GRAND VALLEY WIND FARMS – PHASE 3 WIND PROJECT

WATER ASSESSMENT AND WATER BODY REPORT

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1.0 Introduction

Grand Valley Wind Farms Inc. (GVWF) is proposing to develop, construct, operate and decommission the 40 megawatt (MW) Grand Valley Wind Farms - Phase 3 Wind Project (the Project) in the Town of Grand Valley and Township of Amaranth, Dufferin County in response to the Government of Ontario's initiative to promote the development of renewable electricity in the province.

The Project Study Area is generally bordered on the north by Highway 89, on the south by County Road 109, on the east by 9th Line and on the west by East West Luther Townline. The proposed Project Location includes all parts of the land in, on or over which the Project is proposed (the 'construction area' for the Project). The proposed Project Study Area and Project Location are shown in Figures 1 and 2, Appendix A.

The basic components of the Project include:

- Between 14 and 17 wind turbine generators (Siemens SWT-2.3-113 and/or SWT 3.0-113 turbine) with a total maximum installed nameplate capacity of 40 MW. The turbine models are identical in structure, and would be 'de-rated', generating less electricity per turbine to meet the contract nameplate capacity. Noise Assessment Reports have been completed for both turbine models as part of the Renewable Energy Approval (REA) process;
- A 34.5 kV underground power line collector system that would transport the electricity generated from the Project to the Hydro One Networks Inc. (HONI) transmission system;
- Fibre optic cabling laid with the underground collector lines;
- Turbine access roads;
- Crane pads;
- One connection point to the existing HONI electrical transmission system;
- Existing operations and maintenance facilities to be leased by the Project (joining the current facilities for the operation of the Grand Valley Phase 1 and 2 Wind Projects). The currently municipally-serviced office facility is located at 35A Main Street South, Grand Valley and the currently unserviced warehouse facility is located at 27 Mill Street West, Grand Valley;
- Existing parking (owned) and gravel quarry (leased) sites to be used for employee parking and temporary construction trailer sites (174321 and 173395 County Road 25, Grand Valley);

- A 34.5 kV/230 kV 45 MVA transformer station; and,
- Meteorological equipment, including an approximately 100 m MET tower or a ground mounted SoDAR unit.

Temporary components include:

- Work and storage areas during construction at the turbine locations and along the underground power line collector system; and,
- Office, parking and storage areas during construction for the work crews during the construction phase of the Project.

GVWF retained Stantec Consulting Ltd. (Stantec) to prepare the REA application with input from Zephyr North Ltd., and Archaeological Services Inc. The REA application is a requirement under Ontario Regulation 359/09 - Renewable Energy Approvals under Part V.0.1 of the *Environmental Protection Act* (O. Reg. 359/09), as amended. According to subsection 6 (3) of O. Reg. 359/09, the Project is classified as a Class 4 Wind Facility and will follow the requirements identified in O. Reg. 359/09 for such a facility.

1.1 PROJECT LOCATION

The Project is located on privately-owned land and within municipal road right-of-way (ROW) in the Town of Grand Valley and Township of Amaranth, Dufferin County, Ontario (Appendix A, Figures 1 and 2).

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

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

For the purposes of this Project, the Project Location (construction area) includes the footprint of the facility components, plus any temporary work and storage locations and facility components (Figure 2). The boundary of the Project Location is used for defining setback and site investigation distances according to O. Reg. 359/09. The construction area would be delineated on private lands, and all construction and installation activities would be conducted within this designated area. Similarly, all installation activities related to collector lines would be contained within the boundaries of the municipal road ROW, to the satisfaction of the Town of Grand Valley, the Township of Amaranth, and Dufferin County, acting reasonably.

Although O. Reg. 359/09 considers the REA process in terms of the Project Location, the siting of wind projects is an iterative process, and final location of Project components is not available at Project outset. Therefore, a Project Study Area is developed to examine the general area

within which the Project components may be sited; information gathered within this larger area feeds into the siting exercise.

The Project Study Area is generally bordered on the north by Highway 89, on the south by County Road 109, on the east by 9th Line and on the west by East West Luther Townline. The Project Study Area was determined through professional judgment and experience with the well-known and generally predictable environmental effects of the construction and operation of wind facilities and associated infrastructure.

Project siting has been refined over the course of the Project assessment, and results can now be presented in terms of Project Location instead of Project Study Areas, although the Project Study Areas continue to be used for public notification.

1.2 REPORT REQUIREMENTS

A Water Assessment 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. If water bodies are identified within 120 m of the Project Location, a Water Body Report must be prepared. Additionally, if any Lake Trout lakes that are at or above development capacity are identified within 300 m of the Project Location, then a Water Body Report is required.

A renewable energy project includes all activities associated with the construction, installation, use, operation, maintenance, changing or retiring of the renewable energy generation facility. Therefore, for the purposes of measuring the distance from the Project Location to a water body, a Project Location is considered to be the outer limit where site preparation and construction activities will occur and where infrastructure will be located (e.g. temporary structures, laydown areas, storage facilities, generation equipment, access roads, transmission lines less than 50 km in length, etc.).

Table 1.1 summarizes the documentation requirements of the Water Assessment and Water Body Reports 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.	✓	2.2, 4.0
2. A site investigation conducted in accordance with section 31, including:		
31(4)(1). A summary of any corrections to the report.	✓	Section 3.0, Table 3.1, Figures 2.1 to 2.7
31(4)(2). Information relating to each water body.	✓	4.1
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

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

Requirements (Water Assessment)	Completed	Section Reference
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.	✓	Table 4.1, Appendix C
If an investigation was conducted by visiting the site:		
31(4)(6)(ii). The duration of the site investigation.	✓	Table 4.1, Appendix C
31(4)(6)(iii).The weather conditions during the site investigation	✓	Table 4.1, Appendix C
31(4)(6)(iv). Field notes kept by the person conducting the site investigation.	✓	Appendix C
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 that 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.	✓	4.1, 5.0
5. Report identifies mitigation measures in respect of any negative environmental effects.	✓	6.0
6. Report describes how the environmental effects monitoring plan addresses any negative environmental effects.	✓	7.0
7. Report describes how the construction plan report addresses any negative environmental effects.	✓	6.0, 7.1

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".

2.2 RECORDS REVIEW

A water records review was conducted according to Section 30(1) of O. Reg. 359/09. Data were gathered through agency requests and/or accessing online databases as follows:

- Ontario Ministry of Natural Resources (MNR)
    - Land Information Ontario (LIO) mapping database
    - Background fisheries data acquired from Owen Sound Area office and Guelph District office
- Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA)
- Grand River Conservation Authority (GRCA)
- Town of Grand Valley
- Township of Amaranth

Copies of all correspondence related to the Records Review will be provided in the Record of Consultation which will be submitted as part of the complete REA application to the Ontario Ministry of the Environment (MOE). Information obtained as a result of the information requests/records review are presented in Section 4 of this report.

Figures depicting the watercourses and waterbodies identified by LIO mapping (MNR, 2009) are included in **Figures 2.1** to **2.7, Appendix A**, where "watercourses" and "waterbodies" are water features (including lakes, rivers, streams, etc.), as mapped by the MNR. These water features may or may not meet the definition of a water body as described in Section 2.1. Potential waterbodies were also identified through a review of aerial photographs of the Zone of

Investigation. Further information on these potential water bodies was obtained during the site investigations (as described in Section 2.3).

The MNR and GRCA provided background data regarding fish communities at a number of locations in the Zone of Investigation. DFO's Drain Classification mapping was obtained from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA website, 2012).

2.3 SITE INVESTIGATIONS

Site investigations were carried out according to Section 31 of O. Reg. 359/09. The investigations were conducted on several dates as presented in **Table 4.1**. Records of field investigations are included in **Appendix C** and are summarized in Section 4.0.

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 during the records review; and
- Identify the boundaries of any water body located within 120 m of the Project Location.

While on site, the field crews used visual inspections to verify the presence or absence of water bodies within 120 m of the Project Location.

In some cases, marshes or portions of other on-line wetland features meet the definition of a water body if they are part of a permanent or intermittent channel or seepage area. All other wetland types identified within the Zone of Investigation do not contain channels and, therefore, do not meet the definition of a water body under O. Reg. 359/09 and are addressed in the Natural Heritage Assessment (NHA).

Once locations of water bodies were confirmed, a general aquatic habitat assessment was conducted within the 120 m Zone of Investigation. A combination of background data and results of Stantec's 2012 surveys were used to determine the presence or absence of fish habitat within the 120 m Zone of Investigation.

