Appendix A

Parkhill Interconnect Renewable Energy Approval Application Water Assessment and Water Body Report (GLGH, 2012)

Parkhill Interconnect
Water Body Assessment

Prepared for:
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Canada

Project No. 1341

Date: November 2012

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Parkhill Interconnect
Water Body Assessment

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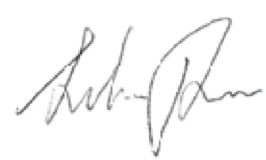

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1.0 Introduction

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Figure 1

Parkhill Interconnect

Project Area and Natural Features

Legend

- Project Area (120m)
- Access Road
- Transmission Line
- Project Location
- Point of Interconnect
- Switchyard
- Existing Transmission Line
- Railroad
- Primary Road
- Secondary Road
- Intermittent Watercourse
- Permanent Watercourse
- Open Aquatic

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Ecologists

Project: 1341 Date: November 16, 2012	NAD83 - UTM Zone 17 Scale: 1:50,000 (11x17")

0 1 2 Kms

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.

Section 29 of the REA Regulation requires proponents of Class 4 wind projects to undertake a water assessment which involves a record review in order to identify whether the project location is:

1. in a water body;
2. within 120 meters of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity;
3. within 300 meters of the average annual high water mark of a lake trout lake that is at or above development capacity;
4. within 120 meters of the average annual high water mark of a permanent or intermittent stream; or
5. within 120 meters of a wetland area.

Section 1.1 of the REA Regulation defines a "water body" as a lake, a permanent stream, an intermittent stream and a wetland area but does not include:

a) a raised waterway;
b) temporary channels for surface drainage, such as furrows or shallow channels that can be tilled and driven through;
c) rock chutes and spillways;
d) roadside ditches that do not contain a permanent or intermittent stream;
e) temporary ponded areas that are normally farmed;
f) dugout ponds; and
g) artificial bodies of water intended for storage, treatment or recirculation of runoff from animal yards, manure storage facilities and site and outdoor confinement areas.

Subsection 2 of Section 30 of the REA Regulation requires the proponent to prepare a report setting out a summary of the records searched and the results of the analysis (O. Reg. 359/09). This *Water Body Assessment* has been prepared for the Parkhill Interconnect to meet these requirements.

Section 31 (1) Subject to subsection (2) of the [illegible] Regulation requires a proponent of a Class 4 wind project 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 record review;
(c) the boundaries, located within 120m of the project location, of any water body that was identified in the record review or the site investigation and
(d) the distance from the project location to the boundaries determined under clause (c).

Subsection (3) of Section 31 of the [illegible] 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 record 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. Signed notes sheet by the person conducting the site investigation.

The Site Investigation details and results have been included in the *Water Body Assessment* to meet the [illegible] requirements.

3.0 Staff Roles

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4.0 Records Review

4.1 Resource Consulted

In accordance with the Study Regulation, NSI biologist consulted several information sources and agencies for the purpose of collecting information regarding water bodies within 120m and 300m of the project location. The results of the record review have been documented throughout the following Section, and have been summarized in Table 1 below.

Table 1. Summary of Information Sources Consulted for the Parkhill Interconnect

Information Source	Consultation Date(s) (2011)	Type of Records Obtained
Ministry of Natural Resources, Aylmer District	August 30	Fish data collection records
Middlesex County	August 9	No applicable information received
Kettle Bay Region Conservation Authority (KBRCA)	November 3	Fish Habitat Management Plan Series 2011; Watershed Report Card; Lower Parkhill (KBRCA 2007)
Ministry of Natural Resources, NHIC and Biodiversity Explorer (OMNR 2011a)	August 9	Species of Conservation Concern records
DFO Conservation Ontario (DFO 2011)	August 9	Aquatic Species at Risk Mapping
Ministry of Natural Resources and Information Ontario (MNR OMNR 2011b)	September	Water body mapping; Surficial Geology mapping

Watercourses within the project area were initially identified using OMNR watercourse mapping and digital air photos. These features are shown on Figure 1.

4.2 Lakes

A comprehensive review of available background information has revealed that no lakes are present within the Parkhill Interconnect project area.

4.3 Lake Trout Lakes

NSI biologist have reviewed available background information, including the Inland Ontario Lakes Designated for Lake Trout Management (OMNR 2007), and have confirmed that no Lake Trout lakes are present within the jurisdiction of the Aylmer District MNR. Therefore, no Lake Trout lakes are present within the Parkhill Interconnect project area.

4.4 Permanent or Intermittent Watercourse

NSI biologist have used available resources, including agency consultation and a variety of available mapping layers (satellite imagery, air photos, drainage classification mapping and OMNR and Information Ontario watercourse mapping) to identify potential intermittent/permanent watercourse features within the Parkhill Interconnect Project area. This review indicated that a number of water bodies/permanent or intermittent watercourses are located within the project area. These watercourses have been divided and discussed based on their respective drainage areas which include The Pottebe Creek (a tributary of Parkhill Creek), Quabbe River and Big Sam Drain.

Watercourse features within the project area are situated within the Quabbe River watershed and are within the jurisdictional area of the MVCA and the OMNR, Aylmer District. The majority of these features have been identified as headwater tributaries and, based on air photo interpretation, are expected to be highly influenced by historic and current agricultural activities (i.e. channelization). Water quality within the associated water bodies is currently influenced by the existing agricultural land use with noted elevations in Total Phosphorus and *E.coli* (MVCA 2007). Benthic invertebrate communities within the watercourses also indicate moderately degraded water quality (MVCA 2007).

The Wyoming Moraine is the most dominant physiographic land feature present within the project area. Due to the presence of this feature, the area is dominated by silty clay till plain with poor to very poor infiltration (Pelrine 2001). Therefore, the ratio of runoff to infiltration is high, and results in variable discharge rates with short periods of high flow and long periods of low to no base flow (Pelrine 2001). This condition is likely exacerbated by tile drainage, which efficiently removes water that has infiltrated the upper soil layers within agricultural fields and conducts it quickly to a drainage outlet. This flow which results in what can be described as flashy systems. The project area land use is dominated by active agricultural activities. A narrow littoral/shore deposit has been identified within the project area that extends through the middle of the Wyoming moraine from the middle of the project area and up through its northeast limit. This relatively narrow deposit contains sandy soils (Pelrine 2001), and therefore may facilitate groundwater recharge and discharge to support base flow in tributaries of The Pottebe Creek.

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<u>The Pt[illegible]ebe Cree[illegible]</u>

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Bi□ S□am□ Drain

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4.5 See□a□e □rea□

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4.□ S□ecie□o□Con□ervation Concern

S□ecie□o□con□ervation concern inc□ude a□□□ecie□ that have been de□i□nated a□a □□ecie□o□S□ecia□Concern accordin□ to the □rovincia□Committee on the Statu□o□ S□ecie□ □□t □i□□in Ontario □COSS□□O□and□or the □edera□Committee on the Statu□o□

□ndan□ered Wi□d□□e in Canada □COS□WIC□, have been □iven a □rovincia□S□□an□o□ S1□S3, or have been de□i□nated by COS□WIC a□Threatened or □ndan□ered but have not been de□i□nated a□either □ndan□ered or Threatened □ithin Ontario.

□ecord□revie□ □indin□□have identi□ied no □□ecie□o□con□ervation concern □ithin or near the Par□hi□□Interconnect □roject area.

Figure 2

Parkhill Interconnect

Water Bodies

Path: X:\1341_JAB_T-Line_Study\NRSI_1341_WB_Fig2_Parkhill_WaterBodies_50K_2012_11_16_KEB.mxd

Legend

- Project Area (120m)
- Non-Water Body
- Confirmed Water Body
- Access Road
- Transmission Line
- Project Location
- Point of Interconnect
- Switchyard
- Existing Transmission Line
- Railroad
- Primary Road
- Secondary Road
- Intermittent Watercourse
- Permanent Watercourse
- Open Aquatic

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Ecologists

Project: 1341 Date: November 16, 2012	NAD83 - UTM Zone 17 Scale: 1:50,000 (11x17")

0 1 2 Kms

4.7 Records Review Summary

In accordance with the REA Regulation, NRSI has completed a comprehensive records review for the proposed Parkhill Interconnect project area. The project area was examined to ensure all water body features in the vicinity of the proposed transmission line were considered. This records review included correspondence with provincial agency staff, and a review of available online and published resources. The results of this records review have been summarized in Table 2 below.

Table 2. Summary of the Water Bodies Records Review for the Parkhill Interconnect

Criteria	Associated Water Body Features
i. In a water body	The records review has identified 9 water bodies, including 5 within The Ptsebe Creek drainage area, 3 within the Ausable River drainage area and 1 within the Big Swamp Drain drainage area overlapping the project location. These represent proposed crossing locations for transmission line. All of these water bodies represent potential permanent or intermittent watercourses, and are designated as warmwater fisheries containing warmwater baitfish species. Each of these potential water bodies will be examined in more detail during the site investigation phase of this project.
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	The records review has identified 19 water bodies, including 10 within The Ptsebe Creek drainage area, 5 within the Ausable River drainage area and 4 within the Big Swamp Drain drainage area that are within 120m of the project location. All of these water bodies represent potential permanent or intermittent watercourses, and are designated as warmwater fisheries containing warmwater baitfish species.
iv. Within 120 m of a seepage area	None

5.0 Site Investigation

5.1 Methodology

In accordance with the REA Regulation, comprehensive site investigations were carried out within the Parkhill Interconnect 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. The 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 outlined in the following sections.

5.1.1 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 3 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 3. Site Investigation Survey Details

Staff Name(s)	Date	Duration (hrs)	Weather Conditions		
			Temp. (°C)	Beaufort Wind	Cloud Cover (%)
Blair Baldwin	Nov 2, 2011	8	10	2	30
Blair Baldwin	Nov 3, 2011	10	11	0	100
Brian Watson	Feb 21, 2012	4	1	4	100
Brian Watson	March 30, 2012	4	7	5	90

5.1.2 Lakes and Lake Trout Lakes

Prior to field investigations, no potential lakes and/or Lake Trout lakes were identified through review of all available natural features mapping as part of the records review. Field investigations were focused on identifying any features that may not have been identified in existing reports or mapping.

