

***DRAFT***

***Bornish Wind Energy Centre***  
**Water Body Site Investigation Report**

**Prepared for:**  
NextEra Energy Canada  
5500 North Service Road, Suite 205  
Burlington, ON, L7L 6W6

Project No. 1231

Date: July 2012



**NATURAL RESOURCE SOLUTIONS INC.**

Aquatic, Terrestrial and Wetland Biologists

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**Bornish Wind Energy Centre  
Water Body Site Investigation Report**

**Project Team:**

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Report submitted on July 19, 2012



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Andrew G. Ryckman

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## 1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in April 2011 by GL Garrad Hassan on behalf of NextEra Energy Canada to conduct a water body assessment in accordance with the Renewable Energy Approval (REA) Regulation. This assessment includes a records review, site investigation, and impact assessment of any water bodies occurring at a proposed 72.9MW wind energy generating facility in North Middlesex, Middlesex County Ontario. The analysis of the water body features is one issue being considered. Other factors, such as natural heritage, land ownership, social impacts, and cultural impacts are also being assessed under separate covers as outlined by the REA Regulation.

The proposed Bornish Wind Energy Centre ('the Project') will be owned and operated by Bornish Wind, LP, a wholly-owned subsidiary of NextEra. The Project is located in northwestern Middlesex County in the Township of North Middlesex, Ontario, more specifically, approximately 3.3km south of the Town of Parkhill, Ontario (Figures 1-3). The project area is bound to the north by Nairn/Elginfield Road, to the south by Townsend Line, and to the east and west by Broken Front/Scout Road and Fort Rose Road, respectively. The Bornish Wind Energy Centre is proposed to consist of up to forty-five GE 1.6-100 (1.62MW) wind energy generating turbines installed for a total installed capacity of 72.9MW. However, locations for forty-eight turbines will be permitted. Associated infrastructure including turbine access roads, overhead and underground electrical collector cabling, interconnection facilities and substations are also proposed. In addition, a transmission line is proposed to run north along Kerwood Road from the substation to Elginfield Road/Nairn Road. This transmission line is then proposed to continue eastward along Nairn Road to an existing 500kV line and interconnection point located west of Petty Street. The general project area was defined early in the planning process for the proposed wind energy facility, based on the availability of wind resources, approximate area required for the proposed project, and availability of existing infrastructure for connection to the electrical grid. The project area was used to facilitate information collection and the records review.

As defined by REA Regulation, the proposed layout of these features is collectively referred to as the 'project location'. This includes turbines and associated infrastructure

as described above, as well as any areas that may be used temporarily during construction (i.e. staging areas, crane pads, crane walks etc.) For the purposes of this report, NRSI will refer to the areas within 120m of the project location as the 'project area'.

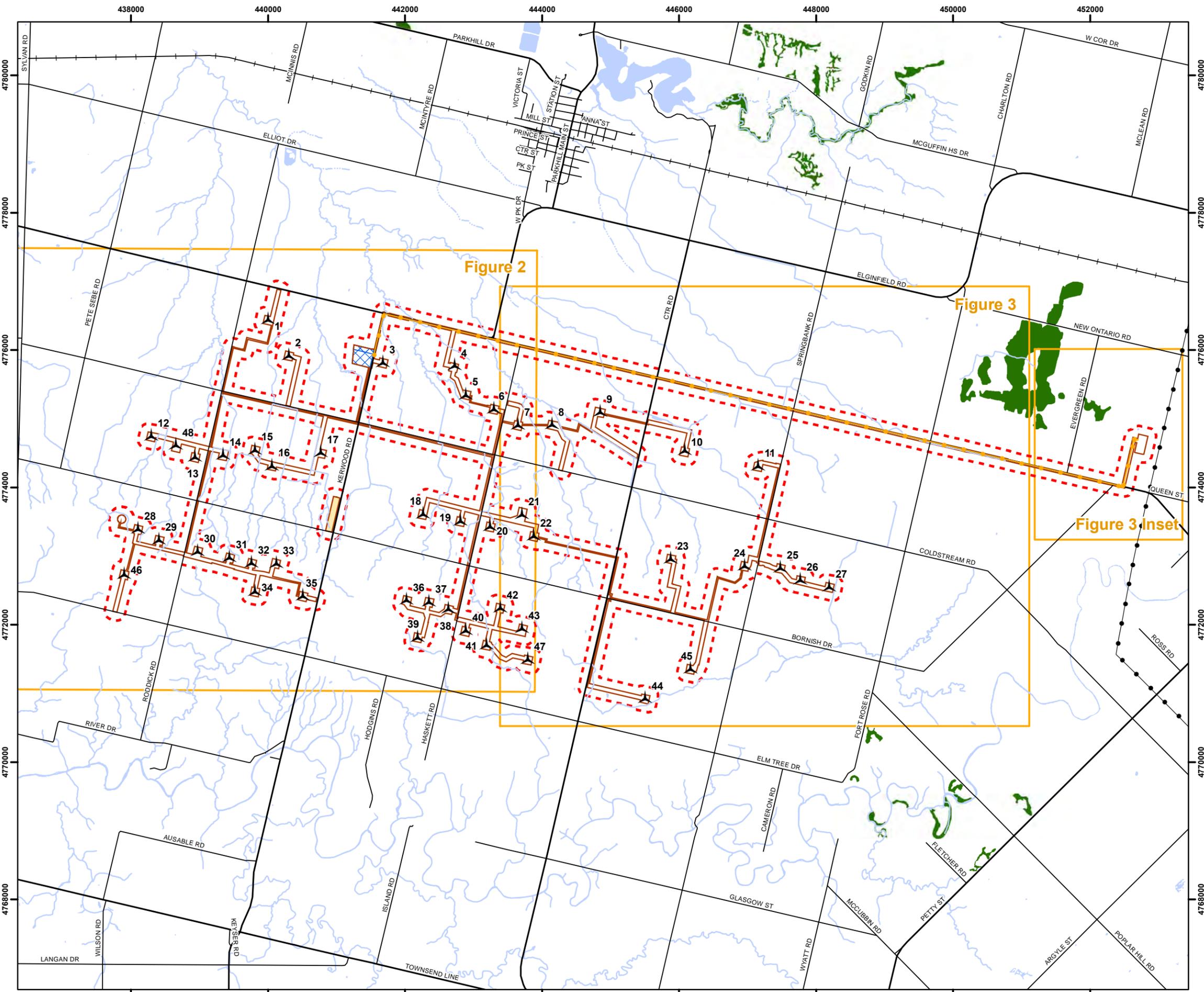
In accordance with the Renewable Energy Approval (REA) Regulation, NRSI has conducted site investigations to identify and characterize water bodies (lakes, seepages, intermittent/permanent watercourses) within 120m of the project location and Lake Trout (*Salvelinus namaycush*) lakes within 300m of the project. Site investigations were conducted to confirm the presence/absence of water bodies identified during the records review (NRSI 2012), pinpoint any corrections to features identified during the records review, and document new water bodies not previously identified. Field investigations also focused on the characterization of the identified features.

As part of this project, NRSI has considered all aspects relating to provincially Threatened and Endangered species. However, since these species are addressed as part of the *Endangered Species Act* (2007), they have not been discussed within any of these Water Body reports. These species will be addressed in full detail, including a habitat description and results of field assessments, potential impacts, and recommended mitigation measures, as part of a separate *Approval and Permitting Requirements Document (APRD)* to be submitted to the OMNR under separate cover, where necessary.