Alternative site investigations were conducted for two reaches located on Galbraith Extension Drainage Works (Reach 7-4) and No. 21 Drainage Works (Reach 6-7). Alternative site investigations were conducted on April 10, 2013 due to recent changes to the layout of Project components, the timing of which precluded site visits. As a result of the collection of background data and field data, an assessment was made with respect to the presence or absence of fish habitat at each surveyed reach.

The following criteria were used for the designation of fish habitat:

- **Fish Habitat** – permanently flowing watercourse with available fish community data or intermittently flowing channel contributing indirectly (e.g., allochthonous inputs, flow) to downstream reaches supporting fish.
- **Not Fish Habitat** – not directly connected to a downstream water feature that supports fish or as per background data.

2.4 QUALIFICATIONS

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

- Mark Pomeroy, B.Sc. – Fisheries Biologist
- Kelly Mason B.Sc. (Env.), ERGC – Aquatic Ecologist
- Kathleen Todd, M.Sc. – Senior Aquatic Ecologist
- Marc Faiella, Tech. Dipl., CEPIT – Aquatic Ecologist
- Mitch Ellah, Tech. Dipl., B.Sc. – Aquatic Ecologist

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

3.0 Water Bodies and Fish Habitat within the 120 m Zone of Investigation

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 features within 120 m of the Project Location, are summarized in **Table 3.1a** and illustrated in **Figures 2.1** to **2.7** (**Appendix A**). Photographs and field notes of these investigations are provided in **Appendices B** and **C** respectively.

Sixteen reaches of twelve water bodies were identified within the 120 m Zone of Investigation. Some of the surface water features identified on MNR mapping (e.g. watercourses) did not exist in the field or consisted of surficial drainage; therefore, these features were not classified as water bodies during Stantec's 2012 field investigations (**Table 3.1a**). Corrections based on field investigations are summarized in **Table 3.1b**. A summary of water bodies and associated Project components is presented in **Table 3.2**. Distances from turbine blade tip to each water body are shown on **Figures 2.1** to **2.7**. During the field investigations, there were no additional water bodies, lakes or seepage areas identified within 120 m of the Project Location other than those described in Sections 4.1 and 4.2.

The presence of fish habitat within the 120 m Zone of the Investigation was determined through a combination background data review and field observations. Fish habitat is illustrated in **Figures 2.1** to **2.7** (**Appendix A**).

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.

Review of sourcewater protection planning documents indicates that the Project Location is within the Lake Erie Source Protection Region (LESPR). According to the *Draft Source Protection Plan for the Grand River Source Protection Area within the Lake Erie Source Protection Region* (hereafter referred to as the "Draft Plan") prepared by the Lake Erie Source Protection Committee (LESPRC) (2012), two Wellhead Protection Zones are located near the eastern limit of the Project Location within the Town of Grand Valley, but are not within 120 m of any Project components. The locations are illustrated on Figure 5.6, Volume II of the Draft Plan (LESPRC, 2012).

Table 3.1a: Water Body Assessment Summary

Watercourse/Water Feature	Water Body Station(s)	Non-Water Body Station(s)	Report Figure #	Water Body	Not a Water Body Criteria							
					No Surface Feature Present	Grassed Waterway/Swale+	Temporary Channel for Surface Drainage*	Roadside Ditch*	Temporarily Ponded Area Normally Farmed*	Dugout Pond*	Rock Chute*	Other
Galbraith Extension Drainage Works	7-1	7-3	2.7	√		√						
Thompson Drainage Works	7-4		2.7	√								
Galbraith Drain	7-2		2.7	√								
No. 21 Drainage Works	5-3, 6-1, 6-2, 6-7, 18-3a	6-3	2.4, 2.5	√								
No. 16 Drainage Works	19-1		2.6	√								
Unnamed Tributary of No. 16 Drainage Works		19-2	2.6		√							
Grand River	18-1		2.4	√								
Palmer Drain	18-2		2.4	√								
Bruce Drainage Works	18-3b		2.4	√								
Gajtani Drainage Works	17-1		2.3	√								
No. 7 Drainage Works	12-4, 12-1	12-3, 12-2	2.3	√		√						
Atkinson Drainage Works	3-2		2.2	√								
No. 1 Drain	2-1	2-3	2.1	√								
No. 2 Drainage Works	1-1, 1-3		2.1	√								
Unnamed Tributary of No. 15 Drainage Works		11-1	2.7		√							
Unnamed Pond		3-1	2.2							√		
Unnamed Tributary of No. 2 Drainage Works		1-2	2.1		√							

*as per REA Definition O. Reg. 359/09

+low lying feature with no defined channel and not dominated by aquatic vegetation

Table 3.1b: Summary of orrections to Water Bodies

Watercourse Name	Site Number	Correction	Figure Number
Unnamed Trib of No. 2 Drainage Works	1-2	Mapped feature not a water body	2.1
Potter Drain	12-3	Mapped feature not a water body	2.2
Atkinson Drainage Works	3-2	Mapped feature not a water body	2.2
Young Drainage Works	n/a	Mapped feature not a water body	2.2
Unnamed Trib of No. 16 Drainage Works	19-2	Mapped feature not a water body	2.4
Trib 2 of No. 16 Drainage Works	7-3	Mapped feature not a water body	2.6
Trib 1 of No. 15 Drainage Works	n/a	Mapped feature not a water body	2.7
Trib 2 of No. 15 Drainage Works	11-1	Mapped feature not a water body	2.7
Thompson Drainage Works	7-4	Mapped feature on the east side of Sideroad 21&22 not a water body	2.7

Table 3.2: Water Body Project Component Summary

Water Body	Station(s)	Crossing Type		Project Component(s) with 120 m		
		Access Road*	Collector Line	Turbine	Access Road*	Collector Line
Galbraith Extension Drainage Works	7-1	√				√
Galbraith Drain	7-2		√			
Thompson Drainage Works	7-4		√			
No. 21 Drainage Works	6-1	√		√	√	√
No. 21 Drainage Works	6-2		√			
No. 21 Drainage Works	6-7		√			
No. 16 Drainage Works	19-1		√			
Grand River	18-1		√			
Palmer Drain	18-2		√			
Bruce Drainage Works	18-3a		√			
No. 21 Drainage Works	18-3b		√			
No. 21 Drainage Works	5-3		√			
Gajtani Drainage Works	17-1		√			
No. 7 Drainage Works	12-4		√			
Potter Drain	12-1			√		√
Atkinson Drainage Works	3-2					√
No. 1 Drain (Boyne Creek)	2-1		√			
No. 2 Drainage Works (Boyne Creek)	1-3		√			
No. 2 Drainage Works (Boyne Creek)	1-1	√				

* includes crane path and underground collector line

4.0 Existing Conditions and Predicted Impacts

4.1 OVERVIEW OF FISHERIES AND AQUATIC HABITAT

In the following sub-sections, available background data are provided for each water body, followed by site-specific information regarding physical habitat as determined by Stantec in 2012. Mapped features that were not deemed to be water bodies are listed in **Table 3.1** with exclusion criteria indicated. Only those water features occurring within 120 m of the Project Location, and that were deemed to be water bodies, are summarized in Section 4 and in **Table 4.3**.

Weather conditions during field investigations are presented in **Table 4.1**.

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 applicable 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 GRCA, and/or DFO may result in site-specific construction methods and mitigation measures for some locations.

Table 4.1: Field Investigations

Dates	Daily Duration of Site Visit	Air Temperature (Range) °C	Weather during 24 hours prior to Survey
October 9, 2012	10:45 am – 3:45 pm	10-12	Mix of sun and cloud, no precipitation.
October 10, 2012	10:10 am – 4:15 pm	8-10	Overcast, scattered showers, strong wind.
October 11, 2012	9:40 am – 3:20 pm	8-10	Rain and light to strong wind.
October 12, 2012	10:15 am – 1:45 pm	0-10	Mix of sun and cloud, mixed precipitation (snow and rain), strong wind.
October 17, 2012	10:10 am – 4:35 pm	8-10	Overcast, rain, moderate wind.
October 18, 2012	10:35 am – 2:00 pm	15	Sunny.
November 29, 2012	10:00 am -10:30 am	-1	Cloudy, light snow.

The Study Area and Project Location fall within the jurisdiction of the Grand River Conservation Authority, specifically within the Upper Grand River Reach as delineated in the Grand River Fisheries Management Plan (GRFMP) (GRCA, 2005).

The Project Location is situated south of the Grand River headwaters and immediately east of Luther Marsh. The watershed is primarily rural, containing agricultural land and forested areas within Amaranth Township and Town of Grand Valley. Within the Project Location, the Upper

Grand River Watershed is characterized by generally flat topography, with many intermittent, first order watercourses that drain directly into the mainstem of the Grand River (GRCA, 2005).