5.1.3 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. Field investigations were focused on confirming the presence of these features as well as identifying 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 GPS coordinates were also taken.

5.1.4 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. 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 that were completed for the Natural Heritage Assessment (NRSI 2012).

During site investigations, groundwater seepage areas were identified through 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.

5.2 Results

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

5.2.1 Lakes

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

5.2.2 Lake Trout Lakes

Site investigations confirmed the absence of Lake Trout Lakes within the project area.

5.2.3 Permanent or Intermittent Watercourses

NRSI biologists have confirmed a total of 10 permanent or intermittent water bodies within the project area. Of these, have been identified as overlapping the transmission line. The remaining water bodies are between 21m and 120m from the transmission line or other related project component, without directly overlapping. For the purposes of this report, these water bodies have been divided and discussed based on their respective drainage areas which include The Ptsebe Creek, Ausable River and Big Swamp Drain. Where specific water body locations are discussed, a unique identifier (WB) has been attributed. Specific water body survey locations are shown on Figure 2. Watercourses are summarized by their respective drainage areas and are discussed below.

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.

<u>The Ptsebe Creek</u>

The records review had identified a total of 10 unnamed tributaries associated with The Ptsebe Creek within the project area. All of these features are designated as warmwater (Veliz 2001) with warmwater baitfish species (ABCA 2007), and are shown on Figure 2.

NRSI biologists conducted site investigations at these 10 potential water bodies and have confirmed that 8 of these features have characteristics that are consistent with a water body, as defined by the REA Regulation. Some of these features may be considered water bodies at some locations within the project area and non-water bodies at other locations. This is due to the nature of the headwater features and the resulting changes in permanency and definition of the feature. A summary of site conditions associated with all features considered during the site investigation, including distances to project location, is provided in Table 4 below.

Table 4. Water Body Site Investigations Summary for the Parkhill Interconnect Project Area – The Ptsebe Creek Drainage Area

Water Body Feature Name	Water Body Location ID	Description of Water Body at Observation Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Tributary	WB19	Intermittent-permanent water body, channelized	**DA - 112** **BU - 112**	**Yes**	**Yes**
Tributary S	WB01	Intermittent-permanent water body, box culvert at roadside	**OL - Crossing**	**Yes**	**Yes**
Tributary T	WB02	Intermittent-permanent water body, fish observed	**OL - Crossing**	**Yes**	**Yes**
Tributary AA	WB04	Intermittent-permanent water body, naturalized channel, fish observed	**OL- Crossing**	**Yes**	**Yes**
Tributary II	WB05	Intermittent-permanent water body, box culvert at roadside	**OL- Crossing**	**Yes**	**Yes**
Tributary	WB0	Intermittent-permanent water body, channelized, flows through agricultural field	**OL- Crossing**	**Yes**	**Yes**
Tributary LL	WB07	Intermittent-permanent water body, channelized, flows through agricultural field	**DA - 57** **OL- 57**	**Yes**	**Yes**
Tributary	WB08	Ephemeral, tile drain	N/A	No	No
Tributary NN	WB09	Ephemeral, grass waterway	N/A	No	No
Tributary TT	WB03	Intermittent-permanent water body, naturalized channel, fish observed	**DA - 14** **OL - 14**	**Yes**	**Yes**

Legend

DA – Disturbance Area
OHL – Overhead Line
BU – Building (includes switchyard and interconnection point)
N/A – Not Applicable
Note: measurements were 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.

Ausable River

The records review identified a total of 5 unnamed tributaries of the Ausable River within the project area. All of these features are designated as warmwater with warmwater baitfish species (ABCA 2007).

NRSI biologists conducted site investigations at these potential water bodies and have confirmed that one feature, Tributary 18, has characteristics that justify designation as a water body, as defined by the REA Regulation. A general summary of all identified features is provided in Table 5 below.

Table 5. Water Body Site Investigations Summary for the Parkhill Interconnect Project Area – Ausable River Drainage Area

Water Body Feature Name	Water Body Location ID	Description of Water Body at Observation Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Tributary 18	WB18	Intermittent/permanent water body, natural channel	**DA - 75 BU- 75**	**Yes**	**Yes**
Tributary 15	WB15	Not present, tile drained	N/A	No	No
Tributary 14	WB14	Not present, tile drained	N/A	No	No
Tributary 16	WB16	Not present, tile drained	N/A	No	No
Tributary 17	WB17	Not present, tile drained	N/A	No	No

Legend
DA – Disturbance Area
BU – Building (includes switchyard 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.

Big Swamp Drain

The records review has identified a total of 4 potential water bodies associated with the Big Swamp Drain within the project area, the Big Swamp Drain and 3 unnamed tributaries. These features are designated as warmwater with warmwater baitfish species (ABCA 2007).

NRSI biologists conducted site investigations at the identified water body features and have confirmed that the Big Swamp Drain has characteristics that warrant the designation as a water body and the unnamed tributaries do not. A general summary of these features is provided in Table .

Table 6. Water Body Site Investigations Summary for the Parkhill Interconnect Project Area – Big Swamp Drain

Water Body Feature Name	Water Body Location ID	Description of Water Body at Observation Location	Distance to Project Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Big Swamp Drain	WB11	Intermittent permanent watercourse, channelized drain	**OL- Crossing**	**Yes**	**Yes**
Tributary A	WB12	Not present, tile drained	N A	No	No
Tributary B	WB13	Not present, tile drained	N A	No	No
Tributary C	WB10	Ephemeral, roadside ditch	N A	No	No

Legend
L verhead Line transmission line
N A Not Applicable
Note easurements 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.

5.2.4 Seepage Areas

No seepage areas were identified during the extensive site investigations that were completed for the Parkhill Interconnect.

5.3 odifications to the Records Review

Results of the site investigation led to the classification of several water bodies based on the site specific conditions observed during site investigations. The modifications to the records review results are discussed further in Table 7.

Table 7. Modifications to the Records Review Based on the Site Investigation Results

Criteria	Results from the Records Review	Corrections Based on Site Investigations
i. In a water body	The records review identified 9 water bodies, including 5 within The Ptsebe Creek drainage area, 3 within the Ausable River drainage area and 1 within the Big Swamp Drain drainage area overlapping the project location.	Site investigations confirmed water bodies, including 5 within The Pstebe Creek drainage area and 1 within the Big Swamp Drain drainage area as overlapping the project location.
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	Site investigations confirmed no lakes, other than Lake Trout lakes, are within 120m of the project location.
iii. Within 300 m of the average annual high water mark of a Lake Trout lake that is at or above development capacity	None	Site investigations confirmed no Lake Trout lakes are within 300m of the project location.
iv. Within 120 m of the average annual high water mark of a permanent or intermittent stream	The records review identified 19 water bodies, including 10 within The Ptsebe Creek drainage area, 5 within the Ausable River drainage area and 4 within the Big Swamp Drain drainage area within 120m of the project location.	Site investigations confirmed 10 water bodies, including 8 within The Pstebe Creek drainage area, 1 within the Ausable River drainage area and 1 within the Big Swamp Drain drainage area are within 120m of the project location.
iv. Within 120 m of a seepage area	None	Site investigations confirmed no seepage areas are within 120m of the project location.

5.4 Site Investigation Summary

In accordance with the REA Regulation, NRSI has completed water body site investigations for the proposed Parkhill Interconnect project area. Site investigations were conducted to confirm the presence absence of water bodies identified during the records review, pinpoint any corrections to features identified during the records review, and document new water bodies not previously identified. ield investigations also focused on the characterization of the identified features. The results of this site investigation have been summarized in Table 8 below.

Table 8. Summary of Water Body Site Investigations for the Parkhill Interconnect

Criteria	Associated Water Body Features
i. In a water body	Site investigations have identified 5 water bodies within The Ptsebe Creek drainage area and 1 within the Big Swamp Drain drainage area that are overlapping the project location. These represent proposed crossing locations for the transmission line. All of these water bodies represent permanent or intermittent watercourses, and are designated as warmwater fisheries containing warmwater baitfish species. Each of these water bodies will be discussed in detail as part of the Water Body Report.
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	Site investigations have confirmed the presence of 10 water bodies within the project area, including 8 within The Ptsebe Creek drainage area, 1 within the Ausable River drainage area and 1 within the Big Swamp Drain drainage area. All of these water bodies are designated as warmwater fisheries containing warmwater baitfish species. All of these features will be discussed in more detail within the Water Body Report.
iv. Within 120 m of a seepage area	None

6.0 References

Publications

Ausable Bayfield Conservation Authority. 2007. Lower Parkhill Watershed Report Card.

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Appendix I
Site Investigation Field Notes

NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

Renewable Energy Water Body Site Investigation

Project # 1231	Project Name: Barnish WF	Crew: BeB	Project Supervisor	Date 02-Nov-11

Weather	Air temp 10-15	Wind 2	Precipitation 0	Cloud Cover 30	Survey start time: 0900	Survey end time: 1830

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) NOTES	Photo # u/s	Photo # d/s	Photo # Channel
FHP65	441374 4775161	7	2.75	1.5	0.5	L	Y	L	80% F 20% C	90% P 10% Vgl	L	n/a		2.1	2.2	2.3

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Renewable Energy Water Body Site Investigation

Project (Number & Name): 1231 Bornish
Field Staff: Brian W., Blair B

Survey Date: 30-Mar-12	**Weather Conditions:**
Time Started: 1600	Temp (°C), Wind, Cloud Cover (%), Precipitation: 3°, Wind 4, 100cc, Ø precip
Time Finished: 1610	Precipitation in Prior 48hrs (mm): Ø
Site # WB42 - Big Swamp Drain	**GPS Location:** 17T
Drainage system: Aucoin R.	Easting: 0450 772
Location in system: Naim Rd	Northing: 4774 397

Channel Dimensions and Morphology

Current stage (low flow/normal flow/high flow): Slow — Est. flow rate (L/sec): 1
Channel characteristics (straight/meandering, defined/poorly defined): Straight, defined
Channel Gradient (H/M/L): L
Avg. Wetted Width (m): 5m — Avg Water Depth (m): 0.25 — Max. Pool Depth (m): 0.42
Avg. Bankfull Width (m): 5.6 — Avg. Bankfull Depth (m): 0.56
Substrate Composition (%) — Boulder: — Cobble: 5 — Gravel: 5 — Fines: 90
Channel Morph (%) — Flat: 100 — Riffle: — Run: — Pool:
Bank Slope and Stability: 150, good

