GRAND RENEWABLE ENERGY PARK
WATER ASSESSMENT AND WATER BODY REPORT

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Prepared for:

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Executive Summary

Samsung C&T (Samsung), Korea Power Electric Corporation (KEPCO) and Pattern Energy (Pattern) are proposing to develop, construct, and operate the Grand Renewable Energy Park (the “Project”) in response to the Government of Ontario’s initiative to promote the development of renewable electricity in the Province. Together, these companies (referred to herein as “SPK”) will be involved in the development of the first phase of the energy cluster development.

The Project is proposed within the County of Haldimand and is generally bounded by Townline Road to the north, Haldimand Road 20 to the west, the Grand River to the east and Lake Erie to the south. It consists of a 151.1 MW (nameplate capacity) wind project, a 100 MW (nameplate capacity) solar project located on privately owned and Ontario Realty Corporation (ORC) managed lands and a transmission line to convey electricity to the existing power grid.

The basic components of the Project include 67 wind turbines, approximately 425,000 photovoltaic (PV) solar panels installed on fixed ground-mounted racking structures organized into 100-1 MW solar modules, a collector sub-station, interconnect station and Operations and Maintenance building, temporary storage and staging areas, approximately 20 km of 230 kV transmission lines along Haldimand Road 20, approximately 82 km of new overhead and/or underground 34.5 kV collector lines along public roads, approximately 48 km of new underground collector lines along turbine access roads, approximately 45 km of turbine access roads, and 40 km of solar panel maintenance roads.

This Water Assessment and Water Body Report is intended to satisfy the requirements outlined within Ontario Regulation 359/09 and is to be submitted as a component of the Renewable Energy Approval (REA) application for the Project.

The presence or absence of water bodies within the Project’s 120 m Zone of Investigation was assessed using the definition of a water body provided in O. Reg. 359/09, which is as follows:

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

Once the Project layout and locations of water bodies were confirmed, a water records review was conducted according to Section 30(1) of O.Reg. 359/09. Additionally, fish communities were sampled at selected locations within the 120 m Zone of Investigation and a general aquatic habitat assessment was conducted. A combination of background data and results of Stantec's fall 2010 surveys were used to determine the presence or absence of water bodies and fish habitat within the 120 m Zone of Investigation. Photographs of all water features were taken during field surveys and are included in **Appendix B**.

Locations where water bodies are present within 120 m of a proposed Project Location are presented in **Figures 2.1** to **2.20** and summarized in **Table 3.2**. The designation of various features as water bodies was agreed upon by field staff using field conditions at the time of the survey and the definition of water body provided in O. Reg. 359/09.

Based on the current Project layout and proposed environmental mitigation measures, in-water work would potentially affect a total of eleven water bodies containing direct fish habitat and an additional seventeen water bodies that contribute indirectly to fish habitat. *Fisheries Act* Authorization may be required due to culvert crossings and underground collector line installation associated with wind components of the Project. Additional potential aquatic species at risk implications may be associated with reach Gran-kk in the Grand River watershed. It is likely that any potential negative effects to aquatic organisms can be mitigated, since no in-water work is proposed within this reach.

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1.0 Introduction

1.1 PROJECT OVERVIEW

Samsung C&T (Samsung), Korea Power Electric Corporation (KEPCO) and Pattern Energy (Pattern) are proposing to develop, construct, and operate the Grand Renewable Energy Park (the “Project”) in response to the Government of Ontario’s initiative to promote the development of renewable electricity in the Province. Together, these companies (referred to herein as “SPK”) will be involved in the development of the first phase of the energy cluster development.

The Project is proposed within the County of Haldimand and is generally bounded by Townline Road to the north, Haldimand Road 20 to the west, the Grand River to the east and Lake Erie to the south. It consists of a 151.1 MW (nameplate capacity) wind project, a 100 MW (nameplate capacity) solar project located on privately owned and Ontario Realty Corporation (ORC) managed lands and a transmission line to convey electricity to the existing power grid.

The basic components of the Project include 67 wind turbines, approximately 425,000 photovoltaic (PV) solar panels installed on fixed ground-mounted racking structures organized into 100-1 MW solar modules, a collector sub-station, interconnect station and Operations and Maintenance building, temporary storage and staging areas, approximately 20 km of 230 kV transmission lines along Haldimand Road 20, approximately 82 km of new overhead and/or underground 34.5 kV collector lines along public roads, approximately 48 km of new underground collector lines along turbine access roads, approximately 45 km of turbine access roads and 40 km of solar panel maintenance roads. The Project site plan which depicts the Project Location during construction and operation is provided in **Appendix A**.

The Project Location includes all land and buildings/structures associated with the Project and any air space in which the Project will occupy. This includes structures such as turbines, solar panels, access roads and power lines as well as any temporary construction zones surrounding access roads and turbines (constructible areas) which will be required during the construction of the Project. This also includes the corridors surrounding infrastructure such as access roads in which the final infrastructure may be located.

For the purposes of the identification of natural heritage features and the assessment of potential effects, an “Zone of Investigation” has been identified based on the requirements of Ontario Regulation 359/09 (O. Reg. 359/09) and the Ministry of Natural Resources’ (MNR’s) *Approval and Permitting Requirements Document for Renewable Energy Projects* (APRD) (September 2009). The Zone of Investigation encompasses the Project Location and an additional 120 m surrounding the Project Location. This ensures that adverse environmental effects that may result from construction and operational activities have been assessed.

SPK has retained Stantec Consulting Ltd. (Stantec) to prepare a Renewable Energy Approval (REA) application, as required under O. Reg. 359/09. According to subsection 6.(3) of O. Reg. 359/09, the wind component of the Project is classified as a Class 4 Wind Facility and the solar component of the Project is classified as a Class 3 Solar Facility. This Water Body and Water Assessment Report is one component of the REA application for the Project, and has been prepared in accordance with O. Reg. 359/09, and the MNR's APRD.

1.2 REPORT REQUIREMENTS

A Water Assessment is a required component of a REA application, and includes a records review and site investigation to determine the presence and boundaries of water bodies as defined in O. Reg. 359/09 within 120 m of the Project Location (assuming that no Lake Trout lakes that are at or above development capacity are identified within 300 m). If water bodies are identified within 120 m of the Project Location, a Water Body Report must be prepared.

The Project Location refers to any land, structure or air space in, on or over which part of a renewable energy project is proposed. This includes structures such as turbines, solar panels, access roads and power lines, as well as any temporary work areas (constructible areas) which are required to be utilized during the construction of the Project (see **Figure 1, Appendix A**). These components have been divided into 3 separate areas that together comprise the Project Location, as follows:

- Wind Project Location: includes wind turbines, access roads and collector lines;
- Solar Project Location (Solar Lands): includes the solar panels, sub-station, collector lines, access roads, operation and maintenance building, stormwater management facility and other appurtenances within the Solar Lands; and
- Transmission Project Location: includes the transmission line, towers, and appurtenances from the substation to the existing transmission lines located south of Hagersville.

This Water Assessment and Water Body Report is intended to satisfy the requirements outlined within O. Reg. 359/09 (s. 39 and 40) and is to be submitted as a component of the REA application. **Table 1.1** summarizes the documentation requirements of the Water Report as specified under O. Reg. 359/09.

Table 1.1: Water Assessment Report and Water Body Report Requirements: O. Reg. 359/09

Requirements (Water Assessment)	Completed	Section Reference
A person who proposes to engage in a renewable energy project shall conduct a water assessment, consisting of the following:		
1. A records review conducted in accordance with section 30.	✓	3.1, 3.2, 3.3, 3.4, 3.5
2. A site investigation conducted in accordance with section 31, including:		
31(4)(1). A summary of any corrections to the report.	✓	2.3
31(4)(2). Information relating to each water body.	✓	3.3, 3.4, 3.5
31(4)(3). A map showing boundaries, location/type and distances.	✓	Appendix A
31(4)(4). A summary of methods used to make observations for the purposes of the site investigation.	✓	2.3
31(4)(5). The name and qualifications of any person conducting the site investigation.	✓	2.4
31(4)(6)(i). The dates and times of the beginning and completion of the site investigation.	✓	2.3
If an investigation was conducted by visiting the site:		
31(4)(6)(ii). The duration of the site investigation.		2.3
31(4)(6)(iii).The weather conditions during the site investigation	✓	2.3
31(4)(6)(iv). Field notes kept by the person conducting the site investigation.	✓	Appendix D
If an alternative investigation of the site was conducted:		
31(4)(7)(i). The dates of the generation of the data used in the site investigation.		N/A
31(4)(7)(ii). An explanation of why the person who conducted the alternative investigation determined htat it was not reasonable to conduct the site investigation by visiting the site.		N/A
Requirements (Water Body)		
4. Report identifies and assesses any negative environmental effects of the project on a water body and on land within 30 metres of the water body.	✓	3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.0
5. Report identifies mitigation measures in respect of any negative environmental effects.	✓	5.0
6. Report describes how the environmental effects monitoring plan addresses any negative environmental effects.	✓	6.0
7. Report describes how the construction plan report addresses any negative environmental effects.	✓	5.0, 6.1

2.0 Methods

2.1 DEFINITION OF A WATER BODY

The presence or absence of water bodies within the Project's 120 m Zone of Investigation was assessed using the definition of a water body provided in O. Reg. 359/09, which is as follows:

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

Once the Project layout and locations of water bodies were confirmed, fish communities were sampled at selected locations within the 120 m Zone of Investigation and a general aquatic habitat assessment was conducted. Fish were collected using a Smith Root Model 12 backpack electrofisher and were sampled between October 18 and October 28, and on November 22, 2010. In cases where one water body traversed several project features, one or two representative locations were fished to determine the general species assemblage for the watercourse. A combination of background data and results of Stantec's fall 2010 surveys were used to determine the presence or absence of fish habitat within the 120 m Zone of Investigation. Photographs of all water features were taken during field surveys and are included in **Appendix B**.

2.2 RECORDS REVIEW

A water records review was conducted according to Section 30(1) of O.Reg. 359/09.

According to Ministry of Natural Resources' (MNR) Land Information Ontario mapping (MNR, 2009), there are many potential watercourses and waterbodies within the Project's 120 m Zone of Investigation. Figures depicting the watercourses identified by MNR mapping are included in this report (**Figure 2**, **Appendix A**), where "watercourses" are water features (including lakes, rivers, streams, etc.), as mapped by MNR. These water features may or may not meet the definition of a water body as described in Section 2.1. Potential additional waterbodies were also identified through a review of aerial photographs of the Zone of Investigation. Further information on these potential watercourses and waterbodies was obtained during the site investigations (as described in Section 3.0).

The MNR provided background data regarding fish communities at a number of locations in the Zone of Investigation. The Grand River Information Network (GRIN), an online database, was accessed for habitat and fish community information pertinent to the Grand River watershed. No additional fish community information was available through the Long Point Region Conservation Authority (LPRCA) or the Grand River Conservation Authority (GRCA) regarding fisheries and watercourses within the Zone of Investigation.

Additional information regarding significant species occurrences and species at risk was obtained from Fisheries and Oceans Canada (DFO) (DFO, 2010) and from the MNR's Natural Heritage Information Centre (NHIC) (NHIC, 2011) online database.

2.3 SITE INVESTIGATIONS

Site investigations were carried out according to Section 31 of O.Reg. 359/09. The investigations were conducted on July 7, July 8, August 25, October 18 to 28, November 8, November 22, November 24, 2010 and January 10 and 11, 2011 as noted on the field records (see **Appendix D**). Weather conditions ranged from -10˚C to 33 ˚C, and 0% to 100% cloud cover. On October 20th to 28th, several days of heavy rain fall occurred during the site investigations.

The purpose of the site investigations was to:

- Ground truth the results of the records review to identify any required corrections;
- Determine whether any additional water bodies exist, other than those identified in the records review;
- Identify the boundaries of any water body located within 120 m of the Project Location; and

While on site, the field crews used visual inspections to verify the presence or absence of potential water bodies within 120 m of the Project Location. A few of the surface water features identified on MNR mapping (e.g. watercourses) did not exist in the field; therefore, these features were not classified as water bodies during Stantec's 2010 field investigations. Mapping of the results of the site investigations is provided in **Figure 2** (**Appendix A**).

2.4 QUALIFICATIONS

The following Stantec personnel were responsible for the identification of water bodies and for determining any implications associated with fish and fish habitat:

- Mark Pomeroy, B.Sc. – Fisheries Biologist
- Edward Malindzak, M.Sc. – Fisheries Biologist
- Kathleen Todd, M.Sc. – Senior Aquatic Ecologist

Curricula vitae are provided in **Appendix F**.

3.0 Existing Conditions and Predicted Impacts

3.1 SPECIES AT RISK

Through a review of available mapping provided by DFO (DFO, 2010) and according to fish community data provided by the MNR, two locations within the Project Location may contain fish and freshwater mussel species at risk. The background data suggests that four rare fish species and nine rare freshwater mussel species exist within the Unnamed Grand River Tributaries, specifically in reaches Gran-kk and Gran-ll (see **Figure 2.14** and Section 3.3.3). These data are summarized in **Table 3.1**.

Table 3.1: Potential Aquatic Species at Risk Occurrences within the Project Location

Common Name	Scientific Name	COSSARO Status[a]	COSEWIC Status[b]
Fish Species			
Eastern Sand Darter	*Ammocrypta pellucid*	Endangered	Endangered
American Eel	*Anguilla rostrata*	Endangered	Special Concern
Grass Pickerel	*Esox americana vermiculatus*	Special Concern	Special Concern
River Redhorse	*Moxostoma carinatum*	Special Concern	Special Concern
Silver Shiner	*Notropis photogenis*	Special Concern	Special Concern
Mussel Species			
Kidneyshell	*Ptychobranchus fasciolaris*	Endangered	Endangered
Round Hickorynut	*Obovario subrotunda*	Endangered	Endangered
Round Pigtoe	*Pleurobema sintoxia*	Endangered	Endangered
Snuffbox	*Epioblasma triquetra*	Endangered	Endangered
Wavy-rayed Lampmussel	*Lampsilis fasciola*	Threatened	Special Concern
Eastern Pondmussel	*Ligumia nasuta*	Endangered	Endangered
Fawnsfoot	*Truncilla donaciformis*	Endangered	Endangered
Mapleleaf	*Quadrula quadrula*	Threatened	Threatened
Rainbow	*Villosa iris*	Endangered	Threatened

[a] Committee on the Status of Species at Risk in Ontario
[b] Committee on the Status of Endangered Wildlife in Canada

The Eastern Sand Darter is listed as Endangered by COSSARO and COSEWIC, and is protected by the provincial *Endangered Species Act* (ESA) and the federal *Species at Risk Act* (SARA). The American Eel is listed as Endangered by COSSARO, but COSEWIC lists it as Special Concern. Therefore, the American Eel is protected under ESA, but is not subject to prohibitions under SARA. The Grass Pickerel, River Redhorse and Silver Shiner are listed as Special Concern by COSSARO and COSEWIC and are not subject to prohibitions under either the ESA or SARA. A review of habitat preferences for each species (SARA, 2010b, e, i, l) suggests that the only species that may be present in either of reaches Gran-kk or Gran-ll is the Grass Pickerel, due to its preference for densely vegetated, slow-moving watercourses (DFO, 2010e). As presented in **Table 3.1**, Grass Pickerel is designated a species of Special Concern and is not subject to the prohibitions discussed in Section 3.6.2.1. Instead, its habitat is protected under the general habitat protection provisions afforded by the *Fisheries Act*.

A review of habitat preferences for each mussel species (SARA, 2010a, c, d, f, g, h, j, k, l) suggests that the only species that may be present in either of reaches Gran-kk or Gran-ll is the Eastern Pondmussel, due to its unique habitat preferences in comparison to the other mussel species. Eastern Pondmussels prefer relatively shallow, slow moving or stagnant water with muddy substrate (SARA, 2010c). All other mussel species listed above tend to prefer moderate to fast flow over generally coarse substrate material. As presented in **Table 3.1**, COSEWIC has designated Eastern Pondmussel as Endangered. Its listing on Schedule 1 of SARA is expected imminently and, as such, the species and its habitat will be protected by the prohibitions discussed in Section 3.6.2.1.

3.2 WATER FEATURES

In the following sub-sections, available background data are provided for each subwatershed, followed by site-specific information regarding physical habitat and fish communities, as determined by Stantec in 2010. Potential impacts to fish habitat and general mitigation measures are provided for each site, where fish habitat is present. In some cases, DFO Operational Statements may be used for construction activities in or near water (e.g. crossing watercourses with overhead lines, underground cables, etc.). When an Operational Statement is used, mitigation measures provided in the Operational Statement will protect fish habitat and no further review or approvals are required.

Although specific Operational Statements are referenced in this report, consultation with the LPRCA, GRCA and/or DFO may result in site-specific construction methods and mitigation measures for some locations. Additional information regarding the permitting process from the LPRCA, GRCA and DFO is provided in Section 3.6.

The following information is presented on a subwatershed basis, within each of the three project components (wind, solar, and transmission). Listed generally west to east, by watershed, the Project Location has been described according to the following subwatersheds:

Long Point Region Conservation Authority (LPRCA)

- Stoney Creek
- Hemlock Creek
- Wardells Creek
- Evans Creek

Grand River Conservation Authority (GRCA)

- Unnamed Grand River Tributaries
- Holmes Creek and Sulphur Creek
- Unnamed Lake Erie Tributaries
- Mazi Drain

Some of the above subwatersheds contain more than one project component. Within each subwatershed, only those water features occurring within 120 m of the Project Location, and that were deemed to provide fish habitat, are summarized in Sections 3.1 to 3.3.

Results of the fall 2010 electrofishing survey are summarized in **Appendix C**.

3.3 WIND PROJECT

As indicated in Section 2.2, the presence or absence of water bodies within the Zone of Investigation was assessed using the definition of a water body provided in O. Reg. 359/09. Based on the results of field investigations and the records review, water bodies within 120 m of the Wind Project Location are summarized in **Table 3.2** and illustrated in **Figure 2** (**Appendix A**). Photographs and field notes of these investigations are provided in **Appendices B**, **C**, and **D**. Additional field surveys included fish sampling at selected locations and an assessment of fish habitat.

Water bodies within the 120 m Zone of the Investigation, where it was determined that fish habitat is present, are listed in **Table 3.2** and illustrated in **Figure 3** (**Appendix A**).

Table 3.2: Summary of Water Bodies and Fish Habitat within the 120 m Zone of Investigation (by subwatershed) – Wind Project

Subwatershed/Tributary/ Reach ID	Crossing Type		w/in 120 m of Turbine[b]	Fish Habitat	
	Access Road[a]	Overhead Collector Line		Direct	Indirect
LONG POINT REGION CONSERVATION AUTHORITY					
Stoney Creek					
No water bodies or fish habitat present within 120 m Zone of Investigation					
Hemlock Creek					
Hem-a		x		x	
Hem-b	x			x	
Hem-c	x		x (24)		x
Hem-d	x		x (20)		x
Hem-e		x		x	
Hem-k		x			x (downstream)
Hem-l		x			x
Hem-m		x			x (downstream)
Wardells Creek					

Table 3.2: Summary of Water Bodies and Fish Habitat within the 120 m Zone of Investigation (by subwatershed) – Wind Project

Subwatershed/Tributary/ Reach ID	Crossing Type		w/in 120 m of Turbine[b]	Fish Habitat	
	Access Road[a]	Overhead Collector Line		Direct	Indirect
Ward-g		x			x
Ward-j		x			x
Evans Creek					
Evans-a		x			x
Evans-c	x		x (12)		x
Evans-e		x			x
Evans-f		x			x
Evans-h		x		x	
Evan-i	x		x (37)		x
GRAND RIVER CONSERVATION AUTHORITY					
Unnamed Grand River Tributaries					
Gran-h	x	x			x
Gran-i	x	x	x (48)	x (upstream)	x (downstream)
Gran-p		x		x	
Gran-q	x		x (56)		x
Gran-r		x		x	
Gran-t		x			x
Gran-u			x (22, 31)	x	
Gran-w	x			x	
Gran-z	x		x (40)	x	
Gran-bb	x		x (47)		x
Gran-cc		x			x
Gran-dd	x	x		x	
Gran-ee	x		x (57)	x	
Gran-ff	x				x
Gran-gg	x		x (30)	x	
Gran-ii	x		x (26)		x
Gran-jj	x		x (15)	x	
Gran-kk	x		x (49)	x	
Gran-mm		x		x	
Gran-nn		x		x	
Gran-oo		x		x	
Gran-qq		x		x	
Holmes Creek/Sulphur Creek					
Holm-a	x	x			x
Holm-b	x				x
Holm-c		x			x
Holm-d	x		x (28)		x
Holm-e		x		x	
Holm-f		x			x
Holm-g		x		x (downstream)	

Table 3.2: Summary of Water Bodies and Fish Habitat within the 120 m Zone of Investigation (by subwatershed) – Wind Project

Subwatershed/Tributary/ Reach ID	Crossing Type		w/in 120 m of Turbine[b]	Fish Habitat	
	Access Road[a]	Overhead Collector Line		Direct	Indirect
Unnamed Lake Erie Tributaries					
Lake-a		x			x
Lake-e		x	x (6)		x
Lake-g			x (3)		x
Lake-h	x		x (54)		x
Lake-i		x		x	
Lake-n		x			x
Lake-p		x			x
Lake-r			x (5)		x
Mazi Drain					
Mazi-a	x		x (67)	x	
Mazi-b	x (w/in 120 m of access road)		x (64)	x	

[a] includes crane path and underground collector line

[b] Turbine Tower number in parentheses

According to correspondence from the MNR (MNR, 2011), the Great Lakes are not considered to be Lake Trout lakes under O. Reg. 359/09. Based on a review of the document entitled "Inland Ontario Lakes Designated for Lake Trout Management (MNR, 2003), there are no Lake Trout lakes that are at or above development capacity identified within 300 m of the Project Location.

3.3.1 Hemlock Creek

Hemlock Creek is a tributary of Stoney Creek (located to the west), which ultimately flows into Lake Erie (see **Figure 1**, **Appendix A**). No background information for Hemlock Creek related to fish communities or aquatic habitat was available from agencies. Field investigations conducted by Stantec in October 2010 revealed the presence of the following three fish species at Hemlock Creek sites:

- Central Mudminnow (*Umbra limi*)
- Brown Bullhead (*Ameiurus nebulosus*)
- Green Sunfish (*Lepomis cyanellus*)

None of the fish species captured in Hemlock Creek tributaries are considered indicator species, although species such as Central Mudminnow and Brown Bullhead are considered tolerant of degraded habitat conditions (CVC, 2003).

Within the Zone of Investigation, there are:

- Seven reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat, and are crossed or are within 120 m of proposed overhead collector lines (**Table 3.2**);Three reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat and are crossed by an access road and buried collector line (**Table 3.3**); and

- Two water reaches that have been designated as bodies that indirectly contribute to fish habitat and are within 120 m of a wind turbine (**Table 3.3**).

Habitat and fish community information at locations identified in **Figures 3.4** (reaches Hem-a, -b, -c, -d, -g, -h, -i, -j, -k, and -l) and **3.6** (reaches Hem-d through -h, and Hem-j through -o) (**Appendix A**) are provided in **Table 3.3** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.3: Summary of Fish Habitat Within the 120 m Zone of Investigation – Hemlock Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Hem-a	Permanently flow dominated by pool morphology Bankfull width = 3.5 m Water depth = 50 cm Substrate = clay Fished October 2010 Fish habitat	Overhead collector line to be located within 120 m of water body providing fish habitat. (refer to **Figure 3.4**)	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat (see Sections 4.1 and 4.3).	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Hem-b	Intermittent flow dominated by pool morphology Bankfull width = 4.5 m Water depth = 7 cm Substrate = clay Fish habitat (connected to Hem-a)	To be crossed by access road to Turbine #58. Buried collector line to be located within 120 m of water body providing fish habitat. (refer to **Figure 3.4**)	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1 Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. (Sections 4.1, 4.2 and 4.4).	Maintain flow conveyance through site and beneath the access road. Backfill culvert with native fill material. See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Hem-b would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Hem-c	Intermittent flow dominated by pool morphology Bankfull width = 2 m Water depth = 2 cm Substrate = clay, silt Contributes indirectly to fish habitat	To be crossed by access road to Turbine #24. Buried collector line and Turbine #24 to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figure 3.4**)	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1 Activities within the constructible area of Turbine #24 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. (Sections 4.1, 4.2 and 4.4).	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Hem-c would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Hem-d	Intermittent flow dominated by isolated	To be crossed by	Temporary increase in	Maintain flow	The only net effect

Table 3.3: Summary of Fish Habitat Within the 120 m Zone of Investigation – Hemlock Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
	pools Bankfull = 0.5 m Water depth = 7 cm Substrate = clay, silt Contributes indirectly to fish habitat, may have seasonal fish habitat downstream in form of Northern Pike spawning habitat	access road. Buried collector line and Turbine #20 to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figures 3.4** and **3.6**)	surface water turbidity due to runoff during construction. See Section 4.1 Activities within the constructible area of Turbine #20 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. (Sections 4.1, 4.2 and 4.4).	conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	on Reach Hem-d would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Hem-e	Intermittent flow dominated by shallow isolated pool morphology Bankfull width = 3.5 Water depth = 10 cm Substrate = clay, silt Fished October 2010 Fish habitat	Overhead collector line to be located within 120 m of water body providing fish habitat. (refer to **Figures 3.4** and **3.6**)	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat (see Sections 4.1 and 4.3).	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Hem-k	Intermittent flow through ill-defined channel downstream of Kohler Road Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figures 3.4** and **3.6**)	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat (see Sections 4.1 and 4.3).	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Hem-l	Intermittent flow through ill-defined channel Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figures 3.4** and **3.6**)	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat (see Sections 4.1 and 4.3).	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected

Table 3.3: Summary of Fish Habitat Within the 120 m Zone of Investigation – Hemlock Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Hem-m	Intermittent flow through ill-defined channel downstream of Kohler Road Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figures 3.4** and **3.6**)	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat (see Sections 4.1 and 4.3).	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Hem-o	Permanent flow Fish Habitat	Overhead collector line to be located within 120 m of water body providing fish habitat. (refer to **Figures 3.4** and **3.6**)	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat (see Sections 4.1 and 4.3).	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected

a see **Figures 3.4** and **3.6** (**Appendix A**)
b assumes all mitigation measures are implemented and successful

3.3.2 Holmes Creek/Sulphur Creek

Located in the northern part of the Project Location, Holmes Creek converges with Sulphur Creek shortly before both converge with the Grand River. Background data obtained from the MNR indicate (MNR, 2009) that Sulphur Creek possesses a warmwater thermal regime and contains Walleye (*Sander vitreus*). No other fish community data were available for Sulphur Creek. No background fish community or aquatic habitat data were available for Holmes Creek.

Electrofishing efforts for Holmes Creek by Stantec in October 2010 yielded the following three fish species:

- Central Mudminnow
- Fathead Minnow (*Pimephales promelas*)
- Creek Chub (*Semotilus atromaculatus*)

Electrofishing efforts for Sulphur Creek by Stantec in October 2010 yielded the following three fish species:

- Common Shiner (*Luxilus cornutus*)
- Fathead Minnow
- Green Sunfish

None of the fish species captured in either watercourse are considered indicator species, although species such as Central Mudminnow and Fathead Minnow are considered tolerant of degraded habitat conditions (CVC, 2003).

Within the Zone of Investigation, there are:

- Five reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat, and are crossed or are within 120 m of proposed overhead collector lines (**Table 3.4**);
- Three reaches that have been designated as water bodies that indirectly contribute to fish habitat and are crossed by an access road and buried collector line (**Table 3.4**); and
- One reach that has been designated a water body that indirectly contributes to fish habitat and is within 120 m of a wind turbine (**Table 3.4**).

Habitat and fish community information at locations identified in **Figures 3.2** (reaches Holm-a through -f, -h through -k), **3.3** (Holm-a through -l), and **3.5** (Holm-g) (**Appendix A**) are provided in **Table 3.4** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.4: Summary of Fish Habitat Within the 120 m Zone of Investigation – Holmes Creek/Sulphur Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Holm-a	**Irish Line** Intermittent flow through channelized agricultural feature with isolated pools at roadside culvert Pool depth = 25 cm Dense vegetation in channel **Access Road to Turbine #46** Channelized feature, intermittent flow dominated by flat morphology Bankfull width = 4.5 m Water depth = 10 cm Substrate = clay, soil **Access Road to Turbine #23** Channelized feature, intermittent flow dominated by pool morphology Bankfull width = 2 m Water depth = 15 cm Fished October 2010 Contributes indirectly to fish habitat	**Irish Line** Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.2** and **3.3)** **Access Road to Turbine #46** To be crossed by access road to Turbine #46. **(**refer to **Figures 3.2** and **3.3)** **Access Road to Turbine #23 and Turbine #28** To be crossed by access road to Turbine #23 and Turbine #28. **(**refer to **Figures 3.2** and **3.3)**	**Irish Line** With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3. **Access Roads** Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. Sections 4.1, 4.2 and 4.4.	**Irish Line** See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**) **Access Roads** Maintain flow conveyance through site and beneath the access road to downstream fish habitat. See Sections 5.1, 5.2 and 5.4.	**Irish Line** None expected **Access Roads** The only net effect on Reach Holm-a would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Holm-b	Channelized feature, intermittent flow dominated by pool morphology Bankfull width = 3 m Water depth = 10 cm Substrate = clay, silt, muck Fished October 2010 Contributes indirectly to fish habitat	To be crossed by access road and buried collector line to Turbine #46. **(**refer to **Figures 3.2** and **3.3)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Holm-b would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.

Table 3.4: Summary of Fish Habitat Within the 120 m Zone of Investigation – Holmes Creek/Sulphur Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Holm-c	High gradient intermittent channel through wooded area. Mix of riffle, pool, run, and flat morphology. Bankfull width = 5.5 m Water depth = 15 cm Substrate = cobble Fished October 2010 Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.2** and **3.3)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Holm-d	Channelized feature, permanent flow dominated by pool morphology Bankfull width = 3.5 m Water depth = 15 cm Substrate = clay, silt Fished October 2010 Contributes indirectly to fish habitat	To be crossed by access road to Turbine #23. Buried collector line and Turbine #28 to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.2** and **3.3)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #28 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Hem-d would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Holm-e	Permanent flow with undercut banks. Mix of pool and run morphology. Bankfull width = 3 m Water depth = 75 cm Substrate = clay, gravel, cobble Fished October 2010 Fish habitat, may contain Northern Pike spawning habitat	Overhead collector line to be located within 120 m of water body containing fish habitat. **(**refer to **Figures 3.2** and **3.3)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected

Table 3.4: Summary of Fish Habitat Within the 120 m Zone of Investigation – Holmes Creek/Sulphur Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Holm-f	Intermittent flow contributing to Holm-e immediately downstream (west) Bankfull width = 2.5 m Water depth = 5 cm Substrate = clay, cobble, gravel Heavy rain within 24 hrs of aquatic habitat assessment Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.2** and **3.3)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Holm-g	Downstream of Kohler Road and Link Road, permanent flow in braided channels containing dense reed canary grass and predominantly pool morphology Bankfull width = 3 m Water depth = 20 cm Substrate = clay Fished October 2010 Fish habitat, may contain Northern Pike spawning habitat downstream of Kohler Road Upstream piped	Overhead collector line to be located within 120 m of water body providing fish habitat. **(**refer to **Figures 3.3** and **3.5)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected

a see **Figures 3.2**, **3.3**, and **3.5** (**Appendix A**)
b assumes all mitigation measures are implemented and successful

3.3.3 Unnamed Grand River Tributaries

The watercourses contained under the heading of “Unnamed Grand River Tributaries” consist of numerous, small, unnamed tributaries that drain directly to the Grand River, located along the northern edge of the study area. These watercourses were itemized into forty-one different reaches for the purposes of assessment.

According to background information (GRIN, 2011), reaches Gran-hh and Gran-nn (see **Figures 2.13** and **2.17**, **Appendix A**) are intermittent watercourses. Background data also indicate that reach Gran-mm (see **Figure 2.14**, **Appendix A**) is a warmwater watercourse. No further data relating to thermal regime, fish community, or aquatic habitat was obtained for other reaches of the Unnamed Grand River Tributaries.

Electrofishing efforts for the Unnamed Grand River Tributaries by Stantec in October 2010 yielded the following six fish species:

- *Alosa* sp.
- Common Shiner
- Bluntnose Minnow (*Pimephales notatus*)
- Fathead Minnow
- Central Mudminnow
- Green Sunfish

None of the fish species captured in the Unnamed Grand River Tributaries are considered indicator species, although species such as Central Mudminnow, Fathead Minnow and Bluntnose Minnow are considered tolerant of degraded habitat conditions (CVC, 2003).

Although the potential for fish and mussel species at risk to occur were identified within reaches Gran-kk and Gran-ll by DFO and MNR (see Section 3.1), none of these species were observed during Stantec’s field investigations. Additionally, Gran-ll is not a water body and, therefore, does not possess habitat characteristics capable of supporting fish or mussel species at risk.

Within the Zone of Investigation, there are:

- Twelve reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat, and are crossed or are within 120 m of proposed overhead collector lines (**Table 3.5**);

- Twelve reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat and are crossed by an access road and buried collector line (**Table 3.5**); and

- Fourteen reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat and are within 120 m of a wind turbine (**Table 3.5**).

Habitat and fish community information at locations identified in **Figures 3.1** (reaches Gran-a through -g), **3.2** (reaches Gran-a, Gran-b), **3.5** (reaches Gran-g through -j, Gran-l, Gran-m, and Gran-pp), **3.6** (reach Gran-n), **3.7** (reaches Gran-q, -r, -t, -u through -w, and -pp), **3.8** (reaches Gran-o, Gran-p, and Gran-s), **3.11** (reaches Gran-t, -x through -z, and -aa through -dd), **3.13** (reaches Gran-y, -z, -aa through -jj, and -oo), **3.14** (reaches Gran-dd, -ff, -gg, -ii, and -jj through -mm), and **3.17** (reaches Gran-nn, and -qq) (**Appendix A**) are provided in **Table 3.5** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.5: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Grand River Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Gran-h	**Access Road** Intermittent flow dominated by pool morphology Bankfull depth = 2 m Water depth = 10 cm Substrate = clay Contributes indirectly to fish habitat, may have seasonal fish habitat downstream in form of Northern Pike spawning habitat upstream (south) of Link Road **Collector Line at Link Road** Intermittent flow, water body dry during field investigations Contributes indirectly to fish habitat, may have seasonal fish habitat downstream in form of Northern Pike spawning habitat upstream (south) of Link Road	**Access Road** To be crossed by access road to Turbine #48. Buried collector line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figure 3.5)** **Collector Line at Link Road** Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figure 3.5)**	**Access Road** Short-term increase in turbidity from runoff and soil erosion during construction. See Section 4.1 Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4. **Collector Line at Link Road** With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	**Access Road** Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4. **Collector Line at Link Road** See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	**Access Road** The only net effect on Reach Gran-h would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required. **Collector Line at Link Road** None expected
Gran-i	**Access Road and Turbine** Intermittent flow, ill-defined channel dominated by pool morphology Bankfull width = 1.5 m Water depth = 4 cm Substrate = clay Contributes indirectly to fish habitat, may have seasonal fish habitat downstream in form of Northern Pike spawning habitat **Collector Line at Richert Road** Permanent flow with run and pool morphology Bankfull width = 4.5 m	**Access Road and Turbine** Access road to Turbine #48, buried collector line and Turbine #48 to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figure 3.5)** **Collector Line at Richert Road** Overhead collector line to be located within 120 m of water body providing fish	**Access Road and Turbine** Short-term increase in turbidity from runoff and soil erosion during construction. See Section 4.1 **Collector Line at Richert Road** With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	**Access Road and Turbine** Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4. **Collector Line at Richert Road** See Sections 5.1 and 5.3. DFO	**Access Road and Turbine** The only net effect on Reach Gran-i would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required. **Collector Line at**

Table 3.5: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Grand River Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
	Water depth = 50 cm (substantial rain within 24 hrs of aquatic habitat assessment) Substrate = clay, boulder Fish habitat	habitat. **(**refer to **Figure 3.5)**		Operational Statement for Overhead Line Construction may apply (**Appendix E**)	**Richert Road** None expected
Gran-p	Intermittent flow dominated by isolated pools Fish Habitat	Overhead collector line and access road to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.8)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Gran-q	Intermittent flow, water body dry during field investigations Contributes indirectly to fish habitat	To be crossed by access road to Turbine# 56 and Turbine #25. Buried collector line and Turbine #56 to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figure 3.7)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1 Activities within the constructible area of Turbine #56 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Gran-q would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Gran-r	Permanent ponded area with diffuse intermittent connection upstream and downstream Water depth = 50 cm Substrate = detritus, muck	Overhead collector line and access road to be located within 120 m of water body containing fish habitat. **(**refer to **Figure**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line	None expected

Table 3.5: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Grand River Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
	Fished October 2010 Fish habitat	**3.7)**	Sections 4.1 and 4.3.	Construction may apply (**Appendix E**)	
Gran-t	Intermittent flow dominated by run morphology Bankfull width = 2 m Water depth = 30 cm Substrate = silt, clay Contributes indirectly to fish habitat, may contain Northern Pike spawning habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.7** and **3.11)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Gran-u	Permanent flow with pool, run, and flat morphology Bankfull width = 7 m Water depth = 7 cm Substrate = clay, gravel, cobble, silt, boulder, and detritus Fished October 2010 Fish habitat	Turbine #22 and buried collector line to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.7)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #5 may affect the reach despite being outside of the turbine constructible area. .	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Gran-w	Permanent flow with pool and run morphology Bankfull width = 3.5 m Water depth = 25 cm Substrate = muck, clay Fished October 2010 Fish habitat, possible Northern Pike spawning habitat	To be crossed by access road to Turbine #22. Buried collector line to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.7)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and	Maintain flow conveyance through site and beneath the access road. Backfill culvert with native fill material. See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Gran-w would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.

Table 3.5: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Grand River Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
			4.4.		
Gran-z	Intermittent flow with variable morphology Bankfull width = 3.5 m Water depth = 10 cm Substrate = clay Fished October 2010 Fish habitat, possible Northern Pike spawning habitat	To be crossed by access road to Turbine #40. Buried collector line and Turbine #40 to be located within 120 m of water body containing fish habitat. **(**refer to **Figures 3.11** and **3.13)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #40 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road. Backfill culvert with native fill material. See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Gran-z would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Gran-bb	Intermittent flow with variable morphology Bankfull width = 4 m Water depth = 40 cm Substrate = clay, silt Contributes indirectly to fish habitat	To be crossed by access road to Turbine #47. Buried collector line and Turbine #47 to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.11** and **3.13)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1 Activities within the constructible area of Turbine #47 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Gran-bb would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.

Table 3.5: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Grand River Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
			due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.		
Gran-cc	Intermittent flow with run morphology Bankfull width = 3.5 m Water depth = 7 cm Substrate = detritus, clay Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.11** and **3.13)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Gran-dd	**Intersection Haldimand Road 20 and Dunn Hald Townline Road** Intermittent flow with variable morphology Bankfull width = 4.5 m Water depth = 30 cm Substrate = clay Fished October 2010 Fish habitat, possible Northern Pike spawning habitat **Access Road to Turbine # 57** Permanent flow with run and pool morphology Bankfull width = 7 m Water depth = 40 cm Substrate = clay Fished October 2010 Fish habitat, possible Northern Pike spawning habitat	**Intersection Haldimand Road 20 and Dunn Hald Townline Road** Overhead collector line to be located within 120 m of water body containing fish habitat. **(**refer to **Figures 3.11** and **3.13)** **Access Road to Turbine # 57** To be crossed by access road to Turbine #57. **(**refer to **Figures 3.11** and **3.13)**	**Intersection Haldimand Road 20 and Dunn Hald Townline Road** With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3. **Access Road to Turbine # 57** Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	**Intersection Haldimand Road 20 and Dunn Hald Townline Road** See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**) **Access Road to Turbine # 57** Maintain flow conveyance through site and beneath the access road. Backfill culvert with native fill material. See Sections 5.1, 5.2 and 5.4.	**Intersection Haldimand Road 20 and Dunn Hald Townline Road** None expected **Access Road to Turbine # 57** The only net effect on Reach Gran-dd would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be

Table 3.5: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Grand River Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Gran-ee	Permanent flow with pool and run morphology Bankfull width = 5 m Pool depth at sample loc'n > 1 m Fish habitat	Access road to Turbine #57, buried collector line and Turbine #57 to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.13)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #57 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road. Backfill culvert with native fill material. See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Gran-ee would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Gran-ff	Intermittent flow with pool and run morphology Bankfull width = 4 m Water depth = 10 cm Substrate = clay Contributes indirectly to fish habitat, may have seasonal fish habitat in form of Northern Pike spawning habitat	To be crossed by access road to Turbine #30. Buried collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.13** and **3.14)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Gran-ff would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.

Table 3.5: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Grand River Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Gran-gg	Online pond and watercourse exhibiting intermittent flow with pool morphology Outflow channel bankfull width = 3 m Outflow channel water depth = 7.5 cm Substrate of pond = muck, clay, and detritus Substrate of outflow channel = clay, and detritus Fish habitat	Access road to Turbine #30, buried collector line and Turbine #30 to be located within 120 m of water body containing fish habitat. **(**refer to **Figures 3.13** and **3.14)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #30 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road. Backfill culvert with native fill material. See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Gran-gg would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Gran-ii	Seeps and intermittent flow in upstream portion of channel; downstream portion recently channelized and dry Bankfull width = 3 m Water depth (upstream) = 7 cm Substrate = clay, cobble, and gravel Contributes indirectly to fish habitat	Access road to Turbine #26 and Turbine #26 to be located within 120 m of water body indirectly contributing to fish habitat. **(**refer to **Figures 3.13** and **3.14)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #26 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Gran-ii would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.

Table 3.5: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Grand River Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Gran-jj	Pond and intermittent outlet channel Outlet channel bankfull width = 1.5 Outlet channel water depth = 30 cm Pond dimensions = 15 m x 20 m Pond water depth > 1 m Outflow channel substrate = clay, muck Fished October 2010 Fish habitat, may contain Northern Pike spawning habitat	Access road to Turbine #15, #49 and #50, buried collector line and Turbine #15 to be located within 120 m of water body containing fish habitat. **(**refer to **Figures 3.13** and **3.14)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #15 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road. Backfill culvert with native fill material. See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Gran-jj would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Gran-kk	Pond and ill-defined intermittent inlet channels. According to DFO and MNR, potential species at risk habitat. No rare fish or mussels observed by Stantec. Inlet channel bankfull width = 40 cm Inlet channel depth = 35 cm Pond water depth > 1 m Substrate = clay, muck Fish habitat	To be crossed by access road to Turbine #15, #49 and #50, and by buried collector line. Turbine #49 to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.14)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1 Activities within the constructible area of Turbine #49 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road. Backfill culvert with native fill material. See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Gran-jj would be the culvert for the access road. May require DFO Authorization, Species at Risk Act permit and Endangered Species Act permit. See Section 3.6.2.

Table 3.5: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Grand River Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Gran-mm	Intermittent flow with pool morphology Bankful width = 2.5 m Water depth = 30 cm Substrate = clay Fished October 2010 Fish habitat	Overhead collector line to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.14)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Gran-nn	Intermittent flow within well defined channel on south side of Kings Row. Channel not present upstream of Kings Row. Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.17)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Gran-oo	Permanent flow with variable morphology Bankfull width = 5.5 m Water depth = 30 cm Substrate = clay, boulder, sand, and gravel Fished October 2010 Fish habitat	Overhead collector line to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.13)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Gran-qq	Permanent flow in well defined, incised channel within 500 m of Grand River Fish habitat	Overhead collector line to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.17)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected

a see **Figures 3.1**, **3.2**, **3.5**, **3.6**, **3.7**, **3.8**, **3.11**, **3.13**, **3.14**, and **3.17** (**Appendix A**)

b assumes all mitigation measures are implemented and successful

3.3.4 Wardells Creek

Wardells Creek is a direct tributary of Lake Erie that flows generally north to south through the southeast edge of the Study Area. No background data related to thermal regime, fish community or aquatic habitat was available from agencies.

Electrofishing efforts for Wardells Creek by Stantec in October 2010 yielded the following four fish species:

- Common Shiner
- Fathead Minnow
- Brook Stickleback (*Culaea inconstans*)
- Largemouth Bass (*Micropterus salmoides*)

Largemouth Bass are generally accepted as being an indicator of slow moving or stagnant watercourses possessing a warmwater thermal regime.

Within the Zone of Investigation, there are:

- One reach that has been designated a water body that indirectly contributes to fish habitat, and is crossed or is within 120 m of proposed overhead collector lines (**Table 3.6**);
- Two reaches that have been designated as water bodies that indirectly contribute to fish habitat and are crossed by an access road and buried collector line (**Table 3.6**); and
- One reach that has been designated a water body that indirectly contributes to fish habitat and is within 120 m of a wind turbine (**Table 3.6**).

Habitat and fish community information at locations identified in **Figures 3.6** (reaches Ward-a, and -b), **3.8** (reaches Ward-b through -j), **3.9** (reaches Ward-f through -h, and -k through -m), and **3.10** (reaches Ward-l, -n, –o, and -p) (**Appendix A**) are provided in **Table 3.6** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.6: Summary of Fish Habitat Within the 120 m Zone of Investigation – Wardells Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Ward-g	Intermittent flow through low lying area dominated by pool morphology in diffuse channel network Reed canary grass prevalent Water depth = 5 cm Substrate = clay Contributes indirectly to fish habitat, may contain Northern Pike spawning habitat	Overhead collector line and Turbine #17 to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.8** and **3.9)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat See Sections 4.1 and 4.3. Activities within the constructible area of Turbine #47 may affect the reach despite being outside of the turbine constructible area.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	None expected
Ward-j	Intermittent flow through low lying area dominated by pool morphology Reed canary grass prevalent Dry during field investigations Contributes indirectly to fish habitat, may contain Northern Pike spawning habitat	Access road to Turbine #52 and #53, buried collector line and Turbine #52 to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figure 3.8)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #52 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Ward-j would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.

a see **Figures 3.6**, **3.8**, **3.9**, and **3.10** (**Appendix A**)

b assumes all mitigation measures are implemented and successful

3.3.5 Evans Creek

Adjacent to the eastern limit of the Wardells Creek subwatershed, the Evans Creek subwatershed also flows generally north to south through the Study Area to converge with Lake Erie near Evans Point. Background data provided by MNR (MNR, 2010) indicates that Evans Creek is a warmwater system supporting a diverse fish community. Fish species recorded in the MNR data include:

- Northern Pike (*Esox lucius*)
- Central Mudminnow
- Brown Bullhead
- Golden Shiner (*Notemigonus crysoleucas*)
- Rosyface Shiner (*Notropis rubellus*)
- Sand Shiner (*Notropis stramineus*)
- Fathead Minnow
- Creek Chub
- Banded Killifish (*Fundulus diaphanus*)
- Pumpkinseed (*Lepomis gibbosus*)
- Yellow Perch (*Perca flavescens*)

Electrofishing efforts for Evans Creek by Stantec in October 2010 yielded the following three fish species:

- Bluntnose Minnow
- Fathead Minnow
- Central Mudminnow

The combined MNR/Stantec fish species list suggests a diverse warm/coolwater fish community containing small- and large-bodied fish, as well as fish with specialized spawning requirements (i.e. Northern Pike).

Within the Zone of Investigation, there are:

- Four reaches that have been designated as water bodies that contain habitat and are crossed or are within 120 m of proposed overhead collector lines (**Table 3.7**);

- Two reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat and are crossed by an access road and buried collector line (**Table 3.7**); and

- Two reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat and are within 120 m of a wind turbine (**Table 3.7**).

Habitat and fish community information at locations identified in **Figures 3.8** (reaches Evans-a, and -d), **3.9** (reaches Evans-a, -c, -e, and -f), **3.10** (reaches Evans-a, -e, -f, -h, and -i), **3.11** (reaches Evans-c, -g, -i, and -k), and **3.12** (reaches Evans-c, -d, and -f) (**Appendix A**) are provided in **Table 3.7** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.7: Summary of Fish Habitat Within the 120 m Zone of Investigation – Evans Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Evans-a	Intermittent, well defined channel with exposed, eroding banks Bankfull width = 2.5 m Water depth = 10 cm Substrate = clay, silt, gravel Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.8, 3.9** and **3.10)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Evans-c	Intermittent flow dominated by pool morphology Bankfull width = 4 m Water depth = 5 cm Substrate = clay Contributes indirectly to fish habitat, may contain Northern Pike spawning habitat	Access road to Turbine #12, buried collector line and Turbine # 12 to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.8, 3.9, 3.11** and **3.12)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #12 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4)	The only net effect on Reach Evans-c would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Evans-e	Intermittent, well defined channel with exposed banks Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.9** and **3.10)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line	None expected

Table 3.7: Summary of Fish Habitat Within the 120 m Zone of Investigation – Evans Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
			habitat. See Sections 4.1 and 4.3.	Construction may apply (**Appendix E**)	
Evans-f	Intermittent, well defined channel with exposed banks Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.8, 3.9, 3.11** and **3.12)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Evans-h	At confluence with Lake Erie Permanent flow within wide, meandering channel dominated by flat morphology Bankfull width = 6 m Water depth = 40 cm Substrate = silt, clay, cobble, detritus, boulder Fish habitat	Overhead collector line to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.10)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Evans-i	Intermittent flow with pool, run, and flat morphology Bankfull width = 2 m Water depth = 25 cm Substrate = clay, detritus Contributes indirectly to fish habitat Heavy rain within 24 hrs of aquatic habitat assessment	To be crossed by access road to Turbines #37 and #68. Buried collector line and Turbine #37 to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.10** and **3.11)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #37 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Evans-j would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.

Table 3.7: Summary of Fish Habitat Within the 120 m Zone of Investigation – Evans Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
			disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.		

a see **Figures 3.8** through **3.12** (**Appendix A**)
b assumes all mitigation measures are implemented and successful

3.3.6 Unnamed Lake Erie Tributaries

The Unnamed Lake Erie Tributaries subwatershed is a collection of small unnamed watercourses located in the southeastern part of the Project Location that flow north to south and empty directly into Lake Erie. They generally consist of agricultural drains and water features with ill-defined intermittent channels. No background data related to thermal regime, fish community or aquatic habitat for the Unnamed Lake Erie Tributaries was available from agencies.

No fish were captured by Stantec crews during electrofishing of the Unnamed Lake Erie Tributaries.

Within the Zone of Investigation, there are:

- Four reaches that have been designated as water bodies that contain habitat and are crossed or are within 120 m of proposed overhead collector lines (**Table 3.8**);
- Two reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat and are crossed by an access road and buried collector line (**Table 3.8**); and
- Two reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat and are within 120 m of a wind turbine (**Table 3.8**).

Habitat and fish community information at locations identified in **Figures 3.10** (reaches Lake-j, and –r through -t), **3.12** (reaches Lake-a through -c, -g, and -k), **3.15** (reaches Lake-d through –i, and -u), **3.16** (reaches Lake-i, and -l through -p), **3.17** (reach Lake-p), and **3.18** (reaches Lake-c, -e through -h, -k, and -r) (**Appendix A**) are provided in **Table 3.8** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.8: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Lake Erie Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Lake-a	Intermittent flow downstream (west) of South Cayuga Road Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figure 3.12)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Lake-e	Intermittent flow dominated by pool morphology Bankfull width = 2 m Water depth = 7 cm Substrate = detritus, clay Fished October 2010 Contributes indirectly to fish habitat	To be crossed by buried collector line between Turbine #6 and Turbine #3. **(**refer to **Figures 3.15** and **3.18)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #6 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Lake-e would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Lake-g	Intermittent flow in steep-sided, well-vegetated agricultural drain dominated by pool morphology Bankfull width = 3.5 m Water depth = 2 cm Fished October 2010 Contributes indirectly to fish habitat	Access road to Turbine #3, buried collector line and Turbine #3 to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.12, 3.15** and **3.18)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #3 may affect the reach despite being outside of the turbine constructible area.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Lake-g would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.

Table 3.8: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Lake Erie Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
			Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.		
Lake-h	Intermittent flow in well defined channel dominated by pool morphology Bankfull width = 2.5 m Water depth = 5 cm Substrate = clay, soil Contributes indirectly to fish habitat Heavy rain within 24 hrs of aquatic habitat assessment	To be crossed by access road to Turbine #54. Buried collector line and Turbine #54 to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.15** and **3.18)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #54 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Lake-h would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Lake-i	Permanent flow in well defined channel Fish habitat	Overhead collector line to be located within 120 m of water body containing fish habitat. **(**refer to **Figures 3.15** and **3.16)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected

Table 3.8: Summary of Fish Habitat Within the 120 m Zone of Investigation – Unnamed Lake Erie Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Lake-n	Intermittent flow within channelized agricultural watercourse Channel only exists downstream of Kings Row Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figure 3.16)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Lake-p	Intermittent flow within channelized agricultural watercourse Channel only exists downstream of Kings Row Contributes indirectly to fish habitat	Overhead collector line to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.16** and **3.17)**	With the exception of potential construction activities, overhead collector lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Lake-r	Intermittent flow within channelized agricultural watercourse Channel only exists downstream of wooded area located at northern limit of 120 m Zone of Investigation Contributes indirectly to fish habitat	Buried collector line and Turbine #5 to be located within 120 m of water body contributing indirectly to fish habitat. **(**refer to **Figures 3.10** and **3.18)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #5 may affect the reach despite being outside of the turbine constructible area.	Maintain flow conveyance through site and beneath the access road to downstream fish habitat See Sections 5.1, 5.2 and 5.4.	None expected

a see **Figures 3.10**, **3.12**, and **3.15**, **3.16**, **3.17**, **3.18** (**Appendix A**)
b assumes all mitigation measures are implemented and successful

3.3.7 Mazi Drain

Mazi Drain is a large, channelized agricultural drainage feature located within the eastern extent of the Project Location that originates in farm fields to the west of the Dunnville Airport. The Mazi Drain channel then skirts the south limit of the airport prior to converging with the Grand River in a marshy area directly across the river from Port Maitland. Background data obtained from the MNR (MNR, 2009) and GRCA (GRIN, 2011) indicate that headwater reaches of Mazi Drain are intermittent and possess a cold/coolwater thermal regime. The same data indicate that the majority of the watercourse length possesses a warmwater thermal regime and contains permanent flow. No further data relating to thermal regime, fish community, or aquatic habitat was obtained for other reaches of the Mazi Drain.

Stantec data, obtained through electrofishing efforts in November 2010, indicate that the following two small-bodied fish species are present in Mazi Drain:

- Fathead Minnow
- Brook Stickleback

Within the Zone of Investigation, there is:

- One reach that has been designated a water body that contains fish habitat and is crossed or is within 120 m of proposed overhead collector lines (**Table 3.9**);
- One reach that has been designated a water body that contains fish habitat and is crossed by an access road and buried collector line (**Table 3.9**); and
- One reach that has been designated a water body that contain fish habitat and is within 120 m of a wind turbine (**Table 3.9**).

Habitat and fish community information at locations identified in **Figures 3.16** (reach Mazi-a) and **3.17** (reach Mazi-b) (**Appendix A**) are provided in **Table 3.9** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.9: Summary of Fish Habitat Within the 120 m Zone of Investigation – Mazi Drain Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Mazi-a	Warmwater thermal regime Intermittent flow in well defined channel with run and pool morphology Bankfull width = 3.5 m Water depth = 15 cm Substrate = clay, detritus, silt, sand, cobble, boulder Fished November 2010 Fish habitat	To be crossed by access road to Turbine #67. Buried collector line and Turbine #67 to be located within 120 m of water body containing fish habitat. **(**refer to **Figure 3.16)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #67 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road. Backfill culvert with native fill material. See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Mazi-a would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.
Mazi-b	Warmwater thermal regime Permanent flow in well defined channel with variable morphology Fish habitat	Access road, buried collector line and Turbine #64 to be located within 120 m of a water body containing fish habitat. **(**refer to **Figure 3.17)**	Temporary increase in surface water turbidity due to runoff during construction. See Section 4.1. Activities within the constructible area of Turbine #64 may affect the reach despite being outside of the turbine constructible area. Direct effects on watercourse due to culvert crossing and disturbance of watercourse due to crossing of underground collector line. See Sections 4.1, 4.2 and 4.4.	Maintain flow conveyance through site and beneath the access road. Backfill culvert with native fill material. See Sections 5.1, 5.2 and 5.4.	The only net effect on Reach Mazi-b would be the culvert for the access road. Can likely be mitigated – unlikely that DFO authorization would be required.

a see **Figures 3.16** and **3.17** (**Appendix A**)

b assumes all mitigation measures are implemented and successful

3.4 SOLAR PROJECT

As indicated in Section 2.2, the presence or absence of water bodies within the Zone of Investigation was assessed using the definition of a water body provided in O. Reg. 359/09. Based on the results of field investigations and the records review, water bodies within 120 m of the Solar Project Location are summarized in **Table 3.10** and illustrated in **Figures 2.5** through **2.6**, and **Figure 4.2** (**Appendix A**). Photographs and field notes of these investigations are provided in **Appendices B**, **C** and **D**. Additional field surveys included fish sampling at selected locations and an assessment of fish habitat. Water bodies within 120 m of the Project Location, where it was determined that fish habitat is present, are illustrated in **Figure 4.3** (**Appendix A**) and are listed in **Table 3.10**. No Lake Trout lakes occur within the Solar Project Location (MNR, 2003).

The Solar Project of the Grand Renewable Energy Park lies within the boundaries of two subwatersheds within the GRCA's jurisdiction; the Unnamed Grand River Tributaries subwatershed and the Wardells Creek subwatershed.

Table 3.10: Summary of Water Bodies and Fish Habitat Within the 120 m Zone of Investigation (by subwatershed) – Solar Project

Subwatershed/Tributary/Reach ID	Fish Habitat	
	Direct	**Indirect**
GRAND RIVER CONSERVATION AUTHORITY		
Unnamed Grand River Tributaries		
Gran-m	x	
Gran-n		x
Gran-p		x
Wardells Creek		
Ward-b		x

3.4.1 Unnamed Grand River Tributaries

As discussed in Section 3.3.3, "Unnamed Grand River Tributaries" consist of numerous, small, unnamed tributaries that drain directly to the Grand River, located along the northern edge of the Study Area.

The Grand River Information Network (GRIN) (GRIN, 2011) online mapping tool indicates that on lands proposed for solar panels installation, all watercourses are intermittent. No additional background information relating to thermal regime, fish community, or aquatic habitat was obtained for reaches of the Unnamed Grand River Tributaries within the proposed solar lands.

Electrofishing efforts by Stantec, on the Solar Project Location, yielded the following three fish species:

- Fathead Minnow
- Central Mudminnow
- Pumpkinseed

None of the fish species captured in the Unnamed Grand River Tributaries are considered indicator species, although Central Mudminnow and Fathead Minnow are considered tolerant of degraded habitat conditions (CVC, 2003).

Within the Zone of Investigation, there are:

- Nine reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat, and are crossed or are within 120 m of proposed overhead collector lines (**Table 3.11**); and
- Three reaches that have been designated as water bodies that contain fish habitat or indirectly contribute to fish habitat and are within 120 m of the proposed solar panel installation location (**Table 3.11**).

Habitat and fish community information at locations identified in **Figures 3.5** through **3.8**, and **4.3** (**Appendix A**) are provided in **Table 3.11** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.11: Summary of Fish Habitat within the 120 m Zone of Investigation – Unnamed Grand River Tributaries

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Gran-m	Permanent flow with predominantly flat morphology Online pond located at downstream end of reach Bankfull width = 1 m Water depth = 10 cm Substrate = clay, silt with sporadic hardpan clay Pond size = 15 m x 15 m Pond depth > 1 m Pond substrate = clay, silt, muck Fished October 2010 Fish habitat	Installation of solar panels within 120 m of watercourse that provides fish habitat. (refer to **Figures 3.5** and **4.3**)	Short-term increase in turbidity from runoff and soil erosion during construction. See Section 4.1.	No removal of woody vegetation associated with watercourse. 15 m setback from top of bank See Section 5.1.	None expected
Gran-n	Intermittent flow with isolated pools converging with Gran-m and Gran-p downstream. Water body not present upstream (west) of Wilson Road. Bankfull width = 0.5 m Water depth = 5 cm Substrate = silt, clay Contributes indirectly to fish habitat	Installation of solar panels within 120 m of watercourse that provides fish habitat. (refer to **Figures 3.6** and **4.3**)	Short-term increase in turbidity from runoff and soil erosion during construction. See Section 4.1.	No removal of woody vegetation associated with watercourse. 15 m setback from top of bank See Section 5.1.	None expected
Gran-p	Intermittent flow in narrow, incised channel with dense reed canary grass in riparian area. Water body not present between confluence of Gran-m, Gran-n and Gran-p (see Figure 4.2, Appendix A), and east field boundary (approx. 375 m east of Wilson Road). Contributes indirectly to fish habitat	Installation of solar panels within 120 m of watercourse that provides fish habitat. (refer to **Figures 3.8** and **4.3**)	Short-term increase in turbidity from runoff and soil erosion during construction. See Section 4.1.	No removal of woody vegetation associated with watercourse. 15 m setback from top of bank See Section 5.1.	None expected

a see **Figures 3.5** through **3.8,** and **4.3** (**Appendix A**)
b assumes all mitigation measures are implemented and successful

3.4.2 Wardells Creek

As discussed in Section 3.3.4, Wardells Creek is a direct tributary to Lake Erie located on the southeast edge of the Project Location.

No background data related to thermal regime, fish community or aquatic habitat was available from agencies. Electrofishing was conducted in reach Ward-b, but no fish were captured.

Within the Zone of Investigation, there is:

- One reach that has been designated a water body that contains fish habitat or indirectly contributes to fish habitat, and is crossed or is within 120 m of proposed overhead collector lines (**Table 3.12**).

Habitat and fish community information at locations identified in **Figures 3.6** and **4.3** (**Appendix A**) are provided in **Table 3.12** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.12: Summary of Watercourses within the 120 m Zone of Investigation – Wardells Creek Subwatershed

Reach ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Ward-b	Intermittent watercourse withvariable morphology Bankfull width = 4 m Water depth = 10 cm Substrate = bedrock, boulder, grave, clay, cobble Fished October 2010 Contributes indirectly to fish habitat, may contain seasonal fish habitat in the form of Northern Pike spawning habitat in upstream reaches (approx. 500 m northeast of Bains Road)	Installation of solar panels within 120 m of watercourse that contributes indirectly to fish habitat. (refer to **Figures 3.6** and **4.3**)	Short-term increase in turbidity from runoff and soil erosion during construction. See Section 4.1.	No removal of vegetation associated with watercourse. 15 m setback from top of bank See Section 5.1.	None expected

a see **Figure 4.3** (**Appendix A**)

b assumes all mitigation measures are implemented and successful

3.5 TRANSMISSION PROJECT

3.5.1 Transmission Line

As indicated in Section 2.1, the presence or absence of water bodies within the Zone of Investigation was assessed using the definition of a water body provided in O. Reg. 359/09. Based on the results of field investigations and the records review, water bodies within 120 m of the Transmission Project Location are summarized in **Table 3.13** and illustrated in **Figures 2.2** through **2.6**, **2.19** and **2.20** (**Appendix A**). Photographs and field notes of these investigations are provided in **Appendices B**, **C** and **D**. Additional field surveys included fish sampling at selected locations and an assessment of fish habitat. Water bodies within 120 m of the Project Location where it was determined that fish habitat is present, are listed in **Table 3.13**. No Lake Trout lakes occur within the Transmission Project Location (MNR, 2003).

The Transmission Project component of the Grand Renewable Energy Park lies within the boundaries of three subwatersheds. Two of the subwatersheds are within the LPRCA's jurisdiction, and one subwatershed is within the GRCA's jurisdiction

Table 3.13: Summary of Water Bodies and Fish Habitat Within the 120 m Zone of Investigation (by subwatershed) – Transmission Project

Subwatershed/Tributary/Reach ID	Fish Habitat	
	Direct	**Indirect**
LONG POINT CONSERVATION AUTHORITY		
Stoney Creek		
Ston-a	x	
Ston-b		x
Ston-g		x
Hemlock Creek		
Hem-a		x
Hem-c		x
Hem-d		x
Hem-e	x	
Hem-g		x
GRAND RIVER CONSERVATION AUTHORITY		
Wardells Creek		
Ward-b		x

3.5.1.1 Stoney Creek

Located in the northeast portion of the Project Location within the LPRCA, Stoney Creek headwater tributaries flow in a southerly and westerly direction across the transmission line corridor toward Lake Erie. MNR Fish Collection Records data from 1974 (MNR, 2010) indicate that Stoney Creek is a warmwater system that supports a diverse fish community; including several top level predators and small-bodied fish species as follows:

- Black Bullhead (*Ameiurus melas*)
- Black Crappie (*Pomoxis nigromaculatus*)
- Blacknose Shiner (*Notropis heterolepis*)
- Bluntnose Minnow
- Brown Bullhead
- Central Mudminnow
- Common Shiner
- Creek Chub
- Fathead Minnow
- Gizzard Shad (*Dorosoma cepedianum*)
- Golden Shiner
- Johnny Darter (*Etheostoma nigrum*)
- Largemouth Bass
- Least Darter (*Etheostoma microperca*)
- Longear Sunfish (*Lepomis megalotis*)
- Northern Pike
- Pumpkinseed
- Rainbow Darter (*Etheostoma caeruleum*)
- Redfin Shiner (*Lythrurus umbratilis*)

- Rock Bass (*Ambloplites rupestris*)
- Rosyface shiner
- Tadpole Madtom (*Noturus gyrinus*)

During fall field investigations, some of the reaches of Stoney Creek were observed to be dry, while other reaches exhibited high flows (following several days of heavy rain) and were not amenable to electrofishing.

Within this subwatershed, there are three water bodies that contain fish habitat and are crossed or are parallel to the proposed Transmission Line route (**Table 3.14**). Habitat and fish community information at locations identified in **Figures 3.2, 3.19** and **3.20** (**Appendix A**) are provided in **Table 3.14** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.14: Summary of Watercourses within the 120 m Zone of Investigation – Stoney Creek Subwatershed

Tributary ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Ston-a	Intermittent watercourse containing pool and run morphology Bankfull width = 2.5 m Water depth = 0.5 m Substrate = Silt/muck Contributes indirectly to fish habitat upstream of Haldimand Road 20, likely contains direct fish habitat downstream of road, may have contain Northern Pike spawning habitat.	Transmission line to be located within 120 m of water body providing fish habitat. (refer to **Figure 3.20**)	With the exception of potential construction activities, overhead transmission lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Ston-b	Intermittent watercourse containing run morphology Bankfull width = 3 m Water depth = 0.15 m Substrate = Silt/clay/detritus Contributes indirectly to fish habitat.	Transmission line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figure 3.20**)	With the exception of potential construction activities, overhead transmission lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected

Table 3.14: Summary of Watercourses within the 120 m Zone of Investigation – Stoney Creek Subwatershed

Tributary ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Ston-g	Intermittent watercourse containing predominantly run morphology. Bankfull width = 1.25 m Water depth = 30 cm Substrate = Soil/silt Contributes indirectly to fish habitat.	Transmission line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figures 3.2** and **3.19**)	With the exception of potential construction activities, overhead transmission lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected

a see **Figures 3.2**, **3.19** and **3.20** (**Appendix A**)

b assumes all mitigation measures are implemented and successful

3.5.1.2 Hemlock Creek

As discussed in Section 3.3.1, Hemlock Creek is a tributary of Stoney Creek (located to the west, within the LPRCA), which ultimately flows into Lake Erie. No background information for Hemlock Creek related to fish communities or aquatic habitat was available from agencies. Field investigations conducted by Stantec in October 2010 revealed the presence of the following three fish species at Hemlock Creek sites:

- Central Mudminnow
- Brown Bullhead
- Green Sunfish

None of the fish species captured in Hemlock Creek tributaries are considered indicator species, although species such as Central Mudminnow and Brown Bullhead are considered to be tolerant of degraded habitat conditions (CVC, 2003).