Figure 1

# Bornish Wind Energy Centre Project Area

- Legend**
- Project Area (120m Buffer)
  - Figure Extents
  - Project Location
  - Turbine
  - Proposed Transmission Line (Aboveground Cabling)
  - Staging Area
  - Substation
  - Existing Transmission Line
  - Primary Road
  - Secondary Road
  - Railroad
  - Intermittent Watercourse
  - Permanent Watercourse
  - Waterbody
  - Provincially Significant Wetland (PSW)
  - Other Wetland



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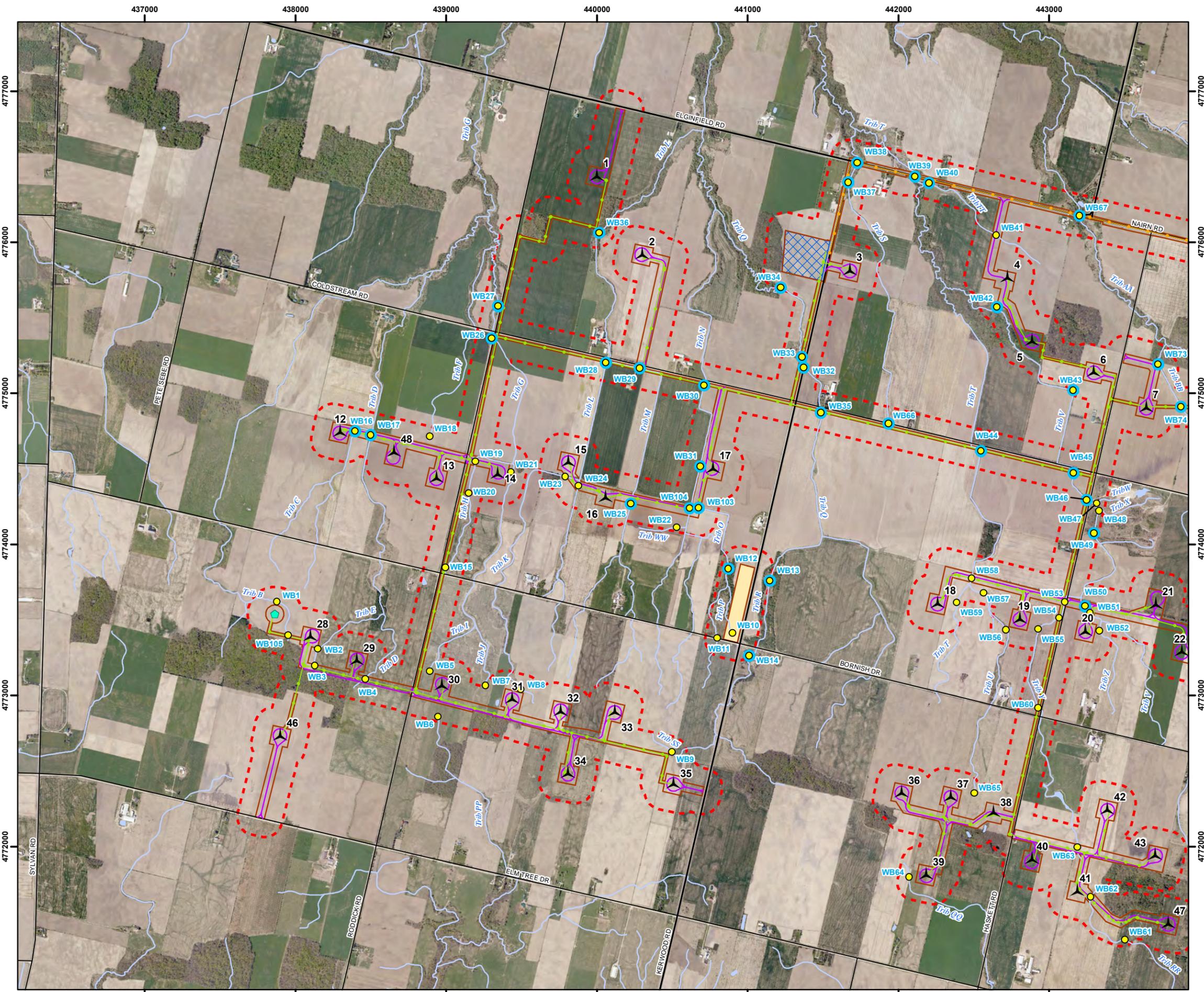
Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Source: Data provided by MNR. Copyright: Queen's Printer Ontario. Airphotos: SWOOP 2006

Project: 1231	NAD83 - UTM Zone 17
Date: July 3, 2012	Scale: 1:25,000 (11x17")

0 500 1,000 1,500 2,000 2,500 Metres

Figure 2

# Bornish Wind Energy Centre Water Bodies Western Project Area



**Legend**

- Water Bodies
- Non-Water Bodies
- Project Area (120m Buffer)
- Project Location
- ▲ Turbine
- ◆ MET Station
- Access Road
- Proposed Transmission Line (Aboveground Cabling)
- Collector System (Underground Cabling)
- Staging Area
- Substation
- Existing Transmission Line
- Primary Road
- Secondary Road
- +— Railroad
- ~ Intermittent Watercourse
- Permanent Watercourse
- Waterbody
- Provincially Significant Wetland (PSW)
- Other Wetland



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Project: 1231	NAD83 - UTM Zone 17
Date: Friday, July 13, 2012	Scale: 1:25,000 (11x17")

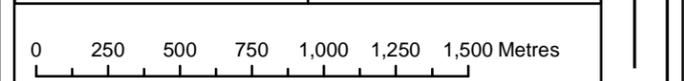


Figure 3

# Bornish Wind Energy Centre Water Bodies Eastern Project Area

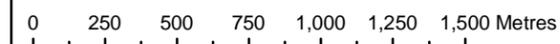


- Water Bodies
- Non-Water Bodies
- Project Area (120m Buffer)
- Project Location
- Turbine
- MET Station
- Access Road
- Proposed Transmission Line
- Collector System
- Staging Area
- Substation
- Existing Transmission Line
- Primary Road
- Secondary Road
- Railroad
- Intermittent Watercourse
- Permanent Watercourse
- Waterbody
- Provincially Significant Wetland (PSW)
- Other Wetland



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Project: 1231	NAD83 - UTM Zone 17
Date: July-05-12	Scale: 1:25,000 (11x17")



## 2.0 REA Requirements

Ontario Regulation (O. Reg.) 359/09 – *Renewable Energy Approvals Under Part V.0.1 of the Act*, (herein referred to as the REA Regulation) made under the *Environmental Protection Act (EPA)* identifies the requirements for the development of renewable energy projects in Ontario. In accordance with REA regulations, the Bornish Wind Energy Centre, classified as a Class 4 wind facility, is required to complete a REA submission.

Section 31 (1) subject to subsection (2) of the REA Regulation requires proponents of Class 4 wind projects to undertake a water site investigation for the purpose of determining:

- (a) whether the results of the analysis summarized in the report prepared under subsection 30(2) are correct or require correction, and identifying any required corrections;
- (b) whether any additional water bodies exist, other than those identified in the records review;
- (c) the boundaries, located within 120m of the project location, of any water body that was identified in the records review or the site investigation; and
- (d) the distance from the project location to the boundaries determined under clause (c).

The REA Regulation has specific requirements if designated lake trout lakes are present within 300m of the Project site. These requirements were not deemed applicable to the Project as no such lakes were found during the Water Body Records Review Report (NRSI 2012).

Subsection (3) of Section 31 of the REA Regulations requires the proponent to prepare a report setting out the following:

1. A summary of any corrections to the report prepared under subsection 30 (2) and the determinations made as a result of conducting the site investigation under subsection (1).
2. Information relating to each water body identified in the records review and in the site investigation, including the type of water body, plant and animal composition and the ecosystem of the land and water investigated.
3. A map showing,
  - i. The boundaries mentioned in clause (1) (c) or (2) (c) and (d),
  - ii. The location and type of each water body identified in relation to the project location, and
  - iii. The distances mentioned in clause (1) (d) or (2) (e).