In-stream Habitat

In-stream Habitat Features (i.e woody debris): - Woody debris, Veg
In-stream Vegetation: Veg - Terrestrial

Riparian Habitat

Riparian Vegetation: T-grass, deciduous trees — Canopy Cover (% and species): Ø
Adjacent Land Use: agriculture

Surface Water

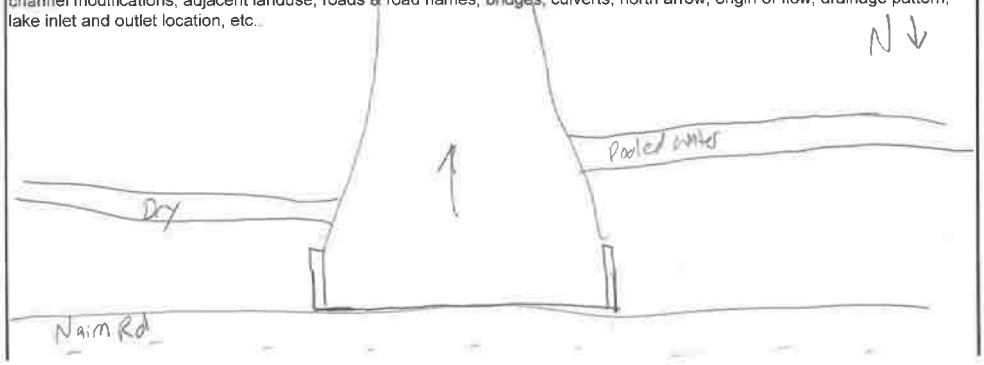
Temp (°C): 6 — Turbidity (L/M/H): M — Colour: brownish yellow

Photographs	**#**	**Direction Taken**	**Description**	**Other Photos**
Upstream view	377	N		
Downstream view	378	S		
Channel	379			

General Comments/General Description of Watercourse
Fish observed, unusual conditions, topography, general land use and vegetation, channlized, naturalized, meandering, drainage characteristics etc.

Waterbody (Y/N/Maybe) Discussion: Yes - large size

Water Body Sketch
Include: watercourse name, flow direction, riffle/pool/run habitat, side tributaries, water body identifier, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, origin of flow, drainage pattern, lake inlet and outlet location, etc.



NATURAL RESOURCE SOLUTIONS INC.

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Renewable Energy Water Body Site Investigation

Project # 1231	Project Name: Barnish	Crew: Brian W	Date: 12-Feb-11	Start Time: 1015	End Time: 1400
Weather: Overcast	Air temp: 33°F	Wind: 4	Precipitation: light snow (flurries)	Cloud Cover: 100%	

Site #	GPS	Bankfull width (m) / Defined channel (Y or N)	Max channel depth (m)	Avg. Wetted width (m)	Max water depth (cm)	Water present (Y or N)	Flowing water (Y or N)	Hydraulic Head in Thalweg (cm)	Turbidity (L/M/H)	Substrate % (fine, gravel, cobble, boulder)	% Coverage of Terrestrial grasses in the channel	Groundwater and prolonged wetness indicators (seeps, springs, veg, temp of spring vs watercourse) -NOTES-	Photo # u/s	Photo # d/s	Photo # Channel
WB 88		2.3 / Y	1	2	19	Y	Y very slow	hh= 0 ww= / depth= /	L	100 Fine	100	Cattails present	1512 (NW)	1513 (SE)	1514
								hh=							

NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

Renewable Energy Water Body Site Investigation

Project # 1231	Project Name: Barnish wF	Crew: B&B	Project Supervisor	Date 02-Nov-11
Weather	Air temp 10 - 15	Wind 2	Precipitation 0	Cloud Cover 30	Survey start time: 0900	Survey end time: 1830

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) NOTES	Photo # u/s	Photo # d/s	Photo # Channel
HP66	17T 441741 4776530	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% Aqv 20% T	m	25	26	27
HP67	17T 442126 4776427	6.1	2.5	2.5	0.4	L	Y	m	80% F 20% C	10% GI 90% P.i	L	Nv	30* cyperaceae obsn.	28	29	30
HP68	17T 442306 4776410	11.5	3.1	4	1	L	Y	H	60% F 20% gvn 20% cob	80% pool 20% gl	L	100% T	20* cyperaceae obsvn	31	32	33

NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

Renewable Energy Water Body Site Investigation

Project # 1331	Project Name: Bornish WF	Crew: BeB	Project Supervisor	Date 02-NOV-11
Weather	Air temp 10-15	Wind 2	Precipitation 0	Cloud Cover 50	Survey start time: 0800	Survey end time: 1830

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) NOTES	Photo # u/s	Photo # d/s	Photo # Channel
HP80	17T 444885 4775772	3.1	1.2	0.3	0.2	m	y	H	80% Gravel 20% fine	30% Glide 70% Riffle	L	20% Aquatic 80% Terrestrial	nil	108	109	110
THP081	17T 446393 4775419	9.2	3.1	0.6	0.12	L	y	m	80% Boulder 60% fine 40% gravel	90% glide 10% pool	L	100% Terrestrial	[illegible]	112	113	114
HP082	17T 446057 4775308	4.2	1.7	0.9	0.2	L	y	H	70% fine 30% gravel	80% Glide 20% Riffle	L	100% Terrestrial Grasses	nil	115	116	117
THP083	17T 447526 4775171	3.4	2.1	1.9	0.4	0	y	L	80% fine 20% Gravel	90% Pool Riffle [illegible]	L	100% Terrestrial	nil	118	119	120
HP84	17T 449022 4774826	4.1	1.9	X	X	X	N	X	100% fine	[illegible]	X	100% Terrestrial	nil	121	122	123

Appendix II
Site Investigation Photographs

1341 Parkhill Interconnect Water Body Photographs

The Ptsebe Creek

Figure 1 Tributary S (WB01) Upstream to the South

Figure 2 Tributary T (WB02) Upstream to the South-East

Figure 3 Tributary TT (WB03) Downstream

Figure 4 Tributary AA (WB04) Downstream

Figure 5 Tributary II (WB05) Upstream

Figure 6 Tributary KK (WB06) Downstream

Figure 7 Tributary LL (WB07) Upstream

Figure 8 Tributary MM (WB08) Downstream

Figure 9 Tributary NN (WB09) Upstream

Big Swamp Drain

Figure 10 Tributary C (WB10) Upstream

Figure 11 Big Swamp Drain (WB11) Upstream

Appendix III
Site Investigation Water Body Details

Drainage	Water Body Feature Name	Report ID	Field ID	UTM Coordinate			Site Investigation Date	Weather Conditions				Flow Regime Based on field observations	Water Body (Y/N)	Bank Full Width (m)	Wetted Width (m)	Bank Full Depth (m)	Water Depth (m)	Visible Discharge Rate	Clarity	Substrate (%)				Channel Morph (%)				Channel Gradient	Channel Definition	Channel Veg	Ground Water Indicators	Bank Veg	Notes
								Wind	Cloud Cover (%)	Air Temp (°C)	Precipitation Time of Survey									Fine	Cobble	Boulder	Gravel	Glide	Slow Riffle	Fast Riffle	Pool						
The Patebe Creek	Tributary □	WB18	AHP65	17T	441245	4775682	04-Nov-11	0	40	12	0	Intermittent/Permanent	□	7	1.5	2.75	0.5	low	high turbidity	80	20	-	-	10	-	-	90	low	defined	Terrestrial Grasses	-	Tresstrial Grasses	Channelized Drain, □ ndercut Banks
	Tributary S	WB01	AHP66	17T	441728	4776525	02-Nov-11	2	□0	10	0	Intermittent/Permanent	□	4.2	1	2.1	0.2	low	moderate turbidity	60	10	-	□0	40	□0	□0	-	low	defined	terrestrial grasses	none	terrestrial grasses and herbs	box culvert at road side
	Tributary T	WB02	AHP67	17T	442112	47764□4	02-Nov-11	2	□0	10	0	Intermittent/Permanent	□	6.1	2.5	2.5	0.4	low	moderate turbidity	80	20	-	-	10	-	-	90	low	defined	terrestrial grasses	none	terrestrial grasses and herbs	□0□ Cyprinidae observed
	Tributary TT	WB0□	AHP67	17T	442204	4776□9□	02-Nov-11	2	□0	10	0	Intermittent/Permanent	□	6.1	2.5	2.5	0.4	low	moderate turbidity	80	20	-	-	10	-	-	90	low	defined	terrestrial grasses	none	terrestrial grasses and herbs	partially channelized, □0□ Cyprinidae observed
	Tributary AA	WB04	AHP68	17T	44□204	4776176	02-Nov-11	2	□0	10	0	Intermittent/Permanent	□	11.5	4	□1	1	low	low turbidity	60	20	-	20	20	-	-	80	low	defined	terrestrial grasses	none	terrestrial grasses and deciduous trees	20□ Cyprinidae observed
	Tributary II	WB05	AHP80	17T	444882	4775784	02-Nov-11	2	□0	10	0	Intermittent/Permanent	□	□1	0□□	1.2	0.2	moderate	low turbidity	20	-	-	80	□0	70	-	-	low	Ill-defined	terrestrial grasses and herbs	none	terrestrial grasses and herbs	box culvert at road side
	Tributary □□	WB06	AHP81	17T	446□95	4775429	02-Nov-11	2	□0	10	0	Intermittent/Permanent	□	9.2	0.6	□1	0.12	low	moderate turbidity	60	-	20	20	90	-	-	10	low	defined	terrestrial grasses and herbs	none	terrestrial grasses and herbs	channelized, flows through agricultural field
	Tributary LL	WB07	AHP82	17T	446888	4775191	02-Nov-11	2	□0	10	0	Intermittent/Permanent	□	4.2	0.9	1.7	0.2	low	low turbidity	70	-	-	□0	80	20	-	-	low	defined	terrestrial grasses and herbs	none	terrestrial grasses and herbs	channelized, flows along agricultural field
	Tributary MM	WB08	AHP8□	17T	447529	4775175	02-Nov-11	2	□0	10	0	Ephemeral	N	□4	1.9	2.1	0.4	none	high turbidity	80	-	-	20	1	-	-	99	low	Ill-defined	terrestrial grasses and herbs	none	terrestrial grasses and herbs	tile drain
	Tributary NN	WB09	AHP84	17T	449027	4774829	02-Nov-11	2	□0	10	0	Ephemeral	N	4.1	-	1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	grass waterway
Big Swamp Drain	Tributary C	WB10	WB88	17T	450184.868	4774527.583	21-Feb-12	4	100	0	0	Ephemeral	N	2.3	2	0.5	0.19	very low	low turbidity	100	-	-	-	-	-	-	-	low	defined	cattails and terrestrial grasses	none	terrestrial grasses	roadside ditch
	Big Swamp Drain	WB11	WB42	17T	450772	4774397	30-Mar-12	4	1	4	0	Intermittent/Permanent	Y	5.6	5	0.56	0.25	low	moderate turbidity	90	5		5	100				low	defined	terrestrial grasses	none	terrestrial grasses, herbaceous plants, and deciduous trees	channelized drain feature
	Tributary A	WB12	-				Screened through air photo interpretation	-	-	-	-	Non-existent	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	tile drain, no water body present
	Tributary B	WB13	-				Screened through air photo interpretation	-	-	-	-	Non-existent	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	tile drain, no water body present
Ausable River	Tributary XX	WB14	-	17T	452140	4774013	Screened through air photo interpretation	-	-	-	-	Non-existent	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	tile drain, no water body present
	Tributary VV	WB15	-	17T	452555	4774318	Screened through air photo interpretation	-	-	-	-	Non-existent	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	tile drain, no water body present
	Tributary YY	WB16	-	17T	452600	4774515	Screened through air photo interpretation	-	-	-	-	Non-existent	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	tile drain, no water body present
	Tributary ZZ	WB17	-	17T	452777	4774632	Screened through air photo interpretation	-	-	-	-	Non-existent	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	tile drain, no water body present
	Tributary UU	WB18	-	17T	452792	4774835	Observations made by local CA and based on air photo review	-	-	-	-	Intermittent/Permanent	□	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	natural meandering watercourse

