plan and clean-up materials are in place.

The general order of preference for carrying out a cable or pipeline stream crossing in order to protect fish and fish habitat is: a) a punch or bore crossing, b) high-pressure directional drill crossing (see *High-Pressure Directional Drilling Operational Statement*), c) dry open-cut crossing, and d) isolated open-cut crossing (see *Isolated or Dry Open-cut Stream Crossings Operational Statement*). This order must be balanced with practical considerations at the site.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the [Fisheries Act](#) no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the [Fisheries Act](#).

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into your project in order to avoid negative impacts to fish habitat. You may proceed with your punch or bore crossing project without a DFO review when you meet the following conditions:

- the crossing is not a wet open-cut crossing,
- the crossing technique will not damage the stream bed or bank and thereby negatively impact fish or fish habitat,
- the site does not occur at a stream location involving known fish spawning habitat, particularly if it is dependent on groundwater upwelling, and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Conducting Punch and Bore Crossings*, listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the [Fisheries Act](#) and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and

the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

**You are required to respect all municipal, provincial or federal legislation that applies to the work being carried out in relation to this Operational Statement.** The activities undertaken in this Operational Statement must also comply with the *Species at Risk Act* ([www.sararegistry.gc.ca](http://www.sararegistry.gc.ca)). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work by filling out and sending the Ontario Operational Statement notification form (<http://www.dfo-mpo.ca/regions/central/habitat/os-eo/provinces-territoires-territoires/on/os-eo20-eng.htm>) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

### **Measures to Protect Fish and Fish Habitat when Conducting Punch and Bore Crossings**

1. A punch or bore crossing can be conducted at any time of the year provided there is not a high risk of failure and it does not require in-water activities such as machinery fording.
2. Design the punch or bore path for an appropriate depth below the watercourse to prevent the pipeline or cable from becoming exposed due to natural scouring of the stream bed.
3. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site and to excavate the bell holes. This removal is to be kept to a minimum and within the utility right-of-way.
4. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the water body. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.
5. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing Operational Statement* is also available.
  - 5.1. If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
  - 5.2. Grading of the stream banks for the approaches should not occur.
  - 5.3. If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
  - 5.4. Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
  - 5.5. Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.
6. Operate machinery on land above the ordinary high water mark (HWM) (see definition below) and in a manner that minimizes disturbance to the banks of the watercourse.
  - 6.1. Machinery is to arrive on-site in a clean condition and is to be maintained free of fluid leaks.
  - 6.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
  - 6.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
7. Excavate bell holes beyond the HWM, far enough away from any watercourse to allow containment of any sediment or deleterious substances above the HWM.
  - 7.1. When dewatering bell holes, remove suspended solids by diverting water into a vegetated area or settling basin, and prevent sediment and other deleterious substances from entering the watercourse.

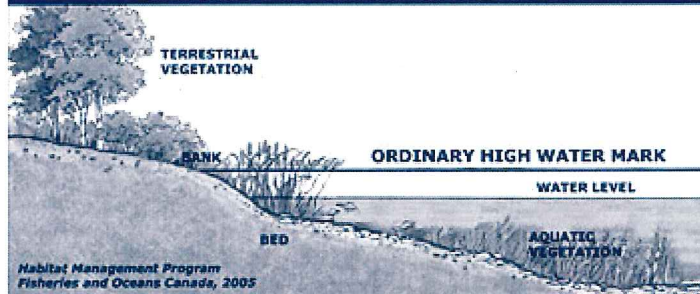
- 7.2. Stabilize any waste materials removed from the work site (including bell holes) to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.
- 7.3. After suitably backfilling and packing the bell holes, vegetate any disturbed areas (see Measure 11).
8. Monitor the watercourse to observe signs of malfunction during all phases of the work.
  9. For the duration of the work, keep on-site and readily accessible, all material and equipment needed to contain and clean-up releases of sediment-laden water and other deleterious substances.
  10. Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance. This plan is to include measures to: a) stop work, contain sediment-laden water and other deleterious substances and prevent their further migration into the watercourse; b) notify all applicable authorities in the area, including the closest DFO office; c) promptly clean-up and appropriately dispose of the sediment-laden water and deleterious substances; and d) ensure clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse.
  11. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.
    - 11.1. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