Data obtained from the Guelph and Owen Sound MNR offices indicate the presence of the following fish species within the Project Location:

- Northern Pike
- Central Mudminnow
- Northern Hog Sucker
- White Sucker
- Blacknose Dace
- Bluntnose Minnow
- Brassy Minnow
- Carp
- Central Stoneroller
- Common Shiner
- Creek Chub
- Fathead Minnow
- Golden Shiner
- Hornyhead Chub
- Longnose Dace
- Northern Redbelly Dace
- Pearl Dace
- Brown Bullhead
- Brook Stickleback
- Bluegill
- Pumpkinseed
- Rock Bass
- Smallmouth Bass
- Fantail Darter
- Iowa Darter
- Johnny Darter
- Least Darter
- Rainbow Darter
- Yellow Perch
- Mottled Sculpin

Within the Project Location, watercourses consist predominantly of municipal drains. Under the *Drainage Act*, municipal drains in Ontario have been classified according to an alphabetical system ranging from A through F, with each class corresponding to a particular set of physical characteristics related to flow periodicity, thermal regime, and the presence or absence of sensitive species such as top level predators, or species at risk. The drain classification system is used exclusively as a tool to streamline drain maintenance activities, but watercourse thermal regime and general fish community information associated with the drain class provides additional information that is useful in the characterization of water bodies (see **Table 4.2**).

Table 4.2: Water Bodies, DFO Drain Class and Thermal Regime

Water Body	DFO Drain Class	Thermal Regime
No. 2 Drainage Works (Boyne Creek)	C	Warmwater
Atkinson Drainage Works	C	Warmwater
No. 21 Drainage Works	D	Warmwater
No. 21 Drainage Works	C	Warmwater
Galbraith Drain	C	Warmwater
Galbraith Extension Drainage Works	C	Warmwater
Gajtani Drainage Works	A	Coldwater (no salmonids)
Palmer Drain	E	Coldwater
Bruce Drainage Works	A	Coldwater (no salmonids)
No. 16 Drainage Works	C	Warmwater
Unnamed Tributary of No. 16 Drain	n/a	Warmwater
No. 1 Drain (Boyne Creek)	B	Warmwater

Habitat information at the locations identified in **Figures 2.1** through **2.7** (**Appendix A**) is provided in **Table 4.3** along with references to general impacts, mitigation measures and predicted net effects of specific Project components.

As discussed in Section 2.3, alternative site investigations were conducted for a reach of Galbraith Extension Drainage Works (Reach 7-4) and a reach of No. 21 Drainage Works (Reach 6-7). Air photo interpretation was used to assess reach 7-4 and a combination of air photo interpretation and previous field investigations at a nearby reach were used to assess reach 6-7. The connecting reach (6-2) is located immediately across Amaranth-Luther Townline.

Table 4.3: Summary of Fish Habitat within the 120 m Zone of Investigation

Reach ID[a] (Station/Water course)	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
7-1 (Galbraith Extension Drainage Works)	Intermittent flow dominated by flat morphology. Riparian area dominated by grasses and *Typha*. In-stream cover consists of aquatic vegetation such as *Typha*, ribbon leaf pondweed and duckweed. Bankfull width = 0.75 m Wetted width = 0.30 m Water depth = 15 cm Substrate = sand, silt, muck and gravel. Presence of Northern Pike noted by MNR.	Access Road to cross a water body. Collector line to be within 120 m of a water body.	Construction activities associated with installing access road and the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1, 5.2, and 5.3).	See Sections 6.1, 6.2, and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
7-2 (Galbraith Drain)	Intermittent flow dominated by flat morphology. Riparian area dominated by grasses. Bankfull width = 1.5 m Wetted width = 1.2 m Water depth = 10 cm Substrate = sand, gravel, cobble and detritus. Presence of Northern Pike noted by MNR.	Collector line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
7-4 (Thompson Drainage Works)	Air photo interpretation was used for this site investigation. Intermittent flow dominated by riparian grasses.	Collector line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
6-1 (No. 21 Drainage Works)	Intermittent flow with 100% flat morphology. Riparian area dominated by grasses. No in-stream cover observed. Bankfull width = 2.5 m Wetted width = 2 m Water depth = 30 cm Substrate = 100% grass based Presence of Mottled Sculpin noted by MNR.	Collector line and Access Road to cross a water body. Access road, collector line, and turbine to be located within 120 m of a water body.	Construction activities associated with installing the collector line, access road and turbine may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1, 5.2 and 5.3).	See Sections 6.1, 6.2 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
6-2 (No. 21 Drainage Works)	Permanent flow with 100% run morphology. Riparian area dominated by grasses and herbaceous meadow species. In-stream cover consists of undercut banks, deep pools and aquatic vegetation such as floating leaf burreed (*Sparganium* sp.). Bankfull width = 4 m Wetted width = 2 m Water depth = 60 cm Substrate = sand, gravel, silt and detritus. Presence of Mottled Sculpin noted by MNR.	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1and 5.3).	See Sections 6.1and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
6-7 (No. 21 Drainage Works)	Based on alternative site investigations 6-7 is similar to site 6-2 therefore, has a permanent flow. Riparian area dominated by grasses and herbaceous meadow species. In-stream cover consists of undercut banks, deep pools and aquatic vegetation such as floating leaf burreed (*Sparganium* sp.).	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1and 5.3).	See Sections 6.1and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected

Table 4.3: Summary of Fish Habitat within the 120 m Zone of Investigation

Reach ID[a] (Station/Water course)	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
19-1 (No. 16 Drainage Works)	Permanent flow with 100% run morphology. Riparian area dominated by grasses and herbaceous meadow species. The in-stream cover consists of undercut banks, deep pools, boulder and aquatic vegetation such as bulrush, *Typha* sp., and reed canary grass. Bankfull width = 6 m Wetted width = 4 m Water depth = 20 cm Substrate = cobble, gravel, boulder and sand.	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
18-1 (Grand River)	Permanent flow dominated by pool and run morphology. Riparian area dominated by mature white cedar, sugar maple and white ash. Iin-stream cover consists of deep pools, woody debris, and boulders. Bankfull width = 19 m Wetted width = 17 m Water depth = 100 cm Substrate = cobble, gravel, sand, boulder, and silt. Presence of Smallmouth Bass noted by MNR.	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
18-2 (Palmer Drain)	Permanent flow with 100% flat morphology. Riparian area dominated by small trees and shrubs. In-stream cover consists of undercut banks, deep pools, boulders and aquatic vegetation such as sedges. Bankfull width = 10 m Wetted width = 7 m Water depth = 75 cm Substrate = gravel, sand, cobble, boulder and detritus. Presence of Smallmouth Bass noted by MNR.	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
18-3a (Bruce Drainage Works)	Permanent flow dominated by pool morphology. Riparian area dominated by mature trees and shrubs consisting of ash, poplar, dogwood and cedar. In-stream cover consists of undercut banks, deep pools, boulders, woody debris and watercress. Bankfull width = 3 m Wetted width = 2.5 m Water depth = 20 cm Substrate = cobble, gravel, sand, boulder and detritus. Presence of Smallmouth Bass noted by MNR.	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
18-3b (No. 21 Drainage Works)	Permanent flow dominated by pool morphology. Riparian area dominated by mature trees and shrubs consisting of ash, poplar, dogwood and cedar. In-stream cover consists of undercut banks, deep pools, boulders, woody debris and watercress. Bankfull width = 3 m	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected

Table 4.3: Summary of Fish Habitat within the 120 m Zone of Investigation

Reach ID[a] (Station/Water course)	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
	Wetted width = 2.5 m Water depth = 20 cm Substrate = cobble, gravel, sand, boulder and detritus. Presence of Smallmouth Bass noted by MNR.				
5-3 (No. 21 Drainage Works)	Permanent flow dominated by pool morphology. Riparian area dominated by mature trees and shrubs consisting of ash, poplar, dogwood and cedar. In-stream cover consists of undercut banks, deep pools, boulders, woody debris and watercress. Bankfull width = 3 m Wetted width = 2.5 m Water depth = 20 cm Substrate = cobble, gravel, sand, boulder and detritus. Presence of Mottled Sculpin noted by MNR.	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
17-1 (Gajtani Drainage Works)	Permanent flow dominated by flat morphology. Riparian area dominated by herbaceous meadow species and grasses. In-stream cover consists of undercut banks, boulders and watercress. Bankfull width = 4 m Wetted width = 2 m Water depth = 20 cm Substrate = cobble, gravel, sand, boulder and detritus.	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
12-4 (No. 7 Drainage Works)	Permanent flow dominated by run morphology. Riparian area dominated by herbaceous meadow species and mature trees. In-stream cover consists predominantly of aquatic vegetation such as watercress and reed canary grass. Bankfull width = 4 m Wetted width = 1 m Water depth = 5-10 cm Substrate = gravel and sand.	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
12-1 (Potter Drain)	Intermittent flow with 100% run morphology. Riparian area dominated by trees and shrubs. In-stream cover consists of aquatic vegetation such as *Typha* sp. Bankfull width = 2 m Wetted width = 1 m Water depth = 10 cm Substrate = muck and silt.	Collector Line and turbine to be within 120 m of a water body.	Construction activities associated with installing the collector line and turbine may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Section 5.1).	See Section 6.1. Ensure implementation of appropriate mitigation measures.	None expected
3-2 (Atkinson Drainage Works)	Shallow, intermittent flow observed during field investigations. Riparian area dominated by *Typha* sp. and reed canary grass. In-stream cover consists of aquatic vegetation. Bankfull width = 4.5 m Wetted width = 1.5 m Water depth = 2 cm	Collector Line to be within 120 m of a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Section 5.1).	See Sections 6.1. Ensure implementation of appropriate mitigation measures.	None expected

