Samsung Renewable Energy Inc. and

Pattern Energy

6C Water Body Environmental Impact Study

For

South Kent Wind Project

SOUTH KENT WIND PROJECT
Water Body Environmental Impact Study

Prepared for:
Hatch Ltd.
4342 Queen Street, Suite 500
Niagara Falls, Ontario Canada L2E 7J7

Project No. 1184 Date: May 2012

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

SOUTH KENT WIND PROJECT
Water Body Environmental Impact Study

Project Team:

Staff	Role
Andrew G. Ryckman	Project Advisor
Tara Lessard	Project Manager/Biologist
Andrew E. Schiedel	Aquatic Biologist
Steve P.G. Burgin	Aquatic Biologist
Gina MacVeigh	Aquatic Biologist
Shawn W. MacDonald	GIS Technician

Report submitted on May 1, 2012

Andrew G. Ryckman

Head Office: 225 Labrador Drive, Waterloo, Ontario, N2K 4M8 **Tel:** (519) 725-2227 **Fax:** (519) 725-2575
Web: www.nrsi.on.ca
Email: info@nrsi.on.ca

Water Body EIS – Summary of Revisions from Layout 012 to Layout 020

Revisions to the Water Body EIS Report were required based on modifications to the layout for the South Kent Wind Project (Layout 012 to Layout 020). These modifications included the removal of 6 proposed turbines, relocations of 39 proposed turbines (between 3m to 354m of their original locations), as well as changes to infrastructure, including access roads and cabling.

Revisions to the Water Body EIS Report from Layout 012 to Layout 020 include:

- There are a total of 524 waterbody locations within 120m of the Project location (compared to 497 waterbody locations within 120m of the Project location in Layout 012)
- There are 265 waterbody crossing locations (compared to 313 crossing locations in Layout 012)
- The Records Review and Site Investigation summaries in this EIS include all of the same changes that were made to the Records Review and Site Investigation Reports

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in September 2010 by Hatch Ltd. ("Hatch"), on behalf of Samsung Renewable Energy Inc. and Pattern Energy (the "Proponent") to produce an Water Body Environmental Impact Study (EIS) in accordance with the Renewable Energy Approval (REA) regulations for a proposed wind energy generating facility in the Regional Municipality of Chatham-Kent (Municipality), Ontario. This report incorporates information obtained through two (2) separate reports entitled *South Kent Wind Project: Water Body Records Review Report (NRSI, 2012a)* and *South Kent Wind Project: Water Body Site Investigation Report (NRSI, 2012b)*. These reports provided specific information regarding water bodies present in the project area, DFO drain classifications, fish community information, as well as occurrences of aquatic Species at Risk (SAR) and species of conservation concern. This *South Kent Wind Project: Water Body Environmental Impact Study* identifies potential environmental impacts to water bodies as a result of construction, operation and decommissioning activities associated with the Project, and provides impact-specific mitigation measures and recommendations for eliminating these impacts.

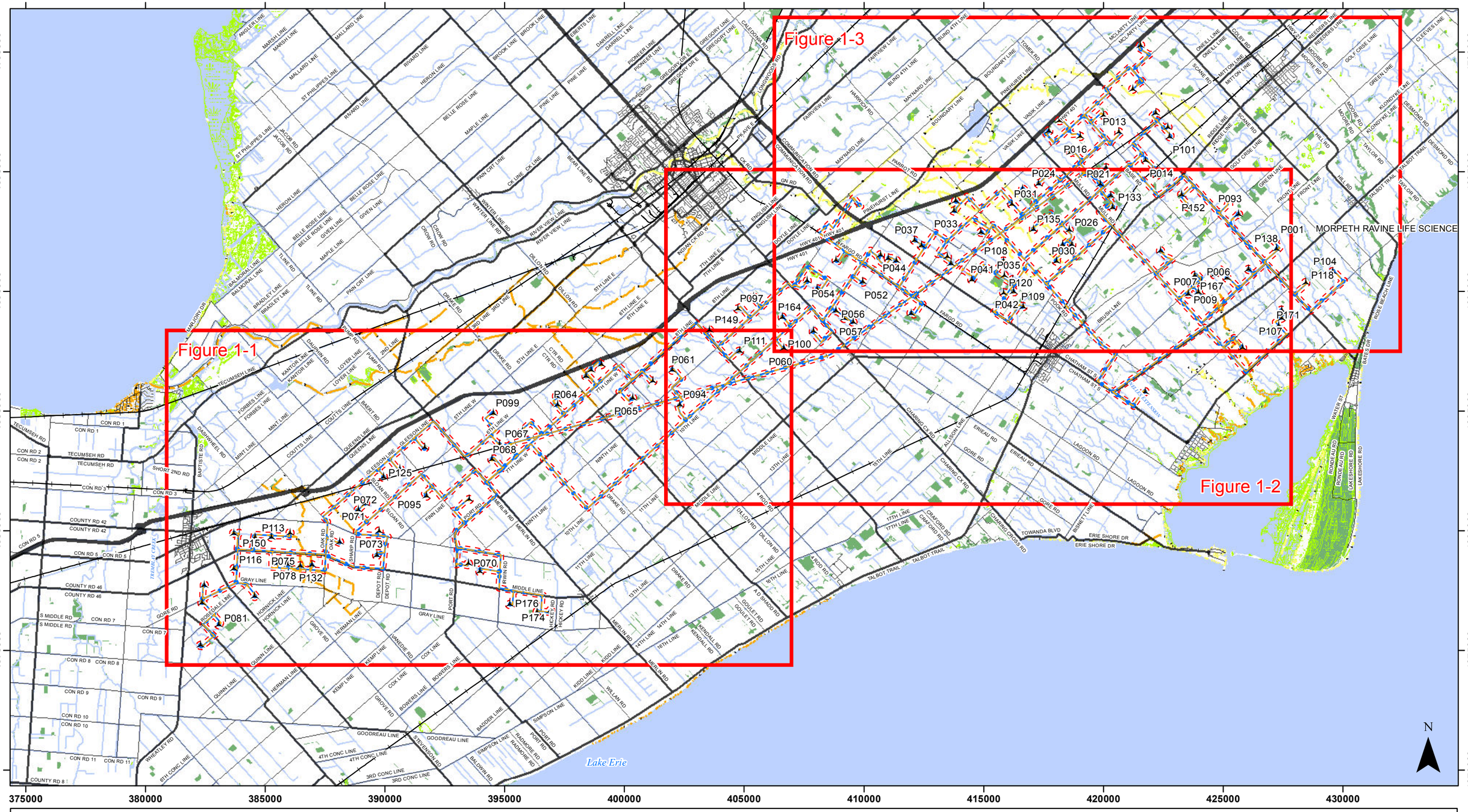
The proposed South Kent Wind Project ("the Project") is located in the southern half of the Regional Municipality of Chatham-Kent between Highway 401 and the shoreline of Lake Erie, and Towns of Tilbury and Ridgetown from west to east, respectively. This wind energy generating facility is proposed to be 270 MW in size, consisting of up to 124 operational wind proposed turbines, as well as supporting infrastructure, including access roads, construction and truck turnaround areas, and buried collection/transmission lines. The collection/transmission line includes approximately 34 km of 230 kV transmission line and two (2) substations to enable step-up of the voltage from 34.5 kV to 230 kV to connect to Chatham Switching Station (SS) (collectively referred to as the Project components).

As identified in the 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*) the proposed layout of these features is collectively referred to as the 'Project location'. Further to this the 'Project area' refers to the area of

120 m surrounding the Project location. This includes all areas within 120 m of proposed turbine blade tip (approximately 170 m from the base of the turbine) as well as any areas proposed for construction or development activities, including access roads, temporary lay-down areas, truck turn-around areas, crane pads, access roads, distribution and transmission lines. The proposed areas to be used for development activities, including the Project location and 120 m Project area, as identified by REA Regulation, are provided in Figures 1-1, 1-2, and 1-3.

In accordance with the REA Regulation it is required that all water bodies existing within 120 m of the project location be investigated. Development within this 120 m distance may be permitted providing that any negative environmental effects due to Project activities are clearly identified and assessed in a report (O. Reg. 359/09). Information collected through these investigations will be used throughout the planning process in determining the most suitable action plans for the construction and decommissioning phases of the Project. No wind turbines or transformer stations are permitted within 30 m of any water body.

The Project is located primarily within areas of active agricultural practices, including rotational crops of corn and soy beans. Other land uses, including hayfields and agricultural pasture, are also expected to be present within the general area of the Project. The water bodies and associated aquatic vegetation found within the Project area are typical of the southwestern Ontario landscape. An extensive system of drains has been established to facilitate land drainage for agricultural practices. These drains represent a large proportion of the water bodies found throughout the Project area, typically located alongside roads and agricultural fields. Additional permanent and intermittent streams are found as naturally vegetated tributaries that flow either northward to the Thames River and ultimately into Lake St. Clair or southward into Rondeau Bay or Lake Erie.



Key Map

South Kent Wind Project

Project Area and Aquatic Features

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 1 2 4 km

April 23, 2012. Project No: NRSI-1184.
UTM Zone 17, NAD 83 Scale: 1:150,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Railway
- Highway
- Primary Road
- Secondary Road
- Fish Species at Risk
- Mussel Species at Risk
- Watercourse
- Wooded Area
- Waterbody
- Wetland Area
- Mussel Species at Risk
- Fish Species at Risk

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig1-1to1-3_ProjectArea_AquaticFeaturesKeyMap_150K_2012_04_23_SWM.mxd

Figure 1-1

South Kent Wind Project

Project Area and Aquatic Features

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.5 1 2 km

April 23, 2012. Project No: NRSI-1184.
UTM Zone 17, NAD 83 Scale: 1:65,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Railway
- Highway
- Primary Road
- Secondary Road
- Fish Species at Risk
- Mussel Species at Risk
- Watercourse
- Wooded Area
- Waterbody
- Wetland Area
- Mussel Species at Risk
- Fish Species at Risk

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig1-1to1-3_ProjectArea_AquaticFeatures_65K_2012_04_23_SWM.mxd

Figure 1-2

South Kent Wind Project

Project Area and Aquatic Features

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.5 1 2 km

April 23, 2012. Project No: NRSI-1184.
UTM Zone 17, NAD 83 Scale: 1:65,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Railway
- Highway
- Primary Road
- Secondary Road
- Fish Species at Risk
- Mussel Species at Risk
- Watercourse
- Wooded Area
- Waterbody
- Wetland Area
- Mussel Species at Risk
- Fish Species at Risk

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig1-1to1-3_ProjectArea_AquaticFeatures_65K_2012_04_23_SWM.mxd

Figure 1-3

South Kent Wind Project

Project Area and Aquatic Features

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

0 0.5 1 2 km

April 23, 2012. Project No: NRSI-1184.
UTM Zone 17, NAD 83 Scale: 1:65,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Railway
- Highway
- Primary Road
- Secondary Road
- Fish Species at Risk
- Mussel Species at Risk
- Watercourse
- Wooded Area
- Waterbody
- Wetland Area
- Mussel Species at Risk
- Fish Species at Risk

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig1-1to1-3_ProjectArea_AquaticFeatures_65K_2012_04_23_SWM.mxd

2.0 REA Requirements

The REA Regulation identifies the requirements for the development of renewable energy projects in Ontario. In accordance with the REA Regulation, the Project is classified as a Class 4 wind energy generating facility, and is required to complete an REA submission.

Section 40 of the REA Regulation state 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 (*Salvelinus namaycush*) 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:

a) 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;
b) identifies mitigation measures in respect of any negative environmental effects mentioned in clause (i);
c) describes how the environmental effects monitoring plan addresses any negative environmental effects mentioned in clause (i); and
d) describes how the construction plan report prepared in accordance with Table 1 of the REA addresses any negative environmental effects mentioned in clause (i).

In accordance with Section 40 of the REA Regulation, the following report has been prepared in order to address the potential negative environmental impacts of the Project on water bodies within the Project area. Furthermore, it will identify all impact-specific mitigation measure and provide recommendations on how to effectively minimize or eliminate these impacts.

3.0 Staff Roles

The requirements of the REA process indicate that the name and qualifications of all staff participating in the site investigation and/or evaluation of significance. As a result, the qualifications and roles of all staff participating in the completion of the Project have been outlined in the following sections.

3.1 Andrew G. Ryckman, B.Sc.

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

Andrew's role for the Project was to act as the project manager, overseeing all aspects of the Water Body Assessment, including both field work and reporting. He assisted with the preparation and final review of the reports, but relied on aquatic resource specialists to complete much of the site investigations and reporting for this project.

3.2 Tara Lessard, B.Sc.

Tara is a Terrestrial and Wetland Biologist with more than 4 years of experience working in the environmental field. During her consulting experience, Tara has conducted bird and bat assessments, amphibian studies, and other fauna assessments throughout Ontario. Tara has participated in field investigations and reporting for wind power projects in Ontario and New Brunswick.

Tara's role for the Project was to act as the project manager, overseeing all aspects of the Water Body Assessment, including both field work and reporting. She assisted with the preparation and final review of the reports, but relied on aquatic resource specialists to complete the site investigations and most of the reporting for this project.

3.3 Andrew E. Schiedel

Andrew Schiedel has 9 yrs of experience as an aquatic biologist dedicated to assessments of aquatic biota and their habitats. He specializes in aquatic habitat

assessments, fish community studies, freshwater mussel surveys, and benthic invertebrate biomonitoring programs. Andrew has extensive field experience on a wide variety of projects. He has been involved in numerous planning projects in Ontario, including subwatershed studies, secondary plans, provincial and municipal Environmental Assessments and Environmental Impact Studies. Andrew also has experience dealing with permit requirements for projects, including negotiation of fish habitat permits under the federal *Fisheries Act*. Andrew is trained in the methods of the Ontario Stream Assessment Protocol, and is a certified participant of the Ontario Benthos Biomonitoring Network.

Andrew's role in this project was to oversee the aquatic team in the site investigations and completion of this Environmental Impact Study.

3.4 Steve Burgin

Steve recently graduated from Trent University with a B.Sc. in Biology (Honours) following three years at Fleming College (F.W.Technology Diploma) and currently works as an Aquatic Biologist. Previous contract positions have provided him with more than 3 years of practical work experience in the environmental field. His areas of expertise include fish habitat surveys, habitat mapping, and fish community assessments, but he also has experience with benthic invertebrate surveys and species identification.

Steve was responsible for the preparation of several of the water body reports, including this Environmental Impact Study. He completed these tasks under the guidance of the project manager and aquatic supervisor.

3.5 Gina K. MacVeigh

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

(2009). She has also completed the Fish and Species at Risk Identification courses through the Royal Ontario Museum (2009).
Gina was responsible for updating several of the water body reports, including this Environmental Impact Study. She completed these tasks under the guidance of the project manager and aquatic supervisor.

3.6 Shawn MacDonald B.A. GIS-AS

Shawn has more than 3 years experience in renewable energy mapping, spatial analysis and asset management systems. As a Geographic Information Systems (GIS) Analyst Shawn specializes in projects relating to wind, solar and hydroelectric power. Shawn has a wide range of project and field experience using GIS, GPS, AutoCAD and other technologies throughout all stages of a renewable energy project. This experience is not limited to renewable energy alone as Shawn has been involved in a number of projects relating to terrestrial and aquatic habitat mapping, environmental restoration and spatial/3D analysis.

Shawn's role in the project was the primary GIS Analyst. He collected and reviewed all available background mapping resources and was the primary contact of the GIS department for the Project.

4.0 Summary of Records Review

In accordance with REA regulations, NRSI biologists have conducted a comprehensive records review of the water bodies within the Project area. The water bodies examined as part of the comprehensive *South Kent Wind Project: Records Review Report (NRSI, 2012a)* are summarized in Table 1 below.

Table 1. Summary of Records Review in accordance with REA Regulations.

Criteria	Yes/No	Result
i. In a water body	Yes	Based on available DFO mapping, a total of 297 project components were found to intersect with a water body. Based on mapping provided by the LTVCA, a total of 273 project components cross a water body.
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	No	No Project components are found 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.
iii. Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity	No	No Project components are found within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity.
iv. Within 120 m of the average annual high water mark of a permanent or intermittent stream	Yes	The South Kent Wind Project is located within 120 m of the average annual high water mark of 216 permanent and intermittent watercourses (refer to Appendix II). The majority of watercourses that fall within this 120 m boundary occur as linear agricultural drains which parallel roads and fields; and facilitate drainage for agricultural practices. The vast majority of these drains have been classified as Class-C and Class-F drains (DFO 2010). However there are several larger watercourses which actively drain water north of the Project Area into the Thames River, or south into Rondeau Bay and Lake Erie. Many of these larger drains have been classified as E-Class and C-Class.

iv. Within 120 m of a seepage area	No	No Project components are found within 120 m of any seepage areas.

5.0 Summary of Site Investigation

Comprehensive site investigations for the Project were undertaken in the fall of 2010 and in 2011 by NRSI biologists and are documented in the *South Kent Wind Project: Water Body Site Investigation Report* (NRSI, 2012b). These site investigations included site-specific habitat assessments of aquatic water bodies throughout the Project area. In areas where site access was not available or project components were located considerable distances from aquatic resources, site investigations were conducted from nearby roadside locations.

The results of the site investigations confirmed the presence of 243 permanent or intermittent streams within the Project area. These occur within the Project area 524 times, which includes 265 total crossing locations where water bodies are crossed by project infrastructure and 202 encroachment areas. Of the 265 crossings, 189 are attributed to cabling, 3 are access roads only, and 73 are a combination of both access roads and cabling at the same location (see Table 2). The results of the site investigation also showed that 54 water body sections (permanent and intermittent streams) were found within the turbine project area (120 m of turbine blade tips). Of those none were within 30 m of a turbine base and 14 came within 30 m of turbine blade tips. There are 51 turbines located within 120 m of a water body (measured from the blade tips) (see Table 4). These have been incorporated into the counts. Based on detailed site investigations, no lakes or lake trout lakes were identified within the Project area during specific site investigations however a total of twelve (12) water bodies were observed with watercress, a species of aquatic vegetation indicative of groundwater seepage areas. A detailed summary of the site investigation results can be found in Appendix III.

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 for the Project. These potential impacts, along with recommended mitigations measures, are addressed in Section 7.0 of this report.