Within this subwatershed there are five water bodies that contain fish habitat or indirectly contribute to fish habitat and are crossed by or are parallel to the proposed Transmission Line route (**Table 3.15**). Habitat and fish community information at locations identified in **Figures 3.3** through **3.6** (**Appendix A**) are provided in **Table 3.15** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.15: Summary of Watercourses within the 120 m Zone of Investigation – Hemlock Creek

Tributary ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Hem-a	Permanently flow dominated by pool morphology Bankfull width = 3.5 Water depth = 50 cm Substrate = clay Fished downstream October 2010 Fish habitat	Transmission line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figure 3.4**)	With the exception of potential construction activities, overhead transmission lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Hem-c	Intermittent flow dominated by pool morphology Bankfull width = 2 m Water depth = 2 cm Substrate = clay, silt Contributes indirectly to fish habitat	Transmission line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figure 3.4**)	With the exception of potential construction activities, overhead transmission lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Hem-d	Intermittent flow dominated by isolated pools Bankfull = 0.5 m Water depth = 7 cm Substrate = clay, silt Contributes indirectly to fish habitat, may have seasonal fish habitat downstream in form of Northern Pike spawning habitat	Transmission line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figures 3.4** and **3.6**)	With the exception of potential construction activities, overhead transmission lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected
Hem-e	Intermittent flow dominated by shallow isolated pool morphology Bankfull width = 3.5 Water depth = 10 cm Substrate = clay, silt Fished October 2010 Fish habitat	Transmission line to be located within 120 m of water body providing fish habitat. (refer to **Figure 3.6**)	With the exception of potential construction activities, overhead transmission lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected

Table 3.15: Summary of Watercourses within the 120 m Zone of Investigation – Hemlock Creek

Tributary ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Hem-g	Intermittent watercourse covered with dense cattails. Flows predominantly in roadside ditch within 120 m of Haldimand Road 20 (upstream). Flows in low lying area dominated by shrubs downstream of road. Bankfull width = 1.5 m Water depth = 40 cm (substantial rain within 24 hrs of aquatic habitat assessment) Substrate = clay, silt, sand, and detritus Contributes indirectly to fish habitat	Transmission line to be located within 120 m of water body contributing indirectly to fish habitat. (refer to **Figures 3.4** and **3.6**)	With the exception of potential construction activities, overhead transmission lines should not affect fish and fish habitat. See Sections 4.1 and 4.3.	See Sections 5.1 and 5.3. DFO Operational Statement for Overhead Line Construction may apply (**Appendix E**)	None expected

a see **Figures 3.3** through **3.6** (**Appendix A**)
b assumes all mitigation measures are implemented and successful

3.5.2 Collector Sub-station

Area drainage from the collector sub-station will be facilitated through a series of swales adjacent to the proposed access road. These swales will collect and convey runoff from the sub-station area and associated access road in a westerly and southerly towards Haldimand Road 20. The total drainage area associated with the sub-station and access road “hard” surfaces is less than 2 ha; therefore, a “wet” water quality control pond (i.e. one containing a permanent pool) is not necessary, as per the MOE *SWM Planning and Design Guidelines Manual (2003)*. In addition to the conveyance of runoff, the series of grassed swales will also provide water quality control. Water quantity control will be provided using a dry detention pond for the storage and slow release of runoff to the existing ditch and drainage system along Haldimand Road 20 (see **Figures 2.6** and **4.2 Appendix A**). Drainage from the Solar Lands will largely be conveyed around the sub-station facility, access road, and associated stormwater management measures through the use of diversion swales, given that it does not require treatment or detention.

3.5.3 Operations and Maintenance Building (including associated Stormwater Management Facility)

A prefabricated operations and maintenance building will be constructed on land on the south side of Haldimand Road 20 opposite the Solar Lands, just east of Mt. Olivet Road (see **Figures 2.6** and **4.2 Appendix A**). The building will likely measure 24 m wide by 85 m long by 7 m high. Employee facilities for approximately 20 workers will be supported by an above ground potable water tank, filled by tanker trucks, as well as septic tank and filter bed for approximately 20 workers.

An access road to the operations and maintenance building will intersect with Haldimand Road 20 and proceed south to the building parking area, located directly south of the woodlot on the north end of the property (**Figure 2.6**, **Appendix A**). The outdoor vehicle and parts storage areas surrounding the operations and maintenance building will be graveled.

The operations and maintenance facility has a total area of about 3.2 ha including building storage and parking areas as well as the access road, plus a septic tile bed and stormwater management facility. Drainage from this area is generally southerly toward an existing channel at the south property limit. Stormwater management (conveyance, treatment, and detention) will be achieved through a combination of grassed swale drainage ditches and an end-of-pipe constructed wetland stormwater management facility. The relatively high degree of impervious coverage and ‘tight’ nature of on-site soils indicate that the drainage area ought to generate sufficient flows to maintain a permanent pool. Drainage from the access road and operations and maintenance building/parking areas will be conveyed to the end-of-pipe facility through grassed swale drainage ditches, which will provide water quality treatment benefits, in addition to moderate peak flow reduction. Swale runoff to the stormwater management facility will discharge into a small inlet micropool / forebay for energy dissipation and sediment retention prior to passing through the constructed wetland cell, which contain a permanent pool depth of approximately 0.3 m. The basin will provide both water quality treatment (i.e. sediment removal) and water quantity control (i.e. discharge rate restricted to existing conditions) and will be planted with vegetation species tolerant to a variety of moisture conditions. The basin will discharge in a non-erosive fashion to the existing channel at the southern site boundary. Further details regarding stormwater management facility configuration can be found in Stantec's Stormwater Management Report, which is included in the Design and Operations Report, as Attachment E.

The only water body in the vicinity of the Collector Sub-station and the Operations and Maintenance building is a tributary to Wardells Creek, located immediately adjacent to the southern boundary of the Solar Project.

3.5.3.1 Wardells Creek

As discussed in Section 3.3.4, Wardells Creek is a direct tributary to Lake Erie located on the southeast edge of the Project Location.

No background data related to thermal regime, fish community or aquatic habitat were available from agencies. Electrofishing was conducted in reach Ward-b during 2010, but no fish were captured.

Within the Zone of Investigation, there is:

- One reach that has been designated a water body that contains fish habitat or indirectly contributes to fish habitat, and is crossed or is within 120 m of proposed overhead collector lines (**Table 3.12**).

Habitat and fish community information at locations identified in **Figures 3.6** and **4.3** (**Appendix A**) are provided in **Table 3.12** along with references to general impacts, mitigation measures and net effects for each location.

Table 3.16: Summary of Watercourses within the 120 m Zone of Investigation – Wardells Creek Subwatershed

Tributary ID[a]	Site Description	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
Ward-b	Intermittent watercourse with variable morphology Bankfull width = 4 m Water depth = 10 cm Substrate = bedrock, boulder, gravel, clay, cobble Fished October 2010 Contributes indirectly to fish habitat, may contain seasonal fish habitat in the form of Northern Pike spawning habitat in upstream reaches (approx. 500 m northeast of Bains Road)	Installation of Collector Sub-station, O&M building and associated Stormwater Management facility within 120 m of watercourse that indirectly contributes to fish habitat. (refer to **Figures 3.6** and **4.3**)	Short-term increase in turbidity from runoff and soil erosion during construction. See Section 4.1.	No permanent removal of vegetation associated with watercourse. No construction within water body or vegetated riparian area. See Section 5.1.	None expected

a see **Figures 3.6** and **4.3** (**Appendix A**)

b assumes all mitigation measures are implemented and successful

3.6 SUMMARY OF PREDICTED IMPACTS TO FISH HABITAT AND APPROVAL PROCESSES

3.6.1 Fisheries Habitat

The federal *Fisheries Act* governs the protection of fish and aquatic habitat, including the harmful alteration, disruption or destruction (HADD) of fish habitat (Section 35), and the deposition of deleterious substances into fisheries waters (Section 36). DFO has signed agreements with 35 of the 36 Conservation Authorities in Ontario to review proposed projects under Section 35 of the *Fisheries Act*. LPRCA has a Level 2 agreement with DFO; therefore, they can determine how the proponent can mitigate any potential impacts to fish and fish habitat. The GRCA has a Level 3 agreement with DFO; therefore, they can determine whether or not HADD will occur and can advise on the suitability of any proposed compensation plans, if required.

If impacts to fish and fish habitat can be mitigated, the appropriate Conservation Authority can issue a Letter of Advice (LOA) directing how the work can proceed. The DFO's Risk Management Framework (RMF) is a process by which the risk of an undertaking to fish habitat can be assessed. Project risk is based on the sensitivity of fish habitat and the nature of the work being proposed. By providing information in a format that follows the RMF, all the necessary information will be available for efficient review and decision making.

Based on the current Project layout and proposed environmental mitigation measures, in-water work would potentially affect fish or fish habitat, or areas that contain fish habitat or contribute indirectly to fish habitat, at twenty-eight locations. DFO Authorization may be required due to culvert crossings and underground collector line installation, associated with the wind and transmission components of the Project, at locations presented in **Table 3.17**. None of the proposed activities associated with the solar component of the Project are expected to result in net effects to water bodies or fish habitat.

Table 3.17: Summary of Potential Net Effects to Fish and Fish Habitat

	Fish Habitat Type	
Subwatershed/Tributary/Reach ID	**Direct**	**Indirect**
LONG POINT REGION CONSERVATION AUTHORITY		
Stoney Creek	none	none
Hemlock Creek		
Hem-b	x	
Hem-c		x
Hem-d		x
Hem-g		x
Wardells Creek		
Ward-b		x
Evans Creek		
Evans-c		x
Evans-i		x
GRAND RIVER CONSERVATION AUTHORITY		
Unnamed Grand River Tributaries		
Gran-h		x
Gran-i	x	x
Gran-q		x
Gran-u	x	
Gran-w	x	
Gran-z	x	
Gran-bb		x
Gran-dd	x	
Gran-ee	x	
Gran-ff		x
Gran-gg	x	
Gran-ii		x
Gran-jj	x	
Gran-kk	x	
Holmes Creek/Sulphur Creek		
Holm-a		x
Holm-b		x
Holm-d		x
Unnamed Lake Erie Tributaries		
Lake-e		x
Lake-g		x
Lake-h		x
Lake-r		x

Table 3.17: Summary of Potential Net Effects to Fish and Fish Habitat

	Fish Habitat Type	
Subwatershed/Tributary/Reach ID	**Direct**	**Indirect**
Mazi Drain		
Mazi-a	x	

Activities associated with access road construction, buried collector line construction may result in net effects to a total of eleven water bodies containing direct fish habitat and an additional seventeen water bodies that contribute indirectly to fish habitat. No net effects are predicted related to the construction of the Collector Sub-station and Operations and Maintenance building. The associated SWM facility outlet configuration should be discussed with agencies to ensure that no additional permitting will be necessary, beyond permitting normally required by MOE for SWM facilities. This results in a total of thirty reaches of water bodies containing fish habitat or contributing indirectly to fish habitat, where net effects may occur.

The conclusions drawn from the designations presented in **Table 3.17** assume that all negative effects associated with turbine construction, overhead collector line installation and transmission line installation can be mitigated. It may then be possible to use DFO Operational Statements (see **Appendix E**) for the construction of these components. When an Operational Statement is used, mitigation measures provided in the Operational Statement will protect fish habitat and no further review or approvals are required. Although specific Operational Statements are referenced in this report, consultation with the LPRCA, GRCA and/or DFO may result in site-specific construction methods and mitigation measures for some locations. In such cases, additional sites may require review by the Conservation Authority or DFO, and details of construction methods, etc. should be submitted for agency review.

Since the Project falls under the jurisdiction of two Conservation Authorities who have differing levels of agreement with DFO, there are two similar, but different approval paths.

3.6.1.1 Long Point Region Conservation Authority

If impacts to fish and fish habitat can be fully mitigated, an LOA will be issued by the Conservation Authority indicating that the proposed activities will not likely cause a HADD if the proposed set of mitigation measures is followed. If the LPRCA determines that impacts cannot be fully mitigated, the project is forwarded to the local DFO office for further review. If the DFO determines that HADD of fish habitat will occur, the proponent needs to submit a Letter of Intent (LOI) to Compensate for Fish Habitat Loss (outlining the details of the proposed work and required mitigation measures, and the resulting net impact to fish habitat). The LOI should include a Fish Habitat Compensation Plan that identifies the proposed habitat enhancement works to compensate for the predicted impacts to fish habitat. DFO approval under the *Fisheries Act* allows the HADD to occur following the conditions of the Authorization.

3.6.1.2 Grand River Conservation Authority

If impacts to fish and fish habitat can be fully mitigated, an LOA will be issued by the Conservation Authority indicating that the proposed activities will not likely cause a HADD if the proposed set of mitigation measures is followed. If the GRCA determines that impacts cannot be fully mitigated, compensation measures need to be discussed to ensure No Net Loss of fish habitat. Once compensation measures have been agreed upon in principle with the GRCA, the proponent needs to submit an LOI to Compensate for Fish Habitat Loss. The LOI should include a Fish Habitat Compensation Plan that identifies the proposed habitat enhancement works to compensate for the predicted impacts to fish habitat. DFO approval under the *Fisheries Act* allows the HADD to occur following the conditions of the Authorization.

3.6.2 Species at Risk

The conclusions drawn from the designations presented in **Table 3.17** assume that potential effects to species at risk habitat located within reach Gran-kk and its vicinity, can be fully mitigated. If effects cannot be fully mitigated, permitting may be necessary under the federal *Species at Risk Act* (SARA)(2003) and the provincial *Endangered Species Act* (ESA)(2007). Both the federal and provincial species at risk permitting processes are not part of the renewable energy approvals (REA) process, and can occur after the REA application has been approved.

3.6.2.1 Species at Risk Act

Under Section 32(1)(i) of SARA, it is prohibited to:

- “Kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species”.

Additionally, Section 58(1) of SARA prohibits the destruction of:

- ”Any part of the critical habitat of any listed endangered species or of any listed threatened species”.

Section 73 of SARA provides for a permitting mechanism, whereby Sections 32 and 58 may be legally contravened provided that the following conditions are met:

- All reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted;
- All feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals; and
- The activity will not jeopardize the survival or recovery of the species.

If net effects to federally protected species at risk are anticipated, it should be noted that the SARA permitting process frequently takes four to six months to complete, due in part to a mandatory public consultation period.

3.6.2.2 Endangered Species Act

Under Section 9(1)(a) of the ESA, it is prohibited to:

- kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species;

Additionally, under Section 10(1) of the ESA, it is prohibited to “destroy the habitat of”:

- A species that is listed on the Species at Risk in Ontario List as an endangered or threatened species; or

Section 17(1) of the ESA states:

- The Minister may issue a permit to a person that, with respect to a species specified in the permit that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species, authorizes the person to engage in an activity specified in the permit that would otherwise be prohibited by section 9 or 10. 2007, c. 6, s. 17 (1).

If it is anticipated that the Project will result in net effects to provincially protected species at risk, it must be demonstrated that overall benefit to the species will be achieved as outlined in the ESA (2007), Section 17(2)(c)(i). It should be noted that the process associated with an ESA permit application and overall benefit proposal takes between eight and twelve months to complete, due in part to a mandatory public consultation period.

4.0 Potential Impacts

4.1 GENERAL CONSTRUCTION-RELATED IMPACTS

The potential impacts of the Project to watercourses located with 120 m of the Project Locationcould include:

- Short-term increase in turbidity from runoff and soil erosion during construction; and
- Water quality and habitat disturbance effects to aquatic habitat.

4.2 CULVERTS AND ACCESS ROADS

Potential impacts related to the installation and maintenance of culvert crossings in addition to the general impacts listed above may include:

- Disturbance to aquatic biota and habitat during installation;
- Permanent enclosure of portions of a watercourse;
- Loss of bed material within the length of the culvert; and
- Changes to riparian vegetation within road allowance.

Culverts must be designed and installed such that there is no:

- Restriction of flows through the culvert resulting in upstream pooling;
- Erosion at the culvert inlets and outlets; and
- Barrier to fish passage to upstream environments.

4.3 OVERHEAD COLLECTOR LINES AND TRANSMISSION LINE

Short-term impacts on watercourses may include loss of riparian vegetation which can result in increased turbidity during construction but also affects fish habitat by removing sources of shade, cover and food production. There are no long term impacts associated with the operation and maintenance of overhead collector lines.

4.4 UNDERGROUND COLLECTOR LINES

Potential impacts to fish and fish habitat related to the installation of underground collector lines are as follows:

- Erosion and sedimentation from site disturbance and dewatering;
- Collapse of the punch or bore hold under the stream;
- Disturbing riparian vegetation can reduce shoreline cover, shade and food production areas; and
- Machinery fording the stream can disturb bottom and bank substrates, disrupt sensitive fish life stages and introduce deleterious substances i.e. equipment is not properly maintained.

4.5 SOLAR

The potential for effects on watercourses exists from soil erosion resulting from unavoidable removal of stabilizing vegetative cover during maintenance activities. Erosion can cause downstream sediment transport and a short-term increase in surface water turbidity, including associated impacts to fish and fish habitat. Due to the Project Location's agricultural land use, the watercourses are not highly sensitive to temporary disturbances. However, the magnitude and duration of potential effects to watercourses depend on the specific characteristics of each watercourse (e.g. flow regime, water velocity, bed substrates, bank conditions, local soils and the extent and duration of exposure). In addition, some materials, such as fuel, lubricating oils and other fluids associated with Project maintenance, have the potential for release to the environment in the event of accidental spills.

Because the solar cells are mounted above the ground, infiltration, filtration through vegetation, and other natural hydrologic process will be similar to existing conditions. Generally, drainage will be directed to existing receiving systems (drainage paths, roadside ditches, etc.) as under current conditions.

4.6 COLLECTOR SUB-STATION AND OPERATIONS AND MAINTENANCE BUILDING

The potential for effects on watercourses exists from soil erosion resulting from unavoidable removal of stabilizing vegetative cover during maintenance activities. Erosion can cause downstream sediment transport and a short-term increase in surface water turbidity, including associated impacts to fish and fish habitat. Due to the Project Location's rural and agricultural land uses, the watercourses are not highly sensitive to temporary disturbances. However, the magnitude and duration of potential effects to watercourses depend on the specific characteristics of each watercourse (e.g. flow regime, water velocity, bed substrates, bank conditions, local soils and the extent and duration of exposure).

Some materials, such as fuel, lubricating oils and other fluids associated with electrical equipment operation and maintenance have the potential for release to the environment in the event of accidental spills. Additionally, a marginal increase in surface water runoff is expected due to an increase in the area of impervious ground resulting from the construction of the two structures. Area drainage from the Collector Sub-station will be accomplished through a series of swales adjacent to the proposed access road that will collect and convey runoff from the sub-station area and associated access road in a westerly and southerly direction toward Haldimand Road 20. The total drainage area associated with the sub-station and access road “hard” surfaces is less than 2 ha; therefore, a “wet” water quality control pond (i.e. one containing a permanent pool) is inappropriate, as per the MOE *SWM Planning and Design Guidelines Manual (2003)*. In addition to the conveyance of runoff, the series of grassed swales will also provide water quality control, which is a suitable stormwater management practice for such an area according to the MOE guidelines. Water quantity control will be provided using a dry detention pond for the storage and slow release of runoff to the existing ditch and drainage system along Haldimand Road 20. Drainage from the Solar Lands will largely be conveyed around the sub-station facility, access road, and associated stormwater management measures through the use of diversion swales, given that it does not require treatment or detention.

5.0 Standard Mitigation Measures for Working around Fish Habitat

Standard mitigation measures used for works in and around water are summarized below. Specific details of the mitigation measures to be implemented would be determined through consultations with the Regional Municipality of Haldimand-Norfolk, the LPRCA, the GRCA and DFO. The extent of mitigation would be dependent on project details such as technical requirements, construction methods and schedule.

5.1 GENERAL MITIGATION MEASURES

There are many mitigation measures to protect fish and fish habitat from potential effects during the construction phase of a project. General mitigation measures for construction activities near a watercourse in the Zone of Investigation include:

- All in-water work would be completed within MNR timing windows to protect local fish populations during their spawning and egg incubation periods. A typical construction timing window for warmwater streams in the Aylmer and Guelph Districts is July 1 to March 15.
- All materials and equipment used for the purpose of site preparation and Project construction shall be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering the water:
    - Any stockpiled materials should be stored and stabilized away from the water;
    - Refuelling and maintenance of construction equipment should occur a minimum of 100 m from a water body;
    - As appropriate, spills should be reported to the MOE Spills Action Centre;
    - Any part of equipment entering the water should be free of fluid leaks and externally cleaned/degreased to prevent any deleterious substance from entering the water; and
    - Only clean material, free of fine particulate matter should be placed in the water.
- Sediment and erosion control measures should be implemented prior to construction and maintained during the construction phase to prevent entry of sediment into the water:
    - Silt fencing and/or barriers should be used along all construction areas adjacent to natural areas;
    - No equipment should be permitted to enter any natural areas beyond the silt fencing during construction;
    - All sediment and erosion control measures should be inspected at least weekly and during and immediately following rainfall events to ensure that they are functioning properly and are maintained and/or upgraded as required;
    - Topsoil stockpiles should be sufficiently distant from watercourses to preclude sediment inputs due to erosion of stored soil materials;

- If the sediment and erosion control measures are not functioning properly, no further work should occur until the sediment and/or erosion problem is addressed;
- All disturbed areas of the construction site should be stabilized immediately and re-vegetated as soon as conditions allow; and
- Sediment and erosion control measures should be left in place until all areas of the construction site have been stabilized.

5.2 MITIGATION MEASURES FOR NEW CULVERT CROSSINGS

Culverts would be required at watercourses crossed by access roads. Culverts should be sized according to hydrologic requirements to be determined during the detailed design / permit application stage. Other technical requirements may influence culvert size and materials.

Where fish habitat is present, culverts must be installed such that fish passage is maintained. Where a watercourse provides indirect habitat, the culvert must continue to convey flow to downstream areas.

Specific methods for culvert installation would be dependent on culvert type, size and construction seasons. If a temporary access road is required, the DFO Operational Statement for Temporary Stream Crossings can be used if the specific conditions can be met. This Operational Statement includes details of mitigation measures.

Under flowing water conditions, water must be pumped around the work area in order to install a culvert. The following steps outline how a site can be isolated for culvert construction:

Temporary Isolation

- Coffer dams (e.g., aqua-dams, sand bags, concrete blocks, steel or wood wall, clean rip-rap, sheet pile or other appropriate designs) can be used to separate the in-water work site from flowing water.

- If rip rap or sand bags are used, clean, washed material should be used to build the berm. The berm face should consist of clean, washed granular material that is adequately sized (i.e., moderate sized rip rap and not sand or gravel) to hold the berm in place during construction. Material to build the berms should not be taken from below the high water mark.

- Coffer dams should be designed to accommodate any expected high flows of the watercourse during the construction period.

- Before starting construction, fish should be salvaged from behind the coffer dam and returned to an area immediately upstream of the isolated area. Salvage operations would consist of electrofishing and/or seining.

- Accumulated sediment should be removed (ensuring that the original bed of the watercourse is not excavated) from behind the coffer dam before its removal.

- The original channel bottom gradient and substrate should be restored after coffer dam removal.
- Water from dewatered areas should be treated or diverted into a vegetated area or settling basin to remove suspended solids and prevent sediment and other deleterious substances from entering the watercourse.
- Coffer dams should be removed in a downstream to upstream sequence to allow gradual re-introduction of water to the dewatered area and prevent excessive suspension of silt or other bed material.
- Pump intakes should be sized and adequately screened to prevent debris blockage and fish mortality (refer to the DFO Freshwater Intake End-of-Pipe Fish Screen Guidelines).
- The pumping system should be sized to accommodate any expected high flows of the watercourse during the construction period. Back-up pumps should be kept on site in case of pump failure.
- The pump should be discharged to a grassed area to allow water to reenter the watercourse only after it has been filtered through vegetation to prevent silt deposition. If no suitable areas exist, a filter bag should be place on the outlet to filter the water prior to reentry into the watercourse.
- Work should not be completed during flood stage flows or during times when heavy precipitation is occurring or is expected.

5.3 MITIGATION MEASURES FOR OVERHEAD COLLECTOR LINES

The DFO has prepared an Operational Statement for overhead transmission line construction (Ontario Operational Statement Habitat Management Program: Overhead Line Construction – see **Appendix E**). This Operational Statement provides measures to protect fish and fish habitat when undertaking this type of construction activity.

Although construction of overhead lines (as required) would not require any in-water works, as discussed in the Operational Statement, it is the riparian habitat that is most sensitive to disturbance from overhead line construction. Riparian vegetation occurs adjacent to the watercourse and directly contributes to fish habitat by providing shade, cover, and spawning and food production areas.

According to the DFO Operational Statement, a proponent may proceed with an overhead transmission line project without DFO review when the following conditions are met:

- Construction and/or placement of any temporary or permanent structures (e.g., islands, poles, crib works, etc.) are not required below the ordinary high water mark; and
- The Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines outlined below are incorporated into the project (abbreviated from the Operational Statement):
  - Installing overhead lines under frozen conditions is preferable;
  - Machinery fording the watercourse to bring equipment required for construction to the opposite side of the watercourse should be limited to a one-time event (over and back). If the stream bed and banks are highly erodible (e.g., dominated by organic materials and silts) and significant erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practices are to be used to protect these areas;
    - Adhere to the MNR District timing windows (typical warmwater timing window for the Aylmer and Guelph Districts is July 1 to March 15).
  - Operate machinery from outside of the water and in a manner that minimizes disturbance to the banks of the watercourse;
    - Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks;
    - Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water; and
    - Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
  - Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and until re-vegetation of disturbed areas is complete, and make all necessary repairs;
  - The removal of select plants may be necessary to accommodate the overhead line. This removal should be kept to a minimum and should not be wider than the ROW;
  - Stabilize any waste materials removed from the work site, above the ordinary high water mark to prevent them from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs;
  - Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring; and

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

5.4 MITIGATION FOR UNDERGROUND COLLECTOR LINES

As appropriate, an Environmental Monitor (or designate) should be on-site during installation of watercourse crossings to ensure compliance with specifications and site plans. In particular, the Construction Contractor would ensure that pre-construction preparation is completed prior to commencement of in-stream work and that bank, bed, and floodplain conditions are restored to pre-construction conditions following completion of the construction activities.

Where required, the Construction Contractor would ensure that detailed pre-construction profiles of the slopes, banks, and bed are determined prior to installation of the power line and/or roads. The Construction Contractor should monitor weather forecasts prior to the installation of the crossings, particularly before crossings of watercourses with year-round flow.

There are several crossing techniques that may be employed for installation of a buried collector line. According to DFO the order of preference for such crossings, in order to protect fish and fish habitat is: 1) punch or bore, 2) high pressure directional drilling, 3) dry open-cut crossing and 4) isolated open-cut crossing. These are described in more detail below. There are DFO Operational Statements for all of the above methods and all are included in **Appendix E**.

A summary of mitigation measures for Dry Open-Cut crossings and Isolated Open-Cut crossings is provided below:

Dry Open-Cut

Mitigation measures to employ for dry open-cut crossings (dry watercourses) include (also see DFO Operational Statements in **Appendix E**):

- Crossings should be undertaken on days when precipitation is not expected;
- The tracked excavator should be working in the dry when excavating a trench;
- Topsoil stockpiles should be reasonably distant from watercourses to preclude sediment inputs due to erosion of stored soil materials;
- Water crossings should be backfilled with substrate material that is consistent with the existing substrate size and texture and would remain in/under the crossing;
- The water crossing bed and bank areas should be rehabilitated to pre-excavation condition; and
- Materials such as sand bags, straw bales, geotextile filters, and/or pumps should be readily available on-site so that the crossing can be completed in the dry in case of unexpected stream flow.

Isolated Open-Cut (Dam and Pump Crossings)

Mitigation measures to employ for at low flow watercourses include (also see **Appendix E** Operational Statement including conditions of use):

- Where an open cut crossing is not possible, in-stream work shall be completed in the dry by de-watering the work area and diverting and/or pumping flows around cofferdams placed at the limits of the work area:
  - To the extent practicable, crossings should take place on days when precipitation is not expected;
  - Existing stream flows shall be maintained downstream of the de-watered work area without interruption, during all stages of the work;
  - Fish, if present, shall be removed from the work area prior to de-watering and released alive immediately upstream;
  - Flow dissipaters and/or filter bags, or equivalent, shall be placed at water discharge points to prevent erosion and sediment release;
  - Sediment laden dewatering discharge can be pumped to a temporary settling basin well away from the watercourse and allowed to settle and/or filter through the riparian vegetation before re-entering the watercourse downstream of the construction area;
  - As conditions warrant the work area shall be stabilized against the impacts of high flow events at the end of each workday;
  - Work in the channel and floodplain shall be suspended and the work area stabilized when there is a high probability of a convective rainfall event and during warm winter periods when there is a high likelihood of significant snowmelt runoff;
  - Silt or debris that has accumulated around the temporary cofferdams shall be removed prior to their withdrawal; and
  - If greater than 50,000 l/d is to be taken from the dewatering area, a Permit to Take Water may be required.

5.5 MITIGATION MEASURES FOR STORMWATER MANAGEMENT FACILITY CONSTRUCTION

The following is a list of mitigation measures for SWM facility construction associated with the Collector Sub-station and Operations and Maintenance, as presented in Attachment E of the Design and Operations Report.

- Erect silt fence before grading begins on the downstream side of the area to be graded to protect the downstream lands from potential sediment transport that may be entrained in overland flows;

- Provide a construction entrance feature (“mud mat”) at all site entrances to minimize the transport of sediment on construction vehicle tires;

- Direct runoff via swales and erosion control berms (where necessary) to sediment control measures to ensure that no untreated runoff is discharged from the site;

- Utilize the proposed end-of-pipe stormwater management facilities as temporary sediment control measures;

- Install temporary rock check dams in swales where appropriate to help attenuate flows,reduce erosive velocities, and encourage sediment deposition;

- Immediately stabilize all disturbed areas not subject to construction activities within 30days, according to OPSS 572; and

- In order to ensure the effectiveness of the various erosion and sediment control measures, an appropriate inspection and maintenance program is necessary. The inspection activities will include:

    - Inspect erosion and sediment controls after each significant rainfall event or weekly, whichever is more frequent. Inspections should include all silt fence installations, rock-check dams, the sediment control facility, outlets and vegetation.

    - Submit regular monitoring results to the LPRCA during active construction periods.

6.0 Monitoring

6.1 CONSTRUCTION

Methodologies/Sampling Protocols (as per the Construction Plan Report)

As appropriate, an Environmental Monitor should be on-site during installation of Project components that could potentially affect aquatic habitats to ensure compliance with specifications, site plans and permits. In particular, the Construction Contractor would ensure that pre-construction preparation is completed prior to commencement of in-stream work (if required). Where required and if applicable, the Construction Contractor would ensure that detailed pre-construction profiles of the slopes, banks, and bed are determined prior to installation of the access roads, crane paths and power lines. The Environmental Monitor should monitor weather forecasts prior to the installation of access roads, crane paths and power lines, particularly prior to work near aquatic habitats.

Performance Objectives/Additional Actions (as per the Construction Plan Report)

The Environmental Monitor should ensure that bank, bed, and floodplain conditions are restored to pre-construction conditions, as possible, following completion of the construction activities.

Environmental monitoring following spring run-off the year after construction (first year of operations) should also occur, to review the effectiveness of the bank and slope re-vegetation (if required), to check bank and slope stability, and to ensure surface drainage has been maintained. In the event that adverse effects are noted, appropriate remedial measures should be completed as necessary (i.e. site rehabilitation and re-vegetation) and additional follow-up monitoring conducted as appropriate, under the direction of an environmental advisor.

Additionally, compensation strategies and/or permits from Fisheries and Oceans Canada and/or the Long Point Region Conservation Authority/Grand River Conservation Authority, as applicable, would likely include conditions of approval such as construction and post-construction monitoring. All such strategies and/or permits should be obtained prior to construction, and all such conditions and requirements would be implemented as appropriate.

6.2 OPERATION

The Environmental Effects Monitoring Plan for the Project is provided in the Design and Operations Report and summarized in Table 6.1 of that report. Operation activities that have the potential to affect aquatic habitat includes accidental spills and/or leaks. Proper storage of materials (e.g. maintenance fluids) at off-site storage containers would greatly reduce the potential for accidental spills and/or leaks.

Appropriate remedial measures may be completed as necessary and additional follow-up monitoring conducted as appropriate in the event of an accidental spill and/or leak. The level of monitoring and reporting should be based on the severity of the spill/leak and may be discussed with the MOE (Spills Action Centre) and MNR.

If *Fisheries Act* approvals are required from DFO, some monitoring may be required, and would be stated in the DFO Authorization. Monitoring typically includes photographic records during construction and for two years after the completion of construction to ensure survival of plantings and overall function of the installation. If significant habitat enhancement or compensation measures are required, monitoring may also include assessments of the fish community and habitat use.

7.0 Conclusions

The Grand Renewable Energy Park 'Water Assessment and Water Body Report' has been prepared by Stantec for SPK in accordance with Ontario Regulation 359/09. This report is one component of the REA application for the Project.

Locations where water bodies are present within 120 m of a proposed Project Location are presented in **Figures 2.1** to **2.20** and summarized in **Table 3.2**. The designation of various features as water bodies was agreed upon by field staff using field conditions at the time of the survey and the definition of water body provided in O. Reg. 359/09.

Based on the current Project layout and proposed environmental mitigation measures, in-water work would potentially affect a total of eleven water bodies containing direct fish habitat and an additional nineteen water bodies that contribute indirectly to fish habitat. *Fisheries Act* Authorization may be required due to culvert crossings and underground collector line installation associated with wind components of the Project. Additional potential aquatic species at risk implications may be associated with reach Gran-kk in the Grand River watershed. It is likely that any potential negative effects to aquatic organisms can be mitigated, since no in-water work is proposed within this reach. (**Figure 2.14**, **Appendix A**).

None of the proposed activities associated with the solar and transmission components (including sub-station and maintenance building) of the Project are expected to result in net impacts to water bodies, fish habitat or aquatic species at risk.

This report has been prepared by Stantec for the sole benefit of SPK, and may not be used by any third party without the express written consent of SPK. The data presented in this report are in accordance with Stantec's understanding of the Project as it was presented at the time of reporting.

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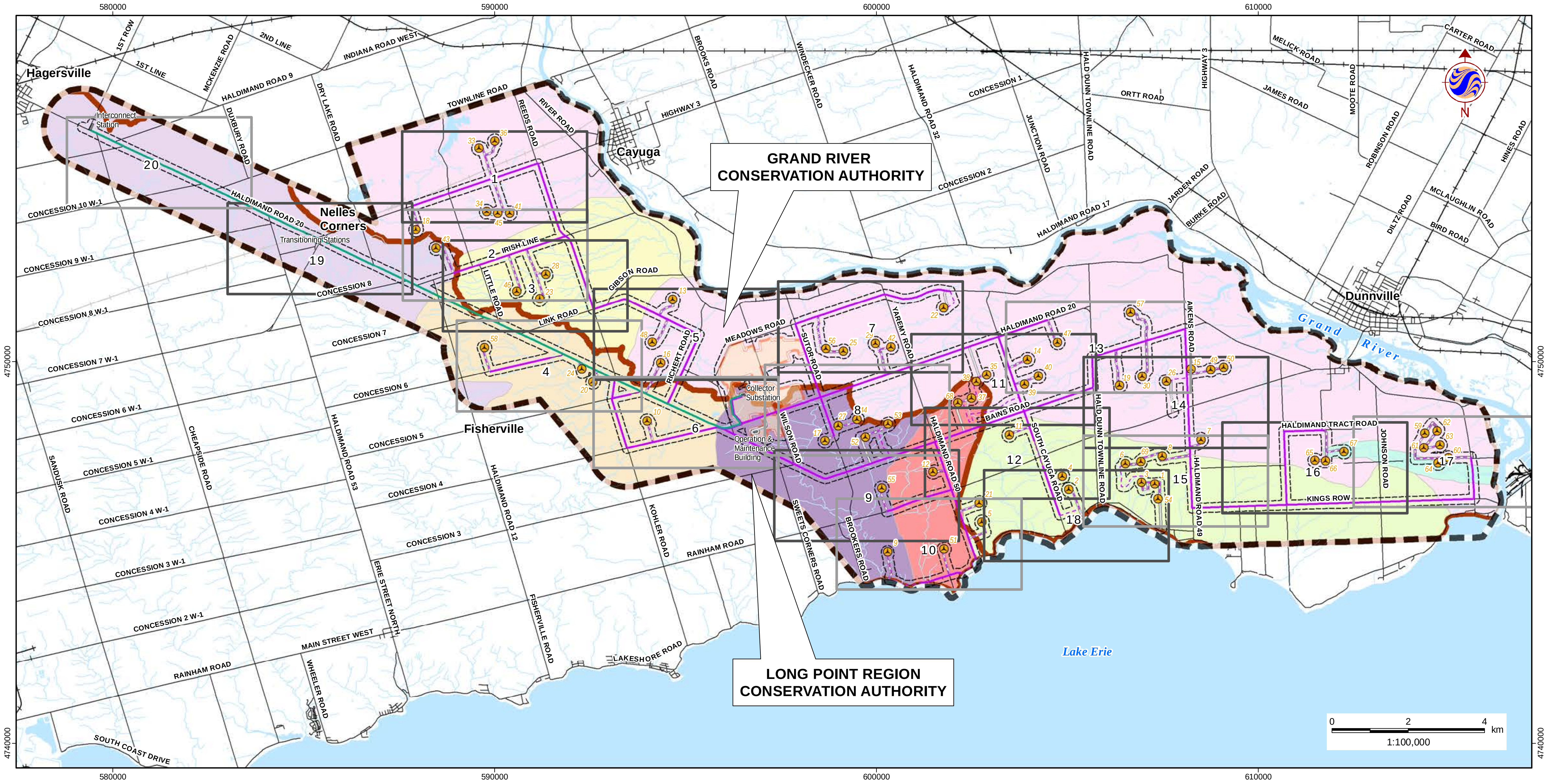
Appendix A

Figures



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October 2011
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Legend

- Study Area
- Zone of Investigation

Wind Project Location

- Proposed Turbine Location
- Access Road
- Overhead Collector Line
- Underground Collector Line

Solar Project Location

- Solar Lands

Transmission Line

- Overhead Transmission Line
- Underground Transmission Line
- Electrical Transmission Component

Existing Features

- Road
- Railway
- Abandoned Railway
- Watercourse (OBM, as modified by Stantec)
- Waterbody (OBM, as modified by Stantec)

- Conservation Authority Watershed Boundary

LPRCA Subwatersheds

- Stoney Creek
- Hemlock Creek
- Wardells Creek
- Evans Creek

GRCA Subwatersheds

- Unnamed Grand River Tributaries
- Holmes Creek/ Sulphur Creek
- Unnamed Lake Erie Tributaries
- Mazi Drain

Notes

1. Coordinate System: UTM NAD 83 - Zone 17 (N).
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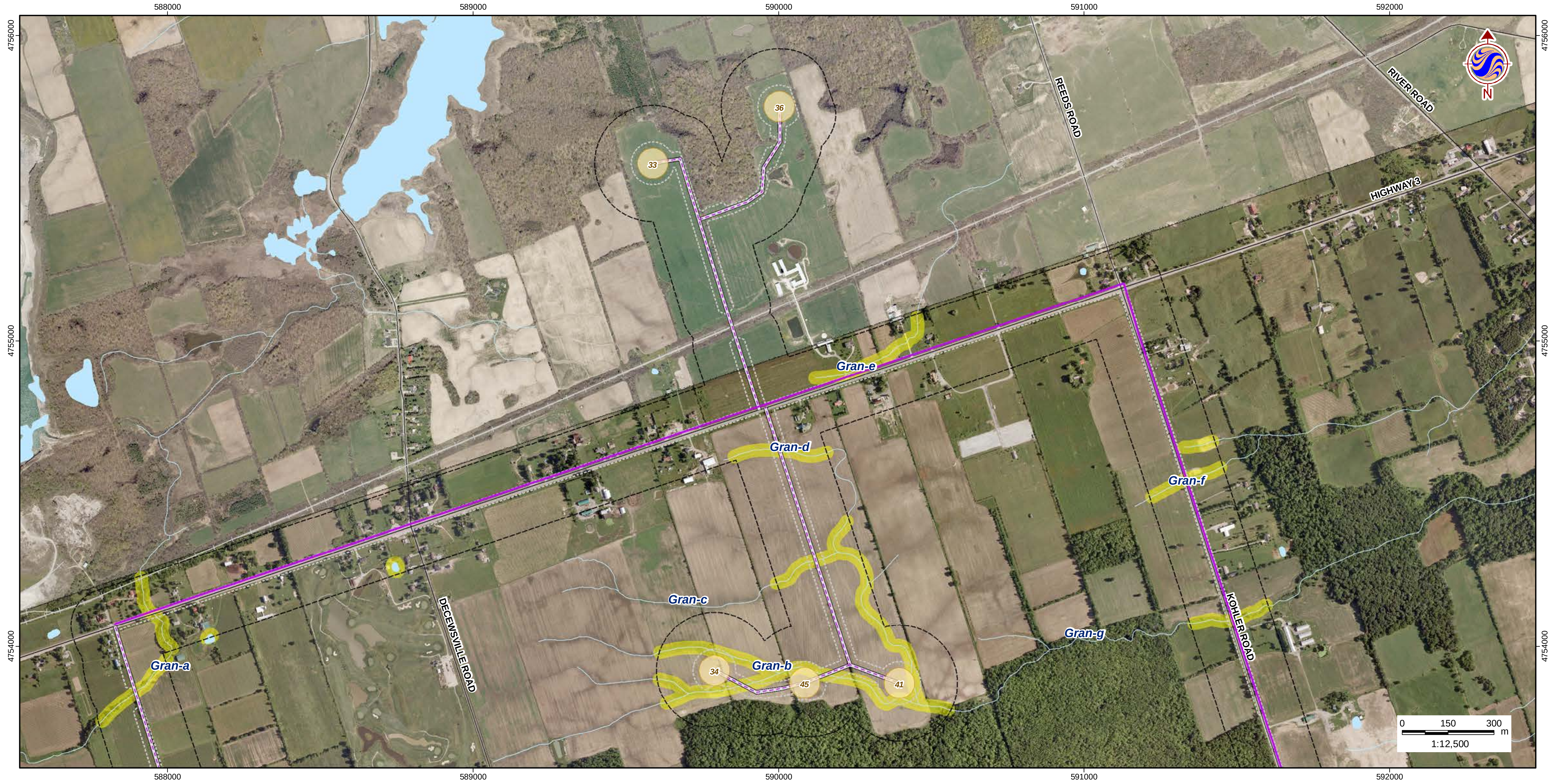
Client/Project
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.
1.0

Title
WATERSHEDS AND SUBWATERSHEDS



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October 2011
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Legend

- Study Area
- ⬚ Zone of Investigation
- ⬚ Constructable Area

Wind Project Location

- ① Proposed Turbine Location
- ═ Access Road
- — Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

- ▭ Solar Lands

Transmission Line

- — Overhead Transmission Line
- ⋯ Underground Transmission Line
- ■ Electrical Transmission Component

Existing Features

- — Road
- ┼ Railway
- ┼ Abandoned Railway
- ◆ Transmission Line (MNR)
- — Watercourse (OBM, as modified by Stantec)
- ■ Waterbody (OBM, as modified by Stantec)

Water Body Status

- 🟩 REA Water Body
- 🟨 Non-REA Watercourse

Notes

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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.1

Title

WATER BODY LOCATIONS
Tile 1 of 20

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Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

① Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

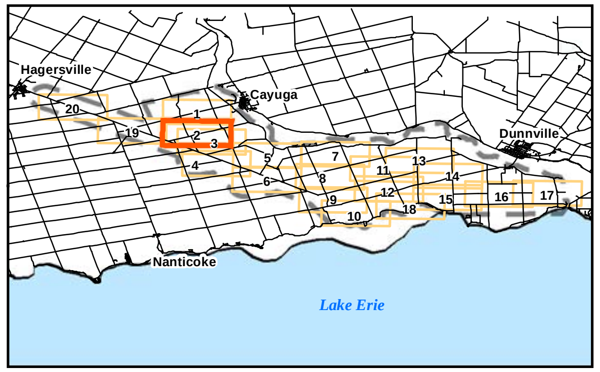
Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as modified by Stantec)
Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse



Notes

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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.2

Title

WATER BODY LOCATIONS
Tile 2 of 20

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Stantec

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

① Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as modified by Stantec)
Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse

Notes

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GRAND RENEWABLE ENERGY PARK

Figure No.

2.3

Title

WATER BODY LOCATIONS
Tile 3 of 20

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October 2011
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Stantec

Legend

- Study Area
- Zone of Investigation
- Constructable Area

Wind Project Location

- ① Proposed Turbine Location
- Access Road
- Overhead Collector Line
- Underground Collector Line

Solar Project Location

- Solar Lands

Transmission Line

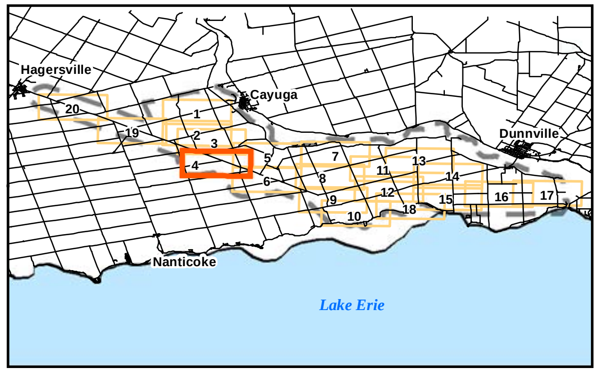
- Overhead Transmission Line
- Underground Transmission Line
- Electrical Transmission Component

Existing Features

- Road
- Railway
- Abandoned Railway
- Transmission Line (MNR)
- Watercourse (OBM, as modified by Stantec)
- Waterbody (OBM, as modified by Stantec)

Water Body Status

- 🟩 REA Water Body
- 🟨 Non-REA Watercourse



Notes

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Client/Project

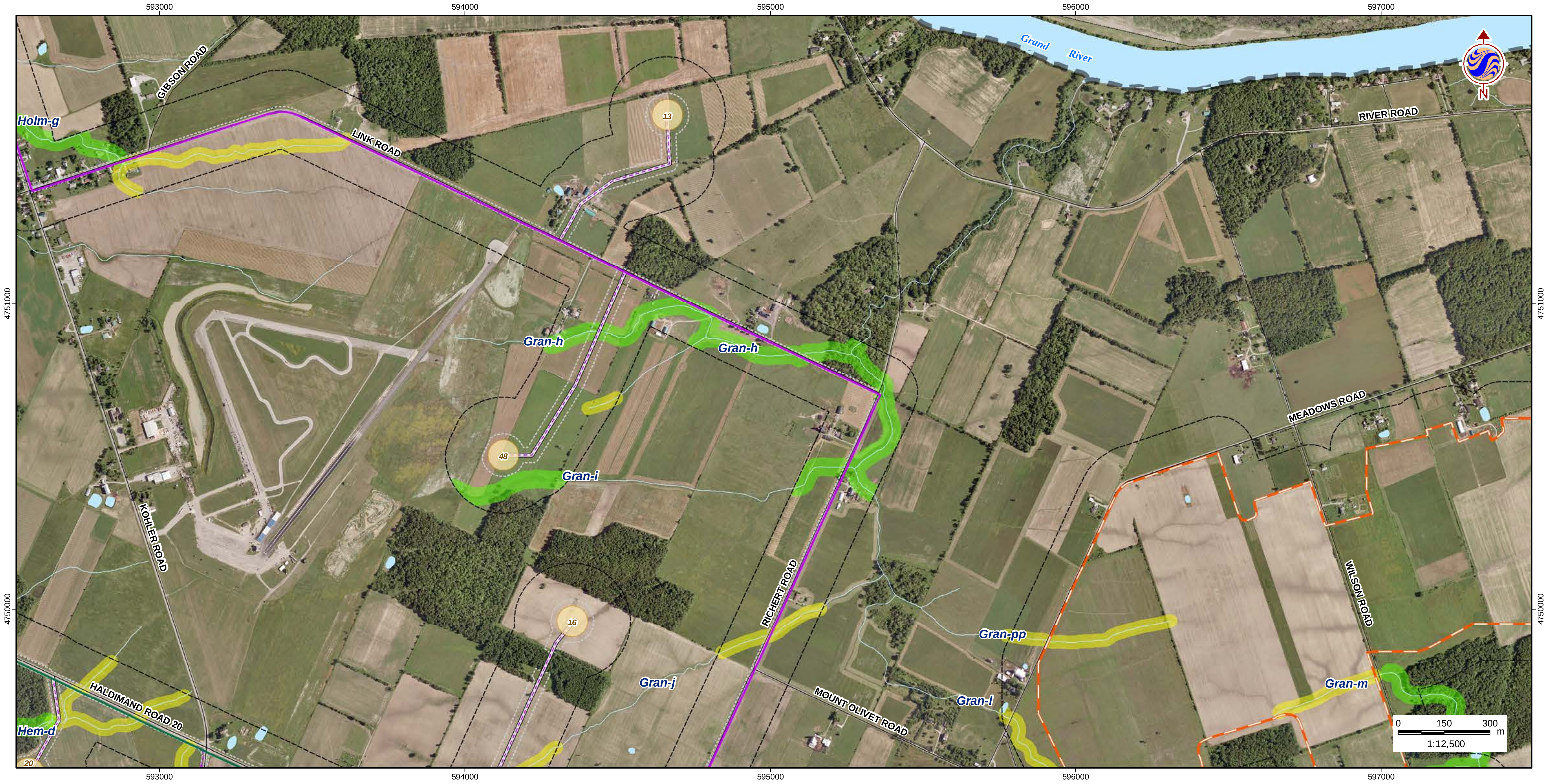
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.4

Title

WATER BODY LOCATIONS
Tile 4 of 20



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Stantec

Legend

▭ Study Area
▭ Zone of Investigation
▭ Constructable Area

Wind Project Location

① Proposed Turbine Location
▬ Access Road
— Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

🟧 Solar Lands

Transmission Line

— Overhead Transmission Line
····· Underground Transmission Line
■ Electrical Transmission Component

Existing Features

— Road
┼ Railway
┼ Abandoned Railway
—•— Transmission Line (MNR)
— Watercourse (OBM, as modified by Stantec)
■ Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse

Notes

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Client/Project

SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.5

Title

WATER BODY LOCATIONS
Tile 5 of 20

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Stantec

Legend

Study Area

Zone of Investigation

Constructable Area

Wind Project Location

① Proposed Turbine Location

Access Road

Overhead Collector Line

Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

Overhead Transmission Line

Underground Transmission Line

Electrical Transmission Component

Existing Features

Road

Railway

Abandoned Railway

Transmission Line (MNR)

Watercourse (OBM, as modified by Stantec)

Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body

🟨 Non-REA Watercourse

Notes

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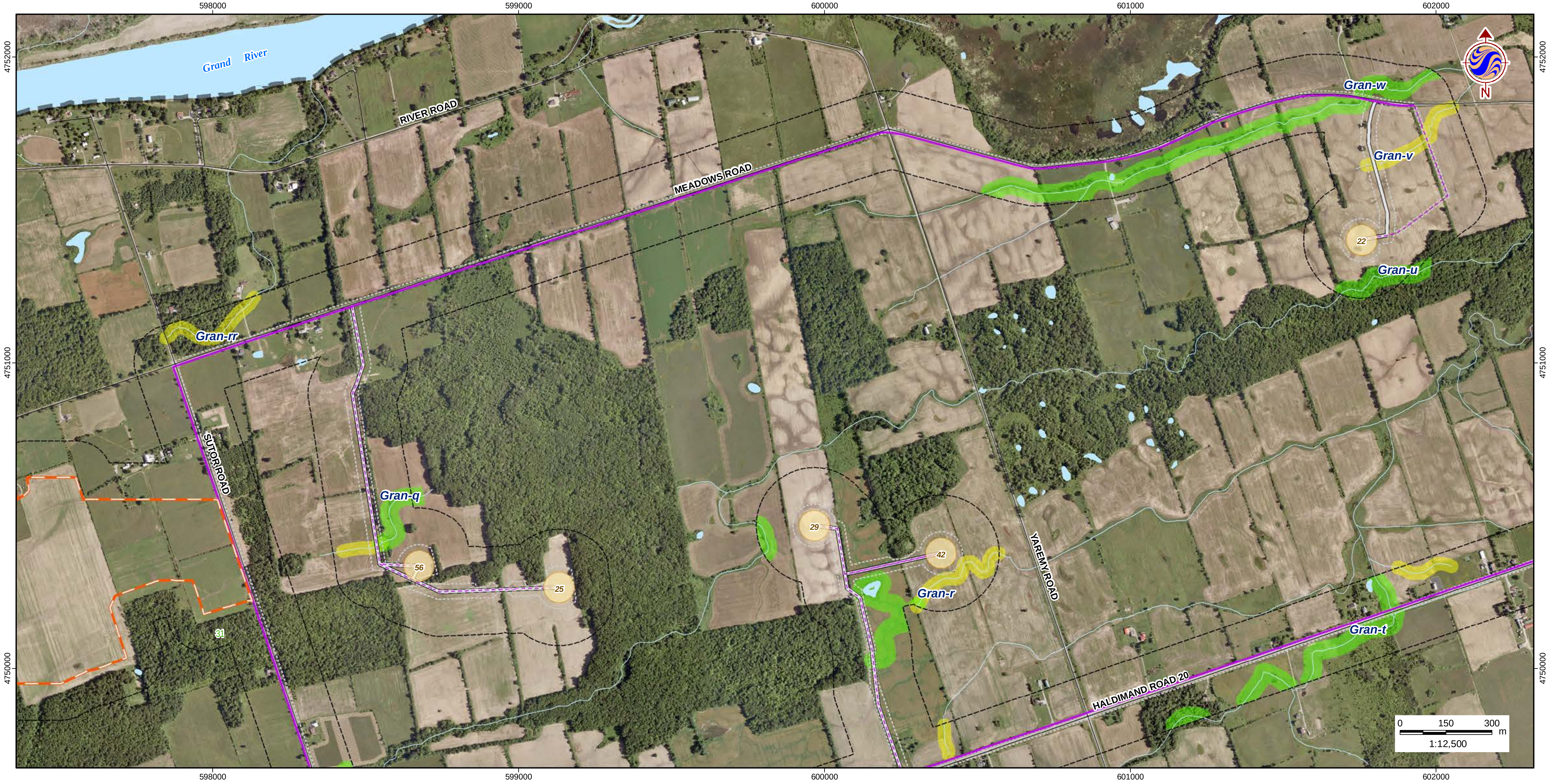
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.6

Title

WATER BODY LOCATIONS
Tile 6 of 20



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Stantec

Legend

⬚ Study Area
⬚ Zone of Investigation
⬚ Constructable Area

Wind Project Location

① Proposed Turbine Location
═ Access Road
― Overhead Collector Line
- - Underground Collector Line

Solar Project Location

▭ Solar Lands

Transmission Line

― Overhead Transmission Line
┄ Underground Transmission Line
■ Electrical Transmission Component

Existing Features

― Road
┼ Railway
┼ Abandoned Railway
┄ Transmission Line (MNR)
― Watercourse (OBM, as modified by Stantec)
■ Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse

Notes

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Client/Project

SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.7

Title

WATER BODY LOCATIONS
Tile 7 of 20

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160960577

Legend

- Study Area
- Zone of Investigation
- Constructable Area

Wind Project Location

- Proposed Turbine Location
- Access Road
- Overhead Collector Line
- Underground Collector Line

Solar Project Location

- Solar Lands

Transmission Line

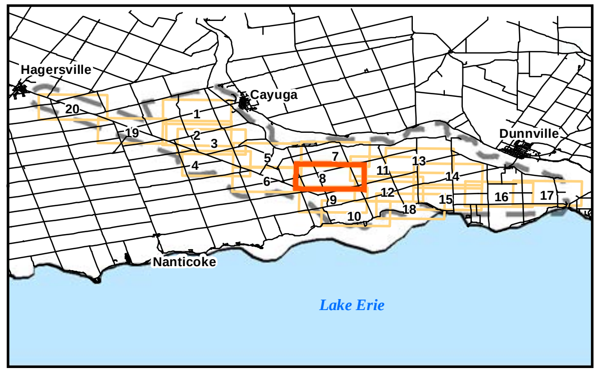
- Overhead Transmission Line
- Underground Transmission Line
- Electrical Transmission Component

Existing Features

- Road
- Railway
- Abandoned Railway
- Transmission Line (MNR)
- Watercourse (OBM, as modified by Stantec)
- Waterbody (OBM, as modified by Stantec)

Water Body Status

- 🟩 REA Water Body
- 🟨 Non-REA Watercourse



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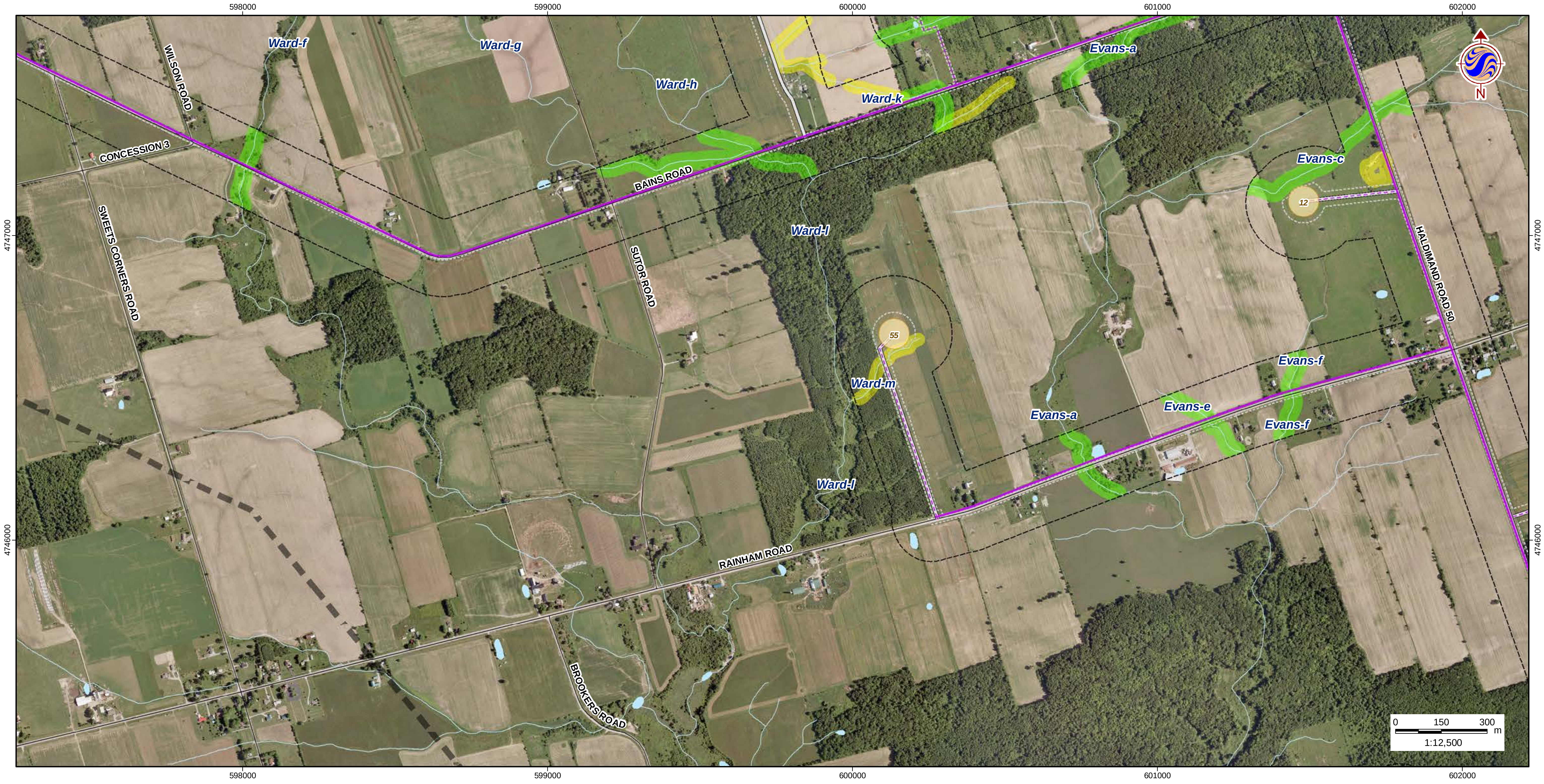
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.8

Title

WATER BODY LOCATIONS
Tile 8 of 20



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Stantec

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

① Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as modified by Stantec)
Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse

Notes

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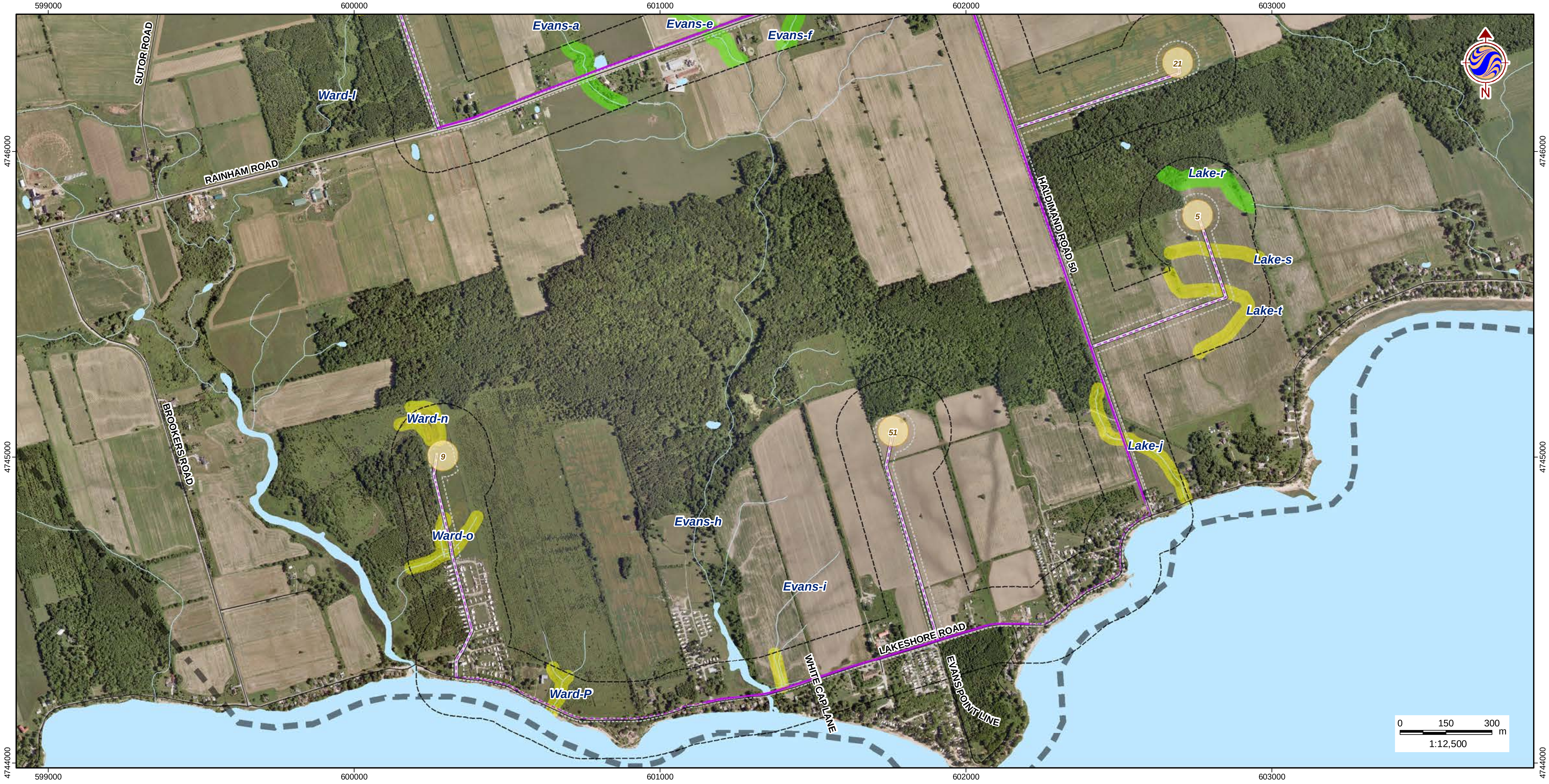
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.9

Title

WATER BODY LOCATIONS
Tile 9 of 20



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Legend

▨ Study Area
☐ Zone of Investigation
☐ Constructable Area

Wind Project Location

● Proposed Turbine Location
═ Access Road
— Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

☐ Solar Lands

Transmission Line

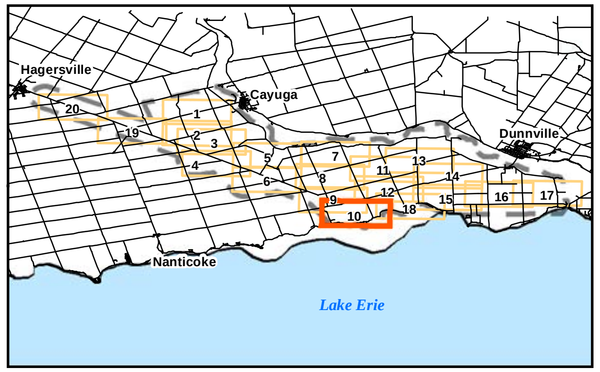
— Overhead Transmission Line
····· Underground Transmission Line
■ Electrical Transmission Component

Existing Features

— Road
—+— Railway
—+— Abandoned Railway
—•— Transmission Line (MNR)
— Watercourse (OBM, as modified by Stantec)
■ Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse



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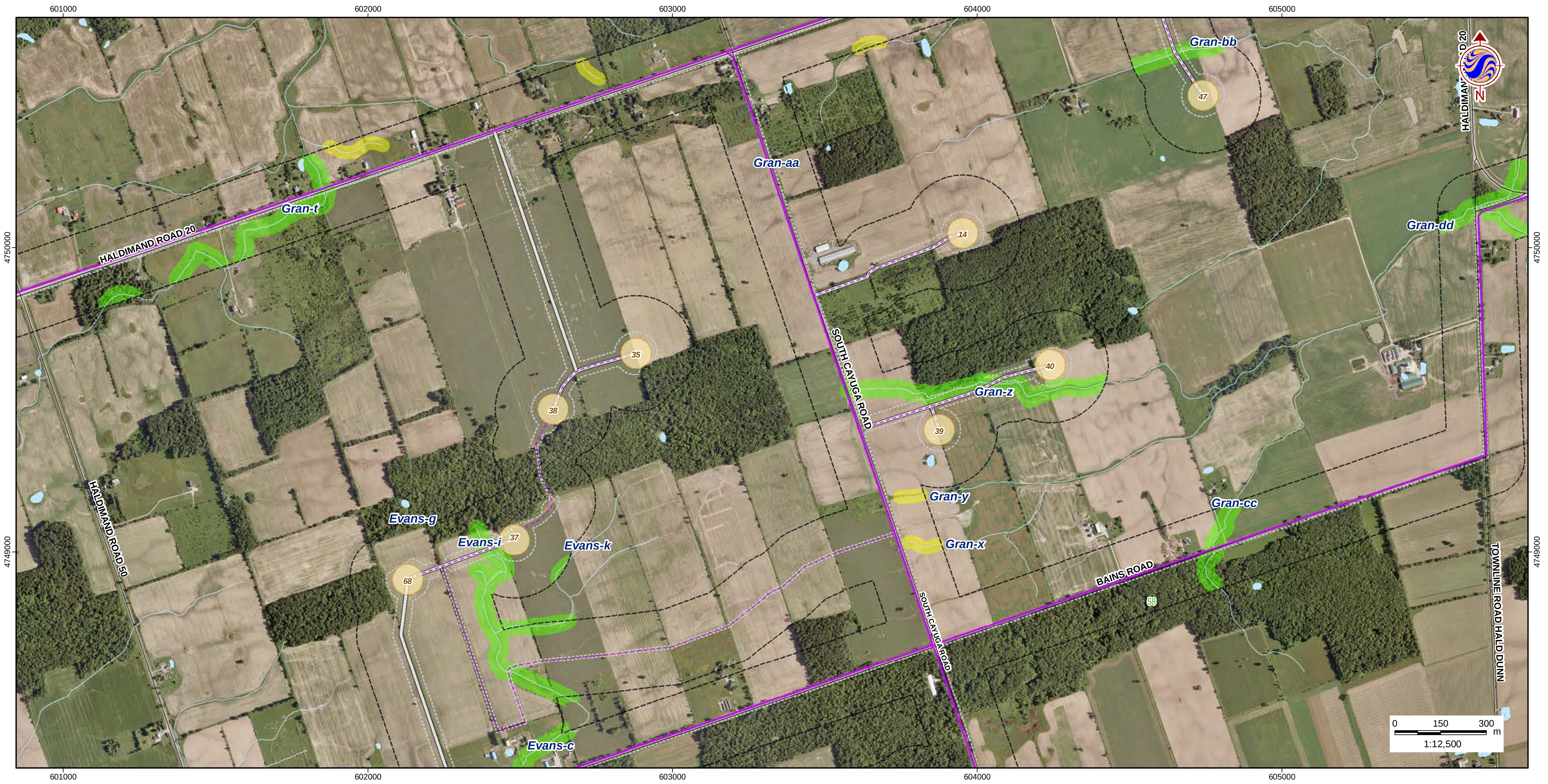
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.10

Title

WATER BODY LOCATIONS
Tile 10 of 20



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Stantec

Legend

▨	Study Area
⬚	Zone of Investigation
⬚	Constructable Area

Wind Project Location

①	Proposed Turbine Location
═	Access Road
━	Overhead Collector Line
╌	Underground Collector Line

Solar Project Location

🟧	Solar Lands

Transmission Line

━	Overhead Transmission Line
┅	Underground Transmission Line
■	Electrical Transmission Component

Existing Features

─	Road
┼	Railway
┼	Abandoned Railway
●─●	Transmission Line (MNR)
─	Watercourse (OBM, as modified by Stantec)
■	Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩	REA Water Body
🟨	Non-REA Watercourse

Notes

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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.11

Title

WATER BODY LOCATIONS
Tile 11 of 20

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Stantec

Legend

▭	Study Area
⬚	Zone of Investigation
⬚	Constructable Area

Wind Project Location

①	Proposed Turbine Location
═	Access Road
━	Overhead Collector Line
┅	Underground Collector Line

Solar Project Location

▭	Solar Lands

Transmission Line

━	Overhead Transmission Line
┅	Underground Transmission Line
■	Electrical Transmission Component

Existing Features

─	Road
┼	Railway
┼	Abandoned Railway
●	Transmission Line (MNR)
─	Watercourse (OBM, as modified by Stantec)
■	Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩	REA Water Body
🟨	Non-REA Watercourse

Notes

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Client/Project

SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.12

Title

WATER BODY LOCATIONS
Tile 12 of 20

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October 2011
160960577

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

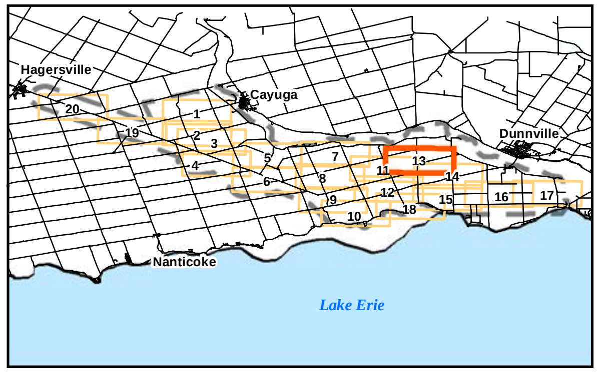
Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as modified by Stantec)
Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse



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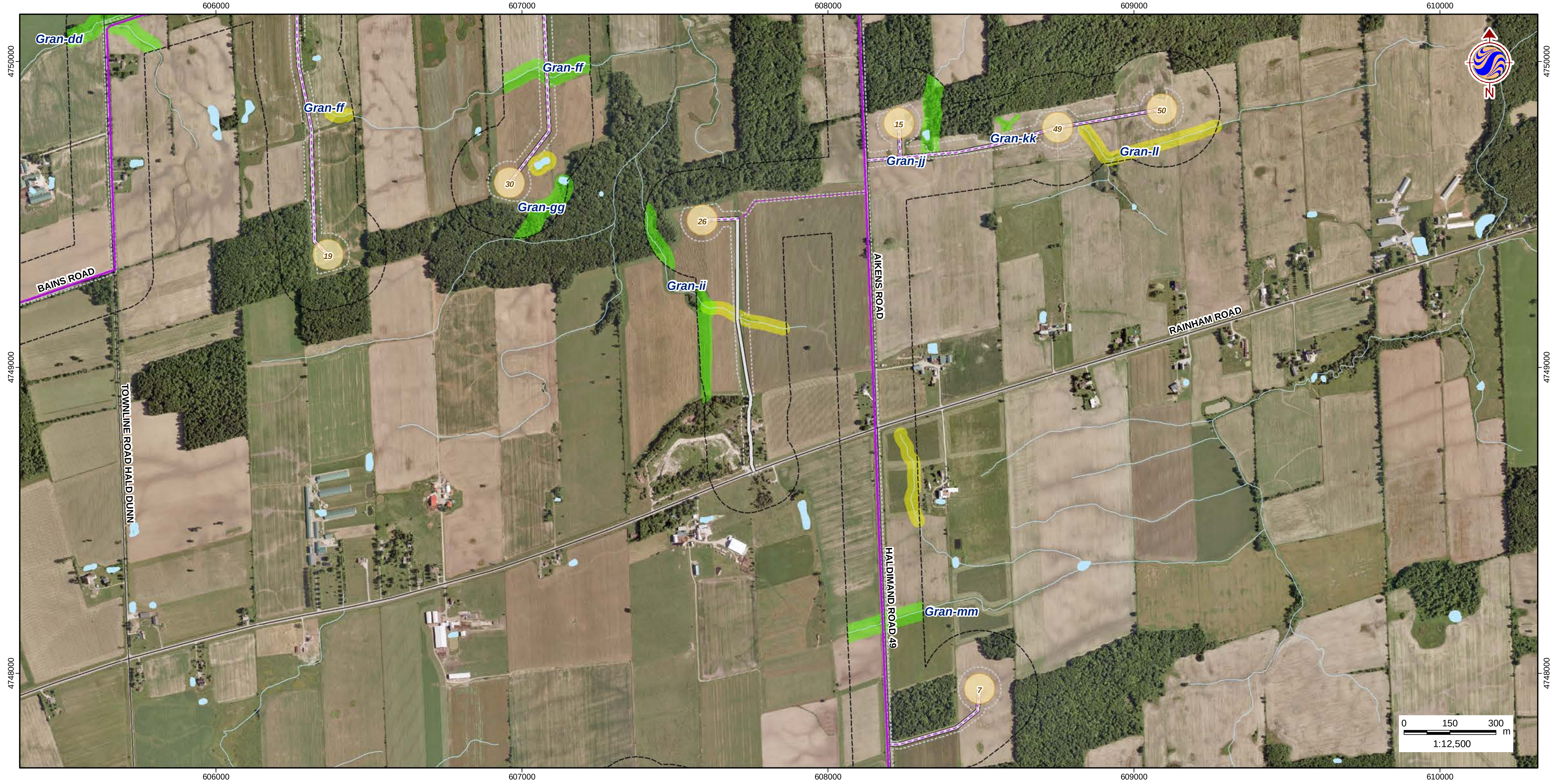
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.13

Title

WATER BODY LOCATIONS
Tile 13 of 20



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Legend

- Study Area
- Zone of Investigation
- Constructable Area

Wind Project Location

- Proposed Turbine Location
- Access Road
- Overhead Collector Line
- Underground Collector Line

Solar Project Location

- Solar Lands

Transmission Line

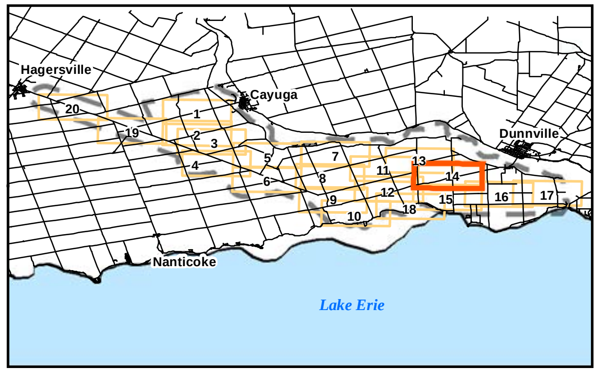
- Overhead Transmission Line
- Underground Transmission Line
- Electrical Transmission Component

Existing Features

- Road
- Railway
- Abandoned Railway
- Transmission Line (MNR)
- Watercourse (OBM, as modified by Stantec)
- Waterbody (OBM, as modified by Stantec)

Water Body Status

- 🟩 REA Water Body
- 🟨 Non-REA Watercourse



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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

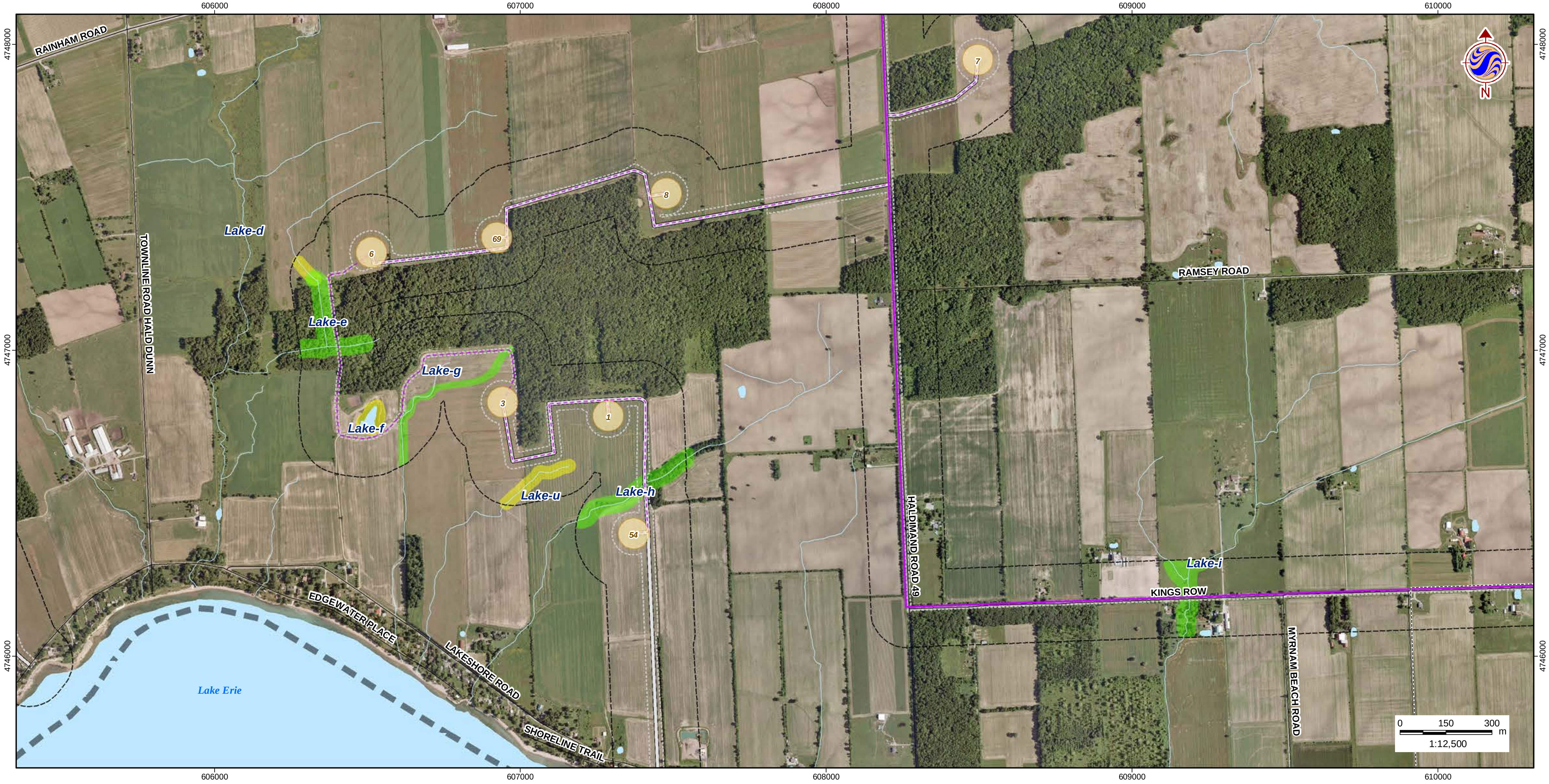
Figure No.

2.14

Title

WATER BODY LOCATIONS
Tile 14 of 20

W:\active\60960577\drawing\GIS\MXD\REA_Figures\WaterReport\60960577_Fig2_WaterBodyLocation_20111001_PW.mxd



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Legend

- Study Area
- Zone of Investigation
- Constructable Area

Wind Project Location

- Proposed Turbine Location
- Access Road
- Overhead Collector Line
- Underground Collector Line

Solar Project Location

- Solar Lands

Transmission Line

- Overhead Transmission Line
- Underground Transmission Line
- Electrical Transmission Component

Existing Features

- Road
- Railway
- Abandoned Railway
- Transmission Line (MNR)
- Watercourse (OBM, as modified by Stantec)
- Waterbody (OBM, as modified by Stantec)

Water Body Status

- 🟩 REA Water Body
- 🟨 Non-REA Watercourse

Notes

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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.15

Title

WATER BODY LOCATIONS
Tile 15 of 20

W:\active\60960577\drawing\GIS\MXD\REA_Figures\WaterReport\60960577_Fig2_WaterBodyLocation_20111001_PW.mxd

October 2011
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Legend

▨	Study Area
☐	Zone of Investigation
☐	Constructable Area
Wind Project Location	
①	Proposed Turbine Location
▭	Access Road
—	Overhead Collector Line
- - -	Underground Collector Line
Solar Project Location	
🟥	Solar Lands
Transmission Line	
—	Overhead Transmission Line
······	Underground Transmission Line
■	Electrical Transmission Component
Existing Features	
—	Road
—+—	Railway
—+—	Abandoned Railway
—•—	Transmission Line (MNR)
—	Watercourse (OBM, as modified by Stantec)
■	Waterbody (OBM, as modified by Stantec)
Water Body Status	
🟩	REA Water Body
🟨	Non-REA Watercourse

Notes

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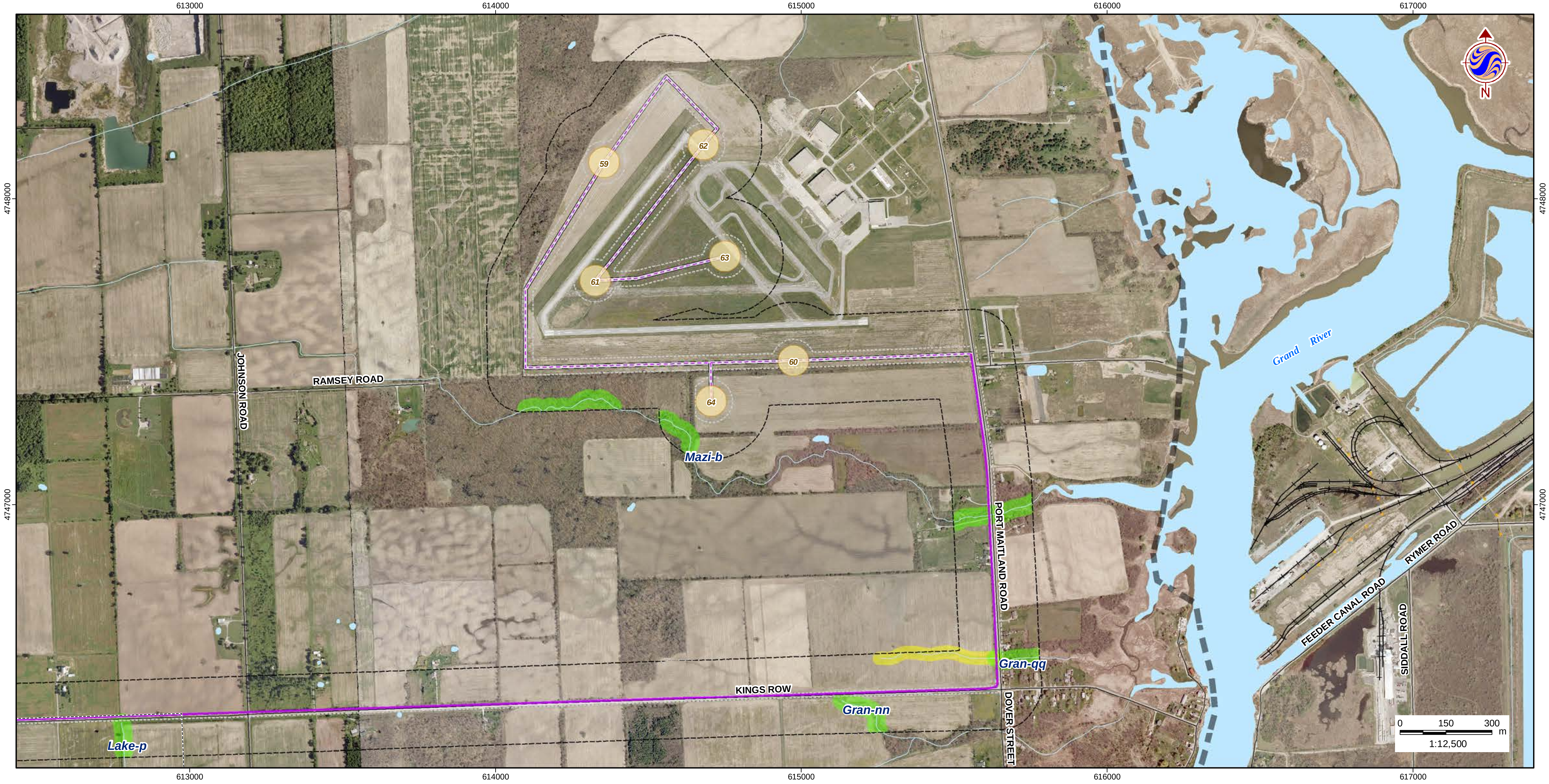
Client/Project
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.
2.16

Title
WATER BODY LOCATIONS
Tile 16 of 20



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Stantec

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as modified by Stantec)
Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse

Notes

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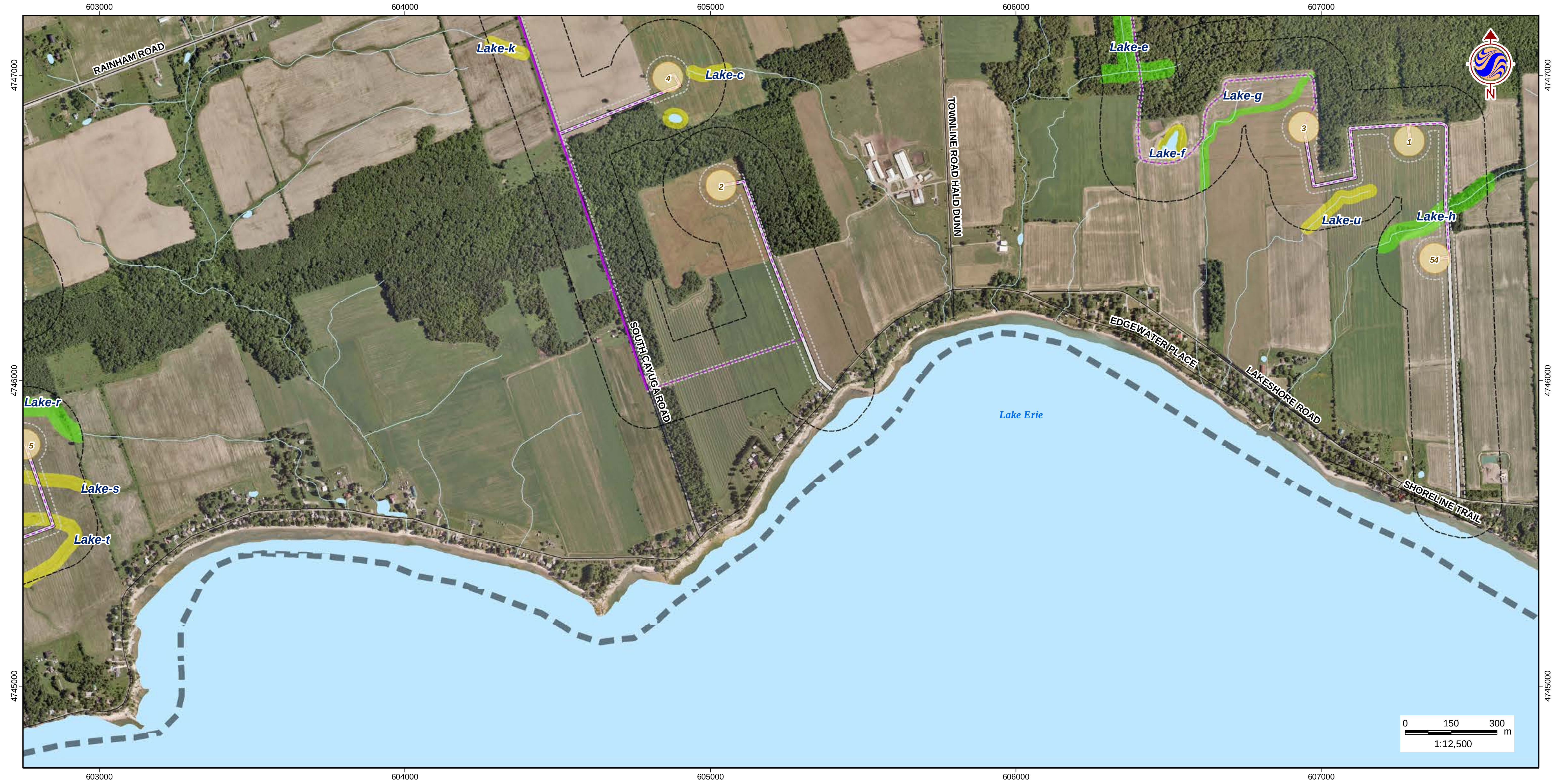
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.17

Title

WATER BODY LOCATIONS
Tile 17 of 20



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Stantec

Legend

Study Area
⬚ Zone of Investigation
⬚ Constructable Area

Wind Project Location

① Proposed Turbine Location
═ Access Road
━ Overhead Collector Line
┅ Underground Collector Line

Solar Project Location

▭ Solar Lands

Transmission Line

━ Overhead Transmission Line
┅ Underground Transmission Line
■ Electrical Transmission Component

Existing Features

— Road
┼ Railway
┼ Abandoned Railway
●— Transmission Line (MNR)
— Watercourse (OBM, as modified by Stantec)
■ Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse

Notes

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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.18

Title

WATER BODY LOCATIONS
Tile 18 of 20

W:\active\60960577\drawing\GIS\MXD\REA_Figures\WaterReport\60960577_Fig2_WaterBodyLocation_20111001_PW.mxd

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Stantec

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

① Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as modified by Stantec)
Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse

Notes

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Client/Project
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.
2.19

Title
WATER BODY LOCATIONS
Tile 19 of 20

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Stantec

Legend

- Study Area
- Zone of Investigation
- Constructable Area

Wind Project Location

- Proposed Turbine Location
- Access Road
- Overhead Collector Line
- Underground Collector Line

Solar Project Location

- Solar Lands

Transmission Line

- Overhead Transmission Line
- Underground Transmission Line
- Electrical Transmission Component

Existing Features

- Road
- Railway
- Abandoned Railway
- Transmission Line (MNR)
- Watercourse (OBM, as modified by Stantec)
- Waterbody (OBM, as modified by Stantec)

Water Body Status

- 🟩 REA Water Body
- 🟨 Non-REA Watercourse

Notes

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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

2.20

Title

WATER BODY LOCATIONS
Tile 20 of 20

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Stantec

Legend

▨ Study Area
☐ Zone of Investigation
☐ Constructable Area

Wind Project Location

① Proposed Turbine Location
▭ Access Road
— Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

▭ Solar Lands

Transmission Line

— Overhead Transmission Line
- - - Underground Transmission Line
■ Electrical Transmission Component

Existing Features

— Road
+ Railway
+ Abandoned Railway
- Transmission Line (MNR)
— Watercourse (OBM, as Modified by Stantec)
▭ Waterbody (OBM, as Modified by Stantec)

▬ Fish Habitat
▬ Indirectly Contributes to Fish Habitat

Notes

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Client/Project

SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

3.1

Title

FISHERIES HABITAT
Tile 1 of 20

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Stantec

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

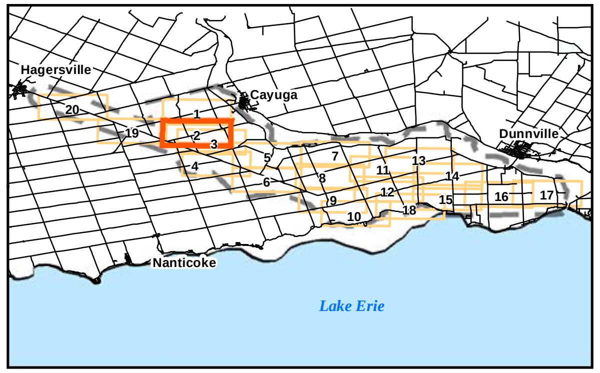
Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as Modified by Stantec)
Waterbody (OBM, as Modified by Stantec)

Fish Habitat
Indirectly Contributes to Fish Habitat



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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

3.2

Title

FISHERIES HABITAT
Tile 2 of 20

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October 2011
160960577

Legend

▨ Study Area
☐ Zone of Investigation
☐ Constructable Area

Wind Project Location

① Proposed Turbine Location
▬ Access Road
— Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

☐ Solar Lands

Transmission Line

— Overhead Transmission Line
- - - Underground Transmission Line
■ Electrical Transmission Component

Existing Features

— Road
—+— Railway
—+— Abandoned Railway
—•— Transmission Line (MNR)
— Watercourse (OBM, as Modified by Stantec)
■ Waterbody (OBM, as Modified by Stantec)

▬ Fish Habitat
▬ Indirectly Contributes to Fish Habitat

Notes

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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

3.3

Title

FISHERIES HABITAT
Tile 3 of 20

October 2011
160960577

Legend

- ▨ Study Area
- ⬚ Zone of Investigation
- ⬚ Constructable Area

Wind Project Location

- ① Proposed Turbine Location
- ═ Access Road
- ─ Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

- ▭ Solar Lands

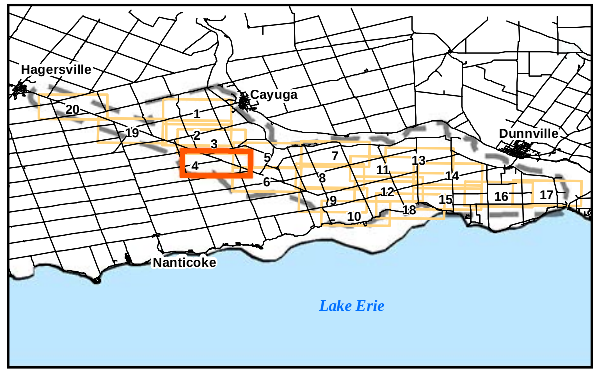
Transmission Line

- ─ Overhead Transmission Line
- ⋯ Underground Transmission Line
- ■ Electrical Transmission Component

Existing Features

- ─ Road
- ┼ Railway
- ┼ Abandoned Railway
- ─•─ Transmission Line (MNR)
- ─ Watercourse (OBM, as Modified by Stantec)
- ■ Waterbody (OBM, as Modified by Stantec)

- ▬ Fish Habitat
- ▬ Indirectly Contributes to Fish Habitat



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GRAND RENEWABLE ENERGY PARK

Figure No.

3.4

Title

FISHERIES HABITAT
Tile 4 of 20

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Stantec

Legend

- Study Area
- Zone of Investigation
- Constructable Area

Wind Project Location

- Proposed Turbine Location
- Access Road
- Overhead Collector Line
- Underground Collector Line

Solar Project Location

- Solar Lands

Transmission Line

- Overhead Transmission Line
- Underground Transmission Line
- Electrical Transmission Component

Existing Features

- Road
- Railway
- Abandoned Railway
- Transmission Line (MNR)
- Watercourse (OBM, as Modified by Stantec)
- Waterbody (OBM, as Modified by Stantec)

- Fish Habitat
- Indirectly Contributes to Fish Habitat

Notes

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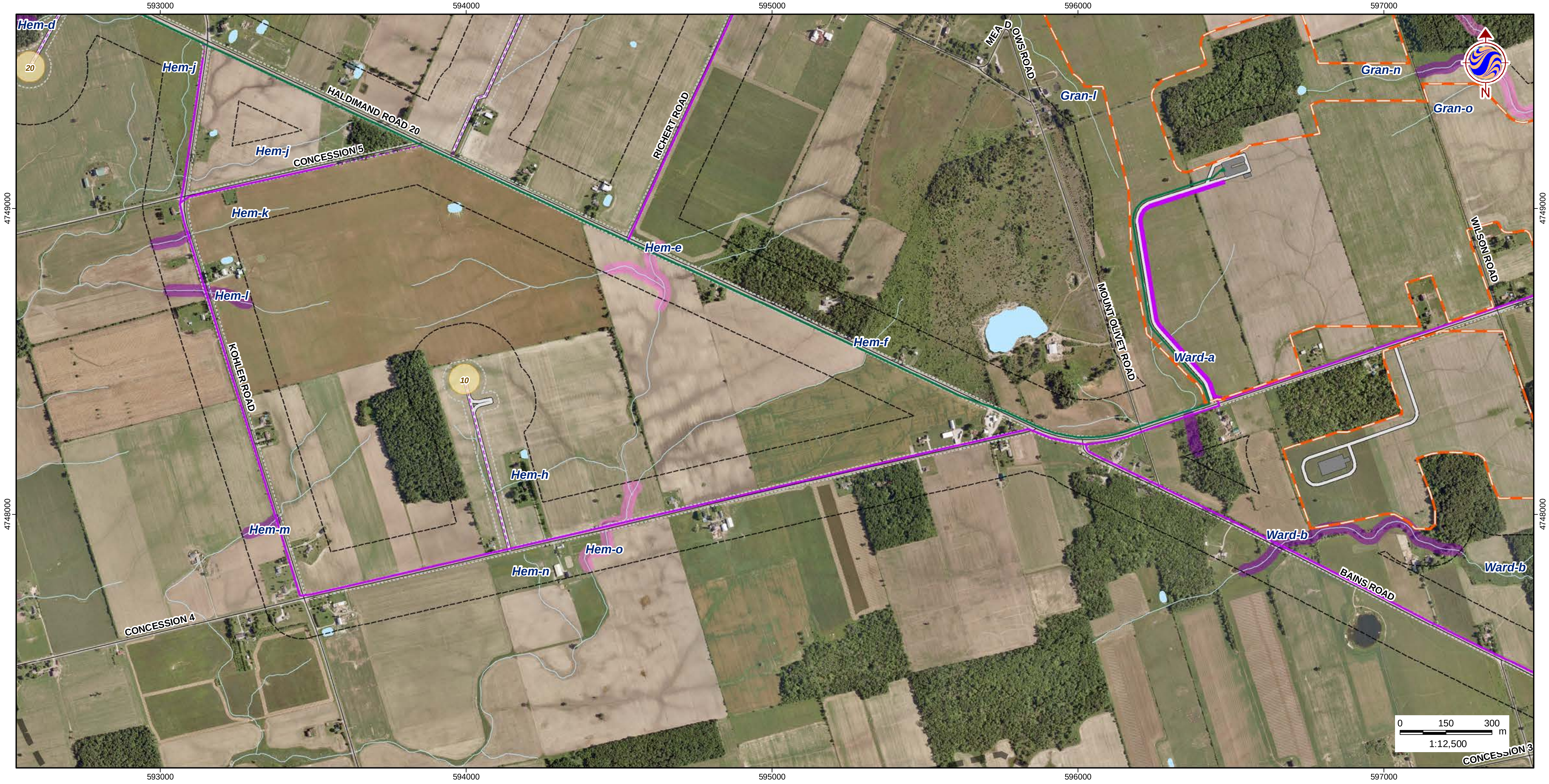
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

3.5

Title

FISHERIES HABITAT
Tile 5 of 20



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Stantec

Legend

▨ Study Area
┅ Zone of Investigation
┅ Constructable Area

Wind Project Location

① Proposed Turbine Location
▭ Access Road
— Overhead Collector Line
--- Underground Collector Line

Solar Project Location

▭ Solar Lands

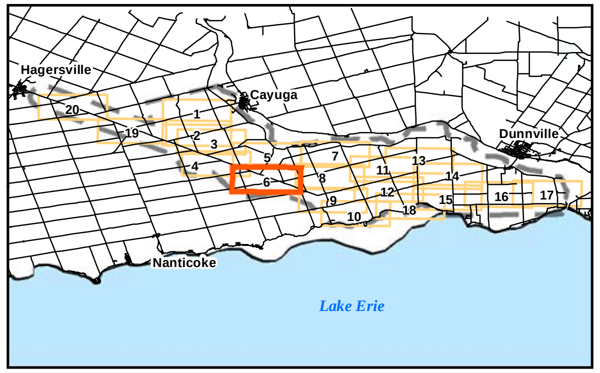
Transmission Line

— Overhead Transmission Line
┅ Underground Transmission Line
■ Electrical Transmission Component

Existing Features

— Road
┼ Railway
┼ Abandoned Railway
•—• Transmission Line (MNR)
— Watercourse (OBM, as Modified by Stantec)
▭ Waterbody (OBM, as Modified by Stantec)

▬ Fish Habitat
▬ Indirectly Contributes to Fish Habitat



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GRAND RENEWABLE ENERGY PARK

Figure No.

3.6

Title

FISHERIES HABITAT
Tile 6 of 20

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Stantec

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location
Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location
Solar Lands

Transmission Line
Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features
Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as Modified by Stantec)
Waterbody (OBM, as Modified by Stantec)

Fish Habitat
Indirectly Contributes to Fish Habitat

Notes

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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

3.7

Title

FISHERIES HABITAT
Tile 7 of 20

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Stantec

Legend

- ▨ Study Area
- ⬚ Zone of Investigation
- ⬚ Constructable Area

Wind Project Location

- ① Proposed Turbine Location
- ═ Access Road
- ━ Overhead Collector Line
- ┅ Underground Collector Line

Solar Project Location

- ▭ Solar Lands

Transmission Line

- ━ Overhead Transmission Line
- ┅ Underground Transmission Line
- ■ Electrical Transmission Component

Existing Features

- ─ Road
- ┼ Railway
- ┼ Abandoned Railway
- ●─● Transmission Line (MNR)
- ─ Watercourse (OBM, as Modified by Stantec)
- ■ Waterbody (OBM, as Modified by Stantec)

- ▬ Fish Habitat
- ▬ Indirectly Contributes to Fish Habitat

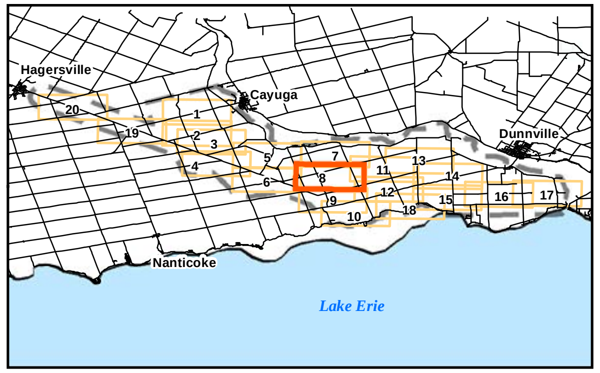

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Figure No.

3.8

Title

FISHERIES HABITAT
Tile 8 of 20

October 2011
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Legend

▨ Study Area
☐ Zone of Investigation
☐ Constructable Area

Wind Project Location

① Proposed Turbine Location
═ Access Road
— Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

☐ Solar Lands

Transmission Line

— Overhead Transmission Line
····· Underground Transmission Line
■ Electrical Transmission Component

Existing Features

— Road
┼ Railway
┼ Abandoned Railway
•—• Transmission Line (MNR)
— Watercourse (OBM, as Modified by Stantec)
■ Waterbody (OBM, as Modified by Stantec)

■ Fish Habitat
■ Indirectly Contributes to Fish Habitat

Notes

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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.
3.9

Title
FISHERIES HABITAT
Tile 9 of 20

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October 2011
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Stantec

Legend

▨ Study Area
┌┐ Zone of Investigation
┌┐ Constructable Area

Wind Project Location

① Proposed Turbine Location
═ Access Road
— Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

▭ Solar Lands

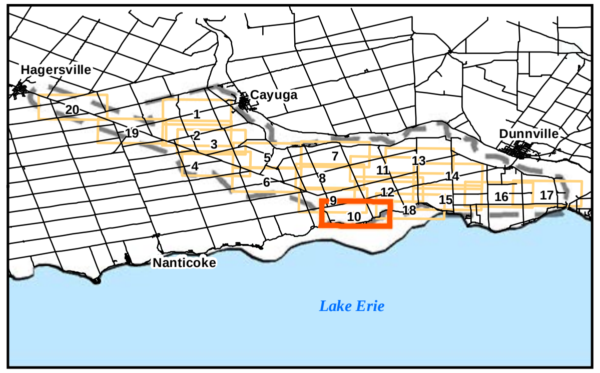
Transmission Line

— Overhead Transmission Line
······ Underground Transmission Line
■ Electrical Transmission Component

Existing Features

— Road
-+- Railway
-+- Abandoned Railway
-•- Transmission Line (MNR)
— Watercourse (OBM, as Modified by Stantec)
■ Waterbody (OBM, as Modified by Stantec)

■ Fish Habitat
■ Indirectly Contributes to Fish Habitat



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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

3.10

Title

FISHERIES HABITAT
Tile 10 of 20

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Stantec

Legend

- ▨ Study Area
- ┅ Zone of Investigation
- ┅ Constructable Area

Wind Project Location

- ① Proposed Turbine Location
- ═ Access Road
- — Overhead Collector Line
- ┅ Underground Collector Line

Solar Project Location

- ▭ Solar Lands

Transmission Line

- — Overhead Transmission Line
- ┅ Underground Transmission Line
- ■ Electrical Transmission Component

Existing Features

- — Road
- ┼ Railway
- ┼ Abandoned Railway
- ┅ Transmission Line (MNR)
- — Watercourse (OBM, as Modified by Stantec)
- ■ Waterbody (OBM, as Modified by Stantec)

- ■ Fish Habitat
- ■ Indirectly Contributes to Fish Habitat

Notes

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GRAND RENEWABLE ENERGY PARK

Figure No.

3.11

Title

FISHERIES HABITAT
Tile 11 of 20

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Stantec

Legend

▨ Study Area
┅ Zone of Investigation
┅ Constructable Area

Wind Project Location

● Proposed Turbine Location
═ Access Road
— Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

▭ Solar Lands

Transmission Line

— Overhead Transmission Line
┅ Underground Transmission Line
■ Electrical Transmission Component

Existing Features

— Road
┼ Railway
┼ Abandoned Railway
- • - Transmission Line (MNR)
— Watercourse (OBM, as Modified by Stantec)
■ Waterbody (OBM, as Modified by Stantec)

■ Fish Habitat
■ Indirectly Contributes to Fish Habitat

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GRAND RENEWABLE ENERGY PARK

Figure No.
3.12

Title
FISHERIES HABITAT
Tile 12 of 20

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Stantec

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

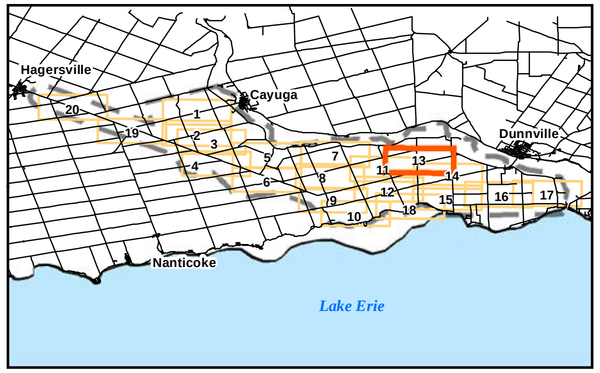
Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as Modified by Stantec)
Waterbody (OBM, as Modified by Stantec)

Fish Habitat
Indirectly Contributes to Fish Habitat



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GRAND RENEWABLE ENERGY PARK

Figure No.

3.13

Title

FISHERIES HABITAT
Tile 13 of 20

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Stantec

Legend

▨ Study Area
⬚ Zone of Investigation
⬚ Constructable Area

Wind Project Location

● Proposed Turbine Location
═ Access Road
— Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

▭ Solar Lands

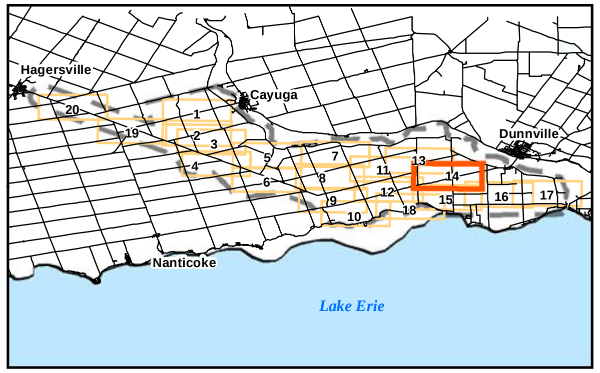
Transmission Line

— Overhead Transmission Line
····· Underground Transmission Line
■ Electrical Transmission Component

Existing Features

— Road
┼ Railway
┼ Abandoned Railway
•—• Transmission Line (MNR)
— Watercourse (OBM, as Modified by Stantec)
■ Waterbody (OBM, as Modified by Stantec)

⬬ Fish Habitat
⬬ Indirectly Contributes to Fish Habitat



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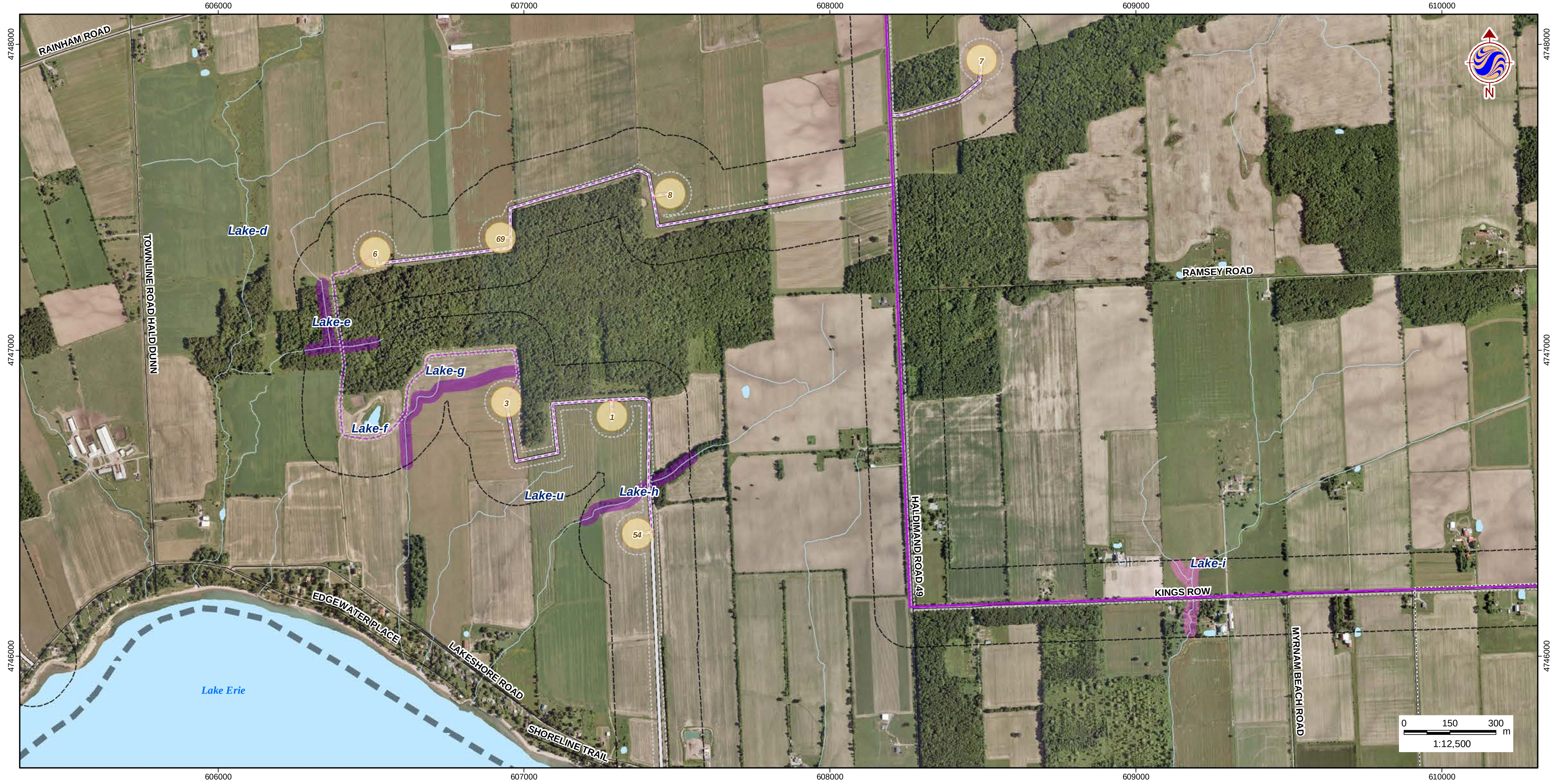
GRAND RENEWABLE ENERGY PARK

Figure No.

3.14

Title

FISHERIES HABITAT
Tile 14 of 20



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Stantec

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as Modified by Stantec)
Waterbody (OBM, as Modified by Stantec)

Fish Habitat
Indirectly Contributes to Fish Habitat

Notes

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GRAND RENEWABLE ENERGY PARK

Figure No.

3.15

Title

FISHERIES HABITAT
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Stantec

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as Modified by Stantec)
Waterbody (OBM, as Modified by Stantec)

Fish Habitat
Indirectly Contributes to Fish Habitat

Notes

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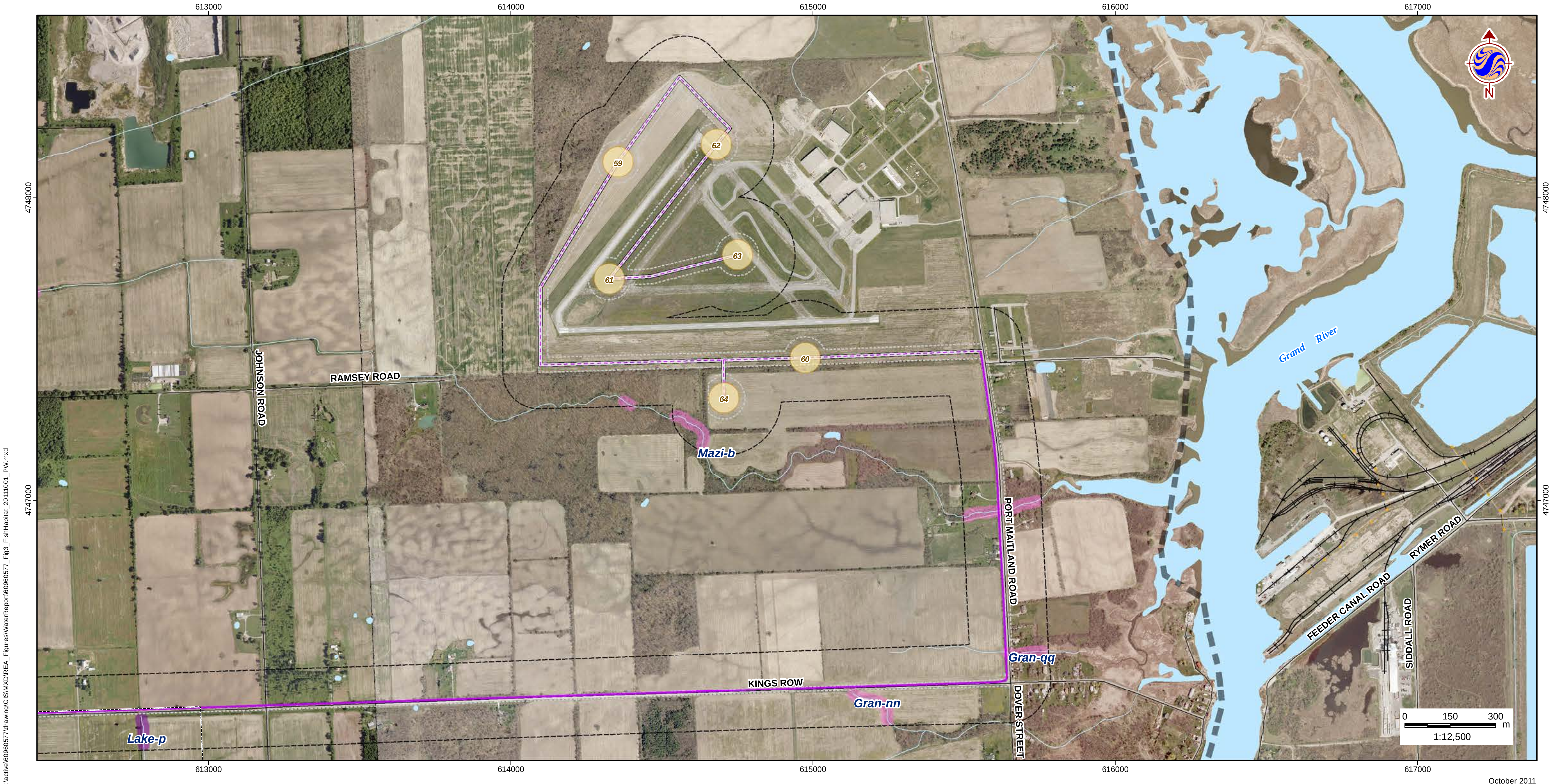
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

3.16

Title

FISHERIES HABITAT
Tile 16 of 20



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Stantec

Legend

- ▨ Study Area
- ☐ Zone of Investigation
- ☐ Constructable Area

Wind Project Location

- ① Proposed Turbine Location
- ═ Access Road
- — Overhead Collector Line
- - - Underground Collector Line

Solar Project Location

- ☐ Solar Lands

Transmission Line

- — Overhead Transmission Line
- - - Underground Transmission Line
- ■ Electrical Transmission Component

Existing Features

- — Road
- ┼ Railway
- ┼ Abandoned Railway
- ·-· Transmission Line (MNR)
- — Watercourse (OBM, as Modified by Stantec)
- ■ Waterbody (OBM, as Modified by Stantec)

- ▬ Fish Habitat
- ▬ Indirectly Contributes to Fish Habitat

Notes

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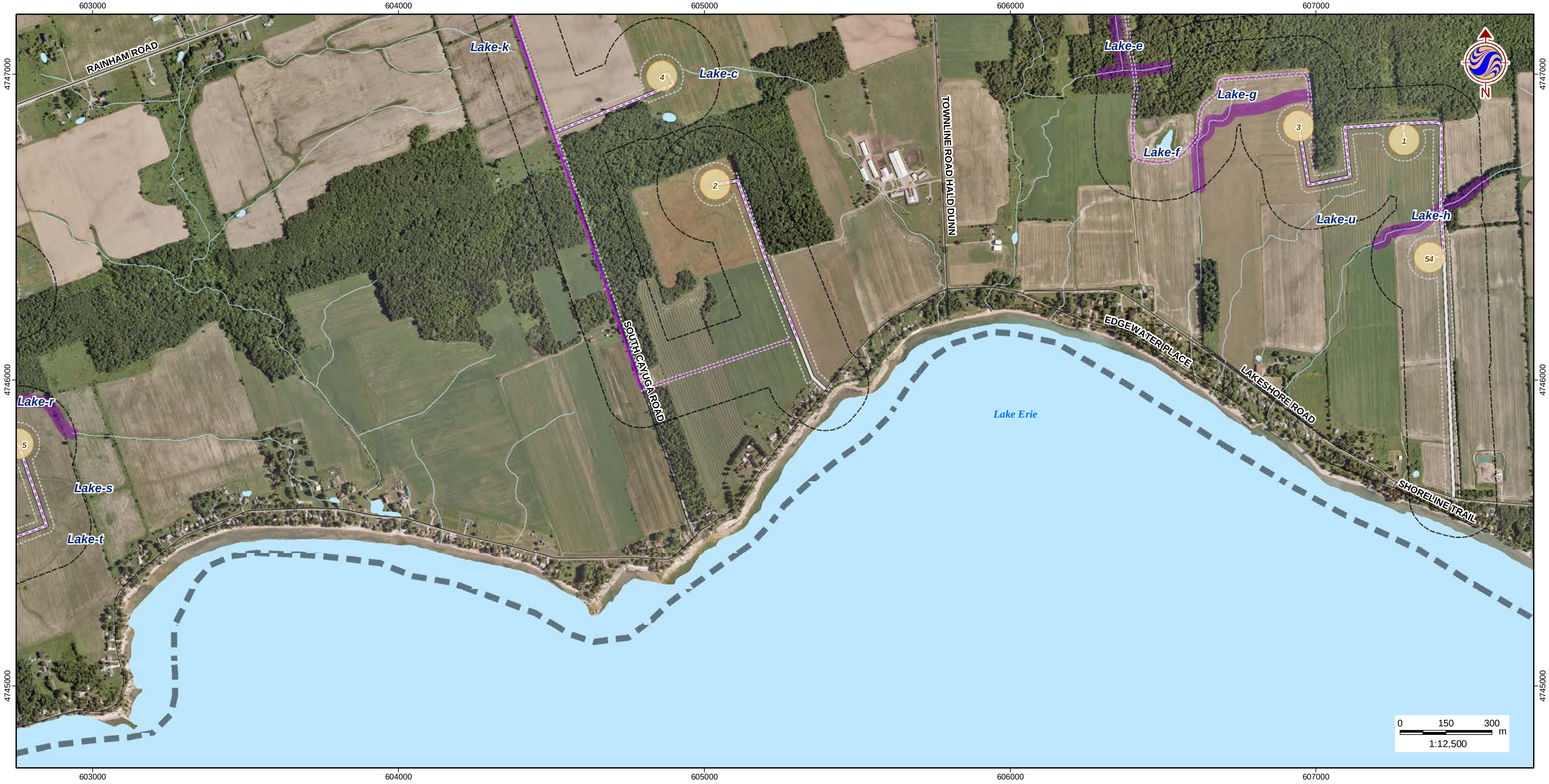
SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

3.17

Title

FISHERIES HABITAT
Tile 17 of 20



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Stantec

Legend

- Study Area
- Zone of Investigation
- Constructable Area

Wind Project Location

- Proposed Turbine Location
- Access Road
- Overhead Collector Line
- Underground Collector Line

Solar Project Location

- Solar Lands

Transmission Line

- Overhead Transmission Line
- Underground Transmission Line
- Electrical Transmission Component

Existing Features

- Road
- Railway
- Abandoned Railway
- Transmission Line (MNR)
- Watercourse (OBM, as Modified by Stantec)
- Waterbody (OBM, as Modified by Stantec)

- Fish Habitat
- Indirectly Contributes to Fish Habitat

Notes

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SAMSUNG, PATTERN & KEPCO (SPK)
GRAND RENEWABLE ENERGY PARK

Figure No.

3.18

Title

FISHERIES HABITAT
Tile 18 of 20

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October 2011
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Legend

- ▨ Study Area
- ⬚ Zone of Investigation
- ⬚ Constructable Area

Wind Project Location

- ① Proposed Turbine Location
- ▭ Access Road
- ━ Overhead Collector Line
- ┅ Underground Collector Line

Solar Project Location

- ▭ Solar Lands

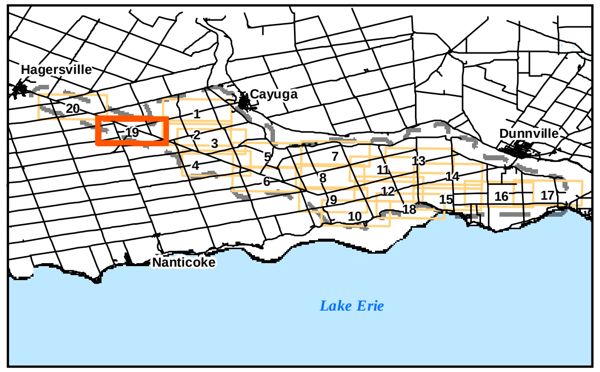
Transmission Line

- ━ Overhead Transmission Line
- ┅ Underground Transmission Line
- ■ Electrical Transmission Component

Existing Features

- ─ Road
- ┼ Railway
- ┼ Abandoned Railway
- ● Transmission Line (MNR)
- ─ Watercourse (OBM, as Modified by Stantec)
- ■ Waterbody (OBM, as Modified by Stantec)

- ⬭ Fish Habitat
- ⬬ Indirectly Contributes to Fish Habitat



Notes

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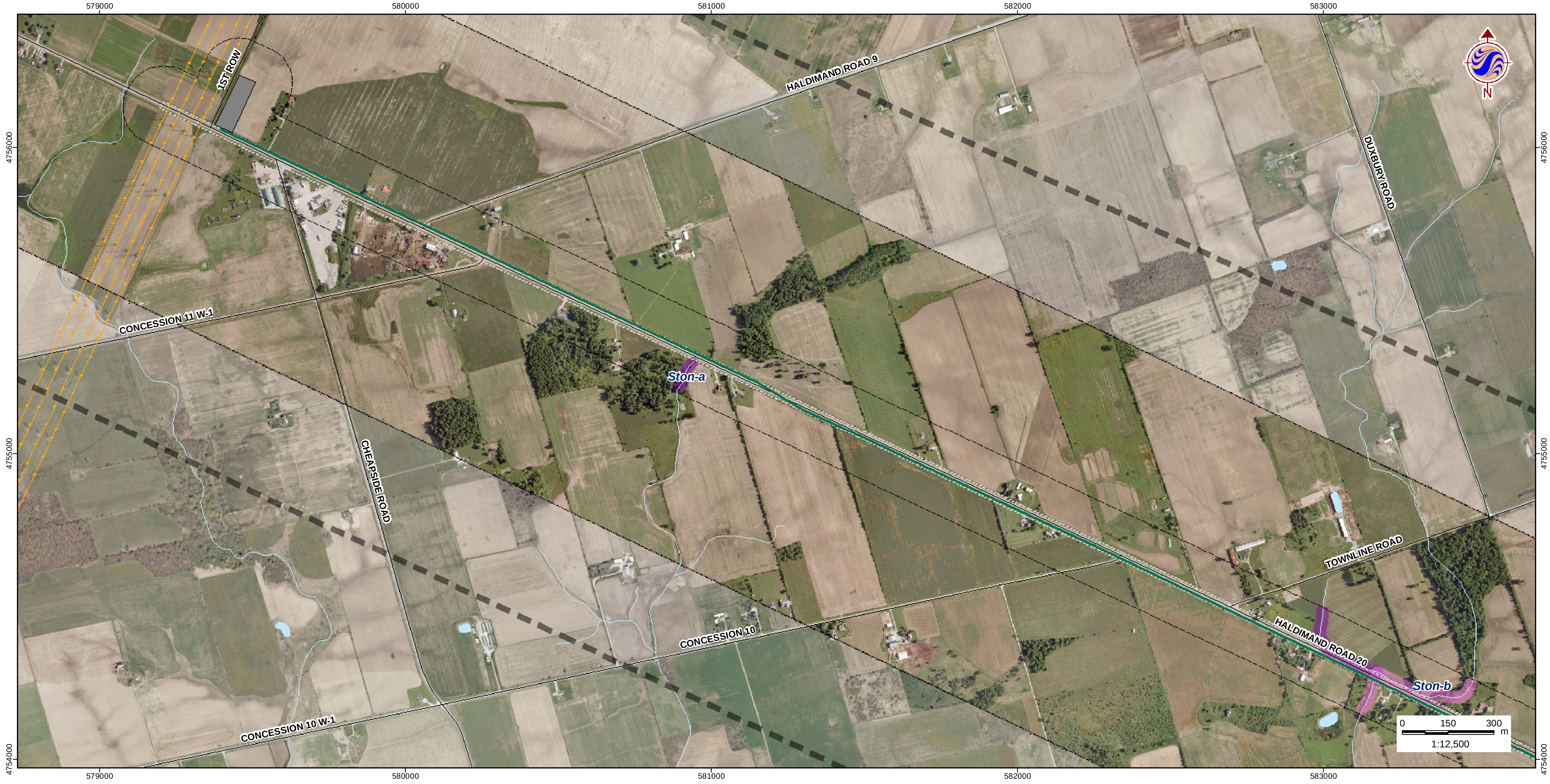
GRAND RENEWABLE ENERGY PARK

Figure No.

3.19

Title

FISHERIES HABITAT
Tile 19 of 20



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Stantec

Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

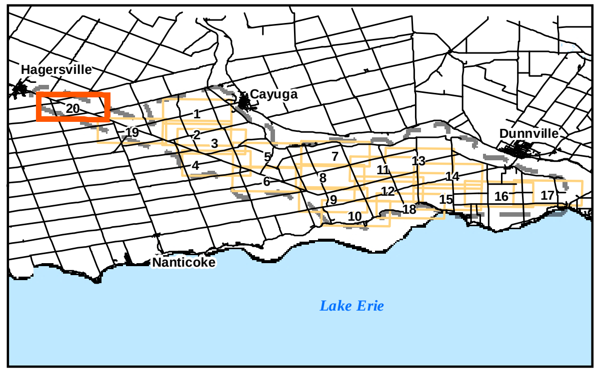
Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as Modified by Stantec)
Waterbody (OBM, as Modified by Stantec)

Fish Habitat
Indirectly Contributes to Fish Habitat



Notes

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GRAND RENEWABLE ENERGY PARK

Figure No.
3.20

Title
FISHERIES HABITAT
Tile 20 of 20

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October 2011
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Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

① Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as modified by Stantec)
Waterbody (OBM, as modified by Stantec)

Water Body Status

🟩 REA Water Body
🟨 Non-REA Watercourse

Notes

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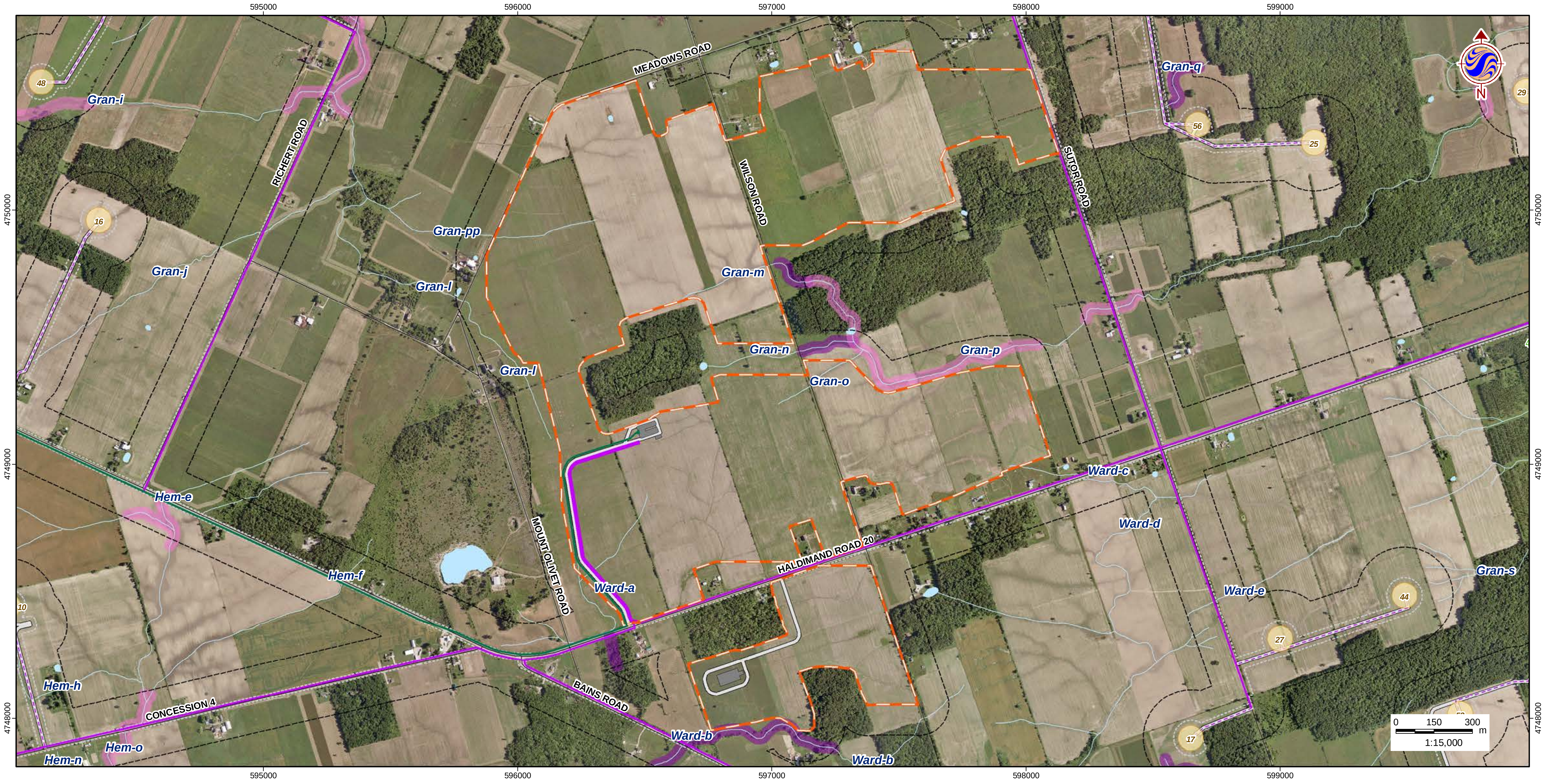
GRAND RENEWABLE ENERGY PARK

Figure No.

4.2

Title

WATER BODY LOCATIONS
Solar Lands



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Legend

Study Area
Zone of Investigation
Constructable Area

Wind Project Location

Proposed Turbine Location
Access Road
Overhead Collector Line
Underground Collector Line

Solar Project Location

Solar Lands

Transmission Line

Overhead Transmission Line
Underground Transmission Line
Electrical Transmission Component

Existing Features

Road
Railway
Abandoned Railway
Transmission Line (MNR)
Watercourse (OBM, as Modified by Stantec)
Waterbody (OBM, as Modified by Stantec)

Fish Habitat
Indirectly Contributes to Fish Habitat

Notes

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GRAND RENEWABLE ENERGY PARK

Figure No.
4.3

Title
FISHERIES HABITAT
Solar Lands

Appendix B

Photographic Record

Appendix B1

Long Point Region Conservation Authority

Photo 1: Ston-a (tile 19) - Looking upstream (southeast) from concrete culvert at flooded vegetation and roadside drain. Site is located on Haldimand Road 20 between Concession 10 and Concession 11 W-1.