### **Definition:**

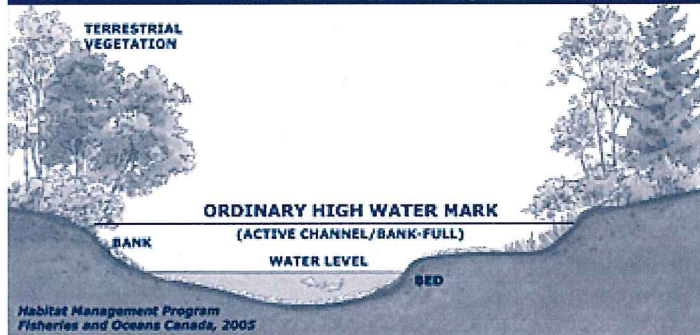
**Ordinary high water mark (HWM)** – The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the “active channel/bank-full level” which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

For the Great Lakes this refers to the 80th percentile elevation above chart datum as described in DFO’s *Fish Habitat and Determining the High Water Mark on Lakes*.

## CROSS-SECTION OF INLAND LAKES, WETLANDS OR MARINE ENVIRONMENTS



## CROSS-SECTION OF FLOWING WATERS (RIVERS, STREAMS)



*[Aussi disponible en français](#)*

### **DFO OFFICE LIST**

**[Notification Form \(PDF Version, 74 Kb\)](#)**



Fisheries and Oceans Canada  
Pêches et Océans Canada

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**Canada**

Date Modified: 2010-07-09



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## Overhead Line Construction

Version 3.0

Fisheries and Oceans Canada  
Ontario Operational Statement

Overhead lines are constructed for electrical or telecommunication transmission across many watercourses that range in size from small streams and ponds to large rivers, lakes and reservoirs. This Operational Statement applies to selective removal of vegetation along the right-of-way to provide for installation and safe operation of overhead lines, and passage of equipment and materials across the water body.

Although fish habitat occurs throughout a water system, it is the riparian habitat that is most sensitive to overhead line construction. Riparian vegetation occurs adjacent to the watercourse and directly contributes to fish habitat by providing shade, cover, and spawning and food production areas. It is important to design and build your overhead line project to meet your needs while also protecting riparian areas. Potential impacts to fish and fish habitat include excessive loss of riparian vegetation, erosion and sedimentation resulting from bank disturbance and loss of plant root systems, rutting and compaction of stream substrate at crossing sites, and disruption of sensitive fish life stages.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the [Fisheries Act](#) no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the [Fisheries Act](#).

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your overhead line project without a DFO review when you meet the following conditions:

- it does not require the construction or placement of any temporary or permanent structures (e.g. islands, poles, crib works, etc.) below the ordinary high water mark (HWM) (see definition below), and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines* listed below in this Operational Statement.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the [Fisheries Act](#) and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the [Fisheries Act](#).

**You are required to respect all municipal, provincial or federal legislation that applies to the work being carried out in relation to this Operational Statement.** The activities undertaken in this Operational Statement must also comply with the *Species at Risk Act* ([www.sararegistry.gc.ca](http://www.sararegistry.gc.ca)). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.



We ask that you notify DFO, preferably 10 working days before starting your work by filling out and sending the Ontario Operational Statement notification form (<http://www.dfo-mpo.ca/regions/central/habitat/os-eo/provinces-territoires-territoires/on/os-eo20-eng.htm>) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

## Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines

1. Installing overhead lines under frozen conditions is preferable in all situations. On wet terrains (e.g., bogs), lines should be installed under frozen conditions, where possible, or using aerial methods (i.e., helicopter).
2. Design and construct approaches so that they are perpendicular to the watercourse wherever possible to minimize loss or disturbance to riparian vegetation.
3. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or overhead line structures.
  - 3.1. Wherever possible, locate all temporary or permanent structures, such as poles, sufficiently above the HWM to prevent erosion.
4. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the overhead line. This removal should be kept to a minimum and within the road or utility right-of-way.
5. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.
  - 5.1. If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
  - 5.2. Grading of the stream banks for the approaches should not occur.
  - 5.3. If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
  - 5.4. Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
  - 5.5. Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.
6. Operate machinery on land and in a manner that minimizes disturbance to the banks of the watercourse.
  - 6.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
  - 6.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
  - 6.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
  - 6.4. Restore banks to original condition if any disturbance occurs.
7. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.
  - 7.1. Avoid work during wet, rainy conditions or use alternative techniques such as aerial methods (i.e., helicopter) to install overhead lines.
8. Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.
9. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds

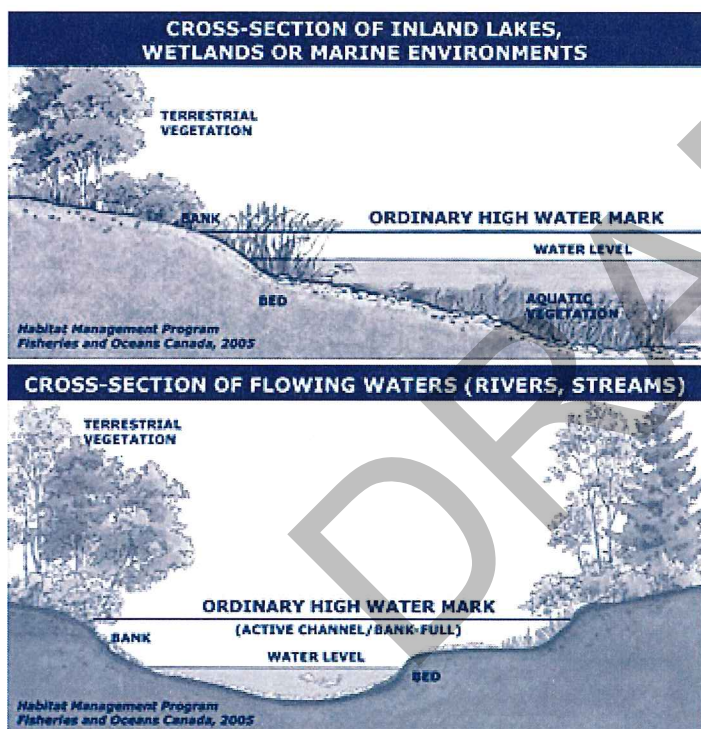
germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

9.1. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

### Definition:

**Ordinary high water mark (HWM)** – The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the “active channel/bank-full level” which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

For the Great Lakes this refers to the 80th percentile elevation above chart datum as described in DFO’s *Fish Habitat and Determining the High Water Mark on Lakes*.



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## High-Pressure Directional Drilling

Version 3.0

Fisheries and Oceans Canada  
Ontario Operational Statement

For the purpose of this Operational Statement, the term High-Pressure Directional Drilling (HPDD) means trenchless methods of crossing a watercourse using pressurized mud systems. HPDD is used to install cables and pipelines for gas, telecommunications, fibre optics, power, sewer, oil and water lines underneath watercourses and roads. This method is preferable to open-cut and isolated crossings since the cable or pipeline is drilled underneath the watercourse with very little disturbance to the bed or banks. HPDD involves drilling a pilot bore hole underneath the watercourse towards a surface target, back-reaming the bore hole to the drill rig while pulling the pipe along through the hole. This process typically uses the freshwater gel mud system composed of a mixture of clean, freshwater as the base, bentonite (clay-based drilling lubricant) as the viscosifier and synthetic polymers.

The general order of preference for carrying out a cable or pipeline stream crossing in order to protect fish and fish habitat is: a) a punch or bore crossing (see *Punch & Bore Crossings* Operational Statement), b) HPDD crossing, c) dry open-cut crossing, and d) isolated open-cut crossing (see *Isolated or Dry Open-cut Stream Crossings* Operational Statement). This order must be balanced with practical considerations at the site.