4. The dates and times of the beginning and completion of the site investigation.
5. The duration of the site investigation.
6. The weather conditions during the site investigation.
7. A summary of methods used to make observations for the purpose of the site investigation.
8. The name and qualifications of any person conducting the site investigation.
9. Field notes kept by the person conducting the site investigation.

### 3.0 Staff Roles

The requirements of the REA Regulation indicate that the name and qualifications of all staff participating in the site investigation should be included, and are thus provided below.

Andrew G. Ryckman, B.Sc.

Andrew is a Terrestrial and Wetland Biologist with 7 years of environmental experience. He routinely manages the natural heritage aspects of renewable energy projects, with specific expertise relating to bats and herpetofauna. Andrew is certified in Ecological Land Classification (2010), and has successfully completed a Bat Conservation International (BCI) Acoustic Monitoring Workshop (2008).

Andrew's role in this project was to act as project advisor, providing input on field work and reporting as well as liaising directly with several agency staff.

Valerie Stevenson, Dip. Env.

Valerie is an Aquatic Biologist with over 9 years of experience in the environmental field. Her expertise is within the areas of freshwater aquatic habitat, biology of freshwater fishes, benthic macroinvertebrate organisms, surface water and sediment quality. Valerie designs, coordinates, manages, analyzes and reports on a variety of aquatic biology monitoring and assessment projects. She also works regularly on multidisciplinary project teams where she contributes her aquatic biology expertise with an integrated understanding of all environment components.

Valerie was the primary author and coordinated the completion of all water body reports.

Ashley Favaro, M. Env. Sc.

Ashley is an Aquatic Biologist with 8 years of work experience in the environmental field. Her areas of expertise include fish community and aquatic habitat assessments. She is experienced in a variety of different field data collection methods and has completed surveys in a number of different habitat types including lakes, coastal wetlands, reservoirs, large rivers, and streams with warm and coldwater fish assemblages. Ashley is certified in the Ontario Stream Assessment Protocol (OSAP) (2005) as well as level 2 fish identification (2010) under the protocol. She is also well versed in a variety of benthic invertebrate sampling protocols including Ontario Benthos Biomonitoring Network (OBBN) and has experience with species identification. Ashley regularly contributes to reports and routinely reviews scientific literature in support of projects.

Ashley was responsible for compiling data and assisting in the completion of reports.

Blair Baldwin, B.Sc.

Blair has two years of experience as an Aquatic Biologist. His areas of expertise include fish habitat surveys, habitat mapping, and fish community assessments, but he also has experience with benthic invertebrate surveys and species identification.

Blair was responsible for conducting the site investigations and data compilation.

Brian Watson, F.W.T.

Brian is an Aquatic Biologist with more than one year of work experience in the environmental field. His areas of expertise are fish and fish habitat surveys, environmental monitoring, and benthic invertebrate surveys. Brian has completed the fish identification course through the Royal Ontario Museum (2011) and obtained his Ontario Benthos Biomonitoring Network Certificate (2010).

Brian was responsible for completing site investigations, data compilation and assisting in the completion of this report.

Gina MacVeigh, F.W.T.

Gina is an Aquatic Biologist with more than 5 years of work experience in the environmental field. Her areas of expertise are fish habitat surveys, habitat mapping, and fish community assessments, but she also has experience with benthic invertebrate surveys and species identification. Gina has been certified to the level two fish identification (2010) under the Ontario Stream Assessment protocol, and has also obtained her Ontario Benthic Biomonitoring Network Certificate (2009). She has also completed the Fish and Species at Risk Identification courses through the Royal Ontario Museum (2009).

Gina was responsible for conducting the site investigations and data compilation.

Michael Ewaschuk, B.Sc.

Michael has over 10 years of experience in the field of aquatic ecology working for government agencies, non-profit organizations, Remedial Action Plans (Hamilton Harbour and Bay of Quinte), and private consulting firms. Michael has worked extensively with the Headwater Classification Guidelines (CVC and TRCA March 2009), which provide methodology to assessing flow permanency in drainage features, which is a key distinction between a water body and non-water body in the REA guidelines.

Michael was responsible for site selection, coordination of field work, overseeing field staff, analyzing data, and assisted in the completion of the report.

Charlotte S. Moore, B.E.S.

Charlotte is a Terrestrial and Wetland Biologist with three field seasons of experience in butterfly ecology and various other environmental projects. Charlotte has completed her Bachelor of Environmental Studies and is a candidate for a Master of Environmental Studies (2013) at the University of Waterloo. Her Masters research will involve measuring the success of past restoration efforts using butterfly abundance and diversity in the riparian zones of

several creeks. Other environmental projects Charlotte has worked on include the use of Ecological Land Classification (ELC), bat habitat assessments, breeding bird surveys and reptile studies.

Charlotte assisted with the reporting and habitat determinations for this project.

Kaitlin Boddaert, Dip GIS

Kaitlin specializes in delivering mapping services using GIS applications and assists with NRSI's spatial technologies. Her project experience includes, but is not limited to, the collection and creation of various datasets, the geocoding of addresses, the use of AutoCAD with integration into GIS, and the use of hard and soft data through scanning and georeferencing into digital format. Kaitlin has produced various digital maps and datasets for publication. She also has education and experience in the field of urban planning and is familiar with municipal mapping and procedures.

Kaitlin was responsible for creating all mapping for the water body reports.

#### 4.0 Summary of Records Review

In accordance with the REA Regulation, NRSI has completed a comprehensive records review for the proposed Bornish Wind Energy Centre project area (NRSI 2012). The results of this records review have been summarized in Table 1 below. For more detail the reader is referred to the complete report (NRSI 2012).

**Table 1. Summary of Records Review of the Bornish Wind Energy Centre**

Criteria	Associated Water Body Features
i. In a water body	<p>The records review has identified 33 water bodies, including 28 within the Ptsebe Creek drainage area, 1 in each in the Galbraith Drain and Big Swamp Drain drainage areas and 3 in the Ausable River drainage area to be overlapping the project location.</p> <p>These overlaps typically represent proposed crossing locations for access roads, transmission line or cabling. All of these water bodies represent potential permanent or intermittent watercourses. All of which are designated as warmwater fisheries containing warmwater baitfish species.</p> <p>Each of these potential water bodies will be examined in more detail during the site investigation phase of this project.</p>
ii. 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	None
iii. Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity	None
iv. Within 120 m of the average annual high water mark of a permanent or intermittent stream	<p>The records review has identified 54 water bodies, including 43 within the Ptsebe Creek drainage area, 2 within the Galbraith Drain drainage area, 1 within the Big Swamp Drain drainage area and 8 within the Ausable River drainage area to be within 120m of the project location. All of these water bodies represent potential permanent or intermittent watercourses, and all are designated as warmwater fisheries containing warmwater baitfish species.</p>
iv. Within 120 m of a seepage area	None

## 5.0 Site Investigation Methodology

In accordance with the REA Regulation, comprehensive site investigations were carried out within the Bornish Wind Energy Centre project area. These site investigations focused on confirming presence/absence and extent of water bodies identified during the records review, identifying any corrections to water body mapping required including the identification of any previously unidentified features, and characterizing identified water bodies. Results of these site investigations will be used to identify proximity of water bodies to project components and identify requirements for mitigation and impact assessment.

A summary of site investigation methodology is found in following sections.

### 5.1 Survey Dates

In accordance with the REA Regulation, NRSI recorded dates, times, duration, and weather conditions during each site investigation. This information has been summarized in Table 2 below. Detailed descriptions of staff roles and qualifications can be found in Section 3.0 of this report, and completed site investigation field data forms have been included in Appendix I.