Table 4.3: Summary of Fish Habitat within the 120 m Zone of Investigation

Reach ID[a] (Station/Water course)	Site Description*	Proposed Works	Potential Impacts	Mitigation	Net Effects[b]
	Substrate = clay, gravel, silt and soil.				
2-1 (No. 1 Drain)	Intermittent flow dominated by flat morphology. Riparian area dominated by herbaceous meadow species. In-stream cover consists of aquatic vegetation such as watercress. Bankfull width = 2 m Wetted width = 1 m Water depth = 15 cm Substrate = gravel, sand and cobble.	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing Construction (Appendix D).	None expected
1-3 (No. 2 Drainage Works/Boyne Creek)	Intermittent flow dominated by run morphology. Riparian area dominated by terrestrial grasses. In-stream cover consists of aquatic vegetation such as reed canary grass. Bankfull width = 3 m Wetted width = 1.5 m Water depth = 5 cm Substrate = silt, sand, gravel, cobble and muck.	Collector Line to cross a water body.	Construction activities associated with installing the collector line may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1 and 5.3).	See Sections 6.1 and 6.3, DFO Operational Statement for High Pressure Directional Drill, Punch and Bore, Isolated or Dry Open-cut Stream Crossing, Construction (Appendix D).	None expected
1-1 (No. 2 Drainage Works/Boyne Creek)	Permanent flow dominated by flat morphology. Riparian area dominated by shrubs and grasses. Bankfull width = 2 m Wetted width = 1.2 m Water depth = 20 cm Substrate = detritus, silt, sand and clay.	Access road to cross a water body.	Construction activities associated with installing the culvert may affect the reach outside the constructible area (e.g. Temporary increase in surface water turbidity due to runoff during construction. (see Sections 5.1, 5.2 and 5.3).	See Sections 6.1 and 6.2.	None expected

a see Appendix A
b assumes all mitigation measures are implemented and successful
*summary of the surveyed reach

4.2 SUMMARY OF CULVERT CROSSINGS AT WATER BODIES

Based on the current Project layout, it may be necessary to acquire approval from DFO under the federal *Fisheries Act*, due to culvert installations. Approvals may include the need for *Fisheries Act* Authorization if DFO deems impacts to fish habitat to be substantial. Based on previously submitted REA applications, it is likely that Project-related impacts to aquatic habitat can be mitigated and that DFO can issue a Letter of Advice confirming that proposed mitigation measures will prevent net effects to fish and fish habitat.

Locations where *Fisheries Act* approval may be necessary include sites where new roads and culverts are proposed, as well as locations where Project activities require that the size or orientation of existing road culverts is substantially altered. The three locations where culvert crossings are proposed at water bodies, and where *Fisheries Act* approval may be necessary, include:

- Galbraith Extension Drainage Works (Station 7-1, **Figure 2.7**)
- No. 21 Drainage Works (Station 6-1, **Figure 2.4**)
- No. 2 Drainage Works (Boyne Creek) (Station 1-1, **Figure 2.1**)

The conclusions of no net effects (**Table 4.3**) assume that negative effects associated with turbine construction and underground collector line installation can be mitigated. It may then be possible to use DFO Operational Statements (see Appendix D) 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 DFO may result in site-specific construction methods and mitigation measures for some locations. In such cases, additional sites may require review by DFO, and details of construction methods, etc. should be submitted for agency review.

5.0 General Overview of Potential Impacts

5.1 GENERAL CONSTRUCTION-RELATED IMPACTS

Potential Project construction activities include land clearing, soil stripping, grubbing, and grading. Potential impacts to watercourses located within 120 m of the Project Location may include:

- Short-term increase in turbidity from runoff and soil erosion during construction;
- Loss of shade;
- Reduced bank stability;
- Reduced allochthonous inputs; and
- Water quality and habitat disturbance effects to aquatic habitat.

5.2 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.

5.3 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 hole 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.

5.4 TRANSFORMER STATION

The potential for effects on watercourses exists from soil erosion resulting from unavoidable removal of stabilizing vegetative cover during construction activities. Erosion can cause sediment transport to nearby watercourses and a short-term increase in surface water turbidity, including associated impacts to fish and fish habitat. Due to the rural and agricultural land uses within the Project Location, 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. An appropriate spill containment system should be installed or kept on-site as necessary.

The transformer station is located more than 120 m from any identified water bodies. Therefore, assuming the implementation of mitigation measures, it is anticipated that there will be no effects associated with construction, operation and decommissioning of the Project.

6.0 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 local municipality, the GRCA, and DFO. The extent of mitigation would be dependent on Project details such as technical requirements, construction methods and schedule.

6.1 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 Guelph District 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;
    - Refueling 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.

6.2 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. The Operational Statement includes details of mitigation measures (see **Appendix D**).

Under flowing water conditions, water must be pumped or flumed 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 pea gravel 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 rescued from behind the coffer dam and returned to an area immediately upstream of the isolated area. Rescue 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.

6.3 MITIGATION FOR UNDERGROUND COLLECTOR LINES

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 D**. In addition to measures identified in the OS, an Emergency Spill Kit should be available on-site in the event of leaks from machinery.

A summary of mitigation measures for Punch and Bore, High Pressure Directional Drill, and Dry Open-Cut crossings and Isolated Open-Cut crossings is provided below:

Punch and Bore

Mitigation measures to employ for punch and bore crossings include (also see DFO Operational Statements in **Appendix D**):

- 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.
- 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.
- 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.
- 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.
- 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.
    - 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.
    - Grading of the stream banks for the approaches should not occur.
    - 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.
    - 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*).
    - Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

- Operate machinery on land above the ordinary high water mark (HWM) 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 any deleterious substance from entering the water.
    - Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
- Excavate bell holes beyond the HWM, far enough away from any watercourse to allow containment of any sediment or deleterious substances above the HWM.
    - 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.
    - 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.
    - After suitably backfilling and packing the bell holes, vegetate any disturbed areas.
- Monitor the watercourse to observe signs of malfunction during all phases of the work.
- 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.
- 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.
- 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.

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

High Pressure Directional Drill

- Use existing trails, roads or cut lines wherever possible, as access routes to avoid disturbance to the riparian vegetation.
- 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.
- 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.
- 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.
    - 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.
    - Grading of the stream banks for the approaches should not occur.
    - 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.
    - 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).
    - Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.
- Operate machinery on land above the ordinary HWM 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 any deleterious substance from entering the water.
- Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
- Restore banks to original condition if any disturbance occurs.

- 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.
  - 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.
- 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:
  - 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.
  - 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.
  - Ensure clean up measures do not result in greater damage to the banks and watercourse than from leaving the drilling mud in place.
  - 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.
  - 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.
- 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.

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

Dry Open-Cut

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

- 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 should 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 D** Operational Statement including conditions of use):

- Where an open cut crossing is not possible, in-stream work should 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 should be maintained downstream of the de-watered work area without interruption, during all stages of the work;
  - Fish, if present, should be removed from the work area prior to de-watering and released alive immediately upstream;
  - Flow dissipaters and/or filter bags, or equivalent, should 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 should be stabilized against the impacts of high flow events at the end of each workday;
- Work in the channel and floodplain should 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 should 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.

7.0 Monitoring

7.1 CONSTRUCTION (AS DESCRIBED IN THE CONSTRUCTION PLAN REPORT)

7.1.1 Methods/Sampling Protocols

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 as per the Environmental Effects Monitoring Plan outlined in Section 7.1 of the Construction Plan Report (e.g. Erosion and Sediment Control Plans), prior to commencement of in-water work (if required). 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 collector lines. The Environmental Monitor should monitor weather forecasts prior to the installation of access roads, crane paths and collector lines, particularly prior to work near aquatic habitats.