Photo 2: Ston-a (tile 19) - Looking upstream (northwest) from concrete culvert at flooded vegetation and roadside drain. Site is located on Haldimand Road 20 between Concession 10 and Concession 11 W-1.

Photo 3: Ston-a (tile 19) - Looking upstream (northeast) from concrete culvert at flooded pasture. Site is located on Haldimand Road 20 between Concession 10 and Concession 11 W-1.

Photo 4: Ston-a (tile 19) - Looking downstream (southwest) from concrete culvert at flooded vegetation. Site is located on Haldimand Road 20 between Concession 10 and Concession 11 W-1.

Title
STONEY CREEK SUBWATERSHED PHOTOS

Photo 5: Ston-b (tile 19) - Looking upstream (southeast) from concrete culvert at agriculture field and roadside drain. Site is located on Haldimand Road 20 between Haldimand Road 53 and Concession 10.

Photo 6: Ston-b (tile 19) - Looking upstream (east) from concrete culvert at flooded vegetation in roadside drain. Site is located on Haldimand Road 20 between Haldimand Road 53 and Concession 10.

Photo 7: Ston-b (tile 19) - Looking upstream (north) from concrete culvert at agriculture field and roadside drain. Site is located on Haldimand Road 20 between Haldimand Road 53 and Concession 10.

Photo 8: Ston-b (tile 19) - Looking downstream (southwest) from concrete culvert at flooded vegetation. Site is located on Haldimand Road 20 between Haldimand Road 53 and Concession 10.

Photo 9: Ston-b (tile 19) - Existing substrate conditions at concrete culvert. Site is located on Haldimand Road 20 between Haldimand Road 53 and Concession 10.

Title
STONEY CREEK SUBWATERSHED PHOTOS

Photo 10: Ston-c (tile 18) - Looking upstream (north) at cattail vegetation in roadside drain and channel flowing through manicured lawn. Site is located on Haldimand Road 20 between Old Talbot Road and Haldimand Road 53.

Photo 11: Ston-c (tile 18) - Looking downstream (west) from concrete culvert at cattail vegetation in roadside drain and channel flowing through agriculture field in the distance. Site is located on Haldimand Road 20 between Old Talbot Road and Haldimand Road 53.

Photo 12: Ston-d (tile 18) - Looking upstream (east) from concrete culvert at agriculture field and roadside drain. Site is located on Haldimand Road 20 between Old Talbot Road and Haldimand Road 53.

Photo 13: Ston-d (tile 18) - Looking downstream (west) from concrete culvert at channel flowing through agriculture field. Site is located on Haldimand Road 20 between Old Talbot Road and Haldimand Road 53.

Photo 14: Ston-d (tile 18) - Existing substrate conditions downstream of concrete culvert. Site is located on Haldimand Road 20 between Old Talbot Road and Haldimand Road 53.

Photo 15: Ston-e (tile 18) - Looking upstream (northeast) from concrete culvert at area of channel. Site is located on Haldimand Road 20 between Dry Lake Road and Highway 3.

Photo 16: Ston-e (tile 18) - Looking downstream (southwest) from concrete culvert at channel flowing through a residential property. Site is located on Haldimand Road 20 between Dry Lake Road and Highway 3.

Photo 17: Ston-f (tile 18) - Looking upstream (northeast) from concrete culvert at area of channel. Site is located on Haldimand Road 20 between Dry Lake Road and Highway 3.

Photo 18: Ston-f (tile 18) - Looking downstream (southwest) from concrete culvert at channel flowing through agriculture field. Site is located on Haldimand Road 20 between Dry Lake Road and Highway 3.

Photo 19: Ston-f (tile 18) - Existing substrate conditions downstream of concrete culvert. Site is located on Haldimand Road 20 between Dry Lake Road and Highway 3.

Photo 20: Ston-g (tile 18) - Looking upstream (northeast) at channel. Site is located on Concession 8 at the intersection of Haldimand Road 20.

Photo 21: Ston-g (tile 18) - Looking downstream (south) at channel. Site is located on Concession 8 at the intersection of Haldimand Road 20.

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Appendix
B1

Title
STONEY CREEK SUBWATERSHED PHOTOS

Photo 1: Hem-a (tile 4) - Flooded agricultural fields adjacent to Water Body south of Concession 6 near the intersection of Haldimand Road 20.

Photo 2: Hem-a (tile 4) - Looking downstream (south) at Water Body and twin CSP culverts located on Concession 6 near the intersection of Haldimand Road 20. Note flooded agricultural fields on west bank and woodlot on east bank.

Photo 3: Hem-a (tile 4) - Looking north on at roadside drain flowing west and adjacent flooded woodlot. This site is upstream of twin CSP culverts located on Concession 6. Haldimand Road 20 can be seen through trees on right side of photo.

Photo 4: Hem-a (tile 4) - Looking north on at pond connected to roadside drain flowing west into Water Body. This site is upstream of twin CSP culverts located on Concession 6 near the intersection of Haldimand Road 20. Agricultural fields occur to the west and woodlot to the east of this pond.

Photo 5: Hem-a (tile 4) - Looking north at confluence of roadside drain flowing west and channel flowing south through woodlot. This site is upstream of twin CSP culverts located on Concession 6 near the intersection of Haldimand Road 20.

Photo 6: Hem-a (tile 4) - Looking west at roadside drain flowing into Water Body on south end of twin CSP culverts located on Concession 6 near the intersection of Haldimand Road 20.

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Appendix B1	Page 1 of 15
Title HEMLOCK CREEK SUBWATERSHED PHOTOS	

Photo 7: Hem-a (tile 4) - Existing substrate conditions in upstream area. Site is located 100 m south of Haldimand Road 20 between Concession 6 and Link Road.

Photo 8: Photo 0099- Hem-b (Tile 3) (field data sheet 10.0) - Looking downstream (east) at undefined channel flowing adjacent an agriculture field. Site is located north of Concession 6 between Haldimand Road 12 and Haldimand Road 20.

Photo 9: Photo 0100- Hem-b (Tile 3) (field data sheet 10.0) - Looking upstream (west) at channel flowing through an agriculture field. Site is located north of Concession 6 between Haldimand Road 12 and Haldimand Road 20.

Photo 10: Photo 0098- Hem-b (tile 3) (field data sheet 10.0) - Existing substrate conditions in channel. Site is located north of Concession 6 between Haldimand Road 12 and Haldimand Road 20.

Photo 11: Hem-c (tile 4) - Looking downstream (west) at small pool in roadside drain associated with CSP culvert. This site is on Haldimand Road 20 between Concession 5 and Concession 6.

Photo 12: Hem-c (tile 4) - Looking upstream (east) at small pool and isolated drain feature associated with CSP culvert flowing through lowland vegetation, agricultural field and eventually into a woodlot. This site is on Haldimand Road 20 between Concession 5 and Concession 6.

Photo 13: Hem-d (tile 4) - Looking upstream (east) at drain feature associated with CSP culvert flowing through plowed agricultural field. This site is on Haldimand Road 20 near the intersection with Kohler Road.

Photo 14: Hem-d (tile 4) - Looking downstream (southwest) at drain feature associated with CSP culvert flowing low-laying area. This site is on Haldimand Road 20 near the intersection with Kohler Road. The racetrack can be seen in the distance.

Photo 15: Hem-d (tile 4) - Looking downstream (southwest) at drain feature associated with CSP culvert flowing low-laying area (shown in previous picture) and into agricultural field (channel can be seen in the distance). This site is on Haldimand Road 20 near the intersection with Kohler Road.

Photo 16: Hem-e (tile 6) - Looking downstream (south) from CSP culvert at shallow drain feature flowing through agricultural field (soy). This site is on Haldimand Road 20 between Richert Road and Meadows Road.

Photo 17: Hem-e (tile 6) - Looking downstream (south) from crop field at shallow drain feature flowing through agricultural field (soy). This site is on Haldimand Road 20 between Richert Road and Meadows Road.

Photo 18: Hem-e (tile 6) - Looking downstream (south) from crop field at location of side channel (depression in crops) into shallow drain feature flowing through agricultural field (soy). This site is on Haldimand Road 20 between Richert Road and Meadows Road.

Photo 19: Hem-g (tile 4) - Looking upstream (northeast) at channel from CSP culvert. Site is located on Haldimand Road 20 between Concession 6 and Link Road.

Photo 20: Hem-g (tile 4) - Looking downstream (south) at channel from CSP culvert. Site is located on Haldimand Road 20 between Concession 6 and Link Road.

Photo 21: Hem-g (tile 4) - Existing substrate conditions at CSP culvert. Site is located on Haldimand Road 20 between Concession 6 and Link Road.

Photo 22: Hem-h (tile 4) - Looking upstream (west) from CSP culvert in laneway at linear channel flowing through a residential property. Site is located west of Haldimand Road 20, between Concession 4 and Concession 5.

Photo 23: Hem-h (tile 4) - Looking downstream (east) from CSP culvert in laneway at linear channel flowing through a residential property. Note, channel flows through agriculture field downstream of residential property. Site is located west of Haldimand Road 20, between Concession 4 and Concession 5.

Photo 24: Hem-h (tile 4) - Looking northeast at isolated pond on east edge of residential property. Site is located west of Haldimand Road 20, between Concession 4 and Concession 5.

Photo 25: Hem-h (tile 4) -Looking upstream (north) at ephemeral feature that flows through an agriculture field, located on the west side of the residential property. Site is located west of Haldimand Road 20, between Concession 4 and Concession 5.

Photo 26: Hem-h (tile 4) - Looking downstream (south) at ephemeral feature that flows through an agriculture field, looking towards a residential property. Site is located west of Haldimand Road 20, between Concession 4 and Concession 5.

Photo 27: Hem-j (tile 4) - Looking upstream (southeast) at agricultural field. Site is located on Haldimand Road 20 between Kohler Road and Concession 6.

Photo 28: Hem-j (tile 4) - Looking upstream (south) at agricultural field. Site is located on Haldimand Road 20 between Kohler Road and Concession 6.

Photo 29: Hem-j (tile 4) - Looking upstream (southwest) at agricultural field. Site is located on Haldimand Road 20 between Kohler Road and Concession 6.

Photo 30: Hem-k (tile 4) - Looking upstream (east) at cattails and agricultural field. Site is located on south of Concession 5 on Kohler Road, between Haldimand Road 20 and Haldimand Road 12.

Photo 31: Hem-k (tile 4) - Looking downstream (west) from Kohler road at channel flowing through agricultural field. Site is located on south of Concession 5 on Kohler Road, between Haldimand Road 20 and Haldimand Road 12.

Photo 32: Hem-k (tile 4) - Looking at in-stream conditions along Kohler road. Site is located on south of Concession 5 on Kohler Road, between Haldimand Road 20 and Haldimand Road 12.

Photo 33: Hem-i (tile 3) - Looking upstream (north) at channel from CSP culvert. Site is located on Haldimand Road 20 between Concession 7 and Haldimand Road 12.

Photo 34: Hem-i (tile 3) - Looking downstream (south) at channel from CSP culvert. Site is located on Haldimand Road 20 between Concession 7 and Halidmand Road 12.

Photo 35: Hem-i (tile 3) - Existing substrate conditions at upstream end of CSP culvert. Site is located on Haldimand Road 20 between Concession 8 and Link Road.

Photo 36: Hem-i (tile 3) - Looking upstream (north) at channel. Site is located 100 m south of Haldimand Road 20 between Concession 8 and Link Road.

Photo 37: Hem-i (tile 3) - Looking downstream (south) at channel. Site is located 100 m south of Haldimand Road 20 between Concession 8 and Link Road.

Photo 38: Hem-l (tile 6) - Looking upstream (west) channel flowing through agricultural field. Site is located on Kohler Road between Concession 4 and Concession 5.

Photo 39: Hem-I (tile 6) - Looking southwest at channel flowing through an agricultural field. Site is located on Kohler Road between Concession 4 and Concession 5.

Photo 40: Hem-m (tile 6) - Looking upstream (northeast) at channel in agricultural field. Site is located on Kohler Road between Concession 4 and Concession 5.

Photo 41: Hem-m (tile 6) - Looking downstream (southwest) at roadside drain and channel flowing through an agricultural field. Site is located on Kohler Road between Concession 4 and Concession 5.

Photo 42: Hem-m (tile 6) - Looking southwest at roadside drain on Kohler Road. Site is located on Kohler Road between Concession 4 and Concession 5.

Photo 43: Hem-n (tile 6) - Looking at CSP culvert and roadside drain on north side of Concession 4. Site is located on Concession 4, between Kohler Road and Haldimand Road 20.

Photo 44: Hem-n (tile 6) - Looking south at outflow of CSP culvert into pasture lands. Site is located on Concession 4, between Kohler Road and Haldimand Road 20.

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Photo 45: Hem-o (tile 6) - Looking east at upstream end of concrete culvert on north side of Concession 4. Site is located on Concession 4, between Kohler Road and Haldimand Road 20.

Photo 46: Hem-o (tile 6) - Looking south at outflow of concrete culvert and channel flowing through agriculture lands. Site is located on Concession 4, between Kohler Road and Haldimand Road 20

Photo 1: Ward-a (solar tile) - Looking upstream (northwest) at channel in meadow. Site is located on Haldimand Road 20 between Wilson Road and Mount Olivet Road.

Photo 2: Ward-a (solar tile) - Looking downstream (east) channel through agricultural field. Site is located on Haldimand Road 20 between Wilson Road and Mount Olivet Road.

Photo 3: Ward-a (solar tile) - Existing substrate conditions. Site is located on Haldimand Road 20 between Wilson Road and Mount Olivet Road.

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Appendix
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Title
WARDELLS CREEK SUBWATERSHED PHOTOS

Photo 4: Ward-b (tile 6) - Looking upstream (south) from concrete culvert on Bains Road, between Haldimand Road 20 and Wilson Road.

Photo 5: Ward-b (tile 6) - Looking downstream (west) from concrete culvert on Bains Road, between Haldimand Road 20 and Wilson Road.

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Appendix
B1

Title
WARDELLS CREEK SUBWATERSHED PHOTOS

Photo 6: Ward-c (tile 8) - Looking upstream (west) at concrete culvert on north side of Haldimand Road 20, between Wilson Road and Sutor Road.

Photo 7: Ward-c (tile 8) - Looking downstream (east) at concrete culvert on south side of Haldimand Road 20, between Wilson Road and Sutor Road.

Photo 8: Ward-d (tile 8) - Looking downstream (west) from Sutor Road at channel location. Site is located on Sutor Road, south of Haldimand Road 20.

Photo 9: Ward-d (tile 8) - Looking upstream (east) from Sutor Road at channel location. Site is located on Sutor Road, south of Haldimand Road 20.

Photo 10: Ward-e (tile 8) - Looking upstream from Sutor Road at channel location. Site is located on Sutor Road, south of Haldimand Road 20.

Photo 11: Ward-e (tile 8) - Looking downstream from Sutor Road at channel location. Site is located on Sutor Road, south of Haldimand Road 20.

Photo 12: Ward-f (tile 8) - Looking upstream (northwest) at water body flowing into a concrete culvert. This site is located on Bains Road between Wilson Road and Haldimand Road 50.

Photo 13: Ward-f (tile 8) - Looking downstream (southeast) at water body flowing from concrete culvert and adjacent to agriculture and residential land uses. This site is located on Bains Road between Wilson Road and Haldimand Road 50.

Photo 14: Ward-f (tile 8) - Existing substrate conditions in water body at downstream end of concrete culvert. This site is located on Bains Road between Wilson Road and Haldimand Road 50.


Photo 15: Ward-g (tile 8) - Looking upstream at grassy wetted area in a field. Site is located west of Sutor Road and north of Bains Road.


Photo 16: Ward-g (tile 8) - Looking downstream at grassy wetted area in a field. Site is located west of Sutor Road and north of Bains Road.

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Appendix
B1

Title
WARDELLS CREEK SUBWATERSHED PHOTOS

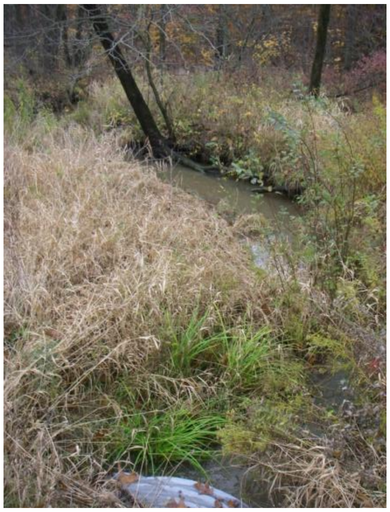

Photo 17: Ward-h (tile 9) - Looking downstream (southwest) at water body flowing from CSP culvert into wooded area. This site is located on Bains Road between Sutor Road and Haldimand Road 50.

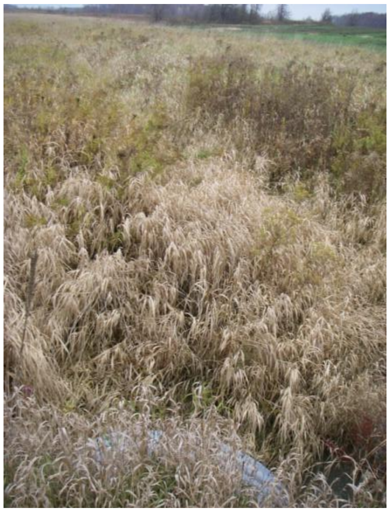

Photo 18: Ward-h (tile 9) - Looking upstream (northeast) at water body flowing from dense vegetation into CSP culvert. This site is located on Bains Road between Sutor Road and Haldimand Road 50.

Photo 19: Ward-j (tile 8) - Looking downstream (southwest) at grassy swale from a CSP culvert in a field. Site is located west of Haldimand Road 50 between Haldimand Road 20 and Bains Road.

Photo 20: Ward-j (tile 8) - Looking upstream (northeast) at grassy swale from a CSP culvert in a field. Site is located west of Haldimand Road 50 between Haldimand Road 20 and Bains Road.

Photo 21: Ward-j (tile 8) - Substrate in drain feature at CSP culvert in a field. Site is located west of Haldimand Road 50 between Haldimand Road 20 and Bains Road.

Photo 22: Ward-k (tile 9) - Looking north at upstream end of concrete culvert on watercourse. This site is located on Bains Road between Sutor Road and Haldimand Road 50.

Photo 23: Ward-k (tile 9)- Looking upstream (west) of concrete culvert on north side of Bains Road. This site is located on Bains Road between Sutor Road and Haldimand Road 50.

Photo 24: Ward-k (tile 9) - Looking downstream (south) of concrete culvert at watercourse flowing into wooded area along Bains Road. This site is located on Bains Road between Sutor Road and Haldimand Road 50.

Photo 25: Ward-m (tile 9) - Looking upstream (northeast) at dry area in middle of an active agricultural field. Site is located west of Haldimand Road 50 between Bains Road and Rainham Road.

Photo 26: Ward-m (tile 9) - Looking downstream (southwest) at dry area in middle of an active agriculture field. Site is located west of Haldimand Road 50 between Bains Road and Rainham Road.

Photo 1: Evans-a (tile 9) - Looking upstream (north) at watercourse flowing through agricultural field into CSP culvert. This site is located on Bains Road between Sutor Road and Haldimand Road 50.

Photo 2: Evans-a (tile 9) - Looking at existing conditions at upstream end of CSP culvert. This site is located on Bains Road between Sutor Road and Haldimand Road 50.

Photo 3: Evans-a (tile 9) - Looking east at roadside drain contributing to watercourse at upstream end of CSP culvert. This site is located on Bains Road between Sutor Road and Haldimand Road 50.

Photo 4: Evans-a (tile 9) - Looking downstream (south) at watercourse from CSP culvert along Bains Road. This site is located on Bains Road between Sutor Road and Haldimand Road 50.

Photo 5: Evans-a (tile 9) - Looking downstream (south) at watercourse from Bains Road as it turns into wooded area. This site is located on Bains Road between Sutor Road and Haldimand Road 50.

Photo 6: Evans- a (tile 9) - Looking upstream (north) from Rainham Road at channel location. Site is located on Sutor Road, between River Road and Meadows Road.

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Appendix
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Title
EVANS CREEK SUBWATERSHED PHOTOS

Photo 7: Evans-a (tile 9) - Looking downstream (south) from Rainham Road at channel flowing though farm lands. Site is located on Rainham Road, between Brookers Road and Haldimand Road 50.

Photo 8: Evans-c (tile 12) - Looking at upstream (north) from CSP culvert flowing under Bains Road, south of Haldimand Road 20, between Haldimand Road 50 and South Cayuga Road.

Photo 9: Evans-c (tile 12) - Looking at downstream (south) from CSP culvert flowing under Bains Road, south of Haldimand Road 20, between Haldimand Road 50 and South Cayuga Road.

Photo 10: Evans-c (tile 12) - Looking at substrate at CSP culvert flowing under Bains Road, south of Haldimand Road 20, between Haldimand Road 50 and South Cayuga Road.

Photo 11: Evans-c (tile 12) - Looking downstream (east) at water feature on Haldimand Road 50, between Bains Road and Rainham Road.

Photo 12: Evans-c (tile 12) - Looking upstream (west) at concrete culvert and water feature on Haldimand Road 50, between Bains Road and Rainham Road.

Photo 13: Evans-c (tile 12) - Looking at existing substrate in water feature on Haldimand Road 50, between Bains Road and Rainham Road.

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Appendix
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Title
EVANS CREEK SUBWATERSHED PHOTOS

Photo 144: Evans-d (tile 12) - Looking at upstream (north) from CSP culvert flowing under Bains Road, south of Haldimand Road 20, between Haldimand Road 50 and South Cayuga Road.

Photo 155: Evans-d (tile 12) - Looking at downstream (south) from CSP culvert flowing under Bains Road, south of Haldimand Road 20, between Haldimand Road 50 and South Cayuga Road.

Photo16: Evans-e (tile 9) - Looking upstream (north) from Rainham Road at channel flowing though farm lands. Site is located on Rainham Road, between Brookers Road and Haldimand Road 50.

Photo17: Evans-e (tile 9) - Looking downstream (south) from Rainham Road at channel flowing though farm lands. Site is located on Rainham Road, between Brookers Road and Haldimand Road 50.

Photo 18: Evans-f (tile 9) - Looking upstream (north) from Rainham Road at channel flowing though farm lands. Site is located on Rainham Road, between Brookers Road and Haldimand Road 50.

Photo 19: Evans-f (tile 9) - Looking downstream (south) from Rainham Road at channel flowing though farm lands. Site is located on Rainham Road, between Brookers Road and Haldimand Road 50.

Photo 20: Evans-h (tile 10) - Looking upstream (north) from concrete culvert at Lakeshore Road. Site is located west of White Cap Lane and Haldimand Road 50, approximately 50 m north of the lake shore.

Photo 21: Evans-h (tile 10) - Looking downstream (south) from concrete culvert at Lakeshore Road. Site is located west of White Cap Lane and Haldimand Road 50, approximately 50 m north of the lake shore.

Photo 22: Evans-h (tile 10) - Looking at substrate at concrete culvert on Lakeshore Road. Site is located west of White Cap Lane and Haldimand Road 50, approximately 20 m north of the lake shore.

Photo 16: Evans-i (tile 11) (field data sheet 33.0) - Looking downstream (south) at ill-defined channel flowing through an agricultural field. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Photo 17: Evans-i (Tile 11) (field data sheet 33.0) - Looking upstream (north) at ill-defined channel flowing through an agricultural field. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Photo 18: Evans-i (Tile 11) (field data sheet 33.0) - Existing substrate conditions in channel. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Photo 19: Evans-i (tile 11) (field data sheet 33.1) - Looking downstream (south) at plowed-through water feature flowing through an agricultural field. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Photo 20: Evans-i (tile 11) (field data sheet 33.1) - Looking upstream (north) at plowed-through water feature flowing through an agricultural field. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Photo 21: Evans-i (tile 11) (field data sheet 33.1) - Existing substrate conditions in channel. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Photo 22: Evans-k (Tile 11) (field data sheet 33.2) - Looking downstream (west) at undefined channel flowing through an agricultural field. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Photo 23: Evans-k (Tile 11) (field data sheet 33.2) - Looking upstream (east) at undefined channel flowing through an agricultural field. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Photo 24: Evans-k (Tile 11) (field data sheet 33.2) - Existing substrate conditions in undefined channel. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Appendix B2

Grand River Conservation Authority

Photo 1: Gran-a (tile 1) - Looking downstream (northeast) at dry channel flowing through a wooded area. Site is located south of Highway 3 between Decewsville Road and Dry Lake Road.

Photo 2: Gran-a (tile 1) - Looking upstream (southwest) at dry channel flowing through a wooded area. Site is located south of Highway 3 between Decewsville Road and Dry Lake Road.

Photo 3: Gran-a (tile 1) - Existing substrate conditions in dry channel flowing through a wooded area. Site is located south of Highway 3 between Decewsville Road and Dry Lake Road.

Photo 4: Gran-b (tile 1) - Looking downstream (southeast) at plowed-through ephemeral water feature flowing through an agricultural field. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 5: Gran-b (tile 1) - Looking upstream (southwest) at plowed-through ephemeral water features. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 6: Gran-b (tile 1) - Existing substrate conditions in channel flowing through an agricultural field. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 7: Gran-b (tile 1) - Looking downstream (northeast) at area where mapping shows the presence of a watercourse. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 8: Gran-b (tile 1) - Looking upstream (south west) at plowed-through ephemeral feature located in an agricultural field. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 9: Gran-b (tile 1) - Existing substrate conditions in channel flowing through an agricultural field. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Stantec

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SAMSUNG C&T
GRAND RENEWABLE ENERGY PARK

January 2011
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Appendix
B2

Title
GRAND RIVER SUBWATERSHED PHOTOS

Photo 10: Gran-c (tile 1) - Looking downstream (south) at plowed-through ephemeral water feature flowing through an agricultural field. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 11: Gran-c (tile 1) - Looking upstream (north) at undefined, plowed-through ephemeral water feature flowing through an agricultural field. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 12: Gran-c (tile 1) - Existing substrate conditions in predominantly dry ephemeral water feature flowing through a plowed agricultural field. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 13: Gran-c (tile 1) - Looking downstream (west) at plowed-through ephemeral water feature flowing through an agricultural field. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 14: Gran-c (tile 1) - Looking upstream (east) at ill-defined channel flowing near an agricultural building. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 15: Gran-c (tile 1) - Substrate conditions in damp ephemeral water feature located in an agricultural field. Site is located south of Highway 3 between Kohler Road and Decewsville Road.

Photo 16: Gran-f (tile 1) - Looking downstream (east) at low lying damp area, from culvert at Kohler Road, south of Highway 3.

Photo 17: Gran-f (tile 1) - Looking downstream (east) from culvert at Kohler Road, south of Highway 3.

Photo 18: Gran-f (tile 1) – Overhead photo of channel at culvert at Kohler Road, south of Highway 3.

Photo 19: Gran-f (tile 1) - Looking upstream (west) from culvert at Kohler Road, south of Highway 3.

Photo 20: Gran-f (tile 1) - Looking downstream (east) from culvert at Kohler Road, south of Highway 3.

Photo 21: Gran-f (tile 1) - Looking upstream (west) from culvert at Kohler Road, south of Highway 3

Photo 22: Gran-f (tile 1) - Looking at substrate at culvert at Kohler Road, south of Highway 3.

Photo 23: Gran-h (tile 5) - Looking downstream (northeast) from twin culverts on Link Road into shallow featureless drain flowing through agricultural field (pasture) and into a wooded area.

Photo 24: Gran-h (tile 5) - Looking upstream (southwest) from culvert on Link Road into shallow drain feature flowing through agricultural field (pasture).

Photo 25: Gran-h (Tile 5) - Looking downstream (east) at channel flowing between two agricultural fields. Site is located north of Haldimand Road 20 between Kohlern Road and Link Road.

Photo 26: Gran-h (Tile 5) - Looking upstream (west) at channel flowing between two agricultural fields. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Photo 27: Gran-h (tile 5) - Existing substrate conditions in channel. Site is located north of Bains Road between Haldimand Road 50 and South Cayuga Road.

Photo 28: Gran-i (tile 5) -Looking downstream (northwest) at water body from concrete culvert on Link Road at the Richert Road intersection.

Photo 29: Gran-i (tile 5) - Looking upstream (south) at water body from concrete culvert on Link Road at the Richert Road intersection.

Photo 30: Gran-i (Tile 5) - Looking downstream (east) at channel flowing between two agricultural fields. Site is located north of Haldimand Road 20 between Kohler Road and Link Road.

Photo 31: Gran-i (Tile 5) - Looking upstream (west) at channel flowing through an agricultural field. Site is located north of Haldimand Road 20 between Kohler Road and Link Road.

Photo 32: Gran-i (Tile 5) - Existing substrate conditions in channel. Site is located north of Haldimand Road 20 between Kohler Road and Link Road.

Photo 33: Gran-i (tile 5) – Looking upstream (northeast) from Richert Road

Photo 34: Gran-i (tile 5) – Looking downstream (southwest) from Richert Road

Photo 35: Gran-i (tile 5) - Looking at substrate at concrete culvert on Bains Road, between Haldimand Road 20 and Wilson Road.

Photo 36: Gran-j (tile 5) - Looking at substrate in ephemeral water feature at culvert on Richert Road, between Haldimand Road 20 and Link Road.

Photo 37: Gran-j (tile 5) - Looking upstream (southwest) from culvert on Richert Road, between Haldimand Road 20 and Link Road.

Photo 38: Gran-j (tile 5) - Looking at ephemeral water feature located downstream (northeast) from culvert on Richert Road, between Haldimand Road 20 and Link Road.

Photo 39: Gran-j (tile 5) - Looking upstream (west) from CSP in laneway at ephemeral feature that flows through an agricultural field. Site is located east of Haldimand Road 20, between Richert Road and Kohler Road.

Photo 40: Gran-j (tile 5) - Looking downstream (east) from CSP in laneway at ephemeral feature that flows through an agricultural field. Site is located east of Haldimand Road 20, between Richert Road and Kohler Road.

Photo 41: Gran-j (tile 5) - Looking at downstream end of perched CSP culvert in laneway at ephemeral feature that flows through an agricultural field. Site is located east of Haldimand Road 20, between Richert Road and Kohler Road.

Photo 42: Gran-j (tile 5) - Looking upstream (west) from CSP culvert in laneway at plowed-through, ephemeral feature that flows through an agricultural field. Site is located east of Haldimand Road 20, between Richert Road and Kohler Road.

Photo 43: Gran-j (tile 5)- Looking downstream (east) from CSP culvert in laneway at plowed-through, ephemeral feature that flows through an agricultural field. Site is located east of Haldimand Road 20, between Richert Road and Kohler Road.


Photo 44: Gran-k (tile 5) - Looking upstream (west) at undefined channel in agricultural field. Site is located on Meadows Road between Wilson Road and Mount Olivet Road.


Photo 45: Gran-k (tile 5) - Looking downstream (east) at dry ill-defined channel through agricultural field. Site is located on Meadows Road between Wilson Road and Mount Olivet Road.


Photo 46: Gran-k (tile 5) - Substrate. Site is located on Meadows Road between Wilson Road and Mount Olivet Road.

Photo 47: Gran-I (tile 6) - Looking upstream (west) at undefined channel in agricultural field. Site is located on Meadows Road between Wilson Road and Mount Olivet Road.

Photo 48: Gran-I (tile 6) - Looking downstream (east) at ill-defined channel through agricultural field. Site is located on Meadows Road between Wilson Road and Mount Olivet Road.

Photo 49: Gran-I (tile 6) - Substrate conditions. Site is located on Meadows Road between Wilson Road and Mount Olivet Road.

Photo 50: Gran-n (tile 6) - Looking upstream (west) from CSP culvert at area where mapping indicates the presence of a watercourse. Site is located on Wilson Road between Meadows Road and Haldimand Road 20.

Photo 51: Gran-n (tile 6) - Looking downstream (east) from CSP culvert at dry channel through agricultural field. Site is located on Wilson Road between Meadows Road and Haldimand Road 20.

Photo 52: Gran-n (tile 6) - Substrate downstream of CSP culvert on Wilson Road. Site is located on Wilson Road between Meadows Road and Haldimand Road 20.

Photo 53: Gran-n (tile 6) - Looking downstream (east) from CSP culvert at existing vegetation and dry channel in the distance (centre, background) located adjacent to an agricultural field (right side of photo). Site is located on Wilson Road between Meadows Road and Haldimand Road 20.

Photo 54: Gran-o (tile 6) - Looking upstream (west) from CSP culvert at area where mapping shows the presence of a watercourse. Site is located on Wilson Road between Meadows Road and Haldimand Road 20.

Photo 55: Gran-o (tile 6) - Looking downstream (east) from CSP culvert at plowed-through, dry channel through agricultural field. Site is located on Wilson Road between Meadows Road and Haldimand Road 20.

Photo 56: Gran-o (tile 6) - Substrate downstream of CSP culvert on Wilson Road. Site is located on Wilson Road between Meadows Road and Haldimand Road 20.

Photo 57: Gran-p (tile 8) - Looking downstream (east) from Sutor Road at mapped location of channel and adjacent agricultural land use. Site is located on Sutor Road, between Meadows Road and Haldimand Road 20.

Photo 58: Gran-p (tile 8) - Looking upstream (west) from Sutor Road at mapped location of channel and adjacent agricultural land use. Site is located on Sutor Road, between Meadows Road and Haldimand Road 20.

Photo 59: Gran-r (tile 7) - Looking upstream (west) from twin culverts at water feature flowing adjacent to an agricultural field. Site is located south of Meadows Road between Yaremy Road and South Cayuga Road.

Photo 60: Gran-t (tile 11) - Looking upstream (south) at watercourse on south side of Haldimand Road 20, between Haldimand Road 50 and South Cayuga Road.

Photo 61: Gran-t (tile 11) - Looking at upstream substrate on south side of Haldimand Road 20, between Haldimand Road 50 and South Cayuga Road.

Photo 62: Gran-t (tile 11) - Looking downstream (north) at concrete culvert and watercourse on north side of Haldimand Road 20, between Haldimand Road 50 and South Cayuga Road.

Photo 63: Gran-t (tile 11) - Looking at downstream substrate on south side of Haldimand Road 20, between Haldimand Road 50 and South Cayuga Road.

Photo 64: Gran-u (Tile 7) - Looking downstream (east) at channel flowing in wooded area. Site is located south of Meadows Road between Yaremy Road and South Cayuga Road.

Photo 65: Gran-u (tile 7) - Looking upstream (west) at channel flowing in wooded area. Site is located south of Meadows Road between Yaremy Road and South Cayuga Road.

Photo 66: Gran-u (tile 7) - Existing substrate conditions in channel. Site is located south of Meadows Road between Yaremy Road and South Cayuga Road.

Photo 67: Gran-v (tile 7) - Looking downstream (east) at ephemeral water feature located in an agricultural field. Site is located south of Meadows Road between Yaremy Road and South Cayuga Road.

Photo 68: Gran-v (tile 7) - Looking upstream (west) at ephemeral water feature located in an agricultural field. Site is located south of Meadows Road between Yaremy Road and South Cayuga Road.

Photo 69: Gran-v (Tile 7) - Existing substrate conditions in ephemeral water feature. Site is located south of Meadows Road between Yaremy Road and South Cayuga Road.

Photo 70: Gran-w (tile 7) - Looking downstream (east) at channel flowing through agricultural field. Site is located south of Meadows Road between Yaremy Road and South Cayuga Road.

Photo 71: Gran-w (tile 7) - Looking upstream (west) from twin culverts at channel flowing adjacent an agricultural field. Site is located south of Meadows Road between Yaremy Road and South Cayuga Road.

Photo 72: Gran-w (Tile 7) - Existing substrate conditions in channel. Site is located south of Meadows Road between Yaremy Road and South Cayuga Road.

Photo 73: Gran-x (tile 11) - Looking at upstream (west) from CSP culvert flowing under South Cayuga Road, between Haldimand Road 20 and Bains Road.

Photo 74: Gran-x (tile 11) - Looking at downstream (east) from CSP culvert flowing under South Cayuga Road, between Haldimand Road 20 and Bains Road.

Photo 75: Gran-x (tile 11) - Looking at substrate near CSP culvert flowing under South Cayuga Road, between Haldimand Road 20 and Bains Road.

Photo 76: Gran-y (tile 11) - Looking upstream (west) at drain feature flowing between agricultural field and wooded area. Site is located east of South Cayuga Road between Haldimand Road 20 and Bains Road.

Photo 77: Gran-y (tile 11) - Looking downstream at drain feature as it occurs southeast of proposed Turbine #39 location (view showing area outside of 120 m Zone of Investigation). Site is located east of South Cayuga Road between Haldimand Road 20 and Bains Road.

Photo 78: Gran-z (tile 11) - Looking upstream (west) from CSP culvert at drain feature flowing through a wooded area and agricultural fields. This site is located on South Cayuga Road between Haldimand Road 20 and Bains Road.

Photo 79: Gran-z (tile 11) - Looking at damaged CSP culvert on west side of South Cayuga Road. This site is located on South Cayuga Road between Haldimand Road 20 and Bains Road.

Photo 80: Gran-z (tile 11) - Looking downstream (east) at CSP culvert outflow, deep pool, and drain feature flowing through agricultural fields and into a wooded area. This site is located on South Cayuga Road between Haldimand Road 20 and Bains Road.

Photo 81: Gran-z (tile 11) - Looking at perched CSP culvert on east side of South Cayuga Road. This site is located on South Cayuga Road between Haldimand Road 20 and Bains Road.

Photo 82: Gran-z (tile 11) - Looking south at isolated anthropogenically created pond. Site is located east of South Cayuga Road between Haldimand Road 20 and Bains Road.

Photo 83: Gran-aa (tile 11) - Looking at roadside ditch upstream of CSP culvert on west side of South Cayuga Road. This site is located on South Cayuga Road between Haldimand Road 20 and Bains Road.

Photo 84: Gran-aa (tile 11) - Looking downstream (east) at drain feature and CSP culvert on east side of South Cayuga Road. This site is located on South Cayuga Road between Haldimand Road 20 and Bains Road.

Photo 85: Gran-aa (tile 11) - Looking east at isolated anthropogenically created pond located adjacent to a large agricultural staging facility. Site is located east of South Cayuga Road between Haldimand Road 20 and Bains Road.

Photo 86: Gran-aa (tile 13) - Looking upstream (north) at channel location, through dense vegetation and wooded area. Site is located on Haldimand Road 20, between Townline Road Hald Dunn.

Photo 87: Gran-aa (tile 13) - Looking downstream (south) at channel location, through dense vegetation. Site is located on Haldimand Road 20, between Townline Road Hald Dunn.

Photo 88: Gran-cc (tile 11) - Looking at upstream (south) from CSP culvert flowing under Bains Road, south of Haldimand Road 20, between South Cayuga Road and Haldimand Road 50.

Photo 89: Gran-cc (tile 11) - Looking at upstream (south) from CSP culvert flowing under Bains Road, south of Haldimand Road 20, between South Cayuga Road and Haldimand Road 50.

Photo 90: Gran-cc (tile 11) - Looking at downstream (north) from CSP culvert flowing under Bains Road, south of Haldimand Road 20, between South Cayuga Road and Haldimand Road 50.

Photo 91: Gran-dd (tile 13) - Looking upstream (south) at existing conditions from immediately upstream of old dam. Site is located north of Haldimand Road 20 between Hald-Dunn Townline Road and Old Hines Road.

Photo 92: Gran-dd (tile 13) - Looking downstream (north) at existing conditions and old dam. Site is located north of Hadimand Road 20 between Hald-Dunn Townline Road and Old Hines Road.

Photo 93: Gran-dd (tile 13) - Looking north at watercourse flowing left to right downstream of old dam. Site is located north of Haldimand Road 20 between Hald-Dunn Townline Road and Old Hines Road.

Photo 94: Gran-dd (tile 13) - Looking downstream (east) from concrete culvert on Hald-Dunn Townline Road towards Haldimand Road 20.

Photo 95: Gran-dd (tile 13) - Looking upstream (west) from concrete culvert on Hald-Dunn Townline Road towards Haldimand Road 20.

Photo 96: Gran-dd (tile 13) - Looking upstream (west) from Haldimand Road 20 towards intersection and concrete culvert on Hald-Dunn Townline Road.

Title
GRAND RIVER SUBWATERSHED PHOTOS

Photo 97: Gran-dd (tile 13) - Looking downstream (east) at concrete culvert flowing under Haldimand Road 20 near the intersection with Hald-Dunn Townline.

Photo 98: Gran-dd (tile 13) - Looking downstream (east) from concrete culvert flowing under Haldimand Road 20 near the intersection with Hald-Dunn Townline.

Photo 99: Gran-ee (tile 13) - Looking south at twin CSP culverts and erosion on farm access road caused by water overtopping road. Site is located north of Haldimand Road 20 between Hald-Dunn Townline Road and Old Hines Road.

Photo 100: Gran-ee (tile 13) Looking upstream (west) at twin CSP culverts and standing water from farm access road. Site is located north of Haldimand Road 20 between Hald-Dunn Townline Road and Old Hines Road.

Photo 101: Gran-ee (tile 13) - Looking at existing conditions downstream (east) of CSP culvert and farm access road. Site is located north of Hadimand Road 20 between Hald-Dunn Townline Road and Old Hines Road.

Photo 102: Gran-ff (tile 13) -Looking south at small drain feature flowing along edge of agricultural field. Anthropogenic feature formed at edge of plowed area. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road. Note: path on right side of photo contained small amounts of water but no defined channel characteristics.

Photo 103: Gran-ff (tile 13) - Looking north at low lying area in agricultural field holding water. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 104: Gran-ff (tile 13) - Looking south at small drain feature flowing along tedge of an agricultural field upstream (west) of proposed access road. Anthropogenic feature formed at edge of plowed area. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 105: Gran-ff (tile 13) - Looking at small drain feature flowing between two agricultural fields. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 106: Gran-ff (tile 13) - Looking north at small drain feature flowing along the edge of an agricultural field. Feature was formed at edge of plowed area and was not naturally occurring. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 107: Gran-ff (tile 13) - Looking downstream (east) at confluence of two small drain features in dense vegetation flowing between two agricultural fields. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 108: Gran-ff (tile 13) - Looking upstream (west) at confluence of two small drain features in dense vegetation flowing between two agricultural fields. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 109: Gran-ff (tile 13) -Elevated area with willow and wet soil. No connection to downstream areas. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 110: Gran-ff (tile 13) - Looking upstream (west) at drain feature flowing between two agricultural fields. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 111: Gran-ff (tile 13) - Looking downstream (east) at drain feature flowing between two agricultural fields. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 112: Gran-ff (tile 13) - Looking at isolated pond. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 113: Gran-ff (tile 13) - Looking south east at low lying area in agricultural field holding water. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 114: Gran-ff (tile 13) - Looking north at small drain feature flowing along the edge of an agricultural field. Feature was formed at edge of plowed area and was not naturally occurring. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 115: Gran-ff (tile 13) - Looking south at pond on edge of wooded area. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 116: Gran-ff (tile 13) - Looking upstream (west) at drain feature flowing through wooded area. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 117: Gran-ff (tile 13) - Looking downstream (east) at drain feature flowing through wooded area. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 118: Gran-ff (tile 13) - Looking upstream (east) at outflow of pond on edge of wooded area. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 119: Gran-ff (tile 13) - Looking upstream (west) at drain feature flowing through wooded area. Site is located east of Hald-Dunn Townline Road between Haldimand Road 20 and Rainham Road.

Photo 120: Gran-hh (tile 13) - Looking upstream (west) from CSP culvert flowing under Aikens Road, south of Haldimand Road 20, between Hal-Dunn Townline Road and Old Hines Road.

Photo 121: Gran-hh (tile 13) -Looking at CSP culvert flowing under Aikens Road, south of Haldimand Road 20, between Hal-Dunn Townline Road and Old Hines Road.

Photo 122: Gran-hh (tile 13) - Looking downstream (east) from CSP culvert flowing under Aikens Road, south of Haldimand Road 20, between Hal-Dunn Townline Road and Old Hines Road.

Photo 123: Gran-hh (tile 13) - Looking north at concrete culvert flowing under Haldimand Road 20, between Hald-Dunn Townline Road and Old Hines Road. Note: this area received heavy rain the previous day.

Photo 124: Gran-hh (tile 13) - Looking south at drain feature flowing from Haldimand Road 20, between Hald-Dunn Townline Road and Old Hines Road. Note: this area received heavy rain the previous day.

Photo 125: Gran-hh (tile 13) - Looking at concrete culvert from north side of Haldimand Road 20, between Hald-Dunn Townline Road and Old Hines Road. Note: this area received heavy rain the previous day.

Photo 126: Gran-ii (tile 14) - Evidence of erosion in small wooded area in the middle of an agricultural field. Site is located west of Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 127: Gran-ii (tile 14) - Low lying area and small wooded area in the middle of an agricultural field. Site is located west of Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 128: Gran-ii (tile 14) - Looking downstream (north) at flowing water on west side of low lying area in small wooded area in the middle of an agricultural field. Site is located west of Aikens Road between Haldimand Road 20 and Rainham Road. Note: the area around the flowing water was recently cleared of mature trees.

Photo 129: Gran-ii (tile 14) - Looking downstream (north) at seepage area on west side of low lying area in small wooded area in the middle of an agricultural field. Site is located west of Aikens Road between Haldimand Road 20 and Rainham Road. Note: this area was recently cleared of mature trees.

Photo 130: Gran-ii (tile 14) - Low lying area with evidence of erosion on east side of small wooded area in the middle of an agricultural field. Site is located west of Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 131: Gran-ii (tile 14) - Standing water in low lying area in small wooded area in the middle of an agricultural field. Site is located west of Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 132: Gran-ii (tile 14) - Looking downstream (west) at flowing water on west side of low lying area in small wooded area in the middle of an agricultural field. Site is located west of Aikens Road between Haldimand Road 20 and Rainham Road. Note: the area in the foreground was recently cleared of mature trees.

Photo 133: Gran-ii (tile 14) - Looking upstream (south) at newly excavated agricultural drain south of the small wooded area in the middle of an agricultural field. Site is located west of Aikens Road between Haldimand Road 20 and Rainham Road. Note: all water in this channel flows into a hole, with no overland connection to downstream areas.

Photo 134: Gran-ii (tile 14) - Looking at newly excavated agricultural drain in location where all water flows into a hole, south of the small wooded area in the middle of an agricultural field. There is no connection to downstream areas. Site is located west of Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 135: Gran-ii (tile 14) - Looking downstream (north) at newly excavated agricultural drain south of the small wooded area in the middle of an agricultural field. Site is located west of Aikens Road between Haldimand Road 20 and Rainham Road. Note: all water in this channel flows into a hole, with no overland connection to downstream areas.

Photo 136: Gran-kk (tile 14) - Looking downstream (north) at inflow to anthropogenically created pond. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 137: Gran-kk (tile 14) - Looking at vegetation and inflow to anthropogenically created pond. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 138: Gran-kk (tile 14) - Looking north at an anthropogenically created pond. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 139: Gran-II (tile 14) - Looking downstream (east) at linear tributary to isolated low lying area. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 140: Gran-II (tile 14) - Looking upstream (west) at flooded agricultural land and inflow to isolated low lying area. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 141: Gran-II (tile 14) -Looking south at eastern edge of isolated low lying area. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 142: Gran-II (tile 14) - Looking east at isolated low lying area. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 143: Gran-II (tile 14) - Looking at typical pond conditions in isolated low lying area. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 144: Gran-II (tile 14) - Looking at typical pond conditions in isolated low lying area. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 145: Gran-II (tile 14) -Looking upstream (north) at flooded agricultural land and inflow to isolated low lying area. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 146: Gran-II (tile 14) - Looking downstream (north) at drain feature flowing through wooded area from flooded agricultural land. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 147: Gran-II (tile 14) - Looking upstream (south) at drain feature flowing through wooded area from flooded agricultural land. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 148: Gran-II (tile 14) -Looking northwest at anthropogenically created pond. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 149: Gran-II (tile 14) - Looking upstream (southwest) at outflow from anthropogencially created pond. Site is located near Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 150: Gran-mm (tile 14) - Looking downstream (east) at water course flowing through CSP culvert and adjacent to agricultural land uses. This site is located on Haldimand Road 49 between Rainham Road and Ramsey Road.

Photo 151: Gran-mm (tile 14) - Looking upstream (west) at watercourse flowing through CSP culvert and adjacent to agricultural land uses. This site is located on Haldimand Road 49 between Haldimand Road 20 and Rainham Road.

Note: Aikens Road becomes Haldimand Road 49 south of Rainham Road.

Photo 152: Gran-oo (tile 13) - Looking downstream (east) at water body flowing through concrete culvert, adjacent to agricultural and residential land uses. This site is located on Aikens Road between Haldimand Road 20 and Rainham Road.

Photo 153: Gran-pp (tile 7) - Looking downstream (east) from Sutor Road at channel flowing through a wooded area. Site is located on Sutor Road, between River Road and Meadows Road.

Photo 154: Gran-pp (tile 7) - Looking upstream (southwest) from Sutor Road at channel flowing through a wooded area. Site is located on Sutor Road, between River Road and Meadows Road.

Photo 155: Gran-pp (tile 7) - Looking upstream (northwest) from Sutor Road at adjacent agricultural land use. Site is located on Sutor Road, between River Road and Meadows Road.

Photo 156: Gran-qq (tile 17) - Looking downstream (east) at channel flowing through residential property. Site is located on Port Maitland Road between Kings Row and Ramsey Road.

Photo 157: Gran-qq (tile 17) - Looking upstream (west) from concrete culvert at mapped channel location on agricultural land. Site is located on Port Maitland Road between Kings Row and Ramsey Road.

Photo 1: Holm-a (tile 2) - Looking upstream (north) from culvert on Irish Line, west of Kohler Road and east of Little Road.

Photo 2: Holm-a (tile 2) - Looking downstream (south) from culvert on Irish Line, west of Kohler Road and east of Little Road.

Photo 3: Holm-a (tile 2) – View of substrate at culvert on Irish Line, west of Kohler Road and east of Little Road.

Photo 4: Holm-a (tile 3) - Existing in-stream and substrate conditions in channel. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 5: Holm-a (tile 3) - Looking downstream (east) at channel flowing through an agricultural field. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 6: Holm-a (tile 3) - Looking upstream (west) at channel flowing through an agricultural field. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 7: Holm-a (tile 3) - Looking downstream (east) at channel flowing adjacent an agricultural field. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 8: Holm-a (tile 3) - Looking upstream (west) at channel flowing adjacent an agricultural field. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 9: Holm-a (tile 3) - Existing substrate conditions in channel. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 10: Holm-a (tile 3) - Looking downstream (east) at plowed-through water feature flowing through an agricultural field. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 11: Holm-a (tile 3) - Looking upstream (west) at plowed-through water feature flowing adjacent an agricultural field. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 12: Holm-a (tile 3) - Existing substrate conditions in plowed-through water feature. Site is located south of Irish Line between Kohler Road and Little Road.

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SUBWATERSHED PHOTOS

Photo 13: Holm-b (tile 3) - Looking downstream (southeast) at channel flowing between two agricultural fields. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 14: Holm-b (tile 3) - Looking upstream (northwest) at channel flowing between two agricultural fields. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 15: Holm-b (Tile 3) - Existing substrate conditions in channel. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 16: Holm-c (tile 3) -Looking downstream (east) from concrete culvert on Kohler Road, between Irish Line and Link Road.

Photo 17: Holm-c (tile 3) - Looking upstream (west) from concrete culvert on Kohler Road, between Irish Line and Link Road.

Photo 18: Holm-c (tile 3) - Looking at substrate at concrete culvert on Kohler Road, between Irish Line and Link Road.

Photo 19: Holm-d (tile 3) - Looking upstream (east) at channel flowing through wooded area and adjacent to residential property. Located on Kohler Road between Irish Line and Link Road.

Photo 20: Holm-d (tile 3) - Looking downstream (west) at channel flowing through active agricultural field and sheep pasture. Located on Kohler Road between Irish Line and Link Road.

Photo 21: Holm-d (tile 3) - Looking upstream (east) at concrete culvert located on Kohler Road between Irish Line and Link Road.

Photo 22: Holm-d (tile 2) - Existing substrate conditions in channel. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 23: Holm-d (tile 2) - Looking downstream (southeast) at channel. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 24: Holm-d (tile 2) - Looking upstream (northwest) at channel. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 25: Holm-e (tile 3) - Looking upstream (west) at small channel flowing through active agricultural field on Kohler Road between Irish Line and Link Road.

Photo 26: Holm-e (tile 3) - Looking downstream (east) at existing conditions and bank side vegetation at culvert of small channel flowing adjacent manicured lawn. Water course is located along Kohler Road between Irish Line and Link Road.

Photo 27: Holm-e (tile 3) - Existing conditions and bank side vegetation at culvert of small channel flowing through active agricultural field on Kohler Road between Irish Line and Link Road.

Photo 28: Holm-f (tile 3) - Looking downstream (east) at existing conditions and vegetation at concrete box culvert of small water feature flowing into agricultural lands. Located along Kohler Road between Irish Line and Link Road.

Photo 29: Holm-f (tile 3) - Looking upstream (west) at existing conditions and vegetation at concrete box culvert of small water feature flowing into agricultural lands located along Kohler Road between Irish Line and Link Road.

Photo 30: Vicinity of Holm-g (tile 3) - View of isolated pond located along Kohler Road between Irish Line and Link Road.

Photo 31: Holm-g (tile 3) - Looking upstream (west) from concrete culvert on Kohler Road, between Irish Line and Link Road.

Photo 32: Holm-g (tile 3) - Looking downstream (east) from concrete culvert on Kohler Road, between Irish Line and Link Road.

Photo 33: Holm-g (tile 3) - Looking at substrate at concrete culvert on Kohler Road, between Irish Line and Link Road.

Photo 34: Holm-h (tile 3) - Looking downstream (east) at small channel flowing through active agriculture/pasture on Kohler Road between Irish Line and Link Road.

Photo 35: Holm-h (tile 3) - Looking at substrate downstream of concrete culvert in small channel flowing through active agricultural/pasture field on Kohler Road between Irish Line and Link Road.

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HOLMES CREEK/SULPHUR CREEK
SUBWATERSHED PHOTOS

Photo 36: Holm-i (tile 3) - Looking upstream (north) from CSP culvert on Irish Line, west of Kohler Road and east of Little Road.

Photo 37: Holm-i (tile 3) - Looking downstream (south) from CSP culvert on Irish Line, west of Kohler Road and east of Little Road.

Photo 38: Holm-i (tile 3) - Looking at substrate at culvert on Irish Line, west of Kohler Road and east of Little Road.


Photo 39: Holm-j (tile 3) - Looking downstream (south) from culvert on Irish Line, west of Kohler Road and east of Little Road.


Photo 40: Holm-j (tile 3) - Looking upstream (north) from culvert on Irish Line, west of Kohler Road and east of Little Road.


Photo 41: Holm-j (tile 3) - Looking at substrate at culvert on Irish Line, west of Kohler Road and east of Little Road.


Photo 42: Holm-j (tile 3) - Looking downstream (south) from culvert on Irish Line, west of Kohler Road and east of Little Road.


Photo 43: Holm-j (tile 3) - Looking upstream (north) from culvert on Irish Line, west of Kohler Road and east of Little Road.

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SUBWATERSHED PHOTOS

Photo 44: Holm-k (tile 3) - Looking upstream (north) from CSP culvert on Irish Line, west of Kohler Road and east of Little Road.

Photo 45: Holm-k (tile 3) - Looking downstream (south) from CSP culvert on Irish Line, west of Kohler Road and east of Little Road.

Photo 46: Holm-k (tile 3) - Looking at substrate at culvert on Irish Line, west of Kohler Road and east of Little Road.

Photo 47: Holm-k (tile 3) - Existing substrate conditions in channel. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 48: Holm-k (tile 3) - Looking downstream (southeast) at undefined channel flowing through an agricultural field. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 49: Holm-k (tile 3) - Looking upstream (northwest) at channel flowing through an agricultural field. Site is located south of Irish Line between Kohler Road and Little Road.

Photo 50: Holm-I (tile 3) - Looking downstream (southeast) at channel flowing through agricultural field. Site is located north of Link Road between Kohler Road and Little Road.

Photo 51: Holm-I (tile 3) - Looking upstream (northwest) at channel flowing through agricultural field. Site is located north of Link Road between Kohler Road and Little Road.

Photo 1: Lake-a (tile 12) - Looking west at flooded wooded area. Site is located on South Cayuga Road between Bains Road and Rainham Road.

Photo 2: Lake-a (tile 12) Looking upstream (east) from South Cayuga Road at watercourse location and adjacent agricultural fields. Site is located on South Cayuga Road, between Bains Road and Rainham Road.

Photo 3: Lake-a (tile 12) - Looking downstream (west) from South Cayuga Road at watercourse location and adjacent agricultural fields. Site is located on South Cayuga Road, between Bains Road and Rainham Road.

Photo 4: Lake-b (tile 12) - Looking upstream (east) from South Cayuga Road at location where channel is mapped. Site is located on South Cayuga Road, between Bains Road and Rainham Road.

Photo 5: Lake-b (tile 12) - Looking downstream (west) from South Cayuga Road at adjacent residential location and location where channel is mapped and properties. Site is located on South Cayuga Road, between Bains Road and Rainham Road.

Photo 6: Lake-c (tile 12) - Looking south at man-made pond. Site is located south of Rainham Road between South Cayuga Road and Hald-Dunn Townline Road.

Photo 7: Lake-c (tile 12) - Looking upstream (northwest) at drain feature flowing through agricultural field. Site is located south of Rainham Road between South Cayuga Road and Hald-Dunn Townline Road.

Photo 8: Lake-c (tile 12) - Looking downstream (southeast) at drain feature flowing through agricultural field and into wooded area. Site is located south of Rainham Road between South Cayuga Road and Hald-Dunn Townline Road.

Photo 9: Lake-c (tile 12) - Looking at existing conditions within drain feature flowing through agricultural field. Site is located south of Rainham Road between South Cayuga Road and Hald-Dunn Townline Road.

Photo 10: Lake-d (tile 15) - Looking downstream in low-lying area near interface with adjacent wooded area. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 11: Lake-d (tile 15) - Looking at confluence of two channels in low-lying area near interface with adjacent wooded area. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 12: Lake-d (tile 15) - Looking upstream in low-lying area near border with adjacent wooded area. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 13: Lake-d (tile 15) - Looking downstream (northeast) at watercourse in wooded area. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 14: Lake-d (tile 15) - Looking upstream (southwest) at watercourse in wooded area. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 15: Lake-d (tile 15) - Looking at historic watercourse channel locations as evidenced by abandoned channel. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

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LAKE ERIE TRIBUTARIES SUBWATERSHED PHOTOS

Photo 16: Lake-d (tile 15) - Looking at isolated linear pool with no upstream or downstream connection. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 17: Lake-d (tile 15) - Looking at upstream channel from ATV trail in wooded area. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 18: Lake-d (tile 15) - Looking upstream at CSP culvert and channel from ATV trail in wooded area. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 19: Lake-d (tile 15) - Looking downstream at CSP culvert and channel from ATV trail in wooded area. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 20: Lake-d (tile 15) - Looking at water feature identified from MNR mapping. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 21: Lake-d (tile 15) - Looking downstream (west) from culvert on Hald-Dunn Townline Road, south of Rainham Road.

Photo 22: Lake-d (tile 15) - Looking at substrate at culvert on Hald-Dunn Townline Road, south of Rainham Road.

Photo 23: Lake-e (tile 15) - Looking at isolated man-made irrigation pond. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 24: Lake-e (tile 15) - Looking at wooded area with wet soil and small amounts of standing water with no visible outflow. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 25: Lake-f (tile 15) - Looking at second isolated man-made irrigation pond. Pond area contains large amounts of debris. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 26: Lake-f (tile 15) - Looking upstream (east) at agricultural drain. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 27: Lake-f (tile 15) - Looking downstream (south) from CSP culvert over an agricultural drain. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 28: Lake-f (tile 15) – Watercourse likely associated with ponds at Lake-f. Looking downstream (south) from culvert on Lakeshore Road approximately 100 metres from the lake shore. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 29: Lake-f (tile 15) -Looking upstream (north) from culvert on Lakeshore Road approximately 100 metres from the lake shore. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 30: Lake-f (tile 15) - Looking upstream (northeast) at agricultural drain. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

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Photo 31: Lake-f (tile 15) - Looking downstream (southwest) at drain in the middle of an agricultural field. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 32: Lake-f (tile 15) - Looking upstream (northeast) at drain in the middle of an agricultural field. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 33: Lake-f (tile 15) - Looking upstream (east) at channel flowing through a wooded area on west side of site. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 34: Lake-f (tile 15) - Looking downstream (west) at channel flowing through a wooded area on west side of site. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 35: Lake-f (tile 15) - Looking upstream (north) from Lakeshore Road approximately 100 metres from the lake shore. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

Photo 36: Lake-f (tile 15) - Looking downstream (south) from Lakeshore Road approximately 100 metres from the lake shore. Site is located east of Hald-Dunn Townline Road between Rainham Road and the lakeshore.

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LAKE ERIE TRIBUTARIES SUBWATERSHED PHOTOS

Photo 37: Lake-i (tile 15) - Looking upstream (northeast) from concrete culvert at channel flowing through field. Site is located on Kings Row, between Haldimand Road 49 and Myrnam Beach Road.

Photo 38: Lake-i (tile 15) - Looking at downstream (southwest) from concrete culvert at channel flowing through wooded area. Site is located on Kings Row, between Haldimand Road 49 and Myrnam Beach Road.

Photo 39: Lake-j (tile 10) - Looking upstream (west) at CSP culvert and water feature from Haldimand Road 50, approximately 300 m north of the lake shore.

Photo 40: Lake-j (tile 10) - Looking upstream (south) at CSP culvert and water feature from Haldimand Road 50, approximately 300 m north of the lake shore.

Photo 41: Lake-j (tile10) - Looking downstream (southeast) at CSP culvert and water feature from Haldimand Road 50, approximately 300 m north of the lake shore.

Photo 42: Lake-j (tile 10) - Looking at substrate at CSP culvert on Haldimand Road 50, approximately 300 m north of the lake shore.

Photo 43: Lake-k (tile 12) - Looking at roadside drain and channel location. Site is located on South Cayuga Road, between Rainham Road and the lakeshore.

Photo 44: Lake-k (tile 12) - Looking downstream (west) at roadside drain and channel location in agricultural field. Site is located on South Cayuga Road, between Rainham Road and the lakeshore.

Photo 45: Lake-I (tile 16) - Looking north at swale on Haldimand Tract Road. Site is located on Haldimand Tract Road between Marshall Road and Haldimand Trail.

Photo 46: Lake-m (tile 16) - Looking south at feature location. Site is located on Kings Row between Marshall Road and Johnson Road.

Photo 47: Lake-m (tile 16) - Looking northeast at feature location. Site is located on Kings Row between Marshall Road and Johnson Road.

Photo 48: Lake-n (tile 16) - Looking south at channel flowing between two agricultural fields. Site is located on Kings Row between Marshall Road and Johnson Road.

Photo 49: Lake-n (tile 16) - Looking northwest at feature location. Site is located on Kings Row between Marshall Road and Johnson Road.

Photo 50: Lake-o (tile 16) - Looking east at mapped location of drainage feature. Site is located on Marshall Road between Haldimand Tract Road and Kings Row.

Photo 51: Lake-o (tile 16) - Looking west at mapped location of drainage feature. Site is located on Marshall Road between Haldimand Tract Road and Kings Row.

Photo 52: Lake-p (tile 16) - Looking downstream (southeast) at channel flowing between two agricultural fields. Site is located on Kings Row between Marshall Road and Johnson Road.

Photo 53: Lake-p (tile 16) - Looking upstream (north) at channel flowing between two agricultural fields. Site is located on Kings Row between Marshall Road and Johnson Road.

Photo 54: Lake-q (tile 12) - Looking at roadside ditch along South Cayuga Road at channel location. Site is located on South Cayuga Road, between Rainham Road and the lakeshore.

Photo 55: Lake-q (tile 12) - Looking downstream (west) at channel location on South Cayuga Road. Site is located on South Cayuga Road, between Rainham Road and the lakeshore.

Photo 56: Lake-r (tile 10) - Looking downstream (southeast) from edge of wooded area at small drain feature flowing through an in-active agricultural field. Site is located east of Haldimand Road 50 between Rainham Road and the lake shore.

Photo 57: Lake-r (tile 10) - Looking upstream (northwest) from edge of in-active agricultural field at small drain feature flowing through wooded area. Site is located east of Haldimand Road 50 between Rainham Road and the lake shore.

Photo 58: Lake-r (tile 10) - Looking at wetted area in centre of wooded area. Site is located east of Haldimand Road 50 between Rainham Road and the lake shore.

Photo 59: Lake-r (tile 10) -Looking downstream (southeast) from wetted area in centre of wooded area. Site is located east of Haldimand Road 50 between Rainham Road and the lake shore.

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LAKE ERIE TRIBUTARIES SUBWATERSHED PHOTOS

Photo 60: Lake-s (Tile 10) Looking west (upstream) showing absence of channel through edge of agricultural field.

Photo 61: Lake s (Tile 10) Looking east (downstream) showing dry, low lying area through agricultural field.

Photo 62: Lake-s (Tile 10) Showing substrate. Note that site is ploughed through and planted.

Photo 63: Lake-t (Tile 10) Looking west (upstream) showing dry, low lying area through agricultural field.

Photo 64: Lake-t (Tile 10) Looking east (downstream) showing dry, low lying area through agricultural field.

Photo 65: Lake-t (Tile 10) Showing substrate. Note that site is ploughed through and planted.

Photo 1: Mazi-a (tile 16) - Looking downstream (east) from CSP culvert at channel flowing between two agricultural fields. Site is located south of Haldiman Tract Road between Marshall Road and Johnson Road.

Photo 2: Mazi-a (tile 16) - Looking upstream (west) from CSP culvert at channel flowing between two agricultural fields. Site is located south of Haldimand Tract Road between Marshall Road and Johnson Road.

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MAZI DRAIN PHOTOS

Photo 3: Mazi-b (tile 17) - Looking downstream (east) at channel flowing through woodlot. Site is located on Port Maitland Road between Kings Row and Ramsey Road.

Photo 4: Mazi-b (tile 17) - Looking upstream (west) at channel flowing through densely vegetated area. Site is located on Port Maitland Road between Kings Row and Ramsey Road.