**Table 2. Site Investigation Survey Details**

Staff Name(s)	Date (2011 & 2012)	Duration (hrs)	Weather Conditions		
			Temp. (°C)	Beaufort Wind	Cloud Cover (%)
Gina MacVeigh	Sept 20, 2011	8	18	0	30
Gina MacVeigh	Sept 21, 2011	8	17	3	100
Gina MacVeigh	Sept 22, 2011	8	17	1	70
Blair Baldwin	Nov 2, 2011	8	10	2	30
Blair Baldwin	Nov 3, 2011	8	8	0	0
Blair Baldwin	Nov 4, 2011	8	5	0	10-40
Brian Watson	Feb 21, 2012	4	1	4	100
Brian Watson	March 30, 2012	4	7	5	90

### 5.2 Lakes and Lake Trout Lakes

No lakes or Lake Trout lakes were identified during the records review. As such, no targeted site investigations were undertaken to characterize this feature type. General presence/absence surveys to confirm the absence of lakes were undertaken.

### 5.3 Permanent and Intermittent Watercourses

Prior to field investigations, potential intermittent/permanent watercourses were identified through review of all available natural features mapping as part of the records review (NRSI 2012). Field investigations were focused on confirming presence of these features as well as any additional watercourse features that may not be shown on existing mapping.

Once a watercourse feature was identified during site investigations, it was further assessed to determine if it meets the definition of a “water body” within the REA Regulation. Under this definition, a water body includes intermittent/permanent watercourses only, and does not include grassed waterways, temporary channels for surface drainage, such as furrows or shallow channels that can be tilled and driven through, rock chutes and spillways, or roadside ditches (that do not contain a permanent or intermittent stream).

Once a watercourse was identified as an intermittent/permanent watercourse, specific water body data was gathered during the site investigations. This involved walking the entire extent of each feature identified within the project area, and in many cases beyond to confirm its point of origin. For each feature, NRSI biologists collected a wide range of field information, including (but not limited to) wetted width, water depth, substrate, vegetation and habitat present, and any groundwater indicators. At each location, photographs and specific UTM coordinates were also taken.

### 5.4 Seepage Areas

No seepage areas were identified through the records review however the potential for such features to exist within the project area was recognized (NRSI 2012). Site investigations were carried out to identify the presence of seepage areas within the project area. These investigations were conducted concurrently with other water body site investigations as well as during wetland site assessments completed for the Natural Heritage Assessment, which also require the identification of potential seepage areas.

During site investigations, groundwater seepage areas were to be identified through a characterization of site-specific characteristics including direct observations of groundwater upwelling, the presence of groundwater indicator plant species (e.g.

watercress (*Nasturtium officinale*), dense patches of jewelweed (*Impatiens capensis*), or iron-staining of soils and substrates.

## 6.0 Site Investigation Results

NRSI biologists completed a comprehensive site investigation of the aquatic resources within the Bornish Wind Energy Centre project area. These surveys have been completed in accordance with the REA Regulation and the results have been summarized below.

### 6.1 Lakes

#### 6.1.1 Lake Trout Lakes

Site investigations confirmed the absence of any Lake Trout Lakes.

#### 6.1.2 Other Lakes

Site investigations confirmed the absence of any lakes within the project area.

### 6.2 Permanent or Intermittent Watercourses

NRSI biologists have confirmed a total of 25 permanent or intermittent watercourses within the project area. Of these, 18 have been identified as overlapping the project location, including proposed crossing locations of access roads and/or cabling. The remaining 7 watercourses range in distance from the project location from 6m to 119m, without any direct overlap with project components. For the purposes of this report, these watercourses have been divided and discussed based on their respective drainage areas which include Ptsebe Creek (a tributary of Parkhill Creek), Ausable River, Big Swamp Drain and Galbraith Drain. Where specific water body locations are discussed, a unique identifier (WB) has been attributed. These locations and watercourse features are shown on Figures 1-3. Watercourses are summarized by their respective drainage areas and are discussed in Sections 6.2.1. to 6.2.4.

Site investigation field notes are provided in Appendix I. Water body site investigation photographs are provided in Appendix II. Detailed habitat information specific to each water body location is provided in Appendix III.

#### 6.2.1 Ptsebe Creek

The records review had identified a total of 43 unnamed tributaries associated with Ptsebe Creek within the project area (NRSI 2012). All of these features are designated

as warmwater (Veliz 2001) with warmwater baitfish species (ABCA 2007), and are shown on Figures 1-3.

NRSI biologists conducted site investigations on these 43 potential water bodies and have confirmed that 22 features have characteristics that are consistent with designations of water bodies, as defined by the REA Regulation. A total of 7 of these features are considered water bodies at some locations within the project area and non-water bodies at other locations. The mix in water body consideration is due to the nature of headwater features and the resulting changes in permanency and definition of the feature. A total of 21 features are not considered water bodies. A summary of site conditions associated with all features considered during the site investigation, including distances to project location, is provided in Table 3 below.

**Table 3. Water Body Site Investigations Summary for Bornish Wind Energy Centre Project Area – Ptsebe Creek Drainage Area**

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Tributary B	WB1	tile drained, no water body feature present	N/A	No	No
	WB105		N/A	No	No
Tributary C	WB16	intermittent/permanent water body with a defined channel	<b>WT- 50</b> <b>AR- Crossing</b> OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	<b>Yes</b>	<b>Yes</b>
Tributary D	WB4	no water body feature present	N/A	No	No
	WB17	intermittent/permanent water body, channelized	WT- >120 <b>AR- Crossing</b> OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	<b>Yes</b>	<b>Yes</b>
Tributary E	WB2	tile drained, no water body feature present	N/A	No	No

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
	WB3	tile drained, no water body feature present	N/A	No	No
Tributary F	WB18	tile drained, no water body feature present	N/A	No	No
Tributary G	WB21	tile drained, no water body feature present	N/A	No	No
	WB26	intermittent/permanent water body, channelized	WT- >120 AR- >120 OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB27	intermittent/permanent water body, naturalized channel	WT- >120 AR- >120 OL- >120 <b>UL- 36</b> <b>CA- 22</b> BU- >120	Yes	Yes
Tributary H	WB15	ephemeral, swale, no defined channel	N/A	No	No
	WB19		N/A	No	No
	WB20		N/A	No	No
Tributary I	WB5	ephemeral, swale through agricultural field (soy bean crop)	N/A	No	No
Tributary J	WB7	tile drained, agricultural pond, no water body feature present	N/A	No	No
Tributary K	WB8	ephemeral, headwater drainage feature influenced by tile drainage	N/A	No	No
	WB23		N/A	No	No
Tributary L	WB24	ephemeral, grassed drainage ditch	N/A	No	No

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
	WB28	intermittent/permanent water body, aquatic vegetation, fish observed	WT- >120 AR- >120 OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB36	intermittent/permanent water body, naturalized channel	WT- >120 AR- >120 OL- >120 <b>UL- 41</b> <b>CA- 32</b> BU- >120	Yes	Yes
Tributary M	WB25	intermittent/permanent water body with very little flow, channelized, aquatic vegetation present	WT- >120 <b>AR- Crossing</b> OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB29		WT- >120 <b>AR- 27</b> OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
Tributary N	WB30	intermittent/permanent water body, channelized, aquatic vegetation present and fish observed	WT- >120 <b>AR- 95</b> OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB31	intermittent/permanent water body, channelized, aquatic vegetation present and fish observed	<b>WT- 37</b> <b>AR- Crossing</b> OL- >120 <b>UL- 45</b> <b>CA- 63</b> BU- >120	Yes	Yes
	WB104	intermittent/permanent water body, channelized drain feature	WT- >120 <b>AR- Crossing</b> OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
Tributary O	WB11	ephemeral, poorly defined channel, terrestrial grasses throughout	N/A	No	No
	WB12	intermittent/permanent water body, naturalized defined channel, within wooded area	WT- >120 AR- >120 OL- >120 UL- >120 <b>CA- 71</b> BU- >120	Yes	Yes