Table 2. Summary of South Kent Wind Project Site Investigation

Table Number	Number of Water Body Sections Within the Project Area			Number of Water Body Sections Crossing a Project Component		
	Access Road Only	Cable	Access Road and Cable	Access Road Only	Cable	Access Road and Cable
3	0	10	2	0	1	4
5	9	24	8	3	19	11
7	4	31	3	0	26	8
9	5	13	4	0	39	7
11	0	4	0	0	1	0
12	6	28	1	0	46	17
14	5	21	7	0	32	17
16	1	13	1	0	23	9
18	1	1	0	0	2	0
Total	**31**	**145**	**26**	**3**	**189**	**73**

Table 3. Summary of South Kent Water Body Sections within the Turbine Project Area

Table Number	Turbine Labels	Number of Water Body Sections within 120m of a Turbine	Number of Water Body Sections within 30 m of a Turbine Base	Number of Water Bodies within 30 m of Project Location
4	P070, P087, P174	3	0	1
6	P116, P132, P081, P080, P115, P122, P071, P072, P075, P082	10	0	1
8	P068, P148	2	0	0
10	P164 (x2), P063, P097, P060, P100, P111, P149	8	0	2
13	P052, P058, P044, P056, P040 (x2), P041, P055, P033, P031, P108, P036, P046, P057, P109 (x2), P120	17	0	5
15	P152, P093, P017, P012, P028, P030, P135, P155	8	0	3
17	P004, P006, P009, P140, P171	5	0	2
19	P145	1	0	0
Total	**51**	**54**	**0**	**14**

Table 4. Proposed Turbines Found Within 120 m of Permanent or Intermittent Streams

Turbine Numbers			
P004	P046	P080	P132
P006	P052	P081	P135
P009	P055	P082	P140
P012	P056	P087	P145
P017	P057	P093	P148
P028	P058	P097	P149

P030	P060	P100	P152
P031	P063	P108	P155
P033	P068	P109	P164
P036	P070	P111	P174
P040	P071	P115	
P041	P072	P116	
P044	P075	P122	

6.0 Description of the Proposed Undertaking

The following sections provide information pertaining to the construction, operation, and decommissioning activities associated with the proposed undertaking for the Project. Detailed descriptions of project phases can be found under separate covers in the Design and Operations Plan Report (Hatch, 2011a), Construction Plan Report (Hatch, 2011b), and Decommissioning Plan Report (Hatch, 2011c). General descriptions of associated activities relating to construction, operation, and decommissioning phases are provided below.

6.1 Construction

Construction is anticipated to occur over approximately a 15 – 18 month period. Activities associated with this phase will include construction of access road and vehicle turn-out areas, site preparation, installation of support structures, collector system, transmission line right-of-way (ROW), site security, substation installation, commissioning, and site rehabilitation (areas not used for permanent infrastructure). Construction activities will be conducted in consultation with the landowners and agencies in compliance with applicable provincial and federal legislative requirements. Erosion control and impact-specific mitigation measures will be implemented where required and are discussed in Section 7.0 of this report.

6.2 Operation

The anticipated commercial operation date for the Project is March 2013 with an expected project life of at least 20 years. The facility will operate year round and generate electricity when suitable wind conditions exist. The turbines will be appropriately designed to perform under varying wind and weather conditions. This Project will be operated remotely and therefore no employees will be permanently located on-site. Periodic inspections and maintenance of the Project components by Project personnel will be conducted as required and therefore access to the wind turbine locations on a rotating basis will be required during the operations phase. Periodic inspection and maintenance activities will include fluid level checks, greasing, bolt torque checks, filter changes, inspection of blades, inspection of brake pads, as well as electrical activities such as inspection of cable connections, fuse checks, voltage level checks, battery inspections, trip tests and electrical cable inspections (Hatch 2011d).

6.3 Decommissioning

The Project is anticipated to have a project life of at least 20 years after which time the Project will be decommissioned or refurbished depending on market conditions and/or technological changes. Decommissioning of the Project will occur following a decision to discontinue renewable energy generation. This will involve the removal of all wind turbines, road networks, cabling and associated infrastructure with the recycling of all materials, where possible. All former Project areas (including areas disturbed by decommissioning activities) will be returned to their original condition including land contours and tile drainage systems.

7.0 Impact Assessment

7.1 Approach to Impact Assessment

For the purposes of this report, the analysis of potential impacts has been divided into the different classifications of significant natural features, as identified by O. Reg. 359/09, s. 30, Table, as follows:

- Lakes;
- Lake Trout Lakes;
- Permanent or Intermittent Streams; and
- Seepage Areas.

Each of these water body features are discussed in more detail below, including potential impacts and proposed mitigation measures for reducing construction related environmental impacts.

7.2 Lakes

Reviews of available background information and detailed site investigations have revealed that no lakes are present within the Project area.

There are expected to be several isolated ponds throughout the Project area that are used for agricultural and/or recreational purposes. Although these features are present and may provide aquatic habitat of varying quality they are not considered to be a "water body" as stated in Section 1.1 of the REA Regulations (O. Reg. 359/09). These isolated ponds are therefore not discussed in this report.

7.3 Lake Trout Lakes

NRSI biologists have reviewed available background information, including the Inland Ontario Lakes Designated for Lake Trout Management (OMNR 2006), 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 Project.

7.4 Permanent or Intermittent Streams

A total of 245 permanent and intermittent streams have been identified within the Project area (NRSI 2012b). The majority of these occur as drains that have been established to facilitate land drainage for agricultural practices. These are typically located alongside roads and agricultural fields and may provide secondary fish habitat for aquatic species

when water is present. Additional permanent and intermittent streams are found as naturally vegetated tributaries that flow either northward to the Thames River and ultimately into Lake St. Clair or southward into Rondeau Bay or Lake Erie. The majority of these water bodies provide essential habitat for fish and other aquatic organisms year round and must be given careful consideration in order to protect them from immediate or prolonged degradation.

The water bodies within the project area are designated as Class-C, Class-E, Class-F, and Unclassified drains according to DFO Drain Classification Mapping (DFO 2010) provided in Appendix I. Descriptions for each drain class can be found below.

- Class-C drains are considered to be permanent, warm-water features in which no sensitive species and/or communities are present (DFO 2010). These water bodies do, however, provide important habitat for a variety of smaller baitfish species (primarily cyprinids).

- Class-E water bodies exhibit permanent flow, warm water, and will typically provide optimal habitat suitable for sensitive warm water species and top predators. Examples of sensitive species found within Class-E water bodies include Northern Pike (*Esox lucius*), Pugnose Shiner (*Notropis anogenus*), and Spotted Sucker (*Minytrema melanops*) (DFO 2010).

- Class-F and Unclassified drains are considered to be intermittent or ephemeral (dry for more than two consecutive months) water bodies that may contain water during wet seasons throughout the year and provide indirect fish habitat. Indirect habitat typically has insufficient flow duration for fish to complete one (1) or more of their life processes (spawning, rearing, feeding, over wintering, or migration). These water bodies provide water and nutrients to downstream areas and as a result can have an impact on direct habitat. Development activities occurring in or near Indirect Fish Habitat can impact Direct Fish Habitat through the transport and deposit of sediment and other deleterious substances.

The federal *Fisheries Act (1985)* prohibits the Harmful Alteration, Disruption, or Destruction (HADD) of fish habitat unless authorized by the Minister of Fisheries and Oceans (Government of Canada 2010). According to the policy for administering this legislation (DFO 1986), a project must not cause a net loss of the productive capacity of fish habitat, applicable to both direct and indirect fish habitat. Regarding fish habitat and HADD, the *Fisheries Act* states that:

i. fish habitat means spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes (clause 1 of Subsection 34).
ii. no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat (clause 1 of Subsection 35).
iii. no person contravenes Subsection (1) by causing the alteration, disruption or destruction of fish habitat by any means or under any conditions authorized by the Minister or under regulations made by the Governor in Council under this Act (clause 2 of Subsection 35).

The impacts to fish and fish habitat can be substantial due to the nature of activities that are associated with the construction and decommissioning of wind turbines and associated infrastructure. These include direct impacts, which can be immediately noticeable, and indirect impacts which may take some time to manifest themselves but can be just as destructive. A review of available background resources and information obtained through field investigations of the Project have identified 524 locations where proposed development activities fall within the 120 m setback from water bodies as required through the REA Regulation (see Table 2 and 3 and Figures 1-1, 1-2, and 1-3). Section 8.0 outlines the potential direct and indirect impacts associated with development adjacent to or in close proximity to water bodies within 120 m of the Project location.

7.5 Seepage Areas

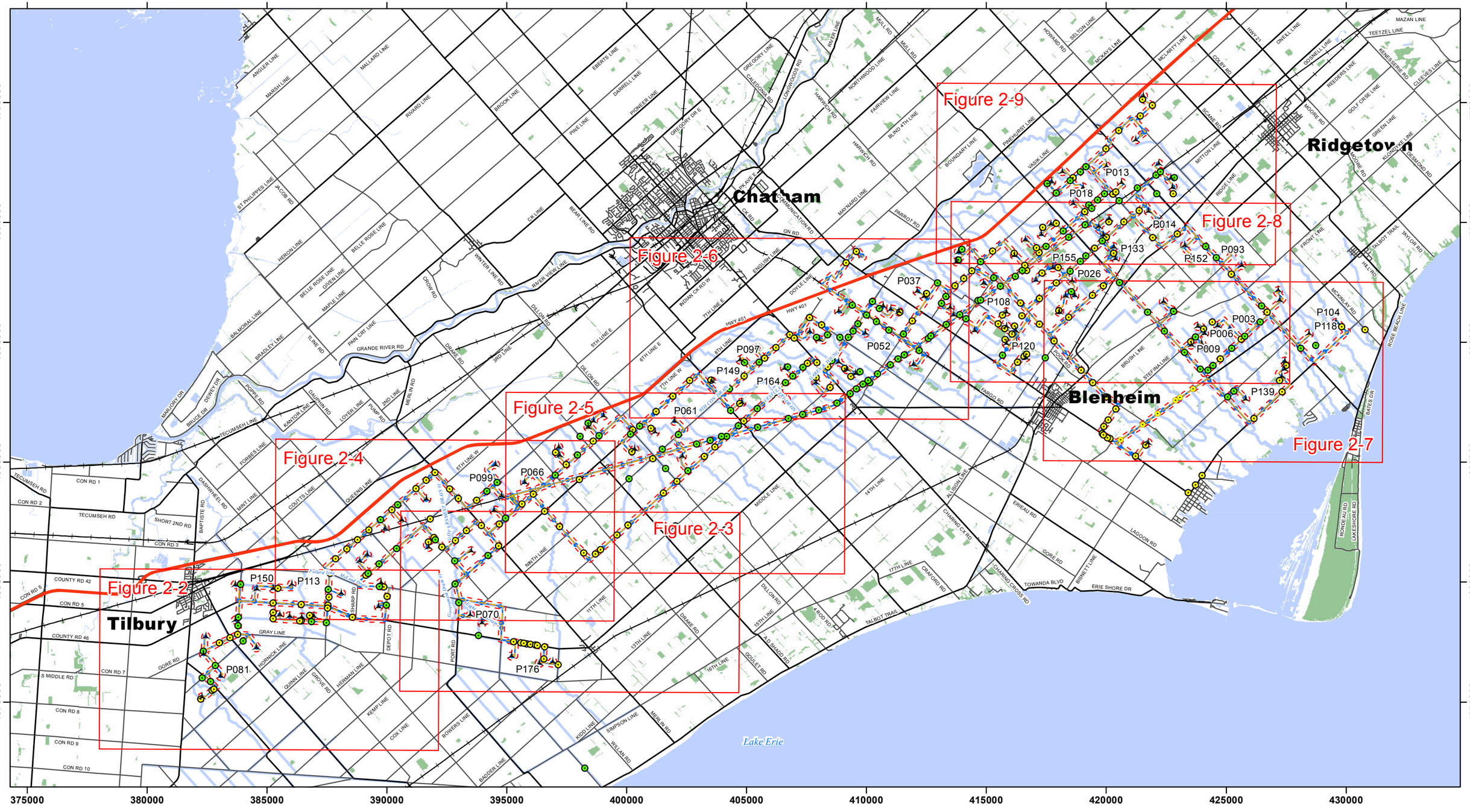
Groundwater seepages and upwellings are fundamental parts of the water cycle, returning sub-surface water above ground to contribute to the water quantity and quality of local water features. Groundwater seepages are especially important to temperature- and turbidity sensitive species by providing cool, clear water habitat. A comprehensive records review of available resources provided no information relating to seepage areas.

During site investigations throughout 2010 and 2011 a total of twelve (12) sites were noted to have characteristics indicative of areas where groundwater seepage is likely to be present (ie. presence of watercress). The water bodies where these were recorded include two (2) unnamed drains, O'Rourke Drain, Fargo Branch Drain, Barfoot Drain, English Drain, Gobert Drain, Archie Campbell Drain, Nelles Extension Drain, Cumming Drain and two (2) locations on McArthur East Drain. Ten (10) of these drains are crossed by cabling; however none of them are within 120 m of a turbine. Refer to the

Site Investigation Report for site-specific information relating to these areas. The recommendations provided in Section 7.4.2 of this report will provide strategies that may be implemented in order to effectively protect these areas against any potential impacts that may be present within the Project area.

8.0 Potential Negative Environmental Effects and Proposed Mitigation

Negative environmental effects include both direct and indirect environmental impacts. Within the Project the potential for these negative effects exist at 524 locations where water bodies are located within 120 m of the Project location. This includes 265 total crossing locations where water bodies are crossed by project infrastructure. Of these, 189 crossings are attributed to cabling, 3 are access roads only, and 73 are a combination of both access roads and cabling at the same location. This also includes 54 water body sections (permanent and intermittent streams) that were found within 120m of a turbine. Of those none was within 30 m of a turbine base and 14 came within 30 m of turbine blade tips. All crossing locations are shown in Figures 2-1 through 2-10 and can be found summarized in Table 2 and 3, above. Due to layout changes occurring between 2010 to 2012 Figure 2-2 has become unnecessary and has not been included in this report. It is anticipated that some of these crossings will be avoided or mitigated either through micrositing of the associated infrastructure or the use of directional drilling (underground cabling) or bailey bridges (access road crossings).



Key Map

South Kent Wind Project

Waterbody Observations

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

April 23, 2012. Project No: NRSI-1184
UTM Zone 17, NAD 83 Scale: 1:150 000 (11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Water Body Observation Points 2010
- Water Body Observation Points 2011
- Pond/Lake
- Highway
- Primary Road
- Secondary Road
- Wooded Area

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-3to2-9_WaterObs_KeyMap_150K_2012_04_23_SWM.mxd

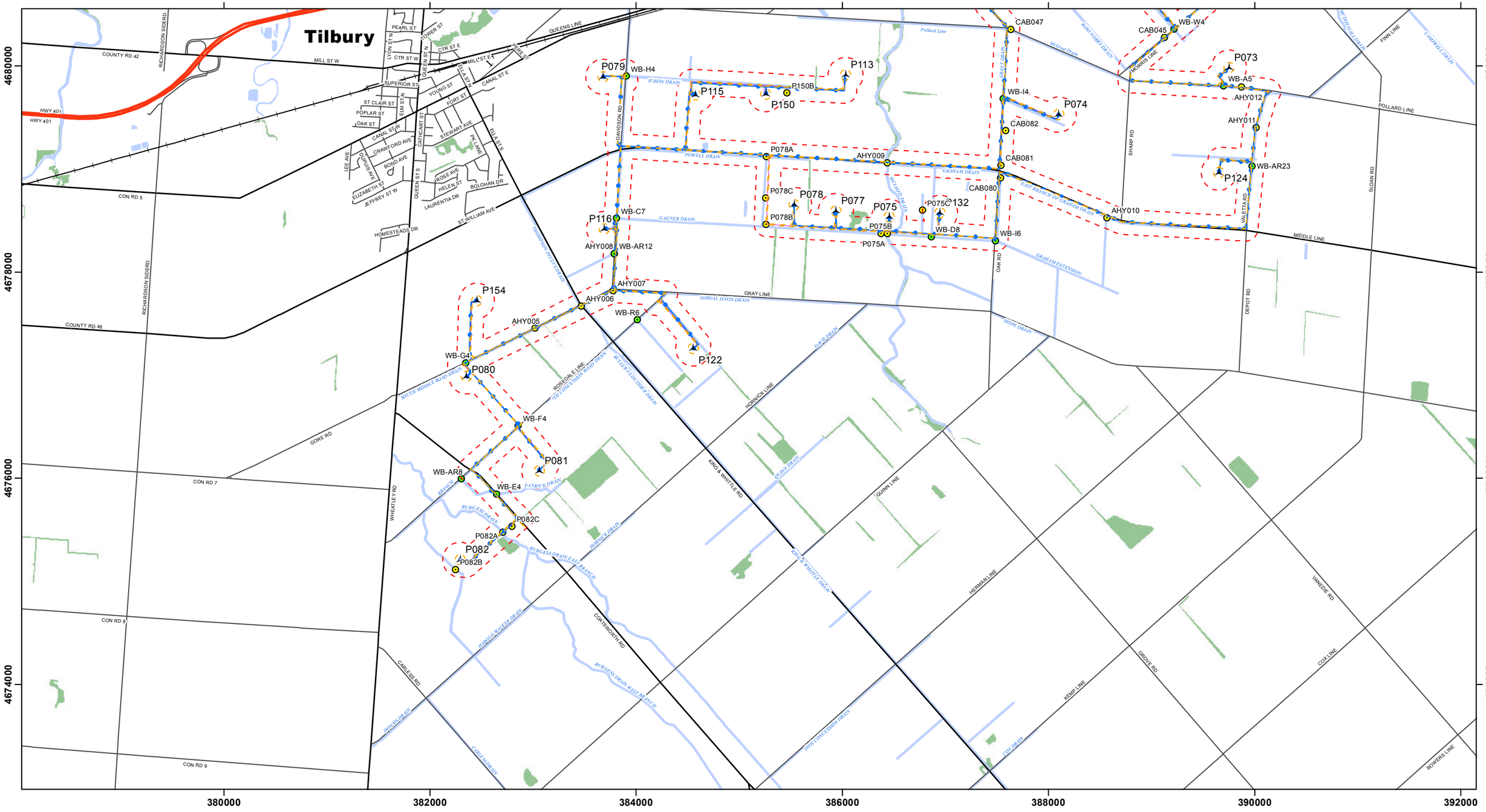


Figure 2-2

South Kent Wind Project

Waterbody Observations

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

N

0 0.5 1 km

April 23, 2012. Project No: NRSI-1184
UTM Zone 17, NAD 83 Scale: 1:35 000 (11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Water Body Observation Points 2010
- Water Body Observation Points 2011
- Water body (Permanent/Intermittent Streams)
- Pond/Lake
- Highway
- Primary Road
- Secondary Road
- Wooded Area