Parkhill Interconnect
Water Body Report

Prepared for:
ericho Wind, Inc.
90 Bay Street, Suite 1720
Toronto, ON M5H 2 2
Canada

Project No. 1 41 Date: November 2012

Parkhill Interconnect
Water Body Report

Project Team:

Staff	Role
Andrew Ryckman	Project Manager/Biologist
Ashley Favaro	A□uatic Biologist
Blair Baldwin	A□uatic Biologist
Brian Watson	A□uatic Biologist
□aitlin Boddaert	GIS Technician

Report submitted on November 5, 2012

Andrew G. Ryckman

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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in April 2011 by GL-Garrad Hassan to conduct a water body assessment and report in accordance with the Renewable Energy Approval (REA) Regulation, Ontario Regulation 59/09.

ericho Wind, Inc. is proposing to develop the ericho Wind Energy Centre and the Parkhill Interconnect Project ("Parkhill Interconnect"), which are subject to Ontario Regulation 59/09 (Renewable Energy Approvals (REA) under Part V.0.1 of the Ontario Environmental Protection Act (EPA)) 1. ericho Wind, Inc. is seeking a Renewable Energy Approval from the Ontario Ministry of the Environment (MOE) for the ericho Wind Energy Centre and its related Parkhill Interconnect Project.

The Parkhill Interconnect will consist of a switchyard, approximately 11.5 km of 115 kV transmission line and a substation. The substation will consist of two (2) 15/225 MVA transformers. The 115 kV line will run from the Parkhill Interconnect's switchyard, known as the Bornish Switchyard, to the Parkhill Interconnect's substation, known as the Parkhill Substation. The Parkhill Substation will then be interconnected to a Hydro One-owned switchyard, known as the Evergreen Switchyard, and to an existing Hydro One 500 kV transmission line that is common to the ericho Wind Energy Centre, the Adelaide Wind Energy Centre (owned by erwood Wind, Inc.), and the Bornish Wind Energy Centre (owned by Bornish Wind, LP). The Point of Common Coupling will be the interface between the Parkhill Substation and Hydro One's Evergreen Switchyard. The Parkhill Interconnect will be owned by Bornish Wind LP, erwood Wind, Inc., and ericho Wind, Inc. These three companies are wholly-owned subsidiaries of NextEra Energy Canada, LC ("NextEra").

The proposed Parkhill Interconnect is located in the Municipality of North Middlesex, Middlesex County, Ontario (see Figure 1). The study area comprises a 115 kV transmission line from the Bornish Switchyard to the Point of Common Coupling (PCC) on Hydro One's 500 kV transmission line. The electricity generated from the Adelaide, Bornish and ericho Wind Energy Centres will converge at the Bornish Switchyard. From this point, the proposed 115 kV line will carry electricity generated by all three projects to the Parkhill Substation then to a second Hydro One-owned Switchyard on to

an existing Hydro One 500 kV transmission line. Approximately 11.5 km in length, the transmission line is proposed to be mounted on new hydro poles within the road rights-of-way along erwood, Elginfield and Nairn Roads. There may be occasional locations where the transmission is below ground for technical reasons.

The location of the transmission line study area was defined early in the planning process for the proposed wind energy facility, based on the availability of existing infrastructure for connection to the electrical grid. The transmission line study area was used to facilitate information collection and the records review.

As identified in the REA Regulation, the proposed layout will be collectively referred to as the project location. As described herein, the project location boundary is the outer limit of where site preparation and construction activities will occur (i.e. temporary disturbance areas), and where permanent infrastructure will be located, including the area occupied by any project components that are installed above ground level.

For the purposes of this report, NRSI will refer to the areas within 120m of the project location as the project area. Water body sites are defined as locations within an identified water body feature where the project location overlaps (i.e. crosses or comes within 120m). Areas surrounding the project location that are expected to be temporarily disturbed during the construction phase are described as disturbance areas.

In accordance with the REA Regulation, NRSI has conducted a records review and site investigations to identify and characterize water bodies (lakes, seepages, intermittent/permanent water bodies) within 120m, and Lake Trout (*Salvelinus namaycush*) lakes within 00m, of the project location. Site investigations were conducted within the project area to confirm the presence/absence of water bodies identified within the records review, as well as to document new water bodies not previously identified. Field investigations also focused on the characterization of these features. The results of these assessments are provided in the Parkhill Interconnect Water Body Assessment Report (NRSI 2012a). Based on a review of these results and the proposed Parkhill Interconnect layout and design plans, an impact assessment was

conducted to identify any potential impacts to water bodies located within the project area.

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

Figure 1

Parkhill Interconnect

Project Area and Natural Features

Legend

- Project Area (120m)
- Access Road
- Transmission Line
- Project Location
- Point of Interconnect
- Switchyard
- Existing Transmission Line
- Railroad
- Primary Road
- Secondary Road
- Intermittent Watercourse
- Permanent Watercourse
- Open Aquatic

NATURAL RESOURCE SOLUTIONS INC.
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Project: 1341 Date: November 16, 2012	NAD83 - UTM Zone 17 Scale: 1:50,000 (11x17")

0 1 2 Kms

2.0 REA Regulation

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.

Section 40 of the REA Regulation states that "no person shall construct, install or expand a renewable energy generation facility as part of a renewable energy project at a project location that is in any of the following locations":

1. within 120 meters of the average annual high water mark of a lake, other than a Lake Trout lake that is at or above development capacity;
2. within 300 meters of the average annual high water mark of a Lake Trout lake that is at or above development capacity;
3. within 120 meters of the average annual high water mark of a permanent or intermittent stream; or
4. within 120 meters of a seepage area.

This however does not apply if the applicant submits a report that:

1. identifies and assesses any negative environmental effects of the project on a water body referred to in paragraphs 1 to 4 (above) and on land within 30 meters of the water body;
2. identifies mitigation measures in respect of any negative environmental effects mentioned in clause (i);
3. describes how the environmental effects monitoring plan addresses any negative environmental effects mentioned in clause (i); and describes how the construction plan report prepared in accordance with Table 1 of the REA addresses any negative environmental effects mentioned in clause (i).

3.0 Summary of Site Investigation

□omprehensive site investigations for the □arkhill □nterconnect were undertaken on several dates in 2011 and 2012 (□RS□2012a). These site investigations included site□ specific habitat assessments of water bodies throughout the project area. Of the 19 potential water body features identified within the study as part of the Records Review, a total of 10 of these features were confirmed as water body features based on site investigation findings (see □igure 2). □o lakes, Lake Trout lakes, or seepage areas were identified within 120m of the □arkhill □nterconnect project location. A summary of the site investigation findings are provided in Table 1 below.

Table 1. Summary of Water Body Site Investigations within the Parkhill Interconnect Project Area

Criteria	Associated Water Body Features
i. □n a water body	Site investigations have identified 5 water bodies within The □tsebe □reek drainage area and 1 within the □ig Swamp □rain drainage area that are overlapping the project location. These represent proposed crossing locations for the transmission line. All of these water bodies represent permanent or intermittent water bodies, and are designated as warmwater fisheries containing warmwater baitfish species. Each of these water bodies will be discussed in detail as part of the □ ater □ody Report.
ii. □ ithin 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	□one
iii. □ ithin 300 m of the average annual high water mark of a Lake Trout lake that is at or above development capacity	□one
iv. □ ithin 120 m of the average annual high water mark of a permanent or intermittent stream	Site investigations have confirmed the presence of 10 water bodies within the project area, including □ within The □tsebe □reek drainage area, 1 within the Ausable River drainage area and 1 within the □ig Swamp □rain drainage area. All of these water bodies are designated as warmwater fisheries containing warmwater baitfish species. All of these features will be discussed in more detail within the □ ater □ody Report.
iv. □ ithin 120 m of a seepage area	□one

The results of this site investigation will be used, in conjunction with the records review, to identify potential impacts associated with the proposed development activities of the □arkhill □nterconnect.