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
	WB103	Intermittent/permanent water body, channelized drain feature	WT- >120 <b>AR- Crossing</b> OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
Tributary P	WB10	tile drained, no water body feature present	N/A	No	No
Tributary Q	WB32	intermittent/permanent water body, channelized	WT- >120 AR- >120 OL- >120 <b>UL- 36</b> <b>CA- 17</b> BU- >120	Yes	Yes
	WB33		WT- >120 AR- >120 OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB34	intermittent/permanent water body, naturalized channel, through wooded area	WT- >120 AR- >120 OL- >120 UL- >120 <b>CA- 103</b> <b>BU- 105</b>	Yes	Yes
	WB35	intermittent/permanent water body, channelized	WT- >120 AR- >120 OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
Tributary R	WB13	intermittent/permanent water body, naturalized channel, some meandering, online pond located near WB14.	WT- >120 AR- >120 OL- >120 UL- >120 <b>CA- 118</b> BU- >120	Yes	Yes
	WB14		WT- >120 AR- >120 OL- >120 UL- >120 <b>CA- 117</b> BU- >120	Yes	Yes
Tributary S	WB37	intermittent/permanent water body, aquatic vegetation	WT- >120 AR- >120 <b>OL- 14</b> UL- >120 <b>CA- 13</b> BU- >120	Yes	Yes
	WB38	intermittent/permanent water body, aquatic vegetation	WT- >120 AR- >120 <b>OL- Crossing</b> UL- >120 <b>CA- Crossing</b> BU- >120	Yes	Yes

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
	WB66		WT- >120 AR- >120 OL- >120 <b>UL- 28</b> <b>CA- 14</b> BU- >120	Yes	Yes
Tributary T	WB39	intermittent/permanent water body, fish observed	WT- >120 AR- >120 <b>OL- Crossing</b> UL- >120 <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB44	intermittent/permanent water body, channelized	WT- >120 AR- >120 OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB58	ephemeral, channelized ditch, influenced by tile drainage	N/A	No	No
	WB59	tile drained, no water body feature present	N/A	No	No
Tributary U	WB56	ephemeral, grassed waterway/swale	N/A	No	No
	WB57		N/A	No	No
	WB65		N/A	No	No
Tributary V	WB42	intermittent/permanent water body, naturalized channel	WT- >120 <b>AR- 51</b> OL- >120 <b>UL- 69</b> <b>CA- 25</b> BU- >120	Yes	Yes
	WB43	intermittent/permanent water body, channelized	WT- >120 AR- >120 OL- >120 UL- >120 <b>CA- 95</b> BU- >120	Yes	Yes
	WB45	intermittent/permanent water body, channelized	WT- >120 AR- >120 OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB46	intermittent/permanent water body, channelized	WT- >120 AR- >120 OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
	WB49		WT- >120 AR- >120 OL- >120 <b>UL- 98</b> <b>CA- 91</b> BU- >120	Yes	Yes
	WB50	intermittent/permanent water body, channelized tile drain outlet	<b>WT- 119</b> <b>AR- Crossing</b> OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB51	tile drained, no water body feature present	N/A	No	No
Tributary W	WB47	ephemeral, drainage channel	N/A	No	No
Tributary X	WB48	ephemeral, drainage channel	N/A	No	No
Tributary Y	WB53	ephemeral, swale through agricultural field	N/A	No	No
	WB54	ephemeral, drainage channel through agricultural field	N/A	No	No
	WB55	ephemeral, drainage channel through agricultural field	N/A	No	No
	WB60	ephemeral, drainage channel through agricultural field	N/A	No	No
	WB63	tile drained, no water body feature present	N/A	No	No
Tributary Z	WB52	ephemeral, small drainage channel through agricultural fields	N/A	No	No
Tributary AA	WB67	intermittent/permanent water body, naturalized defined channel, fish observed	WT- >120 AR- >120 <b>OL- Crossing</b> UL- >120 <b>CA- Crossing</b> BU- >120	Yes	Yes
Tributary BB	WB69	tile drained, no water body feature present	N/A	No	No
	WB70	tile drained, no water body feature present	N/A	No	No

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
	WB73	intermittent/permanent water body, channelized, flows through agricultural field	WT- >120 <b>AR- 31</b> OL- >120 UL- >120 <b>CA- 9</b> BU- >120	Yes	Yes
	WB74	intermittent/permanent water body, channelized, flows through agricultural field	WT- >120 AR- >120 OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
Tributary CC	WB68	intermittent/permanent water body, channelized, flows through agricultural field	WT- >120 <b>AR- &gt;120</b> OL- >120 UL- >120 <b>CA- 95</b> BU- >120	Yes	Yes
Tributary DD	WB71	ephemeral, small drainage feature through agricultural fields	N/A	No	No
Tributary EE	WB72	ephemeral, small drainage feature through agricultural fields	N/A	No	No
Tributary FF	WB75	intermittent/permanent water body, channelized, flows through agricultural field	<b>WT- 82</b> <b>AR- 43</b> OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
Tributary GG	WB76	intermittent/permanent water body, aquatic vegetation present, channelized, fish observed	WT- >120 <b>AR- 21</b> OL- >120 <b>UL- Crossing</b> <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB77		WT- >120 <b>AR- 21</b> OL- >120 UL- >120 <b>CA- 6</b> BU- >120	Yes	Yes
Tributary HH	WB78	intermittent/permanent water body, aquatic vegetation present, channelized, fish observed	WT- >120 <b>AR- 62</b> OL- >120 UL- >120 <b>CA- 49</b> BU- >120	Yes	Yes
Tributary II	WB80	tile drained, no water body feature present	N/A	No	No

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
	WB81	intermittent/permanent water body, channelized	WT- >120 AR- >120 <b>OL- Crossing</b> UL- >120 <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB82	ephemeral, small drainage feature through agricultural fields	N/A	No	No
Tributary JJ	WB83	ephemeral, small drainage feature	N/A	No	No
Tributary KK	WB84	intermittent/permanent water body, channelized, flows through agricultural fields	WT- >120 AR- >120 <b>OL- Crossing</b> UL- >120 <b>CA- Crossing</b> BU- >120	Yes	Yes
	WB85		WT- >120 AR- >120 <b>OL- 21</b> UL- >120 <b>CA- Crossing</b> BU- >120	Yes	Yes
Tributary LL	WB79	intermittent/permanent water body, channelized, flows along agricultural fields	WT- >120 AR- >120 <b>OL- 101</b> UL- >120 CA- >120 BU- >120	Yes	Yes
Tributary MM	WB86	ephemeral, channelized drainage feature through agricultural fields	N/A	No	No
Tributary NN	WB87	ephemeral, channelized drainage feature through agricultural fields	N/A	No	No
Tributary OO	WB88	ephemeral, channelized drainage ditch along road	N/A	No	No
Tributary SS	WB9	tile drained, no water body feature present	N/A	No	No
Tributary TT	WB40	intermittent/permanent water body, partially channelized, fish observed	WT- >120 AR- >120 <b>OL- 19</b> UL- >120 <b>CA- 14</b> BU- >120	Yes	Yes
Tributary WW	WB41	tile drained, no water body feature present	N/A	No	No
	WB22	tile drained, no water body feature present	N/A	No	No

**Legend**

WT- Wind Turbine

AR- Road Access

OL- Overhead Line (transmission line)

UL- Underground Line

CA- Construction Activity (includes crane walk, and staging and disturbance areas)

BU- Building (includes substation and interconnection point)

N/A- Not Available

\*Note: Bold indicates a requirement for an EIS. Measurements are taken from the closest distance to a water body from a given project component, and not necessarily from the specific location of the site investigation.