The Environmental Monitor will:

- Perform routine checks of all erosion and sediment control measures
- Monitor flow conveyance during in-water works where culvert replacements are required
- Visually inspect access/exit pits and directional drill line for frac-outs
- Inspect drilling equipment and materials for spills/leaks

7.1.2 Performance Objectives/Additional Actions

The Environmental Monitor should ensure that bank, bed, and floodplain conditions are restored to pre-construction conditions, where 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.

Compensation strategies and/or permits from DFO and/or the GRCA, as applicable, may 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.

7.2 OPERATION

The Environmental Effects Monitoring Plan for the Project is provided in the Design and Operations 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.

8.0 Closure

The Water Assessment and Water Body Report for the Grand Valley Wind Farms - Phase 3 Wind Project has been prepared by Stantec for Grand Valley Wind Farms Inc. in accordance with Ontario Regulation 359/09.

This report has been prepared by Stantec for the sole benefit of Grand Valley Wind Farms Inc., and may not be used by any third party without the express written consent of Grand Valley Wind Farms Inc. 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.

STANTEC CONSULTING LTD.

Mark Pomeroy, B.Sc.
Fisheries Biologist

Kathleen Todd, M.Sc.
Senior Aquatic Ecologist

Kelly Mason, B.Sc. (Env.), ERGC
Aquatic Ecologist

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9.0 References

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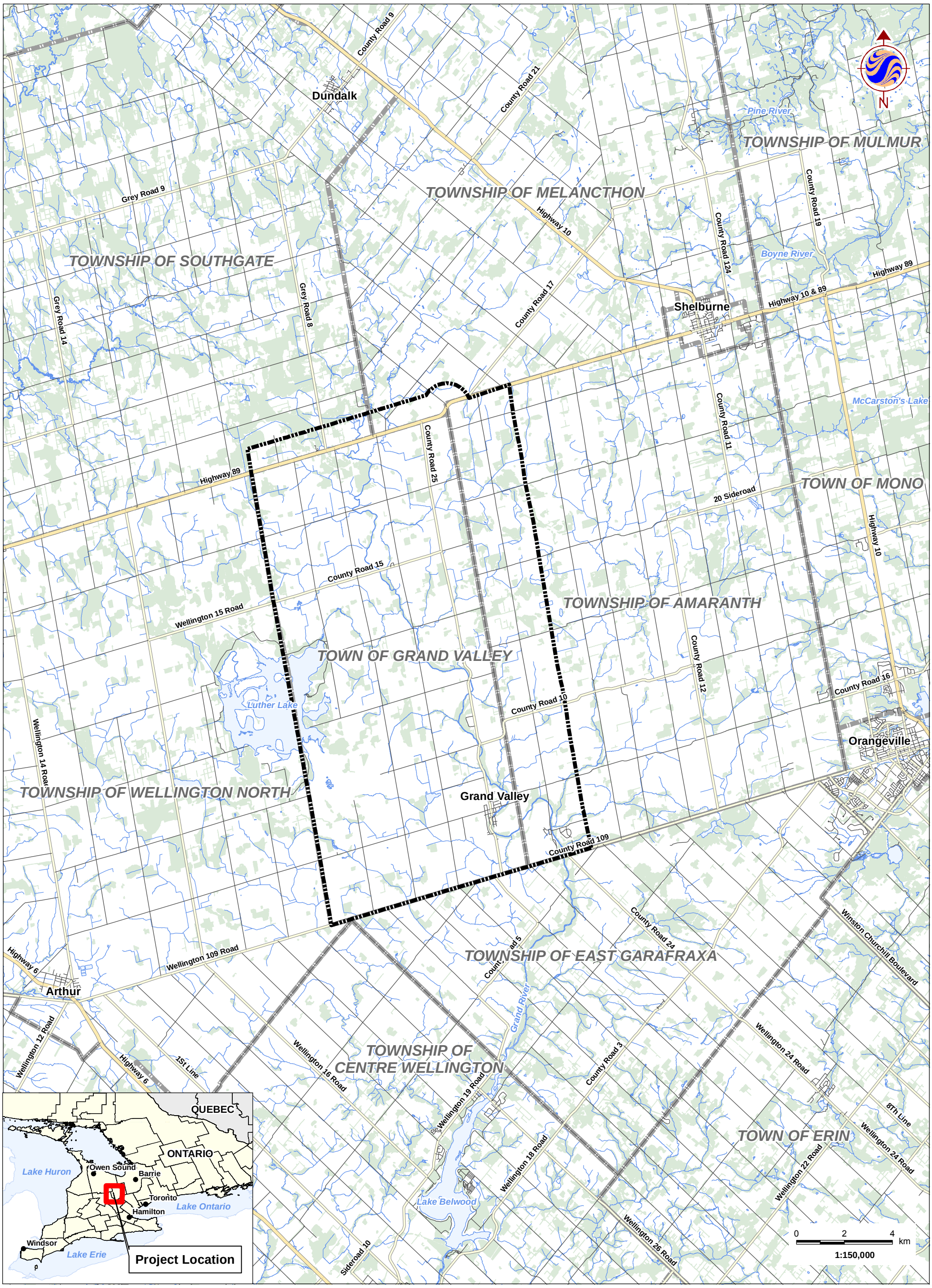
Ontario Ministry of Natural Resources (Owen Sound Area) 2012. Background Fish Data obtained from Kathy Dodge (Area Biologist). November 2012.

Appendix A

Figures



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Revised: 2012-12-19 By: dharvey

December, 2012
160960698

Stantec

Legend

- Study Area
- Highway
- Major Road
- Local Road
- Watercourse
- Municipal Boundary
- Waterbody
- Woodland

Notes

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Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
1

Title
Project Location

Legend

- 120m Zone of Investigation

Proposed Project Components

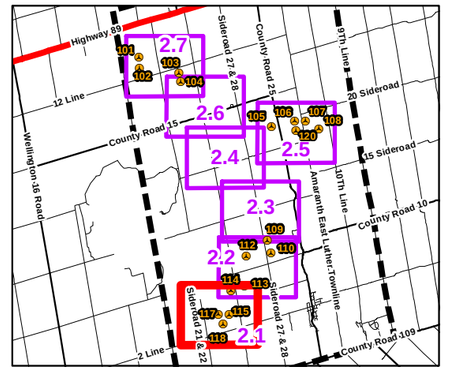
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area

Existing Features

- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel

Water Body Status

- REA Water Body/ Fish Habitat
- Not REA Water Body



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April 2013
160960698

Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
2.1

Title
Water Body Location Mapbook

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Revised: 2013-04-22 By: dharvey

Legend

- 120m Zone of Investigation

Proposed Project Components

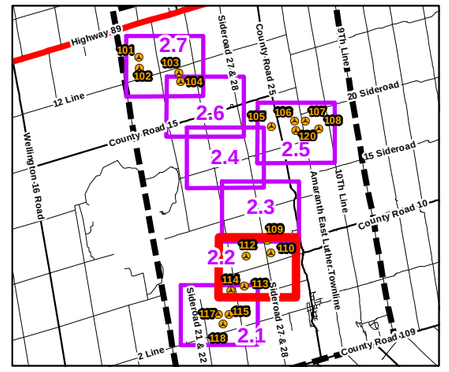
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area

Existing Features

- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel

Water Body Status

- REA Water Body/ Fish Habitat
- Not REA Water Body



Notes

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April 2013
160960698

Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
2.2

Title
Water Body Location Mapbook

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Revised: 2013-04-22 By: dharvey

Legend

- 120m Zone of Investigation

Proposed Project Components

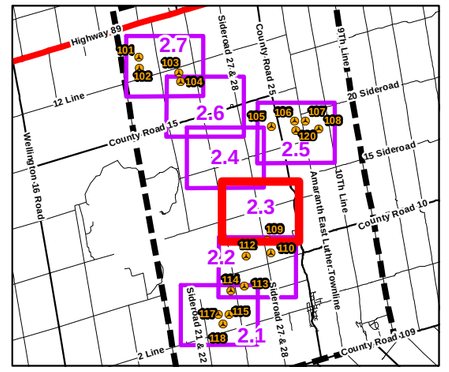
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area

Existing Features

- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel

Water Body Status

- REA Water Body/ Fish Habitat
- Not REA Water Body



Notes

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Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
2.3

Title
Water Body Location Mapbook

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Revised: 2013-04-22 By: dharvey