Title
MAZI DRAIN PHOTOS

Appendix C

Electrofishing Effort

Table C.1: Summary of 2010 Stantec Electrofishing Surveys at Selected Watercourse Locations

Watershed / Creek ID	Date[a]	Effort (seconds)	Station Length (m)	Fish Captured	Water Quality (Temperature, Dissolved Oxygen)	Comments	Project Component
LONG POINT REGION CONSERVATION AUTHORITY							
Hemlock Creek							
Hem-c	25-Oct-10	312	60	Green Sunfish (1)	13.14°C, 5.98 mg/L		Collector Lines
				Cenral Mudminnow (1)			Collector Lines
				Brown Bullhead (1)			Collector Lines
Hem-e	25-Oct-10	176	40	Cenral Mudminnow (1)	14.31°C, 7.55 mg/L	Captured at culvert	Collector Lines
Wardells Creek							
Ward-b	19-Oct-10	167	40	Fathead Minnow (1)	12.9°C, 9.15 mg/L		Turbines
Ward-f	26-Oct-10	68	-	None	13.45°C, 6.70 mg/L		Collector Lines
Ward-h	25-Oct-10	71	25	Juvenile Largemouth Bass (1)	13.55°C, 6.98 mg/L		Collector Lines
				Brook Stickleback (1)			Collector Lines
Ward-k				Fathead Minnow (1)	9.93°C, 8.19 mg/L		Collector Lines
				Juvenile Largemouth Bass (1)			Collector Lines
				Common Shiner (1)			Collector Lines
Evans Creek							
Evans-c	20-Oct-10	18		None	10.27°C, 8.73 mg/L	Small pool	Turbines
Evans-c	27-Oct-10	67	15	Cenral Mudminnow (1)	16.0°C, 8.02 mg/L		Collector Lines
				Bluntnose Minnow (2)			Collector Lines
Evans-d	28-Oct-10	47	-	None	10.78°C, 5.51 mg/L		Collector Lines
Evans-g	22-Oct-10	54	-	None			Turbines
Evans-i	22-Oct-10	117	40	Fathead Minnow (1)	5.99°C, 6.95 mg/L		Turbines
none	28-Oct-10	47	-	None	10.15°C, 7.60 mg/L	Site CL32 on field notes	Collector Lines
GRAND RIVER CONSERVATION AUTHORITY							
Unnamed Grand River Tributaries							
Gran-f	23-Oct-10	38	-	None	10.07°C, 5.61 mg/L		Collector Lines
Gran-h	19-Oct-10	98	-	None			Turbines
Gran-i	25-Oct-10	221	-	None	14.55°C, 7.94 mg/L		Collector Lines
Gran-m	19-Oct-10	267	-	Fathead Minnow (1)	13.2°C, 7.5 mg/L	Pond ~ 10 m X 30 m	Turbines
				Pumpkinseed (1)			Turbines
				YOY* Centrarcids (6)			Turbines
				Central Mud minnow (1)			Turbines
Gran-r	20-Oct-10	140	-	None	12.76°C, 2.06 mg/L	Pond / wetland	Turbines
Gran-r	20-Oct-10	218	30	Central Mudminnow (17)	14.0°C, 10.04 mg/L	Pond / wetland	Turbines
Gran-r	20-Oct-10	27	10	Central Mudminnow (3)	9.75°C, 4.62 mg/L	Small pool	Turbines
Gran-u	20-Oct-10	212	100	YOY Centrarcids (9)			Turbines
				Common Shiner (5)			Turbines
Gran-w	20-Oct-10	97	30	Central Mud minnow (2)	9.6°C, 10.93 mg/L		Turbines
				Common Shiner (3)			Turbines
Gran-y	21-Oct-10	86	-	None	10.35°C, 9.95 mg/L		Turbines
Gran-z	28-Oct-10	38	-	Bluntnose Minnow (1)	10.65°C, 10.42 mg/L		Collector Lines
				Fathead Minnow (3)			Collector Lines
Gran-bb	21-Oct-10	175	-	None	9.58°C, 9.13 mg/L		Turbines
Gran-dd	27-Oct-10	287	45	Cenral Mudminnow (1)	14.10°C, 7.84 mg/L		Collector Lines
				Green Sunfish (1)			Collector Lines
				Common Shiner (6)			Collector Lines

Table C.1: Summary of 2010 Stantec Electrofishing Surveys at Selected Watercourse Locations

Watershed / Creek ID	Date[a]	Effort (seconds)	Station Length (m)	Fish Captured	Water Quality (Temperature, Dissolved Oxygen)	Comments	Project Component
Gran-ee	22-Oct-10	127	50	Alosa sp. (1)			Turbines
Gran-ee				Juvenile Cyprinids (9)	9.21°C, 9.16 mg/L		Turbines
Gran-ff	22-Oct-10	-	-	-		Brook Stickleback observed	Turbines
Gran-jj	26-Oct-10	382	25	Centrarchid YOY (6)	15.08°C, 2.5 mg/L		Turbines
				Central Mudminnow (6)			Turbines
				Fathead Minnow (4)			Turbines
Gran-oo	26-Oct-10	187	30	Cenral Mudminnow (3)	16.20°C, 4.80 mg/L		Collector Lines
				Juvenile Green Sunfish (2)			Collector Lines
				Common Shiner (9)			Collector Lines
none	18-Oct-10	280	-	None		Site 2.2 on field sheets	Turbines
none	18-Oct-10	118	-	None		Site 3.1 on field sheets	Turbines
none	20-Oct-10	Unk	25	None	6.0°C, 9.10 mg/L	Site 16.0 on field sheets	Turbines
Holmes Creek/Sulphur Creek							
Holm-a	19-Oct-10	179	-	None			Turbines
Holm-a	23-Oct-10	25	-	None	11.54°C, 7.72 mg/L		Collector Lines
Holm-b	19-Oct-10	127	-	None			Turbines
Holm-c	23-Oct-10	27	-	None	10.32°C, 8.25 mg/L		Collector Lines
Holm-d	19-Oct-10	86	-	None			Turbines
Holm-d	27-Oct-10	56	30	Cenral Mudminnow (8)	13.18°C, 7.23 mg/L		Collector Lines
				Fathead Minnow (5)			Collector Lines
Holm-f	25-Oct-10	197	20	Green Sunfish (1)	13.10°C, 6.96 mg/L		Collector Lines
				Common Shiner (2)			Collector Lines
Holm-h	23-Oct-10	162	25	Creek Chub (1)	11.54°C, 9.41 mg/L		Collector Lines
				Fathead Minnow (1)			Collector Lines
				Cenral Mudminnow (1)			Collector Lines
Unnamed Lake Erie Tributaries							
Lake-d	23-Oct-10	110	-	None	8.68°C, 9.32 mg/L		Turbines
Lake-d	23-Oct-10	78	-	None	10.01°C, 5.69 mg/L		Turbines
Lake-d	23-Oct-10	187	-	None	9.69°C, 7.40mg/L		Turbines
Lake-f	23-Oct-10	-	50	None	13.16°C, 10.38 mg/L		Turbines
none	21-Oct-10	192	-	None	10.5°C, 1.80 mg/L	Leeches observed. Site 29.0 on field sheets	Turbines
Mazi Drain							
Mazi-a	22-Nov-10	-	-	Fathead Minnow (2)			Turbines
*YOY = young-of-the-year							

Appendix D

Field Notes

Gran-a

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 1
Photos Taken 0121, 0122, 0123
GPS Coordinates 17T 0587854/4753842
Descriptive Location crossing approximately 200 m South of Rt 3 @ house # 4260

Project # 16010646
Field Staff E. Malindzak, M. Kozak
Date 10-18-2010
Time 12:22

Water Quality

Dissolved Oxygen (mg/L) ______
pH ______
Conductivity (µS/cm) ______
Water Temperature (°C) ______
Air Temperature (°C) 11°C
Weather conditions in previous 24 hrs Sunny then cloudy, cool

Watercourse Dimensions & Morphology

Mean Watercourse Width ______ (m)
Maximum Pool Depth ______ (cm)
Mean Bankfull Width ______ (m)
Mean Water Depth ______ (cm)
______ % Riffle ______ % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability channel incised d/s on adjacent property, no defined channel though there is evidence of flow

Substrate – Upstream (% cover)

______ Bedrock ______ Silt ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

Substrate – Downstream (% cover)

______ Bedrock ______ Silt ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 80%, early sucessional meadow
Downstream 60%, grass/meadow w/ agricuture (corn)

Adjacent Land Use
Upstream agriculture currently fallow
Downstream agriculture, corn + meadow

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream at d/s property boundry is piles of concrete/brick
Downstream culvert @ road crossing d/s is dry

Note any fish observations some pooled water on property D/S, isolated as culvert is dry

Other Habitat Notes, Incidental Wildlife Observations, etc. Dry not a water Body no aquatic veg or defined channel

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Gran-aa

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version ____

Project _: Samsung (GREP) Wind
Station # CL-34
Photos Taken 7509, ~~$~~ 7510, 7511
GPS Coordinates 17T 0603302 / 4750311
Descriptive Location South of Haldiman 20 on South Cayuga Rd.

Project # 161010646
Field Staff E. Malindzak, E. Windhorst
Date Oct 28, 2010
Time 10:54, ~~2010~~

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 11°C, cloudy, windy
Weather conditions in previous 24 hrs Sunny, warm, windy

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.20 (m)
Mean Bankfull Width 1.0 (m)
Maximum Pool Depth 0.5 m ~~(cm)~~
Mean Water Depth 0.3 ~~(cm)~~
____ % Riffle 80 % Pool 20 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability none, considering recent rains and very little water in channel, this likely holds water breifly after rain and during spring snow melt.

Substrate – Upstream (% cover)

____ Bedrock ____ Silt ____ Boulder 100 Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

Substrate – Downstream (% cover)

____ Bedrock ____ Silt ____ Boulder 100 Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other Terrestrial

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 90%, terrestrial grasses
Downstream 75%, meadow ~~gro~~ sp.

Adjacent Land Use
Upstream agriculture (soy)
Downstream fallow field / meadow

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations none, culvert is perched ~7.5 cm @ d/s end, u/s is roadside ditch

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Gran-b

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Project # 161010646
Station # 23
Field Staff E. Malindzak, M. Kozak
Photos Taken #0134, 0135, 0136
Date 10-18-2010
GPS Coordinates 17T 0590472 / 4753859
Time 14:04
Descriptive Location o ~ 600 m 80m south of Hwy 3, closest turbine to Kohler Road on west side

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 12°C
Weather conditions in previous 24 hrs sunny then cloudy, cool

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.5 (m)
Maximum Pool Depth 15 (cm)
Mean Bankfull Width 2.5 (m)
Mean Water Depth 7.5 (cm)
% Riffle
100 % Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability no visible flow, agricultural drain

Substrate – Upstream (% cover)

	Bedrock		Silt		Boulder	50	Clay		Cobble
50	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder	50	Clay		Cobble
50	Muck		Gravel		Marl		Sand		Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks, Deep Pool, [✓ Vascular Plants], Overhanging Vegetation, Woody Debris, Boulder, Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 30%, some meadow w/ winter wheat
Downstream 45%, " " " "
Adjacent Land Use
Upstream agriculture
Downstream agriculture, wood lot

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. deer + raccoon tracks ~~possible watercourse~~ possible not a waterbody. Waterbody occurs to the east of turbine + corridor but not in site except near tree line. Contains water but cracking in substrate indicates was dry recently.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Gran-b

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Stantec

Project Samsung (GREP) Wind
Station # 2.2
Photos Taken ~~4~~ see 2.1 shots
GPS Coordinates 17T 0589811 | 4753869
Descriptive Location ~ 600 m South of Hwy 3.

Project # 161010646
Field Staff E. Malindzak, M. Kozak
Date 10-18-2010
Time 13:32

Water Quality
Dissolved Oxygen (mg/L) 10.13
pH 8.45
Conductivity (µS/cm) 0
Water Temperature (°C) 13.54
Air Temperature (°C) 12 °C
Weather conditions in previous 24 hrs Sunny then cloudy, cool

Watercourse Dimensions & Morphology
Mean Watercourse Width 10 x 15 (m)
Maximum Pool Depth unk (cm)
Mean Bankfull Width / (m)
Mean Water Depth unk (cm)
_____% Riffle 100 % Pool _____% Run _____% Flat
Evidence of eroding banks, Comments on bank stability pond in corn field

Substrate – Upstream (% cover)
_____Bedrock _____Silt _____Boulder _____Clay _____Cobble
100 Muck _____Gravel _____Marl _____Sand _____Detritus

Substrate – Downstream (% cover)
_____Bedrock _____Silt _____Boulder 50 Clay _____Cobble
50 Muck _____Gravel _____Marl _____Sand _____Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other_____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 10, Corn
Downstream 50, Soy
Adjacent Land Use
Upstream agriculture, corn
Downstream agriculture, soy

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations

Other Habitat Notes, Incidental Wildlife Observations, etc. deer, racoon, dog tracks, dead opossum, Shocked 280 seconds - no fish captured or observed - not a Water Body

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Gran-6

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Stantec

Project Samsung (GREP) Wind
Station # 2.1
Photos Taken 0130, 0131, 0132, 0133
GPS Coordinates 17T 0589799 / 4753977
Descriptive Location 500 m South of HWY 3

Project # 161010646
Field Staff E. Malindzak, M. Kozak
Date 10-18-2010
Time 13:09

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 11°C
Weather conditions in previous 24 hrs sunny then overcast, cool

Watercourse Dimensions & Morphology
Mean Watercourse Width / (m)
Mean Bankfull Width / (m)
Maximum Pool Depth / (cm)
Mean Water Depth / (cm)
% Riffle
% Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability linear channel through agriculture (soy, corn) fields

Substrate – Upstream (% cover)
/ Bedrock
/ Muck
/ Silt
/ Gravel
/ Boulder
/ Marl
/ Clay
/ Sand
/ Cobble
/ Detritus

Substrate – Downstream (% cover)
Bedrock
50 Muck
Silt
Gravel
Boulder
Marl
50 Clay
Sand
Cobble
Detritus

In-water Cover
Cover Types Present (circle): Overhanging Vegetation, Undercut Banks, Woody Debris, Deep Pool, Boulder, [✓ Vascular Plants], Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 30%, corn
Downstream 50%, soy
Adjacent Land Use
Upstream agriculture (corn)
Downstream agriculture (soy)

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. raccon + deer tracks Not a water body at this location, contains small (10 cm dia) puddles, likely from recent rains - not a Water Body

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Gran-bb

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 32.0
Photos Taken /
GPS Coordinates 17T 0604782/4750664
Descriptive Location 400m south of Haldimand Rd 20, west of Haldimand Rd. 50

Project # 161010646
Field Staff Edward Malindzak, M. Kozak
Date October 21 2010
Time 16:48

Water Quality

Dissolved Oxygen (mg/L) 9.13
pH 7.92
Conductivity (µS/cm) 191
Water Temperature (°C) 9.58
Air Temperature (°C) 9°C
Weather conditions in previous 24 hrs sunny, cloudy, warm, cold, heavy rain, hail

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.0 (m)
Maximum Pool Depth 0.50 m ~~(cm)~~
Mean Bankfull Width 4.0 (m)
Mean Water Depth 0.40 ~~(cm)~~
5 % Riffle
75 % Pool
10 % Run
10 % Flat
Evidence of eroding banks, Comments on bank stability very slow moving agricultural drain, steep banks w/signs of erosion where crop fields enter

Substrate – Upstream (% cover)

	Bedrock	20	Silt		Boulder	80	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

/	Bedrock	20	Silt		Boulder	80	Clay		Cobble
/	Muck		Gravel		Marl		Sand		Detritus

In-water Cover

Cover Types Present (circle):
Overhanging Vegetation
Undercut Banks
Woody Debris
Deep Pool
Boulder
Terrestrial [✓ Vascular Plants]
Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 50%, meadow species, corn (goldenrod, asters, canary grass)
Downstream 50%, meadow species, corn " " " ,
Adjacent Land Use
Upstream agricuture (corn, clover)
Downstream agriculture (corn, soy)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations none, shocked for 175 seconds @ 3 60Hz/300V no fish captured or observed,

Other Habitat Notes, Incidental Wildlife Observations, etc. channel is dominated by terrestrial species and is likely wet only after heavy rainfall and spring run-off.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Gran-c

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # 2.4
Photos Taken 0127, 0128, 0129
GPS Coordinates 17T 0590341/4754251
Descriptive Location approx. 350m South of Hwy 3, east of Decewsville Rd

Project # 161010646
Field Staff E. Malindzak, M. Kozak
Date 10-18-2010
Time 14:35

Water Quality
Dissolved Oxygen (mg/L)
pH
Conductivity (µS/cm)
Water Temperature (°C)
Air Temperature (°C) 12 °C
Weather conditions in previous 24 hrs sunny then cloudy, cool

Watercourse Dimensions & Morphology
Mean Watercourse Width (m)
Mean Bankfull Width (m)
Maximum Pool Depth (cm)
Mean Water Depth (cm)
% Riffle
% Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability

Substrate – Upstream (% cover)
Bedrock
Muck
Silt
Gravel
Boulder
Marl
Clay
Sand
Cobble
Detritus

Substrate – Downstream (% cover)
Bedrock
Muck
Silt
Gravel
Boulder
Marl
Clay
Sand
Cobble
Detritus

In-water Cover
Cover Types Present (circle): Overhanging Vegetation, Undercut Banks, Woody Debris, Deep Pool, Boulder, Vascular Plants, Other winter wheat

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream
Downstream
Adjacent Land Use
Upstream agriculture, wheat
Downstream agriculture, wheat

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations ~~none~~, shallow depression in field,

Other Habitat Notes, Incidental Wildlife Observations, etc. not a water-body

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version ____

Project: Samsung (GREP) Wind
Project # 16010646
Station # CL-29
Field Staff E. Malindzak, E. Windhorst
Photos Taken 7489, 7490, 7491
Date Oct. 27, 2010
GPS Coordinates 17T 0604773/4749014
Time 15:55 ~~2010~~
Descriptive Location On Bains Road, approx. 1Km east of South Cayuga Road

Water Quality

Dissolved Oxygen (mg/L) 5.47
pH 7.15
Conductivity (µS/cm) 149
Water Temperature (°C) 14.30
Air Temperature (°C) 17 oC
Weather conditions in previous 24 hrs Cloudy, rain (heavy) wind, warm currently sunny & windy

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.5 (m)
Maximum Pool Depth 0.20 m ~~(cm)~~
Mean Bankfull Width 3.5 (m)
Mean Water Depth 0.07 ~~(cm)~~
____% Riffle ____% Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability Clearly conveys water from woodlot and roadside drains.

Substrate – Upstream (% cover)

	Bedrock		Silt		Boulder	40	Clay		Cobble
	Muck		Gravel		Marl		Sand	60	Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder	~~40~~ 20	Clay		Cobble
20	Muck		Gravel		Marl		Sand	60	Detritus

In-water Cover

Cover Types Present (circle):
[✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder ~~Vascular Plants~~ Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 95%, mature forest
Downstream 90%, canary grass & meadow sp.
Adjacent Land Use
Upstream Woodlot
Downstream agriculture & residential

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream potential flooded veg. for spring spawners
Migratory Obstructions (seasonal, permanent)
Upstream none
Downstream none
Note any fish observations none. Did not shock due to two very friendly Golden Retrievers wanting to play in water with us.

Other Habitat Notes, Incidental Wildlife Observations, etc. Frogs

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 2.5
Photos Taken ~~#~~0124 0125, 0126
GPS Coordinates 17 T 0590217 / 4754642
Descriptive Location ~ 200 m ~~from~~ south HWY 3, far west of site.

Project # 16101064б
Field Staff E. Malindzak, M. Kozak
Date 10-18 2010
Time 14:55

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 12°C
Weather conditions in previous 24 hrs sunny then cloudy, cool

Watercourse Dimensions & Morphology

Mean Watercourse Width / (m)
Mean Bankfull Width / (m)
Maximum Pool Depth / (cm)
Mean Water Depth / (cm)
___ % Riffle ___ % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability no banks

Substrate – Upstream (% cover)

	Bedrock	100	~~Silt~~ Soil		Boulder		Clay		Cobble
~~100~~	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock	100	~~Silt~~ Soil		Boulder		Clay		Cobble
~~100~~	Muck		Gravel		Marl		Sand		Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other wheat

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 0%, wheat
Downstream 0%, wheat

Adjacent Land Use
Upstream agriculture, wheat
Downstream agriculture, wheat

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations intermittent, recently dry

Other Habitat Notes, Incidental Wildlife Observations, etc. not a waterbody

Field Notes Authored by E. Malindzak Field Notes QA/QCed by M. Pomeroy Page 9 of 95

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version ______

Project Samsung (GREP) Wind
Station # CL-26
Photos Taken 7476, 747
GPS Coordinates 17T 0605646/4750111
Descriptive Location reach between Haldiman 20 and Haldunn Rd

Project # 161010646
Field Staff E. Malindzak, E. Windhorst
Date Oct. 27, 2010
Time 13:17, ~~2010~~

Water Quality

Dissolved Oxygen (mg/L) ~~9.36~~ 7.84
pH ~~8.03~~ 8.03
Conductivity (µS/cm) 294
Water Temperature (°C) 14.13
Air Temperature (°C) 16°C
Weather conditions in previous 24 hrs cloudy, heavy rain, windy, currently sunny w/ high winds

Watercourse Dimensions & Morphology

Mean Watercourse Width 2.00 (m)
Maximum Pool Depth 0.90 m ~~(cm)~~
Mean Bankfull Width 7.0 (m)
Mean Water Depth 0.40 ~~(cm)~~
______ % Riffle ______ % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability largely roadside drain at this location, though flows across private lands U/S + D/S.

Substrate – Upstream (% cover)

______ Bedrock ______ Silt ______ Boulder 100 Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

Substrate – Downstream (% cover)

______ Bedrock ______ Silt ______ Boulder 100 Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

In-water Cover

Cover ~~Types Present (circle)~~: ~~Undercut Banks~~ ~~Deep Pool~~ ~~Vascular Plants~~
~~Overhanging Vegetation~~ ~~Woody Debris~~ Boulder Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 60%, meadow sp, mature trees
Downstream 60%, meadow sp., mature trees
Adjacent Land Use
Upstream agriculture
Downstream agriculture.

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream potential for small area of flooded veg. for spring spawners
Downstream ______
Migratory Obstructions (seasonal, permanent)
Upstream none
Downstream none
Note any fish observations Fished b/t Haldiman 20 and Haldunn Road for 287 seconds @ 60 Hz/500V. Captured (1) green sunfish, Central mudminnow (1), 6 common shiner

Other Habitat Notes, Incidental Wildlife Observations, etc. watercourse overflowing bank/high water mark. Much higher than yesterday. Sighs of significantly higher flows overnight, Flashy system

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

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Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 16101064.8

Station Number CL-26

Project Name Samsung (GREP) Wind

Pass No. (if applicable) 1

Project manager Rob Nadolny

Date (yyyymmdd): 20101027

Descriptive Location

UTM coordinates 0605646 easting 4750111 northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make SR-12

Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 287 Number of Netters: 1 Number of Anodes: 1

Settings

Frequency (Hz) 60 Voltage (volts) 500 Current (Amps) Power (Watts)

Station Information

Length of Stream Surveyed (m) 45 m

Station Characteristics:

Width (m): Range 1.5-3.0 Average: 2.0

Depth (m): Range 0.3-0.9 Average: 0.40

Water Clarity/Colour: Cloudy, Brown

Water Velocity if Measured (m/s): —

Temperature (°C) 14.13

Conductivity (uS/cm) 294

pH 8.03

Dissolved Oxygen (mg/L) 7.84

Catch Data

Species	Number of Fish	Species	Number of Fish
Greensun	fish (1)		
Central	mud minnow (1)		
Common	Shiner (6)		

Fish Measurements on Separate Sheet? Y [✓ N]

Field Staff: E. Malindzak ☑

E. Malindzak ☐

Notes By:

(Station Diagram on Back)

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 161010646
Station # 35.0
Field Staff Edward Malindzak, J. Koch
Photos Taken 7559, 7560, 7561, ?
Date October 22 2010
GPS Coordinates 17T 0607024/4751038
Time 13:36
Descriptive Location Approx 400m north of Haldimand Rd 20, 1 Km West of Aiken's Rd.

Water Quality

Dissolved Oxygen (mg/L) 9.16
pH 7.16
Conductivity (µS/cm) 587
Water Temperature (°C) 9.21
Air Temperature (°C) 6
Weather conditions in previous 24 hrs

Watercourse Dimensions & Morphology

Mean Watercourse Width 2.5 (m)
Maximum Pool Depth 0.50 m ~~(cm)~~
Mean Bankfull Width 4.5 (m)
Mean Water Depth 0.30 ~~(cm)~~
10 % Riffle
40 % Pool
25 % Run
25 % Flat

Evidence of eroding banks, Comments on bank stability twin culverts under "road". Appears water backs up behind road & flows over (erosion on D/S side)

Substrate – Upstream (% cover)

___ Bedrock	___ Silt	___ Boulder	100 Clay	___ Cobble
___ Muck	___ Gravel	___ Marl	___ Sand	___ Detritus

Substrate – Downstream (% cover)

___ Bedrock	___ Silt	___ Boulder	100 Clay	___ Cobble
___ Muck	___ Gravel	___ Marl	___ Sand	___ Detritus

In-water Cover

Cover Types Present (circle): [✓ Undercut Banks] Deep Pool [✓ Vascular Plants]
[✓ Overhanging Vegetation] Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 90%, Canary grass, one mature tree
Downstream 80%, cattails, canary grass, mature forest

Adjacent Land Use
Upstream agriculture (crop, pasture)
Downstream agriculture (crop)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream potential pike spawning, if inundation duration is long enough
Downstream " " " " " " " "

Migratory Obstructions (seasonal, permanent)
Upstream none
Downstream none

Note any fish observations (1) shad, (9) cyprinids (juvenile), shocked for 127 seconds at 60 Hz/500V. Vegetation very dense away from twin culverts

Other Habitat Notes, Incidental Wildlife Observations, etc. Owner stated water breaches access road in spring of last few years. Water levels drop 1-2 days later. WATERBODY

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
Page 12 of 95

Project Number 16101646

Date (yyyymmdd): 20101022

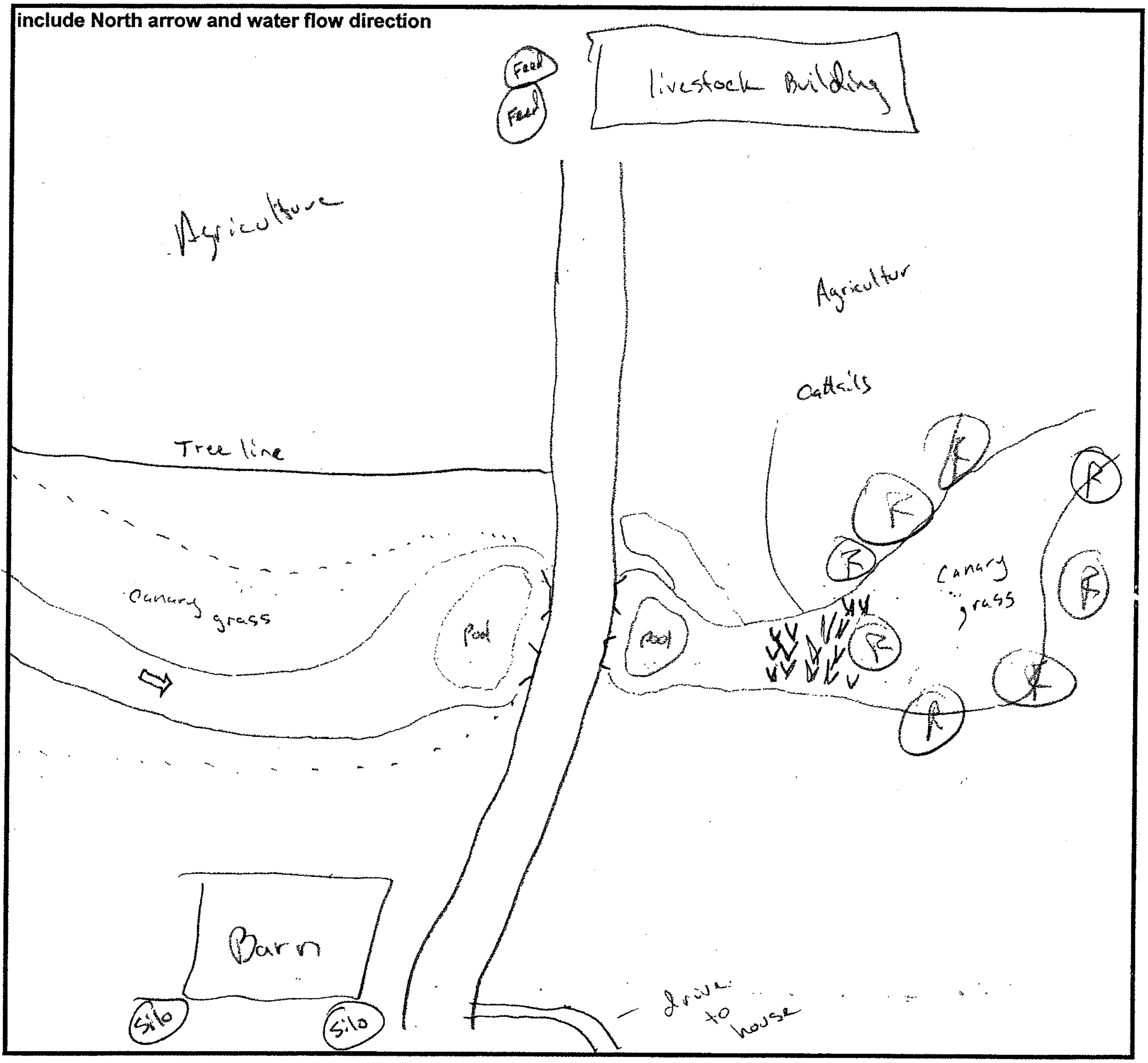
Waterbody Name unk

Station Number 35.0

Pass No. (if applicable) 1

Field Staff: E. Malindzak
J. Koch

include North arrow and water flow direction



NOTES: debris ~~re~~ very high on grass. Landowner states system is flashy, especially in past few years

Quality Control: This form is complete (✓) & legible (✓). QA/QC by: (signature) M. Pomeroy

Stantec

Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 16010646

Station Number 35.0

Project Name Samsung (GREP) Wind

Pass No. (if applicable) 1

Project manager Rob Nadolny

Date (yyyymmdd): 20101022

Descriptive Location

UTM coordinates 17T 0607024 easting 4751038 northing zone

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make SR-12

Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 127 Number of Netters: 1 Number of Anodes: 1

Settings

Frequency (Hz) 60 Voltage (volts) 500 Current (Amps) Power (Watts)

Station Information

Length of Stream Surveyed (m) 50 m

Station Characteristics: Width (m): Range 2-6 m Average: 2.5

Depth (m): Range 0.2 - 0.5 Average: 0.30

Water Clarity/Colour: brown/cloudy

Water Velocity if Measured (m/s):

Temperature (°C) 9.21

Conductivity (uS/cm) 387

pH 7.76

Dissolved Oxygen (mg/L) 9.16

Catch Data

Species	Number of Fish	Species	Number of Fish
Alosa sp.	1		
Cyprinid	9 captured } juvenile		
	11 observed		

Fish Measurements on Separate Sheet? Y/[✓ N]

Field Staff: E. Malindzak

J. Koch

☑ Notes By:

☐

(Station Diagram on Back)

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 1610 10646
Station # 35.1
Field Staff Edward Malindzak,
Photos Taken 7562, 7563, 7564
Date October 22 2010
GPS Coordinates 17T 0607094 | 4751261
Time 14:50
Descriptive Location Approx 650 m north of Haldimand Rd 20, 1 km west of Aikens Rd

Water Quality

Dissolved Oxygen (mg/L) 6.91
pH 7.50
Conductivity (µS/cm) 392
Water Temperature (°C) 8.31
Air Temperature (°C) 8°C
Weather conditions in previous 24 hrs sunny, cloudy, cold, warm, windy, hail, heavy rain.

Watercourse Dimensions & Morphology

Mean Watercourse Width 2.5 (m)
Maximum Pool Depth >1.0 m ~~(cm)~~
Mean Bankfull Width 5 (m)
Mean Water Depth unk (cm)
___ % Riffle
80 % Pool
20 % Run
___ % Flat
Evidence of eroding banks, Comments on bank stability undercut banks & erosion at old dam site. Hard to determine location of channel w/ abundant water.

Substrate – Upstream (% cover)

	Bedrock		Silt		Boulder	100	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder	100	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks [✓ Deep Pool] [✓ Vascular Plants] [✓ Overhanging Vegetation] [✓ Woody Debris] Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 90%, canary grass & mature forest
Downstream 85%, " " " "

Adjacent Land Use
Upstream agriculture
Downstream agriculture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
~~Upstream~~ ~~no~~ potential pike spawning if area remains inundated
Downstream long enough.

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations none. ~~Did not fish as maps indicate Mussel SAR may occur in this area.~~ erroneous.

Other Habitat Notes, Incidental Wildlife Observations, etc. old pond dam behind livestock building, could not see bottom due to cloudy water. Sudden drop off, not sure of depth. Long (100 m) flooded veg pool occurs @ and below old dam structure WATERBODY

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 16101064G
Station # CL1.1 & CL1.2
Field Staff E. Malindzak, E. Windhorst
Photos Taken ~~#~~0043, 0044, 0045, 0046,
Date Oct 24 2010
GPS Coordinates 17T 0591324/4734548
Time 8:22
Descriptive Location Kohler Road, approx 600m South of Hwy 3

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 10°C
Weather conditions in previous 24 hrs

Watercourse Dimensions & Morphology

Mean Watercourse Width / (m)
Maximum Pool Depth / (cm)
Mean Bankfull Width / (m)
Mean Water Depth / (cm)
% Riffle
% Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability little or no water, no defined channel

Substrate – Upstream (% cover)

Bedrock	Silt	Boulder	100 Clay	Cobble
Muck	Gravel	Marl	Sand	Detritus

Substrate – Downstream (% cover)

Bedrock	Silt	Boulder	100 Clay	Cobble
Muck	Gravel	Marl	Sand	Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants]
[✓ Overhanging Vegetation] Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 10%, very little ~~of~~ veg
Downstream 10% " " "

Adjacent Land Use
Upstream agriculture
Downstream agriculture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream lack of channel/flow
Downstream "

Note any fish observations none, ephemeral, [illegible] flows during spring and after heavy rain, Took GPS @ 2nd from HWY 3

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak Field Notes QA/QCed by M. Pomeroy Page 16 of 95

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 16101064 6
Station # 36.0
Field Staff Edward Malindzak,
Photos Taken 7566, 7567,
Date October 22 2010
GPS Coordinates 17T 0607085/4749948
Time 15:23
Descriptive Location 600m South of Haldimand Rd 20, 1 km west of Aikens Rd.

Water Quality

Dissolved Oxygen (mg/L) 12.13 pH 8.09 Conductivity (µS/cm) 152
Water Temperature (°C) 10.60 Air Temperature (°C) /
Weather conditions in previous 24 hrs sunny, cloudy, warm, cool, windy, heavy rain, hail

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.50 (m) Maximum Pool Depth ____ (cm)
Mean Bankfull Width 4.0 (m) Mean Water Depth 10 (cm)
____% Riffle 50 % Pool 50 % Run ____% Flat
Evidence of eroding banks, Comments on bank stability low laying area collecting run-off from surrounding agriculture fields

Substrate – Upstream (% cover)

____Bedrock ____Silt ____Boulder 100 Clay ____Cobble
____Muck ____Gravel ____Marl ____Sand ____Detritus

Substrate – Downstream (% cover)

____Bedrock ____Silt ____Boulder 100 Clay ____Cobble
____Muck ____Gravel ____Marl ____Sand ____Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 80%, meadow + canary grass
Downstream 80%, meadow + canary grass.

Adjacent Land Use
Upstream agriculture
Downstream agriculture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream possible pike spawning if low lying area remains
Downstream inondated long enough

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations none, likely only contains water during periods of high run-off

Other Habitat Notes, Incidental Wildlife Observations, etc. deer tracks
WATER BODY

Field Notes Authored by E. Malindzak Field Notes QA/QCed by M. Pomeroy Page 17 of 95

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # 34.3
Photos Taken 7558
GPS Coordinates 17T 0606265/4750048
Descriptive Location 250m South of Haldimand '20, 600 m east of Townline Road, Hald-Dunn

Project # 161010646
Field Staff Edward Malindzak, J Koch
Date October 22 2010
Time 12:49

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 7°C
Weather conditions in previous 24 hrs Sunny, cloudy, warm, cold, heavy Rain, hail wind

Watercourse Dimensions & Morphology
Mean Watercourse Width / (m)
Maximum Pool Depth / (cm)
Mean Bankfull Width / (m)
Mean Water Depth / (cm)
____% Riffle ____% Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability no water

Substrate – Upstream (% cover)

/ Bedrock	/ Silt	/ Boulder	/ Clay	/ Cobble
/ Muck	/ Gravel	/ Marl	/ Sand	/ Detritus

Substrate – Downstream (% cover)

/ Bedrock	/ Silt	/ Boulder	/ Clay	/ Cobble
/ Muck	/ Gravel	/ Marl	/ Sand	/ Detritus

In-water Cover
Cover Types Present (circle): Overhanging Vegetation, Undercut Banks, Woody Debris, Deep Pool, Boulder, [✓ Vascular Plants], Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream willow + canary grass
Downstream —
Adjacent Land Use
Upstream agriculture
Downstream —

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream —
Migratory Obstructions (seasonal, permanent)
Upstream lack of water
Downstream —
Note any fish observations patch of canary grass + a willow on top of a rise. no water or evidence of standing/flowing water

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 16101064
Station # 34.2
Field Staff Edward Malindzak, J. Koch
Photos Taken 7553, 7554, 7555, 7556, 7557
Date October 22 2010
GPS Coordinates 17T 0604446 4749813
Time 12:00
Descriptive Location 600m south of Haldimand Rd 20, 600m east of Townline Road Hald-Dunn.

Water Quality

Dissolved Oxygen (mg/L) 8.42
pH 7.99
Conductivity (µS/cm) 133
Water Temperature (°C) 8.80
Air Temperature (°C) 7°C
Weather conditions in previous 24 hrs sunny, cloudy, heavy rain, hail, windy, cold, warm

Watercourse Dimensions & Morphology

Mean Watercourse Width ______ (m)
Maximum Pool Depth ______ (cm)
Mean Bankfull Width ______ (m)
Mean Water Depth ______ (cm)
______ % Riffle
100 % Pool
______ % Run
______ % Flat
Evidence of eroding banks, Comments on bank stability large pools formed by farm machinery. D/S channel is braided w/ no "defined channel" (canary grass) U/S large low laying area also w/ canary grass (40m x 100m)

Substrate – Upstream (% cover)

______ Bedrock
______ Silt
______ Boulder
______ Clay
______ Cobble
______ Muck
______ Gravel
______ Marl
______ Sand
______ Detritus

Substrate – Downstream (% cover)

______ Bedrock
______ Silt
______ Boulder
100 Clay
______ Cobble
______ Muck
______ Gravel
______ Marl
______ Sand
______ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants]
Overhanging Vegetation Woody Debris Boulder Other canary grass

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream ______
Downstream 100%, canary grass
Adjacent Land Use
Upstream agriculture (corn, soy)
Downstream agriculture (soy).

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream potential pike spawning in canary grass
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow, agriculture operations
Note any fish observations none, lots of standing water, likely due to heavy rains last 2 nights.

Other Habitat Notes, Incidental Wildlife Observations, etc. Wetted area w/ canary grasses is large (~ 20m x 75m). Several small "channels" drain crops, with minimal amounts of water & planted through w/crops. Will not hold water and are typically dry.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 161010646
Station # CL 2.0
Field Staff Edward Malindzak, E. Windhorst
Photos Taken 0039, 0040, 0042
Date October 23 2010
GPS Coordinates 0591474 / 4754881 17T
Time 8:40
Descriptive Location Kohler Road, 1.2 Km South of Hwy 3

Water Quality

Dissolved Oxygen (mg/L) 5.61
pH 7.35
Conductivity (µS/cm) 255
Water Temperature (°C) 10.07
Air Temperature (°C) 10°C
Weather conditions in previous 24 hrs Cloudy, ~~tio~~ rain, windy

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.15 (m)
Maximum Pool Depth 0.50 m ~~(cm)~~
Mean Bankfull Width 3.0 (m)
Mean Water Depth 0.15 ~~(cm)~~
10 % Riffle
40 % Pool
25 % Run
25 % Flat
Evidence of eroding banks, Comments on bank stability meandering channels. Cobble placed @ u/s end of culvert.

Substrate – Upstream (% cover)

	Bedrock		Silt		Boulder	100	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder	100	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks [✓ Woody Debris] Deep Pool Boulder [✓ Vascular Plants] Other canary grass

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 90%, canary grass, meadow sp.
Downstream 90%, " ", willows + shrubs further D/S

Adjacent Land Use
Upstream agriculture
Downstream agriculture (corn, pasture for horses)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream vegitation potential spawning habitat if inundated long enough
Downstream " "

Migratory Obstructions (seasonal, permanent)
Upstream none
Downstream none

Note any fish observations none, deep pool at culvert gets much shallower and narrower, likely very little water under normal conditions

Other Habitat Notes, Incidental Wildlife Observations, etc. Shocked for 38 seconds @ 60 Hz / ~~8~~ 500 V with no fish captured or observed. Shocked u/s pool.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 161010646
Station # 362
Field Staff Edward Malindzak,
Photos Taken 7569, 7570, 7571, 7572, 7573
Date October 2010
GPS Coordinates 0607124, 4749603
Time 1541
Descriptive Location 900m south of Haldimand Rd 20, 1Km west of Aikens

Water Quality
Dissolved Oxygen (mg/L) 8.65
pH 7.78
Conductivity (µS/cm) 210
Water Temperature (°C) 9.78
Air Temperature (°C) 6°C
Weather conditions in previous 24 hrs Sunny, Cloudy, warm, cool, Windy, heavy rain, hail

Watercourse Dimensions & Morphology out-flow from pond + connecting creek
Mean Watercourse Width 1.5 (m)
Maximum Pool Depth 10.0 (cm)
Mean Bankfull Width 3.0 (m)
Mean Water Depth 7.5 (cm)
___ % Riffle 100 % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability very little evidence of flow very shallow and wide.

Substrate – ~~Upstream (% cover)~~ Pond

	Bedrock		Silt		Boulder	30	Clay		Cobble
50	Muck		Gravel		Marl		Sand	20	Detritus

Substrate – Downstream ~~(% cover)~~ outflow + connecting creek

	Bedrock		Silt		Boulder	50	Clay		Cobble
	Muck		Gravel		Marl		Sand	50	Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants]
[✓ Overhanging Vegetation] Woody Debris Boulder Other___

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
~~Upstream~~ (Pond) 50%, meadow + water loving species (at woodlot) dogwood + canary grass
Downstream (Creek) 90%, Mature woodlot (hardwoods)
Adjacent Land Use
Upstream (Pond) agriculture
Downstream (outflow + creek) woodlot (Hardwoods)

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations observed Brook Stickleback in pond + Tadpoles.

Other Habitat Notes, Incidental Wildlife Observations, etc. WATERBODY

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 16101064b
Station # 36.1
Field Staff Edward Malindzak,
Photos Taken 7568
Date October 22 2010
GPS Coordinates 0607093/4749677
Time 15:34
Descriptive Location 850m south of Haldimand Road 20, 1Km west of Aikens Rd.

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 8°C
Weather conditions in previous 24 hrs sunny, cloudy, cool, warm, heavy rain, hail windy

Watercourse Dimensions & Morphology

Mean Watercourse Width 8x25 (m)
Maximum Pool Depth unk (cm)
Mean Bankfull Width — (m)
Mean Water Depth (cm)
% Riffle
% Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability

Substrate – Upstream (% cover)

/ Bedrock
/ Silt
/ Boulder
/ Clay
/ Cobble
/ Muck
/ Gravel
/ Marl
/ Sand
/ Detritus

Substrate – Downstream (% cover)

/ Bedrock
/ Silt
/ Boulder
/ Clay
/ Cobble
/ Muck
/ Gravel
/ Marl
/ Sand
/ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder Vascular Plants Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)

Upstream 15%, meadow vegitation
Downstream —

Adjacent Land Use

Upstream agriculture
Downstream —

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)

Upstream none
Downstream —

Migratory Obstructions (seasonal, permanent)

Upstream not connected to anything
Downstream —

Note any fish observations none, This is an isolated pond, not connected to any in/out flow

Other Habitat Notes, Incidental Wildlife Observations, etc. NOT a Water Body

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # CL-19
Photos Taken [0085, 0086, 0087] [7441, 7442]
GPS Coordinates 0595367/4750737
Descriptive Location Intersection of Richert Rd and Link Rd (northeast side)
Project # 16101064646
Field Staff E. Malindzak, E. Windhorst
Date Oct 25, 2010
Time 15:27

Water Quality

Dissolved Oxygen (mg/L) 7.94
pH 7.79
Conductivity (μS/cm) 324
Water Temperature (°C) 14.55
Air Temperature (°C) 18°C
Weather conditions in previous 24 hrs cloudy, rain, wind

Watercourse Dimensions & Morphology

Mean Watercourse Width 2.5 (m)
Mean Bankfull Width 4.5 (m)
Maximum Pool Depth 0.75 (cm)
Mean Water Depth 0.50 (cm)
___ % Riffle
50 % Pool
50 % Run
___ % Flat
Evidence of eroding banks, Comments on bank stability Clear evidence of erosion U/S + D/S of concrete box culvert.

Substrate – Upstream (% cover)

___ Bedrock
___ Muck
___ Silt
___ Gravel
30 Boulder
___ Marl
70 Clay
___ Sand
___ Cobble
___ Detritus

Substrate – Downstream (% cover)

___ Bedrock
___ Muck
___ Silt
___ Gravel
___ Boulder
___ Marl
100 Clay
___ Sand
___ Cobble
___ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] [✓ Undercut Banks] Woody Debris [✓ Deep Pool] [✓ Boulder] Vascular Plants Other___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 75%, mature trees + canary grass (trees only near culvert)
Downstream 75%, mature trees

Adjacent Land Use
Upstream agriculture
Downstream woodlot

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream culvert @ grade or higher, may be obstruction
Downstream during low flow.

Note any fish observations Shocked for 221 seconds @ 60 Hz/500 V. No fish captured or observed.

Other Habitat Notes, Incidental Wildlife Observations, etc. Water was very turbid and plentiful.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # CL-19.1
Photos Taken 0088, 0089, 0090
GPS Coordinates
Descriptive Location Approx 300m South of Link Rd on Richart Road

Project # 161010646
Field Staff E. Malindzak, E. Windhorst
Date Nov 12 2010
Time 11:29 am

Water Quality

Dissolved Oxygen (mg/L) N/A
pH N/A
Conductivity (µS/cm) N/A
Water Temperature (°C) N/A
Air Temperature (°C)
Weather conditions in previous 24 hrs

Watercourse Dimensions & Morphology

Mean Watercourse Width (m)
Maximum Pool Depth (cm)
Mean Bankfull Width (m)
Mean Water Depth (cm)
% Riffle
% Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability

Substrate – Upstream (% cover)

Bedrock
100 ~~Silt~~ Soil
Boulder
Clay
Cobble
Muck
Gravel
Marl
Sand
Detritus

Substrate – Downstream (% cover)

Bedrock
100 ~~Silt~~ Soil
Boulder
Clay
Cobble
Muck
Gravel
Marl
Sand
Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 10, grass, early
Downstream

Adjacent Land Use
Upstream agriculture (crop)
Downstream agriculture (crop)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream None
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low/no flow
Downstream low/no flow

Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. NOT a Water Body
intermittent/ephemeral channel

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by M. Pomeroy

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind

Station # CL-18

Photos Taken 0082, 0083, 0084 Also 7438, 7439, 7440

GPS Coordinates 17T 0595119/4750811

Descriptive Location 300m west of Richert Rd on ~~to~~ Link Rd.

Project # 161010646

Field Staff E. Malindzak, E. Windhorst

Date Oct. 25, 2010

Time 14:59

Water Quality

Dissolved Oxygen (mg/L) ______ pH ______ Conductivity (μS/cm) ______

Water Temperature (°C) ______ Air Temperature (°C) 18°C

Weather conditions in previous 24 hrs Cloudy, rain, windy

Watercourse Dimensions & Morphology

Mean Watercourse Width ______ (m) Maximum Pool Depth ______ (cm)

Mean Bankfull Width ______ (m) Mean Water Depth ______ (cm)

______ % Riffle ______ % Pool ______ % Run ______ % Flat

Evidence of eroding banks, Comments on bank stability erosion is appearant d/s near treeline. Cattle have unrestricted access

Substrate – Upstream (% cover)

______ Bedrock ______ Silt ______ Boulder 100 Clay ______ Cobble

______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

Substrate – Downstream (% cover)

______ Bedrock ______ Silt ______ Boulder 100 Clay ______ Cobble

______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)

Upstream 100%, canary grass

Downstream 50%, canary grass

Adjacent Land Use

Upstream pasture (cattle)

Downstream " "

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)

Upstream potential flooded veg. for spring spawners

Downstream none

Migratory Obstructions (seasonal, permanent)

Upstream none observed

Downstream " "

Note any fish observations none, Coveys water likely in Spring, very little accessable water @ time of visit.

Other Habitat Notes, Incidental Wildlife Observations, etc. ______

Field Notes Authored by E. Malindzak Field Notes QA/QCed by M. Pomeroy Page 25 of 95

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # CL-17
Photos Taken [0080] [7437]
GPS Coordinates 17T 0594726/4751064
Descriptive Location 600m west of Richert Rd on Link Rd

Project # 161010646
Field Staff E. Malindzak, E. Windhorst
Date Oct 25 2010
Time 14:44

Water Quality

Dissolved Oxygen (mg/L) ______ pH ______ Conductivity (µS/cm) ______
Water Temperature (°C) ______ Air Temperature (°C) 18°C
Weather conditions in previous 24 hrs cloudy, rain, wind

Watercourse Dimensions & Morphology (downstream of Road)

Mean Watercourse Width 1.5 (m)
Maximum Pool Depth unk (cm)
Mean Bankfull Width 2.5 (m)
Mean Water Depth ~0.20 (cm)
______ % Riffle 100 % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability could not find connectivity U/S. Some standing water in ditch, though veg too dense to shock

Substrate – Upstream (% cover)

______ Bedrock ______ Silt ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

Substrate – Downstream (% cover)

______ Bedrock ______ Silt ______ Boulder 100 Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

In-water Cover

Cover Types Present (circle):
[✓ Overhanging Vegetation] Undercut Banks Deep Pool Vascular Plants
Woody Debris Boulder Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream —
Downstream 15%, canary grass near road, then very little

Adjacent Land Use
Upstream —
Downstream active cattle pasture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream —
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream —
Downstream none

Note any fish observations only shockable / YSI depth water was on private land w/ no access

Other Habitat Notes, Incidental Wildlife Observations, etc. ______

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # ~~#27~~ 13.1
Photos Taken 0084, 0085, 0086, 0087, 0088
GPS Coordinates 17T 0594279/4750862
Descriptive Location 200m south of Link Rd, 900m west of Richert Rd.

Project # 161010646
Field Staff Edward Malindzak
Date October 19, 2010
Time 14:16

Water Quality

Dissolved Oxygen (mg/L) 15.4
pH 8.77
Conductivity (µS/cm) 432 } pond
Water Temperature (°C) 15.1
Air Temperature (°C) 11°C } pond
Weather conditions in previous 24 hrs cloudy, sunny, cool, windy

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.5 (m)
Mean Bankfull Width 2.0 (m)
Maximum Pool Depth >0.5m (cm)
Mean Water Depth 10 (cm)
___ % Riffle 100 % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability small stream with online pond (~8 m diameter). Pond is man-made

Substrate – Upstream (% cover)

___ Bedrock	___ Silt	___ Boulder	100 Clay	___ Cobble
~~100~~ Muck	___ Gravel	___ Marl	___ Sand	___ Detritus

Substrate – Downstream (% cover)

___ Bedrock	___ Silt	___ Boulder	100 Clay	___ Cobble
___ Muck	___ Gravel	___ Marl	___ Sand	___ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 90%, canary grass
Downstream 90%, canary grass

Adjacent Land Use
Upstream agriculture, equine + clover
Downstream agriculture, equine + clover

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream potential pike spawning habitat

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations Pond is 100% muck, no cover and no potential critical habitat

Other Habitat Notes, Incidental Wildlife Observations, etc. Horse farm, shocked pond @ 60 Hz/300V for 98 seconds, No fish captured or observed

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version

Project : Samsung (GREP) Wind
Station # CL - 28
Photos Taken 37486, 7487, 7488
GPS Coordinates 17T 0608081/4750701
Descriptive Location 100 m south of Haldiman 20 on Aikens Road @ new culvert.

Project # 16010646
Field Staff E. Malindzak, E. Windhorst
Date Oct 27, 2010
Time 14:50, ~~2010~~

Water Quality

Dissolved Oxygen (mg/L) 9.70
pH 7.52 36
Conductivity (µS/cm) 357
Water Temperature (°C) 15.93
Air Temperature (°C) 16 °C
Weather conditions in previous 24 hrs Cloudy, heavy rain, warm, wind currently warm and windy.

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.80 (m)
Mean Bankfull Width 2.5 (m)
Maximum Pool Depth 0.30 ~~(cm)~~ M
Mean Water Depth 0.15 ~~(cm)~~
___ % Riffle 100 % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability culvert appears new as straw bales are still present.

Substrate – Upstream (% cover)

___ Bedrock 20 Silt ___ Boulder 30 Clay ___ Cobble
50 Muck ___ Gravel ___ Marl ___ Sand ___ Detritus

Substrate – Downstream (% cover)

___ Bedrock 20 Silt ___ Boulder 30 Clay ___ Cobble
50 Muck ___ Gravel ___ Marl ___ Sand ___ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool ~~Vascular Plants~~ Boulder Other Terrestrial

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 80%, meadow sp.
Downstream 30%, soy
Adjacent Land Use
Upstream agriculture
Downstream agriculture (soy)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream none
Downstream low flow through agriculture field
Note any fish observations none, likely little or no water most of the time. Lacks connectivity to d/s.

Other Habitat Notes, Incidental Wildlife Observations, etc. tadpoles & frogs

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version

Project: Samsung (GREP) Wind
Station #: CL-27
Photos Taken: 7482 7483, 7484
GPS Coordinates: 17T 0607745/4750760
Descriptive Location: Haldimand Road 20, 600 m east of Aikens Rd

Project #: 16010646
Field Staff: E. Malindzak, E. Windhorst
Date: Oct. 27, 2010
Time: 14:28 ~~2010~~

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 16°c
Weather conditions in previous 24 hrs: cloudy, heavy rain, windy. Currently sunny & windy

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.15 (m)
Mean Bankfull Width 3.0 (m)
Maximum Pool Depth 0.05 m ~~(cm)~~
Mean Water Depth 0.05 ~~(cm)~~
___ % Riffle
100 % Pool
___ % Run
___ % Flat
Evidence of eroding banks, Comments on bank stability: no evidence of flow and very little water w/ dense veg.

Substrate – Upstream (% cover)

/	Bedrock	/	Silt	/	Boulder	~~95~~	Clay	~~5~~	Cobble
/	Muck	/	Gravel	/	Marl	/	Sand	/	Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder	95	Clay	5	Cobble
	Muck		Gravel		Marl		Sand		Detritus

In-water Cover

Cover Types Present (circle):
[✓ Overhanging Vegetation]
Undercut Banks
Woody Debris
Deep Pool
Boulder
[✓ Vascular Plants]
Other ___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream: — dry
Downstream: 95%, canary grass with small area of cattails

Adjacent Land Use
Upstream: — early successional meadow
Downstream: agriculture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream: —
Downstream: potential flood veg for spring spawners

Migratory Obstructions (seasonal, permanent)
Upstream: low flow
Downstream: low flow

Note any fish observations: none ephemeral system contains water only after heavy rain

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by: E. Malindzak
Field Notes QA/QCed by: M. Pomeroy

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 13.0
Photos Taken 0081, 0082, 0083
GPS Coordinates 17T 0594076/4750367
Descriptive Location 800m South of Link Rd., 900m west of Richert Rd.

Project # 161010646
Field Staff Edward Malindzak, M. Kozak
Date October 19, 2010
Time 13:59

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 10°C
Weather conditions in previous 24 hrs cloudy, sunny, cool, windy

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.75 (m)
Maximum Pool Depth 10 (cm)
Mean Bankfull Width 1.5 (m)
Mean Water Depth 4 (cm)
% Riffle
% Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability hard to determine channel dimensions, very dense w/ canary grass

Substrate – Upstream (% cover)

	Bedrock		Silt		Boulder	100	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder	100	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

In-water Cover
Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 100%, canary grass
Downstream 100%, canary grass
Adjacent Land Use
Upstream agriculture, wheat, clover
Downstream agricuture, wheat

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream potential pike habitat
Downstream " " "
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations likely conveys significant amounts of water in spring

Other Habitat Notes, Incidental Wildlife Observations, etc. none, likely a waterbody. Gas well b/w 13.0 + 13.1

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 37.2
Photos Taken 7592, 7593, 7594
GPS Coordinates 17T 0607599 | 4749032
Descriptive Location 400m north of Rainham Road, 550m west of Aikens Road

Project # 16101064 6
Field Staff Edward Malindzak,
Date October 22 2010
Time 17:49

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) /
Weather conditions in previous 24 hrs Recent heavy rain

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.0 (m)
Mean Bankfull Width 5.5 (m)
Maximum Pool Depth 8 (cm)
Mean Water Depth 4 (cm)
20 % Riffle
60 % Pool
— % Run
20 % Flat
Evidence of eroding banks, Comments on bank stability recently dug drain channel isolated woody area. Channel flows from back of private property to banks are slumping and all water drains into a hole (tile?)

Substrate – Upstream (% cover)

___ Bedrock ___ Muck ___ Silt ___ Gravel ___ Boulder ___ Marl 100 Clay ___ Sand ___ Cobble ___ Detritus

Substrate – Downstream (% cover)

/ Bedrock / Muck / Silt / Gravel / Boulder / Marl / Clay / Sand / Cobble / Detritus

In-water Cover

Cover Types Present (circle): Overhanging Vegetation Undercut Banks Woody Debris Deep Pool Boulder Vascular Plants Other none totally Bare.

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream none
Downstream —
Adjacent Land Use
Upstream agriculture
Downstream —

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream —
Migratory Obstructions (seasonal, permanent)
Upstream abscence of connectivity
Downstream —
Note any fish observations channel may allow fish to move u/s in high flows, All water flowed into a drain tile w/none moving d/s through channel

Other Habitat Notes, Incidental Wildlife Observations, etc. was not fished due to potential presence of mussels. Water observed likely due to heavy rains last two ~~da~~ nights and this channel is likely dry most of the time.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 37.1
Photos Taken 7587, 7588, 7589, 7590, 7591
GPS Coordinates 17T 0607580/4749220
Descriptive Location 600m north of Rainham Rd, 550m west of Aikens Rd.

Project # 161010646
Field Staff Edward Malindzak,
Date October 27 2010
Time 17:28

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 9°C
Weather conditions in previous 24 hrs Sunny, warm, cloudy, cool, heavy rain, hail, windy

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.30 (m)
Mean Bankfull Width 3.0 (m)
Maximum Pool Depth 0.3 m ~~(cm)~~
Mean Water Depth 0.07 ~~(cm)~~
30 % Riffle
30 % Pool
20 % Run
20 % Flat
Evidence of eroding banks, Comments on bank stability evidence of erosion and high flows. West side of tree area recently cleared of mature trees

Substrate – Upstream (% cover) of isolated woodlot

/	Bedrock		Silt		Boulder	/	Clay	/	Cobble
/	Muck	/	Gravel	/	Marl		Sand	/	Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder	40	Clay	30	Cobble
	Muck	30	Gravel		Marl		Sand		Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks, Deep Pool, Vascular Plants, Overhanging Vegetation, Woody Debris, Boulder, Other floating and filimentous algea

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream channel not visible, water contribution via drain tile
Downstream ~~40%~~, 5%, recently cleaned drain, no veg on south side

Adjacent Land Use
Upstream agriculture
Downstream agriculture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations ~~none, did not shock due to SAR mussels on map.~~ erroneous and lack of water. Presence of algea and seeps at isolated wooded area suggest continuously wet, though very minimal flow

Other Habitat Notes, Incidental Wildlife Observations, etc. Very little water. Seeps are covered w/ dense algea, ~~likely~~ Water Body

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

not a Water Re

Project Samsung (GREP) Wind.
Project # 161010646
Station # 37.0
Field Staff Edward Malindzak,
Photos Taken 7585, 7586
Date October 22 2010
GPS Coordinates 17T 0607723/4749168
Time 17:17
Descriptive Location 400m west of Aikens Rd, 600m north of Rainham Rd.

Water Quality

Dissolved Oxygen (mg/L)
pH
Conductivity (µS/cm)
Water Temperature (°C)
Air Temperature (°C) 10°C
Weather conditions in previous 24 hrs Sunny, warm, Cloudy, cool, heavy rain, hail wind

Watercourse Dimensions & Morphology

Mean Watercourse Width (m)
Maximum Pool Depth (cm)
Mean Bankfull Width (m)
Mean Water Depth (cm)
% Riffle
100 % Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability standing water in pocket of trees & terrestrial veg. Evidence of erosion though could not ID source of water other than surrounding lands. Assume erosion caused by drain tile

Substrate – Upstream (% cover)

Bedrock	Silt	Boulder	100 Clay	Cobble
Muck	Gravel	Marl	Sand	Detritus

Substrate – Downstream (% cover)

Bedrock	Silt	Boulder	Clay	Cobble
Muck	Gravel	Marl	Sand	Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 95%, mature fruit trees (apple?) and canary grass
Downstream —

Adjacent Land Use
Upstream agriculture (Clover and others)
Downstream —

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream —

Migratory Obstructions (seasonal, permanent)
Upstream lack of connection. Appears to contain water in quantity
Downstream — & velocity to cause erosion. No visable inflow or out flow

Note any fish observations none, could not define channel.

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version ____

Stantec

Project: 161010646
Project # Samsung (GREP) Wind
Station # 42.3
Field Staff E. Malindzak, E. Windberst
Photos Taken 17T 0608330/4749786 }
GPS Coordinates 7463, 7464 }
Date Oct 26, 2010
Time 13:33 ~~2010~~
Descriptive Location 200m east of Haldimand Rd 49, 900m north of Rainham Rd.

Water Quality
Dissolved Oxygen (mg/L) 2.50
pH 7.40
Conductivity (µS/cm) 214
Water Temperature (°C) 15.08
Air Temperature (°C) 18°c
Weather conditions in previous 24 hrs Cloudy, rain, warm

Watercourse Dimensions & Morphology → outflow
Mean Watercourse Width ~~[illegible]~~ 0.4 (m)
Maximum Pool Depth 0.30 m ~~(cm)~~
Mean Bankfull Width 1.5 (m)
Mean Water Depth 0.5 ~~(cm)~~
____ % Riffle 100 % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability pond (man-made). Very turbid.

Substrate – ~~Upstream (% cover)~~ Pond outflow
____ Bedrock ____ Silt ____ Boulder ~~100~~ 70 Clay ____ Cobble
30 Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

Substrate – Downstream (% cover)
____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

In-water Cover
Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder Vascular Plants Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Pond ~~Upstream~~ 15%, Canary grass, hardwood trees
outflow ~~Downstream~~ ← 90%, hardwood forest

Adjacent Land Use
pond Upstream agriculture, woodlot
outflow Downstream ← woodlot

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Pond Upstream ~~lack of connection~~ connectivity limited
outflow Downstream ~ low flow
Note any fish observations pond and outflow channel. Pond is ~15x20 m, depth exceeds 1.0 m. Shocked pond for 382 seconds @ 60 Hz/600V. Captured Greensunfish (6 YOY), Central mudminnow (6), fathead minnow (4),
Other Habitat Notes, Incidental Wildlife Observations, etc. two turtles, deer & racoon tracks. Shocked pond only

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 161010646
Project Name Samsung (GREP) Wind
Project manager Rob Nadolny
Descriptive Location

Station Number 42.3
Pass No. (if applicable) 1
Date (yyyymmdd): 20101026

UTM coordinates 0608330 easting 4749786 northing zone 17T

Fishing Method (circle one): [✓ ~~Backpack~~] Boat Unit Model/Make SR-12
Sampling Method (circle one): [✓ ~~even~~] habitat transect spot

Effort (Electrofishing Seconds): 382 Number of Netters: 1 Number of Anodes: 1

Settings
Frequency (Hz) 60 Voltage (volts) 600 Current (Amps) Power (Watts)

Station Information
Length of Stream Surveyed (m) 25 shoreline of pond. Could not shock channel due to dense vegitation

Station Characteristics: Width (m): Range 15x20 Average: ~~0.40~~
Depth (m): Range >1.0 Average: 0.40 > pond

Water Clarity/Colour: turbid
Temperature (°C) 15.08
pH 7.40

Water Velocity if Measured (m/s): —
Conductivity (uS/cm) 214
Dissolved Oxygen (mg/L) 2.50

Catch Data

Species	Number of Fish	Species	Number of Fish
Green sunfish	6 YOY		
Central Mudminnow	6		
Fathead minnow	4		

Fish Measurements on Separate Sheet? Y/N

☑ Notes By:

☐ ~~(Station Diagram on Back)~~

Field Staff: E. Malindzak
E. Windhorst

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version ______

Project 161010649
Station # 42.2
Photos Taken ~~2~~7461, 7462
GPS Coordinates 17T 0608626/4749836
Descriptive Location 750m east of Aikens Rd, 1900m north of Rainham Rd.
Project # Samsung (GREP) Wind
Field Staff E. Malindzak, E. Winhorst
Date Oct 26, 2010
Time 13:16 ~~2010~~

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 18°C
Weather conditions in previous 24 hrs windy, warm, rain, cloudy

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.75 (m)
Maximum Pool Depth 0.20 (cm)
Mean Bankfull Width 1.5 (m)
Mean Water Depth 0.15 (cm)
______% Riffle 100 % Pool ______% Run ______% Flat
Evidence of eroding banks, Comments on bank stability shows evidence of erosion, stream originates in field and flows into woodlot.

Substrate – Upstream (% cover) in field
______Bedrock ______Silt ______Boulder ~~90~~ 100 Clay ______Cobble
______Muck ______Gravel ______Marl ______Sand ______Detritus

Substrate – Downstream (% cover) woodlot
______Bedrock ______Silt ______Boulder ______Clay ______Cobble
______Muck ______Gravel ______Marl ______Sand 100 Detritus leaves

In-water Cover
Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other______

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 0%, Wheat
Downstream 80%, mature trees
Adjacent Land Use
Upstream agriculture
Downstream Woodlot

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations none.

Other Habitat Notes, Incidental Wildlife Observations, etc. ______

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version ____

Project 16010649
Station # 42.0
Photos Taken 7451, 7452, 7453
GPS Coordinates 17T 608529 / 4749737
Descriptive Location 450 m east of Aikens Rd, 900 m north of Rainham Rd.

Project # Samsung (GREP) Wind
Field Staff E. Malindzak, E. Windhorst
Date Oct 26, 2010
Time 11:35 ~~2010~~

Water Quality

Dissolved Oxygen (mg/L) 6.52
pH 7.78
Conductivity (µS/cm) 267
Water Temperature (°C) 14.14
Air Temperature (°C) 17°C
} Pond
Weather conditions in previous 24 hrs cloudy, rain, windy + warm

Watercourse Dimensions & Morphology

Mean Watercourse Width ____ (m)
Mean Bankfull Width ____ (m)
Maximum Pool Depth >1.0 m ~~(cm)~~
Mean Water Depth 0.5 @ bank (cm)
} Pond
____ % Riffle ____ % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability irregularly shaped man-made pond w/ several inputs and NO outflow

Substrate – Upstream (% cover)

____ Bedrock ____ Silt ____ Boulder 70 Clay ____ Cobble
30 Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

Substrate – Downstream (% cover)

____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other canary grass + terrestrial meadow sp.

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 30%, mature trees, dogwoods, canary grass
Downstream —

Adjacent Land Use
Upstream agriculture, woodlot
Downstream —

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none; isolated pond w/ contribution from several field
Downstream — run-off "channels"

Migratory Obstructions (seasonal, permanent)
Upstream lack of connection, permanent
Downstream —

Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. Inflow channel and man-made pond are not on map. Channel was 0.4 m wide + 0.35 m deep on average. Pond likely retains water year round. Channel has dense grass.