## 6.2.2 Ausable River

The records review identified a total of 8 unnamed tributaries of the Ausable River within the project area (NRSI 2012). All of these features are designated as warmwater with warmwater baitfish species (ABCA 2007).

NRSI biologists conducted site investigations on these 8 potential water bodies and have confirmed that 1 of these features has characteristics that justify a designation as a water body, as defined by the REA Regulation and 7 do not. A general summary of all 8 features considered as part of the site investigation, including distances to project location, is provided in Table 4 below.

**Table 4. Water Body Site Investigations Summary for Bornish Wind Energy Centre Project Area – Ausable River Drainage Area**

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Location Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Tributary PP	WB66	tile drained, no water body feature present	N/A	No	No
Tributary QQ	WB64	tile drained, no water body feature present	N/A	No	No
Tributary RR	WB61	ephemeral, poorly defined drainage ditch	N/A	No	No
	WB62	ephemeral, poorly defined drainage ditch	N/A	No	No
Tributary UU	WB95	Intermittent/permanent water body, natural meandering watercourse	WT- >120 <b>AR- 84</b> OL- >120 UL- >120 <b>CA- 75</b> <b>BU- 117</b>	<b>Yes</b>	<b>Yes</b>
Tributary VV	WB101	Not present, tile drained	N/A	No	No

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Location Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Tributary XX	WB102	Not present, tile drained	N/A	No	No
Tributary YY	WB100	Not present, tile drained	N/A	No	No
Tributary ZZ	WB98	Not present, tile drained	N/A	No	No
	WB99		N/A	No	No

**Legend**

WT- Wind Turbine

AR- Road Access

OL- Overhead Line (transmission line)

UL- Underground Line

CA- Construction Activity (includes crane walk, and staging and disturbance areas)

BU- Building (includes substation and interconnection point)

N/A- Not applicable

\*Note: Measurements are taken from the closest distance to a water body from a given project component, and not necessarily from the specific location of the site investigation.

### 6.2.3 Big Swamp Drain

The records review has identified a total of one water body associated with the Big Swamp Drain within the project area, the Big Swamp Drain itself (NRSI 2012). This feature is designated as warmwater with warmwater baitfish species (ABCA 2007).

NRSI biologists conducted site investigations on the identified water body feature and have confirmed that the drain has characteristics that warrant the designation as a water body. A general summary of this feature is provided in Table 5.

**Table 5. Water Body Site Investigations Summary for Bornish Wind Energy Centre Project Area – Big Swamp Drain**

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Location Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Big Swamp Drain	WB97	Intermittent/permanent watercourse, channelized drain	WT- >120 AR- >120 <b>OL- Crossing</b> UL- >120 <b>CA- Crossing</b> BU- >120	Yes	Yes

**Legend**

WT- Wind Turbine

AR- Road Access

OL- Overhead Line (transmission line)

UL- Underground Line

CA- Construction Activity (includes crane walk, and staging and disturbance areas)

BU- Building (includes substation and interconnection point)

\*Note: Measurements are taken from the closest distance to a water body from a given project component, and not necessarily from the specific location of the site investigation.

#### 6.2.4 Galbraith Drain

The records review has identified a total of 2 watercourses associated with the Galbraith drainage area within the project area (NRSI 2012). Both of these features are designated as warmwater with warmwater baitfish species (ABCA 2007).

NRSI biologists conducted site investigations on the identified watercourse features and have confirmed that one of these watercourses has characteristics that warrant a designation as a water body. A general summary of both of the features considered as part of the site investigation, including distances to project location, is provided in Table 6 below.

**Table 6. Water Body Site Investigations Summary for Bornish Wind Energy Centre Project Area – Galbraith Drain**

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Location Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Galbraith Drain	WB89	ephemeral, grassed waterway through agricultural field	N/A	No	No
	WB90		N/A		
	WB91		N/A	No	No
	WB92	ephemeral, channelized ditch for drainage	N/A	No	No
Tributary A	WB93	intermittent/permanent, channelized	<b>WT- 33</b> <b>AR- 41</b> OL- >120 <b>UL- 86</b> <b>CA- 20</b> BU- >120	<b>Yes</b>	<b>Yes</b>
	WB94		WT- >120 AR- >120 OL- >120 UL- >120 CA- >120 BU- >120	No	No

**Legend**

WT- Wind Turbine  
AR- Road Access

OL- Overhead Line (transmission line)

UL- Underground Line

CA- Construction Activity (includes crane walk, and staging and disturbance areas)

BU- Building (includes substation and interconnection point)

\*Note: Measurements are taken from the closest distance to a water body from a given project component, and not necessarily from the specific location of the site investigation.

### 6.3 Seepage Areas

No seepage areas were identified during the extensive site investigations that were completed at the Bornish Wind Energy Centre.

## **7.0 Modifications to the Records Review**

Results of the site investigation led to the classification of several potential water bodies depending on the observed site-specific conditions. These modifications are discussed further below.

The records review identified a total of 43 unnamed tributaries associated with Ptsebe Creek within the project area as potential water bodies (NRSI 2012). Findings of the site investigations confirmed that of these 43 tributaries, 22 have been confirmed to have at least some habitat that warrants water body classification and warrant further consideration as part of the Environmental Impact Study (EIS). The remaining 21 features have been confirmed to be agricultural swales, temporary drainage, or grassed waterways that do not warrant consideration in the EIS in accordance with the REA Regulation.

The records review identified a total of 8 unnamed tributaries of the Ausable River within the project area as potential water bodies (NRSI 2012). Findings of the site investigations confirmed that 7 of the 8 tributaries are not considered water bodies and will not be considered as part of the EIS, while one does warrant further consideration in the EIS.

The records review identified a total of 2 watercourses associated with the Galbraith drainage area within the project area as potential water bodies (NRSI 2012). Findings of the site investigations confirmed that 1 of these features is considered a water body and warrants further consideration within the EIS.

## 8.0 Summary of Site Investigation

In accordance with the REA Regulation, NRSI has completed water body site investigations for the proposed Bornish Wind Energy Centre project area. Site investigations were conducted to confirm the presence/absence of water bodies identified during the records review (NRSI 2012), pinpoint any corrections to features identified during the records review, and document new water bodies not previously identified. Field investigations also focused on the characterization of the identified features. The results of this records review have been summarized in Table 7 below.

**Table 7. Summary of Water Body Site investigations for the Bornish Wind Energy Centre**

Criteria	Associated Water Body Features
i. In a water body	<p>Site investigations have identified 17 water bodies within the Ptsebe Creek drainage area and 1 within the Big Swamp Drain drainage area that are overlapping the project location.</p> <p>These overlaps represent proposed crossing locations for access roads, transmission line or cabling. All of these water bodies represent permanent or intermittent watercourses. All of which are designated as warmwater fisheries containing warmwater baitfish species.</p> <p>Each of these potential water bodies will be discussed in detail as part of the Environmental Impact Study.</p>
ii. 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	None
iii. Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity	None
iv. Within 120 m of the average annual high water mark of a permanent or intermittent stream	<p>Site investigations have confirmed the presence of 25 water bodies within the project area, including 22 within the Ptsebe Creek drainage area, 1 within the Ausable River drainage area, 1 within the Big Swamp Drain drainage area and 1 within the Galbraith Drain drainage area.</p> <p>All of these water bodies are designated as warmwater fisheries containing warmwater baitfish species. All will be discussed in more detail within the Environmental Impact Study</p>
iv. Within 120 m of a seepage area	None

## 9.0 References

Ausable Bayfield Conservation Authority. 2007. Lower Parkhill Watershed Report Card. (ABCA 2007).