One of the risks associated with HPDD is the escape of drilling mud into the environment as a result of a spill, tunnel collapse or the rupture of mud to the surface, commonly known as "frac-out". A frac-out is caused when excessive drilling pressure results in drilling mud propagating toward the surface. The risk of a frac-out can be reduced through proper geotechnical assessment practices and drill planning and execution. The extent of a frac-out can be limited by careful monitoring and having appropriate equipment and response plans ready in the event that one occurs. HPDD can also result in excessive disturbance of riparian vegetation and sedimentation and erosion due to operation of equipment on the shoreline or fording to access the opposite bank.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the [Fisheries Act](#) no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the [Fisheries Act](#).

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your high-pressure directional drill project without a DFO review when you meet the following conditions:

- the crossing technique will not damage the stream bed and thereby negatively impact fish or fish habitat,
- the crossing is not a wet open-cut crossing,
- you have an emergency frac-out response plan and a contingency crossing plan in place that outline the protocol to monitor, contain and clean-up a potential frac-out and an alternative method for carrying out the crossing, and
- you incorporate the *Measures to Protect Fish and Fish Habitat when High-Pressure Directional Drilling* listed below in this Operational Statement.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

**You are required to respect all municipal, provincial or federal legislation that applies to the work being carried out in relation to this Operational Statement.** The activities undertaken in this Operational Statement must also comply with the *Species at Risk Act* ([www.sararegistry.gc.ca](http://www.sararegistry.gc.ca)). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work by filling out and sending the Ontario Operational Statement notification form ([http://www.dfo-mpo.ca/regions/central/habitat/os-20-eng.htm](http://www.dfo-mpo.ca/regions/central/habitat/os-eo/provinces-territoires-territoires/on/os-20-eng.htm)) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

## **Measures to Protect Fish and Fish Habitat when High-Pressure Directional Drilling**

1. Use existing trails, roads or cut lines wherever possible, as access routes to avoid disturbance to the riparian vegetation.
2. Design the drill path to an appropriate depth below the watercourse to minimize the risk of frac-out and to a depth to prevent the line from becoming exposed due to natural scouring of the stream bed. The drill entry and exit points are far enough from the banks of the watercourse to have minimal impact on these areas.
3. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the road or utility right-of-way.
4. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.
  - 4.1. If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
  - 4.2. Grading of the stream banks for the approaches should not occur.
  - 4.3. If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
  - 4.4. Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
  - 4.5. Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.
5. Operate machinery on land above the ordinary high water mark (see definition below) and in a manner that minimizes disturbance to the banks of the watercourse.
  - 5.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
  - 5.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
  - 5.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
  - 5.4. Restore banks to original condition if any disturbance occurs.

6. Construct a dugout/settling basin at the drilling exit site to contain drilling mud to prevent sediment and other deleterious substances from entering the watercourse. If this cannot be achieved, use silt fences or other effective sediment and erosion control measures to prevent drilling mud from entering the watercourse. Inspect these measures regularly during the course of construction and make all necessary repairs if any damage occurs.
  - 6.1. Dispose of excess drilling mud, cuttings and other waste materials at an adequately sized disposal facility located away from the water to prevent it from entering the watercourse.
7. Monitor the watercourse to observe signs of surface migration (frac-out) of drilling mud during all phases of construction.

### **Emergency Frac-out Response and Contingency Planning**

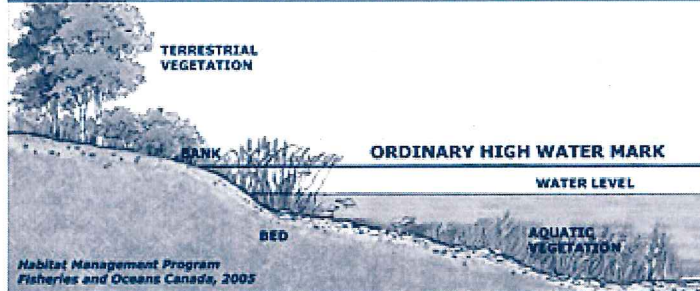
8. Keep all material and equipment needed to contain and clean up drilling mud releases on site and readily accessible in the event of a frac-out.
9. Implement the frac-out response plan that includes measures to stop work, contain the drilling mud and prevent its further migration into the watercourse and notify all applicable authorities, including the closest DFO office in the area (see Ontario DFO office list). Prioritize clean up activities relative to the risk of potential harm and dispose of the drilling mud in a manner that prevents re-entry into the watercourse.
10. Ensure clean up measures do not result in greater damage to the banks and watercourse than from leaving the drilling mud in place.
11. Implement the contingency crossing plan including measures to either re-drill at a more appropriate location or to isolate the watercourse to complete the crossing at the current location. See *Isolated or Dry Open-cut Stream Crossings* Operational Statement for carrying out an isolated trenched crossing.
12. Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with preferably native grass or shrubs.
13. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.
  - 13.1. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