WATERBODY

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 42.1
Photos Taken 7454 -> 7460
GPS Coordinates 17T 0608964 | 4749687
Descriptive Location

Project # 161010646
Field Staff E. Malindzak, E. Windhorst
Date Oct. 26 2010
Time 12:31

Water Quality

Dissolved Oxygen (mg/L) 1.60
pH 7.05
Conductivity (µS/cm) 266
Water Temperature (°C) 14.21
Air Temperature (°C) 17°c
Weather conditions in previous 24 hrs Cloudy, rain, wind, warm

Watercourse Dimensions & Morphology

Mean Watercourse Width / (m)
Mean Bankfull Width (m)
Maximum Pool Depth 40 (cm)
Mean Water Depth 0.30 (cm)
% Riffle
100 % Pool
% Run
% Flat

Evidence of eroding banks, Comments on bank stability This is a low spot that collects water from four directions, no outflow. Inflow comes from adjacent fields, and woodlot.

Substrate – Upstream (% cover)

Bedrock
Silt
Boulder
20 Clay
Cobble
30 Muck
Gravel
Marl
Sand
50 Detritus

Substrate – Downstream (% cover)

/ Bedrock
/ Silt
/ Boulder
/ Clay
/ Cobble
/ Muck
/ Gravel
/ Marl
/ Sand
/ Detritus

In-water Cover

Cover Types Present (circle):
[✓ Overhanging Vegetation]
Undercut Banks
Woody Debris
Deep Pool
Boulder
[✓ Vascular Plants]
Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 80%, Cattails, meadow sp., Willow, canary grass, duck weed
Downstream —

Adjacent Land Use
Upstream agriculture
Downstream —

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream —

Migratory Obstructions (seasonal, permanent)
Upstream lack of connection in any direction
Downstream —

Note any fish observations This low spot is partially (at least) man-made. large cattail area in centre. Fished large cattail area and largest inflow.

Other Habitat Notes Incidental Wildlife Observations, etc. none.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version ____

Project : Samsung (GREP) Wind
Project # 161010646
Station # CL-24
Field Staff E. Malindzak, E. Windhorst
Photos Taken 7472, 7473
Date ~~10~~ Oct 27, 2010
GPS Coordinates 17T 0608193/4748170
Time 11:06, ~~2010~~
Descriptive Location culvert on Aikens (Haldiman Rd 49), 600m South of Rainham Rd.

Water Quality

Dissolved Oxygen (mg/L) 723
pH 7.41
Conductivity (µS/cm) 792
Water Temperature (°C) 13.18
Air Temperature (°C) ____
Weather conditions in previous 24 hrs Cloudy, rain (heavy), windy, warm

Watercourse Dimensions & Morphology @ road culvert

Mean Watercourse Width 0.40 (m)
Maximum Pool Depth 0.80 (cm)
Mean Bankfull Width 2.5 (m)
Mean Water Depth 0.30 (cm)
____ % Riffle
100 % Pool
____ % Run
____ % Flat
Evidence of eroding banks, Comments on bank stability contribution is mostly from roadside drains, however a small channel flows from adjacent agriculture field

Substrate – Upstream (% cover)

____ Bedrock
____ Silt
____ Boulder
100 Clay
____ Cobble
____ Muck
____ Gravel
____ Marl
____ Sand
____ Detritus

Substrate – Downstream (% cover)

____ Bedrock
____ Silt
____ Boulder
100 Clay
____ Cobble
____ Muck
____ Gravel
____ Marl
____ Sand
____ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other flooded terrestrail veg.

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 65%, meadow veg + corn
Downstream 85%, Canary grass + meadow sp.

Adjacent Land Use
Upstream agriculture (corn, clover)
Downstream agriculture (soy, clover)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream potential for flooded veg. for spring spawners

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations 8 central mudminnow @ culvert on both sides of Road. Shocked for 56 seconds @ 60 Hz / 600 V.

Other Habitat Notes, Incidental Wildlife Observations, etc. frogs. This is likely holding water due to ~~recentr~~ recent rains, though water likely stays around culvert year-round.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 161010646

Project Name Samsung (GREP) Wind

Project manager Rob Nadolney

Descriptive Location

Station Number CL-24

Pass No. (if applicable) 1

Date (yyyymmdd): 20101027

UTM coordinates 0608193 easting 4748170 northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make SR-12

Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 56 Number of Netters: 1 Number of Anodes: 1

Settings

Frequency (Hz) 60 Voltage (volts) 600 Current (Amps) Power (Watts)

Station Information

Length of Stream Surveyed (m) 30 m

Station Characteristics:

Width (m): Range 0.30-0.45 Average: 0.40

Depth (m): Range 0.20-0.80 Average: 0.3

Water Clarity/Colour: Cloudy

Temperature (°C) 13.18

pH 7.41

Water Velocity if Measured (m/s): —

Conductivity (uS/cm) 792

Dissolved Oxygen (mg/L) 7.23

Catch Data

Species	Number of Fish	Species	Number of Fish
Central	Mudminnow (8)		

Fish Measurements on Separate Sheet? Y/[✓ N]

Field Staff: E. Malindzak
E. Windhorst

☑ Notes By:

☐ ~~(Station Diagram on Back)~~

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version ____

Project _ Samsung (GREP) Wind
Station # CL-23
Photos Taken 7965, 7466
GPS Coordinates 17T 0608098/4750810
Descriptive Location ~~Aitkens Rd.~~ culvert on Aikens Rd 550m south of Haldimand Rd 20.

Project # 161010646.
Field Staff E. Malindzak E. Windhorst
Date oct. 26/2010
Time 15:29 ~~2010~~

Water Quality
Dissolved Oxygen (mg/L) 4.80
pH 7.44
Conductivity (µS/cm) 275
Water Temperature (°C) 16.20
Air Temperature (°C) 19°C
Weather conditions in previous 24 hrs cloudy, rain, wind, warm

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.5 (m)
Mean Bankfull Width 5.5 (m)
Maximum Pool Depth 0.45 m ~~(cm)~~
Mean Water Depth 0.30 ~~(cm)~~
15 % Riffle
45 % Pool
15 % Run
15 % Flat
Evidence of eroding banks, Comments on bank stability undercut banks, exposed roots

Substrate – Upstream (% cover)
/ Bedrock
/ Muck
/ Silt
/ Gravel
at culvert 10 Boulder
/ Marl
90 Clay
/ Sand
/ Cobble
/ Detritus

Substrate – Downstream (% cover)
\ Bedrock
\ Muck
\ Silt
10 Gravel
10 Boulder
\ Marl
60 Clay
10 Sand
10 Cobble
/ Detritus

In-water Cover
Cover Types Present (circle): [✓ Undercut Banks] Deep Pool [✓ Vascular Plants] [✓ Overhanging Vegetation] [✓ Woody Debris] [✓ Boulder] Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 50%, grasses & mature trees
Downstream 70%, Mature trees
Adjacent Land Use
Upstream woodlot, agriculture
Downstream woodlot agriculture

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream flooded veg for spring spawners
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream none
Downstream none
Note any fish observations ____

Other Habitat Notes, Incidental Wildlife Observations, etc. water is high, above high water and above or at bank full

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 161010646
Station Number CL-23
Project Name Samsung (GREP) Wind
Pass No. (if applicable) 1
Project manager Rob Nadolny
Date (yyyymmdd): 20101026
Descriptive Location Aikens Road, South of Haldimand 20

UTM coordinates 0608098 easting 4750310 northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make SR-12
Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 187 Number of Netters: 1 Number of Anodes: 1

Settings

Frequency (Hz) 60 Voltage (volts) 600 Current (Amps) Power (Watts)

Station Information

Length of Stream Surveyed (m) 30 m

Station Characteristics: Width (m): Range 1.0 - 2.5 Average: 1.5
Depth (m): Range 0.25- 0.45 Average: 0.36

Water Clarity/Colour: cloudy
Water Velocity if Measured (m/s): —
Temperature (°C) 16.20
Conductivity (uS/cm) 275
pH 7.44
Dissolved Oxygen (mg/L) 4.80

Catch Data

Species	Number of Fish	Species	Number of Fish
Central	Mudminnow (3)		
Common	Shiner (9) + 6 observed		
Green sun	fish (2) yoy/juvenile		

Fish Measurements on Separate Sheet? Y/N

Field Staff: E. Malindzak ☑ Notes By:
E. Windhorst ☐

~~(Station Diagram on Back)~~

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Project # 16101064b
Station # 15.0
Field Staff Edward Malindzak,
Photos Taken 0078, 0079, 0080
Date October 14, 2010
GPS Coordinates 17T 0598605/4750564
Time 17.14
Descriptive Location 750 m south of Meadows' Rd, 450 m east of Sutor Rd

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 14 °C
Weather conditions in previous 24 hrs cloudy, sunny, windy cool

Watercourse Dimensions & Morphology
Mean Watercourse Width / (m)
Maximum Pool Depth / (cm)
Mean Bankfull Width / (m)
Mean Water Depth / (cm)
_____ % Riffle _____ % Pool _____ % Run _____ % Flat
Evidence of eroding banks, Comments on bank stability dry w/ intermittent pools, grade is steep, likely contains flowing water briefly in spring and after significant rain

Substrate – Upstream (% cover)
_____ Bedrock _____ Silt _____ Boulder 100 Clay _____ Cobble
_____ Muck _____ Gravel _____ Marl _____ Sand _____ Detritus

Substrate – Downstream (% cover)
_____ Bedrock _____ Silt _____ Boulder 100 Clay _____ Cobble
_____ Muck _____ Gravel _____ Marl _____ Sand _____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants]
[✓ Overhanging Vegetation] Woody Debris Boulder Other_____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 85%, meadow + mature trees, then soy
Downstream 85%, Meadow species + canary grass
Adjacent Land Use
Upstream agriculture, ~~meadow + mature trees~~ Soy
Downstream agriculture, Soy

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream
Downstream gradient/velocity, low flow
Note any fish observations none, contains defined channel ~30 cm wide D/S (~100 m D/S). U/S shows erosion at culvert, deeply incised 2 m wide and 1 m deep.
Other Habitat Notes, Incidental Wildlife Observations, etc. Clearly conveys water but likely functions as indirect habitat due to grade.
Small Pick-up truck blocking our exit.
829-2WB GMC Sonoma - Red

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 16101064b
Station # 18H
Field Staff Edward Malindzak,
Photos Taken 4
Date October 20 2010
GPS Coordinates 0600147, 4750068 (17T)
Time 14:06
Descriptive Location 400 m north of Haldimand Rd 20, 600 m west of Yaremy Rd.

Water Quality

Dissolved Oxygen (mg/L) 4.62
pH 7.66
Conductivity (µS/cm) 138
Water Temperature (°C) 9.75
Air Temperature (°C) 9°c
Weather conditions in previous 24 hrs ______

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.20 (m)
Maximum Pool Depth 0.46 (cm)
Mean Bankfull Width ∞ (m)
Mean Water Depth 0.20 (cm)
______ % Riffle
100 % Pool
______ % Run
______ % Flat
Evidence of eroding banks, Comments on bank stability - pool created by placing material for field access, Pool has drian tile outflow

Substrate – Upstream (% cover)

______ Bedrock
______ Silt
______ Boulder
80 Clay
______ Cobble
20 Muck
______ Gravel
______ Marl
______ Sand
______ Detritus

Substrate – Downstream (% cover) Dry

______ Bedrock
______ Silt
______ Boulder
______ Clay
______ Cobble
______ Muck
______ Gravel
______ Marl
______ Sand
______ Detritus

In-water Cover

Cover Types Present (circle): Overhanging Vegetation, Undercut Banks, Woody Debris, Deep Pool, Boulder, [✓ Vascular Plants], Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 75%, mature forest
Downstream 0%, agriculture (Harvested)

Adjacent Land Use
Upstream wood lot
Downstream agriculture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream rubble pile plated in watercoarse to allow
Downstream farm machinery to pass, permenant

Note any fish observations central mudminnow (3) in pool @ 60Hz/300V

Other Habitat Notes, Incidental Wildlife Observations, etc. Frogs in tire cuts and pool

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy

Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 161010646

Project Name Samsung (GREP) Wind

Project manager Rob Nadolny

Descriptive Location

Station Number 18.4

Pass No. (if applicable) 1

Date (yyyymmdd): 20101020

UTM coordinates 0600147 easting 4750068 northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make SR-12

Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 27 Number of Netters: 1 Number of Anodes: 1

Settings

Frequency (Hz) 30 Voltage (volts) ~~60~~ 500 Current (Amps) Power (Watts)

Station Information

Length of Stream Surveyed (m) 10 m (entire pool)

Station Characteristics: Width (m): Range Average:

Depth (m): Range Average:

Water Clarity/Colour: brown

Temperature (°C) 9.75

pH 7.66

Water Velocity if Measured (m/s): –

Conductivity (uS/cm) 138

Dissolved Oxygen (mg/L) 4.62

Catch Data

Species	Number of Fish	Species	Number of Fish
Central Mudminnow	3		

Fish Measurements on Separate Sheet? Y/N

Field Staff: E. Malindzak

M. Kozak

Notes By:

☑

☐ (~~Station Diagram on Back~~)

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # 18.3
Photos Taken 0071
GPS Coordinates 17T 0600324 / 4750207
Descriptive Location 300m west of Yaremy Rd, 600m north of Haldimand Rd 20.

Project # 16101064b
Field Staff Edward Malindzak, M. Kozak
Date October 20 2010
Time 13:19

Water Quality
Dissolved Oxygen (mg/L)
pH
Conductivity (µS/cm)
Water Temperature (°C)
Air Temperature (°C) 10°C
Weather conditions in previous 24 hrs sunny, windy, cool

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.75 (m)
Mean Bankfull Width 0.75 (m)
Maximum Pool Depth 4 cm ~~(cm)~~
Mean Water Depth 3 cm (cm)
% Riffle
100 % Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability minor sign of erosion

Substrate – Upstream (% cover)

	Bedrock		Silt		Boulder	50	Clay		Cobble
50	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder		Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

In-water Cover
Cover Types Present (circle): Overhanging Vegetation, Undercut Banks, Woody Debris, Deep Pool, Boulder, [✓ Vascular Plants], Other soy

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 25%, soy
Downstream –
Adjacent Land Use
Upstream Agriculture
Downstream Agriculture

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations none, some alga & moss in/near water in minor amounts. Appears to drain adjacent field & wetland (18.2)

Other Habitat Notes, Incidental Wildlife Observations, etc. canine, racoon, and deer tracks.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy

Layout Version 1

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Project Samsung (GREP) Wind.
Station # 18.2
Photos Taken 3
GPS Coordinates 0600169, 4750219
Project # 16101064
Field Staff Edward Malindzak, M. Kozak
Date October 20 2010
Time 13:27
Descriptive Location 650 m north of Haldimand Rd 20, 550 m west of Yaremy Rd

Water Quality
Dissolved Oxygen (mg/L) 10.04
pH 7.75
Conductivity (µS/cm) 291
Water Temperature (°C) 14.00
Air Temperature (°C) 10°C
Weather conditions in previous 24 hrs rain, cloud, cool

Watercourse Dimensions & Morphology
Mean Watercourse Width ____ (m)
Mean Bankfull Width ____ (m)
Maximum Pool Depth >0.75 m ~~(cm)~~
Mean Water Depth 0.5 ~~(cm)~~
____ % Riffle
100 % Pool
____ % Run
____ % Flat
Evidence of eroding banks, Comments on bank stability ____

Substrate – Upstream (% cover)
____ Bedrock
50 Muck
____ Silt
____ Gravel
____ Boulder
____ Marl
~~30~~ Clay
____ Sand
____ Cobble
~~20~~ 50 Detritus

Substrate – Downstream (% cover)
____ Bedrock
____ Muck
____ Silt
____ Gravel
____ Boulder
____ Marl
____ Clay
____ Sand
____ Cobble
____ Detritus

In-water Cover
Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other cattails milfoil duckweed

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 30%, cattails and canary grass
Downstream —
Adjacent Land Use
Upstream Agriculture (clover)
Downstream —

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream —
Migratory Obstructions (seasonal, permanent)
Upstream ~~too~~ no connection except during periods of high overland flow
Downstream —
Note any fish observations Shocked for 218 seconds. Captured 17 Central mudminnow and observed many more. Did not observe any other species

Other Habitat Notes, Incidental Wildlife Observations, etc. field mouse/vole
Wetted areas appear to convey water overland. No channel and contains terrestrial vegitation (likely very seasonal)

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 161010646
Station Number 18.2
Project Name Samsung (GREP) Wind
Pass No. (if applicable) 1
Project manager Rob Nadolney
Date (yyyymmdd): 20101020
Descriptive Location

UTM coordinates 0600169 easting 4750219 northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make SR-12
Sampling Method (circle one): even [✓ habitat] transect spot

Effort (Electrofishing Seconds): 218 Number of Netters: 1 Number of Anodes: 1

Settings

Frequency (Hz) 60 Voltage (volts) ~~3~~ 500 Current (Amps) Power (Watts)

Station Information

Length of Stream Surveyed (m) 30 m of in-water shockin
Station Characteristics: Width (m): Range 50 x 70 Average: —
Depth (m): Range 0.25 - >0.75 Average: 0.5

Water Clarity/Colour: Fairly Clear
Water Velocity if Measured (m/s): —
Temperature (°C) 14.00
Conductivity (uS/cm) 291
pH 7.75
Dissolved Oxygen (mg/L) 10.04

Catch Data

Species	Number of Fish	Species	Number of Fish
Central Mudminnow	17		

Fish Measurements on Separate Sheet? Y/[✓ N]
Field Staff: E. Malindzak
M. Kozak
Notes By:
☑
☐
~~(Station Diagram on Back)~~

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 161010646
Station # 18.1
Field Staff Edward Malindzak,
Photos Taken 3
Date October 20 2010
GPS Coordinates 17T 0600099/4750462
Time 12:44
Descriptive Location 700m north of Haldimand Rd 20, 500m west of Yaremy Rd

Water Quality

Dissolved Oxygen (mg/L) 2.06
pH 7.59
Conductivity (µS/cm) 62
Water Temperature (°C) 12.76
Air Temperature (°C) /
Weather conditions in previous 24 hrs Cool, rain

Watercourse Dimensions & Morphology

Mean Watercourse Width / (m)
Maximum Pool Depth 0.30 (cm)
Mean Bankfull Width / (m)
Mean Water Depth — (cm)
% Riffle
100 % Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability wetted area east of 18.0

Substrate – Upstream (% cover)

Bedrock
Silt
Boulder
Clay
Cobble
100 Muck
Gravel
Marl
Sand
Detritus

Substrate – Downstream (% cover)

/ Bedrock
/ Silt
/ Boulder
/ Clay
/ Cobble
/ Muck
/ Gravel
/ Marl
/ Sand
/ Detritus

In-water Cover

Cover Types Present (circle):
[✓ Overhanging Vegetation]
Undercut Banks
Woody Debris
Deep Pool
Boulder
[✓ Vascular Plants]
Other cattails duckweed

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 30, shrubs + small trees
Downstream —

Adjacent Land Use
Upstream agriculture, woodlot
Downstream —

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream ~~none~~

Migratory Obstructions (seasonal, permanent)
Upstream no connection
Downstream —

Note any fish observations Shocked for 140 sec. @ 500V/60 Hz. No fish captured or observed.

Other Habitat Notes, Incidental Wildlife Observations, etc. Water from here may contribute to water @ 18.0, no visable connection. ~~Fog~~ frogs and ~~on~~ leeches are abundant. See map for notes on wetted areas.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 161010646

Station Number 18.1

Project Name Samsung (GRED) Wind

Pass No. (if applicable) 1

Project manager Rob Nadolny

Date (yyyymmdd): 20101020

Descriptive Location

UTM coordinates 0600099 easting 4750462 northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make SR - 12

Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 140 Number of Netters: 1 Number of Anodes: 1

Settings

Frequency (Hz) 60 Voltage (volts) 300 Current (Amps) Power (Watts)

Station Information

Length of Stream Surveyed (m) pond/wetland

Station Characteristics:

Width (m): Range ~~0.5-0.50~~ Average: ~~0.30~~

Depth (m): Range 0.05-0.50 Average: 0.30

Water Clarity/Colour: muck, visibility nil

Water Velocity if Measured (m/s): —

Temperature (°C) 12.76

Conductivity (uS/cm) 62

pH 7.59

Dissolved Oxygen (mg/L) 2.06

Catch Data

Species	Number of Fish	Species	Number of Fish
	No fish captured		
	or observed		

Fish Measurements on Separate Sheet? Y/[✓ N]

Field Staff: E. Maliadzah

M. Kozak

Notes By:

☑

☐ ~~(Station Diagram on Back)~~

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 18.0
Photos Taken 4
GPS Coordinates 17T 0600091/4750442
Project # 16101064 6
Field Staff Edward Malindzak, M.Kozak
Date October 20 2010
Time 12:38
Descriptive Location 700m north of Haldimand Rd 20, 500m west of Yaremy Rd

Water Quality

Dissolved Oxygen (mg/L)
pH
Conductivity (µS/cm)
Water Temperature (°C)
Air Temperature (°C) 8°C
Weather conditions in previous 24 hrs sunny, windy, cool

Watercourse Dimensions & Morphology

Mean Watercourse Width – (m)
Mean Bankfull Width – (m)
Maximum Pool Depth 5 (cm)
Mean Water Depth 5 (cm)
% Riffle
100 % Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability a wet spot in the middle of a clover field, has un-harvested crops, no aquatic species

Substrate – Upstream (% cover)

	Bedrock		Silt		Boulder	~~50~~ 100	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder		Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

In-water Cover

Cover Types Present (circle):
Overhanging Vegetation
Undercut Banks
Woody Debris
Deep Pool
Boulder
[✓ Vascular Plants] -Terrestrial
Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 40%, unharvested crop
Downstream –

Adjacent Land Use
Upstream agriculture
Downstream –

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream –

Migratory Obstructions (seasonal, permanent)
Upstream not connected
Downstream –

Note any fish observations none, a wetted area occurs ~ 75 m north of this location, contains cattails (dense) w/very little standing water

Other Habitat Notes, Incidental Wildlife Observations, etc. Too shallow to shock

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Channel Not present - no photos

Project Samsung (GREP) Wind
Station # 19.0
Photos Taken /
GPS Coordinates 0559723, 4748562
Descriptive Location 900m east of Sutor Rd, 750m south of Haldimand Road 20
Project # 161010646
Field Staff Edward Malindzak, M. Kozak
Date October 20 2010
Time 15:02

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 10°C
Weather conditions in previous 24 hrs sunny, cool, windy

Watercourse Dimensions & Morphology

Mean Watercourse Width / (m)
Mean Bankfull Width / (m)
Maximum Pool Depth / (cm)
Mean Water Depth / (cm)
/ % Riffle
/ % Pool
/ % Run
/ % Flat
Evidence of eroding banks, Comments on bank stability no evidence of channel, flowing water, or overland flow.

Substrate – Upstream (% cover)

/	Bedrock	/	Silt	/	Boulder	/	Clay	/	Cobble
/	Muck	/	Gravel	/	Marl	/	Sand	/	Detritus

Substrate – Downstream (% cover)

/	Bedrock	/	Silt	/	Boulder	/	Clay	/	Cobble
/	Muck	/	Gravel	/	Marl	/	Sand	/	Detritus

In-water Cover

Cover Types Present (circle): Overhanging Vegetation, Undercut Banks, Woody Debris, Deep Pool, Boulder, Vascular Plants, Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream /
Downstream /

Adjacent Land Use
Upstream /
Downstream /

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream /
Downstream /

Migratory Obstructions (seasonal, permanent)
Upstream /
Downstream /

Note any fish observations

Other Habitat Notes, Incidental Wildlife Observations, etc. this is featureless terrain, no evidence of water courses. Not fish habitat, waterbodies is an agriculture field w/ soy.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 2

Project Samsung (GREP)
Project # 161010646
Station # CL 37
Field Staff M. Pomeroy, D. Williams
Photos Taken 0039, 0040, 0041, 0042
Date Nov 8 2010
GPS Coordinates 0601858 4750176
Time 10:56am, 2010
Descriptive Location approx 1Km west of Haldimand Rd 50 on Haldimand Rd 20

Water Quality

Dissolved Oxygen (mg/L) 10.20
pH 7.39
Conductivity (µS/cm) 650
Water Temperature (°C) 3.60
Air Temperature (°C)
Weather conditions in previous 24 hrs cool, clear

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.5 (m)
Maximum Pool Depth 0.75 (cm)
Mean Bankfull Width 2.0 (m)
Mean Water Depth 0.30 (cm)
% Riffle
% Pool
100 % Run
% Flat
Evidence of eroding banks, Comments on bank stability undercut banks, heavily vegetated

Substrate – Upstream (% cover)

Bedrock
80 Silt
Boulder
20 Clay
Cobble
Muck
Gravel
Marl
Sand
Detritus

Substrate – Downstream (% cover)

Bedrock
80 Silt
Boulder
20 Clay
Cobble
Muck
Gravel
Marl
Sand
Detritus

In-water Cover

Cover Types Present (circle): [✓ Undercut Banks] [✓ Deep Pool] [✓ Vascular Plants] [✓ Overhanging Vegetation] [✓ Woody Debris] Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 20%, grass, early
Downstream 20%, grass, early
Adjacent Land Use
Upstream meadow, ag field
Downstream meadow, ag field

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream none
Downstream none
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. algae

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

not a Water Body

Project Samsung (GREP) Wind.
Station # 11.0
Photos Taken 7616, 7617, 7618, 7619, 7620
GPS Coordinates 17T 0594103 / 4749463
Project # 161010646
Field Staff Edward Malindzak, M. Kozak
Date October 19 2010
Time 12:47
Descriptive Location ~200 m north of Haldiman Road 20, near intersection w/ conc 5, Field map 6

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 10°C
Weather conditions in previous 24 hrs cloudy, sunny, cool, windy

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.40 (m)
Maximum Pool Depth 30 (cm)
Mean Bankfull Width 0.40 (m)
Mean Water Depth 5 (cm)
______% Riffle 100 % Pool ______% Run ______% Flat
Evidence of eroding banks, Comments on bank stability "channel" meanders through Soy field

Substrate – Upstream (% cover)
______Bedrock 10 Silt ______Boulder 90 Clay ______Cobble
______Muck ______Gravel ______Marl ______Sand ______Detritus

Substrate – Downstream (% cover)
______Bedrock 10 Silt ______Boulder 90 Clay ______Cobble
______Muck ______Gravel ______Marl ______Sand ______Detritus

In-water Cover
Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder Vascular Plants Other algae

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 50 %, Soy
Downstream 80 %, Soy
Adjacent Land Use
Upstream agriculture
Downstream agriculture

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream perched culvert, low flow
Downstream " "
Note any fish observations none, this is only pools around culvert intermitant flow, likely in spring and high precip.

Other Habitat Notes, Incidental Wildlife Observations, etc. mouse, frog

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 16101064.6
Station # 17.0
Field Staff Edward Malindzak, M. Kozak
Photos Taken 0068, 0069, 0070
Date October 20 2010
GPS Coordinates 17T 0601638/4751212
Time 9:44 am
Descriptive Location 600 m South of Meadows Rd., 1.4 Km east of Yaremy Rd.

Water Quality

Dissolved Oxygen (mg/L) 7.34
pH 7.78
Conductivity (μS/cm) 316
Water Temperature (°C) 7.55
Air Temperature (°C) ______
Weather conditions in previous 24 hrs ______

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.0 (m)
Maximum Pool Depth 0.75 (cm)
Mean Bankfull Width 7 (m)
Mean Water Depth 0.075 (cm)
20 % Riffle   40 % Pool   20 % Run   20 % Flat
Evidence of eroding banks, Comments on bank stability Bankfull depth 1.5-2m conveys large volume of water in spring (supported by anicdotal info)

Substrate – Upstream (% cover)

	Bedrock	10	Silt	5	Boulder	35	Clay	20	Cobble
	Muck	25	Gravel		Marl		Sand	5	Detritus

Substrate – Downstream (% cover)

	Bedrock	10	Silt	5	Boulder	35	Clay	20	Cobble
	Muck	25	Gravel		Marl		Sand	5	Detritus

In-water Cover

Cover Types Present (circle): [✓ Undercut Banks] [✓ Deep Pool] Vascular Plants [✓ Overhanging Vegetation] [✓ Woody Debris] [✓ Boulder] Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 65%, mature forest (red oak, maple, wild cherry, Beech)
Downstream 65%, mature forest " " " "

Adjacent Land Use
Upstream woodlot
Downstream wood lot

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream gravel deposits
Downstream gravel deposits

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations local homeowner says all watercourses at this site are heavily flooded in Spring, lasting a few days. Land owner also states pike are common in spring.

Other Habitat Notes, Incidental Wildlife Observations, etc. ______

Field Notes Authored by E. Malindzak   Field Notes QA/QCed by M. Pomeroy   Page 55 of 95

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Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 16101064G
Station Number 17.0
Project Name Samsung (GREP) Wind
Pass No. (if applicable) 1
Project manager Rob Nodolny
Date (yyyymmdd): 20101020
Descriptive Location

UTM coordinates 17T 0601680 / ~~easting~~ 4751212 northing zone

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make
Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 212 Number of Netters: 1 Number of Anodes: 1

Settings

Frequency (Hz) 60 Voltage (volts) 500 Current (Amps) Power (Watts)

Station Information

Length of Stream Surveyed (m) ~ 100 m

Station Characteristics:
Width (m): Range ~~0.75~~ 0.5 Average: 1.0
Depth (m): Range 0.10 - 0.50 Average: 0.20

Water Clarity/Colour: ~~Cle~~ clear
Water Velocity if Measured (m/s):
Temperature (°C)
Conductivity (uS/cm)
pH
Dissolved Oxygen (mg/L)

Catch Data

Species	Number of Fish	Species	Number of Fish
Centrarchid	9		
Common Shiner	5		

Fish Measurements on Separate Sheet? Y [✓ N]

Field Staff: E. Malindzak
M. Kozak

Notes By:
☑
☐

~~(Station Diagram on Back)~~

Project Number 1610646

Date (yyyymmdd): 20101020

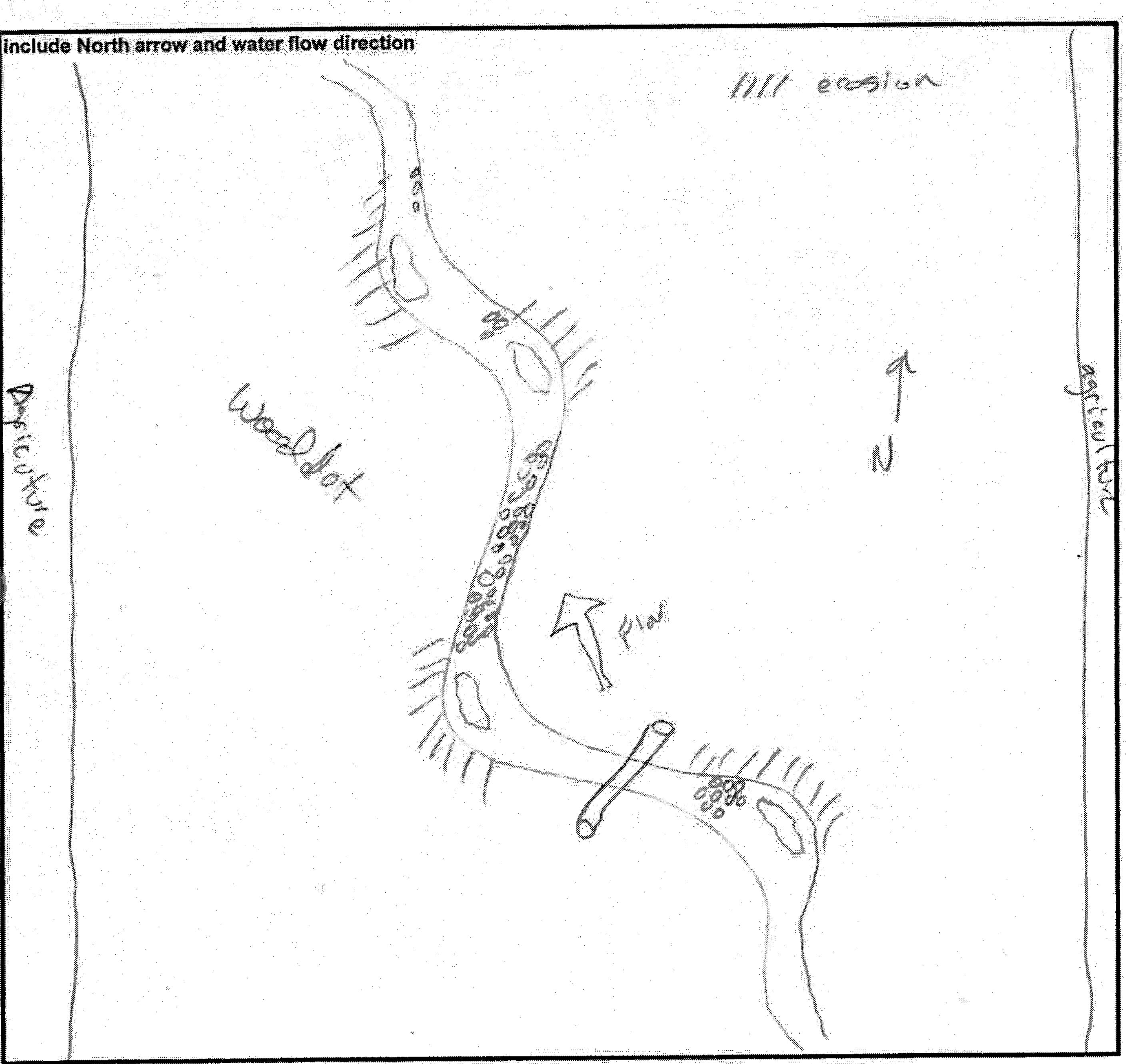
Waterbody Name unk

Station Number 17.0

Pass No. (if applicable) 1

Field Staff: E. Maliadak, M. Kozak

include North arrow and water flow direction



NOTES: nice natural system w/ meanders, ~~to~~ erosion is very common Anecdotal info indicates historically held pike In water ~~sh~~ visibility was complicated by layer of recently fallen leaves

Quality Control: This form is complete (☒) & legible (☒). QA/QC by: (signature) Mark Poveny

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 161010646
Station # 171
Field Staff Edward Malindzak
Photos Taken ~~0~~0065, 0066, 0067
Date October 20 2010
GPS Coordinates 17T 0601792/4751648
Time 11:10
Descriptive Location 300m South of Meadows Rd, 1.3 km east of Yaremy Rd

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 7°C
Weather conditions in previous 24 hrs sunny, cool, windy

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.6 (m)
Maximum Pool Depth / (cm)
Mean Bankfull Width undefined (m)
Mean Water Depth / (cm)
___ % Riffle ___ % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability this was dry but muddy

Substrate – Upstream (% cover) ~~100%~~

	Bedrock		Silt		Boulder	100	Clay/Mud		Cobble
	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder	100	Clay/Mud		Cobble
	Muck		Gravel		Marl		Sand		Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other none

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 50%, soy, mature
Downstream 50%, soy, mature
Adjacent Land Use
Upstream agriculture, soy
Downstream agriculture, soy

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream None
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations clearly conveys water, likely over a short period of time, not fish habitat (no contribution d/s)

Other Habitat Notes, Incidental Wildlife Observations, etc. ~~any~~ many deer tracks & racoon

Field Notes Authored by E Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # 17.2
Photos Taken 0062, 0063, 0064
GPS Coordinates 17T 0601742/4751857
Descriptive Location 20 m south of Meadowl road, where water coarse crosses road

Project # 161010646
Field Staff Edward Malindzak, Mark Kozak
Date October 20 2010
Time 11:24

Water Quality

Dissolved Oxygen (mg/L) 10.93
pH 8.08
Conductivity (µS/cm) 211
Water Temperature (°C) 9.60
Air Temperature (°C) 7°C
Weather conditions in previous 24 hrs sunny, cool, windy

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.0 (m)
Maximum Pool Depth 0.40 (cm)
Mean Bankfull Width 3.5 (m)
Mean Water Depth 0.25 (cm)
____ % Riffle 90 % Pool 10 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability Densley vegitated, could only shock at field access culvert.

Substrate – Upstream (% cover)

____ Bedrock	____ Silt	____ Boulder	30 Clay	____ Cobble
70 Muck	____ Gravel	____ Marl	____ Sand	____ Detritus

Substrate – Downstream (% cover)

____ Bedrock	____ Silt	____ Boulder	30 Clay	____ Cobble
70 Muck	____ Gravel	____ Marl	____ Sand	____ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks [✓ Woody Debris] Deep Pool Boulder [✓ Vascular Plants] Other cattails canary grass

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 95%, cattails, canary grass, meadow species, willow
Downstream 95%, " " " " "

Adjacent Land Use
Upstream agriculture (soy)
Downstream agriculture (soy)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream in stream veg potential for pike
Downstream " "

Migratory Obstructions (seasonal, permanent)
Upstream low flow possibly
Downstream " " "

Note any fish observations 2 common Shiner, 3 Central Mudminnow

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec

Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 16010646

Station Number 17.2

Project Name Samsung (GREP) - Wind

Pass No. (if applicable) 1

Project manager Rob Wadolny

Date (yyyymmdd): 20101020

Descriptive Location

UTM coordinates 0601742/4751857 easting ——— northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make

Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 97

Number of Netters: 1

Number of Anodes: 1

Settings

Frequency (Hz) 60

Voltage (volts) 500

Current (Amps)

Power (Watts)

Station Information

Length of Stream Surveyed (m) 30 m

Station Characteristics:

Width (m): Range 0.80-1.40 Average: 1.0

Depth (m): Range 0.20-0.40 Average: 0.25

Water Clarity/Colour: Clear

Water Velocity if Measured (m/s): —

Temperature (°C) 9.6

Conductivity (uS/cm) 211

pH 8.08

Dissolved Oxygen (mg/L) 10.93

Catch Data

Species	Number of Fish	Species	Number of Fish
Central Mudminnow	2		
Common Shiner	3		

Fish Measurements on Separate Sheet? Y/N

Field Staff: E. Malinczak

M Kozak

☐ Notes By:

☐ ~~(Station Diagram on Back~~)

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 33.1
Photos Taken 0095, 0096, 0097
GPS Coordinates UTM17T 0602248, 4748957
Descriptive Location 1.2 Km east of Haldimand Rd 50, 1.4 Km south of Haldinand Rd 20

Project # 16101064 6
Field Staff Edward Malindzak, J. Koch
Date October 22 2010
Time 9:51

Water Quality - too shallow
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 7°C
Weather conditions in previous 24 hrs Sunny, cloudy, cold, warm, heavy rain, Hail

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.15 (m)
Maximum Pool Depth 15 (cm)
Mean Bankfull Width 2m - ∞ (m)
Mean Water Depth 5 (cm)
/ % Riffle
40 % Pool
30 % Run
30 % Flat
Evidence of eroding banks, Comments on bank stability this drains flooded agriculture field u/s. Channel shows it conveys water but lacks any in-stream features. Likely contains water in spring and after heavy rain (like past 2 nights).

Substrate – Upstream (% cover) Tree line
___ Bedrock
___ Silt
___ Boulder
~~100~~ 95 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
5 Detritus

Substrate – Downstream (% cover) agriculture field
___ Bedrock
___ Silt
___ Boulder
~~100~~ 95 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
5 Detritus

In-water Cover
Cover Types Present (circle):
[✓ Overhanging Vegetation] \In tree line
Undercut Banks
Woody Debris
Deep Pool
Boulder
[✓ Vascular Plants]
Other soy

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 30%, meadow species, young trees, crops (soy)
Downstream 30%, crop (soy)
Adjacent Land Use
Upstream Agriculture (soy)
Downstream " "

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations Shocked for 54 seconds @ 60 Hz / ~~7~~ 500 V
No fish captured or observed.

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version ____

Project: Samsung (GREP) Wind
Project # 161010646
Station # CL-35
Field Staff E. Malindzak, E. Windhorst
Photos Taken 7512, 7513, 7514, 7515
Date Oct. 28, 2010
GPS Coordinates 17T 0603592/4749533
Time 11:09, ~~2010~~
Descriptive Location b/t Bains Road & Haldimand 20 on South Cayuga Rd.

Water Quality

Dissolved Oxygen (mg/L) 10.42
pH 7.61
Conductivity (µS/cm) 220
Water Temperature (°C) 10.65
Air Temperature (°C) 11°C
Weather conditions in previous 24 hrs Sunny, cool

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.40 (m)
Maximum Pool Depth 1.5 m ~~(cm)~~
Mean Bankfull Width 3.0 (m)
Mean Water Depth 0.05 (cm)

____ % Riffle 90 % Pool 10 % Run ____ % Flat

Evidence of eroding banks, Comments on bank stability very deep pool at culvert outflow, clear overhanging banks and slumping visable

Substrate – Upstream (% cover)

____ Bedrock	____ Silt	____ Boulder	100 Clay	____ Cobble
____ Muck	____ Gravel	____ Marl	____ Sand	____ Detritus

Substrate – Downstream (% cover)

____ Bedrock	____ Silt	____ Boulder	100 Clay	____ Cobble
____ Muck	____ Gravel	____ Marl	____ Sand	____ Detritus

In-water Cover

Cover Types Present (circle): [✓ Undercut Banks] [✓ Deep Pool] Vascular Plants [✓ Overhanging Vegetation] Woody Debris Boulder Other terrestrial veg.

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 60%, grasses & soy
Downstream 70%, Meadow sp., grasses (minor)

Adjacent Land Use
Upstream agriculture (soy)
Downstream agriculture (soy)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream perched culvert
Downstream low flow

Note any fish observations Shocked for 38 seconds @ plunge pool for @ 60 Hz and 700V. Captured (1) bluntnose minnow and 3 fathead minnows

Other Habitat Notes, Incidental Wildlife Observations, etc. ____

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec

Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 161010646
Station Number CL-35
Project Name Samsung (GREP) Wind.
Pass No. (if applicable) 1
Project manager Rob Nadolny
Date (yyyymmdd): 20101028
Descriptive Location

UTM coordinates 0603592 easting 4749533 northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make SR-12
Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 38 Number of Netters: 1 Number of Anodes: 1

Settings

Frequency (Hz) 60 Voltage (volts) 700 Current (Amps) Power (Watts)

Station Information

Length of Stream Surveyed (m) 3x3 m pool
Station Characteristics: Width (m): Range — Average: –
Depth (m): ~~Range~~ max 1.5 m Average: —

Water Clarity/Colour: Cloudy
Water Velocity if Measured (m/s): —
Temperature (°C) 10.65
Conductivity (uS/cm) 220
pH 7.61
Dissolved Oxygen (mg/L) 10.42

Catch Data

Species	Number of Fish	Species	Number of Fish
Bluntnose minnow	(1)		
Fathead minnow	(3)		

Fish Measurements on Separate Sheet? Y[✓ N]

Field Staff: E. Malindzak ☑ Notes By:
E. Windhorst ☐ ~~(Station Diagram on Back~~)

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 161010646
Station # 30.8
Field Staff Edward Malindzak,
Photos Taken 7578, 7579, 7580
Date October 21 2010
GPS Coordinates 17T 0603844 / 4749315
Time 15:08
Descriptive Location 160m east of South Cayuga Rd, 600 m north of Bains Rd.

Water Quality

Dissolved Oxygen (mg/L) 9.08
pH 8.21
Conductivity (µS/cm) 317
Water Temperature (°C) 11.35
Air Temperature (°C) /
Weather conditions in previous 24 hrs sunny, windy, warm, cold, Heavy rain, hail (variable)

Watercourse Dimensions & Morphology

Mean Watercourse Width 10m dia (m)
Maximum Pool Depth 70.5 m (~~cm~~)
Mean Bankfull Width — (m)
Mean Water Depth — (~~cm~~)
___ % Riffle 100 % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability man-made pond in middle of agriculture field (soy) outlet is standpipe, no inlet.

Substrate – Upstream (% cover) pond

___ Bedrock
___ Muck
___ Silt
___ Gravel
___ Boulder
___ Marl
40 Clay
___ Sand
___ Cobble
60 Detritus

Substrate – Downstream (% cover)

___ Bedrock
/ Muck
/ Silt
/ Gravel
/ Boulder
/ Marl
/ Clay
/ Sand
/ Cobble
/ Detritus

In-water Cover

Cover Types Present (circle): Overhanging Vegetation, Undercut Banks, Woody Debris, [✓ Deep Pool], Boulder, [✓ Vascular Plants], Other moss, floating algea filimentous alge a coontail (?)

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 30%, willow
Downstream —

Adjacent Land Use
Upstream Agriculture (soy)
Downstream —

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream —

Migratory Obstructions (seasonal, permanent)
Upstream no conectivity, isolated pond
Downstream —

Note any fish observations none, ~~lots~~

Other Habitat Notes, Incidental Wildlife Observations, etc. lots of tadpoles

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Project # 161010646
Station # CL-6
Field Staff E. Malindzak, E. Windhorst
Photos Taken 0056, 0057, 0060
Date Oct 23, 2010
GPS Coordinates 17T 0590057/4752690
Time 10:03
Descriptive Location Irish Line, 500m east of Little Rd

Water Quality

Dissolved Oxygen (mg/L) 7.72
pH 7.61
Conductivity (µS/cm) 35.1
Water Temperature (°C) 11.54
Air Temperature (°C) /
Weather conditions in previous 24 hrs Cloudy, rain

Watercourse Dimensions & Morphology → could not see → no access

Mean Watercourse Width — (m)
Maximum Pool Depth 25 (cm)
Mean Bankfull Width — (m)
Mean Water Depth unk (cm)
___ % Riffle ___ % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability U/S is roadside ditch, D/S a pool @ culvert outlet and into dense veg.

Substrate – Upstream (% cover)

___ Bedrock
___ Silt
___ Boulder
~~40~~ 100 ~~100~~ Clay
~~10~~ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

Substrate – Downstream (% cover)

___ Bedrock
___ Silt
___ Boulder
90 Clay
10 Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants]
[✓ Overhanging Vegetation] Woody Debris Boulder Other___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 80%, meadow & hardwoods
Downstream 100%, meadow & crops (corn)

Adjacent Land Use
Upstream agriculture
Downstream agriculture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream " "

Note any fish observations none, fished pool @ outlet for 25 seconds @ 60Hz/500V with no fish captured or observed.

Other Habitat Notes, Incidental Wildlife Observations, etc. contains little water and is likely dry except after rain and in spring.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 9.3
Photos Taken 0104, 0105 0106
GPS Coordinates 17T 0590951/4752750
Descriptive Location South of Irish Line (~200 m), 1 Km West of Kohler Rd

Project # 161010646
Field Staff E. Malindzak, M. Kozak
Date 10-19-2010
Time 11:41

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 9°C
Weather conditions in previous 24 hrs sunny, cloudy, cool

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.0 (m)
Mean Bankfull Width 2.0 (m)
Maximum Pool Depth ~~30~~ 20 (cm)
Mean Water Depth 15 (cm)
_____ % Riffle
100 % Pool
_____ % Run
_____ % Flat
Evidence of eroding banks, Comments on bank stability maintained linear drain

Substrate – Upstream (% cover)

___ Bedrock	10 Silt	___ Boulder	90 Clay	___ Cobble
___ Muck	___ Gravel	___ Marl	___ Sand	___ Detritus

Substrate – Downstream (% cover)

___ Bedrock	10 Silt	___ Boulder	90 Clay	___ Cobble
___ Muck	___ Gravel	___ Marl	___ Sand	___ Detritus

In-water Cover
Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other filimentous algea

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 20, soy
Downstream 20, soy
Adjacent Land Use
Upstream agriculture, soy
Downstream agriculture, soy

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream None
Migratory Obstructions (seasonal, permanent)
Upstream low flow, possible difficulties from recently constructed pond.
Downstream low flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by M. Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1
not a Water Body

Project Samsung (GREP) Wind.
Station # 9.1
Photos Taken 012, 013, 014
GPS Coordinates 17T 0590789 / 4752719
Descriptive Location 200m South of Irish Line, 1.3 Km west of Kohler Rd.

Project # 161010646
Field Staff E. Malindzak, M. Kozak
Date 10-19-2010
Time 11:18

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) /
Weather conditions in previous 24 hrs Cool, Sunny

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.50 (m)
Maximum Pool Depth 30 (cm)
Mean Bankfull Width 3.0 (m)
Mean Water Depth 10 (cm)
____ % Riffle
60 % Pool
40 % Run
____ % Flat
Evidence of eroding banks, Comments on bank stability none

Substrate – Upstream (% cover)
____ Bedrock
20 Silt
____ Boulder
50 Clay
____ Cobble
____ Muck
30 Gravel
____ Marl
____ Sand
____ Detritus

Substrate – Downstream (% cover)
____ Bedrock
20 Silt
____ Boulder
50 Clay
____ Cobble
____ Muck
30 Gravel
____ Marl
____ Sand
____ Detritus

In-water Cover
Cover Types Present (circle): Overhanging Vegetation, Undercut Banks, Woody Debris, Deep Pool, Boulder, [✓ Vascular Plants], Other ~~watercress~~?

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 5%, manicured lawn
Downstream 40%, Soy (mature)
Adjacent Land Use
Upstream Residential
Downstream agriculture

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream ~~possible watercress~~ Checked, NOT WC
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. breed dogs (chows and collies), spoke w/ land owner and daughter

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Kozak
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 8.1
Photos Taken # 115, 116, 117
GPS Coordinates 17T 0590399 / 4752660
Descriptive Location watercourse that crosses driveway and will be crossed by access Rd. Approximately 100 m South of Irish line

Project # 161010646
Field Staff E. Malindzak, M. Kozak
Date 10-19-2010
Time 10:52

Water Quality

Dissolved Oxygen (mg/L) 10.40
pH 7.64
Conductivity (µS/cm) 747
Water Temperature (°C) 9.2
Air Temperature (°C) 9
Weather conditions in previous 24 hrs overcast, no precip

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.5 (m)
Mean Bankfull Width 4.5 (m)
Maximum Pool Depth 30 (cm)
Mean Water Depth 10 (cm)
___ % Riffle ___ % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability Fairly linear w/ grass and meadow species buffer.

Substrate – Upstream (% cover)

___ Bedrock ___ Silt ___ Boulder 100 Clay ___ Cobble
___ Muck ___ Gravel ___ Marl ___ Sand ___ Detritus

Substrate – Downstream (% cover) No access

___ Bedrock ___ Silt ___ Boulder ___ Clay ___ Cobble
___ Muck ___ Gravel ___ Marl ___ Sand ___ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks, Deep Pool, [✓ Vascular Plants], Overhanging Vegetation, [✓ Woody Debris], Boulder, Other ___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 75%
Downstream ~~no access~~ ±60%, meadow species

Adjacent Land Use
Upstream agriculture (soy)
Downstream agriculture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. Electrofished for 179 seconds no fish captured or observed @ 60 Hz and 300 V

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Powers
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # 8.0
Photos Taken 128, 119, 120
GPS Coordinates 17T 0590590/4752142
Project # 161010646
Field Staff E. Malindzak, M. Kozak
Date 10-19-2010
Time 10:26
Descriptive Location 750 m south of Irish Line, 1.71 km west of Kohler Rd

Water Quality

Dissolved Oxygen (mg/L) 11.5
pH 7.44
Conductivity (µS/cm) 620
Water Temperature (°C) 9.1
Air Temperature (°C) 9
Weather conditions in previous 24 hrs overcast, no precip

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.5 (m)
Maximum Pool Depth ______ (cm)
Mean Bankfull Width 3.0 (m)
Mean Water Depth 10 (cm)
______ % Riffle 100 % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability largely linear channel w/ farm machinery driving through

Substrate – Upstream (% cover)

______ Bedrock
10 Silt
______ Boulder
80 Clay
______ Cobble
10 Muck
______ Gravel
______ Marl
______ Sand
______ Detritus

Substrate – Downstream (% cover)

No access

______ Bedrock
______ Silt
______ Boulder
______ Clay
______ Cobble
______ Muck
______ Gravel
______ Marl
______ Sand
______ Detritus

In-water Cover

Cover Types Present (circle):
[✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 50%, meadow species + canary grass
Downstream 30%, canary grass + crops

Adjacent Land Use
Upstream agriculture (clover and formerly soy)
Downstream agriculture (unk.)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none observed, no access

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations instream veg include aquatic plants + filimentous algae

Other Habitat Notes, Incidental Wildlife Observations, etc. no fish captured or observed. Electrofished @ 60 Hz / 300 V for 127 sec.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # CL-7.0
Photos Taken 0062, 0063, 0064
GPS Coordinates 17T 0592117/4752773
Descriptive Location Kohler Road, 600m South of Irish Line

Project # 161010646
Field Staff E. Malindzak
Date Oct 23 2010
Time 10:45

Water Quality

Dissolved Oxygen (mg/L) 8.25
pH 7.31
Conductivity (µS/cm) 601
Water Temperature (°C) 10.52
Air Temperature (°C) 13°C
Weather conditions in previous 24 hrs cloudy

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.0 (m)
Maximum Pool Depth 0.25 ~~(cm)~~ m
Mean Bankfull Width 5.5 (m)
Mean Water Depth 0.15 ~~(cm)~~
30 % Riffle
25 % Pool
30 % Run
15 % Flat
Evidence of eroding banks, Comments on bank stability evidence of erosion in undercut banks. Open bottom box culvert

Substrate – Upstream (% cover) dense veg. prevents further observations @ culvert

___ Bedrock	___ Silt	___ Boulder	___ Clay	100 Cobble
___ Muck	~~20~~ Gravel	___ Marl	___ Sand	___ Detritus

Substrate – Downstream (% cover)

___ Bedrock	___ Silt	25 Boulder	___ Clay	30 Cobble
___ Muck	20 Gravel	___ Marl	10 Sand	15 Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants]
[✓ Overhanging Vegetation] [✓ Woody Debris] [✓ Boulder] Other vehical

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 90%, canary grass
Downstream 80%, Mature forest

Adjacent Land Use
Upstream wet low laying area
Downstream woodlot w/ adjacent agriculture field

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream springtime flooded veg.
Downstream coarse substrates

Migratory Obstructions (seasonal, permanent)
Upstream none observed
Downstream " "

Note any fish observations none, fished for 27 seconds @ culvert outlet @ 60Hz/500V. No fish captured or observed

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Poweroz

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 6.0
Photos Taken 0107, 0108, 0109
GPS Coordinates 0591268, 4752[illegible]
Descriptive Location Gps taken at field access culvert.
900m South of Irish Line, ~~&~~ 1.1 Km west of Kohler Rd.

Project # 161010646
Field Staff E. Malindzak, M. Kozak
Date 10.19 - 2010
Time 8:30

Water Quality
Dissolved Oxygen (mg/L) 8.09
pH 7.71
Conductivity (µS/cm) 514
Water Temperature (°C) 7.83
Air Temperature (°C) 7°C
Weather conditions in previous 24 hrs Cloudy, Sunny

Watercourse Dimensions & Morphology
Mean Watercourse Width 1 (m)
Maximum Pool Depth 0.40 m ~~(cm)~~
Mean Bankfull Width 3.5 (m)
Mean Water Depth 0.15 m ~~(cm)~~
____% Riffle 100 % Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability fairly linear w/some meander
no evidence of flowing water, though deeper pools occur at ends of culvert

Substrate – Upstream (% cover)

____ Bedrock	10 Silt	____ Boulder	90 Clay	____ Cobble
____ Muck	____ Gravel	____ Marl	____ Sand	____ Detritus

Substrate – Downstream (% cover)

____ Bedrock	10 Silt	____ Boulder	90 Clay	____ Cobble
~~10~~ Muck	____ Gravel	____ Marl	____ Sand	____ Detritus

In-water Cover
Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other filimentous algea

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 50%, sedges & grasses
Downstream 50%, sedges & grasses
Adjacent Land Use
Upstream agriculture (corn)
Downstream agriculture (soy)

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations ~ 30 m d/s + u/s of culvert, channel becomes wide and shallow with aquatic veg + algea. Tracks of turkey, deer, racoon, canine

Other Habitat Notes, Incidental Wildlife Observations, etc. Shocked @ 60 Hz/300V
no fish captured or observed. small trib joins about 100 m u/s.
Flows through ag. field w/ no defined channel. (likely intermittant)
Main channel is likely permanent.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pmuz
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # ~~90~~ CL-10
Photos Taken #0068, 0069, 0070
GPS Coordinates 0592354/4751999
Descriptive Location Kohler Rd, 700 m north of Link Rd.

Project # 161010646
Field Staff E. Malindzak, E. Windhorst
Date Oct 23 2010
Time 15.01

Water Quality

Dissolved Oxygen (mg/L) 9.41 pH 7.84 Conductivity (µS/cm) 623
Water Temperature (°C) 13.81 Air Temperature (°C) 14°C
Weather conditions in previous 24 hrs cloudy and rain

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.75 (m) Maximum Pool Depth 1.5 ~~(cm)~~ m
Mean Bankfull Width 3.0 (m) Mean Water Depth 0.75 ~~(cm)~~ m
___ % Riffle 70 % Pool 30 % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability undercut banks, carrys large amount of water.

Substrate – Upstream (% cover)

___ Bedrock ___ Silt ___ Boulder 60 Clay 10 Cobble
___ Muck 30 Gravel ___ Marl ___ Sand ___ Detritus

Substrate – Downstream (% cover)

___ Bedrock ___ Silt ___ Boulder 50 Clay 5 Cobble
___ Muck 35 Gravel ___ Marl ___ Sand ___ Detritus

In-water Cover

Cover Types Present (circle): [✓ Undercut Banks] [✓ Deep Pool] Vascular Plants
[✓ Overhanging Vegetation] [✓ Woody Debris] Boulder Other___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 40%, mature trees + canary grass
Downstream 60%, canary grass
Adjacent Land Use
Upstream woodlot + residential
Downstream agriculture (soy, sheep pasture)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream flooded grasses may be important in spring
Downstream " " " " "
Migratory Obstructions (seasonal, permanent)
Upstream none
Downstream none
Note any fish observations This is likely permanent. Shocked for 127 seconds @ 60 Hz / 300 V. Caught 19 Green Sunfish and 5 fathead minnow

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak Field Notes QA/QCed by Mark Pomeroy Page 72 of 95

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Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number ~~[illegible]~~ 161010646

Station Number CL-10

Project Name Samsung (GREP) Wind

Pass No. (if applicable) 1

Project manager Rob Nadolney

Date (yyyymmdd): 20101025

Descriptive Location

UTM coordinates 0592354 easting 4751999 northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat

Unit Model/Make SR-12

Sampling Method (circle one): even habitat transect spot

Effort (Electrofishing Seconds): 127

Number of Netters: 1

Number of Anodes: 1

Settings

Frequency (Hz) 60

Voltage (volts) 500

Current (Amps)

Power (Watts)

Station Information

Length of Stream Surveyed (m) 25m

Station Characteristics:

Width (m): Range 0.75-2.5 Average: 1.75

Depth (m): Range 0.30-1.5 Average: 0.75

Water Clarity/Colour: Brown/turbid

Water Velocity if Measured (m/s): —

Temperature (°C) 13.81

Conductivity (uS/cm) 623

pH 7.84

Dissolved Oxygen (mg/L) 9.41

Catch Data

Species	Number of Fish	Species	Number of Fish
Green sunfish	19		
Fathead minnow	5		

Fish Measurements on Separate Sheet? Y/[✓ N]

Field Staff: E. Malindzak

E. Windhorst

Notes By:

~~(Station Diagram on Back)~~

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # CL-10
Photos Taken 0071, 0072, 0073
GPS Coordinates 17T 0592430/4751837
Descriptive Location Kohler Rd, 500m north of Link Rd

Project # 161010646
Field Staff E. Malindzak, E. Windhorst
Date Oct. 24/25 2010
Time 9:11

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 14°C
Weather conditions in previous 24 hrs cloudy, rain, breezy

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.50 (m)
Mean Bankfull Width 2.5 (m)
Maximum Pool Depth 0.50 m m ~~(cm)~~
Mean Water Depth 0.05 m ~~(cm)~~
20 % Riffle
30 % Pool
30 % Run
20 % Flat
Evidence of eroding banks, Comments on bank stability abundant signs of erosion u/s @ culvert and immediately d/s.

Substrate – Upstream (% cover)

Bedrock	Silt	Boulder	100 Clay	Cobble
Muck	Gravel	Marl	Sand	Detritus

Substrate – Downstream (% cover) ~~un~~

Bedrock	Silt	Boulder	40 Clay	30 Cobble
Muck	30 Gravel	Marl	Sand	Detritus

In-water Cover

Cover Types Present (circle): [✓ Undercut Banks] [✓ Deep Pool] Vascular Plants [✓ Overhanging Vegetation] Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 30%, soy, canary grass @ culvert
Downstream 80%, canary grass, mature trees

Adjacent Land Use
Upstream agriculture (soy)
Downstream woodlot, residential (manicured lawn)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream water appears to ~~fl~~ flow around/under culvert, low flow
Downstream low flow

Note any fish observations this is a minor feature that is likely dry most of the time. Contains water due to rain last 4 days

Other Habitat Notes, Incidental Wildlife Observations, etc. Did not shock because only pool deep enough appears to be on private property (no access)

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # CL-12
Photos Taken ~~[illegible]~~ 0074, 0075, 0076
GPS Coordinates 17T 0592492/4751598
Descriptive Location ~~26~~ Kohler Rd, 200m' north of Link Rd

Project # 16010646
Field Staff E. Malindzak, E. Windhorst
Date Oct. ~~24~~ 24 2010
Time 9:31 am

Water Quality

Dissolved Oxygen (mg/L) 6.96
pH 7.70
Conductivity (µS/cm) ~~7--~~ 743
Water Temperature (°C) 13.10
Air Temperature (°C) /
Weather conditions in previous 24 hrs Cloudy, warm, rain, windy

Watercourse Dimensions & Morphology

Mean Watercourse Width unk (m)
Maximum Pool Depth 0.6 m (cm)
Mean Bankfull Width 3.0 - 15.0 (m)
Mean Water Depth 0.2 m (cm)
___ % Riffle 90 % Pool 10 % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability no clearly defined channel in road row. Appears more defined U/S + D/S, though visibility obscured by dense veg. Water likely due to rain last four days.

Substrate – Upstream (% cover)

___ Bedrock
___ Silt
___ Boulder
100 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

Substrate – Downstream (% cover)

___ Bedrock
___ Silt
___ Boulder
100 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks [✓ Deep Pool] ~~Vascular Plants~~
[✓ Overhanging Vegetation] Woody Debris Boulder Other___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 90%, Canary grass
Downstream 90%, " "

Adjacent Land Use
Upstream agriculture (soy), residential
Downstream agriculture, residential

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream ~~low~~ none
Downstream large low laying area w/ abundant grasses for spring spawners

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations Shocked for 177 seconds (U/S + D/S) @ 60 Hz/300 V caught (1) green sunfish (2) common shiner

Other Habitat Notes, Incidental Wildlife Observations, etc. cattails on both ends of culvert suggest culvert wet significant amount of time. Turbidity and amount of water made ID-ing channel characteristics difficult.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 161610646

Station Number CL-12

Project Name Samsung (GREP) Wind

Pass No. (if applicable) 1

Project manager Rob Nadolny

Date (yyyymmdd): 201010~~24~~ 25

Descriptive Location

UTM coordinates 0592492 easting 4751598 northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat

Unit Model/Make SR -12

Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 197

Number of Netters: 1

Number of Anodes: 1

Settings

Frequency (Hz) 60

Voltage (volts) 500

Current (Amps)

Power (Watts)

Station Information

Length of Stream Surveyed (m) 20 m

Station Characteristics:

Width (m): Range 0.75 - 3.0 Average: unk

Depth (m): Range 0.15-0.6 Average: 0.20

Water Clarity/Colour: brown, very turbid

Water Velocity if Measured (m/s): —

Temperature (°C) 13.1

Conductivity (μS/cm) 743

pH 7.70

Dissolved Oxygen (mg/L) 6.96

Catch Data

Species	Number of Fish	Species	Number of Fish
Green Sunfish	(1)		
Common Shiner	(2)		

Fish Measurements on Separate Sheet? Y/N

Field Staff: E. Mallindale

E. Windhorst

☑ Notes By:

☐ (~~Station Diagram on Back~~)

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # CL-9
Photos Taken 0065, 0066, 0067
GPS Coordinates 17T 0592243/4752344
Descriptive Location ~~Kohler Road~~ Kohler Rd, 1.1 Km south of Irish Line

Project # 161010646
Field Staff E. Malindzak, E. Windhorst
Date Oct 23 2010
Time 11:18

Water Quality

Dissolved Oxygen (mg/L) 9.41
pH 7.92
Conductivity (µS/cm) 531
Water Temperature (°C) 11.54
Air Temperature (°C) 13°C
Weather conditions in previous 24 hrs Cloudy, rain

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.40 (m)
Mean Bankfull Width 3.0 (m)
Maximum Pool Depth 0.60 M ~~(cm)~~
Mean Water Depth 0.30 ~~(cm)~~
___ % Riffle
___ % Pool
___ % Run
___ % Flat
Evidence of eroding banks, Comments on bank stability armoring w/rip-rap + gabion basket U/S + D/S. Box culvert (open Bottom

Substrate – Upstream (% cover)

___ Bedrock
___ Muck
___ Silt
___ Gravel
10 Boulder
___ Marl
90 Clay
___ Sand
___ Cobble
___ Detritus

Substrate – Downstream (% cover)

___ Bedrock
___ Muck
___ Silt
___ Gravel
10 Boulder
___ Marl
~~80~~ 85 Clay
___ Sand
5 Cobble
___ Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other ___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 70% ; canary grass, meadow sp.
Downstream 70%, canary grass, willow ; shrub
Adjacent Land Use
Upstream agriculture outside of tree line
Downstream woodlot w/ low lying area, residential

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream canary grass for spring spawners
Downstream " " " "
Migratory Obstructions (seasonal, permanent)
Upstream none
Downstream none
Note any fish observations E-fished for 162 seconds @ 60 Hz/500V. Captured (1) large Creek chub, (1) central mudminnow, (1) Fathead minnow

Other Habitat Notes, Incidental Wildlife Observations, etc. culvert is open bottom. U Fished u/s as provided longer reach. Canary grass dense in-stream both U/S + D/S

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 161010646
Station Number CL-9
Project Name Samsung (GREP) Wind
Pass No. (if applicable) 1
Project manager Rob Nadolny
Date (yyyymmdd): 20101023
Descriptive Location Kohler Road

UTM coordinates 0592243 easting 4752344 northing zone 17T

Fishing Method (circle one): [✓ Backpack] Boat Unit Model/Make SR-12
Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 162 Number of Netters: 1 Number of Anodes: 1

Settings
Frequency (Hz) 60 Voltage (volts) ~~300~~ 500 Current (Amps) Power (Watts)

Station Information
Length of Stream Surveyed (m) 25 m
Station Characteristics:
Width (m): Range 0.2 - 1.5 Average: 0.4
Depth (m): Range 0.2 - .80 Average: 0.3

Water Clarity/Colour: Clear
Temperature (°C) 11.54
pH 7.92
Water Velocity if Measured (m/s): —
Conductivity (uS/cm) 531
Dissolved Oxygen (mg/L) 9.41

Catch Data

Species	Number of Fish	Species	Number of Fish
~~Creek~~	~~k~~ Creek Chub (1)		
	Fathead minnow (1)		
	Central Mudminnow (1)		

Fish Measurements on Separate Sheet? Y [✓ N]

Field Staff: E. Malindzak
E. Winghorst

Notes By:
☑
☐ ~~(Station Diagram on Back)~~

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # CL - 3.0
Photos Taken 0047,0048,0049.
GPS Coordinates 17T 0591340/4753126
Descriptive Location ~~Kohler Road~~ Irish Line, 600 m west of Kohler Rd

Project # 16101064
Field Staff Edward Malindzak,
Date October 23 2010
Time 9:05

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 12°C
Weather conditions in previous 24 hrs cloudy, rain

Watercourse Dimensions & Morphology

Mean Watercourse Width / (m)
Mean Bankfull Width / (m)
Maximum Pool Depth / (cm)
Mean Water Depth / (cm)
______% Riffle ______% Pool ______% Run ______% Flat
Evidence of eroding banks, Comments on bank stability no defined channel, drains tree lot u/s, and into pasture. Very little water

Substrate – Upstream (% cover) - grass + forest floor

______Bedrock ______Silt ______Boulder ______Clay ______Cobble
______Muck ______Gravel ______Marl ______Sand ______Detritus

Substrate – Downstream (% cover)

______Bedrock ______Silt ______Boulder ______Clay 100 Cobble @ culvert outflow
______Muck ______Gravel ______Marl ______Sand ______Detritus

In-water Cover

Cover Types Present (circle): NO ~~Undercut Banks~~ Deep Pool [✓ Vascular Plants]
[✓ Overhanging Vegetation] Woody Debris Boulder Other terrestrial

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 95%, woodlot + Residential
Downstream 0%, pasture grasses

Adjacent Land Use
Upstream woodlot, Residential
Downstream Pasture + Residential

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow lack of channel
Downstream " " " "

Note any fish observations none, not enough water to support fish

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 16101064б
Station # CL-4.0
Field Staff Edward Malindzak, E. Windhorst
Photos Taken 0050, 0051, 0052
Date October 23 2010
GPS Coordinates 0591078/4753025
Time 9:29
Descriptive Location Irish line, 900 m west of Kohler Rd

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 13°C
Weather conditions in previous 24 hrs cloudy, rain

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.05 (m)
Maximum Pool Depth ~~3~~ 5 (cm)
Mean Bankfull Width 1.0 (m)
Mean Water Depth 3 (cm)
20 % Riffle
40 % Pool
10 % Run
30 % Flat
Evidence of eroding banks, Comments on bank stability very little water, likely only wet due to last nights rain.