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-2to2-9_WaterObs_35K_2012_04_23_SWM.mxd

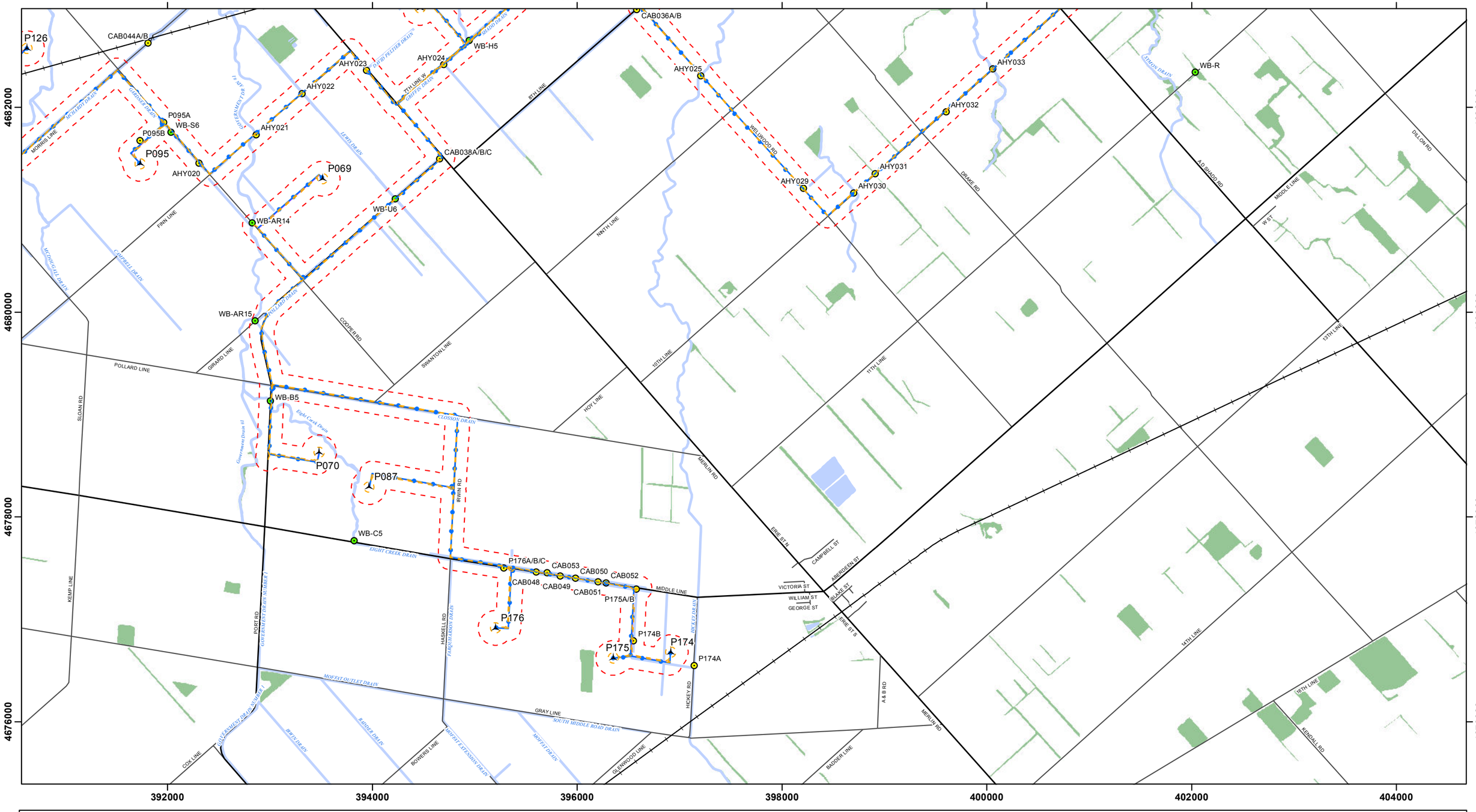


Figure 2-3

South Kent Wind Project

Waterbody Observations

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

N

0 0.5 1 km

April 23, 2012. Project No: NRSI-1184
UTM Zone 17, NAD 83 Scale: 1:35 000 (11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Water Body Observation Points 2010
- Water Body Observation Points 2011
- Water body (Permanent/Intermittent Streams)
- Pond/Lake
- Highway
- Primary Road
- Secondary Road
- Wooded Area

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-2to2-9_WaterObs_35K_2012_04_23_SWM.mxd

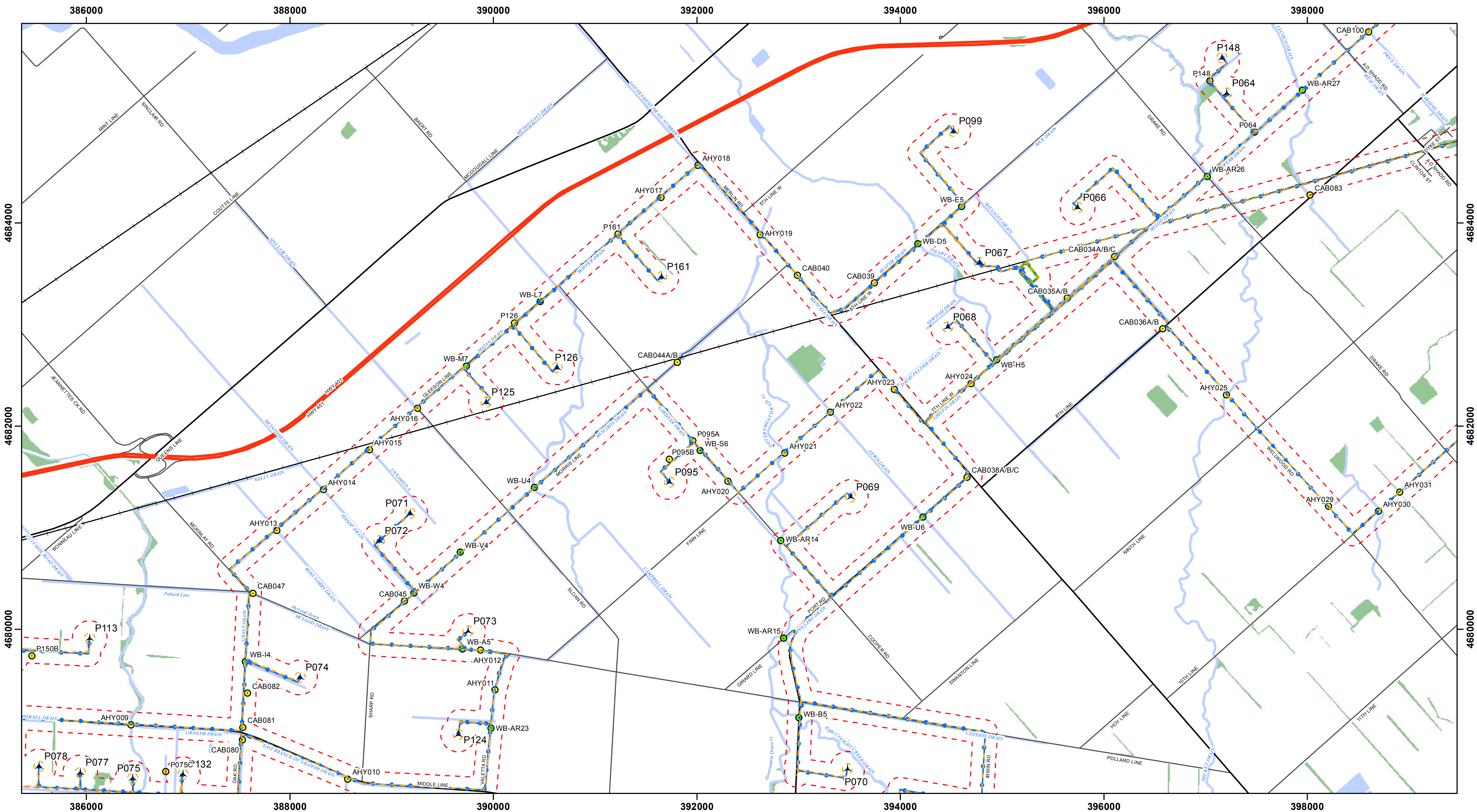


Figure 2-4

South Kent Wind Project

Waterbody Observations

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

N

0 0.5 1 km

April 23, 2012. Project No: NRSI-1184
UTM Zone 17, NAD 83 Scale: 1:35 000 (11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Water Body Observation Points 2010
- Water Body Observation Points 2011
- Water body (Permanent/Intermittent Streams)
- Pond/Lake
- Highway
- Primary Road
- Secondary Road
- Wooded Area

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-2to2-9_WaterObs_35K_2012_04_23_SWM.mxd

Figure 2-5

South Kent Wind Project

Waterbody Observations

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

N

0 0.5 1 km

April 23, 2012. Project No: NRSI-1184
UTM Zone 17, NAD 83 Scale: 1:35 000 (11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Water Body Observation Points 2010
- Water Body Observation Points 2011
- Water body (Permanent/Intermittent Streams)
- Pond/Lake
- Highway
- Primary Road
- Secondary Road
- Wooded Area

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-2to2-9_WaterObs_35K_2012_04_23_SWM.mxd

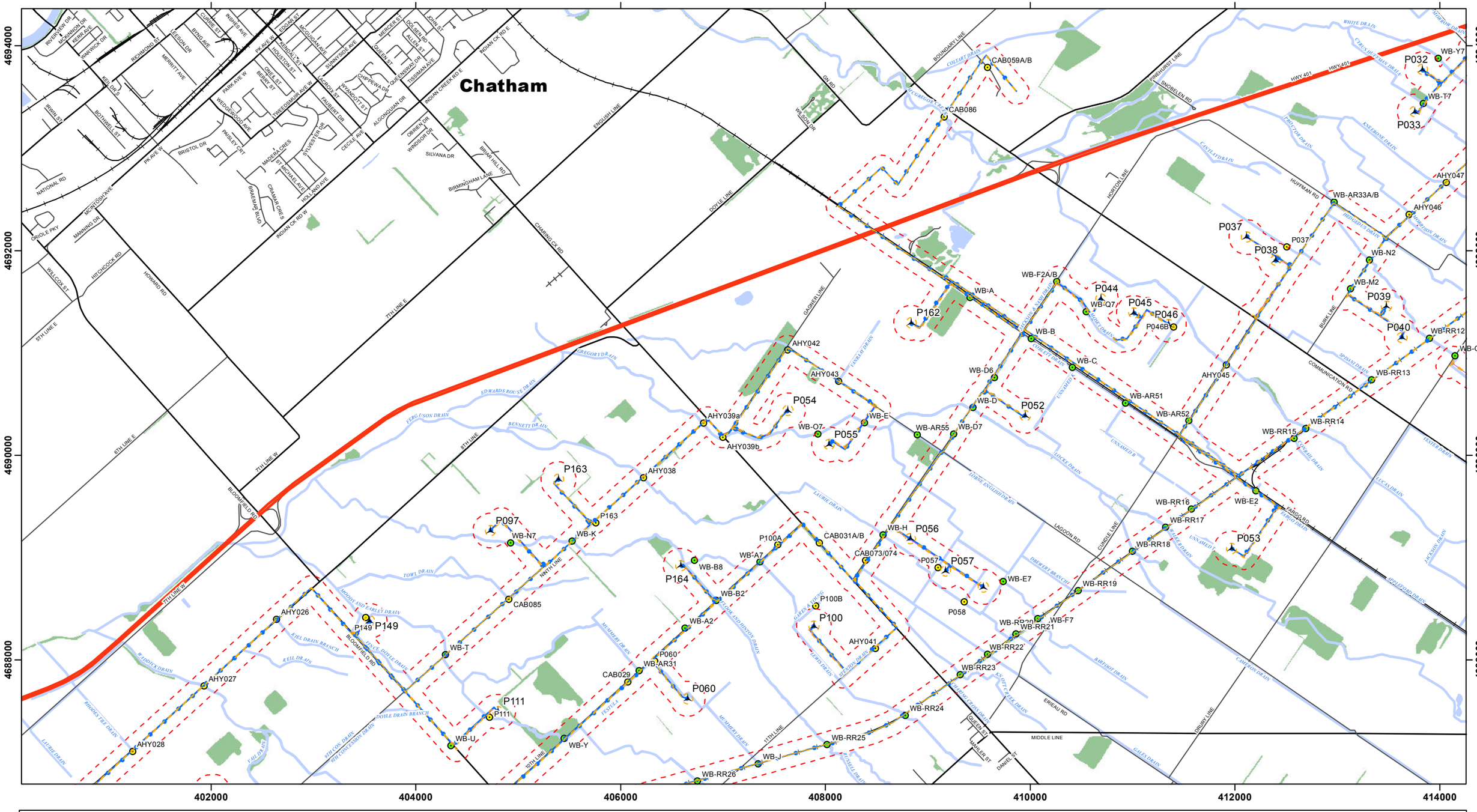


Figure 2-6

South Kent Wind Project

Waterbody Observations

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

April 23, 2012. Project No: NRSI-1184
UTM Zone 17, NAD 83 Scale: 1:35 000 (11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Water Body Observation Points 2010
- Water Body Observation Points 2011
- Water body (Permanent/Intermittent Streams)
- Pond/Lake
- Highway
- Primary Road
- Secondary Road
- Wooded Area

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-2to2-9_WaterObs_35K_2012_04_23_SWM.mxd

Figure 2-7

South Kent Wind Project

Waterbody Observations

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

N

0 0.5 1 km

April 23, 2012. Project No: NRSI-1184
UTM Zone 17, NAD 83 Scale: 1:35 000 (11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Water Body Observation Points 2010
- Water Body Observation Points 2011
- Water body (Permanent/Intermittent Streams)
- Pond/Lake
- Highway
- Primary Road
- Secondary Road
- Wooded Area

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-2to2-9_WaterObs_35K_2012_04_23_SWM.mxd

Figure 2-8

South Kent Wind Project

Waterbody Observations

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

N

0 0.5 1 km

April 23, 2012. Project No: NRSI-1184
UTM Zone 17, NAD 83 Scale: 1:35 000 (11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Water Body Observation Points 2010
- Water Body Observation Points 2011
- Water body (Permanent/Intermittent Streams)
- Pond/Lake
- Highway
- Primary Road
- Secondary Road
- Wooded Area

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-2to2-9_WaterObs_35K_2012_04_23_SWM.mxd

414000 416000 418000 420000 422000 424000 426000

4700000 4698000 4696000 4694000

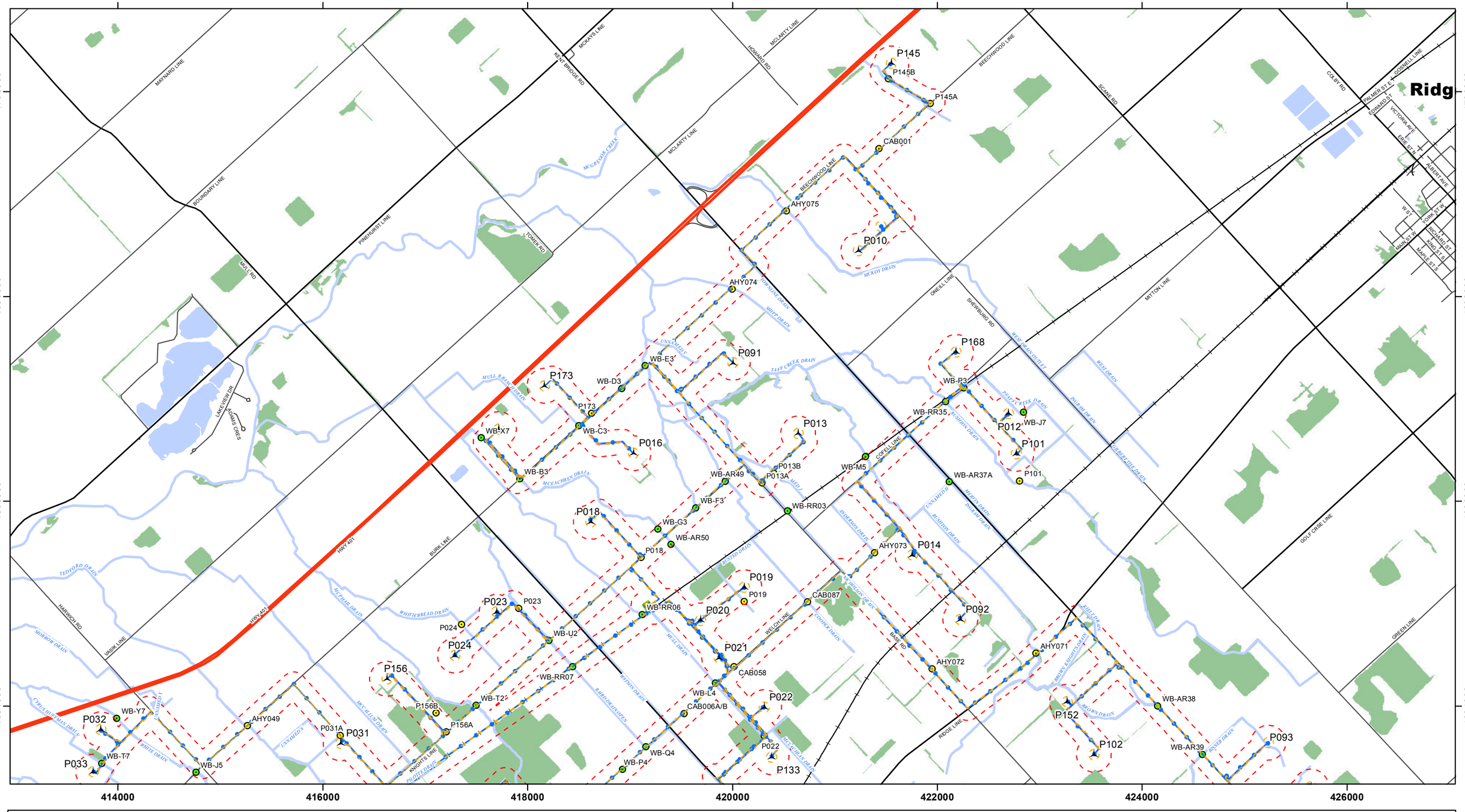


Figure 2-9

South Kent Wind Project

Waterbody Observations

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

N

0 0.5 1 km

April 23, 2012. Project No: NRSI-1184
UTM Zone 17, NAD 83 Scale: 1:35 000 (11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Water Body Observation Points 2010
- Water Body Observation Points 2011
- Water body (Permanent/Intermittent Streams)
- Pond/Lake
- Highway
- Primary Road
- Secondary Road
- Wooded Area

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-2to2-9_WaterObs_35K_2012_04_23_SWM.mxd

8.1 Potential Impacts and Proposed Mitigation

Aquatic habitats can be affected through loss of habitat caused by physical changes to the stream channel, streambed and riparian vegetation; barriers to fish passage through the placement of outfalls or culverts within the stream channel; shading (or lack thereof) from crossing structures and the removal of riparian vegetation, respectively. It can also cause changes to existing water quality and quantity through contaminant spills and as a result of an increase in impervious surfaces due to soil compaction from machinery (Samanns 2002) which leads to sedimentation and increases in turbidity.