Figure 2

Parkhill Interconnect

Water Bodies

Path: X:\1341_JAB_T-Line_Study\NRSI_1341_WB_Fig2_Parkhill_WaterBodies_50K_2012_11_16_KEB.mxd

Legend

- Project Area (120m)
- Non-Water Body
- Confirmed Water Body
- Access Road
- Transmission Line
- Project Location
- Point of Interconnect
- Switchyard
- Existing Transmission Line
- Railroad
- Primary Road
- Secondary Road
- Intermittent Watercourse
- Permanent Watercourse
- Open Aquatic

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Aquatic, Terrestrial and Wetland Ecologists

Project: 1341 Date: November 16, 2012	NAD83 - UTM Zone 17 Scale: 1:50,000 (11x17")

0 1 2 Kms

4.0 Description of Proposed Undertaking

The following sections provide information pertaining to the design, construction, operation, and decommissioning activities associated with the proposed undertaking for the □arkhill □nterconnect.

4.1 □esign

The 115 k□ transmission line, from the □ornish Switchyard, will collect power from Adelaide, □ornish, and □ericho □ ind Energy □entres. The transmission line will travel along □erwood, Elginfield and □airn Roads within the municipal rights□of□way to the □arkhill Substation then to a second □ydro One□owned Switchyard on to an existing □ydro One 500 k□ transmission line.

An access road will be constructed to allow for access to project components.

4.2 □onstruction

The construction phase of the project will involve:

- installation of transmission line;
- creation of new access road;
- installation of associated facilities (□ornish Switchyard and □arkhill Substation).

The construction phase of the □arkhill □nterconnect project will involve the installation of the transmission line, the □ornish Switchyard, and the □arkhill Substation (including associated access road).

One access road will be constructed to be approximately 11m wide during the construction phase to allow for access. Access road construction will include clearing top□soil to a depth of 300□□00mm. The road will be topped with clean Type □A□ or Type □□□gravel. □ew or existing culverts may be used for the water crossings, which are planned to be open□bottomed.

□t is anticipated that the transmission line will be mounted on new hydro poles. The local utility company may require □ericho □ ind, □nc. to erect additional poles, or replace undersi□ed poles, in order to accommodate the transmission line. The poles are

proposed to be constructed of wood, concrete or steel and will be between 1□ and 30 m tall.

□ased on current layouts, occasional vegetation clearing and tree removal, grubbing, and grading will occur throughout the project area to accommodate the transmission line, □ornish Switchyard, □arkhill Substation and access road. Any vegetation clearing or tree removal is expected to occur entirely with the road right□of□way or within agricultural habitats (i.e. hedgerows), and not within the boundaries of natural features outside the surveyed road right□of□way. A detailed impact assessment associated with vegetation removal is provided in the □atural □eritage Environmental □mpact Study Report (□RS□2012b).

4.3 Operation

The application of herbicides may occur within the project area to help control vegetation growth beneath above ground cabling routes (i.e. transmission lines) (□L□□ 2012).

□o ground water or surface water will be used as part of the operation of the facility, as municipal water supplies will be accessed (□L□□ 2012). □o permanent sediment control features or storm water management facilities will be implemented. □n addition, there are no areas where waste, biomass or source separated organics are stored, handled, processed or disposed of during the operation of the transmission line (□L□□ 2012). □ aste will be disposed of by an authori□ed and approved offsite vendor.

4.4 □ecommissioning

□roject components are expected to be in service for approximately 30 years. □ollowing the operation, a decision would be made to extend the life of the facility or to decommission. □ecommissioning would entail the dismantling and removal of project infrastructure associated with the □arkhill □nterconnect and restoring the land to a use similar to pre□construction activities.

Two buildings associated with the □arkhill □nterconnect (□ornish Switchyard and □arkhill Substation) will require demolishing and removal.

As part of this project, overhead cabling will be installed along the length of the transmission line. □pon decommissioning of the project, these lines will be dismantled and removed. All poles and cabling solely associated with this project will be removed at the end of the project life, and land will be restored to a condition similar to those observed during pre□construction (□L□□ 2012).

□t is envisioned that all access roads and associated water body crossing structures will be left in place, although this is at the discretion of the landowner (□L□□ 2012).

5.0 Impact Assessment

5.1 Approach to Impact Assessment

For the purposes of this report, the analysis of potential impacts has been divided into two categories. Firstly, generalized potential impacts on water bodies related to each project phase including design, construction, operation and decommissioning will be presented and discussed. Secondly, specific impacts to each water body identified within the project area are discussed based on the site specific features and functions of the water body as well as the proposed works. These impacts are grouped by water body feature type, as identified by O. Reg. 359/09, s. 30 and include lakes, Lake Trout lakes, intermittent or permanent water bodies, and springs and seeps. This approach allows for general impacts to water body features as it relates to project design, construction, operation and decommissioning to be identified and addressed clearly and concisely.

All identified impacts are discussed in this section assuming no mitigations are applied, which describes a “worst case scenario” for impacts to water bodies. Recommendations to mitigate identified impacts as well as monitoring of effectiveness of these measures are also included in this section.

5.2 Generalized Project Phase Impacts and Mitigations

If not mitigated appropriately, impacts to water bodies have the potential to be considerable due to the nature of development and construction activities. These impacts have the potential to affect surface water quality, fish, fish habitat, benthic organisms, and stream hydrology and range in degree from temporary disturbance to permanent loss or impairment.

Any loss in the productive capacity of fish habitat as a result of changes to the physical structure, substrate, type and quantity of cover, vegetation, and flow volume and dynamics are considered harmful alteration, disruption or destruction (HADD) to fish habitat and are prohibited under the federal *Fisheries Act (1986)*.

Mitigation measures provided in the following sections are designed to reduce potential impacts to water bodies and their ecological functions. It is anticipated that the

implementation of mitigation measures will be achieved through the conditions of approval in the REA application.

□mpacts and recommended mitigations associated with each project phase including design, construction, operation, and decommissioning are discussed below. Specific impacts associated with each water body within the project area are discussed in Tables 5 and □.

5.2.1 □esign

□mpacts associated with wind energy project design are related to 1) project layout and 2) the design of project components. □roject layout will dictate what water bodies will be directly impacted based on project component orientation and the level of risk associated with the impact based on the proximity of the project component to the water body feature (i.e. 25m away versus 100m away). □t is inferred that the greater the distance a water body is away from a project component, the lower the risk for impacts to the feature. Topography (slope to the water body), the permeability of soils, and the density of vegetation and/or ground litter (i.e. dead grass, leaves, twigs, and logs) are also factors that determine the level of risk the impact has to water bodies.

□ ith respect to project components occurring within a water body, the REA Regulation sets clear guidelines as to where wind development is acceptable. The development of transmission lines can occur at any distance from, including within, a water body if it is demonstrated that it will result in no negative environmental effects, through the completion of an impact study.

□ ithin the proposed □arkhill □nterconnect project area, transmission lines will traverse intermittent/permanent water bodies and therefore are occurring within these features. The □ornish Switchyard, □arkhill Substation and associated access road will be located within 120m of intermittent/permanent water bodies. □esign related impacts as a result of project components occurring within these water bodies as well associated mitigation measures are discussed in Table 2.

Table 2. Summary of Project Components and Potential Negative Environmental Effects, Associated Impacts and Recommended Mitigations Proposed for the Parkhill Interconnect

Project Component	Potential Negative Effects	Associated Impacts	Recommended Mitigation
115 k Transmission Line	• ncreased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation • ncrease in impervious surfaces and increased surface run off resulting from clearing of forested areas and re grading of land	• hanges to water body flow (increase or decrease) • hanges to thermal characteristics of a water body (warming of a feature through increased surface water run off contributions) • ecreased groundwater base flow and increases and decreases in water levels of seepage areas and lakes • ecreased infiltration to key areas (areas of recharge) due to newly impervious cover leading to interruptions to the natural water cycle • ncrease in impervious cover facilitating increased runoff down a steep slope (i.e. a valley feature), resulting in increased potential for erosion and downstream sedimentation • Loss and alteration of fish habitat caused by physical changes to the stream channel, streambed and riparian vegetation	• esign layout that avoids impacts to water bodies whenever possible • Select crossing locations that avoid key habitat features such as spawning habitat or refuge pools and choose straight reaches of the channel over meandering sections to minimi e potential for erosion and sedimentation • aintain existing surface water drainage patterns and functions through proper stormwater management design considerations

Project Component	Potential Negative Effects	Associated Impacts	Recommended Mitigation
□uildings (□ornish Switchyard and □arkhill Substation)	• □ncrease in impervious surfaces and increased surface run□off resulting from clearing of forested areas, re□grading of land, and stormwater management plans associated with building construction. • □ ater contamination by oils, gasoline, grease, and other materials • Soil compaction as a result of heavy construction equipment leading to a loss in soil permeability creating additional impervious cover.	• □hanges to water body flow (increase or decrease) • □hanges to thermal characteristics of a water body (warming of a feature through increased surface water run□off contributions) • □ecreased groundwater base flow and increases and decreases in water levels of seepage areas and lakes • □ecreased infiltration to key areas (areas of recharge) due to newly impervious cover leading to interruptions to the natural water cycle • □hanges in water chemistry resulting in decreased water quality, ultimately resulting in changes in benthic invertebrate and fish community • □ncrease in impervious cover facilitating increased runoff down a steep slope (i.e. a valley feature), resulting in increased potential for erosion and downstream sedimentation	• □esign layout that avoids impacts to water bodies whenever possible • □aintain existing surface water drainage patterns and functions through proper stormwater management design considerations • Time construction activities to avoid seasonally wet periods to reduce the risk of erosion or soil compaction.