Substrate – Upstream (% cover)

	Bedrock		Silt		Boulder	100	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder	100	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks, Deep Pool, [✓ Vascular Plants], [✓ Overhanging Vegetation], Woody Debris, Boulder, Other Ter~~es~~strial veg.

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 95%, forest
Downstream 40%, Soy crop

Adjacent Land Use
Upstream woodlot
Downstream agriculture (soy)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream " "

Note any fish observations none, too shallow to shock and get water quality very likely dry most times except after rain + during spring

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # CL-5
Photos Taken 0053, 0054, 0055
GPS Coordinates 17T 0590841/4752958
Descriptive Location Irish Line, 1.1 Km west of Kohler Rd

Project # 161010646
Field Staff Edward Malindzak,
Date October 23 2010
Time 9:47

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 12°C
Weather conditions in previous 24 hrs cloudy rain

Watercourse Dimensions & Morphology

Mean Watercourse Width / (m)
Mean Bankfull Width / (m)
Maximum Pool Depth / (cm)
Mean Water Depth / (cm)
___ % Riffle ___ % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability no water U/S. Most flow D/S comming from roadside ditch. No evidence of channel U/S except roadside ditches

Substrate – Upstream (% cover)

___ Bedrock ___ Silt ___ Boulder ___ Clay ___ Cobble
___ Muck ___ Gravel ___ Marl ___ Sand ___ Detritus

Substrate – Downstream (% cover) - immediately D/S of culvert

___ Bedrock ___ Silt ___ Boulder ___ Clay 100 Cobble @ culvert outflow
___ Muck ___ Gravel ___ Marl ___ Sand ___ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants] [✓ Overhanging Vegetation] Woody Debris Boulder Other Terrestrial

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 90%, meadow & common roadside sp.
Downstream 100%, grasses & clover

Adjacent Land Use
Upstream agriculture
Downstream agriculture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations none, small pool of water D/S @ culvert. Could not see channel d/s. Likely only containg water due to recent rains

Other Habitat Notes, Incidental Wildlife Observations, etc. D/S - channel flows through clover field, ~~not~~ planted through w/ clover

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

not a WaterBod

Project Samsung (GREP) Wind
Station # 9.2
Photos Taken 0101, 0102, 0103
GPS Coordinates 17T 0590869/4752936
Descriptive Location a ~ 20 m South of Irish Line, 1.1 Km west of Kohler Rd

Project # 161010646
Field Staff E. Malinczak, M. Kozak
Date 10-19-2010
Time 11:30

Water Quality
Dissolved Oxygen (mg/L) ___
pH ___
Conductivity (µS/cm) ___
Water Temperature (°C) ___
Air Temperature (°C) 9°C
Weather conditions in previous 24 hrs cloudy, sunny, cool

Watercourse Dimensions & Morphology
Mean Watercourse Width ___ (m)
Mean Bankfull Width ___ (m)
Maximum Pool Depth ___ (cm)
Mean Water Depth ___ (cm)
___ % Riffle 100 % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability drain through clover field likely only conveys water in spring and during high precip.

Substrate – Upstream (% cover)

___ Bedrock	___ Silt	___ Boulder	100 Clay	___ Cobble
___ Muck	___ Gravel	___ Marl	___ Sand	___ Detritus

Substrate – Downstream (% cover)

___ Bedrock	___ Silt	___ Boulder	100 Clay	___ Cobble
___ Muck	___ Gravel	___ Marl	___ Sand	___ Detritus

In-water Cover
Cover Types Present (circle): Overhanging Vegetation, Undercut Banks, Woody Debris, Deep Pool, Boulder, [✓ Vascular Plants], Other Terrestrial plants

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 40%, grass + terrestrial species
Downstream —
Adjacent Land Use
Upstream agriculture
Downstream agriculture

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. ___

Field Notes Authored by E. Malinczak
Field Notes QA/QCed by Mark Powery

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 6.1
Photos Taken 0110, 0111
GPS Coordinates 0591319 / 4751529 (17T)
Descriptive Location Soy field 600m north of Link Rd, 1.2 Km west of Kohler Rd.

Project # 161010646
Field Staff E. Malindzak, M. Kozak
Date 10-19-2010
Time 9:17

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 8°C
Weather conditions in previous 24 hrs cloudy, sunny - cool

Watercourse Dimensions & Morphology

Mean Watercourse Width / (m)
Mean Bankfull Width / (m)
Maximum Pool Depth / (cm)
Mean Water Depth / (cm)
/ % Riffle 100 % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability a low spot in soy field. Likely conveys water in periods of high precip/runoff. One small area likely remains wet but does not hold water. based on veg. present

Substrate – Upstream (% cover)

/ Bedrock
/ Muck
/ Silt
/ Gravel
/ Boulder
/ Marl
/ Clay
/ Sand
/ Cobble
/ Detritus

Substrate – Downstream (% cover)

/ Bedrock
/ Muck
/ Silt
/ Gravel
/ Boulder
/ Marl
/ Clay
/ Sand
/ Cobble
/ Detritus

In-water Cover

Cover Types Present (circle): Overhanging Vegetation, Undercut Banks, Woody Debris, Deep Pool, Boulder, Vascular Plants, Other ___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 25%, soy mature
Downstream 25%, mature soy

Adjacent Land Use
Upstream agriculture, soy
Downstream agriculture, soy

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream None
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations none, saw deer + turkey tracks

Other Habitat Notes, Incidental Wildlife Observations, etc. a woodlot occurs to the east. "Channel" flows into wood lot. Heard a very poor mallard imitation by a duck hunter to the NW

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Project # 16101 0646
Station # 28.1
Field Staff Edward Malindzak,
Photos Taken 7575, 7576, 7577
Date October 21 2010
GPS Coordinates 17T 0604906/4747027
Time 12:56
Descriptive Location 700m South of Rainham Rd, 600m east of South Cayuga Rd

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 9°C
Weather conditions in previous 24 hrs Sunny, warm, windy, heavy rain

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.10 (m)
Maximum Pool Depth 0.05 (cm)
Mean Bankfull Width 1.0 (m)
Mean Water Depth 0.02 (cm)
25 % Riffle
25 % Pool
25 % Run
25 % Flat
Evidence of eroding banks, Comments on bank stability small patch of erosion in middle of agriculture field. likely contains water due to heavy rains last night.

Substrate – Upstream (% cover) spot in field

	Bedrock	20	Silt		Boulder	80	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

/	Bedrock	/	Silt	/	Boulder	/	Clay	/	Cobble
/	Muck	/	Gravel	/	Marl	/	Sand	/	Detritus

In-water Cover

Cover Types Present (circle):
Overhanging Vegetation
Undercut Banks
Woody Debris
Deep Pool
Boulder
Vascular Plants
Other None

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream None
Downstream –
Adjacent Land Use
Upstream agriculture
Downstream –

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none, agriculture planted through it for >100m in all directions
Downstream –
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream
Note any fish observations none, site was confluence of two agriculture drains no veg or source of contribution of nutrients, etc. downstream

Other Habitat Notes, Incidental Wildlife Observations, etc. Likely contains water due to heavy rains last night ~~and~~

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Ymery
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 28.0
Photos Taken 7574
GPS Coordinates 17T 0604872/4746848
Descriptive Location 800m South of Rainham Rd, 500m east of South Cayuga Rd.

Project # 161010646
Field Staff Edward Malindzak,
Date October 21 2010
Time 12:34

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 8°C
Weather conditions in previous 24 hrs Sunny, windy, warm, heavy rain

Watercourse Dimensions & Morphology

Mean Watercourse Width 20 X 30 (m)
Maximum Pool Depth ~~30 x 20~~ ~~(cm)~~
Mean Bankfull Width / (m)
Mean Water Depth (cm)
% Riffle
100 % Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability no outflow, water from adjacent woodlot flows to this man-made pond, likely only in spring

Substrate – Upstream (% cover) – pond

Bedrock
50 Muck
Silt
Gravel
Boulder
Marl
50 Clay
Sand
Cobble
Detritus

Substrate – Downstream (% cover)

/ Bedrock
/ Muck
/ Silt
/ Gravel
/ Boulder
/ Marl
/ Clay
/ Sand
/ Cobble
/ Detritus

In-water Cover

Cover Types Present (circle):
[✓ Overhanging Vegetation]
Undercut Banks
Woody Debris
Deep Pool
Boulder
[✓ Vascular Plants]
Other cattails mature forest

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 30, cattails & mature forest
Downstream –

Adjacent Land Use
Upstream agriculture, woodlot
Downstream –

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream –

Migratory Obstructions (seasonal, permanent)
Upstream lack of connectivity
Downstream –

Note any fish observations we determined man-made pond due to un-characteristic mound of soil inside tree line and buried root flair on larger trees

Other Habitat Notes, Incidental Wildlife Observations, etc. likely constructed many years ago. Covered Root flare tree includes Red Oak ~14" DBH Newer trees @ 11" DBH growing on top of mound.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark P[illegible]
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version ____

Project Samsung (GREP) Wind
Project # 161010646
Station # CL-25
Field Staff E. Malindzak, E. Windhorst
Photos Taken 7474, 7475
Date Oct 27, 2010
GPS Coordinates 17T 0605740/4747613
Time 13:00 ~~2010~~
Descriptive Location 450m South of Rainham Road on Haldun Road.

Water Quality

Dissolved Oxygen (mg/L) ____ pH ____ Conductivity (µS/cm) ____
Water Temperature (°C) ____ Air Temperature (°C) 16°C
Weather conditions in previous 24 hrs Heavy rain, cloudy, windy, warm. Currently sunny & windy

Watercourse Dimensions & Morphology

Mean Watercourse Width ____ (m) Maximum Pool Depth ____ (cm)
Mean Bankfull Width ____ (m) Mean Water Depth ____ (cm)
____ % Riffle ____ % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability place where roadside drains flow d/s across agriculture field

Substrate – Upstream (% cover)

____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

Substrate – Downstream (% cover)

____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants]
Overhanging Vegetation Woody Debris Boulder Other Terrestrial

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 80%, meadow sp.
Downstream 70%, meadow sp.

Adjacent Land Use
Upstream agriculture (clover)
Downstream agricuture (clover)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream lack of channel and connectivity
Downstream " " " "

Note any fish observations none, a small amout of water was located in the roadside ditch but none in field.

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 38.2
Photos Taken 7518, 7519, 7520
GPS Coordinates 17T 0606066 / 4747037
Descriptive Location 300 m east of Hald Dunn Townline, 1.2 Km South of Rainham Rd.

Project # 161010646
Field Staff Edward Malindzak, J. Koch
Date October 23 2010
Time 10:57

Water Quality
Dissolved Oxygen (mg/L) 7.40
pH 7.69
Conductivity (µS/cm) 341
Water Temperature (°C) 9.69
Air Temperature (°C) 12°C
Weather conditions in previous 24 hrs sunny, cool, cloudy, warm, breif rain

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.25 (m)
Mean Bankfull Width 4 (m)
Maximum Pool Depth 0.50 ~~(cm)~~ M
Mean Water Depth 0.25 ~~(cm)~~
15 % Riffle
60 % Pool
10 % Run
15 % Flat
Evidence of eroding banks, Comments on bank stability deeply undercut banks (>1.5m) & evidence of slumping and channel movement. Clearly conveys large quantities, of water. from all tribs within our study area, some banks exceed 2 m high.

Substrate – Upstream (% cover)
___ Bedrock
___ Muck
___ Silt
25 Gravel
___ Boulder
___ Marl
25 Clay
___ Sand
~~20~~ 25 Cobble
25 Detritus

Substrate – Downstream (% cover)
___ Bedrock
___ Muck
___ Silt
25 Gravel
___ Boulder
___ Marl
25 Clay
___ Sand
25 Cobble
25 Detritus

In-water Cover
Cover Types Present (circle): [✓ Overhanging Vegetation] [✓ Undercut Banks] [✓ Woody Debris] [✓ Deep Pool] Boulder Vascular Plants Other ___

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 80%, Mature forest (hardwoods)
Downstream 80%, " " "

Adjacent Land Use
Upstream woodlot, agriculture further upstream, trail for motorized vehicals
Downstream " "

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream gravel and cobble is limiting in tribs to this creek
Downstream

Migratory Obstructions (seasonal, permanent)
Upstream none observed
Downstream " "

Note any fish observations none, shocked for 187 seconds @ 60 Hz/500 V no fish captured or observed.

Other Habitat Notes, Incidental Wildlife Observations, etc. white tailed deer, frog Channel shows ample evidence of movement, old channels are very evident. ~~Oxbows [illegible]~~ Water is currently slow moving.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 38.0
Photos Taken 7539, 7540, 7541
GPS Coordinates 17T 0606054/4747178
Descriptive Location 300m east of Hald Dunn Townline, 1Km south of Rainham Rd

Project # 161010646
Field Staff Edward Malindzak,
Date October 23 2010
Time 9:39

Water Quality

Dissolved Oxygen (mg/L) 9.32
pH 7.68
Conductivity (µS/cm) 860
Water Temperature (°C) 8.68
Air Temperature (°C) 12°c
Weather conditions in previous 24 hrs

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.60 (m)
Maximum Pool Depth 0.40 m ~~(cm)~~
Mean Bankfull Width 5.0 (m)
Mean Water Depth 0.20 ~~(cm)~~

20 % Riffle 40 % Pool 20 % Run 20 % Flat

Evidence of eroding banks, Comments on bank stability undercut banks, two agricultural drains w/riparian cover (meadow sp.) converge here. Hard to see channel features with dense vegetation

Substrate – Upstream (% cover) of confluentee of two small drains

	Bedrock		Silt		Boulder	50	Clay	~~50~~ 40	Cobble
	Muck		Gravel		Marl		Sand	10	Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder	50	Clay	40	Cobble
	Muck		Gravel		Marl		Sand	10	Detritus

In-water Cover

Cover Types Present (circle): [✓ Undercut Banks] Deep Pool Vascular Plants [✓ Overhanging Vegetation] Woody Debris Boulder Other turbidity

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 95%, meadow & canary grass
Downstream ~~woo~~ 80%, wood lot (mature)

Adjacent Land Use
Upstream agriculture
Downstream woodlot

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream potential spawning habitat in veg. flooded in spring
Downstream " " " " " "

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations none, channel contains meanders & actual banks w/ undercuts & dangling roots/veg. Possible most water is from recent rains though veg suggest soil remains moist.

Other Habitat Notes, Incidental Wildlife Observations, etc. deer scat,
shocked for 110 sec. @ 60 Hz / 500 v no fish captured or observed.
water very turbid.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Powery
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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Stantec

Project Samsung (GREP) Wind
Project # 16101064 6
Station # 38.1
Field Staff Edward Malindzak, J. Koch
Photos Taken 7521, 7522, 7523, 7524, 7525
Date October 23 2010
GPS Coordinates 17T 0606311/4747105
Time 10:33
Descriptive Location culvert under recreational vehicle trail (ATV, snowmobile) 800m east of Hald Dunn Townline Rd, 1.1 Km south of Rainham Rd.

Water Quality

Dissolved Oxygen (mg/L) 5.69
pH 8.09
Conductivity (µS/cm) 277
Water Temperature (°C) 10.01
Air Temperature (°C) 12°C
Weather conditions in previous 24 hrs sunny, cool, warm, cloudy

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.80 (m)
Maximum Pool Depth 25 (cm)
Mean Bankfull Width 2 (m)
Mean Water Depth 7 (cm)
___ % Riffle
100 % Pool
___ % Run
___ % Flat
Evidence of eroding banks, Comments on bank stability clearly conveys flow, likely seasonal. Some evidence of erosion. Several very small tribs. flow into channel w/in 30 m of this location. Tribs are very minor and drain woodlot

Substrate – Upstream (% cover)

	Bedrock		Silt		Boulder	20	Clay		Cobble
	Muck		Gravel		Marl		Sand	80	[✓ Detritus]

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder		Clay		Cobble
	Muck		Gravel		Marl	20	Sand	80	[✓ Detritus]

In-water Cover

Cover Types Present (circle):
[✓ Overhanging Vegetation]
Undercut Banks
Woody Debris
Deep Pool
Boulder
Vascular Plants
Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 80%, mature wood lot (hardwoods)
Downstream 80%, mature woodlot (hardwoods)
Adjacent Land Use
Upstream woodlot
Downstream woodlot

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations surrounding terrain suggest this area does not flood extensively and rarely

Other Habitat Notes, Incidental Wildlife Observations, etc. Shocked site for 78 secs. @ 60HZ/300 V. No fish captured or observed. Numerous frogs. Shocked deeper pool (0.40 m) further d/S for 18 seconds, with same results.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # 39.0
Photos Taken 7530
GPS Coordinates
Descriptive Location 600 m north of Lakeshore Rd, 700 m east of Hald Dunn Townline Rd.

Project # 161010646
Field Staff E. Malindzak, J. Cook
Date Oct. 23 2010
Time 11:47 am

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 12°c
Weather conditions in previous 24 hrs Sunny, cool, warm, cloudy, windy

Watercourse Dimensions & Morphology
Mean Watercourse Width 25×35 (m)
Mean Bankfull Width – (m)
Maximum Pool Depth unk. (cm)
Mean Water Depth unk (cm)
____ % Riffle 100 % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability this is an isolated pond, and likely naturally made.

Substrate – Upstream (% cover) did not collect.
____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

Substrate – Downstream (% cover)
____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

In-water Cover
Cover Types Present (circle): Overhanging Vegetation Undercut Banks Woody Debris Deep Pool Boulder Vascular Plants Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream /
Downstream /
Adjacent Land Use
Upstream /
Downstream /

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream
Downstream
Migratory Obstructions (seasonal, permanent)
Upstream
Downstream
Note any fish observations did not shock or enter. Large amounts of refuse has been deposited in pond. Also an overpowering odour of decomposing flesh. is present. active burning pile.

Other Habitat Notes, Incidental Wildlife Observations, etc. did not sample due to safety concerns (see above)
NOT a Water Body

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 39.2
Photos Taken 7531, 7532, 7533
GPS Coordinates 17T 0606630/4746752
Descriptive Location 850m east of Hald Dunn Townline Rd, 600m north of Lakeshore Rd

Project # 161010646
Field Staff E. Malindzak, J. Koch
Date Oct 23 2010
Time 12:07

Water Quality
Dissolved Oxygen (mg/L) 10.38
pH 8.31
Conductivity (µS/cm) 386
Water Temperature (°C) 13.16
Air Temperature (°C) 15°C
Weather conditions in previous 24 hrs Sunny, warm, cloudy, cool, windy, rain

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.30 (m)
Mean Bankfull Width 3.5 (m)
Maximum Pool Depth 0.30 m ~~(cm)~~
Mean Water Depth ~~0.07~~ 0.02 ~~(cm)~~
___ % Riffle ___ % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability recently cleaned drain b/t culvert & woodlot. Not cleaned b/t culvert & Road. Channel across agriculture field (east → west) has not been cleaned either.

Substrate – Upstream (% cover)
___ Bedrock
30 Silt
___ Boulder
70 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

Substrate – Downstream (% cover)
___ Bedrock
30 Silt
___ Boulder
70 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

In-water Cover
Cover Types Present (circle):
[✓ Overhanging Vegetation]
Undercut Banks
Woody Debris
Deep Pool
Boulder
[✓ Vascular Plants]
Other ___

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 75%, meadow sp. & canary grass
Downstream —
Adjacent Land Use
Upstream agriculture
Downstream —

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream —
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream —
Note any fish observations none, minor amounts of water, likely due to recent rains. Shocked drain for ~50m @ 60Hz/500V. No fish captured or observed.

Other Habitat Notes, Incidental Wildlife Observations, etc. Channel bottom is un-even creating isolated puddles of water. Water is very turbid. Photo's @ culvert on Lakeshore Road (photo # 7375). Very little flow and very minor channel feature through ag. field. At lake erie photo # 7376. No wet connection to lake

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Project # 161010646
Station # 41.0
Field Staff E. Malindech, J. Koch
Photos Taken 7534, 7535, 7536, 7537
Date Oct 23 2010
GPS Coordinates 0601213/4746546 17T
Time 13:08
Descriptive Location 675m west of Haldimand Rd 49, 1.8Km south of Rainham Rd.

Water Quality

Dissolved Oxygen (mg/L) 6.26
pH 7.54
Conductivity (µS/cm) 391
Water Temperature (°C) 12.46
Air Temperature (°C) 14°c
Weather conditions in previous 24 hrs sunny, cloudy, ~~sunny~~, warm, cool, rain showers wind.

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.0 (m)
Maximum Pool Depth 0.20 m ~~(cm)~~
Mean Bankfull Width 2.5 (m)
Mean Water Depth 0.05 ~~(cm)~~
___ % Riffle
___ % Pool
___ % Run
___ % Flat
Evidence of eroding banks, Comments on bank stability could not visualize substrate/channel charatoristics due to vegitation + turbidity signs of erosion in woodlot.

Substrate – Upstream (% cover)

___ Bedrock
___ Silt
___ Boulder
100 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

Substrate – Downstream (% cover)

___ Bedrock
___ Silt
___ Boulder
100 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants] [✓ Overhanging Vegetation] Woody Debris Boulder Other___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream (woodlot) 80%, mature forest (hardwoods)
Downstream 99%, canary grass, low growing trees (crabapple)
Adjacent Land Use
Upstream wood lot
Downstream agriculture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream potential spawning if remains wet long enough
Migratory Obstructions (seasonal, permanent)
Upstream ~~potential spawning~~
Downstream perched culvert at Lake Erie
Note any fish observations lacks direct contact to Lake Erie, likely even during high flows.

Other Habitat Notes, Incidental Wildlife Observations, etc. photo of d/s where meets Lake erie #7377. Photo of culvert @ Lakeshore photo #7378 (looking U/S)

Field Notes Authored by E. Malindech
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 2

Project : Samsung
Station # CL 39
Photos Taken 0046, 0047, 0048, 49
GPS Coordinates 0602533 4745053
Descriptive Location approx 200m North of Lake Erie on Haldimand Rd 50

Project # 161010646
Field Staff M. Pomeroy, D. Williams
Date Nov 8 2010
Time 1130am, 2010

Water Quality
Dissolved Oxygen (mg/L) POOLED @ culvert, no H_2O in channel.
pH
Conductivity (µS/cm)
Water Temperature (°C)
Air Temperature (°C)
Weather conditions in previous 24 hrs

Watercourse Dimensions & Morphology DRY
Mean Watercourse Width (m)
Maximum Pool Depth (cm)
Mean Bankfull Width (m)
Mean Water Depth (cm)
% Riffle
% Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability

Substrate – Upstream (% cover)
Bedrock
100 Silt (soil)
Boulder
Clay
Cobble
Muck
Gravel
Marl
Sand
Detritus

Substrate – Downstream (% cover)
Bedrock
100 Silt (soil)
Boulder
Clay
Cobble
Muck
Gravel
Marl
Sand
Detritus

In-water Cover
Cover Types Present (circle):
Overhanging Vegetation
Undercut Banks
Woody Debris
Deep Pool
Boulder
~~Vascular Plants~~
Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 100%, grass, early
Downstream 100%, grass, early
Adjacent Land Use
Upstream ag field (corn)
Downstream ag field (hay)

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none.
Migratory Obstructions (seasonal, permanent)
Upstream low/no flow
Downstream low/no flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. grassy swale with cattails and diffuse channel

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Station # 27.0
Photos Taken 7597, 7598
GPS Coordinates 17T 0422559/47746019
Project # 161010646
Field Staff Edward Malindzak, M. Kozak
Date October 21 2010
Time 11:01 am
Descriptive Location 375 m east of Haldimand Rd 50, 800 m South of Rainham Rd.

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 8°C
Weather conditions in previous 24 hrs Sunny, warm, windy. Heavy rain

Watercourse Dimensions & Morphology

Mean Watercourse Width ____ (m)
Mean Bankfull Width ____ (m)
Maximum Pool Depth 10 (cm) not in ATV ruts
Mean Water Depth 7 (cm)
____ % Riffle
100 % Pool
____ % Run
____ % Flat
Evidence of eroding banks, Comments on bank stability evidence of erosion @ wet area "pond" outflow, flows ~70 m then ends. Pods of standing water occur throughout woodlot but are not visably connected. Likely only connected in spring

Substrate – Upstream (% cover)

/	Bedrock	/	Silt	/	Boulder	50	Clay	/	Cobble
50	Muck	/	Gravel	/	Marl	/	Sand	/	Detritus

Substrate – Downstream (% cover) D/S of wetland "pond"

	Bedrock		Silt		Boulder	20	Clay		Cobble
20	Muck		Gravel		Marl		Sand	60	Detritus (leaves)

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder Vascular Plants Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream —
Downstream 80% mature forest
Adjacent Land Use
Upstream —
Downstream woodlot

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream —
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream —
Downstream lack of channel, not visibly connected to anything
Note any fish observations D/S is below wet area "pond". Pond is flooded area possibly wet most of the time, though lacks appropriate veg. Standing water is likely due to heavy rains last night
Other Habitat Notes, Incidental Wildlife Observations, etc. Vast network of ATV tracks through woodlot. Hummocky grass tufts common.

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout, Version 1

CATTLE IN FIELD ∴ not able to access to re-photograph

Project Samsung (GREP) Wind
Station # 7.0
Photos Taken 8
GPS Coordinates 17T 0588591 / 4752824
Descriptive Location at man-made pond ~675m north of Irish Line, 750m west of Decewsville Rd.

Project # 161010646
Field Staff E. Malindzak, M. Kozak
Date 10-19-2010
Time 9:50

Water Quality
Dissolved Oxygen (mg/L) ____
pH ____
Conductivity (µS/cm) ____
Water Temperature (°C) ____
Air Temperature (°C) 8°C
Weather conditions in previous 24 hrs Cloudy, sunny, cool

Watercourse Dimensions & Morphology
Mean Watercourse Width ____ (m)
Mean Bankfull Width ____ (m)
Maximum Pool Depth 70.4 m ~~(cm)~~
Mean Water Depth unk ~~(cm)~~
____ % Riffle   100 % Pool   ____ % Run   ____ % Flat
Evidence of eroding banks, Comments on bank stability cattle watering hole. Pond is man made and does not appear connected to anything

Substrate – Upstream (% cover)
____ Bedrock   ____ Silt   ____ Boulder   100 Clay   ____ Cobble
____ Muck   ____ Gravel   ____ Marl   ____ Sand   ____ Detritus

Substrate – Downstream (% cover)
____ Bedrock   ____ Silt   ____ Boulder   100 Clay   ____ Cobble
____ Muck   ____ Gravel   ____ Marl   ____ Sand   ____ Detritus

In-water Cover
Cover Types Present (circle):
Overhanging Vegetation   Undercut Banks   Woody Debris   Deep Pool   Boulder   Vascular Plants   Other Hoof prints

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 0% agriculture → active pasture
Downstream 0% " "
Adjacent Land Use
Upstream cattle pasture
Downstream —

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow, no connectivity
Downstream low flow, no connectivity
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. Man made pond for watering cattle, this is not fish habitat, is not connected to any channel and does not contribute anything d/s

Field Notes Authored by E. Malindzak   Field Notes QA/QCed by Mark Pomeroy   Page 95 of 95

N (on-site)

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Stantec

Project Samsung
Station # 4
Photos Taken 3 (6263, 6264, 6265)
GPS Coordinates 595781 4749638 5m acc.
Descriptive Location On Meadows Rd immediately NE of junction with Mt. Olivet Rd.

Project # 16010624
Field Staff M. Pomeroy, J. Keene
Date July 7, 2010
Time 5:26 pm

Water Quality

N/A

Dissolved Oxygen (mg/L) /
pH /
Conductivity (μS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 31
Weather conditions in previous 24 hrs dry, hot

Watercourse Dimensions & Morphology

D/S only

Mean Watercourse Width 1.1 (m)
Mean Bankfull Width 1.8 (m)
Maximum Pool Depth ____ (cm)
Mean Water Depth 10 (cm)
____ % Riffle ____ % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability ____

Substrate – Upstream (% cover)

N/A

____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

Substrate – Downstream (% cover)

____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

In-water Cover

N/A

Cover Types Present (circle): Overhanging Vegetation Undercut Banks Woody Debris Deep Pool Boulder Vascular Plants Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 0%, meadow, early
Downstream 20%, grass, early
Adjacent Land Use
Upstream fallow field
Downstream fallow field

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream no flow / low flow
Downstream no flow / low flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. no channel definition. Grassed swale, not a water body

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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N

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Project Samsung Solar
Project # 161010624
Station # 3
Field Staff M. Pomeroy, J. Koone
Photos Taken 4 (6259, 6260, 6261, 6262)
Date July 7, 2010
GPS Coordinates 595898 4749892 4m acc.
Time 5:11 pm
Descriptive Location On Meadows Rd, NE of farm buildings on east side of road

Water Quality

N/A

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 31°C
Weather conditions in previous 24 hrs hot, dry

Watercourse Dimensions & Morphology

N/A

Mean Watercourse Width ____ (m)
Maximum Pool Depth ____ (cm)
Mean Bankfull Width 0.40 (m)
Mean Water Depth ____ (cm)
____ % Riffle
____ % Pool
____ % Run
____ % Flat
Evidence of eroding banks, Comments on bank stability

Substrate – Upstream (% cover)

N/A

____ Bedrock
____ Silt
____ Boulder
____ Clay
____ Cobble
____ Muck
____ Gravel
____ Marl
____ Sand
____ Detritus

Substrate – Downstream (% cover)

____ Bedrock
____ Silt
____ Boulder
____ Clay
____ Cobble
____ Muck
____ Gravel
____ Marl
____ Sand
____ Detritus

In-water Cover

N/A

Cover Types Present (circle):
Overhanging Vegetation
Undercut Banks
Woody Debris
Deep Pool
Boulder
Vascular Plants
Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 0%, meadow, early
Downstream 0%, meadow, N/A
Adjacent Land Use
Upstream fallow field
Downstream hay field, pasture

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream no flow
Downstream no flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. Black swallowtail observed
GPS @ origin 596300 4749965 5m acc.

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

also 5461, 5462, 5463

Project Samsung Solar
Station # 2
Photos Taken 4 (6255, 6256, 6257, 6258)
GPS Coordinates 597107 4749432 6m acc.
Project # 16101 0624
Field Staff M. Pomeroy, J. Iloene
Date July 7, 2010, Aug 25 2010.
Time 4:47 pm
Descriptive Location Middle, channel north of Haldimand County Road 20 on Wilson Road.

Aug 25 2010

Water Quality

Dissolved Oxygen (mg/L) 8.00
pH 7.26
Conductivity (µS/cm) 264
Water Temperature (°C) 29.34
Air Temperature (°C) 28°C (~~Jul~~ Aug 25, 2010)
Weather conditions in previous 24 hrs hot, dry

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.2 (m)
Mean Bankfull Width 0.5 (m)
Maximum Pool Depth N/A (cm)
Mean Water Depth 0.05 (cm)
______ % Riffle
______ % Pool
______ % Run
100 % Flat
Evidence of eroding banks, Comments on bank stability highly erodible banks, evidence of recent erosion (no veg on ≥45° banks, fines in channel)

Aug 25 2010

Substrate – Upstream (% cover)

	Bedrock	60	Silt		Boulder	40	Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock		Silt		Boulder		Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

In-water Cover

N/A

Cover Types Present (circle):
Overhanging Vegetation
Undercut Banks
Woody Debris
Deep Pool
Boulder
Vascular Plants
Other______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 0%, meadow, early
Downstream 0%, meadow, early
Adjacent Land Use
Upstream fallow field
Downstream Soybean field (South), fallow field (North)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations none

16 Belostomatids in-channel

Other Habitat Notes, Incidental Wildlife Observations, etc. dry, ill-defined channel
water body: (July 7, 2010) (U/S) { 2 reaches of wet, Water Body
Monarch butterfly noted (not Viceroy) { 1 reach of grassed swale, NOT water Body
End of 1st reach of Water Body: 0597299 4749460 } D/W is NOT a
End of 2nd reach of Water Body: 0597574 4749338 } Water Body

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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POND SOLAR

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Stantec

Project Samsung (GREP) Wind

Station # 4.0

Photos Taken 2

GPS Coordinates 17T 0596738/4749383

Descriptive Location east of Wilson Rd, immediately south of woodlot edge.

Project # 1610 10~~646~~ 624

Field Staff E. Malindzak, M. Kozak

Date 10-18-2010

Time 17:21

Water Quality

Dissolved Oxygen (mg/L) /

pH /

Conductivity (µS/cm) /

Water Temperature (°C) /

Air Temperature (°C) /

Weather conditions in previous 24 hrs warm, sunny

Watercourse Dimensions & Morphology

Mean Watercourse Width 20 x 30 (m)

Mean Bankfull Width — (m)

Maximum Pool Depth unk (cm)

Mean Water Depth unk (cm)

___% Riffle ___% Pool ___% Run ___% Flat

Evidence of eroding banks, Comments on bank stability

Substrate – Upstream (% cover)

___Bedrock ___Silt ___Boulder 25 Clay ___Cobble

75 Muck ___Gravel ___Marl ___Sand ___Detritus

Substrate – Downstream (% cover)

/ Bedrock / Silt / Boulder / Clay / Cobble

/ Muck / Gravel / Marl / Sand / Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks [✓ Woody Debris] Deep Pool Boulder [✓ Vascular Plants] Other duckweed & cattails

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)

Upstream 50% forest / 50% meadow

Downstream —

Adjacent Land Use

Upstream 50% agriculture / 50% woodlot

Downstream —

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)

Upstream none

Downstream none

Migratory Obstructions (seasonal, permanent)

Upstream agricultural crops, low flow

Downstream —

Note any fish observations none, pond with abundant duckweed and cattails in-water,

Other Habitat Notes, Incidental Wildlife Observations, etc. heard deer in forest ~~tweety birds~~ (song birds), duck blind present.

Field Notes Authored by E. Malindzak

Field Notes QA/QCed by Mark Phenny

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Stantec

Project Samsung Solar
Station # 1
Photos Taken 3 (6252, 6253, 6254)
GPS Coordinates 597144 4749324 8m acc
Descriptive Location Southernmost channel on Wilson Rd, north of Haldimand County Rd 20.

Project # 161010624
Field Staff M. Pomeroy, J. Keene
Date July 7, 2010
Time 431pm

Water Quality

N/A

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 32.5°C
Weather conditions in previous 24 hrs hot, dry

Watercourse Dimensions & Morphology

Mean Watercourse Width 0 (m)
Mean Bankfull Width 1.5 (m)
Maximum Pool Depth 0 (cm)
Mean Water Depth 0 (cm)
___ % Riffle ___ % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability bank hgt: 30-40cm

Substrate – Upstream (% cover)

~~N/A~~

___ Bedrock 100 ~~Silt~~ Soil ___ Boulder ___ Clay ___ Cobble
___ Muck ___ Gravel ___ Marl ___ Sand ___ Detritus

Substrate – Downstream (% cover)

___ Bedrock 100 ~~Silt~~ Soil ___ Boulder ___ Clay ___ Cobble
___ Muck ___ Gravel ___ Marl ___ Sand ___ Detritus

In-water Cover

N/A

Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other ___

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 0%, none, N/A
Downstream 0%, none, N/A
Adjacent Land Use
Upstream fallow field
Downstream soybean field

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream absence of flow
Downstream absence of flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. Dry, well defined channel. Not a water body

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung
Station # Solar pond (site 17a)
Photos Taken 5464 (D/S) 5465 (U/S) 5466 (sub)
6 m accuracy GPS Coordinates 17T 0597301E, 4749604N
Descriptive Location east of Wilson Rd, between Haldimand Rd 20 & Meadows Rd. South of woodlot (on edge) Approx 150 m E of Wilson Rd.

Project # 16010624
Field Staff R. Dibbley, M. Pomeroy
Date Aug 25, 2010
Time 14:05, 2010

Water Quality

Dissolved Oxygen (mg/L) 10.26
pH 7.01
Conductivity (µS/cm) 200
Water Temperature (°C) 26.1
Air Temperature (°C)
Weather conditions in previous 24 hrs Sunny, cloud

Watercourse Dimensions & Morphology

will check when we fish

Mean Watercourse Width 0.50 (m) (outflow
Mean Bankfull Width 0.50 (m) + inflow channel)
Maximum Pool Depth (cm)
Mean Water Depth (cm)
% Riffle
% Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability bank well vegetated, stable

Substrate – Upstream (% cover)

Bedrock
50 Silt
Boulder
25 Clay
Cobble
5 Muck
Gravel
Marl
Sand
20 Detritus

Substrate – Downstream (% cover)

Bedrock
50 Silt
Boulder
25 Clay
Cobble
5 Muck
Gravel
Marl
Sand
20 Detritus

In-water Cover

Cover Types Present (circle): Overhanging Vegetation [✓ Undercut Banks] Woody Debris [✓ Deep Pool] Boulder [✓ Vascular Plants] Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 5%, grass/goldenrod, mature
Downstream 5%, grass/goldenrod, early

Adjacent Land Use
Upstream woodlot
Downstream meadow sp., bean field

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream none
Downstream none

Note any fish observations ripples on surface likely caused by fish, fish jumped

Other Habitat Notes, Incidental Wildlife Observations, etc. catbird heard.
[illegible], on-line pond just south of woodlot

Field Notes Authored by R. Dibbley
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung Solar
Station # 17b
Photos Taken 5467
GPS Coordinates 0597202 4749701
Descriptive Location upstream Channel from pond (17a)

Project # 1610.10624
Field Staff M. Pomeroy R. Dibbley
Date Aug 25, 2010
Time 300 pm, 2010

Water Quality

Dissolved Oxygen (mg/L) 10.30
pH 7.94
Conductivity (µS/cm) 207
Water Temperature (°C) 20.3
Air Temperature (°C) /
Weather conditions in previous 24 hrs hot, sunny, no precip

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.4 (m)
Maximum Pool Depth 10 (cm)
Mean Bankfull Width 1 (m)
Mean Water Depth 10 (cm)
___% Riffle ___% Pool ___% Run 100 % Flat
Evidence of eroding banks, Comments on bank stability none

Substrate – Upstream (% cover)

___ Bedrock
40 Silt
___ Boulder
60 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

Substrate – Downstream (% cover)

___ Bedrock
40 Silt
___ Boulder
60 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

In-water Cover

Cover Types Present (circle): [✓ Undercut Banks] Deep Pool [✓ Vascular Plants]
[✓ Overhanging Vegetation] [✓ Woody Debris] Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 50, meadow sp., mix (50% early, 50% mature)
Downstream 50, meadow sp., mix (50% early, 50% mature)

Adjacent Land Use
Upstream meadow, woodlot
Downstream meadow, woodlot

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream Cyprinid habitat
Downstream Cyprinid habitat

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations cyprinid observed.

Other Habitat Notes, Incidental Wildlife Observations, etc. GPS of seep 0597156 4749692
Site is Water Body Hardpan clay
observed sporadically.

Field Notes Authored by MP
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

N (on-site)

Project Samsung Solar
627[illegible]
Project # 161010624
Station # 5
Field Staff M. Pomeroy, J. Keane
Photos Taken 5(6266, 6267, 6268, 6269)
Date July 7, 2010 (@ culvert) July 8, 2010 (upstream)
@ culvert – GPS Coordinates 596343 4748316 5m acc.
Time 5:43pm (July 7) 2:16pm (July 8)
Descriptive Location On Haldimand County Rd 20 immediately east of Indian Line

Water Quality

Dissolved Oxygen (mg/L) 7.26
pH 8.42
Conductivity (µS/cm) 2883
in pool @ culvert Water Temperature (°C) 25.9
Air Temperature (°C) 32.5
Weather conditions in previous 24 hrs hot, dry

Watercourse Dimensions & Morphology

D/S only
Mean Watercourse Width / (m)
Maximum Pool Depth / (cm)
Mean Bankfull Width 0.7 (m) @ culvert
Mean Water Depth / (cm)
____ % Riffle ____ % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability

Substrate – Upstream (% cover) N/A

___ Bedrock	___ Silt	___ Boulder	___ Clay	___ Cobble
___ Muck	___ Gravel	___ Marl	___ Sand	___ Detritus

Substrate – Downstream (% cover)

___ Bedrock	___ Silt	___ Boulder	___ Clay	___ Cobble
___ Muck	___ Gravel	___ Marl	___ Sand	___ Detritus

In-water Cover

D/S: only
Cover Types Present (circle): [✓ Undercut Banks] [✓ Deep Pool] [✓ Vascular Plants] [✓ Overhanging Vegetation] Woody Debris Boulder Other____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream None
Downstream off site
Adjacent Land Use
Upstream fallow field (corn + soybean)
Downstream off site

Fish Habitat Potential N/A

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream no flow / low flow
Downstream no flow / low flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. GPS @ NE branch inception 596496 4748826 4m acc.
upstream ~~area~~ moderate to ill definition. branches

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

N (on site)

Project Samsung Solar
Station # 5
Photos Taken 5(6266, 6267, 6268, 6269) 6297
@ culvert — GPS Coordinates 596343 4748316 5m acc.
Descriptive Location On Haldimand County Rd 20 immediately east of Indian Line

Project # 161010624
Field Staff M. Pomeroy, J. Keane
Date July 7, 2010 (@ culvert) July 8, 2010 (upstream
Time 5:43pm (July 7) 2:18pm (July 8)

Water Quality

in pool @ culvert

Dissolved Oxygen (mg/L) 7.26
pH 8.42
Conductivity (µS/cm) 2883
Water Temperature (°C) 25.9
Air Temperature (°C) 32.5
Weather conditions in previous 24 hrs hot, dry

Watercourse Dimensions & Morphology

D/S only

Mean Watercourse Width ____ (m)
Mean Bankfull Width 0.7 (m) @ culvert
Maximum Pool Depth ____ (cm)
Mean Water Depth ____ (cm)
____ % Riffle ____ % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability ____

Substrate – Upstream (% cover)

N/A

____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

Substrate – Downstream (% cover)

____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

In-water Cover

D/S only

Cover Types Present (circle): [✓ Undercut Banks] [✓ Deep Pool] [✓ Vascular Plants] [✓ Overhanging Vegetation] Woody Debris Boulder Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream None
Downstream off site
Adjacent Land Use
Upstream fallow field, (corn + soybean)
Downstream off site

Fish Habitat Potential

N/A

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream no flow / low flow
Downstream no flow / low flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. GPS @ NE branch inception 596496 4748826 4m acc.
upstream ~~area~~ moderate to ill definition.
branches

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Project Samsung Solar
Project # 16010624
Station # 13
Field Staff M. Pomeroy, J. Keene
Photos Taken 3 (6301, 6302, 6303)
Date July 8, 2010
GPS Coordinates 597354 4747822 10m acc.
Time 452pm
Descriptive Location north of Indian Line (approx 300m), west of Wilson Rd. west of forest edge

Water Quality

N/A
Dissolved Oxygen (mg/L) / pH / Conductivity (µS/cm) /
Water Temperature (°C) / Air Temperature (°C) 33
Weather conditions in previous 24 hrs hot, dry

Watercourse Dimensions & Morphology

N/A
Mean Watercourse Width ______(m) Maximum Pool Depth ______(cm)
Mean Bankfull Width ______(m) Mean Water Depth ______(cm)
______% Riffle ______% Pool ______% Run ______% Flat
Evidence of eroding banks, Comments on bank stability ______

Substrate – Upstream (% cover)

N/A
______Bedrock ______Silt ______Boulder ______Clay ______Cobble
______Muck ______Gravel ______Marl ______Sand ______Detritus

Substrate – Downstream (% cover)

______Bedrock ______Silt ______Boulder ______Clay ______Cobble
______Muck ______Gravel ______Marl ______Sand ______Detritus

In-water Cover

N/A
Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 100, grass, early
Downstream 100, grass, early
Adjacent Land Use
Upstream meadow
Downstream meadow

Fish Habitat Potential

N/A
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream ______
Downstream ______
Migratory Obstructions (seasonal, permanent)
Upstream ______
Downstream ______
Note any fish observations ______

Other Habitat Notes, Incidental Wildlife Observations, etc. dry, diffuse channel & ill-defined

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

N

Project Samsung Solar
Project # 16010624
Station # 14
Field Staff M. Pomeroy, J. Keene
Photos Taken 3(6304, 6305, 6306)
Date July 8, 2010
GPS Coordinates 597 475 4747877 8m acc
Time
Descriptive Location north of Indian Line (approx 300m), west of Wilson Rd
In forest

Water Quality

N/A

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 33
Weather conditions in previous 24 hrs hot, sunny

Watercourse Dimensions & Morphology

N/A

Mean Watercourse Width ____ (m)
Maximum Pool Depth ____ (cm)
* Mean Bankfull Width 1 (m)
Mean Water Depth ____ (cm)
____ % Riffle ____ % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability

Substrate – Upstream (% cover)

N/A

____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

Substrate – Downstream (% cover)

____ Bedrock ____ Silt ____ Boulder ____ Clay ____ Cobble
____ Muck ____ Gravel ____ Marl ____ Sand ____ Detritus

In-water Cover

N/A

Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 90, trees, mature
Downstream 90, trees, mature
Adjacent Land Use
Upstream Woodlot
Downstream woodlot

Fish Habitat Potential

N/A

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream
Downstream
Migratory Obstructions (seasonal, permanent)
Upstream
Downstream
Note any fish observations

Other Habitat Notes, Incidental Wildlife Observations, etc. dense poison ivy

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Y

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Stantec

Project SamsungSolar
Project # 16101062 4
Station # 15
Field Staff M. Pomeroy, J. Keone
Photos Taken 3 (6307, 6308, 6309)
Date July 8, 2010
GPS Coordinates 597550 4747789 10m acc
Time 516 pm
Descriptive Location West of Wilson Rd, Southerly channel

N/A

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 31
Weather conditions in previous 24 hrs hot, dry

N/A

Watercourse Dimensions & Morphology

Mean Watercourse Width ______ (m)
Maximum Pool Depth / (cm)
Mean Bankfull Width diffuse (m)
Mean Water Depth / (cm)
______ % Riffle ______ % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability /

N/A

Substrate – Upstream (% cover)

______ Bedrock ______ Silt ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

Substrate – Downstream (% cover)

______ Bedrock ______ Silt ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

N/A

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 60, grass, mature
Downstream 60, grass, mature
Adjacent Land Use
Upstream woodlot
Downstream woodlot

N/A

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream ______
Downstream ______
Migratory Obstructions (seasonal, permanent)
Upstream ______
Downstream ______
Note any fish observations ______

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind
Station # 14.0
Photos Taken #
GPS Coordinates 17T 0597076 / 4747938
Descriptive Location Approximately 300 m northeast of Bains Rd., west of Wilson Rd.
Project # 161010~~646~~ 624
Field Staff Edward Malindzak,
Date October 19, 2010
Time 15 53

Water Quality
Dissolved Oxygen (mg/L) 9.15
pH 7.25
Conductivity (µS/cm) 411
Water Temperature (°C) 12.9
Air Temperature (°C) /
Weather conditions in previous 24 hrs warm, windy

Watercourse Dimensions & Morphology
Mean Watercourse Width 2.0 (m)
Maximum Pool Depth 30 (cm)
Mean Bankfull Width 15.0 (m)
Mean Water Depth 15 (cm)
___ % Riffle
100 % Pool
___ % Run
___ % Flat
Evidence of eroding banks, Comments on bank stability very ~~dens~~ dense vegetation channel characteristics un-clear

Substrate – Upstream (% cover)
___ Bedrock
20 Silt
___ Boulder
80 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

Substrate – Downstream (% cover)
___ Bedrock
20 Silt
___ Boulder
80 Clay
___ Cobble
___ Muck
___ Gravel
___ Marl
___ Sand
___ Detritus

In-water Cover
Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 99%, canary grass + willows
Downstream 99%, canary grass + willows
Adjacent Land Use
Upstream Agriculture (horse pasture + crop)
Downstream " " " "

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream potential pike spawning area in grasses, Home owner
Downstream indicates channel floods regularly but water withdraws within 3-5 days.
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations One fathead minnow captured @ 60 Hz + 300V

Other Habitat Notes, Incidental Wildlife Observations, etc. none

Field Notes Authored by E. Malindzak
Field Notes QA/QCed by Mark Poney
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Stantec Consulting Ltd - Electrofishing Record and Catch Results

Project Number 161010624

Project Name Samsung (GREP) Wind

Project manager Rob Nadolny

Descriptive Location

UTM coordinates 17T 0597076 easting 4747938 northing zone 17T

Station Number 14.0

Pass No. (if applicable) 1 of 1

Date (yyyymmdd): 2010. october 19

Fishing Method (circle one): [✓ Backpack] Boat

Unit Model/Make SR Model 12

Sampling Method (circle one): [✓ even] habitat transect spot

Effort (Electrofishing Seconds): 167 Number of Netters: 1 Number of Anodes: 1

Settings

Frequency (Hz) 60 Voltage (volts) 300 Current (Amps) Power (Watts)

Station Information

Length of Stream Surveyed (m) ~40

Station Characteristics:

Width (m): Range 1 - 3.5 Average: 2.0

Depth (m): Range 10 - 30 Average: 15

Water Clarity/Colour: Clear

Temperature (°C) 12.9

pH 7.25

Water Velocity if Measured (m/s): 0

Conductivity (uS/cm) 411

Dissolved Oxygen (mg/L) 9.15

Catch Data

Species	Number of Fish	Species	Number of Fish
FTHD	1 (Fathead)		

Fish Measurements on Separate Sheet? Y/[✓ N]

Field Staff; E. Malindzak

M. Kozak

Notes By

☑

☐ ~~(Station Diagram on Back)~~

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Y

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Project Samsung Solar
Project # 161010624
Station # 12
Field Staff M, Pomeroy, J. Keene
Photos Taken 5 (6291, 6292, 6293, 6294, 6295)
Date July 8, 2010
GPS Coordinates 598255 4747950 (US east limit) 5m acc.
Time 10:50 am
Descriptive Location east of Indian Line, NW of Junction of Bairs Rd and Indian line

Water Quality

N/A
Dissolved Oxygen (mg/L) ______ pH ______ Conductivity (µS/cm) ______
Water Temperature (°C) ______ Air Temperature (°C) 29.5
Weather conditions in previous 24 hrs hot, dry

Watercourse Dimensions & Morphology

N/A
Mean Watercourse Width ______ (m) Maximum Pool Depth ______ (cm)
* Mean Bankfull Width 0.5-1 (m) Mean Water Depth ______ (cm)
______ % Riffle ______ % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability ______

Substrate – Upstream (% cover)

*
✓ Bedrock ______ Silt ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

N/A

Substrate – Downstream (% cover)

______ Bedrock ______ Silt ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

In-water Cover

N/A
Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 70, grass, early
Downstream 70, grass, early
Adjacent Land Use
Upstream fallow corn field, soybean
Downstream soybean, fallow corn

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream Possible pike spawning (assess downstream connectivity)
Downstream possible pike spawning (assess downstream connectivity)
Migratory Obstructions (seasonal, permanent)
Upstream ______
Downstream ______
Note any fish observations ______

Other Habitat Notes, Incidental Wildlife Observations, etc. GPS of confluence NE + NW channel 598178 4747796 5m acc.
- braided, well-defined channel throughout
- bedrock prevalent in downstream (150m long)

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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N

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RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Project Samsung Solar
Station # 10
Photos Taken 3 (6285, 6286, 6287)
GPS Coordinates 600376 4746711 4m acc.
Descriptive Location on western edge of property north of Hwy 3, south of Bains Rd

Project # 161010624
Field Staff M. Pomeroy, J. Keene
Date July 8, 2010
Time 935 am

Water Quality

N/A

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) 29.5
Weather conditions in previous 24 hrs hot, windy

Watercourse Dimensions & Morphology

N/A

Mean Watercourse Width ______ (m)
Mean Bankfull Width 0.50 (m)
Maximum Pool Depth ______ (cm)
Mean Water Depth ______ (cm)
______ % Riffle ______ % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability ______

Substrate – Upstream (% cover)

N/A

______ Bedrock ______ Silt ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

Substrate – Downstream (% cover)

______ Bedrock ______ Silt ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

In-water Cover

N/A

Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other ______

Riparian Zone

N/A

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream ______
Downstream ______
Adjacent Land Use
Upstream Wheat field (winter)
Downstream Wheat field (winter)

Fish Habitat Potential

N/A

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream ______
Downstream ______
Migratory Obstructions (seasonal, permanent)
Upstream ______
Downstream ______
Note any fish observations ______

Other Habitat Notes, Incidental Wildlife Observations, etc. well-defined channel ploughed through, definition ~~by~~ caused by spring flow

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 2

Project Samsung Wind
Station # T10
Photos Taken 0020, 0021, 0022, 0023
GPS Coordinates 0580947 4755325
Descriptive Location approx 650m SE of Concession 11W-1

Project # 1601064
Field Staff M. Pomeroy
Date Nov 24 2010
Time 2:15 pm , 2010

Water Quality
Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) /
Weather conditions in previous 24 hrs Cool

Watercourse Dimensions & Morphology
Mean Watercourse Width 3 (m)
Mean Bankfull Width 2.5 (m)
Maximum Pool Depth 0.7 (cm)
Mean Water Depth 0.5 (cm)
____ % Riffle ____ % Pool ____ % Run 100 % Flat
Evidence of eroding banks, Comments on bank stability no erosion noted

Substrate – Upstream (% cover)

	Bedrock	100	Silt		Boulder		Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

Substrate – Downstream (% cover)

	Bedrock	100	Silt		Boulder		Clay		Cobble
	Muck		Gravel		Marl		Sand		Detritus

In-water Cover
Cover Types Present (circle): [✓ Overhanging Vegetation] Undercut Banks [✓ Woody Debris] Deep Pool Boulder [✓ Vascular Plants] Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 5%, grass, early
Downstream 60% (within Row), grass, early
Adjacent Land Use
Upstream crop/pasture
Downstream agr (crop)

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream possible pike
Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. D/S - Water Body, U/S - not a Water Body

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung culvert@road
Station # T9 alternate
Photos Taken 5456 5457 5459, 5460/
5m acc. GPS Coordinates 17T 0583328 4754716
Descriptive Location South of Townline Rd, west of Duxbury Rd in woodlot North of Indian Line

Project # 161010624
Field Staff M. Pomeroy, ~~R [illegible]~~
Date Aug 25, 2010
Time 1230pm

Water Quality

Dissolved Oxygen (mg/L) 0.79
pH 7.47
Conductivity (µS/cm) 790
Water Temperature (°C) 18.55
Air Temperature (°C)
Weather conditions in previous 24 hrs hot, no precip.

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.5 (m)
Mean Bankfull Width 3 (m)
Maximum Pool Depth 25 (cm)
Mean Water Depth 15 (cm)
____ % Riffle 100 % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability none.

Substrate – Upstream (% cover)

____ Bedrock
____ Muck
40 Silt
____ Gravel
____ Boulder
____ Marl
40 Clay
____ Sand
____ Cobble
20 Detritus

Substrate – Downstream (% cover)

____ Bedrock
____ Muck
40 Silt
____ Gravel
____ Boulder
____ Marl
40 Clay
____ Sand
____ Cobble
20 Detritus

In-water Cover

Cover Types Present (circle): [✓ Overhanging Vegetation] [✓ Undercut Banks] [✓ Woody Debris] [✓ Deep Pool] Boulder [✓ Vascular Plants] Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 70, mix (grass, trees), mature
Downstream 70, mix (grass, trees), mature

Adjacent Land Use
Upstream woodlot
Downstream woodlot

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations none.

Other Habitat Notes, Incidental Wildlife Observations, etc. duckweed observed Water Body, intermittent flow, many large standing pools watercourse not where mapping indicates. 'Re map' based on GPS. Green frogs

Field Notes Authored by MP

Field Notes QA/QCed by Mark Pomeroy

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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 3

Project Samsung Wind
Station # T8
Photos Taken 0013, 0014
GPS Coordinates 0584382 4753703
Descriptive Location b/w driveways to Cayuga Motor Speedway

Project # 161010646
Field Staff M. Pomeroy
Date Nov 24 2010
Time 150 pm, 2010

Water Quality
Dissolved Oxygen (mg/L) DRY
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) /
Weather conditions in previous 24 hrs cool

Watercourse Dimensions & Morphology DRY - no channel
Mean Watercourse Width ______ (m)
Mean Bankfull Width ______ (m)
Maximum Pool Depth ______ (cm)
Mean Water Depth ______ (cm)
______ % Riffle ______ % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability ______

Substrate – Upstream (% cover)
______ Bedrock 100 ~~Silt~~ Soil ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

N/A

Substrate – Downstream (% cover)
______ Bedrock 100 ~~Silt~~ Soil ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

N/A

In-water Cover
Cover Types Present (circle): Overhanging Vegetation Undercut Banks Woody Debris Deep Pool Boulder Vascular Plants Other ______

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream ______
Downstream ______

N/A

Adjacent Land Use
Upstream lawn
Downstream Crop

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream no channel
Downstream no channel
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. U/S is front lawn of race track, D/S is low damp spot in field. NOT a Water Body

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 3

Project 161010646
Station # T 7
Photos Taken 0584735 4753537 5
GPS Coordinates 0010, 0011, 0012
Descriptive Location approx 600m NW of Nelles Corners on Haldimand Rd 20

Project # Samsung Wind
Field Staff M. Pomeroy
Date Nov 24 2010
Time 140pm, 2010

Water Quality

Dissolved Oxygen (mg/L) TOO SHALLOW to sample pH ______ Conductivity (µS/cm) ______
Water Temperature (°C) ______ Air Temperature (°C) ______
Weather conditions in previous 24 hrs Cool

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.5 (m) Maximum Pool Depth 0.1 (cm)
Mean Bankfull Width 2.0 (m) Mean Water Depth 0.1 (cm)
____% Riffle ____% Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability no erosion evident

Substrate – Upstream (% cover)

____Bedrock 100 ~~Silt~~ SOIL ____Boulder ____Clay ____Cobble
____Muck ____Gravel ____Marl ____Sand ____Detritus

Substrate – Downstream (% cover)

____Bedrock 100 ~~Silt~~ SOIL ____Boulder ____Clay ____Cobble
____Muck ____Gravel ____Marl ____Sand ____Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants]
[✓ Overhanging Vegetation] Woody Debris Boulder Other____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 30, cattails, early
Downstream 40, grass, early
Adjacent Land Use
Upstream agr (crop)
Downstream agr. (crop)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low / no flow
Downstream low/no flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. U/S is roadside ditch w/ cattails. D/S grassed Swale. NOT a WaterBody

Field Notes Authored by M. Pomeroy Field Notes QA/QCed by Mark Pomeroy Page 4 of 10

Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 3

Project Samsung (GREP) Wind.
Project # 161010646
Station # T6
Field Staff M.Pomeroy, F.
Photos Taken 0008, 0009
Date November 24, 2010
GPS Coordinates 0585595 4753133
Time 130pm
Descriptive Location approx 100m SE of Nelles Corners on Haldimand Rd 20

Water Quality
Dissolved Oxygen (mg/L) DRY
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) /
Weather conditions in previous 24 hrs Cool

Watercourse Dimensions & Morphology no defined bed and banks
Mean Watercourse Width ______ (m)
Maximum Pool Depth ______ (cm)
Mean Bankfull Width ______ (m)
Mean Water Depth ______ (cm)
______ % Riffle ______ % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability ______

Substrate – Upstream (% cover)
______ Bedrock
100 ~~Silt~~ Soil
______ Boulder
______ Clay
______ Cobble
______ Muck
______ Gravel
______ Marl
______ Sand
______ Detritus

Substrate – Downstream (% cover)
______ Bedrock
100 ~~Silt~~ Soil
______ Boulder
______ Clay
______ Cobble
______ Muck
______ Gravel
______ Marl
______ Sand
______ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Vascular Plants
Overhanging Vegetation Woody Debris Boulder Other ______

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 0, lawn, N/A
Downstream 0, lawn, N/A
Adjacent Land Use
Upstream residential
Downstream residential

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream no flow
Downstream no flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. Not a Water Body

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout
Version 1

Project Samsung (GREP) Wind.
Station # T5
Photos Taken 0005, 0006, 0007
GPS Coordinates 0586356 4752765
Descriptive Location approx. 800m SE of Nelles Corners on Haldimand Rd 20

Project # 161010646
Field Staff M. Pomeroy, ~~R. Dibbley~~
Date November 24 2010
Time 120 pm

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) /
Weather conditions in previous 24 hrs Cool

Watercourse Dimensions & Morphology ISOLATED POOLS D/S of Rd.

Mean Watercourse Width ______ (m)
Mean Bankfull Width 1.25 (m)
Maximum Pool Depth 0.1 (cm)
Mean Water Depth 0.1 (cm)
N/A ______ % Riffle ______ % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability U/S is Roadside Ditch, grassed. D/S is grassed swale, no erosion

Substrate – Upstream (% cover)

______ Bedrock
______ Muck
100 ~~Silt~~ Soil
______ Gravel
______ Boulder
______ Marl
______ Clay
______ Sand
______ Cobble
______ Detritus

Substrate – Downstream (% cover)

______ Bedrock
______ Muck
100 ~~Silt~~ Soil
______ Gravel
______ Boulder
______ Marl
______ Clay
______ Sand
______ Cobble
______ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks, Deep Pool, [✓ Vascular Plants], Overhanging Vegetation, Woody Debris, Boulder, Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 90%, trees, mature
Downstream 100%, grass, early

Adjacent Land Use
Upstream woodlot, roadside ditch
Downstream agr (crop, feedlot)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low/no flow
Downstream low/no flow

Note any fish observations none.

Other Habitat Notes, Incidental Wildlife Observations, etc. not a Water Body. intermittent channel.

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 1

Project Samsung (GREP) Wind.
Project # 161010646
Station # T4
Field Staff M. Pomeroy, ~~R. Dibbley~~
Photos Taken 0001, 0002, 0003, 0004
Date November 24 2010
GPS Coordinates 0587548/4752082
Time 105 pm
Descriptive Location intersection of Concession Rd 8 and Haldimand Rd 20 on west side.

Water Quality

Dissolved Oxygen (mg/L) /
pH /
Conductivity (µS/cm) /
Water Temperature (°C) /
Air Temperature (°C) /
Weather conditions in previous 24 hrs cool, windy

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.75 (m)
Maximum Pool Depth 0.3 (cm)
Mean Bankfull Width 1.25 (m)
Mean Water Depth ____ (cm)
____ % Riffle
____ % Pool
100 % Run
____ % Flat
Evidence of eroding banks, Comments on bank stability fully vegetated banks.

Substrate – Upstream (% cover)

____ Bedrock
100 ~~Silt~~ Soil
____ Boulder
____ Clay
____ Cobble
____ Muck
____ Gravel
____ Marl
____ Sand
____ Detritus

Substrate – Downstream (% cover)

____ Bedrock
100 ~~Silt~~ Soil
____ Boulder
____ Clay
____ Cobble
____ Muck
____ Gravel
____ Marl
____ Sand
____ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants] Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 15%, grass, early
Downstream 15%, grass, early

Adjacent Land Use
Upstream residential/ag (crop)
Downstream fallow field

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low/no flow
Downstream low/no flow

Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. intermittent WaterBody in Roadside ditch d/s of Haldimand 20. U/S of Haldimand 20, NoT a WaterBody

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 3

Project Samsung (GREP) Wind.
Project # 161010646
Station # T1
Field Staff M.Pomeroy, ~~R. Dibbley~~
Photos Taken 0001, 0002 (U/S), 0003, 0004, 0005, 0006 (D/S)
Date November 22, 2010
GPS Coordinates 0591134 4750507
Time 215 pm
Descriptive Location on Haldimand 20 westof

Water Quality

Dissolved Oxygen (mg/L) 8.58
pH 8.03
Conductivity (µS/cm) 468
Water Temperature (°C) 10.07
Air Temperature (°C) 11°C
Weather conditions in previous 24 hrs warm, rain

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.25 (m)
Maximum Pool Depth 0.4 (cm)
Mean Bankfull Width 1.5 (m)
Mean Water Depth 0.4 (cm)
___ % Riffle ___ % Pool 100 % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability undercut banks

Substrate – Upstream (% cover)

	Bedrock	25	Silt		Boulder	35	Clay		Cobble
	Muck		Gravel		Marl	20	Sand	20	Detritus

Substrate – Downstream (% cover)

	Bedrock	35	Silt		Boulder	25	Clay		Cobble
	Muck		Gravel		Marl	15	Sand	25	Detritus

In-water Cover

Cover Types Present (circle): [✓ Undercut Banks] Deep Pool Vascular Plants
[✓ Overhanging Vegetation] [✓ Woody Debris] Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 25%, shrub, early s
Downstream 100%, cattail, early s

Adjacent Land Use
Upstream agr (crop)
Downstream agr (crop)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low flow
Downstream low flow

Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. none

Field Notes Authored by M.Pomeroy
Field Notes QA/QCed by Mark Pomeroy

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Stantec

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Lay

Project Samsung (GREP) Wind
Project # 1610106460
Station # T3
Field Staff M. Pomeroy, ~~R. Bibby~~
Photos Taken 0013, 0014, 0015 (015), 0016, 0017, 0018, 0019 (015)
Date November 22, 2010
GPS Coordinates 0588566 4751513
Time 135 pm
Descriptive Location approx 100 m South of Haldimand Rd 20 on

Water Quality

Dissolved Oxygen (mg/L) TOO SHALLOW pH ______ Conductivity (µS/cm) ______
Water Temperature (°C) ______ Air Temperature (°C) ______
Weather conditions in previous 24 hrs Rain, Warm

Watercourse Dimensions & Morphology No defined channel

Mean Watercourse Width ______ (m) Maximum Pool Depth ______ (cm)
Mean Bankfull Width ______ (m) Mean Water Depth ______ (cm)
______ % Riffle ______ % Pool ______ % Run ______ % Flat
Evidence of eroding banks, Comments on bank stability ______

Substrate – Upstream (% cover)

______ Bedrock 100 ~~Silt~~ soil ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

Substrate – Downstream (% cover)

______ Bedrock 100 ~~Silt~~ soil ______ Boulder ______ Clay ______ Cobble
______ Muck ______ Gravel ______ Marl ______ Sand ______ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool [✓ Vascular Plants] grass
Overhanging Vegetation Woody Debris Boulder Other ______

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 100, grass, early
Downstream 100, grass, early
Adjacent Land Use
Upstream Crop, pasture
Downstream Crop

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none
Migratory Obstructions (seasonal, permanent)
Upstream low/no flow
Downstream low/no flow
Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc. no watercourse crossing present Water Body may exist to SE approx 30 m from Rd.