Natural Resource Solutions Inc. January 2012. Bornish Wind Energy Centre Water Body Report – Records Review. (NRSI 2012)

Ontario Ministry of Natural Resources. 2006. Inland Ontario Lakes Designated for Lake Trout Management. Available at:  
<http://www.ontla.on.ca/library/repository/mon/14000/262222.pdf>. Accessed December 9, 2010

Veliz, M. 2001. Fish Habitat Management Plan. Ausable-Bayfield Conservation Authority. (Veliz 2001).

**Appendix I**  
Site Investigation Field Notes

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1231-Bornish - Water Body  
Assessment  
21-Feb-12  
Brian W.

Notes:

WB99 - Flowing water, some cattails  
intermittent water course.

WB14 - Defined channel w flowing water  
No aquatic veg. - Small agricultural  
pond - see photo 1987  
Permanent water course

WB11 - Almost no flow or water present -  
poorly defined channel, tiled  
of Bornish Dr. Ephemeral

WB10 - No channel or water present,  
walk on field to the tile outlet.  
Very little water present, no definite  
channel,





# NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

## Renewable Energy Water Body Site Investigation

Project #	1231	Project Name:	Barnish	Crew:	B&B	Project Supervisor	Date	02-May-11	
Weather	10-15	Air temp	10-15	Cloud Cover	30	Survey start time:	0700	Survey end time:	1830
		Wind	2	Precipitation	0				

Indicate an X for yes and a strike through for no or not applicable

Site #	GPS	Bankfull width (m)	Max channel depth (m)	Wetted width (m)	Max water depth (cm)	Visual discharge estimate (L/s)	Water present (Y or N) + Refuge pool dimension	Water Clarity (L/M/H)	Substrate %'s (to equal 100%)	Channel Morphology (% pool, glide, slow riffle, fast riffle)	Channel Gradient (H/M/L)	In-channel vegetation (% and type) (i.e. terrestrial vs aquatic)	Groundwater indicators (seeps, springs, veg)	Photo #		
														u/s	d/s	Channel
AHP59	177 429420 4772726	5	1.2	X			N				L	100% Terrestrial	no Def. Channels	11 12 13	14	
[REDACTED]	[REDACTED]	X	X	X	X	X	[REDACTED]				[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
AHP61	177 440458 4772588	X		X			N				L	100% Terrestrial	no water Def.	14 15 16	15	
AHP62	177 440815 4772726	3.2	0.75	0.2	0.005	L	Y	m	70% F 30% cbb	90% glide 10% riffle	L	100% T.	no	17	18	
AHP63	177 440871 4773065	0.7	0.2	X	X	X	N	X	100% F	X	L	100% T	no Def. Channels	16	17	
AHP64	177 441179 4774907	5	1.5	1.25	0.25	L	Y	m	90% F 5% c	90% G 10% F	L	100%		15	20	
AHP65	441374 4775166	7	2.75	1.5	0.5	L	Y	L	80% F 20% C	90% F 10% G	L	no		18	22	

Site #	GPS	Bankfull width (m)	Max bankfull depth (m)	Wetted width (m)	Max water depth (cm)	Visual discharge estimate (L/s)	Water present (Y or N) + Refuge pool dimension	Water Clarity (L/M/H)	Substrate %'s (to equal 100%)	Channel Morphology (% pool, glide, slow riffle, fast riffle)	Channel Gradient (H/M/L)	In-channel vegetation (% and type) (i.e. terrestrial vs aquatic)	Groundwater indicators (seeps, springs, veg)	Photo #		
														u/s	d/s	Channel
AHP66	<del>177</del> 177 444741 477530	4.2	2.1	1.0	0.2	L	Y	m	60% F 30% G 10% C	30% SR 40% G 30% P	L	30% A 70% T	25	26	27	
AHP67	177 444126 477627	6.1	2.5	2.5	0.4	L	Y	m	80% F 20% C	100% G 90% P	L	N/A	30+ cyprinid obs.	28	29	30
AHP68	177 444206 4775150	11.5	2.1	4	1	L	Y	H	60% F 20% G 20% C	80% pool 20% G	L	100% T	20+ cyprinid obs.	31	32	33
AHP69	177 4443564 4775543	6.2	1.3	5.0	0.3	L	Y	H	70% G 20% F 10% C	10% G 20% SR 70% P	L	100% T	20+ cyprinid obs.	34	35	36
AHP70	177 444721 4775222	5.1	1.1	2	0.1	L	Y	L	90% F 10% G	100% P	L	100% T	Ref. β1	37	38	39
AHP71	177 444101 4774306	2.5	1.0	0.2	0.05	L	X	m	80% F 20% C	80% G 20% SR	L	90% T 10% A	20+ cyprinid obs.	40	41	42
AHP72	177 4443986 4774982	5.1	1.5	0.75	0.2	L	Y	H	80% G 20% F	90% G 10% SR	L	100% T	20+ cyprinid obs.	44	45	46
AHP73	177 444191 4775055	2.7	1.2	0.3	0.1	L	Y	H	100% F	100% G	L	100% T	20+ cyprinid obs.	47	48	49
AHP74	177 444348 4775042	6.2	2.1	1.7	0.25	L	Y	H	60% F 40% C	20% SR 80% G	L	100% T	30+ cyprinid obs.	50	51	52
AHP75	177 444323 4775649	3.0	0.6	0.1	0.05	L	Y	m	90% F 10% C	10% G	L	100% T	20+ cyprinid obs.	53	54	55

2 of 2



# NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

## Renewable Energy Water Body Site Investigation

Project Name: B&B Crew: B&B Project Supervisor: BA Date: Nov - 11

Project # 1331 Survey start time: 0800 Survey end time: 1330

Weather: W Air temp: 10-15 Precipitation: 0 Cloud cover: 30

Bankfull width (m): 1.5 Max channel depth (m): 0.7 W/ind: 0 W/etted width (m): 0.09 Max water depth (cm): 1003 Visual discharge estimate (L/s): Low Water present (Y or N) + Refuge pool dimension: Y Water clarity (L/M/H): H Substrate %'s (to equal 100%): 100% F Channel Morphology (% pool, glide, slow riffle, fast riffle): 50% Glid, 50% Slow Riffle Channel Gradient (H/M/L): L

Site #	GPS	Bankfull width (m)	Max channel depth (m)	W/etted width (m)	Max water depth (cm)	Visual discharge estimate (L/s)	Water present (Y or N) + Refuge pool dimension	Water clarity (L/M/H)	Substrate %'s (to equal 100%)	Channel Morphology (% pool, glide, slow riffle, fast riffle)	Channel Gradient (H/M/L)	In-channel vegetation (% and type) (i.e. terrestrial vs aquatic)	Groundwater indicators (seeps, springs, veg)	Photo #			
														u/s	d/s	Chann el	
AHP062	17T 442337 4773463	1.5	0.7	0.09	1003	Low	Y	H	100% F	50% Glid 50% Slow Riffle	L	100% T. Grass	Tile Drain	77	78	79	
AHP064	17T 442337 4773463	X	X	X	X	X	N	X	X	X	X	100% T. Grass	Grass watering	N 81 E 82 S 83 W 84			
AHP079	17T 442337 4773463	X	X	X	X	X	N	X	X	X	X	100% T. Grass	NO channel/seeps water	N 84 E 85 S 86 W 87			
AHP 076	17T 442337 4773463	X	X	X	X	X	N	X	X	X	X	100% T. Grass	NO channel or seeps with water	N 85 E 86 S 87 W 88			
AHP 077	17T 442337 4773463	X	X	X	X	X	N	X	X	X	X	100% T. Grass	NO channel or seeps with water	N 89 E 90 S 91 W 92			
AHP 078	17T 442337 4773463	X	X	X	X	X	N	X	X	X	X	100% T. Grass	NO channel or seeps with water	N 93 E 94 S 95 W 96			
AHP079	17T 442337 4773463	2.5	1	0.7	0.4	0	Y	H	100% F	100% pool	L	100% T. Grass	NO channel or seeps with water	104	105	106	