### **Definition:**

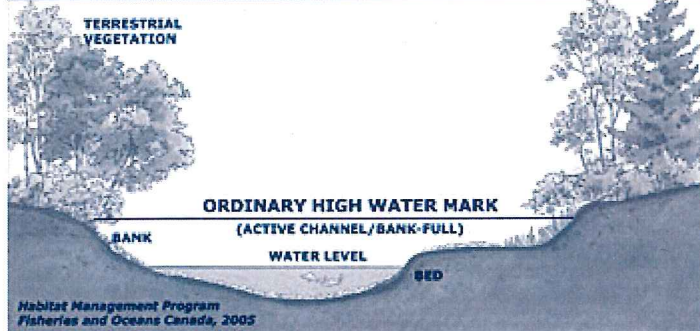
**Ordinary high water mark** – The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the “active channel/bank-full level” which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

For the Great Lakes this refers to the 80th percentile elevation above chart datum as described in DFO’s *Fish Habitat and Determining the High Water Mark on Lakes*.

**CROSS-SECTION OF INLAND LAKES,  
WETLANDS OR MARINE ENVIRONMENTS**



**CROSS-SECTION OF FLOWING WATERS (RIVERS, STREAMS)**



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## Isolated or Dry Open-cut Stream Crossings

Version 1.0

Fisheries and Oceans Canada  
Ontario Operational Statement

For the purpose of this Operational Statement, the term "Isolated Crossing" means a temporary stream crossing technique that allows work (e.g., trenched pipeline or cable installation) to be carried out "in-the-dry" while diverting the natural flow around the site during construction. These types of open trenched crossings are isolated using flume or dam and pump techniques (see *Pipeline Associated Watercrossings*, 2005 at [www.capp.ca/library/publications/industryOperations/pages/pubInfo.aspx?DocId=96717](http://www.capp.ca/library/publications/industryOperations/pages/pubInfo.aspx?DocId=96717)). The term "Dry Open-cut Stream Crossing" means a temporary stream crossing work (e.g., trenched pipeline or cable installation) that is carried out during a period when the entire stream width is seasonally dry or is frozen to the bottom.

The risks to fish and fish habitat associated with isolated open cut stream crossings include the potential for direct damage to substrates, release of excessive sediments, loss of riparian habitat, stranding of fish in dewatered areas, impingement/entrainment of fish at pump intakes, and disruption of essential fish movement patterns. Similarly, dry open-cut stream crossings pose a risk to fish and fish habitat due to potential harmful alteration of substrates, loss of riparian habitat, and release of excessive sediment once stream flows resume.

The order of preference for carrying out a cable or pipeline stream crossing, in order to protect fish and fish habitat, is: a) punch or bore crossing (see *Punch & Bore Crossings* Operational Statement); b) high-pressure directional drill crossing (see *High-Pressure Directional Drilling* Operational Statement); c) dry open-cut crossing; and d) isolated open-cut crossing. This order must be balanced with practical considerations at the site.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the [Fisheries Act](#) no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the [Fisheries Act](#).