Field Notes Authored by M. Pomeroy Field Notes QA/QCed by Mark Pomeroy Page 9 of 10

RAPID ASSESSMENT FORM FOR AQUATIC HABITAT

Layout Version 3

Stantec

Project Samsung (GREP) Wind.
Station # T2
Photos Taken 0007, 0008, 0009 (U/S), 0010, 0011, 0012 (D/S)
GPS Coordinates 0588831 4751591
Descriptive Location on Haldimand Rd 20 approx 400m SE of Haldimand Rd 12

Project # 161010646
Field Staff M. Pomeroy, ~~[illegible]~~
Date November 22, 2010
Time 130 pm

Water Quality

Dissolved Oxygen (mg/L) TOO SHALLOW pH
Conductivity (µS/cm)
Water Temperature (°C)
Air Temperature (°C)
Weather conditions in previous 24 hrs warm, rain

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.4 (m)
Maximum Pool Depth 0.1 (cm)
Mean Bankfull Width 0.4 (m)
Mean Water Depth 0.1 (cm)
% Riffle
% Pool
% Run
% Flat
Evidence of eroding banks, Comments on bank stability low lying area in farmers field, trenched, open soil, plowed through (U/S) grassed swale (D/S)

Substrate – Upstream (% cover)

	Bedrock	100	~~Silt~~ Soil		Boulder		Clay
	Muck		Gravel		Marl		Sand

Cobble
Detritus

Substrate – Downstream (% cover)

	Bedrock	100	~~Silt~~ Soil		Boulder		Clay
	Muck		Gravel		Marl		Sand

Cobble
Detritus

In-water Cover

Cover Types Present (circle): (D/S) [✓ Overhanging Vegetation] Undercut Banks Woody Debris Deep Pool Boulder [✓ Vascular Plants] (D/S) Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Upstream 0%, none, N/A
Downstream 100%, grass, meadow, early

Adjacent Land Use
Upstream Crop
Downstream Crop

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Upstream none
Downstream none

Migratory Obstructions (seasonal, permanent)
Upstream low/no flow
Downstream low/no flow

Note any fish observations none

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by M. Pomeroy
Field Notes QA/QCed by Mark Pomeroy
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Appendix E

DFO Operational Statements

Fisheries and Oceans Canada
Pêches et Océans Canada

HIGH-PRESSURE DIRECTIONAL DRILLING

Fisheries and Oceans Canada
Ontario Operational Statement

Version 3.0

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

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

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

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

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

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

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

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

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

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

1. Use existing trails, roads or cut lines wherever possible, as access routes to avoid disturbance to the riparian vegetation.
2. Design the drill path to an appropriate depth below the watercourse to minimize the risk of frac-out and to a depth

to prevent the line from becoming exposed due to natural scouring of the stream bed. The drill entry and exit points are far enough from the banks of the watercourse to have minimal impact on these areas.

3. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the road or utility right-of-way.

4. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.

  4.1. If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
  4.2. Grading of the stream banks for the approaches should not occur.
  4.3. If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
  4.4. Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
  4.5. Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

5. Operate machinery on land above the ordinary high water mark (see definition below) and in a manner that minimizes disturbance to the banks of the watercourse.

  5.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
  5.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
  5.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
  5.4. Restore banks to original condition if any disturbance occurs.

6. Construct a dugout/settling basin at the drilling exit site to contain drilling mud to prevent sediment and other deleterious substances from entering the watercourse. If this cannot be achieved, use silt fences or other effective sediment and erosion control measures to prevent drilling mud from entering the watercourse. Inspect these measures regularly during the course of construction and make all necessary repairs if any damage occurs.

  6.1. Dispose of excess drilling mud, cuttings and other waste materials at an adequately sized disposal facility located away from the water to prevent it from entering the watercourse.

7. Monitor the watercourse to observe signs of surface migration (frac-out) of drilling mud during all phases of construction.

Emergency Frac-out Response and Contingency Planning

8. Keep all material and equipment needed to contain and clean up drilling mud releases on site and readily accessible in the event of a frac-out.

9. Implement the frac-out response plan that includes measures to stop work, contain the drilling mud and prevent its further migration into the watercourse and notify all applicable authorities, including the closest DFO office in the area (see Ontario DFO office list). Prioritize clean up activities relative to the risk of potential harm and dispose of the drilling mud in a manner that prevents re-entry into the watercourse.

10. Ensure clean up measures do not result in greater damage to the banks and watercourse than from leaving the drilling mud in place.

11. Implement the contingency crossing plan including measures to either re-drill at a more appropriate location or to isolate the watercourse to complete the crossing at the current location. See *Isolated or Dry Open-cut Stream Crossings* Operational Statement for carrying out an isolated trenched crossing.

12. Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with preferably native grass or shrubs.

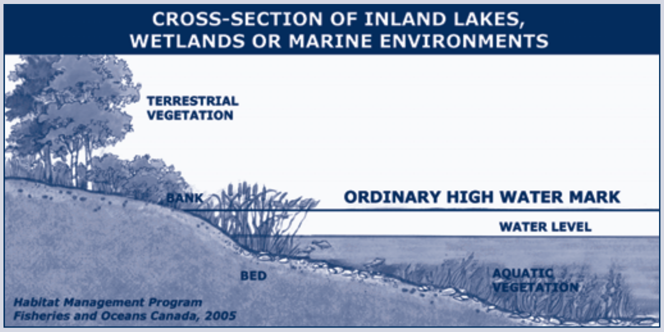
13. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

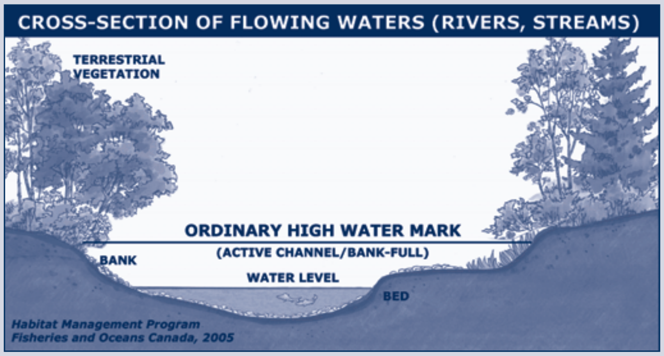
  13.1. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

Definition:

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

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





FISHERIES AND OCEANS CANADA OFFICES IN ONTARIO

Southern Ontario District

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

London
Fisheries and Oceans Canada
73 Meg Drive
London, ON N6E 2V2
Telephone: (519) 668-2722
Fax: (519) 668-1772
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Eastern Ontario District

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Fisheries and Oceans Canada
501 Towerhill Road, Unit 102
Peterborough, ON K9H 7S3
Telephone: (705) 750-0269
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Prescott
Fisheries and Oceans Canada
401 King Street West
Prescott, ON K0E 1T0
Telephone: (613) 925-2865
Fax: (613) 925-2245
Email: ReferralsPrescott@DFO-MPO.GC.CA

Northern Ontario District

Parry Sound
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28 Waubeek Street
Parry Sound, ON P2A 1B9
Telephone: (705) 746-2196
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Thunder Bay and Kenora
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Aussi disponible en français

http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

DFO/2007-1329

Fisheries and Oceans Canada
Pêches et Océans Canada

NOTIFICATION FORM

Fisheries and Oceans Canada
Ontario Operational Statement

Version 3.1

PROPONENT INFORMATION

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

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

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

PROJECT INFORMATION

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

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

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

☐ River, Stream, Creek
☐ Lake (8 hectares or greater)
☐ Marine (Ocean or Sea)
☐ Pond or wetland (pond is less than 8 hectares)
☐ Estuary

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

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

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

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

Signature ______________________________ Date ______________

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

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

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http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

DFO/2007-1329

Fisheries and Oceans Canada
Pêches et Océans Canada

ISOLATED OR DRY OPEN-CUT STREAM CROSSINGS

Fisheries and Oceans Canada
Ontario Operational Statement

Version 1.0

For the purpose of this Operational Statement, the term "Isolated Crossing" means a temporary stream crossing technique that allows work (e.g., trenched pipeline or cable installation) to be carried out "in-the-dry" while diverting the natural flow around the site during construction. These types of open trenched crossings are isolated using flume or dam and pump techniques (see *Pipeline Associated Watercrossings*, 2005 at **http://www.capp.ca/default.asp?V_DOC_ID=763&PubID=96717**). The term "Dry Open-cut Stream Crossing" means a temporary stream crossing work (e.g., trenched pipeline or cable installation) that is carried out during a period when the entire stream width is seasonally dry or is frozen to the bottom.

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

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

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

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

- if working within the Thames River, Sydenham River, Ausable River, Grand River, or Maitland River, you have contacted your Conservation Authority or local DFO Office (see Ontario DFO office list) to ensure that your project will not impact Schedule I mussel species at risk under the federal *Species at Risk Act* (SARA), before proceeding,
- for dry, open-cut crossings the watercourse is dry or frozen completely to the bottom at the site,
- for isolated crossings, the channel width of the watercourse at the crossing site is less than 5 meters from ordinary high water mark to ordinary high water mark (HWM) (see definition below),
- the isolated crossing does not involve the construction or use of an off-stream diversion channel, or the use of earthen dams,
- the isolated crossing ensures that all natural upstream flows are conveyed downstream during construction, with no change in quality or quantity,
- the site does not occur at a stream location involving known fish spawning habitat, particularly if it is dependent on groundwater upwelling,
- the use of explosives is not required to complete the crossing, and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Carrying Out an Isolated or Dry Open-cut Stream Crossing* listed below.

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

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

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

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

1. Use existing trails, roads or cut lines wherever possible, as access routes to avoid disturbance to the riparian vegetation.

2. Locate crossings at straight sections of the stream, perpendicular to the banks, whenever possible. Avoid crossing on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in the erosion and scouring of the stream bed.

3. Complete the crossing in a manner that minimizes the duration of instream work.

4. Construction should be avoided during unusually wet, rainy or winter thaw conditions.

5. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the utility right-of-way.

6. Machinery fording a flowing watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and is to occur only if an existing crossing at another location is not available or practical to use. Operational Statements are also available for *Ice Bridges and Snow Fills*, *Clear-Span Bridges*, and *Temporary Stream Crossing*.

- **6.1.** If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
- **6.2.** Grading of the stream banks for the approaches should not occur.
- **6.3.** If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
- **6.4.** Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
- **6.5.** Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

7. Operate machinery in a manner that minimizes disturbance to the watercourse bed and banks.

- **7.1.** Protect entrances at machinery access points (e.g., using swamp mats) and establish single site entry and exit.
- **7.2.** Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
- **7.3.** Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
- **7.4.** Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.

8. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

9. Stabilize any waste materials removed from the work site, above the HWM, to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.

10. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

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

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

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

11. Time isolated crossings to protect sensitive fish life stages by adhering to fisheries timing windows (see Measure 6.4).

12. Use dams made of non-earthen material, such as water-inflated portable dams, pea gravel bags, concrete blocks, steel or wood wall, clean rock, sheet pile or other appropriate designs, to separate the dewatered work site from flowing water.

- **12.1.** If granular material is used to build dams, use clean or washed material that is adequately sized (i.e., moderately sized rock and not sand or gravel) to withstand anticipated flows during the construction. If necessary, line the outside face of dams with heavy poly-plastic to make them impermeable to water. Material to build these dams should not be taken from below the HWM of any water body.
- **12.2.** Design dams to accommodate any expected high flows of the watercourse during the construction period.

13. Before dewatering, rescue any fish from within the isolated area and return them safely immediately downstream of the worksite.

- **13.1.** You will require a permit from DFO to relocate any aquatic species that are listed as either endangered or threatened under SARA. Please contact your Conservation Authority or the DFO office in your area to determine if an aquatic species at risk is in the vicinity of your project and, if appropriate, use the DFO website at **www.dfo-mpo.gc.ca/species-especes /permits/sarapermits_e.asp** to apply for a permit.

14. Pump sediment laden dewatering discharge into a vegetated area or settling basin, and prevent sediment and other deleterious substances from entering any water body.

15. Remove accumulated sediment and excess spoil from the isolated area before removing dams.

16. Stabilize the **streambed** and restore the original channel shape, bottom gradient and substrate to pre-construction condition before removing dams.

17. Ensure **banks** are stabilized, restored to original shape, adequately protected from erosion and re-vegetated, preferably with native species.

18. If rock is used to stabilize banks, it should be clean, free of fine materials, and of sufficient size to resist displacement during peak flood events. The rock should be placed at the original stream bank grade to ensure there is no infilling or narrowing of the watercourse.

19. Gradually remove the downstream dam first, to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle.

20. During the final removal of dams, restore the original channel shape, bottom gradient and substrate at these locations.

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

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

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

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

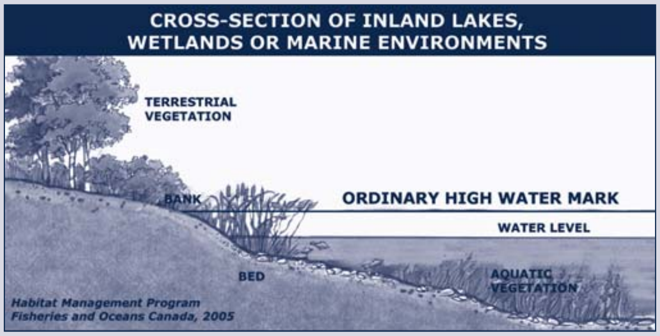
22. Stabilize the **streambed** and restore the original channel shape, bottom gradient and substrate to pre-construction condition.

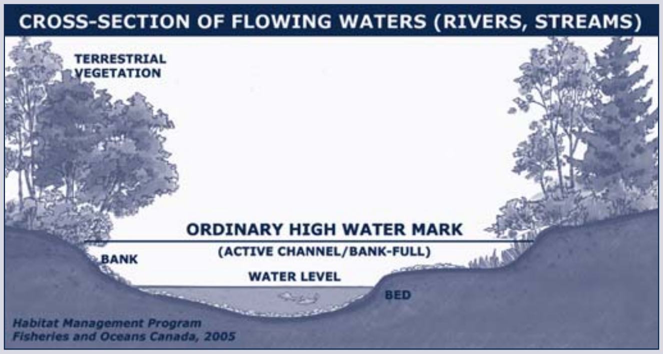
23. Ensure **banks** are stabilized, restored to original shape, adequately protected from erosion and re-vegetated, preferably with native species.

Definition:

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

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





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Aussi disponible en français

http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

DFO/2007-1329

This Operational Statement (Version 1.0) may be updated as required by Fisheries and Oceans Canada. It is your responsibility to use the most recent version. Please refer to the Operational Statements web site at **http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_e.asp** to ensure that a more recent version has not been released.

Fisheries and Oceans Canada | Pêches et Océans Canada

OVERHEAD LINE CONSTRUCTION

Fisheries and Oceans Canada
Ontario Operational Statement

Version 3.0

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

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

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

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

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

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

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

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

Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines

1. Installing overhead lines under frozen conditions is preferable in all situations. On wet terrains (e.g., bogs), lines should be installed under frozen conditions, where possible, or using aerial methods (i.e., helicopter).

2. Design and construct approaches so that they are perpendicular to the watercourse wherever possible to minimize loss or disturbance to riparian vegetation.

3. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or overhead line structures.

  3.1. Wherever possible, locate all temporary or permanent structures, such as poles, sufficiently above the HWM to prevent erosion.

4. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the overhead line. This removal should be kept to a minimum and within the road or utility right-of-way.

5. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.

- **5.1.** If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
- **5.2.** Grading of the stream banks for the approaches should not occur.
- **5.3.** If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
- **5.4.** Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
- **5.5.** Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

6. Operate machinery on land and in a manner that minimizes disturbance to the banks of the watercourse.

- **6.1.** Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
- **6.2.** Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
- **6.3.** Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
- **6.4.** Restore banks to original condition if any disturbance occurs.

7. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

- **7.1.** Avoid work during wet, rainy conditions or use alternative techniques such as aerial methods (i.e., helicopter) to install overhead lines.

8. Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.

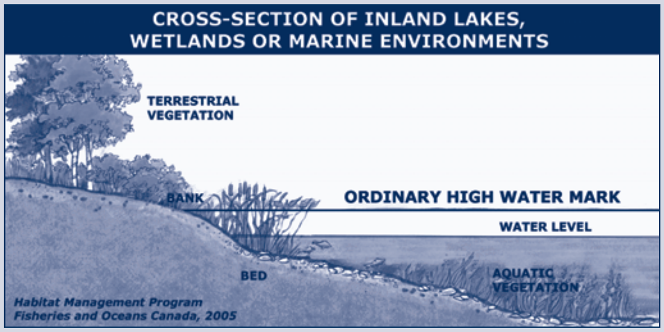
9. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

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

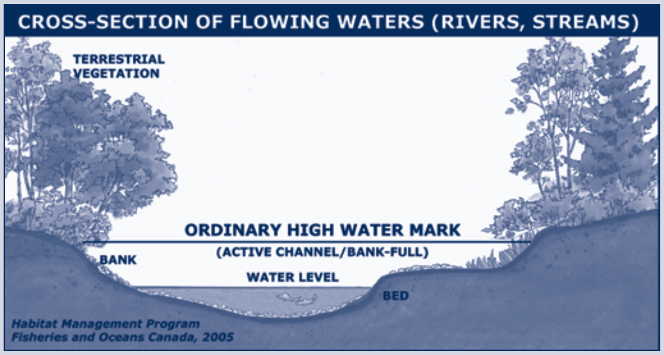
Definition:

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

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


CROSS-SECTION OF INLAND LAKES, WETLANDS OR MARINE ENVIRONMENTS

Habitat Management Program
Fisheries and Oceans Canada, 2005


CROSS-SECTION OF FLOWING WATERS (RIVERS, STREAMS)

Habitat Management Program
Fisheries and Oceans Canada, 2005

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http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

DFO/2007-1329

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Fisheries and Oceans Canada Pêches et Océans Canada

PUNCH & BORE CROSSINGS

Fisheries and Oceans Canada
Ontario Operational Statement

Version 3.0

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

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

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

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

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

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

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

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

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

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

1. A punch or bore crossing can be conducted at any time of the year provided there is not a high risk of failure and it does not require in-water activities such as machinery fording.

2. Design the punch or bore path for an appropriate depth below the watercourse to prevent the pipeline or cable from becoming exposed due to natural scouring of the stream bed.

Canada

3. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site and to excavate the bell holes. This removal is to be kept to a minimum and within the utility right-of-way.

4. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the water body. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

5. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.

  5.1. If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
  5.2. Grading of the stream banks for the approaches should not occur.
  5.3. If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
  5.4. Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
  5.5. Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

6. Operate machinery on land above the ordinary high water mark (HWM) (see definition below) and in a manner that minimizes disturbance to the banks of the watercourse.

  6.1. Machinery is to arrive on-site in a clean condition and is to be maintained free of fluid leaks.
  6.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
  6.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.

7. Excavate bell holes beyond the HWM, far enough away from any watercourse to allow containment of any sediment or deleterious substances above the HWM.

  7.1. When dewatering bell holes, remove suspended solids by diverting water into a vegetated area or settling basin, and prevent sediment and other deleterious substances from entering the watercourse.
  7.2. Stabilize any waste materials removed from the work site (including bell holes) to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.
  7.3. After suitably backfilling and packing the bell holes, vegetate any disturbed areas (see Measure 11).

8. Monitor the watercourse to observe signs of malfunction during all phases of the work.

9. For the duration of the work, keep on-site and readily accessible, all material and equipment needed to contain and clean-up releases of sediment-laden water and other deleterious substances.

10. Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance. This plan is to include measures to: a) stop work, contain sediment-laden water and other deleterious substances and prevent their further migration into the watercourse; b) notify all applicable authorities in the area, including the closest DFO office; c) promptly clean-up and appropriately dispose of the sediment-laden water and deleterious substances; and d) ensure clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse.

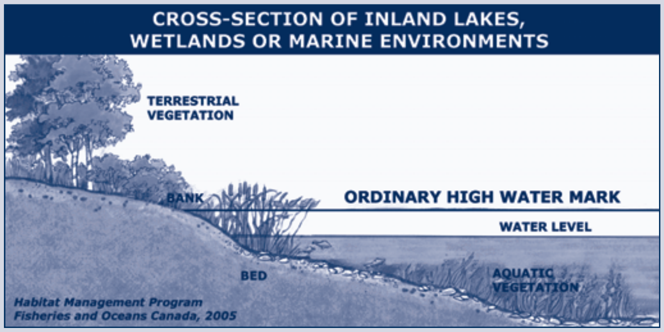
11. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

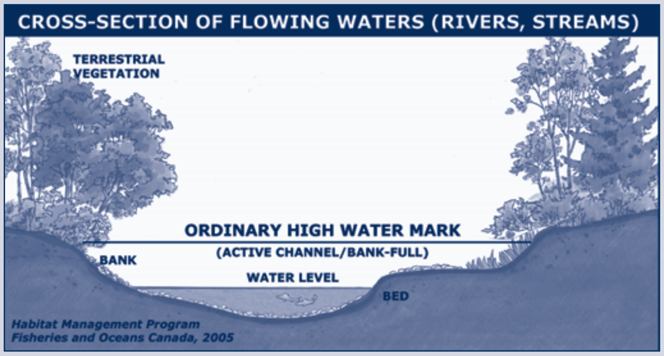
  11.1. Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

Definition:

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

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





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DFO/2007-1329

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Canada

TEMPORARY STREAM CROSSING

Fisheries and Oceans Canada
Ontario Operational Statement

Version 1.0

A temporary stream crossing consists of i) a one-time ford in flowing waters, ii) a seasonally dry streambed ford, or iii) a temporary bridge (e.g., Bailey bridge or log stringer bridge). Temporary stream crossings are employed for short term access across a watercourse by construction vehicles when an existing crossing is not available or practical to use. They are not intended for prolonged use (e.g., forest or mining haul roads). The use of temporary bridges or dry fording is preferred over fording in flowing waters due to the reduced risk of damaging the bed and banks of the watercourse and downstream sedimentation caused by vehicles. Separate Operational Statements are available for *Ice Bridges and Snow Fills* used for temporary access during the winter and for non-temporary *Clear Span Bridges*.

The risks to fish and fish habitat associated with temporary stream crossings include the potential for direct harm to stream banks and beds, release of excessive sediments and other deleterious substances (e.g., fuel, oil leaks), loss of riparian habitat and disruption to sensitive fish life stages.

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

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

- the bridge is no greater than one lane in width, and no part of its structure is placed within the wetted portion of the stream,
- the work does not include realigning the watercourse,
- for fording in flowing waters and temporary bridges, the channel width at the crossing site is no greater than 5 metres from ordinary high water mark to ordinary high water mark (HWM) (see definition below),
- disturbance to riparian vegetation is minimized,
- the work does not involve dredging, infilling, grading or excavating the bed or bank of the watercourse,
- all crossing materials will be removed prior to the spring freshet, or immediately following project completion if this occurs earlier,
- fording involves a one time event (over and back) and will not occur in areas that are known fish spawning sites,
- the crossing will not result in erosion and sedimentation of the stream, or alteration (e.g., compaction or rutting) of the bed and bank substrates,
- the crossing does not involve installation of a temporary culvert, and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Carrying Out a Temporary Stream Crossing* listed below.

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

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

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

Measures to Protect Fish and Fish Habitat when Carrying Out a Temporary Stream Crossing

1. Use existing trails, roads or cut lines wherever possible, as access routes to avoid disturbance to the riparian vegetation.

2. Locate crossings at straight sections of the stream, perpendicular to the bank, whenever possible. Avoid crossing on meander bends, braided streams, alluvial fans, or any other area that is inherently unstable and may result in the erosion and scouring of the stream bed.

3. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the road or utility right-of-way. When practicable, prune or top the vegetation instead of uprooting.

4. Generally, there are no restrictions on timing for the construction of bridge structures or fording seasonally dry streambeds, as they do not involve in-water work. However, if there are any activities with the potential to disrupt sensitive fish life stages (e.g., fording of the watercourse by machinery) these should adhere to appropriate fisheries timing widows (see the *Ontario In-Water Construction Timing Windows*).

5. Machinery fording a flowing watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and is to occur only if an existing crossing at another location is not available or practical to use.

- **5.1.** If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used, provided they do not constrict flows or block fish passage.
- **5.2.** Grading of the stream banks for the approaches should not occur.
- **5.3.** If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary bridge should be used in order to protect these areas.
- **5.4.** The one-time fording should adhere to fisheries timing windows (see Measure 4).
- **5.5.** Fording should occur under low flow conditions, and not when flows are elevated due to local rain events or seasonal flooding.

6. Install effective sediment and erosion control measures before starting work to prevent the entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

7. For temporary bridges also employ the following measures:

- **7.1.** Use only clean materials (e.g., rock or coarse gravel fill, wood, or steel) for approaches to the bridge (i.e., not sand, clay or organic soil) and install in a manner that avoids erosion and sedimentation.
- **7.2.** Design temporary bridges to accommodate any expected high flows of the watercourse during the construction period.
- **7.3.** Restore the bank and substrate to pre-construction condition.
- **7.4.** Completely remove all materials used in the construction of the temporary bridge from the watercourse following the equipment crossing, and stabilize and re-vegetate the banks.

8. Operate machinery in a manner that minimizes disturbance to the watercourse bed and banks.

- **8.1.** Protect entrances at machinery access points (e.g., using swamp mats) and establish single site entry and exit.
- **8.2.** Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
- **8.3.** Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
- **8.4.** Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.

9. Stabilize any waste materials removed from the work site, above the HWM, to prevent them from entering any watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with preferably native grass or shrubs.

10. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

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

Definition:

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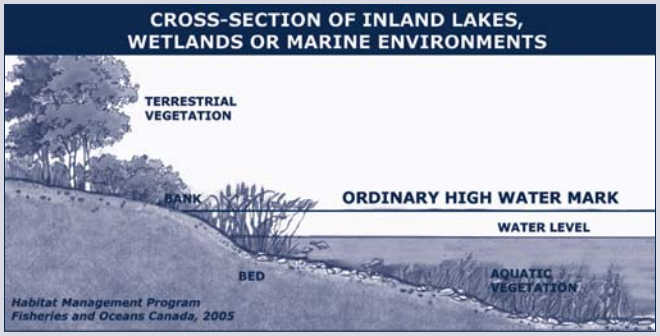
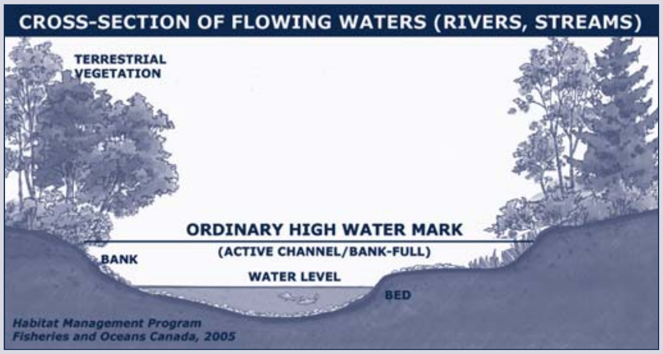


CROSS-SECTION OF INLAND LAKES, WETLANDS OR MARINE ENVIRONMENTS

Habitat Management Program
Fisheries and Oceans Canada, 2005



CROSS-SECTION OF FLOWING WATERS (RIVERS, STREAMS)

Habitat Management Program
Fisheries and Oceans Canada, 2005

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Appendix F

Curricula vitae

Mark C. Pomeroy B.Sc.

Fisheries Biologist

Stantec

Mark has 13 years experience with fisheries habitat and impact assessments, encompassing numerous habitat types including lakes, ponds, large rivers, warmwater and coldwater streams. Past employment with the Department of Fisheries and Oceans (DFO), Grand River Conservation Authority and St. Clair Region Conservation Authority contributes to Mark's extensive working experience with regulatory and approvals processes related to the Fisheries, Conservation Authorities and Drainage Acts. Mark has developed and implemented monitoring, mitigation, compensation and inventory processes. He has also been involved in several projects in a construction monitoring and inspection capicity, where he has resolved various issues related to Fisheries Act approvals and Species at Risk. He has also coordinated many large field sampling programs where data for a large number of varied parameters (such as water quality, fish habitat and community, sediment and benthos) were collected.

EDUCATION

Honours B.Sc. (Agriculture), University of Guelph / Natural Resources Management, Guelph, Ontario, 2000

Fisheries Assessment Specialist and Fisheries Contracts Specialist, MTO/DFO/OMNR Fisheries Protocol Course, Downsview, Ontario, 2006

Class 1 Electrofishing Certificate / Ministry of Natural Resources, Waterloo, Ontario, 2010

Ontario Freshwater Mussel Identification Workshop / Fisheries and Oceans Canada - Canada Centre for Inland Waters, Burlington, Ontario, 2007

PROJECT EXPERIENCE

Environmental Assessments

Pier 22 Environmental Assessment, Hamilton, Ontario (Aquatic Biologist)

Negotiated Fisheries Act approvals for improvements to Pier 22 lands. Improvement works included infill of watercourse reaches on the property. Additionally, contributed relevant input to federal environmental assessment process.

Bruce to Milton, Various, Ontario (Fisheries Biologist)

Planned, coordinated and assisted with execution of large-scale fisheries field program to assess potential impacts of proposed hydroelectric corridor reinforcement project and provided relevant input to the provincial environmental assessment process as well as the Fisheries Act and Conservation Authorities Act permitting processes. Managed data entry, analysis and completed reporting of aquatic resources sections. Coordination of multi-disciplinary team and regulatory agencies for acquisition of appropriate permits and approvals.

Yellow Falls Hydroelectric Project, Smooth Rock Falls, Ontario (Aquatic Biologist)

Planned, coordinated and assisted with execution of fisheries field program to assess potential impacts of proposed hydroelectric dam project. Facilitated acquisition of permits and approvals from relevant agencies. Assisted with fish, benthos, habitat, water and sediment sampling. Authored significant portions of the technical appendix related to aquatic study results.

Environmental Impact Assessments

Georgia Pacific Thorold Cycle 4 EEM, Thorold, Ontario (Aquatic Ecologist)

Assisted in field sampling of fish, benthos, water and sediment for federally regulated pulp and paper environmental effects monitoring.

Spruce Falls Cycle 4 EEM, Kapuskasing, Ontario (Aquatic Ecologist)

Assisted in field sampling of fish, benthos, water and sediment for federally regulated pulp and paper environmental effects monitoring.

Smooth Rock Falls Cycle 4 EEM, Smooth Rock Falls, Ontario (Aquatic Ecologist)

Assisted in field sampling of fish, benthos, water and sediment for federally regulated pulp and paper environmental effects monitoring.

Highway and Transportation

Detroit Windsor Truck Ferry Improvements (Design) (GWP 3071-06-00), Windsor, ON (Fisheries Biologist)

Provided aquatic community and habitat assessment services as well

as input regarding project design, construction staging and silt and sediment control planning. Acquired approvals under Fisheries Act and Conservation Authorities Act related to fish habitat.

** denotes projects completed with other firms*

Mark C. Pomeroy B.Sc.

Fisheries Biologist

Highway 24 Intersection Improvements, Cambridge, ON (Fisheries Biologist)
Provided fish rescue services. Performed environmental inspection duties related to implementation of the Fisheries Act compensation plan and resolution of onsite issues related to construction.

Detroit Windsor Truck Ferry Improvements (Contract Administration) (WP 3071-06-00), Windsor, ON (Fisheries Biologist)
Construction monitoring services related to Fisheries Act implications (fish removals, species at risk identification training for contract staff , staging and implementation design review), provision of advice regarding alternative staging/construction operations to prevent impacts to aquatic habitat/organisms.

Natural Resource Services

Municipal Drain Classification Program*, Various, Ontario (Drain Assessment Technician)
Planned and implemented large scale sampling protocol designed by DFO to assess the sensitivity of various municipal drains to disturbance. Sampling program encompassed all drains within the Grand River watershed and consisted of habitat, thermal and fish community characterization based on extensive field sampling. Analyzed substantial quantities of field data, summarized results and produced interim and final reports.

Fish Habitat Study*, Strathroy, Ontario (Biological Technician)
Planned and implemented field program to sample fish community in reservoirs managed by the St. Clair Region Conservation Authority. Responsible for writing final report concerning existing fish habitat status and providing recommendations based on field data. Participated in water quality and benthic community field sampling programs.

Various Environmental Assessments*, Sarnia, Ontario (Fish Habitat Biologist)
Assessed project proposals for impacts to fish habitat as defined in the Fisheries Act. Carried out screening level environmental assessments of proposed projects under the Canadian Environmental Assessment Act. Participated in outreach programs and inter-agency work groups regarding Species at Risk recovery.

Urban Land

Berczy Dam Removal, Markham, Ontario (Fisheries Biologist)
Provided fish rescue services, including resolution of issues related to Species at Risk.

Medway Sanitary Trunk Sewer Extension, London, Ontario (Fisheries Biologist)
Assisted with approvals application to DFO, MNR regarding pipeline crossing of Medway Creek and assessing potential impact to Species at Risk and fish habitat.

Fox Hollow Subdivision, London, Ontario (Fisheries Biologist)
Facilitated acquisition of approvals from DFO for the realignment of the Heard Drain/Snake Creek and the installation of a stormwater management pond in relation to construction of the Fox Hollow Subdivision. Performed construction inspection services, resolved onsite implementation issues related to the Fisheries Act.

Fanshawe Park Road Widening, London, Ontario (Fisheries Biologist)
Facilitated acquisition of approvals from DFO for the realignment of Heard Drain/Snake creek during the expansion of Fanshawe Park Road. Performed construction inspection services, resolved onsite implementation issues related to the Fisheries Act.

** denotes projects completed with other firms*

Edward G. Malindzak M.Sc.

Fisheries Biologist

Edward is a Biologist with Stantec's Environmental Management group with a background in fisheries science, environmental management, and impact assessments. Ed has experience in conducting environmental effects monitoring (EEM), environmental impact studies (EIS), ecological risk assessments, environmental baseline studies and statistical analysis of biological data.

Edward's academic background includes a graduate thesis in stream fish ecology. His experience is focused in fish biology in lentic and lotic systems, with extensive experience in fish inventories and habitat assessments in urban and remote environments. Ed is experienced in Fisheries Act Authorization process, as well as permitting requirements of other federal, provincial (particularly Ontario), and regional agencies for altering watercourses as they relate to the *Fisheries Act*, the *Conservation Authority Act*, the *Public Lands Act*, the *Lakes and Rivers Improvement Act*, *Navigable Waters Protection Act*, and the *National Parks Act*.

EDUCATION

B.Sc., North Carolina State University / Specialization in Fisheries and Wildlife Science, Raleigh, North Carolina, 2003

M.Sc., North Carolina State University / Specialization in Fisheries and Wildlife Science: Minor in Statistics, Raleigh, North Carolina, 2006

Training Certificate, United States Fish and Wildlife Service / Electrofishing Certification, Raleigh, North Carolina, 2005

Training Certificate, Fisheries Specialist, MTO, DFO, MNR / Protocol for Protecting Fish Habitat on Provincial Transportation Undertakings, Downsview, Ontario, 2006

Training Certificate, MNR / Class 2 Electrofishing Certification (Crew Leader), Guelph, Ontario, 2009

Training Certificate, Royal Ontario Museum / Fish Identification Workshop, Toronto, Ontario, 2008

PROFESSIONAL ASSOCIATIONS

Member, American Fisheries Society.

PROJECT EXPERIENCE

Environmental Assessments

Chesterville Waterfront Development, Chesterville, Ontario (Fisheries Biologist)

Collected existing information on the natural environment, provided design input to minimize impacts to fish and fish habitat, and consulted with federal, provincial, regional, and local agencies to coordinate and expedite approvals process.

Chippewa Creek Culvert Removal, North Bay, Ontario (Fishereries Biologist)

Completed assessment of anticipated impacts to cool water fish and fish habitat related to the removal a rail line culvert crossing and associated pedestrian pathway. Provided significant input towards compensation plan development related impacts of the culvert removal impacts on a National and Provincial Species of Special Concern.

TransCanada Pipelines Limited Petawawa Sales Meter Station, Petawawa, Ontario (Fisheries Biologist)

Completed environmental impact assessment for proposed metering station in Petawawa, Ontario.

Mining

Cycle 3 Environmental Effects Monitoring (EEM) Program for Hudson Bay Mining & Smelting Co. Ltd., Flin Flon, Manitoba (Fisheries Biologist)

Conducted remote fish community inventories and collected benthic invertebrate, sediment, and water quality samples, as well as lethal and non-lethal fish tissue samples for mercury analysis, according to Environment Canada protocols. Also statistically analyzed and reported results on fisheries data to determine whether the mine effluent was responsible for a fish community level effect.

Cycle 2 Environmental Effects Monitoring (EEM) Program for Hudson Bay Mining & Smelting Co. Ltd., Flin Flon, Manitoba (Fisheries Biologist)

Conducted remote fish community inventories and collected benthic invertebrate, sediment, and water quality samples, as well as lethal and non-lethal fish tissue samples for mercury analysis, according to Environment Canada biological monitoring protocols. Also statistically analyzed and reported results on fisheries data to determine whether the mine effluent was responsible for a fish community level effect.

Environmental Effects Monitoring (EEM) Program for Kirkland Lake Gold Inc., Kirkland Lake, Ontario (Fisheries Biologist)

Statistically analyzed and reported on fisheries data, according to Environment Canada biological monitoring protocols, to determine whether mine effluent was responsible for a fish community level effect. Incorporated fisheries, benthic, and water quality investigation findings into the final long-term monitoring report.

INCO Junction Creek Environmental Effects Monitoring Confirmatory Study Design, Sudbury, Ontario (Fisheries Biologist)

Produced confirmatory study design conforming to Environment Canada biological protocols for an Environmental Effects Monitoring program related to INCO's Junction Creek mining operation.

Natural Resource Services

Island Falls Hydroelectric Project, Smooth Rock Falls, Ontario (Fisheries Biologist)

Biological and hydrological assessment of proposed dam construction and anticipated impacts to fish, fish habitat, and upstream passage in preparation for compensation negotiations with Fisheries and Oceans Canada and Ontario Ministry of Natural Resources.

Environmental Impact Studies for Power Projects, Various Sites, Ontario (Fisheries Biologist)

Assessed potential environmental impacts from power development proposals. Conducted fish community inventories in watercourses and prepared reports providing summaries of existing fish communities, likely sensitivities, mitigation solutions to minimize impacts to the natural environment and net effects analyses. EIS experience includes:

- Bruce to Milton Transmission Reinforcement Project, Multiple Sites, Ontario
- Ostrander Point Wind Energy Park, Near Picton, ON
- TransCanada Pipelines Limited Sales Meter Station, Petawawa, ON

Environmental Impact Studies for Land Development, Various Sites, Ontario (Fisheries Biologist)

Assessed potential environmental impacts from land development proposals. Conducted fish community inventories in watercourses, and prepared habitat and impact assessments providing summaries of existing fish communities, sensitivities of fish and fish habitat, mitigation solutions to minimize impacts to the natural environment, and net effects analyses. EIS experience includes:

- Ashcroft East Urban Lands, Ottawa, ON
- La Cité collégiale , Ottawa, ON
- Oxford Village Residential Development, Kemptville, ON
- Richcraft Homes Residential Development, Stittsville, ON
- U88 Climatic Chamber Facilities Extension, Ottawa, ON
- Upper Feedmill Creek Development, Stittsville, ON
- Valcartier Water Park, Limoges, ON

Barrhaven South Development, Ottawa, Ontario (Fisheries Biologist)

Completed impact assessment and compensation plan related to the decommissioning of four municipal drains south of the Jock River within the City of Ottawa. Benefits of the proposed compensation measures to fish and fish habitat included an overall net gain in fish habitat quality and quantity due, in part, to habitat improvements at the mouths of the four drains. Additional gains in habitat were realized through the channel realignment and natural channel design principles coupled with extensive re-vegetation and the creation suitable fish habitats (i.e. pool/riffle sequences and linear wetlands). New fish habitat was created in a constructed pond with a total volume of 6500 m^3. The construction of this pond and the proposed channel re-alignments increased the productive capacity of these waters, with the potential to increase fish biomass up to 10 times.

Melfa Cresent Bank Stabilization Project, Ottawa, Ontario (Fisheries Biologist)

Collected, compiled, and reported existing aquatic and terrestrial conditions in support of bank stabilization work on the Rideau River within the City of Ottawa.

Hazeldean Tributary Realignment, Ottawa, Ontario (Fisheries Biologist)

Completed assessment of anticipated impacts to fish and fish habitat related to a tributary realignment, developed comprehensive mitigation plan, coordinated submissions and negotiated mitigation to avoid compensation with associated conservation authority, Fisheries and Oceans Canada and Ontario Ministry of Natural Resources.

** denotes projects completed with other firms*

Edward G. Malindzak M.Sc.

Fisheries Biologist

Research

Literature Search and Summary of Habitat Needs of Canadian Amphibian Species (Aquatic Ecologist)

Researched, compiled, and evaluated relevant literature for on water bodies that provide amphibian habitat. Literature included grey and white papers identified though internet and library database searches. Additionally, data was collected from prominent amphibian researchers.

Review of Ammonia Toxicity to Fish in the Marine Environment (Aquatic Ecologist)

Researched, compiled, and summarized peer-reviewed scientific literature related to the toxicity of ammonia in the marine environment. Completed an assessment of the potential impacts associated with a marine discharge for INCO Limited.

Literature Search and Evaluation for Future Development of Canadian Water Quality Guidelines for Agricultural Uses (Aquatic Ecologist)

Researched, compiled, critically evaluated and summarized peer-reviewed scientific literature since the derivation of the current guideline describing physical and chemical properties, production, uses, sources, environmental fate, behaviour, toxicology and effects and environmental levels of copper, manganese, boron, cadmium and E. coli as they relate to irrigation for Environment Canada.

Development of Nutrient Standards for Streams Draining Agricultural Land Uses (Aquatic Ecologist)

Performed statistical analysis of the nutrient data contained in the NAESI Freshwater Nutrient Database to explore relationships between nutrient concentrations and biological conditions (algal biomass) in rivers in agricultural areas. The purpose was to assist Environment Canada in the development of performance standards for nutrients in surface waters in Canadian agricultural regions.

Case Study Analysis for Impacted, Flowing Water Bodies for the CCME National Water Quality Index (Fisheries Biologist)

Developed case studies to provide a comparison between the various statistical approaches to be used to determine site-specific natural background concentrations for impacted flowing water bodies, as applied in the context of the Canadian Water Quality Index.

Transportation Planning

Meadow Creek Bridge Replacement (GWP 181-92-00), Iroquois Falls, Ontario (Fisheries Biologist)

Collected aquatic habitat data and produced an impact assessment report outlining likely temporary and permanent impacts to aquatic habitat, provided mitigation recommendations and provided input during detail design to minimize impacts to fish habitat related to a bridge replacement. Consulted and negotiated with regulatory agencies and submitted Form 1 "No HADD" and supporting documentation in support of the replacement of the Meadow Creek Bridge for the Ontario Ministry of Transportation.

Key River Bridge Replacement (GWP 87-96-00), Parry Sound, Ontario (Fisheries Biologist)

Collected aquatic habitat data and produced an impact assessment report outlining likely temporary and permanent impacts to aquatic habitat, provided mitigation recommendations and provided input during detail design to minimize impacts to fish habitat related to a bridge replacement. Consulted and negotiated with regulatory agencies and submitted Form 1 "No HADD" and supporting documentation in support of the replacement of the Key River Bridge for the Ontario Ministry of Transportation.

Highway 69 Patrol Yard Site Selection (GWP-5094-06-00), Parry Sound / Sudbury, Ontario (Fisheries Biologist)

Collected aquatic habitat data and produced existing conditions report outlining potential impacts to aquatic habitat and mitigation recommendations for proposed works. Provided input during the site selection process during preliminary design to minimize impacts to fish habitat related to of three new highway maintenance patrol yards for the Ontario Ministry of Transportation.

Highway 11 Access Review at the South Entrance to Powassan (GWP 323-00-00), Powassan, Ontario (Fisheries Biologist)

Collected aquatic habitat data and produced existing conditions report outlining potential impacts to aquatic habitat and mitigation recommendations for proposed works. Provided design input during preliminary design of a new highway interchange to minimize impacts to fish habitat related to a new highway interchange for the Ontario Ministry of Transportation.

Road Improvement Projects, Various Sites, Ontario (Fisheries Biologist)

Collected aquatic habitat field data and produced numerous existing conditions and habitat assessment reports related to roadway improvement works. Where required, Fisheries Act Authorization was obtained and Fish Habitat Compensation Plans were developed. Potential impacts to aquatic habitat were described for the following studies:

- City of Ottawa, Cumberland Transitway (Phase 1)
- City of Ottawa, West Transitway
- Township of Horton, Garden of Eden Road Widening
- Defense Construction Canada, Re-alignment of Leitrim Road, Ottawa, ON
- Defense Construction Canada, Roadside Drain Improvements, Farnham, QC

City of Ottawa Light Rail Project, Ottawa, Ontario (Fisheries Biologist)

Assessment of 17 cool and warmwater watercourse crossings associated with the proposed rail project. Crossings included CSP culverts of various diameters, concrete box culverts (box and open bottom), and large bridge spans. Specific tasks included: collection of existing and archival fish and fish habitat data, development of a comprehensive fisheries compensation plan to facilitate Department of Fisheries and Oceans permitting, coordination of federal, provincial, and regional permit applications for watercourse crossings as they related to various Regulatory Acts.

Water Resources Management

Environmental Effects Monitoring (EEM) Program for Spruce Falls Inc., Kapuskasing, Ontario (Fisheries Biologist)

Statistically analyzed and reported on fisheries data, according to Environment Canada biological monitoring protocols, to determine whether the mill effluent was responsible for a fish community level effect.

Shekak River Post Impoundment Environmental Monitoring for the Shekak-Nagagami Hydroelectric Development, Hearst, Ontario (Fisheries Biologist)

Statistically analyzed and reported on fish mercury concentrations, according to Environment Canada biological monitoring protocols, to determine whether the impoundment has contributed to a fish community-level effect.

Year Ten Environmental Monitoring Program, Cochrane, Ontario (Fisheries Biologist)

Conducted remote environmental monitoring program to evaluate existing environmental conditions including fish and benthic invertebrate communities, sediment and water quality, and mercury accumulation in fish (lethal and non-lethal fish tissue sampling) to determine potential impacts ten years since impoundment for hydroelectric power facility. Collected and statistically analyzed data using Environment Canada biological protocols.

Stream Fish Sampling Project*, Utuado, Puerto Rico (Research Technician)

Collection of data directed at cataloguing native and introduced fish species richness, distribution, population sizes and habitat utilization in the remote central mountain region of Puerto Rico.

Indian Creek Fishway Project*, Roebuck, Ontario (Fisheries Technician)

Designed and constructed an offline fishway in an intermittent stream to provide spawning fish upstream access to traditional spawning grounds. Completed hydrologic modeling and field surveys to assess existing habitat conditions, developed fishway design criteria, and monitored and maintained sediment and erosion control measures.

** denotes projects completed with other firms*

Edward G. Malindzak M.Sc.

Fisheries Biologist

PUBLICATIONS

Cope, W.G., R.M. Heltsley, D. Shea, R.B. Bringolf, T.J. Kwak and E.G. Malindzak. Development of novel, non-lethal sampling techniques to assess organic contaminants in fish. *Annual Meeting of the North Carolina Chapter of the American Fisheries Society. Greensboro, North Carolina. January 31-February 1*, 2006.

Kwak, T.J., E.G. Malindzak and J.R. Brewster. Catfish Ecology and Management Symposium. Invited speaker, introduced flathead catfish, dam removal and endangered species. *Annual Meeting of the Southern Division of the American Fisheries Society. San Antonio, Texas. February 8-12*, 2006.

Heltsley, R.M., W.G. Cope, D. Shea, R.B. Bringolf, T.J. Kwak and E.G. Malindzak. Assessing Organic Contaminants in Fish: Comparison of a Non-lethal Tissue Sampling Technique to Mobile and Stationary Passive Sampling Devices. *Environmental Science & Technology. 39:7601-7608*, 2005.

Malindzak, E.G. and T.J. Kwak. Movement and habitat use of introduced riverine flathead catfish: implications for imperiled fishes and dam removal. *135th Meeting of the American Fisheries Society. Anchorage, Alaska. September*, 2005.

Kathleen R. O. Todd M.Sc.

Senior Aquatic Ecologist

Kathleen's experience is focused in aquatic biology, including stream, lake and wetland assessments, benthic macroinvertebrate identification and biomonitoring, and fisheries habitat studies. She has experience conducting environmental impact studies, environmental effects monitoring programs, baseline studies and watershed plans. Using ecosystem based approaches, typical multidisciplinary project involvement includes Class EAs and infrastructure siting/routing studies, evaluating alternative design concepts and developing mitigative solutions to minimize impacts to the natural environment.

Kathleen has acquired an understanding of federal and provincial legislation, policies and procedures for natural heritage features, particularly regarding working in and around fish habitat in Ontario. She is experienced in the Fisheries Act Authorization process, including evaluating the effects of development on aquatic habitat, designing fish habitat mitigation measures, and negotiating Fisheries Compensation Strategies. In addition, Kathleen serves as a team leader for aquatic science staff in Ontario, including professionals in the fields of fisheries biology, fluvial geomorphology, and aquatic invertebrate taxonomy.

EDUCATION

M.Sc., Watershed Ecosystems, Trent University, Peterborough, Ontario, 2003

B.Sc. (Env.), Environmental Sciences, University of Guelph, Guelph, Ontario, 1997

Certified in the Ecological Land Classification (ELC) System for Southern Ontario, Ontario Ministry of Natural Resources, Turkey Point, Ontario, 2000

Qualified Southern and Northern Ontario Wetlands Evaluator, Ontario Ministry of Natural Resources, North Bay, Ontario, 2000

Fisheries Assessment Specialist and Fisheries Contracts Specialist, MTO/DFO/OMNR Fisheries Protocol Course, Downsview, Ontario, 2006

Ontario Freshwater Mussel Identification Workshop / Fisheries and Oceans Canada, Burlington, Ontario, 2008

Qualified Electrofishing Operator (Class 2), Ontario Ministry of Natural Resources, Guelph, Ontario, 2010

PROFESSIONAL ASSOCIATIONS

Member, North American Benthological Society

PROJECT EXPERIENCE

Environmental Assessment

Northwest Area Planning and Servicing Review, Welland, Ontario* (Environmental Scientist)

Conducted a review of natural heritage features and identified development-related constraints in a newly designated urban area.

Willoughby Lands Golf Course Facility, Niagara Region, Ontario* (Aquatic Ecologist)

Obtained Fisheries Act Authorization for development of a golf course facility. Supervised an underwater dive investigation to survey aquatic habitat along a series of alternative Niagara River water intake pipe alignments. The study lands also support habitat for a rare aquatic plant and an extensive program was proposed to ensure its protection. Environmental monitoring during construction was conducted.

Municipal Water and Wastewater EAs, Various Sites, Ontario* (Aquatic Ecologist)

Evaluated natural heritage features in terms of ecological sensitivity and watermain and/or trunk sewer construction feasibility options (tunnel vs. open cut). Aquatic habitat conditions were assessed at all potential watercourse crossings and recommendations were provided regarding Fisheries Act requirements, construction mitigation measures and timing restrictions on in-water works. Also responsible for siting a chlorine booster station, surface water treatment plants and pumping stations, and mitigating impacts from emergency overflow of chlorinated water into adjacent watercourses. Water and wastewater experience includes:

- *City of Barrie, Surface Water Treatment Plant Class EA & Impact Assessment*
- *Region of Niagara (Point Abino), Water Supply Class EA*
- *Region of Peel (Brampton), West Brampton Reservoir, Pumping Station & Watermain Class EA*

** denotes projects completed with other firms*

- Region of York (Etobicoke), Steeles Avenue West Forcemain Class EA
- Region of York (Markham), Southeast Collector Trunk Sewer Class EA

Natural Sciences & Heritage Resources

Environmental Impact Studies for Land Development, Various Sites, Ontario (Project Manager)

Assessed potential environmental impacts from land development proposals. Conducted ecological community inventories in watercourses, wetlands and woodlots. Prepared Environmental Management Plans providing net effects analyses, mitigation solutions to minimize impacts to the natural environment, buffer zone recommendations, and re-vegetation and restoration activities. Participated in consultation to address agency concerns. EIS experience includes:
- Block 34 East Landowners Group Inc., Block 34 East Natural Environment Report, Vaughan, Ontario
- Block 41-28W Development Group Inc., Block 41 Natural Environment Report, Vaughan, Ontario
- Boca East Investments Limited, Block 64 Master Environmental Servicing Plan (Natural Environment Chapter), Vaughan, Ontario
- Georgian International Land Corp., Buffalo Springs Development Environment Report, Township of Oro-Medonte
- Keirland Developments Inc., Meadows of Bear Creek Subdivision Phases 2 & 3 EIS, Barrie, Ontario
- Kleinburg Heights Holdings Inc., Kleinburg Heights Natural Environment Report, Vaughan, Ontario

Environmental Impact Studies for Land Development, Various Sites, Ontario* (Project Manager)

Assessed potential environmental impacts from land development proposals. Conducted ecological community inventories in watercourses, wetlands and woodlots. Prepared Environmental Management Plans providing net effects analyses, mitigation solutions to minimize impacts to the natural environment, buffer zone recommendations, re-vegetation and restoration activities, proposed trail routes and community stewardship programs. Participated in public open houses to address the concerns of local residents. Where required, environmental monitoring during construction was conducted. EIS experience includes:
- City of London, Dearness Home for Seniors Redevelopment EIS, London, Ontario
- Fieldgate Developments, Tresstown Subdivision EIS, Stouffville, Ontario
- Grey Gables School, Proposed Private School Site, Ecological Assessment, St. Catharines
- Lebovic-Fieldgate Developments, Functional Servicing Plan, Ecological Component, Stouffville, Ontario
- Norwest Land Corp., Kains Road East Development EIS, London, Ontario
- Quinte's Isle Campark, Scoped EIS, Prince Edward County, Ontario
- Sifton Properties Ltd., Equestrian Condominium Communities, Development Assessment Reports, Township of Middlesex Centre & Municipality of West Middlesex
- Sifton Properties Ltd., River Bend Community Phases 1&2 EIS, London, Ontario
- St. Joseph's Health Care Centre, Parkwood Hospital Scoped EIS, London, Ontario
- Westhill Redevelopment Company Limited, Aurora Golf Course Community EIS, Aurora, Ontario

River Bend Community Phases 1 & 2, Environmental Monitoring Protocol & Baseline Study*, London, Ontario (Environmental Scientist)

Established baseline aquatic, terrestrial and soils conditions in the vicinity of a golf course community. Subsequently, the Environmental Monitoring Program - Year 1 and, later, Year 3, were submitted to document any potential impacts.

Ecological Risk Assessment of Residual Heavy Oil in a Wetland*, Drumbo, Ontario (Environmental Scientist)

Analyzed stream and wetland data to determine potential aquatic food chain impacts of a historical heavy oil release. Analyzed invertebrate community structure and identified exposure pathways and community end-points. Considered site remediation options on the basis of these data.

Dufferin Aggregates Acton Quarry Extension, Acton, Ontario (Aquatic Ecologist / Project Manager)

The extension of the existing Acton Quarry is proposed to meet the need for additional close-to-market aggregate resources of high quality Amabel Dolostone. The area of focus encompasses approximately 615 ha, across two Conservation Authority watersheds within the Regional Municipality of Halton Hills. Kathleen has participated in extensive ecological field work, including aquatic species surveys and habitat assessments, inventories for potential Species at Risk habitat, and aquatic rehabilitation planning. She has co-authored technical reports produced in accordance with the PPS and ARA application requirements, as well as participated in interdisciplinary consultation with agencies and agency-appointed committees.

Otonabee Landfill Site Biological Assessment Study*, Peterborough, Ontario (Wetlands Ecologist)

Prepared a 'Surface Water Quality Study' to address background water quality and aquatic habitat conditions and a 'Natural Environment Report' to identify baseline wetland and terrestrial environment conditions. The study was designed to identify potential impacts from existing landfill operations and to predict future impacts from proposed landfill site expansion.

** denotes projects completed with other firms*

Forest City Industrial Lands, Wetland Evaluation & Environmental Assessment*, London, Ontario (Wetlands Ecologist)

Evaluated a locally significant wetland according to the Ontario Wetland Evaluation System and revised the existing boundaries of a provincially significant wetland in cooperation with MNR.

West Nile Virus Information Package, Ballantrae, Ontario (Environmental Scientist)

Designed a pamphlet to educate residents and golfers regarding West Nile virus, the status of the virus in York Region, and the client's proactive mosquito monitoring program.

Confidential Client, Environmental Baseline and Feasibility Study for a Decommissioned Gold Mine*, Northern, Ontario (Environmental Scientist)

Conducted aquatic and terrestrial habitat inventories to determine the environmental feasibility of re-opening a gold mine. Assessed streams, wetlands and woodlots. Conducted invertebrate and fish collections, avifauna and wildlife surveys, and vegetation community inventories.

Transportation Planning

MTO Aquatic and Terrestrial Biology Retainer Services, Southwestern Ontario (Project Manager / Fisheries Specialist)

Under the terms of two 2-year Retainer Agreements (2004-2006, 2007-2009) eleven individual assignments were completed, involving: characterizing existing ecological conditions, assessing site sensitivities and impacts related to proposed bridge/culvert repairs and highway improvements, recommending environmental mitigation measures, and conducting during/post-construction monitoring. Value added components included: fluvial geomorphological services, design and implementation of bio-engineered slope stabilization solutions, Permit to Take Water applications, and site rehabilitation and Planting Plans. Extensive agency liaison was required with staff from numerous Conservation Authority, MNR and DFO offices.

Municipal Road Improvement Projects, Various Sites, Ontario (Environmental Scientist)

Collected aquatic and terrestrial habitat field data, conducted environmental impact assessments, and obtained required agency approvals related to municipal transportation projects, including:

- *City of Hamilton, Bridge & Culvert Master Plan**
- *City of London, Airport Road Widening**
- *City of London, Bradley Avenue Extension*
- *City of London, Western Road Widening*
- *Town of Markham, Woodbine Avenue By-Pass**
- *Township of Wilmot, Haysville Bridge Replacement**

Natural Sciences Reports Related to MTO Highway Improvement Works, Various Sites, Ontario (Fisheries Specialist)

Produced numerous Natural Sciences reports related to highway improvement works. Where required, Fisheries Act Authorization was obtained and Fish Habitat Compensation Plans were developed. Potential impacts to aquatic habitat, terrestrial vegetation, wetlands and wildlife were described for the following studies:

- *Highway 6 (Flamborough)**
- *Highway 6 (Guelph)*
- *Highway 6 By-Pass (Caledonia)**
- *Highway 7 (Marmora)**
- *Highway 7 (Peterborough)**
- *Highway 7A/28/115 (Peterborough)**
- *Highway 8 (Dublin)**
- *Highways 11/17 (North Bay)*
- *Highways 11/17 (Thunder Bay)*
- *Highways 11/101 (Matheson)*
- *Highway 17 (Stonecliffe)**
- *Highway 17/Municipal Road 55 (Sudbury)*
- *Highway 17 Southwest By-Pass (Sudbury)*
- *Highways 17/531 (North Bay)**
- *Highway 21 (Bluewater)*
- *Highway 21 (Grand Bend)*
- *Highway 23 (Palmerston)*
- *Highway 24 Interchange Improvements (Cambridge)*
- *Highway 26 (Meaford)*
- *Highway 26 (Owen Sound)*
- *Highway 63 (Bancroft)**
- *Highway 63 (North Bay)**
- *Highway 401/403 (Woodstock)*
- *Highway 401/County Road 41 (Napanee)**
- *Highway 518 (Orrville)**

West Nile Virus Surveillance Program, Various Sites, Central Ontario (Aquatic Ecologist)

Evaluating the potential for MTO owned/managed properties (e.g. stormwater ponds) to be mosquito breeding habitats, and recommended suitable strategies to curtail mosquito breeding success.

Bridge Widening, CN Rail Mile 119.6*, Kingston, Ontario (Aquatic Ecologist)

Procured federal Fisheries Act Authorization related to a rail line widening project over a warmwater creek. Conducted a post-construction monitoring program to confirm the viability of the habitat compensation measures.

** denotes projects completed with other firms*

Environmental Data Collection, CN Rail Corridor*, Toronto to Hornepayne, Ontario (Environmental Scientist)
Identified, collected and assessed secondary source natural heritage data for a study area that followed the CNR corridor from Toronto to Hornepayne. The data were then transferred to a GIS database, to be used during emergency planning.

Water Resources Management
Minnow Lake Restoration*, Sudbury, Ontario (Aquatic Ecologist)
Coordinated a lake-wide monitoring program to evaluate the degree of water pollution resulting from stormwater discharge to an urban lake. Participated in frequent public consultation to liaise with residents of the Minnow Lake Restoration Group.

Fort Creek Restoration*, Sault Ste. Marie, Ontario (Aquatic Ecologist)
In consultation with DFO, completed a restoration plan for an urban creek that outlets to Lake Huron and provides salmon spawning habitat. Habitat enhancement involved the removal of in-stream debris, channel stabilization, riparian plantings, substrate enhancement, and creation of refuge areas. Fisheries Act Authorization was obtained, and environmental monitoring during construction was conducted.

Environmental Effects Monitoring Programs for Mining Sector Clients, Various Sites, Canada (Benthic Ecologist)
Contributed benthic ecology chapter to numerous EEM reports for Canadian metal mines. Analyzed and reported on invertebrate data to determine whether the respective mine effluent was resonsible for an aquatic community level effect. EEM experience includes:
- Hudson Bay Mining & Smelting Co. Ltd., Chisel North Mine, Snow Lake, Manitoba
- Hudson Bay Mining & Smelting Co. Ltd., Snow Lake Mill / Anderson Tailings, Snow Lake, Manitoba
- Hudson Bay Mining & Smelting Co. Ltd., Flin Flon Tailings Impoundment System and Trout Lake Mine, Flin Flon, Manitoba
- Hudson Bay Mining & Smelting Co. Ltd., Ruttan Mine, Leaf Rapids, Manitoba
- Hudson Bay Mining & Smelting Co. Ltd., Konuto Lake Mine, Denare Beach, Saskatchewan
- SMC (Canada) Ltd., McAlpine Mill, Cobalt, Ontario

Environmental Effects Monitoring Programs for Pulp and Paper Sector Clients, Various Sites, Canada (Benthic Ecologist)
Contributed the benthic ecology chapter to numerous EEM reports for Canadian pulp and paper mills. Statistically analyzed and reported on invertebrate data, according to Environment Canada biological monitoring protocols, to determine whether the respective mill effluent was responsible for an aquatic community level effect. EEM project experience includes:
- Cascades Fine Papers Group Thunder Bay Inc., Lake Superior, Thunder Bay, Ontario
- Georgia-Pacific Canada Inc., Lake Gibson, Thorold, Ontario
- Kimberly-Clark Incorporated, Lake Superior, Terrace Bay, Ontario
- Marathon Pulp Inc., Lake Superior, Marathon, Ontario
- Nexfor Fraser Papers, Saint John River, Edmunston, New Brunswick
- Norampac Inc., Lake Superior, Red Rock, Ontario
- Spruce Falls Inc., Kapuskasing River, Kapuskasing, Ontario
- Stora Enso Port Hawkesbury Limited, Strait of Canso, Port Hawkesbury, Nova Scotia
- Tembec Industries Inc., Mattagami River, Smooth Rock Falls, Ontario

Watershed Based Biomonitoring Program for Urban Development, Oakville, Ontario (Benthic Ecologist)
Sampled and analyzed the Fourteen Mile Creek invertebrate community to establish baseline conditions, prior to the development of a housing subdivision. Six subsequent years of during-construction monitoring were conducted.

North and South Meade Creeks Subwatershed Plan*, Peterborough, Ontario (Aquatic Ecologist)
Conducted fish collections and population analyses, invertebrate sampling and identification, and collected and analyzed water chemistry samples. The information was used to predict the ecological sensitivity of Meade Creek and to provide recommendations regarding the extent and type of future development permitted in the watershed.

Pike River Aquatic Impact Assessment*, Field, Ontario (Benthic Ecologist)
Sampled fish, invertebrates and benthic sediments within the vicinity of a chlorinated discharge zone to determine the extent of chlorine related effects to the aquatic environment.

Biological Impact Assessment of a Closed Landfill on the Maitland River, Wingham, Ontario (Benthic Ecologist)
Analyzed Maitland River invertebrate community data within the vicinity of a closed landfill to determine the potential impact of landfill leachate.

Receiver Biomonitoring Program, Elmira, Ontario (Benthic Ecologist)

Analyzed invertebrate community data to determine the viability of an industrial contaminated groundwater collection and treatment system which discharges treated water to Canagagigue Creek.

Shekak River Post Impoundment Environmental Monitoring for the Shekak-Nagagami Hydroelectric Development, Hearst, Ontario (Aquatic Ecologist)

Addressed agency concerns regarding environmental monitoring in the headpond area of a river impoundment. Evaluated shoreline erosion and the viability of fish habitat compensation measures, including a walleye spawning shoal and aquatic invertebrate enhancement works.

Environmental Effects Monitoring Program for the Antamina Mine & Port Facility, Peru (Benthic Ecologist)

Analyzed biological (metal concentrations in fish and shellfish tissues, fish health, benthic invertebrate community structure) and physical (water and sediment chemistry) data collected in the vicinity of both an inland mine (freshwater environment) and a coastal mining port facility (marine environment) to determine if the local ecosystems were being adversely affected by mining/shipping operations.

Benthic Invertebrate Monitoring Program*, Caledonia, Ontario (Benthic Ecologist)

Assessed the Fox Creek invertebrate community to determine if the stream habitat was being adversely affected by adjacent mining effluent discharge.

** denotes projects completed with other firms*

Kathleen R. O. Todd M.Sc.

Senior Aquatic Ecologist

PUBLICATIONS

Todd, K.R.O., M.G. Fox and D.C. Lasenby. Presented at the 52nd Annual Meeting of the North American Benthological Society. Seasonal influence of riparian vegetation on stream macroinvertebrate community structure. *North American Benthological Society, Vancouver, B.C. (June 6-10)*, 2004.

Todd, K.R.O. The Influence of Deciduous and Coniferous Riparian Vegetation on Aquatic Macroinvertebrate Community Structure in Low Order Streams of South Central Ontario. *M.Sc. Thesis, Trent University*, 2003.