Project Component	Potential Negative Effects	Associated Impacts	Recommended Mitigation
Access Road	• Increase in impervious surfaces and increased surface run-off resulting from re-grading of land, and stormwater management plans associated with building construction. • Water contamination by oils, gasoline, grease, and other materials • Loss and alteration of fish habitat caused by physical changes to the stream channel, streambed and riparian vegetation through filling, straightening and enclosing a water body within the crossing area • Physical alteration or removal of key aquatic habitat features (i.e. such as refuge pools, spawning beds etc.)	• Changes to water body flow (increase or decrease) • Changes to thermal characteristics of a water body (warming of a feature through increased surface water run-off contributions) • Decreased groundwater base flow and increases and decreases in water levels of seepage areas and lakes • Decreased infiltration to key areas (areas of recharge) due to newly impervious cover leading to interruptions to the natural water cycle • Increase in impervious cover facilitates increased runoff down a steep slope (i.e. a valley feature), could increase potential for erosion and downstream sedimentation • Changes in water chemistry resulting in decreased water quality, ultimately resulting in changes in benthic invertebrate and fish community • Loss and alteration of fish habitat caused by physical changes to the stream channel, streambed and riparian vegetation through filling, straightening and enclosing a water body within the crossing area • Loss of natural substrates and alteration of food supply (i.e. benthos, macrophytes) • Creating a barrier to fish passage (using culvert styles that limit fish movement and migration)	• Design layout that avoids impacts to water bodies whenever possible • Maintain existing surface water drainage patterns and functions through proper stormwater management design considerations • Crossing structures should be designed to reduce loss and alteration of habitat (i.e. reduce affected area by cutting back from grading limit to road and install headwall, open bottom culvert etc.) • Crossing structure should be properly sized and positioned appropriately (angle and embedded) as to avoid erosion issues and creation of potential fish barriers • Crossing structures should be sized appropriately so as to not result in alterations in stream hydrology, scouring or flooding crossing structures • Crossing structure type should consider sensitivity of the water body and location of crossing. • Time construction activities to avoid seasonally wet periods to reduce the risk of erosion or soil compaction

5.2.2 Construction

Potential impacts identified for the construction phase of the Parkhill Interconnect are based on the understanding of project works described in Section 5.2, and include the following project activities:

- installation of transmission line;
- creation of new access road;
- installation of associated facilities (Cornish Switchyard and Parkhill Substation).

Construction related impacts resulting from the installation and erection of project components occurring on or within 120m of water bodies and the recommended mitigations are discussed in Table 3.

Table 3. Summary of Construction Activities, Potential Negative Effects Associated with the Activity, Resulting Impacts and Recommended Mitigations Proposed for the Parkhill Interconnect

Project Component	Potential Negative Effects	Associated Impacts	Recommended Mitigation
115 k□ transmission line	• □ncreased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation • □ontaminant spills due to the proximity of construction vehicles and machinery to water bodies • □ncrease in impervious surfaces and increased surface run□off resulting from clearing of treed areas and re□grading of land • Soil compaction as a result of heavy machinery and the stockpiling of heavy materials (i.e. soils) in the project area • Loss and alteration of fish habitat caused by physical changes to the stream channel, streambed and riparian vegetation	• □hanges to thermal characteristics of a water body (warming of a feature through increased surface water run□off contributions) which can result in changes to fish community based on thermal preferences • □ecreased groundwater base flow and increases and decreases in water levels of seepage areas and lakes which can ultimately alter flow regimes • □ecreased infiltration to key areas (areas of recharge) due to newly impervious cover leading to interruptions to the natural water cycle • Soil compaction reduces the permeability of soils and their ability to retain water during rain/snow melt events resulting in an increase in surface water run□off which will ultimately increase the erosion potential and the amount of sediment being transported into adjacent water bodies • □ncreased impervious cover facilitates increased run□off down a steep slope (i.e. a valley feature), resulting in increased potential for erosion and downstream sedimentation • Sedimentation has the ability to reduce water clarity, absorb energy from sunlight, and increase turbidity which can reduce the feeding success of sight□feeding fish and invertebrate species, reduce the reproductive success of aquatic species through the loss of nesting habitat and the smothering of eggs, inhibit plant photosynthesis, warm the water in a system, impair respiratory functions, lower tolerance to disease and toxicants and increase physiological stress (□ewcombe and □ac□onald 1991; □ ard 1992; □ aters 1995; Osterling *et al.* 2010) • A contaminant spill can result in the degradation of water quality which may impose significant	• □onstruction activities near water should take place within the low flow periods to avoid or minimi□e impacts (specific windows are not required because no in□water work is proposed for overhead cabling installation) • □learing, grubbing, and grading activities should be timed to avoid seasonally wet periods (i.e. spring) • □onstruction should be avoided during high volume rain events (20mm in 24 hours) and significant snow melts/thaws and can resume once soils have stabili□ed to avoid risk of erosion, soil compaction or the potential for sediment release into nearby water bodies • A □lood Response □lan should be developed to deal with on□site flooding as to mitigate any possible effects to the aquatic environment • An Erosion and Sediment □ontrol □lan (ES□) will minimi□e the potential for construction related sediment release into nearby water bodies (ES□ □uideline), ES□ condition reports will be prepared as part of the monitoring and maintenance plan • Riparian planting after construction should be implemented to stabili□e water body channel banks and encourage rapid re□vegetation of disturbed soils to prevent collapse and erosion which, in turn, will minimi□e sedimentation, support fish habitat, and protect the many sensitive ecological functions that occur in water bodies and should be completed as soon as weather permits, following reconstruction of the slope • □f insufficient time is available in the growing season to establish vegetative cover, overwintering treatments such as erosion control blankets, fiber matting, rock (large, clean angular rocks) reinforcement/armoring or equivalent should be

Project Component	Potential Negative Effects	Associated Impacts	Recommended Mitigation
		behavioral and physiological stress on fish species, leading to impaired spawning, feeding or routine activities • □ ater quality that remains at levels unacceptable for aquatic life can result in death of aquatic organisms which in some cases may occur instantly based on contaminant • □ atercourses can potentially convey ha□ardous materials for long distances based on flow in the watercourse and can affect large areas of habitat • A release of contaminant or □spill□into a water body is considered a release of a □deleterious substance□ and is prohibited under the *Fisheries Act*, the *Environmental Protection Act* and the *Ontario Water Resources Act* • Stockpiling construction related materials such as soil, shrubs, trees or roots wads in or near a water body can enter the water body if not properly contained which can result in the destruction or disturbance of fish habitat and flow patterns, increase the risk for flooding or erosion and sedimentation and impair water quality	applied to contain the site over the winter period and planting should then follow in the next growing season and maintenance and inspection of the vegetative cover should occur • □onstruction equipment (i.e. cranes, back hoes etc.), should be operated in a manner that minimi□es disturbance to the banks of the water body and should stay outside of the water body and bank area as much as possible • □achinery should arrive on site in clean condition and is to be checked and maintained free of fluid leaks and must be refueled, washed and serviced a minimum of 30m away from all water bodies and other drainage features to prevent any deleterious substances from entering a water body • □uel and other construction related materials should be stored securely away from any drainage features and construction staging areas should also be located 30m away from any water body • A Spill Response □lan (SR□) must be developed prior to commencement of construction to provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other ha□ardous liquids and chemicals, a spill kit must also be kept on site at all times and on□site workers must be trained in the use of this kit and be fully aware of the SR□ • To minimi□e the potential for soil compaction, construction equipment should be restricted to designated controlled vehicle access routes • □onstruction debris should be removed from the site and be stabili□ed to prevent it from entering the nearby water bodies • Any waste generated from the site should be removed and disposed of appropriately off site according to municipal standards

Project Component	Potential Negative Effects	Associated Impacts	Recommended Mitigation
□uildings (□ornish Switchyard and □arkhill Substation)	• □ncreased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation • □ontaminant spills due to the proximity of construction vehicles and machinery to water bodies • □ncrease in impervious surfaces and increased surface run□off resulting from clearing of treed areas and re□grading of land • Soil compaction as a result of heavy machinery and the stockpiling of heavy materials (i.e. soils) in the project area	• □hanges to thermal characteristics of a water body (warming of a feature through increased surface water run□off contributions) which can result in changes to fish community based on thermal preferences • □ecreased groundwater base flow and increases and decreases in water levels of seepage areas and lakes which can ultimately alter flow regimes • □ecreased infiltration to key areas (areas of recharge) due to newly impervious cover leading to interruptions to the natural water cycle • Soil compaction reduces the permeability of soils and their ability to retain water during rain/snow melt events resulting in an increase in surface water run□ off which will ultimately increase the erosion potential and the amount of sediment being transported into adjacent water bodies • □ncreased impervious cover facilitates increased run□ off down a steep slope (i.e. a valley feature), resulting in increased potential for erosion and downstream sedimentation • Sedimentation has the ability to reduce water clarity, absorb energy from sunlight, and increase turbidity which can reduce the feeding success of sight□ feeding fish and invertebrate species, reduce the reproductive success of aquatic species through the loss of nesting habitat and the smothering of eggs, inhibit plant photosynthesis, warm the water in a system, impair respiratory functions, lower tolerance to disease and toxicants and increase physiological stress (□ewcombe and □ac□onald 1991; □ ard 1992; □ aters 1995; Osterling et al. 2010) • A contaminant spill can result in the degradation of water quality which may impose significant behavioral and physiological stress on fish species, leading to impaired spawning, feeding or routine activities • □ ater quality that remains at levels unacceptable for	• □learing, grubbing, and grading activities should be timed to avoid seasonally wet periods (i.e. spring) • □onstruction should be avoided during high volume rain events (20mm in 24 hours) and significant snow melts/thaws and can resume once soils have stabili□ed to avoid risk of erosion, soil compaction or the potential for sediment release into nearby water bodies • A □lood Response □lan should be developed to deal with on□site flooding as to mitigate any possible effects to the aquatic environment • An Erosion and Sediment □ontrol □lan (ES□) will minimi□e the potential for construction related sediment release into nearby water bodies (ES□ □uideline), ES□ condition reports will be prepared as part of the monitoring and maintenance plan • □onstruction equipment (i.e. cranes, back hoes etc.), should be operated in a manner that minimi□es disturbance to the banks of the water body and should stay outside of the water body and bank area as much as possible • □achinery should arrive on site in clean condition and is to be checked and maintained free of fluid leaks and must be refueled, washed and serviced a minimum of 30m away from all water bodies and other drainage features to prevent any deleterious substances from entering a water body • □uel and other construction related materials should be stored securely away from any drainage features and construction staging areas should also be located 30m away from any water body • A Spill Response □lan (SR□) must be developed prior to commencement of construction to provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other ha□ardous liquids and chemicals, a spill kit must also be kept on site at all times and on□site workers must be trained in the use of this kit and be fully aware of