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your isolated or dry open-cut stream crossing project without a DFO review when you meet the following conditions:

- if working within the Thames River, Sydenham River, Ausable River, Grand River, or Maitland River, you have contacted your Conservation Authority or local DFO Office (see Ontario DFO office list) to ensure that your project will not impact Schedule I mussel species at risk under the federal *Species at Risk Act* (SARA), before proceeding,
- for dry, open-cut crossings the watercourse is dry or frozen completely to the bottom at the site,
- for isolated crossings, the channel width of the watercourse at the crossing site is less than 5 meters from ordinary high water mark to ordinary high water mark (HWM) (see definition below),
- the isolated crossing does not involve the construction or use of an off-stream diversion channel, or the use of earthen dams,
- the isolated crossing ensures that all natural upstream flows are conveyed downstream during construction, with no change in quality or quantity,

- the site does not occur at a stream location involving known fish spawning habitat, particularly if it is dependent on groundwater upwelling,
- the use of explosives is not required to complete the crossing, and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated or Dry Open-cut Stream Crossing* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent- Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

**You are required to respect all municipal, provincial and federal legislation that applies to the work being carried out in relation to this Operational Statement.** The activities undertaken in this Operational Statement must also comply with SARA ([www.sararegistry.gc.ca](http://www.sararegistry.gc.ca)). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending the Ontario Operational Statement notification form ([www.dfo-mpo.gc.ca/regions/central/habitat/os-ao/provinces-territoires-territoires/on/os-ao20-eng.htm](http://www.dfo-mpo.gc.ca/regions/central/habitat/os-ao/provinces-territoires-territoires/on/os-ao20-eng.htm)) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

### **Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated or Dry Open-Cut Stream Crossing**

1. Use existing trails, roads or cut lines wherever possible, as access routes to avoid disturbance to the riparian vegetation.
2. Locate crossings at straight sections of the stream, perpendicular to the banks, whenever possible. Avoid crossing on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in the erosion and scouring of the stream bed.
3. Complete the crossing in a manner that minimizes the duration of instream work.
4. Construction should be avoided during unusually wet, rainy or winter thaw conditions.
5. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the utility right-of-way.
6. Machinery fording a flowing watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and is to occur only if an existing crossing at another location is not available or practical to use. Operational Statements are also available for *Ice Bridges and Snow Fills*, *Clear-Span Bridges*, and *Temporary Stream Crossing*.
  - 6.1. If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
  - 6.2. Grading of the stream banks for the approaches should not occur.
  - 6.3. If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
  - 6.4. Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
  - 6.5. Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.



7. Operate machinery in a manner that minimizes disturbance to the watercourse bed and banks.
  - 7.1. Protect entrances at machinery access points (e.g., using swamp mats) and establish single site entry and exit.
  - 7.2. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
  - 7.3. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
  - 7.4. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
8. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.
9. Stabilize any waste materials removed from the work site, above the HWM, to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.
10. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.
  - 10.1. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

### **Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated Crossing**

Temporary isolation is used to allow work "in-the-dry" while maintaining the natural downstream flow by installing dams up and downstream of the site and conveying all of the natural upstream flow into a flume, or pumping it around the isolated area. In addition to measures 1 to 10, the following measures should be carried out when conducting an isolated stream crossing:

11. Time isolated crossings to protect sensitive fish life stages by adhering to fisheries timing windows (see Measure 6.4).
12. Use dams made of non-earthen material, such as waterinflated portable dams, pea gravel bags, concrete blocks, steel or wood wall, clean rock, sheet pile or other appropriate designs, to separate the dewatered work site from flowing water.
  - 12.1. If granular material is used to build dams, use clean or washed material that is adequately sized (i.e., moderately sized rock and not sand or gravel) to withstand anticipated flows during the construction. If necessary, line the outside face of dams with heavy poly-plastic to make them impermeable to water. Material to build these dams should not be taken from below the HWM of any water body.
  - 12.2. Design dams to accommodate any expected high flows of the watercourse during the construction period.
13. Before dewatering, rescue any fish from within the isolated area and return them safely immediately downstream of the worksite.
  - 13.1. You will require a permit from DFO to relocate any aquatic species that are listed as either endangered or threatened under SARA. Please contact your Conservation Authority or the DFO office in your area to determine if an aquatic species at risk is in the vicinity of your project and, if appropriate, use the DFO website at [www.dfo-mpo.gc.ca/species-especies/act-loi/act-loi-eng.htm](http://www.dfo-mpo.gc.ca/species-especies/act-loi/act-loi-eng.htm) to apply for a permit.
14. Pump sediment laden dewatering discharge into a vegetated area or settling basin, and prevent sediment and other deleterious substances from entering any water body.
15. Remove accumulated sediment and excess spoil from the isolated area before removing dams.
16. Stabilize the **streambed** and restore the original channel shape, bottom gradient and substrate to pre-construction condition before removing dams.