The federal *Fisheries Act* (1985) requires that direct impacts to aquatic habitat are avoided, mitigated, or compensated. Agency and municipal requirements should be considered early on to streamline planning. Operational Guidelines prepared by the Lower Thames Valley Conservation Authority (LTVCA) specify that the alteration of water bodies must not:

a. result in a more unstable stream bank slope;
b. impact flood levels upstream or downstream of the altered location; and
c. impact erosion levels upstream or downstream of the altered location (O. Reg. 152/06) (LTVCA 2010).

In adhering to these guidelines, mitigation strategies and best management practices will be carefully considered for each potential direct impact. This will eliminate potential HADD in accordance with the *Fisheries Act* and minimize any of these impacts to fish (including freshwater mussels) and their associated habitats.

Direct impacts including sedimentation, habitat loss, barriers to fish passage and contaminant spills have been described in the following sections including their effects on aquatic biota (fish and freshwater mussels) and aquatic habitat. Appropriate mitigation measures and control strategies have also been incorporated in order to determine the best management practices for each construction phase.

Currently, there are numerous agencies with varying levels of responsibility for aquatic habitats, including the DFO and LTVCA. Following the review of the submission

package, these agencies will assist in the mitigation and compensation strategies and will be responsible for providing appropriate permitting for any necessary watercourse crossings. The combination of mitigation and compensation measures will ensure that impact to fish (including freshwater mussels) and their habitats is avoided. Numerous Acts have been implemented to protect watercourse habitat and rare species, including the *Fisheries Act, Ontario Drainage Act,* the federal *Species at Risk Act*, and Ontario's *Endangered Species Act.* These agencies and Acts will be consulted prior to any construction activities at the Project.

Potential impacts and proposed mitigation measures have been provided in the following sections, based on the three (3) major project phases, construction, operation, and decommissioning.

8.1.1 Construction

8.1.1.1 Sedimentation

8.1.1.1.1 Environmental Effects

Disturbance of a Project location as a result of vegetation clearing, topsoil and subsoil stripping, grading, use of heavy machinery, stockpiling, drilling, construction of access roads and water body crossings, and concentration of flow in drainage features (e.g. ditches) have the potential to increase erosion in areas directly at or adjacent to water bodies. Rainfall and surface water runoff in disturbed areas will result in the erosion of exposed soils and the potential movement of sediment-laden runoff into receiving water bodies. Soil compaction, vegetation removal, and grading/ditching activities that are associated with development activities are of concern when considering sedimentation. Additionally, the foundations prepared for turbines replace areas of previously permeable soil with flat, impermeable surfaces which act to increase run-off. Due to the anticipated life expectancy of the Project this will provide a permanent basis for sedimentation for 25 to 30 years.

Soil compaction is likely to occur as a result of heavy machinery and the stockpiling of heavy materials (i.e., soils) in the Project area. Soil compaction can greatly reduce the permeability of soils and affect their ability to drain water during rain/snow melt events. This will result 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. The removal of riparian and buffer vegetation associated with water crossing structures and other development activities will compromise the stability of stream banks and adjacent lands. Naturally or artificially vegetated riparian buffers comprised of trees, shrubs and herbaceous plants (primarily grasses) work to stabilize stream banks, and absorb/filter water and materials that flow from adjacent lands and valleys into water bodies. These riparian areas can substantially reduce erosion of stream banks which, in turn, will minimize sedimentation, support fish habitat, and protect the many sensitive ecological functions that occur in water bodies (River Keepers 1998). This again, increases erosion and sedimentation potential around water bodies. Finally, grading/ditching can affect the quantity of surface water that flows into water bodies. This is anticipated to be an issue in several locations within the Project area where access and service roads are required as well as the area surrounding individual turbines. Erosion and sedimentation is likely to be accelerated in and around the water bodies as a result of the exposure of soils and changes in the gradient of water bodies.

The effects of sedimentation on aquatic life has been well documented (Newcombe and MacDonald 1991, Ward 1992, Waters 1995, Osterling *et al.* 2010). Sedimentation has the potential to negatively affect the aquatic habitat in any water body, and destabilize the existing erosion and sediment transport regimes of water bodies. It has the ability to reduce water clarity, absorb energy from sunlight, and increase turbidity. These effects 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.

The effects of erosion and sedimentation are a concern at the 524 proposed crossing locations, and potential encroachment areas, where development activities are proposed to occur within 120 m of identified water bodies. Potential encroachment and crossing areas have been identified based on review of the broad-scale mapping of water bodies and proposed turbine and access road layouts. Currently, a total of 202 potential encroachment areas have been identified within the 30 m top-of-bank setback. It is

anticipated that in most, if not all, cases the 30 m setback buffer will be adhered to by micrositing the project location immediately outside of this setback area during detailed design and field-fitting, and/or directionally drilling any cabling. Where it is not possible to avoid encroachment of the 30 m setback (i.e., access road crossings), the water body features will be crossed at a right angle using acceptable crossing techniques, as discussed with the Lower Thames Valley Conservation Authority.

8.1.1.1.2 Mitigation Strategy

A conceptual erosion and sediment control (ESC) plan, prepared in accordance with the guidance provided in the *Erosion & Sediment Control Guideline for Urban Construction* (GGHACA 2006) will provide a detailed description of mitigation measures relating specifically to erosion and sedimentation. Additional information on the sediment and erosion control plan is also provided in the Construction Plan Report (Hatch 2011b). The purpose of this plan is prevention of erosion and sedimentation through the use of a variety of control measures including proper construction phasing, minimizing the size and duration of soil disturbance, and re-vegetating or stabilization, as soon as possible, immediately following disturbance. Incorporated into this plan are a variety of mitigation measures that will help to minimize soil erosion and off-site transport from the construction area into adjacent water bodies. Table 4 provides several of these mitigation measures specific to water bodies. Additional general mitigation measures which may be provided in the ESC may include:

1. Minimize the size of the cleared and disturbed areas at the construction site.
2. Install limit of work devices to prevent the contractor from operating outside the defined construction area (e.g., silt fences at the edge of the 10 m buffer around water bodies).
3. Phase construction to minimize the time that soils are exposed.
4. Limit vegetation removal to existing agricultural fields. Limit of work devices should be installed outside the drip line of residual trees, where possible.
5. An adequate supply of erosion control devices (e.g., geotextiles, revegetation materials) and sediment control devices (e.g., silt fence barriers) to be provided on site to control erosion and sedimentation and respond to unexpected events.
6. Sediment control fencing may be installed along the periphery of the Project site where there is the potential for sedimentation off site and at the edge of all 30 m buffer areas adjacent to the water body and

seepage area on the Project site as one of the first construction activities. These silt fence barriers should remain in place until construction is complete and site vegetation, and other long-term protection measures are stabilized and adequate to prevent further erosion.

7. Divert runoff from the temporary and permanent access roads or laydown areas through vegetated areas or into a properly designed and constructed drainage collection system to ensure that exposed soils are not eroded. Runoff velocities in ditches or other drainage routes, or along slopes, to be kept low via proper installation of flow velocity control measures such as rock flow check dams, to minimize erosion potential. Runoff discharge locations to be protected with erosion resistant material, if required.
8. Grade stockpiles to a stable angle as soon as possible after disturbance to eliminate potential slumping. Revegetation (if during the growing season) or some other means of stabilization (e.g., tarping) should occur for any disturbed surface that is to be left exposed for longer than 30 days.
9. Revegetate or stabilize exposed sites as soon as possible after they have been disturbed, using quick growing grasses or other native vegetation species approved by the Lower Thames Valley Conservation Authority (LTVCA). Where revegetation is not possible other erosion protection methods, such as erosion matting may be used.
10. Excavated erodible material stockpiles to be placed in suitable designated areas away from water bodies (i.e., outside the 30 m buffer and the LTVCA Regulated Area boundary at the northern end of the Project site, away from drainage channels) and properly constructed silt fence barriers should be installed around the stockpiles to limit the transport of sediment.
11. Monitoring the tracking of mud onto local streets during construction. If mud on streets occurs, the contractor will be required to implement a system to prevent transfer of this material to local ditches and water bodies. This could potentially include wheel washing areas at the exit from the construction site or end-of-day street sweeping/scraping to remove accumulated materials from local streets.
12. Ensuring that the 30 m buffer adjacent to water bodies is vegetated as quickly as possible once the growing season commences to assist in buffering surface water runoff.

At the water body crossings, in-water work has potential to release sediment into the water body downstream. Mitigation measures include installing the culverts when flows are low or absent, or by working in dry conditions using accepted methods to bypass flows such as damming and pumping the water around the in-water construction area or using a diversion channel.

It is anticipated that the implementation of effective mitigation measures will avoid, minimize, or mitigate the potential to change surface water runoff rates, quantities and vectors as a result of the proposed Project. Additionally, all grading of a Project location will be conducted to ensure that surface water runoff flows are maintained as close as possible to pre-development drainage patterns to avoid alterations in the moisture regime of the surrounding areas.

8.1.1.2 Habitat Loss

8.1.1.2.1 Environmental Effects

Any changes to the water body physical structure, substrate, type and quantity of cover, vegetation, flow volume and dynamics, and water quality are considered direct changes to habitat (HADD) and are prohibited under the federal *Fisheries Act (DFO, 1985)*. Alteration of these characteristics can greatly reduce the ability of a water body to maintain natural ecological functions and processes that are so critical for the survival of aquatic species. In turn, a HADD can negatively affect food supply, in-stream structure and cover, rearing grounds and nursery areas necessary for the survival of larval and juvenile fish (MNR 2009).

8.1.1.2.2 Mitigation Strategy

Appropriate crossing methodologies and structures for construction of the access roads and cabling shall be used to ensure continuity is maintained within the water body in order to avoid the loss off aquatic habitat present at proposed water body crossings. These crossing methodologies (i.e., structure and type) shall be dependent on drainage classification and location. . No in-water work is expected to occur as a result of crossing locations of cabling or distribution lines, and as such, no habitat loss is expected at these locations.

General guidelines and protocols provided through the provincial and federal agencies should be consulted in collaboration with LTVCA and municipal guidelines in order to eliminate potential HADD and determine appropriate mitigation strategies and best management practices. Applicable information can be found in the Natural Heritage Reference Manual (MNR 2009), Environmental Guide for Fish and Fish Habitat (MTO 2009), DFO Operational Statements (DFO 2009), Policy for the Management of Fish

Habitat (DFO 1986), and the Department of Fisheries and Ocean's Risk Management Framework (DFO 2006). Appropriate crossing structure (i.e. pipe culvert, open bottom culvert, box culvert, or span bridge) and installation requirements will be determined during the permitting phase by the overseeing agencies. Generally, in order to minimize the effects of crossing structures on a water body, it is important to minimize their length and slope. Culverts with an open bottom design substantially reduce in-stream impacts by minimizing areas of disturbance, effectively maintaining the integrity of fish habitat. Consultation with provincial and federal government agencies and area Conservation Authorities during the permitting process, and the proper installation of crossing structures will ensure that the crossings have no residual effect on aquatic organisms. Therefore, the level of concern is considered to be minimal and not significant.

Mitigation measures specific to preventing loss of habitat and the potential for HADD have been outlined in Table 4.

8.1.1.3 Barriers to Fish Passage

8.1.1.3.1 Environmental Effects

Barriers to fish passage can potentially limit the daily and seasonal movement patterns of fish species. Ultimately this may affect fish by restricting their ability to reach optimal habitat as well as spawning and foraging areas. Barriers may also cause a disconnect in populations that are located upstream and downstream of barriers (MNR 2009) which could negatively influence population genetics by reducing genetic diversity (Wofford *et al.* 2005). By obstructing stream flow, these barriers can also affect stream morphology and alter habitat. In-stream barriers will reduce flow upstream, creating a 'head pond' above the barrier. Depending on the size of the obstruction flooding can occur upstream as well as deposition of excess amounts of sediment. In turn these will increase water temperature in addition to other physical and chemical water characteristics.

Some of the most common effects associated with fish passage occur as a result of improper installation of crossing structures as well as construction/ decommissioning activities and temporary compensatory structures implemented as mitigation strategies. An example of the effects of improper installation of crossing structures is the presence of perched culverts which result in a vertical barrier to fish over time due to excessive

scouring of the streambed during high flow events. This is unlikely to become a problem throughout the majority of the project area due to the low relief of the land and relatively small water bodies. Construction and decommissioning activities may pose a significant problem to migrating fish species as a result of coffer dams that are required both upstream and downstream of the site to allow for work under dry conditions.

The effects associated with in-water work and barriers to fish passage are a potential concern at the 267 crossing locations that have been identified within the 120 m Project area buffer although as mentioned in previous sections, it is anticipated that the potential impacts associated with a number of the crossing locations may be avoided through relocation of the facilities, directional drilling or placement of bailey bridges for access roads.

8.1.1.3.2 Mitigation Strategy

Recommendations and mitigation measurements applicable for preventing barriers to fish passage have been previously discussed in the section on preventing habitat loss, above.

One issue not discussed above is the in-water work required for the construction of crossing structures. In-water timing windows must be respected as set out by the LTVCA. This will minimize the impacts to migratory fish species by scheduling work around critical times of the year, most importantly when fish migrate to access spawning habitat.

Mitigation measures relevant in preventing barriers to fish passage are specified in Table 4.

8.1.1.4 Accidental Spills and Release of Contaminants

8.1.1.4.1 Environmental Effects

The potential exists during the construction and decommissioning phases of the Project for the unplanned release of hazardous materials to the 267 proposed crossing locations.

Under circumstances in which construction activities are proposed to occur within 120 m of identified water bodies, the use of construction vehicles (personnel trucks, dozers, backhoes, cranes, transport trucks etc.) and other equipment (augers, cabling /directional drilling equipment, drillers etc.) may increase the potential for contamination of the water bodies from spills. Contaminants to be considered include concrete curing compounds, petroleum products required for equipment operation and maintenance, and septic waste. The potential for accidental release of these hazardous materials on the job site is anticipated to be low and with spills being relatively localized. This is due to the fact that the majority of occurrences are likely to be a result of spills and leaks from improperly sealed containers and/or vehicles. As a result of the relatively localized potential impacts from spills, NRSI has reviewed all water bodies within 30 m of the project location for any potential for negative impacts associated with contamination from spills.

8.1.1.4.2 Mitigation Strategy

Spills shall be avoided and/or minimized through the application of preventative and mitigation measures in the event of a release. A Project Emergency Response Plan (ERP), provided in the South Kent Wind Project Construction Plan Report (Hatch 2011b), shall address the measures to be implemented in the event of an unplanned release or spill. Additional avoidance and mitigation measures include, but are not limited to, training of all personnel in the handling of hazardous materials and spill response, refueling of construction equipment at designated areas only located no less than 30 m from any water body, storage of hazardous materials off-site or in locked and impermeable containment able to contain at least 110% of the areas storage capacity, and the provision and continued maintenance of emergency spill kits on all equipment/Project vehicles and at all construction decommissioning areas. The Project will adhere to the applicable regulations for the storage and handling of hazardous materials and wastes (i.e., Ontario Regulation 461/05). In the unlikely event that a spill does occur every effort must be taken to completely clean the area prior to any rain events.

Mitigation measures applicable to contaminant spills are specified in Table 5.

These recommended mitigation measures will ensure that the likelihood of a spill entering a water body is minimized and that there is a plan for responding to spills should they occur. As a result of the implementation of the preventative measures and the ERP, the level of concern regarding contaminant spills is considered to be minimal and not significant.

8.1.2 Operation

The operation of the Project is not anticipated to have substantial negative effects on adjacent water bodies within the area since already constructed access roads will only be utilized as required for general maintenance and monitoring purposes. Indirect impacts related to dust emissions and surface water run-off will be addressed on an as required basis and through implementation of grading and drainage ditches at the end of the construction phase.

8.1.3 Decommissioning

Many of the activities associated with decommissioning are similar to those required for the construction phase of the Project (Section 8.1.1). These include impacts associated with the use of machinery and personnel vehicles and in water work. As such, direct impacts and associated mitigation measures relating to sedimentation, habitat loss, barriers to fish passage, and accidental spills of contaminants will be considered as part of the decommissioning phase. Mitigation strategies and best management practices should be implemented as outlined in Section 8.1.1 and Table 5 and will include the preparation of an ESC plan and proper management practices specific to erosion and sedimentation, spill contamination, as well as habitat loss and barriers to fish passage (if applicable). Implementation of these mitigation measures will provide a great deal of protection from direct and indirect environmental impacts resulting from decommissioning activities. As such, it is anticipated that any potential negative environmental effects will be substantially minimized.