Project Component	Potential Negative Effects	Associated Impacts	Recommended Mitigation
		aquatic life can result in death of aquatic organisms which in some cases may occur instantly • atercourses can potentially convey ha ardous materials for long distances based on flow in the watercourse and can affect large areas of habitat • A release of contaminant or spill into a water body is considered a release of a deleterious substance and is prohibited under the *Fisheries Act*, the *Environmental Protection Act* and the *Ontario Water Resources Act* • Stockpiling construction related materials such as soil, shrubs, trees and roots wads in or near a water body can enter the water body if not properly contained which can result in the destruction or disturbance of fish habitat and flow patterns, increase the risk for flooding or erosion and sedimentation and impair water quality	the SR • To minimi e the potential for soil compaction, construction equipment should be restricted to designated controlled vehicle access routes • onstruction debris should be removed from the site and be stabili ed to prevent it from entering the nearby water bodies • Any waste generated from the site should be removed and disposed of appropriately off site according to municipal standards
Access Road onstruction	• ncreased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation • ater contamination by oils, gasoline, grease, and other materials • ncrease in impervious surfaces and increased surface run off resulting from clearing of forested areas and re grading of land • Loss and alteration of fish habitat caused by physical changes to the stream channel, streambed and riparian vegetation through filling,	• hanges to water body flow (increase or decrease) • hanges to thermal characteristics of a water body (warming of a feature through increased surface water run off contributions) • ecreased groundwater base flow and increases and decreases in water levels of seepage areas and lakes • ecreased infiltration to key areas (areas of recharge) due to newly impervious cover leading to interruptions in the natural water cycle • ncrease in impervious cover facilitates increased runoff down a steep slope (i.e. a valley feature), could increase potential for erosion and downstream sedimentation • hanges in water chemistry resulting in decreased water quality, ultimately resulting in changes in benthic invertebrate and fish community • Loss and alteration of fish habitat caused by physical changes to the stream channel, streambed and riparian vegetation through filling, straightening	• learing, grubbing, and grading activities should be timed to avoid seasonally wet periods (i.e. spring) • onstruction should be avoided during high volume rain events (20mm in 24 hours) and significant snow melts/thaws and can resume once soils have stabili ed to avoid risk of erosion, soil compaction or the potential for sediment release into nearby water bodies • A lood Response lan should be developed to deal with on site flooding as to mitigate any possible effects to the aquatic environment • An Erosion and Sediment ontrol lan (ES) will minimi e the potential for construction related sediment release into nearby water bodies (ES uideline), ES condition reports will be prepared as part of the monitoring and maintenance plan • onstruction equipment (i.e. cranes, back hoes etc.), should be operated in a manner that minimi es disturbance to the banks of the water body and should stay outside of the water body and bank area

Project Component	Potential Negative Effects	Associated Impacts	Recommended Mitigation
	straightening and enclosing a water body within the crossing area • □hysical alteration or removal of key aquatic habitat features (i.e. such as refuge pools, spawning beds etc.) • Temporary disruption of substrates/habitat at locations where in□water work is required • □ish passage temporarily restricted and migration patterns disrupted as a result of construction activities • □ompletion of in□water work requiring in□stream dewatering Excess sediment suspended and carried downstream by stream flow during the installation and removal of temporary structures • □inor, isolated, short term dewatering of shallow groundwater from excavation areas required when excavation intercepts an area of shallow groundwater table conditions	and enclosing a water body within the crossing area • Loss of natural substrates and alteration of food supply (i.e. benthos, macrophytes) • □reating a barrier to fish passage (using culvert styles that limit fish movement and migration)	as much as possible • □achinery should arrive on site in clean condition and is to be checked and maintained free of fluid leaks and must be refueled, washed and serviced a minimum of 30m away from all water bodies and other drainage features to prevent any deleterious substances from entering a water body • □uel and other construction related materials should be stored securely away from any drainage features and construction staging areas should also be located 30m away from any water body • A Spill Response □lan (SR□) must be developed prior to commencement of construction to provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other ha□ardous liquids and chemicals, a spill kit must also be kept on site at all times and on□site workers must be trained in the use of this kit and be fully aware of the SR□ • To minimi□e the potential for soil compaction, construction equipment should be restricted to designated controlled vehicle access routes • □onstruction debris should be removed from the site and be stabili□ed to prevent it from entering the nearby water bodies • Any waste generated from the site should be removed and disposed of appropriately off site according to municipal standards • Any water body locations requiring in□water work or work within a regulated area (typically water body flood plains) will require a permit from the respective jurisdictional conservation authority • □ermitting will be required under the Regulation of □evelopment, □nterference with □ etlands and Alterations to Shorelines and □ atercourses, Reg. 14□/0□ • □ermitting will be granted upon review and approval of a completed E□S based on the final design details

Project Component	Potential Negative Effects	Associated Impacts	Recommended Mitigation
			of the project. • Review and approval under the □isheries Act (19□□) will also be required by the above noted authorities on behalf of the □□O • Should □A□□ of fish habitat be unavoidable, lost or altered habitat must be compensated for under the □isheries Act (19□□) • □ompensation measures must be employed to ensure there is no net loss of fish habitat, the combination of mitigation and compensation will ensure that impact to fish (including freshwater mussels) and their habitats are avoided • All in□water work should be performed during dry conditions; short□term isolated dewatering may be required • □rior to dewatering, the work area will be isolated, if required The structure should prevent the escape of debris and sediment to the exterior water body □rior to surface water dewatering, fish must be collected and relocated to a suitable location, preferably downstream and away from the construction area. This should be executed through the development of a □ish Salvage □lan. • □ewatering pump hoses should also be fitted with screens at end of pipe as to not entrain or impinge fish in the hose or pumps. □reshwater □ntake End□of □ipe □uidelines should be referenced to determine appropriate screening standards (□□O 1995). A Scientific □ollection □ermit will be required from the O□ □R, prior to execution of salvage • The success of all mitigation will be verified though groundwater quality sampling.

5.2.3 Operation

During the operational phase of the project, it is anticipated that impacts to water bodies will be limited and associated with increased traffic access within the project area as well as ongoing maintenance activities. This includes a risk of contaminant spills and application of herbicides along the transmission lines. Operational related impacts resulting from the maintenance of the Parkhill Interconnect and associated mitigations of these impacts are discussed in Table 4.

Table 4. Summary of Operational Activities, Potential Negative Effects Associated with the Activity, Resulting Impacts and Recommended Mitigations Proposed for the Parkhill Interconnect

Operational Component	Potential Negative Effects	Associated Impacts	Recommended Mitigation
Application of erbicides ncreased ehicle Access	• ncreased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation • ater contamination by oils, gasoline, grease, and herbicides • ncrease in impervious surfaces and increased surface run off resulting from clearing of vegetation	• hanges to thermal characteristics of a water body (warming of a feature through increased surface water run off contributions) which can result in changes to fish community based on thermal preferences • ncreased impervious cover facilitates increased run off down a steep slope (i.e. a valley feature), resulting in increased potential for erosion and downstream sedimentation • Sedimentation has the ability to reduce water clarity, absorb energy from sunlight, and increase turbidity which can reduce the feeding success of sight feeding fish and invertebrate species, reduce the reproductive success of aquatic species through the loss of nesting habitat and the smothering of eggs, inhibit plant photosynthesis, warm the water in a system, impair respiratory functions, lower tolerance to disease and toxicants and increase physiological stress (ewcombe and ac onald 1991; ard 1992; aters 1995; Osterling *et al.* 2010) • A contaminant or spill can result in the degradation of water quality which may impose significant behavioral and physiological stress on fish species, leading to impaired spawning, feeding or routine activities • A release of contaminant or spill into a water body is considered a release of a deleterious substance and is prohibited under the *Fisheries Act*, the *Environmental Protection Act* and *Ontario Water Resources Act*	• The use of herbicides for the removal of vegetation should be avoided, if application is required, it should be limited and adhere to s for herbicide application, and use herbicides approved for use adjacent to water bodies or within riparian buffer areas • An Erosion and Sediment ontrol lan (ES) will minimi e the potential for construction related sediment release into nearby water bodies (ES uideline), ES condition reports will be prepared as part of the monitoring and maintenance plan • uel and other construction related materials should be stored securely away from any drainage features and construction staging areas should also be located 30m away from any water body • A Spill Response lan (SR) must be developed prior to commencement of construction to provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other ha ardous liquids and chemicals, a spill kit must also be kept on site at all times and on site workers must be trained in the use of this kit and be fully aware of the SR • To minimi e the potential for soil compaction, vehicles should be restricted to designated controlled vehicle access routes • Any waste generated from the site should be removed and disposed of appropriately off site according to municipal standards

5.2.4 Decommissioning

The decommissioning phase impacts and mitigations are the same as the construction phase impacts and mitigations with regards to the removal of the overhead cabling, buildings and access roads. Please see Section 5.2.2 for impacts and mitigation associated with decommissioning of the Parkhill Interconnect.

5.3 Site Specific Water Body Impacts and Mitigations

In accordance with the Renewable Energy Approval (REA), the proposed Parkhill Interconnect project area has been assessed for the presence of water bodies by RSC Biologists through the completion of a records review and site investigations. Identified water bodies located within 120m of the project location were further evaluated for potential impacts as they relate to the proposed undertaking. General project phase impacts are discussed in Section 5.2., site specific impacts to identified water bodies are discussed below.

For the purposes of this report, the analysis of potential impacts has been divided by water body type, as defined by the REA regulation. The potential impacts have been further divided water bodies to include those that are crossing, as well as those that are within 120m, but not overlapping, the project location.

A total of 10 water body features were identified within the project area, and all of which have been identified as intermittent/permanent water bodies. There are a total of 10 individual sites where these 10 water bodies are present within 120m of the Parkhill Interconnect, including the Cornish Switchyard, Parkhill Substation, and associated access road. No lakes, Lake Trout lakes, or seepage areas were identified along the proposed Parkhill Interconnect.

The following section outlines potential site specific impacts on water bodies associated with the proposed Parkhill Interconnect.

5.3.1 Intermittent/Permanent Water Bodies

A total of 10 intermittent/permanent water bodies have been identified within the Parkhill Interconnect project area. These water bodies provide direct or indirect habitat for fish

and other aquatic organisms and must be given consideration in order to protect them from immediate or prolonged degradation.

RS has identified that water bodies will be crossed by the transmission line at individual locations. Each of these individual crossing locations has been summari ed in Table 5 below.

n addition to the specific crossing locations identified above, RS has also identified that 4 water bodies are located within 120m of, but not overlapping, the project location. ithin these 4 water bodies, there are 4 specific locations where the project location is within 120m. These locations are summari ed in Table below.