Legend

- 120m Zone of Investigation

Proposed Project Components

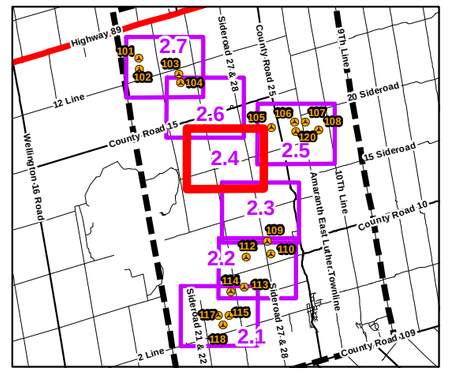
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area

Existing Features

- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel

Water Body Status

- REA Water Body/ Fish Habitat
- Not REA Water Body



Notes

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Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
2.4

Title
Water Body Location Mapbook

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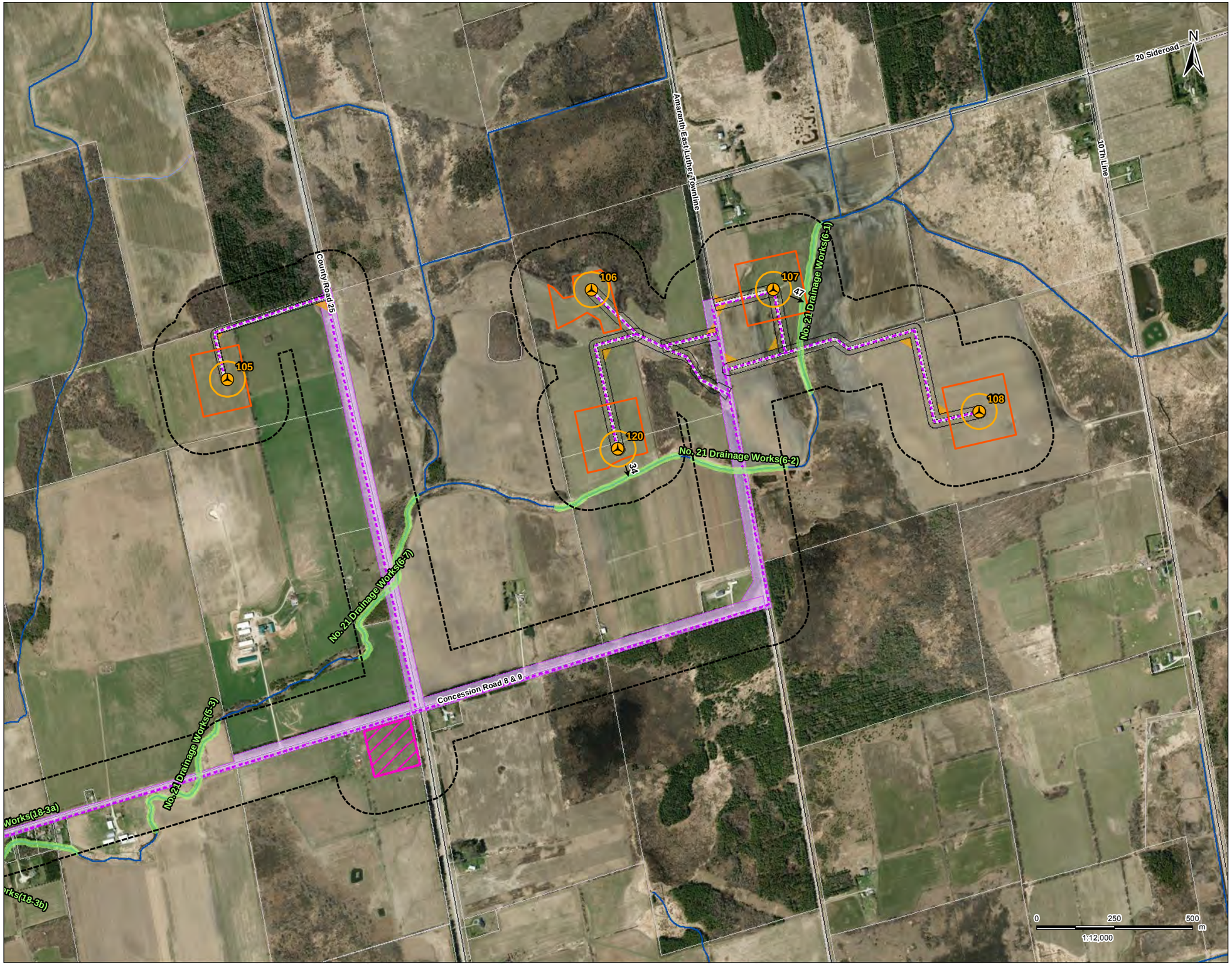
Revised: 2013-04-22 By: dharvey



Legend

- 120m Zone of Investigation

Proposed Project Components

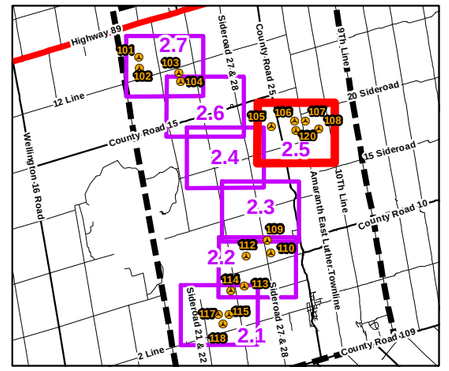
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area

Existing Features

- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel

Water Body Status

- REA Water Body/ Fish Habitat
- Not REA Water Body



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Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
2.5

Title
Water Body Location Mapbook

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Revised: 2013-04-22 By: dharvey

Legend

- 120m Zone of Investigation

Proposed Project Components

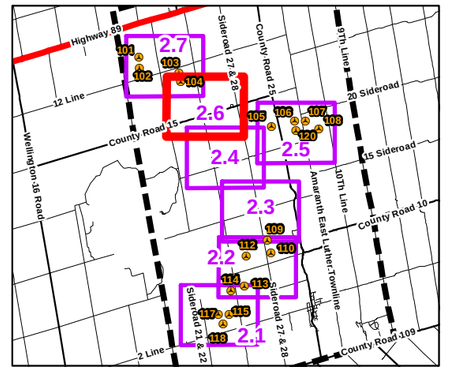
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area

Existing Features

- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel

Water Body Status

- REA Water Body/ Fish Habitat
- Not REA Water Body



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Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
2.6

Title
Water Body Location Mapbook

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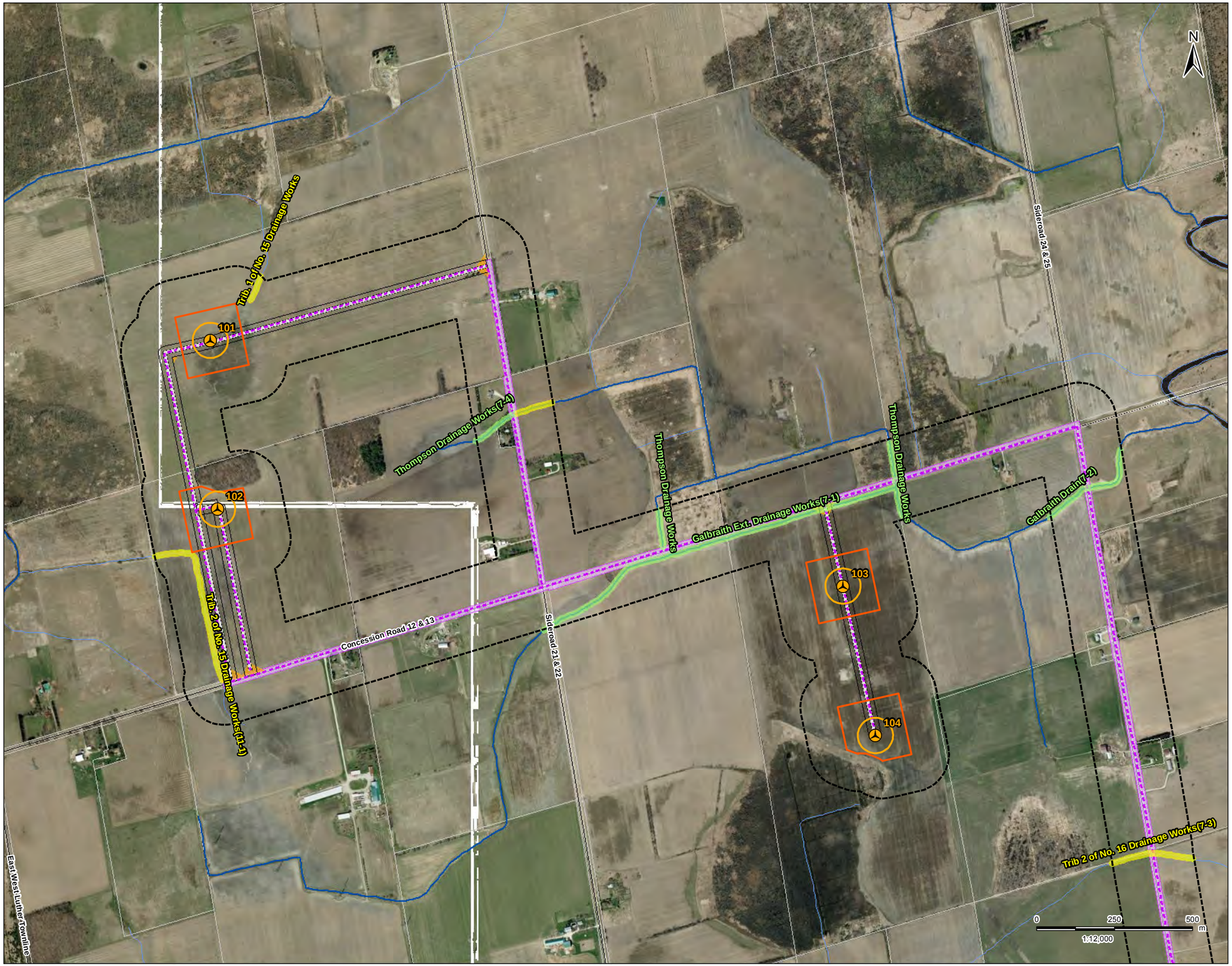
Revised: 2013-04-22 By: dharvey