During the decommissioning phase of the Project, if a decision is made to discontinue the Project and remove all turbines and associated infrastructure, it is anticipated that all water body crossing structures that are required as access roads will remain in place. Leaving structures in place will eliminate the need for additional in-water work which in itself will act to mitigate the potential for sedimentation, contaminant spills, and loss of

habitat commonly associated with this type of work. Additionally, this will minimize the necessary remediation activities that are required to rehabilitate the site following the destruction of riparian vegetation and various effects on in-stream aquatic habitat. Recommendations have been provided in Table 5 if the decision is made to remove all crossing structures. All former Project areas (including areas disturbed by decommissioning activities will also be returned to their original condition including land contours and tile drainage systems and all disturbed areas revegetated using native species

Table 5. Summary of Mitigation Measures Recommended During the Construction, Operation, and Decommissioning Phases of the South Kent Wind Project.

Effect	Mitigation Measure	Potential Impact	Significance of Effect
Construction			
Direct impacts from crossings (access and service roads, cabling)	1. Suitable crossing designs (including methodologies and structure types) must be developed in accordance with the appropriate permitting requirements under the federal *Fisheries Act (1985)* and in consultation with LTVCA, DFO, and MNR. 2. Cabling requirements should be addressed in consultation with LTVCA, DFO, and MNR, and compared with applicable regulations. 3. Utilize existing roads to reduce the necessity for building new structures.	Low	Not Significant

Effect	Mitigation Measure	Potential Impact	Significance of Effect
Sedimentation	1. Sub-contractor shall develop an effective erosion and sediment control plan (ESC) to be reviewed and approved by the Engineer and Proponent. 2. The greater of a 10 m setback from the top-of-bank of any open drain or its naturally vegetated corridor is to be respected such that no construction activity occurs in this area (Municipality of Chatham-Kent 2010). 3. Additional site grading shall be conducted to ensure surface runoff is directed away from the area of concern and the natural drainage of the area is maintained. 4. Timing windows, specified by LTVCA, for in-water works are to be respected. 5. Culverts shall be installed in dry conditions only using DFO/MNR/LTVCA accepted methods only. 6. Standard sediment and erosion controls are to be implemented and maintained for the duration of the disturbance (i.e. Silt fences, hay bales, screening dams etc.) until the area has been stabilized or establishment of re-vegetation efforts. 7. Place stockpiles of topsoil and subsoil at least 30 m away from water bodies and grade stockpiles to a stable angle as soon as possible after disturbance to eliminate potential slumping. 8. Implementation of an Environmental Management Plan (EMP) as guidance for the contractor to minimize environmental impacts, including impacts on vegetation. 9. Revegetation (if during the growing season) or some other means of stabilization (e.g., tarping) should occur for any disturbed surface that is to be left exposed for longer than 30 days. 10. Use settling ponds to remove sediment prior to discharge of water, where necessary.	Minimal	Not Significant

Effect	Mitigation Measure	Potential Impact	Significance of Effect
Habitat Loss	1. Consultation with agencies regarding culvert type and proper installation procedures. 2. Avoidance of 30 m setback area around water bodies. 3. Use of directional drilling methodologies for placement of underground cabling. 4. Use of bailey bridges to avoid or minimize impacts to the larger water bodies to be crossed. 5. Immediate revegetation of disturbed areas no longer required for permanent infrastructure.	Minimal	Not Significant
Barriers to fish passage	1. Appropriate crossing structures should be properly installed with guidance from responsible government agencies. 2. Culvert lengths should be limited, and slope should be kept to a minimum. 3. Timing windows, specified by LTVCA, for in-water works are to be respected.	Minimal	Not Significant

Effect	Mitigation Measure	Potential Impact	Significance of Effect
Contamination from spills	1. Maintenance areas and any hazardous materials (fuel storage) and/or waste storage should be located in a central Project area, off-site and in a secure (fenced/locked) and impermeable area capable of containing at least 110% of the storage capacity of the area. 2. Refueling activities should occur only in designated (central) areas and should be located no less than 30 m from water bodies. 3. All hydraulic systems on equipment will be inspected prior to mobilization to all sites, daily prior to use, and prior to remobilization to the next site. 4. Equipment shall not be placed within the water body with all work conducted from land with sufficient setbacks to prevent failure of bank slopes. 5. Contractor to have Emergency Response Plan (ERP) in place in accordance with EMP. 6. All construction staff shall be properly trained on Spill Response and the use of Spill Kits. 7. Adhere to Project operational control procedure for storage and handling of hazardous materials. All construction staff to be trained on proper handling of hazardous materials. 8. All Project and construction vehicles shall maintain a mobile spill kit in the vehicle at all times.	Minimal	Not Significant
Operations			
Direct impacts from crossing	None	None	None
Sedimentation	None	None	None
Habitat Loss	None	None	None

Effect	Mitigation Measure	Potential Impact	Significance of Effect
Barriers to fish passage	None	None	None
Contamination from spills	See Construction Phase	Minimal	Not Significant
Decommissioning			
Direct impacts from crossing	1. Permission under the federal *Fisheries Act* must be obtained from LTVCA, DFO, and MNR to remove structures. 2. All timing windows for in-water work respected	Minimal	Not Significant
Sedimentation	See Construction Phase	Minimal	Not Significant
Habitat Loss	See Construction Phase	Minimal	Not Significant
Barriers to fish passage	3. Ensure the removal of all material from water body following decommissioning.	Minimal	Not Significant
Contamination from spills	See Construction Phase	Minimal	Not Significant

8.2 Species of Conservation Concern

A total of 28 water bodies, 21 of which intersect project infrastructure, have also been identified as likely to contain SAR according to the DFO's 2010 Distribution Mapping (Table 7). Twelve (12) of these are designated as fish SAR water bodies, while the remaining Sixteen (16) are designated as water bodies that may contain mussel species. Furthermore, 21 drains identified in Table 7 are also proposed to be crossed by access roads and/or cabling, which will require crossing structures and in-water work and Twelve (12) have turbines proposed within 120 m of them. Extreme care should be taken during construction and decommissioning activities that occur at these locations, ensuring that any applicable guidelines and protocols are strictly adhered to. In addition to the species-specific information provided in the South Kent Wind Project Records Review report, the MNR, as well as species experts, scientific status reports and recovery plans, should be consulted to determine the specific life history requirements, known occurrences and identify significant habitats that require protection. If possible, it is recommended that these areas be examined prior to development in the presence of responsible government agencies in order to identify areas of sensitive habitat. By doing so, development may be planned around these areas in order to maintain the habitat.

Table 6. Drains in the South Kent Wind Project Area with Species At Risk (SAR) Historically Present

Watercourse Name	Turbine within 120 m	Type of Crossing Infrastructure	Species
Graham Drain	P132	Access Road/ Cabling	Fish
Baptiste Creek	P075	Cabling	Fish
Graham Extension		Access Road/ Cabling	Fish
Ross Norry Drain		Cabling	Fish
Raleigh Plains Drain		Cabling	Fish
West Drain		Cabling	Fish
Chase Drain	P063	Access Road/ Cabling	Fish
Clendenning Drain		Access Road/ Cabling	Fish
Campbell Drain		Cabling	Mussel
McGregor Creek		Cable	Mussel
No Name Drain		Cable	Mussel
Morrow Drain		None	Mussel
Cyrus Huffman Drain	P033	Access Road/ Cabling	Mussel
White Drain		Access Road/ Cabling	Mussel
Tedford Drain	P030	Cabling	Mussel
No Name	P028	None	Mussel
McCallum Drain		None	Mussel

Edward Smith Drain	P135	Access Road/ Cabling	Mussel
Gobert Drain		None	Mussel
Pilotte Drain		Cabling	Mussel
McKoy Drain		Cabling	Mussel

In accordance with the federal *Fisheries Act (1985)* and prohibitions outlined in the *Species At Risk Act* (2002), the permitting process through LTVCA and DFO will ensure the prevention of HADD and the protection of critical habitat. Should harmful alterations to aquatic habitat be unavoidable, compensation measures can be employed to ensure there is no net loss of fish habitat. Clauses 37 to 55 of the SARA outline recovery strategies and action plans related to Species At Risk. Additional information specific to crossing locations may also be necessary to ensure compliance under the federal *Fisheries Act*. For example, if rare fish species may be present at a proposed crossing location, fish sampling may be required in order to determine whether these species are present. Although some limited potential habitat for the Ghost Shiner may be present in the large drains in the northern portion of the Project area, it is unlikely that this, or any other rare aquatic species, is present in large numbers within the majority of the Project area. Providing the permitting process is followed under responsible agencies and that the recommendations and mitigation measures provided in Table 6 are followed, the level of concern for Species of Conservation Concern resulting from direct impacts from crossings is considered low, and not significant.

8.3 Impact Summary

Minimizing potential direct (sediment, habitat alteration, barrier to fish passage) and indirect (water quality and quantity) impacts to aquatic habitat during the construction, operations, and decommissioning phases of the Project through consultation with the responsible government agencies prior to construction, adherence to minimum setbacks/buffers/guidelines, and the implementation of avoidance, mitigation and compensation measures, as identified above, is expected to reduce the hazards and protect fish and fish habitat within and adjacent to the Project area. Providing the above mitigation measures are implemented, where appropriate, and the responsible government agencies are consulted during the permitting process, NRSI considers the potential net effect/impacts to water bodies resulting from the proposed development of the Project will be non-significant, and avoided, wherever possible.

9.0 Environmental Effects Monitoring Plan –Design and Operations Report

As discussed in the Design and Operations Report (Hatch 2011a), an Environmental Effects Monitoring Plan (EEMP) is proposed in respect of any negative environmental effects that may result from engaging in the Project. As per the REA Regulation, the monitoring plan identifies:

- performance objectives in respect of the negative environmental effects
- mitigation measures to assist in achieving the performance objectives
- a program for monitoring negative environmental effects for the duration of the time the Project is engaged in, including a contingency plan to be implemented if any mitigation measures fail.

For the purposes of this EIS report, the effects monitoring measures with respect to negative effects on water bodies have been reproduced here, in Table 8.

The monitoring proposed in Table 8 will serve to verify that mitigation measures are functioning as designed to meet performance objectives. If monitoring shows that performance objectives are not being met, the contingency measures documented in Table 8 will be used to ensure that remedial action is undertaken as necessary to meet the performance objectives.

Table 7. Summary of Environmental Effects Monitoring Requirements with Respect to Water Bodies

Negative Effect	Mitigation Strategy	Performance Objective	Monitoring Plan					Contingency Measures
			Methodology	Monitoring Locations	Frequency	Rationale	Reporting Requirements	
Construction Phase								
Direct impacts from crossings due to access/service roads and cabling	See Table 6	Minimize direct impacts.	Ensure mitigation and compensation measures are properly implemented.	At all water body crossing locations.	Once per week.	Visual monitoring will confirm that compensation structures and mitigation measures remain as designed and identify deficiencies.	Reported in monthly environmental monitoring report during construction.	Mitigation measures will be remediated as necessary to ensure that they are functioning as designed. Alternate measures may be required and will be determined based on on-site issues and conditions.
Erosion and sedimentation into adjacent water bodies due to increased run-off following site disturbance	See Table 6	Minimize changes to surface water runoff conditions, loss of riparian vegetation and pathways to water bodies.	Ensure erosion and sediment controls are properly installed, well maintained and functioning. Identify high-risk areas pre-construction.	Throughout construction site.	Daily with increased scrutiny prior to and following rain events.	Visual monitoring will confirm that mitigation measures remain as designed (e.g., silt fences, straw bale flow checks, ditches, etc.) and identify deficiencies.	Reported in monthly environmental monitoring report during construction.	Mitigation measures will be remediated as necessary to ensure that they are functioning as designed. Alternate measures may be required and will be determined based on on-site issues and conditions.
Loss of aquatic habitat due to activities in and around water	See Table 6	Minimize the removal and alteration of aquatic vegetation and in-stream structure.	Ensure work in or near water is in compliance with agency standards.	At all water bodies within 120 m of Project activities.	Once per week or as required during in-water work.	Visual monitoring throughout the project phase will identify any changes to aquatic habitat.	Reported in monthly environmental monitoring report during construction.	Proper compensatory measures and recovery plans will be utilized following any loss of habitat in order to restore site to pre-construction conditions.
Barriers to fish passage resulting from improper installation of crossing structures	See Table 6	Minimize immediate barriers and the potential for barriers to occur following construction completion.	Ensure proper design and installation of crossing structures in compliance with agency standards	At all water body crossing locations.	Prior to and following the installation of crossing structures as required.	Visual monitoring and appropriate designs will ensure structures are installed properly preventing post-construction issues.	Reported in monthly environmental monitoring report during construction.	Problems will be remediated following the identification of any issues relating to in-stream barriers and fish passage. This may include the re-installation of problem culverts.
Accidental spills and release of contaminants	See Table 6	Minimize accidental spills and release of contaminants.	Ensure mitigation strategies are implemented including preparation of an Emergency Response Plan (ERP).	Throughout construction site.	Once per week and as required following any incidents.	By ensuring that appropriate clean-up tools are prepared and ready any accidental spills can be dealt with immediately.	Reported immediately following incidents and in monthly environmental monitoring report during construction.	Immediate application of the ERP following any accidental spills, leaks, or release of hazardous material into the environment.
Operations Phase								
None								
Decommissioning Phase								
Refer to Construction Phase for applicable negative effects and monitoring requirements.								

10.0 Construction Plan Report

The REA Regulation requires proponents of Class 4 wind projects to prepare a Construction Plan Report (CPR).

The CPR details the construction and installation activities, location and timing of construction and installation activities, any negative environmental effects that result from construction activities within 300 m of the Project and mitigation measures for the identified negative environmental effects. The CPR addresses all potential effects of construction on water bodies within 300 m of the Project site in a general manner. The mitigation proposed in the CPR with respect to preventing/minimizing negative effects on water bodies is the same as that discussed in this EIS. Additional mitigation is proposed to address negative effects during construction not related to water bodies. Therefore, the CPR and this EIS should be read in conjunction with each other, although all negative effects and mitigation requirements with respect to water bodies are contained within this EIS and duplicated in the CPR.

11.0 Summary and Conclusions

An assessment of the water bodies within and adjacent to the proposed Project has occurred through the use of a detailed records review and site investigations conducted by NRSI biologists. The potential for negative effects exist for 524 locations where water bodies are located within 120 m of the Project location including encroachment areas and water body crossings. These occur within the Project area as 265 crossings and 202 as encroachment areas. This includes 189 crossings attributed to cabling, 3 to access roads only, and 73 to a combination of both access roads and cabling at the same location; it also includes 50 encroachment areas. Furthermore it was determined that these crossings represent Class-C, Class-F, Class-E, and unclassified drains.

DFO Redline Mapping also indicates that 21 drains found within the Project area have historic SAR occurrences. Eight (8) of which have been noted for fish SAR, while the remaining 13 drains have historic presence of mussel SAR. Additionally, 17 drains identified are proposed to be crossed by access roads and/or cabling, which will require crossing structures and in-water work and eight (8) have turbines proposed within 120 m of them.

This EIS has been prepared to identify potential negative environmental effects that all phases of the Project may have on water bodies within the Project area. Potential negative effects with construction, operation, and decommissioning activities include:

- Sedimentation,
- Habitat Loss,
- Barriers to Fish Passage, and
- Accidental Spills and Release of Contaminants.

Mitigation measures have been proposed to prevent these environmental impacts from occurring or minimize the magnitude, extent, duration and frequency in the event that they do occur. Primary mitigation measures include the development of an effective erosion and sediment control plan (ESC), revegetation of disturbed areas, use of appropriate crossing structures and reducing the amount of in-water work. Monitoring measures have been proposed to confirm that mitigation measures are having the intended effect and that performance objectives are being met.

12.0 References

Publications

Fisheries and Oceans Canada (DFO). 1999. Fact Sheet #2. Version 1.0. A Class Authorization System for Agricultural Drains in the Southern Ontario Region.

Newcombe, C.P. and D.D. MacDonald. 1991. Effects of Suspended Sediments on Aquatic Ecosystems, North American Journal of Fish Management, 11:72-82.

Hatch Ltd. 2011a. South Kent Wind Project – Design and Operations Report. Prepared for Pattern Energy and Samsung Renewable Energy. July 2011.

Hatch Ltd. 2011b. South Kent Wind Project – Construction Plan Report. Prepared for Pattern Energy and Samsung Renewable Energy. July 2011.

Hatch Ltd. 2011c. South Kent Wind Project – Decommissioning Plan Report. Prepared for Pattern Energy and Samsung Renewable Energy. July 2011.

Hatch Ltd. 2011d. South Kent Wind Project – Natural Heritage Environmental Impact Study. Prepared for Pattern Energy and Samsung Renewable Energy. July 2011.

Ministry of Transportation (MTO). 2009. Environmental Guide for Fish and Fish Habitat.

Natural Resource Solutions Inc. (NRSI). 2012a. South Kent Wind Project: Water Body Records Review Report. Prepared for Hatch Ltd. March 2012.

Natural Resource Solutions Inc. (NRSI). 2012b. South Kent Wind Project: Water Body Site Investigation Report. Prepared for Hatch Ltd. March 2012.

Ontario Ministry of Natural Resources (MNR). 2009. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement - Draft for Environmental Registry: Second Edition. Section 11.0 – Fish Habitat.

Osterling M.E., B.J. Arvidsson, and L.A. Greenburg. 2010. Habitat degredation and the Decline of the Threatened Mussel *Margaritifera margaritifera*: Influence of Turbidity and Sedimentation on the Mussel and its Host. Journal of Applied Ecology. 47 (4): p. 759-768.

Ward, N. 1992. The Problem of Sediment in Water for Fish, Northwestern Ontario Boreal Forest Management Technical Notes, Ontario Ministry of Natural Resources.

Waters, T.F. 1995. Sediment in Streams, biological effects and control. American Fisheries Society.

Wofford, J.E.B, R.E. Gresswell, and M.A. Banks. 2005. Influence of Barriers to Movement on Within-Watershed Genetic Variation of Coastal Cutthroat Trout. Ecological Applications. 15(2): 628 – 637.

Internet Sources

Government of Canada. 2010. Fisheries Act (R.S., 1985, c. F-14). Act current to November 30, 2010. Available at: http://laws.justice.gc.ca/en/F-14/index.html.