Indicate an X for yes and a strike through for no or not applicable

Site #	GPS	Bankfull width (m)	Max bankfull depth (m)	Wetted width (m)	Max water depth (cm)	Visual discharge estimate (L/s)	Water present (Y or N) + Refuge pool dimension	Water Clarity (L/M/H)	Substrate %'s (to equal 100%)	Channel Morphology (% pool, glide, slow riffle, fast riffle)	Channel Gradient (H/M/L)	In-channel vegetation (% and type) (i.e. terrestrial vs aquatic)	Groundwater indicators (seeps, springs, veg)	Photo #		
														u/s	d/s	Chann el
AHP080	17T 444885 4775772	3.1	1.2	0.3	0.2	m	Y	H	80% Grnd 20% fine	30% pool 70% slow	L	20% Aquatic 80% Terrestrial	none	108	109	110
AHP081	17T 446393 4775419	2.2	3.1	0.6	0.12	L	Y	m	80% Grnd 60% fine 30% 5mm	90% pool 10% pool	L	100% Terrestrial	fast	112	113	114
AHP082	17T 446857 4775708	4.2	1.7	0.9	0.2	L	Y	H	70% fine 30% 5mm	80% pool 20% SARH	L	100% Terrestrial	none	115	116	117
AHP083	17T 447526 4775133	3.4	2.1	1.9	0.4	0	Y	L	80% fine 20% 5mm	90% pool 10% 5mm	L	100% Terrestrial	fast	118	119	120
AHP084	17T 449022 4774926	4.1	1.9	X	X	X	N	X	100% fine	<del>90% pool</del> 100% pool	X	100% Terrestrial	fast	121	122	123
AHP085	17T 448739 4773201	5.0	3.1	1.1	0.2	L	Y	m	90% fine 30% 5mm	100% pool 10% 5mm	L	40% Aquatic 60% Terrestrial	fast	124	125	126
AHP086	17T 448381 4770807	7.1	2.1	1.2	0.8	0	Y	m	90% fine 10% 5mm	100% pool	L	100% Terrestrial	fast	127	128	129
AHP087	17T 448605 4770807	4.0	1.2	1.2	0.3	L	Y	L	100% fine	90% pool 10% 5mm	L	100% Terrestrial	fast	130	131	132
AHP088	17T 448481 4771087	X	X	Y	Y	X	N	X	X	X	X	100% Terrestrial	Grass mats	134	135	136
AHP089	17T 448491 4771087	X	X	X	X	X	N	X	X	X	X	100% Terrestrial	No channel/sinks mats	137	138	139

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4775133  
4775419  
4770807  
4773201  
4775708  
4775772



# NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

## Renewable Energy Water Body Site Investigation

Project Name: **RECON.** wF Precipitation  Wind  Air temp **8-13**

Project Supervisor: **PEB** Date: **04-09-2011**

Crew: **10-46** Cloud Cover **10-46**

Survey start time: **07:45** Survey end time: **13:00**

Indicate an X for yes and a strike through for no or not applicable

Site #	GPS	Bankfull width (m)	Max channel depth (m)	Wetted width (m)	Visual discharge estimate (L/s)	Water present (Y or N) + Refuge pool dimension	Water Clarity (L/M/H)	Substrate %'s (to equal 100%)	Channel Morphology (% pool, glide, slow riffle, fast riffle)	Channel Gradient (H/M/L)	In-channel vegetation (% and type) (i.e. terrestrial vs aquatic)	Groundwater indicators (seeps, springs, veg)	Photo #		
													u/s	d/s	Channel
AHP 016	177 43824 4773228	X	X	X	X	N	X	X	X	X	100% Terrestrial	X	271	272	273
AHP 001	177 440030 4776085	3.8	1.1	1.3	0.4	Y	M	40% silt 60% fine	80% pool 20% silt	L	100% Terrestrial	re	274	275	276
AHP 057	177 448300 4772689	5.2	1.4	0.7	0.25	Y	M	100% fine	100% silt	L	100% Terrestrial	channel seep Ditch	277	278	280
AHP 089	177 442569 4772244	1.45	0.65	0.4	0.12	Y	M	80% fine 20% silt	40% silt 30% silt-20% 30% fine	L	100% Terrestrial	dry	281	282	283
AHP 090	177 43773 4768309	4.2	2.1	3	0.9	Y	H	10% fine 40% silt 30% silt 20% silt	60% silt 40% silt 10% silt 10% silt	L	100% Terrestrial	fish Barn	284	285	286
AHP 091	177 442436 4770693	12.0	3.1	10.1	2.3	Y	L	14% fine 10% silt 30% silt	90% silt 10% fine	L	Terrestrial high	dry	287	288	289
AHP 092	177 442177 4769760	36.2	1000 To measure	32.0	0.4	Y	L	Terrestrial low high	80% silt 20% fine	L	Terrestrial high to low	dry	290	291	292

Site #	GPS	Bankfull width (m)	Max bankfull depth (m)	Wetted width (m)	Max water depth (cm)	Visual discharge estimate (L/s)	Water present (Y or N) + Refuge pool dimension	Water Clarity (L/M/H)	Substrate %'s (to equal 100%)	Channel Morphology (% pool, glide, slow riffle, fast riffle)	Channel Gradient (H/M/L)	In-channel vegetation (% and type) (i.e. terrestrial vs aquatic)	Groundwater indicators (seeps, springs, veg)	Photo #		
														u/s	d/s	Chann el
AHP 093	177 440205 4720199	no defined channel	X	X	X	Y	N	X	100% fin	X	L	40% aquatic 60% Terrestrial	no water or other signs	293	294	295
AHP 094	177 440358 4720259	7.3	2.4	5.9	1.7	L	Y	L	80% fin 20% GP 10% GP	100% pool	L	100% Terrestrial	na	296	297	298
AHP 095	177 439980 4762200	X	X	Y	X	X	N	X	X	X	L	X	no signs to begin channeling	299	300	301
AHP 096	177 439886 4761667	9.2	no depth measurement	7.5	Y	L	Y	X	100% GP 30% GP 30% GP	100% pool 10% GP	L	Terrestrial too high	low	302	303	304
AHP 097	177 439748 4767072	1.2	0.4	Y	X	X	N	X	100% fin	X	L	100% Terrestrial	na	305	306	307
AHP 098	177 439839 4767209	3.2	1.3	2.1	0.6	L	Y	m	80% fin 20% GP	100% GP 100% GP 100% GP	L	100% Terrestrial	na	308	309	310
AHP 099	177 439820 4766391	3.6	0.8	3.1	0.3	Ø	Y	L	10% GP 90% fin	100% pool	L	100% Terrestrial	na	311	312	313
AHP 100	177 439817 4766382	5.2	0.7	3.6	0.25	m	Y	H	40% GP 50% GP 10% GP	30% SR 10% GP 10% GP 60% GP	m	100% Terrestrial	na	314	315	316
AHP 101	177 440022 4767380	3.1	1.1	2.6	0.5	Ø	Y	L	40% GP 60% GP	90% pool 10% GP	L	100% Terrestrial	na	317	318	319
AHP 102	177 440439 4767308	5.4	2.0	4.6	0.8	L	X	L	30% GP 40% GP 30% GP	50% GP 50% GP	L	100% Terrestrial	heavily shaded	320	321	322