17. Ensure **banks** are stabilized, restored to original shape, adequately protected from erosion and re-vegetated, preferably with native species.
18. If rock is used to stabilize banks, it should be clean, free of fine materials, and of sufficient size to resist displacement during peak flood events. The rock should be placed at the original stream bank grade to ensure there is no infilling or narrowing of the watercourse.
19. Gradually remove the downstream dam first, to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle.
20. During the final removal of dams, restore the original channel shape, bottom gradient and substrate at these locations.
21. **Pumped Diversions**

Pumped diversions are used to divert water around the isolated area to maintain natural downstream flows and prevent upstream ponding.

  - 21.1. Ensure intakes are operated in a manner that prevents streambed disturbance and fish mortality. Guidelines to determine the appropriate mesh size for intake screens may be obtained from DFO (e.g., *Freshwater Intake End-of-Pipe Fish Screen Guideline* (1995), available at [www.dfo-mpo.gc.ca/Library/ 223669.pdf](http://www.dfo-mpo.gc.ca/Library/223669.pdf) (PDF Version, 2.93 Mb)).
  - 21.2. Ensure the pumping system is sized to accommodate any expected high flows of the watercourse during the construction period. Pumps should be monitored at all times, and back-up pumps should be readily available on-site in case of pump failure.
  - 21.3. Protect pump discharge area(s) to prevent erosion and the release of suspended sediments downstream, and remove this material when the works have been completed.

### **Measures to Protect Fish and Fish Habitat when Carrying Out a Dry Open-Cut Stream Crossing**

In addition to measures 1 to 10, the following measures should be carried out when conducting a dry open-cut stream crossing:

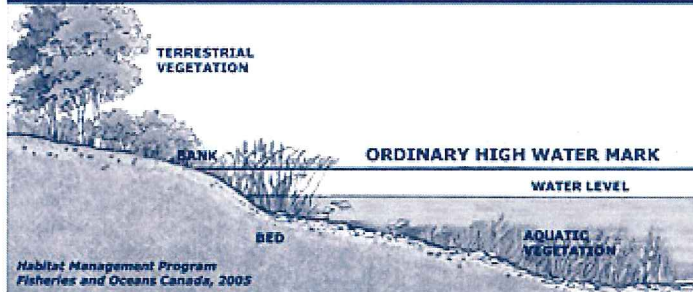
22. Stabilize the **streambed** and restore the original channel shape, bottom gradient and substrate to pre-construction condition.
23. Ensure **banks** are stabilized, restored to original shape, adequately protected from erosion and re-vegetated, preferably with native species.

### **Definition:**

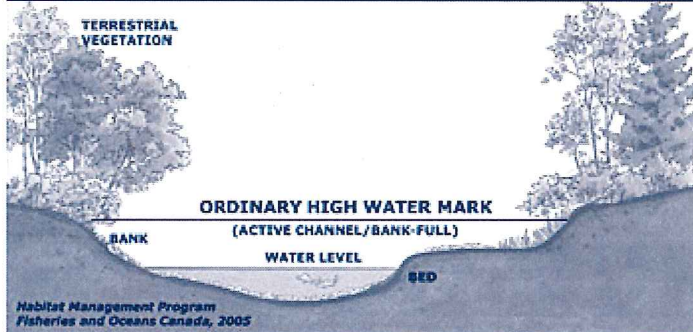
**Ordinary high water mark (HWM)** – The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

For the Great Lakes this refers to the 80th percentile elevation above chart datum as described in DFO's Fish Habitat and Determining the High Water Mark on Lakes.

**CROSS-SECTION OF INLAND LAKES,  
WETLANDS OR MARINE ENVIRONMENTS**



**CROSS-SECTION OF FLOWING WATERS (RIVERS, STREAMS)**



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