Greater Golden Horseshoe Area Conservation Authorities (GGHACA). 2006. Erosion and Sediment Control Guideline for Urban Construction. Available at: http://www.sustainabletechnologies.ca/Portals/_Rainbow/Documents/ESC%20Guideline%20-%20December%202006.pdf

Fisheries and Oceans Canada (DFO). 1986. Policy for the Management of Fish Habitat. First published in 1986. PDF document prepared 9 January, 2001. Available at: http://www.dfo-mpo.gc.ca/Library/23654.pdf

Fisheries and Oceans Canada (DFO). 2006. Practitioners Guide to the Risk Management Framework for DFO Habitat Management Staff. Version 1.0. Availabel at: http://www.dfo-mpo.gc.ca/habitat/role/141/1415/14155/risk-risque/pdf/Risk-Management-eng.pdf

Fisheries and Oceans (DFO). 2009. Ontario Operational Statements. Available at: http://www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/provinces-territories-territoires/on/index-eng.htm.

Lower Thames Valley Conservation Authority (LTVCA). 2010. Operational Guidelines-Lower Thames Valley Conservation Authority: Development, Interference With Wetlands and Alteration to Shorelines and Watercourses Regulation. Ontario Regulation 152/06 (Under O.R. 97/04). Available at: http://www.lowerthames-conservation.on.ca/Publications/Regulation_OperationalGuidelines_Dec2010.pdf

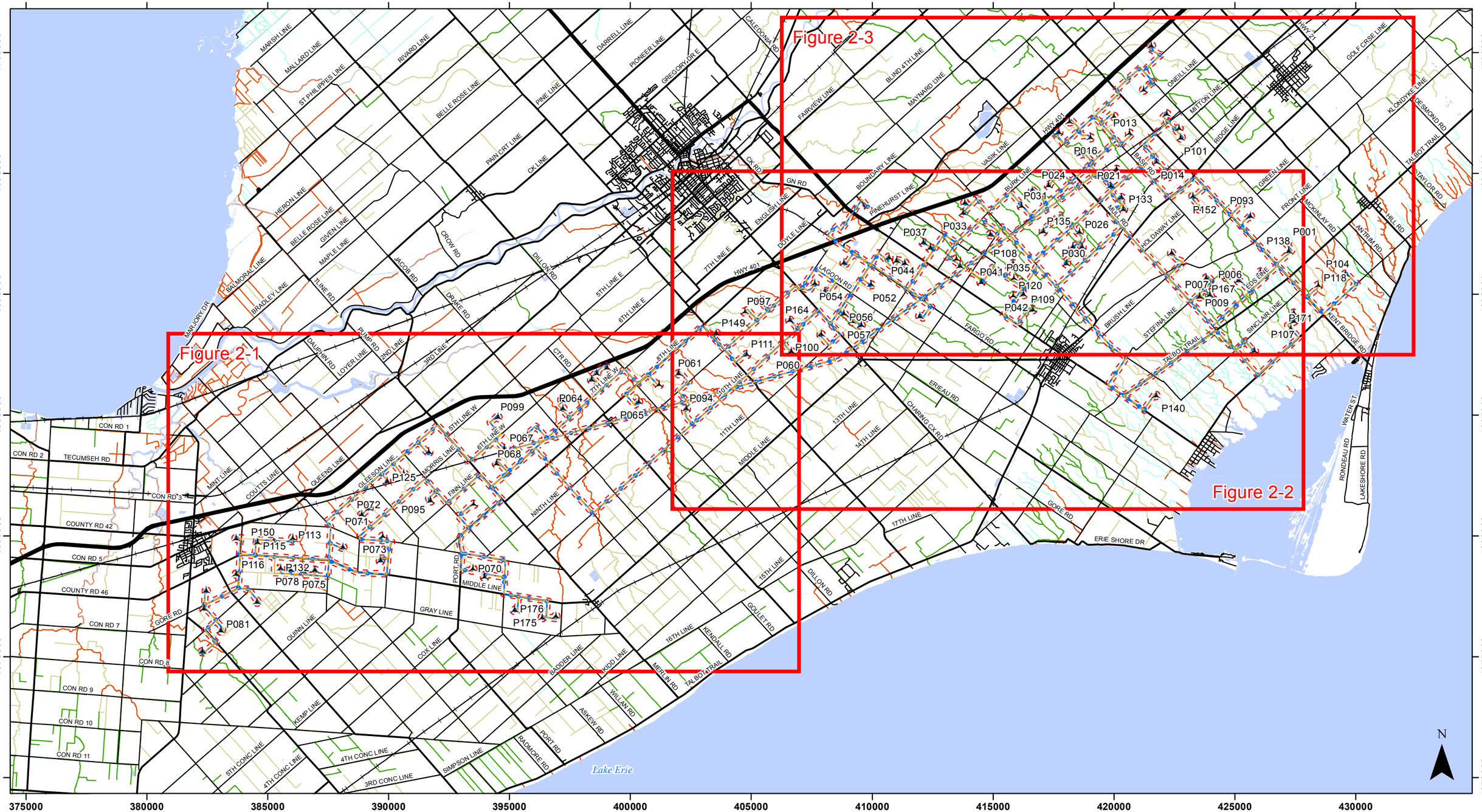
Municipality of Chatham-Kent. 2010. Implications of the Green Energy Act 2009 on Wind and Solar Projects in Chatham-Kent. Available at: http://www.chatham-kent.ca/NR/rdonlyres/841E6925-64A4-4434-BEBD-A983391B0A26/12097/16d.pdf

Ontario Ministry of Natural Resources (MNR). 2006. Inland Ontario Lakes Designated for Lake Trout Management. Available at: http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@letsfish/documents/document/256676.pdf

River Keepers. 1998. Riparian Buffers: Rationale, Strategies, and Resources for Restoring and Protecting Streamside Corridors. Available at: http://www.riverkeepers.org/pdf/riparian_buffers_fact_sheet.pdf.

Samanns, E. 2002. National Cooperative Highway Research Program (NCHRP) Synthesis 302: Mitigation of Ecological Impacts. A Synthesis of Highway Practices. Available at: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_302.pdf

Appendix I
DFO Drain Classification Mapping



Key Map

South Kent Wind Project

Drain Classifications

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 1 2 4 km

April 23, 2012. Project No: 1184.
UTM Zone 17, NAD 83 Scale: 1:150,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Highway
- Primary Road
- Secondary Road
- Railway
- Waterbody

DFO Drain Classifications

- Class C
- Class D
- Class E
- Class F
- Unclassified

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-1to2-3_DrainClassificationKeyMap_150K_2012_04_23_SWM.mxd

Figure 2-1

South Kent Wind Project

Drain Classifications

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.5 1 2 km

April 23, 2012. Project No: 1184.
UTM Zone 17, NAD 83 Scale: 1:65,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Highway
- Primary Road
- Secondary Road
- Railway
- Waterbody

DFO Drain Classifications

- Class C
- Class D
- Class E
- Class F
- Unclassified

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-1to2-3_DrainClassification_65K_2012_02_23_SWM.mxd

Figure 2-2

South Kent Wind Project

Drain Classifications

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.5 1 2 km

April 23, 2012. Project No: 1184.
UTM Zone 17, NAD 83 Scale: 1:65,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Highway
- Primary Road
- Secondary Road
- Railway
- Waterbody

DFO Drain Classifications

- Class C
- Class D
- Class E
- Class F
- Unclassified

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-1to2-3_DrainClassification_65K_2012_02_23_SWM.mxd

Figure 2-3

South Kent Wind Project

Drain Classifications

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

0 0.5 1 2 km

April 23, 2012. Project No: 1184.
UTM Zone 17, NAD 83 Scale: 1:65,000 (at 11x17")

Legend

- Project Area (April, 2012)
- Constructible Area
- Proposed Turbine (L020)
- Substation
- Cabling
- Access Road
- Highway
- Primary Road
- Secondary Road
- Railway
- Waterbody

DFO Drain Classifications

- Class C
- Class D
- Class E
- Class F
- Unclassified

Path: X:\1184_ChathamKentWF\NRSI_1184_Fig2-1to2-3_DrainClassification_65K_2012_02_23_SWM.mxd

Appendix II
Existing Permanent and Intermittent Streams

Table 1. Existing Permanent and Intermittent Streams within the South Kent Project Area

Watercourse Name	Turbine within 120 m	Drain Classification	SAR Designation
Thompson Paulus Drain		Unclassified	-
South Middle Road Drain	P080	E	-
Branch		Unclassified	-
Burgess Drain		E	-
Burgess Drain E. Branch		F	-
Burgess Drain W. Branch		F	-
Hornick Drain		F	-
7th Concession Road Drain		C	-
Norval Davis Drain		C	-
King & Whittle Drain	P116	C	-
Gagner Drain	P116	C	-
Powell Drain		C	-
Graham Drain		E	Fish
Ivison Drain	P115,P150	C	-
Anesser Drain		C	-
Grant Drain		Unclassified	-
Hope Drain		E	Fish
Davis Drain		C	-
Davidson Drain		C	-
Struthers Drain		E	Fish
Graham Extension		F	Fish
McLeod Drain	P075	C	-
Ross Norry Drain		E	Fish
Jessop Drain	P072	C	-
McDougall Drain W. Branch		C	-
McHardy Drain		C	-
Mazan Drain		C	-
Skipper Drain		F	-
McDougall Drain		E	Mussel
Gardner Drain		Unclassified	-
Macnell Drain		Unclassified	-
Government Drain No. 1		C	-
Campbell Drain		C	-
Auxilary Drain		C	-
Lewis Drain	P164,P100	C	-
Pollard Drain		Unclassified	-
Closson Drain		C	-
Eight Creek Drain	P087,P070	C	-
Farquharson Drain		C	-
Moffat Outlet Drain		C	-
Mancell Drain		C	-
Griffin Drain		C	-
Ball Drew Drain		C	-
Roy Dillon Drain		C	-
Beattie Drain		C	-
Deary Drain		C	-
Rice Drain		C	-

Watercourse Name	Turbine within 120 m	Drain Classification	SAR Designation
Souligny Drain		C	-
Shadd Drain		C	-
Finn and Cooper Drain		E	-
Webb Drain		E	-
Lecoco Drain		E	-
West Drain		E	Fish
Bell Drain		E	Fish
Prince and Deechan Drain		Unclassified	-
Carter Drain	P065	C	-
Wallace Drain		Unclassified	-
Symon Drain		E	-
Deechan		E	-
O'Rourke Drain	P094,	C	-
Shea Drain		C	-
Laurie Drain	P056,P057	Unclassified	-
Doyle Drain		C	-
Vail Drain		E	-
Waddick Drain		C	-
Miller Drain		C/E	-
Horne Drain		E	-
Vince Doyle Drain	P149	Unclassified	-
Mummery Drain	P060	C	-
Lewis Drain	P164,P100	C	-
Flook and Hinton Drain	P097,P164	C	-
Ferguson Drain	P056,P057	E	-
Laurie Drain		C/F	-
Gales Drain		C	-
Knott Creek Drain		C	-
Barfoot Drain		F	-
Drewery Branch		F	-
Locke Drain	P055	C	-
Lorne English Drain		Unclassified	-
Gregory Drain		C	-
Jackson & Nash Drain		C	-
Corlett Drain		F	-
McGregor Creek		E/C	Mussel
Coltart Drain		Unclassified	-
Geo Smyth Drain		Unclassified	-
R.I. Smyth Drain	P037,P038,P039	F	-
Un-named Drain		E	Mussel
McCorkell Drain		C	-
Lucas Drain		C/F	-
W.M. Walker Drain		C	-
Fargo Drain		Unclassified	-
Appleford Drain		Unclassified	-
Jackson Drain		F	-
Mosey Drain	P044	C	-
Spisani Drain		C	-
Vester Drain		Unclassified	-

Watercourse Name	Turbine within 120 m	Drain Classification	SAR Designation
Brooksbank Drain		Unclassified	-
Proctor Drain	P039,P040,P041,	F	-
Lucas Drain Extension		F	-
Sample Drain	P109	F	-
Watts Drain	P035,P108	F	-
Morrison Drain	P036	F	-
Hedgedus Drain		F	-
Cantlay Drain		F	-
Kneebone Drain	P034	E	-
Morrow Drain		E	Mussel
Centre Line Drain		Unclassified	-
Tedford Drain	P030	Unclassified	Mussel
White Drain		F	Mussel
Unnamed W		F	Mussel
Cyrus Huffman Drain	P033	F	Mussel
Nichol Drain	P109	F	-
Pilotte Drain		F	Mussel
Edward Smith Drain	P028	F	Mussel
Gobert Drain		F	Mussel
Newcomb Drain		F	Mussel
McMillan Drain		Unclassified	-
McCallum Drain		F	Mussel
McPhail Drain	P155	F	-
WhitieBread Drain		F	-
Baird Drain Open		C	-
Watson Drain		C/F	-
Donald Campbell Drain		F	-
Mull Drain		C	-
McLachlan Drain		C	-
Cooper Drain		F	-
McEachren Drain		F	-
Mull Branch Drain		C	-
Enos Smith Drain		F	-
Unnamed V		Unclassified	-
Nicholson Drain	P152	C	-
Taff Creek Drain		C	-
Gilbert Tile Drain		F	Mussel
West Drain Outlet		F	Mussel
PFAFF Creek Drain	P012	C	-
Rushton Drain		C	-
Ingram Drain		Unclassified	-
Mervin Drain		Unclassified	-
Nicholson Drain		C	-
Woofenden Drain		F	-
Cleveland Drain		C	-
Union Drain		C	-
Woodlife Drain		Unclassified	-
Rowe Drain	P009	F	-
Clunis Drain	P006	F	-

Watercourse Name	Turbine within 120 m	Drain Classification	SAR Designation
McKay Drain	P004	F	-
Simmons Drain		Unclassified	-
Neve Drain		C	-
Indian Creek		C/F	Fish
Hastings Drain		Unclassified	-
Warwich Drain		F	-
Arachie Campbell Drain		E/F	-
Brush Drain		F	-
Cumming Drain		C	-
Shanks Drain		F	-
Flood Drain		Unclassified	-
McArthur East Drain		C	-
Willow Creek Drain		C	-
Ward Drain		Unclassified	-
Nelles Extension Drain	P140	Unclassified	-
Hobbard Drain	P006,P007	F	-
Clendenning Drain		C/F	Fish
Nesbitt Drain		F	-
Coleman Drain		C/F	-
East Lake Drain		F	-
Arnold Davis Drain	P106	Unclassified	-
Debrouwer Drain		Unclassified	-
Fraser Drain	P106	F	-
Holdaway Drain		C	-
Haugh Drain		C	-
Bates Bloomfield Drain		C	-
Bates Drain	P138	F/Unclassified	-
McLean Drain		E	-
Branch Number 1 Drain		E/Unclassified	-
Ross Drain		E	-
Craig Stinson Drain	P166	Unclassified	-
Wiebenga Drain		Unclassified	-
Bisner Drain		F	-
Un-named Drain		Unclassified	-
Shipp Drain		Unclassified	-
Townline Drain		Unclassified	-
McKoy Drain		F/Unclassified	Mussel
East Branch Drain	P132	F	-
Sinnett Drain		F	-
Alexander Drain	P145	C	-
Berry Fletcher Drain	P099	Unknown	-
Bolohan Craig Drain Extension		Unknown	-
Brown Drain	P152	Unclassified/C	-
Busted Drain	P019	Unclassified	-
Carless Drain	P082	F	-
Chase Drain	P063	E	Fish
Clifford Ashton Drain		Unclassified/E	-
Garen & Young	P100	C	-
Grist Drain		F	-

Watercourse Name	Turbine within 120 m	Drain Classification	SAR Designation
Linnen Drain	P148	Unclassified/E	-
Moody and Earley Drain	P149,P111	C	-
Welles Drain	P140	Unclassified	-
Newham Drain	P068	C	-
No Name 1	P071	Unclassified	-
No Name 2	P052	Unclassified	-
No Name 3	P058	Unknown	
No Name 4	P007	F	-
No Name 5	P028	Unclassified	-
No Name 6	P171	F	-
Sampson Drain		Unclassified/E	-
Tompkins Drain	P135	F	Mussel
Willis Drain Number 2		Unknown	-
Pepper Drain	P174	Unknown	-
Scafe Drain	P145	Unknown	-
Saddington Drain	P155	F	-
Kenedone Drain	P034	E/F	-
Gagnier Drain	P116	C	-
Eastlake Drain	P093	Unclassified	-
Duke Drain	P164,P097	C	-
Baptise Creek Drain	P075	E	-

Appendix III
Summary of Observation Points Including Water Body Crossings and Encroachment Areas

Table 2. Water Body Observation Summary for Distances to Access Roads and Cabling