Legend

- 120m Zone of Investigation

Proposed Project Components

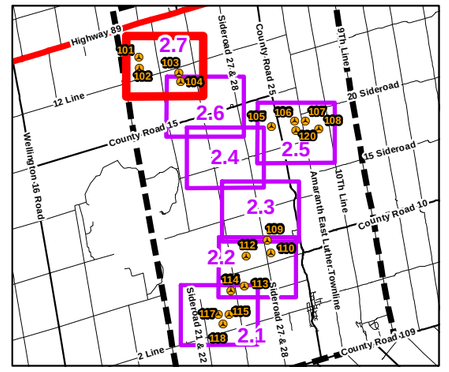
- Turbines
- Access Roads
- Collector Lines
- Collector Line ROW
- Transformer Location/ HONI Connection Point/ Met Tower/ Construction Laydown
- Turbine Blade Reach (56.5m)
- Turbine Construction Area
- Turning Area

Existing Features

- Road
- Constructed Drain
- Watercourse
- Waterbody
- Property Parcel

Water Body Status

- REA Water Body/ Fish Habitat
- Not REA Water Body



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Client/Project
Grand Valley Phase 3
Veresen Inc.

Figure No.
2.7

Title
Water Body Location Mapbook

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Revised: 2013-04-22 By: dharvey

Appendix B

Photographic Record

Photo 1: Station 7-1 – Galbraith Extension Drainage Works (Fall 2012) - Facing upstream (southwest) from Concession 12 &13, showing channel within cattails and grasses.

Photo 2: Station 7-1 – Galbraith Extension Drainage Works (Fall 2012) - Facing downstream (northeast) from Concession 12 &13, showing channel within cattails and grasses.

Photo 3: Station 7-1 – Galbraith Extension Drainage Works (Fall 2012) - At Concession 12 &13, showing water in channel.

Photo 4: Station 7-2 – Galbraith Drain (Fall 2012) - Facing upstream (west) from Sideroad 24 &25, showing channel overview.

Photo 5: Station 7-2 – Galbraith Drain (Fall 2012) - Facing downstream (east) from Sideroad 24 &25, showing channel overview and adjacent field.

Photo 6: Station 7-3 – Unnamed Tributary of No. 16 Drainage Works (Fall 2012) - Facing upstream (west) from Sideroad 24 & 25, showing non-water body.

Photo 7: Station 7-3 – Unnamed Tributary of No. 16 Drainage Works (Fall 2012) - Facing downstream (east) from Sideroad 24 & 25, showing non-water body.

Photo 8: Station 6-1 – No. 21 Drainage (Fall 2012) - Facing upstream (west) from Concession 8 & 9, showing channel overview.

Photo 9: Station 6-1 – No. 21 Drainage (Fall 2012) - Facing downstream (east) south of 20th Sideroad, showing channel overview.

Photo 10: Station 6-1 – No. 21 Drainage Works (Fall 2012) - South of 20th Sideroad, showing channel substrate.

Photo 11: Station 6-2 – No. 21 Drainage Works (Fall 2012) - Facing upstream (west) south of 20th Sideroad, showing channel overview.

Photo 12: Station 6-2 – No. 21 Drainage Works (Fall 2012) - Facing downstream (east) south of 20th Sideroad, showing channel overview and adjacent fields.

Photo 13: Station 19-1 – No. 16 Drainage Works (Fall 2012) - Facing upstream (west) from Sideroad 24 & 25, showing channel overview.

Photo 14: Station 19-1 – No. 16 Drainage Works (Fall 2012) - Facing downstream (east) from Sideroad 24 & 25, showing channel overview.

Photo 15: Station 19-1 – No. 16 Drainage Works (Fall 2012) - At Sideroad 24 & 25, showing channel substrate.

Photo 16: Station 19-2 – No. 16 Drainage Works (Fall 2012) - Facing downstream (east) from Sideroad 24 & 25, showing surficial drainage.

Photo 17: Station 18-1 – Grand River (Fall 2012) - Facing upstream (northwest) at the intersection of Sideroad 27 & 28 and Concession 8 & 9, showing channel overview.

Photo 18: Station 18-1 – Grand River (Fall 2012) - Facing downstream (southeast) at the intersection of Sideroad 27 & 28 and Concession 8 & 9, showing channel overview.

Photo 19: Station 18-2 – Palmer Drain (Fall 2012) - Facing upstream (west) from Concession 8 & 9, showing channel overview.

Photo 20: Station 18-2 – Palmer Drain (Fall 2012) - Facing downstream (east) from Concession 8 & 9, showing channel overview and surrounding riparian vegetation.

Photo 21: Station 18-3a – No. 21 Drainage Works (Fall 2012) - Facing upstream (southeast) from Concession 8 & 9, showing channel overview.

Photo 22: Station 18-3a – No. 21 Drainage Works (Fall 2012) - Facing downstream (southwest) from Concession 8 & 9, showing channel overview and surrounding riparian vegetation.

Photo 23: Station 18-3a – No. 21 Drainage Works (Fall 2012) - From Concession 8 & 9, showing channel substrate.

Photo 24: Station 5-3 – No. 21 Drainage Works (Fall 2012) - Facing upstream (northeast) from Concession 8 & 9, showing channel overview, adjacent fields and forest.

Photo 25: Station 5-3 – No. 21 Drainage Works (Fall 2012) - Facing downstream (southwest) from Concession 8 & 9, showing channel overview.

Photo 26: Station 17-1 – Gajtani Drainage Works (Fall 2012) - Facing upstream (west) from Sideroad 27 & 28, showing channel overview and adjacent agricultural fields.

Photo 27: Station 17-1 – Gajtani Drainage Works (Fall 2012) - Facing downstream (east) from Sideroad 27 & 28, showing channel overview and adjacent agricultural fields.

Photo 28: Station 17-1 – Gajtani Drainage Works (Fall 2012) at Sideroad 27 & 28, showing water in channel and bank definition.

Photo 29: Station 12-4 – No. 7 Drainage Works (Fall 2012) - Facing upstream (west) from Sideroad 27 & 28, showing channel overview and surrounding forest.

Photo 30: Station 12-4 – No. 7 Drainage Works (Fall 2012) - Facing downstream (northeast) from Sideroad 27 & 28, showing channel overview and surrounding forest.

Photo 31: Station 12-4 – No. 7 Drainage Works (Fall 2012) - From Sideroad 27 & 28, showing water in channel.

Photo 32: Station 12-1 – Potter Drain (Fall 2012) - Facing upstream (east) from Sideroad 27 & 28, showing dense in-channel vegetation.

Photo 33: Station 12-1 – Potter Drain (Fall 2012) - Facing downstream (west) from Sideroad 27 & 28, showing dense in-channel vegetation and bank definition.

Photo 34: Station 12-3 – Potter Drain (Fall 2012) - Facing upstream (northeast) from Sideroad 27 & 28, showing non-water body.

Photo 35: Station 12-3 – Potter Drain (Fall 2012) - Facing downstream (southwest) from Sideroad 27 & 28, showing non-water body.

Photo 36: Station 3-2 – Atkinson Drainage Works (Fall 2012) - Facing downstream (south) from Concession Road 4 & 5, showing channel and surrounding agricultural fields.

Photo 37: Station 3-2 – Atkinson Drainage Works (Fall 2012) at Concession Road 4 & 5, showing channel definition at culvert.