Table 5. Summary of Intermittent/Permanent Water Body Crossing Locations, Site Specific Considerations, Potential Impacts and Recommended Mitigations

Drainage Area	Water Body Feature Name	Water Body Location ID	Crossing Infrastructure	Site Specific Considerations	Potential Impacts	Recommended Mitigation Measures
The tsebe reek	Tributary S	01	• Overhead abling	Low sensitivity fish habitat, tolerant baitfish species present, no in water work or drilling associated with overhead cabling	Outlined in Section .2	Outlined in Section .2
	Tributary T	02	• Overhead abling			
	Tributary AA	04	• Overhead abling			
	Tributary	05	• Overhead abling			
	Tributary	0	• Overhead abling			
ig Swamp rain	ig Swamp rain	11	• Overhead abling			

ote: fish habitat sensitivity was derived from the O *Practitioners Guide to the Risk Management Framework* and considers habitat factors such as species sensitivity, species dependence on habitat, rarity, and habitat resiliency. The assessment should be considered preliminary for the purposes of assessing impact as further assessment would be required for final sensitivity determination.

Table 6. Summary of Site Specific Considerations, Potential Impacts and Recommended Mitigations for Intermittent/Permanent Water Bodies Within 0.1 and 120m of the Parkhill Interconnect Project Location

Drainage Area	Water Body Feature Name	Water Body Location ID	Associated Infrastructure and Distance (m)	Site Specific Conditions	Potential Impacts	Recommended Mitigation Measures
The tsebe reek	Tributary	19	112	Low sensitivity fish habitat, tolerant baitfish species present, no in water work proposed, increased risk of impacts based on proximity to water body	Outlined in Section .2	Outlined in Section .2
	Tributary TT	03	OL – 14			
	Tributary LL	0	OL – 5			
Ausable River	Tributary	1	5			

ote: fish habitat sensitivity was derived from the O *Practitioners Guide to the Risk Management Framework* and considers habitat factors such as species sensitivity, species dependence on habitat, rarity, and habitat resiliency. The assessment should be considered preliminary for the purposes of assessing impact as further assessment would be required for final sensitivity determination.

Legend

OL Overhead Line (transmission line)

uilding (includes ornish Switchyard and arkhill Substation)

5.4 Monitoring

An adaptive management approach to the protection of water bodies requires regular site inspections and monitoring by a designated on-site Environmental Manager(s) (EM). Understanding the condition of the natural ecosystem throughout all phases of the project will form the basis upon which to consider altering construction methods, environmental protection measures and monitoring programs. Ultimately, any determination related to the application of mitigation and contingency measures will be informed by ongoing analysis of monitoring data, and rely on the experience and judgment of the on-site EM in consultation with the MOE, MOE and MNR as regulatory agencies.

Pre-construction monitoring is recommended where baseline conditions must be determined (i.e. water quality, water levels etc.). Active construction monitoring will be required at all locations where drainage features and water bodies are present, as well as, locations where water bodies are in close proximity to the project location. Post-construction monitoring may also be required to certify that proper restoration, stabilization, and overall quality of run-off is returned to pre-construction conditions, and to satisfy regulatory permitting and/or authorizations. Detailed monitoring plans will be developed within the detailed design phase and will incorporate other monitoring required by regulatory permitting and authorizations i.e.) Letter of Advice (LOA), Fisheries Act Authorization, Permit to Take Water (PTTW) etc. They will also incorporate specific detail of developed plans (i.e. ESM Plan, Flood Response Plan etc.)

General recommended monitoring activities are summarized in Table 7.

Table 7. Summary of General Monitoring Recommendations

Recommended Monitoring	Timing of Monitoring	Estimated Frequency of Monitoring
Monitor on-site conditions (i.e. erosion and sediment control measures, spills, flooding	• Construction phase	• Weekly during active construction periods • Prior to, during and after forecasted rain events (>20mm in 24 hours) or significant snowmelt events • Daily during extended rain or snowmelt periods • Monthly during inactive construction periods • As detailed in the ESM Plan, SRM, and Flood Response Plan

Recommended Monitoring	Timing of Monitoring	Estimated Frequency of Monitoring
□onitor meteorological conditions from Environment □anada	• □onstruction phase	• □aily review of weather forecasts
□ocument changes to existing aquatic habitat	• □re□construction (to document existing conditions) • □onstruction □hase	• Once during pre□construction • □aily during in□water and work within 30m of water body • □ eekly for work occurring within 31□120m of a water body
□onitor surface water quality for general parameters (i.e. temperature, p□, dissolved oxygen, conductivity, TSS, turbidity, nutrients, metals)	• □re□construction (to document baseline conditions) • □onstruction □hase	• □re□construction sampling should meet agency requirements as to adequately establish baseline conditions • □requent measurements of in□situ parameters and turbidity during construction • Other general water quality parameters as required by agencies

6.0 Impact Assessment Summary

A summary of general project phase water body potential impacts, recommended mitigations and resulting impacts are presented in Table □.

A summary of water body specific potential impacts and recommended mitigations are presented in Tables 5 and □ in Section 5.3.1. □ ith appropriate application of recommended mitigation measures outlined in this report, it is anticipated there will be no resulting significant impacts.

Table 8. Summary of General Project Phase Potential Impacts, Recommended Mitigation Measures and Resulting Significance of Impact

Potential Impact	Recommended Mitigation Measure(s)	Resulting Impact Significance[1]
Design Phase		
• Alteration of local drainage patterns	• □esign to maintain existing surface water drainage patterns and functions (including project layout, grading, storm water management facilities and structure designs) • □tili□e existing roads and road crossing structures, where possible • □rossing structures should be si□ed appropriately according to municipal engineering standards as to not result in alterations in stream hydrology, scouring or flooding crossing structures • □ewly impervious surfaces should consider use of permeable materials	• □ot Significant
• □ish habitat alteration/loss	• □onsideration of design layout to minimi□e number of crossings • □onsider layout distances to water body features and sensitivity of those features • □rossing locations should be selected as to avoid key habitat features (i.e. refuge pool) and cross the feature within a straight reach of the channel as to avoid meanders etc. and cross perpendicular • □rossing structures should be designed to reduce loss and alteration of habitat (i.e. reduce affected area by cutting back from grading limit to road and install headwall, open bottom culvert etc.) • □rossing structure should be properly si□ed and positioned appropriately (angle and embedded) as to avoid erosion issues and creation of potential fish barriers • □rossing structures should be si□ed appropriately according to municipal engineering standards as to not result in alterations in stream hydrology, scouring or flooding crossing structures • □rossing structure type should be determined in consultation with agency and municipality staff and should consider sensitivity of the water body and location of crossing. • Any loss to the productive capacity of a water body must be compensated for under the □isheries Act.	• □ot Significant
Construction Phase		
• Erosion and sedimentation	• □inimi□e potential for soil compaction (see Soil □ompaction below) • □ontrolled vehicle and machinery access routes, keep away from water bodies • Avoid clearing, grubbing and grading activities during seasonally wet periods (i.e. spring) • Avoid work if during high volume rain events (□20mm in 24hrs) or snow melts are observed, resuming once soils have stabili□ed • □mplement □lood Response □lan if on□site flooding occurs • □mplement Erosion and Sediment □ontrol □lan • Stabili□e banks as soon as possible after construction disturbance (i.e. plantings, rock etc.), if insufficient time is available in the growing season to establish vegetative cover, an overwintering treatment such as erosion control blankets, fiber matting etc. should be applied to contain the site over the winter period • □inimi□e disturbance by keeping construction equipment outside and away from water bodies	• □ot Significant

[1] □onsiders if recommended mitigation measures are applied

Potential Impact	Recommended Mitigation Measure(s)	Resulting Impact Significance[1]
	• nstall silt fencing in water downstream of water containment structures • mplement Stormwater anagement lan	
• ater uality mpairment	• mplement Erosion and Sediment ontrol lan • mplement Spill Response lan • eep machinery clean and refuel a minimum of 30m away from any water body • uel and other construction related chemical should be stored securely away from water bodies • Any discharges to a water body must meet OE olicy 2 standards (at or better water quality than that of the Receiving water body) • Adequately treat any discharge water prior to discharge as to meet OE policy 2 standards (i.e. filer bags) • mplement Stormwater anagement lan	• ot Significant
• Temporary disruption of fish habitat (in water work)	• achinery should be operated in a manner that minimi es disturbance to the banks and bed of the water body • hen using a water containment structure, implement ish Salvage lan to remove any fish prior to dewatering work area • Stabili e banks as soon as possible after construction disturbance (i.e. plantings, rock etc.) • ork in dry conditions (low flow) where possible	• ot Significant
• Soil ompaction	• ontrol vehicle access routes	• ot Significant
• ebris entering a water body	• onstruction debris should be stabili ed (i.e. tarps) away from water bodies • Refuse and other material should be appropriately disposed of off site	• ot Significant
Operational Phase		
• ater quality impairment	• mplement Spill Response lan • Avoid or limit use of herbicides, implement s • Address any impacts resulting from design or construction phases	• ot Significant
Decommissioning		
• See construction related impacts and recommended mitigation		

[1] onsiders if recommended mitigation measures are applied

7.0 Summary and Conclusions

A detailed assessment of the water bodies within and adjacent to the proposed the □arkhill □nterconnect has occurred through the use of a detailed Records Review and Site □nvestigations (□RS□2012a) conducted by □atural Resource Solutions biologists.

Through the completion of these studies, □RS□has confirmed the presence of 10 water bodies within the project area, all of which have been identified as intermittent/permanent water bodies. □ ithin these water bodies, a total of 10 individual locations have been identified where these water bodies are present within 120m of the project location.

Six of the 10 water bodies have been identified as crossing the transmission line at one location. The remaining 4 water bodies are found within 120m of, but not overlapping, the project location.

All water bodies within the project area are designated warmwater fish habitat with the presence of warmwater baitfish species. As such, the water bodies have been ranked as low sensitivity when assessing impact to these features.

□o lakes, Lake Trout lakes or seepage areas were identified within the □arkhill □nterconnect project area.

□f recommended mitigation measures are employed as described in this report, no significant impacts are anticipated on the identified water body features as a result of the development of the □arkhill □nterconnect.

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