Water Body Observation	Water Body Name	Type of Water Body	Type of Infrastructure within 120m of Water Body	Distance to Infrastructure (m)
WB-B5	Eight Creek Drain	Intermittent Stream	Cable	Crosses
WB-C5	Eight Creek Drain	Intermittent Stream	Access Road & Cable	113
CAB048	Eight Creek Drain	Permanent Stream	Cable	21
CAB049	Eight Creek Drain	Permanent Stream	Cable	20
CAB050	Eight Creek Drain	Permanent Stream	Cable	19
CAB051	Eight Creek Drain	Permanent Stream	Cable	18
CAB052	Unnamed Drain	Intermittent Stream	Cable	15
CAB053	Unnamed Drain	Intermittent Stream	Cable	13
P174A	Unnamed Drain	Permanent Stream	Cable & Access Road	Crosses
P174B	Unnamed Drain	Intermittent Stream	Cable & Access Road	17
P175A	Eight Creek Drain	Intermittent Stream	cabling	17
P175B	Eight Creek Drain	Permanent Stream	Cable & Access Road	Crosses
P176A	Eight Creek Drain	Permanent Stream	Cable	20
			Access Road & Cable	Crosses
P176B	Unnamed Drain	Intermittent Stream	Cable	9
P176C	Unnamed Drain	Permanent Stream	Access Road & Cable	Crosses
			Cable	22
WB-A5	Unnamed	Intermittent Stream	Cable	Crosses
WB-AR8	Branch Drain	Intermittent Stream	Cable	12
WB-AR12	Unnamed Drain	Intermittent Stream	Cable	Crosses
	King & Whittle Drain	Intermittent Stream	Cable	10
WB-AR23	Unnamed Drain	Intermittent Stream	Access Road	22
			Cable	Crosses
	McDougall Drain	Intermittent Stream	Access Road & Cable	7
WB-C7	King & Whittle Drain	Intermittent Stream	Access Road	Crosses
			Cable	6
	Gagner Drain	Intermittent Stream	Access Road	58
			Cable	6
WB-D8	Unnamed	Intermittent Stream	Access Road	Crosses
			Cable	Crosses
	Graham Extension Drain	Intermittent Stream	Access Road & Cable	Crosses
			Access Road & Cable	10
WB-E4	Patrick Drain	Intermittent Stream	Cable	Crosses
WB-F4	Branch 7th Concession Drain	Intermittent Stream	Access Road & Cable	Crosses
	Unnamed Drain	Intermittent Stream	Access Road & Cable	7
WB-G4	South Middle Road Drain	Intermittent Stream	Access Road & Cable	Crosses
WB-H4	Ivison Drain	Intermittent Stream	Access Road	15
			Cable	30
			Access Road & Cable	10
WB-I4	Grant Drain	Intermittent Stream	Access Road, & Cable	Crosses
	Ivison Drain	Intermittent Stream	Cable	Crosses
			Cable	20
			Access Road	25
WB-I6	Graham Extension Line	Intermittent Stream	Cable	Crosses
			Cable	5
WB-R6	7th Concession Road Drain	Intermittent Stream	Access Road & Cable	Crosses
			Access Road & Cable	21
WB-V4	Unnamed Drain A	Intermittent Stream	Cable	10
WB-W4	Jessop Drain	Intermittent Stream	Access Road. Cable & Cable	Crosses
			Access Road	23
			Cable	6

Water Body Observation	Water Body Name	Type of Water Body	Type of Infrastructure within 120m of Water Body	Distance to Infrastructure (m)
CAB045A	Unnamed	Permanent Stream	Access Road & Cable	Crosses
CAB045B	Unnamed Roadside Ditch	Intermittent Stream	Access Road & Cable	Crosses
CAB047	McLeod Drain	Permanent Stream	Cable	Crosses
CAB080	Graham Drain	Permanent Stream	Cable	Crosses
			able	13
CAB081	Grant Drain	Intermittent Stream	Cable	3
			Cable	Crosses
CAB082	Unnamed Drain E	Intermittent Stream	Cable	Crosses
P075A	McLeod Drain	Permanent Stream	Access Road & Cable	Crosses
P075B	Unnamed	Permanent Stream	Access Road & Cable	18
P075C	Unnamed	Permanent Stream	Access Road & Cable	Crosses
P078A	Unnamed Water Body	Permanent Stream	Access Road	Crosses
			Access Road & Cable	15
P078B	Gagner Drain	Intermittent Stream	Access Road	45
P078C	Unnamed Water Body	Intermittent Stream	Access Road	17
P082A	Burgess Drain	Permanent Stream	Access Road & Cable	Crosses
P082B	Carless Drain	Permanent Stream	Access Road & Cable	100
P082C	Unnamed Water Body	Intermittent Stream	Access Road	23
			Cable	16
P150B	Ivison Drain	Intermittent Stream	Access Road	7
			Cable	18
			Cable	Crosses
AHY005	South Middle Road Drain	Intermittent Stream	Cable	7
AHY006	South Middle Road Drain	Intermittent Stream	Cable	7
	King & Whittle Drain	Intermittent Stream	Cable	Crosses
AHY007	Norval Davis Drain	Intermittent Stream	Cable	9
			Cable	Crosses
WB-R6	7th Concession Road Drain	Intermittent Stream	Access Road & Cable	Crosses
			Access Road & Cable	21
WB-V4	Unnamed Drain A	Intermittent Stream	Cable	10
WB-W4	Jessop Drain	Intermittent Stream	Access Road. Cable & Cable	Crosses
			Access Road	23
			Cable	6
CAB045A	Unnamed	Permanent Stream	Access Road & Cable	Crosses
CAB045B	Unnamed Roadside Ditch	Intermittent Stream	Access Road & Cable	Crosses
CAB047	McLeod Drain	Permanent Stream	Cable	Crosses
CAB080	Graham Drain	Permanent Stream	Cable	Crosses
			Cable	13
CAB081	Grant Drain	Intermittent Stream	Cable	3
			Cable	Crosses
CAB082	Unnamed Drain E	Intermittent Stream	Cable	Crosses
P075A	McLeod Drain	Permanent Stream	Access Road & Cable	Crosses
P075B	Unnamed	Permanent Stream	Access Road & Cable	18
P075C	Unnamed	Permanent Stream	Access Road & Cable	Crosses
P078A	Unnamed Water Body	Permanent Stream	Access Road	Crosses
			Access Road & Cable	15
P078B	Gagner Drain	Intermittent Stream	Access Road	45
P078C	Unnamed Water Body	Intermittent Stream	Access Road	17
P082A	Burgess Drain	Permanent Stream	Access Road & Cable	Crosses
P082B	Carless Drain	Permanent Stream	Access Road & Cable	100
P082C	Unnamed Water Body	Intermittent Stream	Access Road	23
			Cable	16

Water Body Observation	Water Body Name	Type of Water Body	Type of Infrastructure within 120m of Water Body	Distance to Infrastructure (m)
P150B	Ivison Drain	Intermittent Stream	Access Road	7
			Cable	18
			Cable	Crosses
AHY005	South Middle Road Drain	Intermittent Stream	Cable	7
AHY006	South Middle Road Drain	Intermittent Stream	Cable	7
	King & Whittle Drain	Intermittent Stream	Cable	Crosses
AHY007	Norval Davis Drain	Intermittent Stream	Cable	9
			Cable	Crosses
AHY008	Unnamed Drain	Intermittent Stream	Cable	Crosses
AHY009	McLeod Drain	Permanent Stream	Cable	Crosses
	Graham Drain	Intermittent Stream	Cable	7
	Powell Drain	Intermittent Stream	Cable	7
AHY010	Unnamed Drain	Intermittent Stream	Cable	5
	East Branch Graham Drain	Intermittent Stream	Cable	20
AHY011	Valetta Road Drain	Intermittent Stream	Cable	10
AHY012	Unnamed Drain	Intermittent Stream	Cable	5
AHY013	Ross Norry Drain	Intermittent Stream	Cable	Crosses
	Unnamed Drain	Intermittent Stream	Cable	17
AHY014	Jessop Drain	Intermittent Stream	Cable	Crosses
	Unnamed Drain	Intermittent Stream	Cable	20
WB-AR14	Government Drain #1	Permanent Stream	Access Road & Cable	80
	Unnamed	Intermittent Stream	Access Road	35
			Cable	15
WB-AR15A	Government Drain	Permanent Stream	Cable	Crosses
WB-AR15B	Pollard Drain	Permanent Stream	Cable	Crosses
			Cable	5
WB-AR26	Finn and Cooper Drain	Permanent Stream	Cable	Crosses
			Cable	Crosses
	Webb Drain	Intermittent Stream	Cable	Crosses
WB-D5	Deary Drain	Intermittent Stream	Cable	Crosses
WB-E5	Rice Drain	Intermittent Stream	Access Road & Cable	Crosses
			Cable	6
			Access Road& Cable	20
WB-H5	Deary Drain	Intermittent Stream	Cable	Crosses
			Access Road	45
WB-L7	Mazan Drain	Intermittent Stream	Cable,	1
WB-M7	Mazan Drain	Intermittent Stream	Access Road & Cable	Crosses
			Cable	5
WB-S6	Gardner Drain	Intermittent Stream	Cable	15
WB-U4	McDougall Drain	Intermittent Stream	Cable	Crosses
WB-U6	Cooper-Stevenson Drain	Intermittent Stream	Cable	10
	Lewis Drain	Intermittent Stream	Cable	Crosses
CAB034A	Shadd Drain	Permanent Stream	Cable	5
			Cable	Crosses
			Access Road & Cable	14
CAB034B	Unnamed	Intermittent Stream	Cable	13
			Cable	Crosses
			Access Road & Cable	Crosses
CAB034C	Unnamed	Permanent Stream	Cable	15
CAB035A	Shadd Drain	Permanent Stream	Cable	3
CAB035B	Unnamed	Intermittent Stream	Cable	17
			Cable	Crosses
CAB036A	Unnamed	Intermittent Stream	Cable	Crosses
CAB036B	Unnamed	Permanent Stream	Cable	Crosses

Water Body Observation	Water Body Name	Type of Water Body	Type of Infrastructure within 120m of Water Body	Distance to Infrastructure (m)
CAB038A	Cooper-Stevenson Drain	Permanent Stream	Cable	17
CAB038B	Unnamed	Intermittent Stream	Cable	12
			Cable	Crosses
CAB038C	Mancell Drain	Permanent Stream	Cable	Crosses
			Cable	3
CAB039	Beattie Drain	Permanent Stream	Cable	12
CAB040	Mancell Drain	Permanent Stream	Cable	2
			Cable	Crosses
CAB044A	McHardy Drain	Permanent Stream	Cable	Crosses
			Cable	2
CAB044B	Unnamed	Intermittent Stream	Cable	Crosses
			Cable	10
P064	Unnamed	Intermittent Stream	Access Road & Cable	Crosses
P095A	Gardner Drain	Permanent Stream	Access Road & Cable	Crosses
P095B	Unnamed	Permanent Stream	Access Road	37
			Cable	27
P126	Mazan Drain	Permanent Stream	Access Road & Cable	Crosses
			Cable	10
P148	Linnen Drain	Intermittent Stream	Access Road, Cable	Crosses
			Cable	15
			Access Road	30
P161	Skipper Drain	Permanent Stream	Access Road & Cable	Crosses
			Cable	10
AHY015	Unnamed Drain A	Intermittent Stream	Cable	Crosses
AHY016	Sinclair Drain	Intermittent Stream	Cable	Crosses
AHY017	Skipper Drain	Permanent Stream	Cable	14
AHY018	Government Drain #1	Permanent Stream	Cable	Crosses
			Cable	10
AHY019A	Government Drain #1	Permanent Stream	Cable	21
AHY019B	Mancell Drain	Intermittent Stream	Cable	21
AHY019C	Unnamed Drain	Intermittent Stream	Cable	Crosses
AHY020	Gardiner Drain	Intermittent Stream	Cable	10
AHY021	Government Drain #1	Permanent Stream	Cable	Crosses
AHY022	Lewis Drain	Intermittent Stream	Cable	Crosses
AHY023	Mancell Drain	Intermittent Stream	Cable	3
AHY024	Unnamed Drain	Intermittent Stream	Cable	7
	Griffin Drain	Intermittent Stream	Cable	7
AHY025	Finn & Cooper Drain	Permanent Stream	Cable	Crosses
	Unnamed Drain	Intermittent Stream	Cable	6
WB-A2	Vsetula Drain	Intermittent Stream	Cable	15.5
WB-A7	Lewis Drain	Intermittent Stream	Cable	Crosses
			Access Road & Cable	100
WB-AR27	Lecoco Drain	Permanent Stream	Cable	Crosses
WB-AR31	Vsetula Drain	Intermittent Stream	Cable	Crosses
			Access Road & Cable	10
WB-AR56	Chase Drain	Intermittent Stream	Access Road	13
			Cable	15
			Cable	Crosses
WB-B2	Flook and Hinton Drain	Intermittent Stream	Cable	Crosses
			Access Road	20
			Cable	6
WB-J	Mummery Drain	Intermittent Stream	Cable	6
WB-K	Flook and Hinton Drain	Permanent Stream	Cable	Crosses
WB-L	Chase Drain	Intermittent Stream	Access Road & Cable	Crosses
	Sampson Drain	Intermittent Stream	Access Road & Cable	12
WB-M	West Drain	Intermittent Stream	Cable	Crosses
WB-N	Carter Drain	Intermittent Stream	Cable	Crosses

Water Body Observation	Water Body Name	Type of Water Body	Type of Infrastructure within 120m of Water Body	Distance to Infrastructure (m)
			Cable	Crosses
WB-N7	Flook & Hinton Drain	Permanent Stream	Access Road, Cable	Crosses
WB-O	Carter Drain	Intermittent Stream	Cable	Crosses
WB-P	O'Rourke Drain	Intermittent Stream	Cable	Crosses
WB-Q	Doyle Drain	Intermittent Stream	Cable	Crosses
	Sheeler Waddick Drain	Intermittent Stream	Cable	20
WB-RR24	Lewis Drain	Permanent Stream	Cable	Crosses
WB-RR25	Flook & Hinton Drain	Permanent Stream	Cable	Crosses
WB-RR26	Garnet Russel Drain	Intermittent Stream	Cable	Crosses
WB-RR27	Miller Drain	Permanent Stream	Cable	Crosses
WB-RR28	Horne Drain	Permanent Stream	Cable	Crosses
WB-RR29	Vail Drain	Permanent Stream	Cable	Crosses
WB-RR30	Doyle Drain	Intermittent Stream	Cable	Crosses
WB-S	Government Drain	Intermittent Stream	Cable	Crosses
WB-T	Moody & Earley Drain	Intermittent Stream	Cabling	Crosses
WB-U	O'Neil Drain	Intermittent Stream	Cable	Crosses
			Access Road & Cable	60
WB-V	Miller Drain	Intermittent Stream	Cable	Crosses
WB-W	Horne Drain	Intermittent Stream	Cable	Crosses
WB-Y	Garnet & Russell Drain	Intermittent Stream	Cable	Crosses
WB-Y6	O'Rourke Drain	Intermittent Stream	Cable	Crosses
WB-Z6	O'Rourke Drain	Intermittent Stream	Access Road	20
			Cable	5
CAB029	Unnamed Drain	Permanent Stream	Cable	Crosses
CAB030	Unnamed roadside ditch	Intermittent Stream	Cable	1
CAB033A	Government Drain	Permanent Stream	Cable	8
			Cable	Crosses
CAB033B	Unnamed roadside ditch	Intermittent Stream	Cable	5
			Cable	Crosses
CAB083	Lecoco Drain	Permanent Stream	Cable	Crosses
CAB084	Symon Drain	Permanent Stream	Cable	Crosses
CAB085	Towl Drain	Permanent Stream	Cable	Crosses
CAB100	Price Drain	Intermittent Stream	Cable	Crosses
P060	Mummery Drain	Permanent Stream	Access Road	20
			Cable	15
P065	Carter Drain	Intermittent Stream	Access Road & Cable	Crosses
P098	Reach Connecting Doyle and O'Rourke Drains	Permanent Stream	Access Road & Cable	Crosses
			Access Road	30
			Cable	14
P100A	Unnamed Roadside Ditch	Intermittent Stream	Cable	8
P111	Tributary to Moody & Earley Drain	Permanent Stream	Access Road & Cable	Crosses
P149	Vince Doyle Drain	Permanent Stream	Access Road & Cable	Crosses
P163	Unnamed roadside ditch	Intermittent Stream	Access Road & Cable	Crosses
AHY027	Waddick Drain	Permanent Stream	Cable	Crosses
AHY034	Symon Drain	Permanent Stream	Cable	Crosses
AHY035	Government Drain	Permanent Stream	Cable	Crosses
AHY036	Doyle Drain	Intermittent Stream	Cable	Crosses
AHY037	Vail Drain	Permanent Stream	Cable	Crosses
AHY038	Ferguson/Laurie Drain	Permanent Stream	Cable	Crosses
AHY041	Stenton Drain	Intermittent Stream	Cable	17
AHY029	Unnamed Drain	Intermittent Stream	Cable	5
AHY030	Unnamed Drain	Permanent Stream	Cable	6
	Unnamed Drain	Intermittent Stream	Cable	6
AHY031	Unnamed Drain	Intermittent Stream	Cable	5
AHY033	Carter Drain	Intermittent Stream	Cable	Crosses

Water Body Observation	Water Body Name	Type of Water Body	Type of Infrastructure within 120m of Water Body	Distance to Infrastructure (m)
WB-A	McCorkell Drain	Intermittent Stream	Cable	10
			Access Road & Cable	Crosses
WB-AR33A	Hedgedus Drain	Intermittent Stream	Cable	8
WB-AR33B	McGregor Creek tributary	Intermittent Stream	Cable	Crosses
WB-AR51	Unnamed Drain B	Intermittent Stream	Cable	Crosses
	Corlett Drain	Intermittent Stream	Cable	40
WB-AR52	Fargo Branch Drain	Intermittent Stream	Cable	Crosses
			Cable	Crosses
WB-AR55	Lorne English Drain	Intermittent Stream	Access Road & Cables	Crosses
			Cable	Crosses
WB-B	Corlett Drain	Intermittent Stream	Cable	38
			Cable	Crosses
WB-C	Unnamed Drain K	Intermittent Stream	Cable	10
WB-D	Locke Drain	Permanent Stream	Cable	Crosses
WB-D6	Jackson & Nash Drain	Intermittent Stream	Access Road & Cable	Crosses
			Cable	17
WB-D7	Jackson & Nash Drain	Intermittent Stream	Cable	2
			Cable	Crosses
WB-E	Locke Drain	Intermittent Stream	Cable & Access Road	Crosses
WB-E2	Fargo Drain	Intermittent Stream	Access Road & Cable	Crosses
			Cable	5
			Cable	Crosses
WB-F2A	Mosey Drain	Intermittent Stream	Access Road	9
			Access Road & Cable	Crosses
WB-F2B	Jackson & Nash Drain	Intermittent Stream	Access Road & Cable	Crosses
WB-F7	Barfoot Drain	Permanent Stream	Cable	Crosses
WB-H	Laurie Drain	Intermittent Stream	Cable	Crosses
WB-J5	White Drain	Intermittent Stream	Cable	81
WB-M2	R.L. Smyth Drain	Intermittent Stream	Cable	Crosses
			Access Road	60
WB-N2	Proctor Drain	Intermittent Stream	Cable	Crosses
WB-O2	Proctor Drain	Intermittent Stream	Access Road & Cable	Crosses
WB-07	Locke Drain	Permanent Stream	Access Road	115
WB-P2A	Morrison Drain	Intermittent Stream	Cable	Crosses
WB-P2B	Watts Drain	Intermittent Stream	Cable	Crosses
WB-Q2	White Drain	Intermittent Stream	Cable	Crosses
			Cable	100
WB-Q7	Mosey Drain	Intermittent Stream	Access Road	75
			Cable	60
WB-R7	Lucas Drain	Intermittent Stream	Access Road & Cable	Crosses
WB-S2	Pilotte Drain	Intermittent Stream	Cable	10
WB-T7	Cyrus Huffman Drain	Intermittent Stream	Access Road & Cable	Crosses
WB-Y7	White Drain	Intermittent Stream	Cable	10
WB-RR09	Tedford Drain	Intermittent Stream	Cable	Crosses
WB-RR10	White Drain	Intermittent Stream	Cable	Crosses
			Cable	97
WB-RR11	Morrison Drain	Intermittent Stream	Cable	Crosses
WB-RR12	Proctor Drain	Intermittent Stream	Cable	Crosses
			Access Road	82
WB-RR13	Spisani Drain	Permanent Stream	Cable	Crosses
WB-RR14	Lucas Drain	Permanent Stream	Cable	Crosses
WB-RR15	Conrail Drain	Intermittent Stream	Cable	Crosses
WB-RR16	Unnamed	Intermittent Stream	Cable	Crosses
WB-RR17	Locke Drain	Intermittent Stream	Cable	Crosses
WB-RR18	Locke Drain	Intermittent Stream	Cable	Crosses
WB-RR19	Drewery Branch Drain	Intermittent Stream	Cable	Crosses

Water Body Observation	Water Body Name	Type of Water Body	Type of Infrastructure within 120m of Water Body	Distance to Infrastructure (m)
WB-RR20	Barfoot Drain	Intermittent Stream	Cable	Crosses
WB-RR21	Laurie Drain	Intermittent Stream	Cable	Crosses
WB-RR22	Gales Drain	Intermittent Stream	Cable	Crosses
WB-RR23	Knott Creek Drain	Permanent Stream	Cable	Crosses
CAB031A	Charring Cross Drain	Permanent Stream	Cable	8
			Cable	Crosses
CAB031B	Unnamed Drain	Permanent Stream	Cable	10
CAB059A	Unnamed Drain	Intermittent Stream	Cable	Crosses
CAB059B	Unnamed Drain	Intermittent Stream	Cable	Crosses
CAB073A	Unnamed Drain	Intermittent Stream	Cable	20
CAB073B	Unnamed Drain	Intermittent Stream	Cable	10
CAB074	Unnamed Drain	Intermittent Stream	Cable	10
CAB086	McGregor Creek	Permanent Stream	Cable	Crosses
P031A	Unnamed Drain	Intermittent Stream	Access Road	60
			Cable	Crosses
P031B	Unnamed Drain	Intermittent Stream	Cable	100
			Access Road & Cable	Crosses
P035	Watt Drain	Intermittent Stream	Access Road & Cable	Crosses
			Cable	15
P036A	Grist Drain	Intermittent Stream	Access Road & Cable	Crosses
P036B	Morrison Drain	Intermittent Stream	able	Crosses
P037	RL Smyth Drain no longer exists at this location			
P057	Unnamed Drain	Intermittent Stream	Access Road & Cable	Crosses
P058	This historical Unnamed water body no longer exists			
P108A	Watt Drain is a historical water body that no longer exists at this location			
P108B	Morrison Drain	Permanent Stream	Access Road & Cable	Crosses
P109A	Lucas /Sample Drain	Permanent Stream	Access Road & Cable	Crosses
P109B	Lucas /Sample Drain	Permanent Stream	Access Road & Cable	Crosses
AHY039A/B	Gregory Drain	Permanent Stream	Cable	Crosses
			Cable	20
			Access Road & Cable	20
AHY042	Unnamed Roadside Ditch	Intermittent Stream	Cable	10
AHY043	Vanraay Drain	Intermittent Stream	Cable	10
AHY045	Lucas Drain	Permanent Stream	Cable	Crosses
	Unnamed Drain	Intermittent Stream	Cable	10
AHY046	Morrison Drain	Permanent Stream	Cable	Crosses
AHY047	Kneeborne Drain	Intermittent Stream	Cable	Crosses
AHY048	Cyrus Huffman Drain	Intermittent Stream	Cable	Crosses
AHY049	Tedford Drain	Permanent Stream	Cable	Crosses
	Unnamed Drain	Intermittent Stream	Cable	10
AHY050	Centre Line Drain	Intermittent Stream	Cable	20
AHY051	White Drain	Intermittent Stream	Cable	Crosses
AHY052	Tedford Drain	Permanent Stream	Cable	Crosses
AHY058	White Drain Branch	Intermittent Stream	Cable	Crosses
WB-AR37A	Ingram Drain	Intermittent Stream	Cable	Crosses
	Mervin Drain	Intermittent Stream	Cable	Crosses
WB-AR38	Brown Drain	Intermittent Stream	Cable	Crosses
			Access Road & Cable	Crosses
WB-AR39	Bisner Drain	Intermittent Stream	Cable	Crosses
			Access Road & Cable	Crosses
	Unnamed Drain U	Intermittent Stream	Cable	Crosses
WB-AR49	Cooper Drain	Intermittent Stream	Cable	Crosses
WB-AR50	McEachren Drain	Intermittent Stream	Cable	Crosses
WB-AR60	Baird Drain	Intermittent Stream	Cable	Crosses
			Cable	20
WB-B3	McEachren Drain	Intermittent Stream	Access Road & Cable	8

Water Body Observation	Water Body Name	Type of Water Body	Type of Infrastructure within 120m of Water Body	Distance to Infrastructure (m)
WB-C3	Mull Branch Drain	Intermittent Stream	Cable	Crosses
			Access Road	22
			Cable	30
			Access Road	108
			Cable	115
WB-D3	Unnamed Drain	Intermittent Stream	Cable	25
WB-E3	Unnamed Drain	Intermittent Stream	Cable	Crosses
	Taff Creek Drain	Intermittent Stream	Cable	Crosses
WB-F3	Unnamed Drain	Intermittent Stream	Cable	Crosses
WB-G3	McEachren Drain	Intermittent Stream	Access Road & Cable	86
			Cable	Crosses
WB-H3	Union Drain	Intermittent Stream	Cable	Crosses
			Access Road	20
			Cable	17
WB-I3	Union Drain (Old Course)	Intermittent Stream	Cable	Crosses
	Union Drain (New Course)	Intermittent Stream	Cable	6
	Cleveland Drain	Intermittent Stream	Cable	45
WB-J7	Pfaff Creek Drain	Intermittent Stream	Access Road & Cable	70
WB-L4	Mull Drain	Intermittent Stream	Cable	Crosses
WB-M4	McPhail Drain	Intermittent Stream	Cable	Crosses
WB-M5	Pfaff Creek Drain	Intermittent Stream	Cable	Crosses
			Access Road & Cable	90
WB-N5	Wiebenga Drain	Intermittent Stream	Cable	20
			Access Road & Cable	Crosses
WB-P3	Pfaff Creek Drain	Intermittent Stream	Access Road & Cable	Crosses
			Cable	30
			Access Road & Cable	20
WB-P4	Unnamed Drain	Intermittent Stream	Cable	15
WB-Q4	Baird Drain Open	Intermittent Stream	Cable	Crosses
WB-RR03	Nicholson Drain	Intermittent Stream	Cable	Crosses
WB-RR06	Mull Drain	Intermittent Stream	Cable	Crosses
			Cable	Crosses
WB-RR07	Baird Drain Open	Intermittent Stream	Cable	Crosses
WB-RR35	Rushton Drain	Permanent Stream	Cable	Crosses
WB-T2	McPhail Drain	Intermittent Stream	Cable	Crosses
WB-U2	Baird Drain Open	Intermittent Stream	Cable	Crosses
			Access Road & Cable	20
WB-U7	Unnamed Drain W	Intermittent Stream	Access Road & Cable	Crosses
WB-X7	McEachren Drain	Intermittent Stream	Access Road	10
			Cable	15
CAB006A	Unnamed Drain	Intermittent Stream	Cable	15
CAB006B	Unnamed Drain	Intermittent Stream	Cable	10
CAB058	Unnamed Drain	Intermittent Stream	Access Road & Cable	Crosses
			Cable	15
CAB087	Cooper Drain	Permanent Stream	Cable	Crosses
P005B	Unnamed Drain	Intermittent Stream	Access Road & Cable	Crosses
P013A	Nicholson Drain	Permanent Stream	Access Road & Cable	Crosses
P013B	Unnamed J Drain	Permanent Stream	Access Road & Cable	Crosses
			Cable	15
P018	Unnamed Drain	Intermittent Stream	Access Road & Cable	Crosses
			Cable	9
P019	Busted Drain no longer exists at this location			
P022	Mull & McLachlan Drain	Permanent Stream	Access Road & Cable	Crosses
P023	Baird Drain Open	Intermittent Stream	Access Road	26
			Cable	12

Water Body Observation	Water Body Name	Type of Water Body	Type of Infrastructure within 120m of Water Body	Distance to Infrastructure (m)
P024	Whitiebread Drain	Permanent Stream	Access Road & Cable	Crosses
P030	Tedford Drain	Permanent Stream	Access Road & Cable	Crosses
P101	Rushton Drain no longer exists at this location			
P135	Tompkins Drain	Permanent Stream	Access Road & Cable	Crosses
P138	Wiebenga Drain	Permanent Stream	Access Road & Cable	Crosses
P155	Unnamed Drain	Permanent Stream	Access Road & Cable	22
P156A	Unnamed Drain	Intermittent Stream	Access Road & Cable	Crosses
P156B	Water Body no longer exists at this location			
P166	Bolohan Craig Drain Extension no longer exists at this location			
P173	Unnamed Drain	Intermittent Stream	Access Road & Cable	Crosses
AHY053	Unnamed Drain W	Intermittent Stream	Cable	Crosses
			Cable	10
AHY054	English Drain	Permanent Stream	Cable	12
AHY055	McPhail Drain	Intermittent Stream	Cable	Crosses
AHY056	Gobert Drain	Permanent Stream	Cable	12
	Tedford Drain	Permanent Stream	Cable	Crosses
AHY071	Brown Drain	Permanent Stream	Cable	Crosses
AHY072	Unnamed Drain	Intermittent Stream	Cable	Crosses
	Nicholson Drain	Permanent Stream	Cable	10
AHY073	Anderson Drain no longer exists at this location			
AHY074	Shipp Drain no longer exists at this location			
WB-AR40	Neve Drain	Permanent Stream	Cable	Crosses
WB-AR41	Unnamed Water Body	Permanent Stream	Cable	Crosses
WB-AR42	Clendening Drain	Intermittent Stream	Cable	Crosses
			Access Road	22
			Cable	85
WB-AR43	Chris Debrouwer Drain	Intermittent Stream	Cable	Crosses
			Cable	26
WB-AR48	Bates Bloomfield Drain	Permanent Stream	Access Road & Cable	Crosses
			Cable	Crosses
WB-AR62	Woodlife Drain	Intermittent Stream	Cable	13
WB-K3	Woodlife Drain	Intermittent Stream	Cable	7
			Access Road & Cable	Crosses
WB-L3	Rowe Drain	Intermittent Stream	Cable	Crosses
WB-M3	Arnold Davis Drain	Intermittent Stream	Cable	Crosses
WB-N3A	East Lake Drain	Intermittent Stream	Cable	Crosses
WB-O3	McKay Drain	Permanent Stream	Cable	Crosses
WB-W7	Rowe Drain & Clunis Drain Intersection	Intermittent Stream	Access Road & Cable	Crosses
WB-X5	McLean Drain	Intermittent Stream	Cable	Crosses
CAB024	McArthur East Drain	Permanent Stream	Cable	Crosses
CAB026	Unnamed Drain	Intermittent Stream	Cable	Crosses
CAB028	Unnamed Drain	Permanent Stream	Cable	9
			Cable	Crosses
CAB054A	Unnamed Drain	Intermittent Stream	Cable	12
CAB054B	Unnamed Drain	Permanent Stream	Cable	25
CAB055	Unnamed Drain	Permanent Stream	Cable	7
CAB056	Unnamed Drain	Intermittent Stream	Cable	22
CAB057	Unnamed Drain	Permanent Stream	Access Road & Cable	Crosses
			Cable	23
CAB090	Unnamed Drain	Permanent Stream	Cable	Crosses
P003	Unnamed D	Intermittent Stream	Access Road & Cable	Crosses
P004	McKay Drain	Permanent Stream	Access Road & Cable	53
P009	Rowe Drain	Permanent Stream	Access Road & Cable	Crosses
P104B	Historical unnamed Water Body no longer exists			
P106	Historical Water Body Frasier Drain no longer exists at this location			
P140	Nelles Extension Drain	Permanent Stream	Access Road & Cable	Crosses

Water Body Observation	Water Body Name	Type of Water Body	Type of Infrastructure within 120m of Water Body	Distance to Infrastructure (m)
P167	Clunis Drain	Permanent Stream	Access Road & Cable	Crosses
P171C	Unnamed X Drain	Permanent Stream	Access Road & Cable	Crosses
AHY057	White Drain	Intermittent Stream	Cable	50
AHY059	Unnamed Drain	Intermittent Stream	Cable	Crosses
AHY060A/B	McArthur East Drain	Permanent Stream	Cable	10
			Cable	10
AHY068	Clendening Drain	Permanent Stream	Cable	Crosses
AHY070	Nesbitt Drain	Permanent Stream	Cable	Crosses
AHY086	Neve Drain	Permanent Stream	Cable	Crosses
AHY087	Archie Campbell Drain	Permanent Stream	Cable	Crosses
AHY088	Unnamed Drain	Intermittent Stream	Cable	Crosses
AHY089	Cumming Drain	Permanent Stream	Cable	Crosses
AHY090	McArthur East Drain	Permanent Stream	Cable	Crosses
AHY091	Nelles Extension Drain	Permanent Stream	Cable	Crosses
P145A	McGregor Creek	Permanent Stream	Cable	Crosses
P145B	McGregor Creek	Permanent Stream	Access Road	20
			Cable	15
CAB001	Unnamed Drain	Permanent Stream	Cable	Crosses

Table 3. Water Body Observation Summary for Distances to Turbines

Water Body Observation	Water Body Name	Type of Water Body	Turbine Closest to Water Body	Distance Between Water Body and Turbine (m)	Distance Between Water Body and Project Location (m)
WB-B5	Eight Creek Drain	Intermittent Stream	P070	120	71
WB-C5	Eight Creek Drain	Intermittent Stream	P087	110	61
P174A	Unnamed (north/south)	Intermittent Stream	P174	64	15
WB-C7	King & Whittle Drain	Intermittent Stream	P116	111	62
WB-D8	Unnamed	Intermittent Stream	P132	70	21
WB-F4	Unnamed	Intermittent Stream	P081	140	91
WB-G4	South Middle Road Drain	Intermittent Stream	P080	118	69
WB-H4	Ivison Drain	Intermittent Stream	P115	130	15
WB-R6	7th Concession Road Drain Extension	Intermittent Stream	P122	75	26
WB-V4	Unnamed Drain A	Intermittent Stream	P071	115	66
WB-W4	Jessop Drain	Intermittent Stream	P072	80	31
P075A	McLeod Drain	Permanent Stream	P075	118	69
P082B	Carless Drain	Permanent Stream	P082	100	51
WB-H5	Newham Drain	Intermittent Stream	P068	117	68
P148	Linnen Drain	Intermittent Stream	P148	85	12
WB-B2	Flook and Hinton Drain	Intermittent Stream	P164	90	41
WB-B8	Lewis Drain	Permanent Stream	P164	94	45
WB-L	Chase Drain	Intermittent Stream	P063	120	80
WB-N7	Flook & Hinton Drain	Permanent Stream	P097	100	51
P060	Mummery Drain	Permanent Stream	P060	40	15
P100B	Garen & Young Drain	Permanent Stream	P100	129	80
P111	Tributary to Moody & Earley Drain	Permanent Stream	P111	67	18
P149	Moody & Earley Drain	Permanent Stream	P149	40	0
WB-C	Unnamed Drain K	Intermittent Stream	P052	139	90
WB-E7	Barfoot Drain	Intermittent Stream	P058	129	80
WB-F2A	Mosey Drain	Intermittent Stream	P044	80	0
WB-H	Laurie Drain	Intermittent Stream	P056	123	74
WB-N2	Proctor Drain	Intermittent Stream	P040	133	84
WB-O2	Proctor Drain	Intermittent Stream	P041	78	29
WB-07	Locke Drain	Permanent Stream	P055	135	86
WB-T7	Cyrus Huffman Drain	Intermittent Stream	P033	111	62
WB-RR12	Proctor Drain	Intermittent Stream	P040	139	90
P031A	Unnamed Drain	Intermittent Stream	P031	65	11
P035	Watt Drain	Intermittent Stream	P108	136	87
P036B	Morrison Drain	Permanent Stream`	P036	127	78
P046B	Lucas Drain	Intermittent Stream	P046	61	12
P057	Unnamed Drain	Intermittent Stream	P057	76	27
P109B	Sample Drain	Permanent Stream	P109	73	24
P109C	Nichol Drain	Permanent Stream	P109	128	79
P120	Proctor and Grist Drain	Intermittent Stream	P120	130	0
WB-AR38	Brown Drain	Intermittent Stream	P152	90	18
WB-AR39	Bisner Drain	Intermittent Stream	P093	24	0
WB-B3	McEachren Drain	Intermittent Stream	P017	160	111
WB-J7	Pfaff Creek Drain	Intermittent Stream	P012	80	21
WB-U7	Unnamed Drain W	Intermittent Stream	P028	107	58
P030	Tedford Drain	Permanent Stream	P030	30	0
P135	Tompkins Drain	Permanent Stream	P135	65	16

Water Body Observation	Water Body Name	Type of Water Body	Turbine Closest to Water Body	Distance Between Water Body and Turbine (m)	Distance Between Water Body and Project Location (m)
P155	Unnamed Drain	Permanent Stream	P155	170	111
P004	McKay Drain	Permanent Stream	P004	53	4
P009	Rowe Drain	Permanent Stream	P009	69	20
P140	Nelles Extension Drain	Permanent Stream	P140	114	65
P167	Clunis Drain	Permanent Stream	P006	144	95
P145B	McGregor Creek	Permanent Stream	P145	137	88