Photo 38: Station 2-1 – No. 1 Drain (Boyne Creek) (Fall 2012) - Facing upstream (west) from Amaranth East Luther Townline, showing channel overview.

Photo 39: Station 2-1 – No. 1 Drain (Boyne Creek) (Fall 2012) - Facing downstream (east) from Amaranth East Luther Townline, showing channel overview.

Photo 40: Station 2-1 – No. 1 Drain (Boyne Creek) (Fall 2012) at Amaranth East Luther Townline, showing water and algae within channel.

Photo 41: Station 1-3 – No. 2 Drainage Works (Fall 2012) - Facing upstream (south) from Concession 2 & 3, showing channel overview.

Photo 42: Station 1-3 – No. 2 Drainage Works (Fall 2012) - Facing downstream (north) from Concession 2 & 3, showing channel overview.

Photo 43: Station 1-1 – No. 2 Drainage Works (Fall 2012) - Facing upstream (north) from Concession 2 & 3, showing channel overview.

Photo 44: Station 1-1 – No. 2 Drainage Works (Fall 2012) - Facing downstream (east) from Concession 2 & 3, showing channel overview and surrounding riparian vegetation.

Photo 45: Station 1-1 – No. 2 Drainage Works (Fall 2012) at Concession 2 & 3, showing water in channel and bank definition.

Photo 46: Station V9-1 – Young Drainage Works (Fall 2012) - Facing upstream (north) south of Concession 4 & 5, showing channel overview.

Photo 47: Station V9-1 – Young Drainage Works (Fall 2012) - Facing downstream (east) south of Concession 4 & 5, showing channel overview.

Appendix C

Field Notes

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 1-1
Watercourse Name unnamed
Photos 57 - 61 us, ds, sb, us
Date 2012/10/09

Project Name Grand Valley Wind
Project # 160960698
Field Staff MEllah, K Mason
Time 10:45

Weather conditions in previous 24 hrs mix sun & cloud,
GPS Coordinates (Zone) 17T E 0550217 N 4859667 +/- 3m Datum Nad 83
Descriptive Location ~950 m west of side road 24 & 25, north of concession rd. 2 & 3

Water Quality
Dissolved Oxygen (mg/L) 10.42 pH 9.35 Conductivity (µS/cm) 288
Water Temperature (°C) 7.54 Air Temperature (°C) ~12
Time *in situ* measurements taken 10:45

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.2 (m) Maximum Pool Depth 30 (cm)
Mean Bankfull Width 2 (m) Mean Water Depth 20 (cm)
____ % Riffle 30 % Pool slight % Run 70 % Flat
Evidence of eroding banks, Comments on bank stability ~ eroding banks evident - dogwood grasses & other shrubs stabilizing bank

Substrate (% cover)
____ Bedrock ____ Cobble 5 Sand 40 Silt ____ Muck
____ Boulder ____ Gravel 5 Clay ____ Marl 50 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____
↳ shrubs + grasses

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
20% shaded, shrubs, grasses - early successional
Adjacent Land Use
ag fields, rural residential

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential for spawning in high water
Migratory Obstructions (seasonal, permanent)
thick vegetation
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ✓ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. channel adjacent & in between ag fields, defined channel, narrow buffer between fields & waterbody (~4-7m) - water brown with tannin

Field Notes Authored by MEllah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 1-2
Watercourse Name unnamed tributary
Photos 146 - 152
Date 2012 | 10 | 11
Project Name Grand Valley Wind
Project # 1609 60698
Field Staff MEllah, K Mason
Time 9:40
Weather conditions in previous 24 hrs rain, ~ 8°C, light winds
GPS Coordinates (Zone) 17 T E 0550583 N 4859980 Datum NAD 83
Descriptive Location north of concession road 23, west of sideroad 24+25, north east of station 1-1

Water Quality no water
Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) 10°C
Time *in situ* measurements taken _____

Watercourse Dimensions & Morphology no water
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 (% cover) no channel
_____ Bedrock _____ Cobble _____ Sand _____ Silt _____ Muck
_____ Boulder _____ Gravel _____ Clay _____ Marl _____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
_____
Adjacent Land Use
ag fields

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
_____
Migratory Obstructions (seasonal, permanent) N/A
_____
Note any fish observations _____
_____

Waterbody Notes
Natural Watercourse _____ Trapezoidal Channel _____ Grassed Swale _____ Buried Tile ✓
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry _____

Other Habitat Notes, Incidental Wildlife Observations, etc. no waterbody leading from 1-1 to 1-2 - soya bean field. no standing water in scrubland / bush area in field. bush area possibly drainage in high water such as freshet in spring.

Field Notes Authored by MEllah
Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 1-3
Watercourse Name unnamed
Photos 243-249
Date Oct 17, 2012
Weather conditions in previous 24 hrs moderate precipitation, windy.
GPS Coordinates (Zone) 17T E 0551109 N 4859739 Datum Nad83
Descriptive Location On Con 2+3 ~ 850m west of Sdrd 24+25

Project Name Grand Valley wind
Project # 160960698
Field Staff KM, MF
Time 10:10

Water Quality

Dissolved Oxygen (mg/L) 10.40 pH 8.43 Conductivity (µS/cm) 493
Water Temperature (°C) 8.41 Air Temperature (°C) 7°C
Time *in situ* measurements taken 10:30

Watercourse Dimensions & Morphology

Mean Watercourse Width ~1.5 (m) Maximum Pool Depth ~10.0 (cm)
Mean Bankfull Width ~3.0 (m) Mean Water Depth ~5.0 (cm)
20 % Riffle 5 % Pool 75 % Run % Flat
Evidence of eroding banks, Comments on bank stability None observed
Channel dominated by grasses.

Substrate (% cover)

Soil = 10

Bedrock 10 Cobble 20 Sand 30 Silt 10 Muck
Boulder 20 Gravel Clay Marl Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (Reed canary grass)
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
0 minor cover from terrestrial grasses.
Adjacent Land Use
Agricultural field

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Small bait fish only.
Migratory Obstructions (seasonal, permanent)
Lack of water
Note any fish observations none

Waterbody Notes

Natural Watercourse Trapezoidal Channel ✓ Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc.

None.
Defined, grassed channel. Flows present. Channel has been previously channelized (dug). Cannot drive through channel. Is not planted.

Field Notes Authored by MF Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 2-1
Watercourse Name unnamed
Photos 62-66 us, us, ds, ds, sub.
Date 2012/08/09

Project Name Grand Valley Wind
Project # 160960698
Field Staff MEllah, KMason
Time 11:15

Weather conditions in previous 24 hrs overcast, sun & cloud mix ~13°C, no precip.
GPS Coordinates (Zone) 17T E 0551134 N 4861381 Datum NAD83
Descriptive Location assessed from sideroad 24 & 25, south of concession road 4&5.

Water Quality
Dissolved Oxygen (mg/L) 11.98 pH 8.92 Conductivity (µS/cm) 260
Water Temperature (°C) 7.58 Air Temperature (°C) ~12°C
Time *in situ* measurements taken 11:15

Watercourse Dimensions & Morphology
Mean Watercourse Width 1 (m) Maximum Pool Depth 25 (cm)
Mean Bankfull Width 2 (m) Mean Water Depth 15 (cm)
5 % Riffle 30 % Pool 5 % Run 60 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - stabilized by grasses & shrubs

Substrate (% cover)

	Bedrock 20	Cobble 30	Sand	Silt		Muck
	Boulder 50	Gravel	Clay	Marl		Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg Overhanging Vegetation Woody Debris Boulder Other sparse

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
10% shaded, early successional meadow species - grasses, shrubs
Adjacent Land Use
road, ag fields

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential salmonid spawning habitat - dependent on habitat u/s & d/s - flows into forest habitats.
Migratory Obstructions (seasonal, permanent)
low water levels potential
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ✓ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. cattails & reed canary grass in channel - us & ds waterbody flows through forest habitats - potential cold water supply.

Field Notes Authored by MEllah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 2-2
Watercourse Name un-named
Photos 153 - 156
Date 2012/10/11
Project Name Grand Valley Wind
Project # 1609 60698
Field Staff M Ellah, K Mason
Time 10:30
Weather conditions in previous 24 hrs rain, overcast, ~10°C, light wind
GPS Coordinates (Zone) 17T E 0550530 N 4861246 Datum NAD83
Descriptive Location West of sideroad 24+25, south of concession rd 4+5 SW of proposed turbine #14.

Water Quality
Dissolved Oxygen (mg/L) 10.99 pH 8.71 Conductivity (µS/cm) 289
Water Temperature (°C) 8.92 Air Temperature (°C) 10°C
Time *in situ* measurements taken 10:30

Watercourse Dimensions & Morphology - pond
Mean Watercourse Width 100x200 (m) Maximum Pool Depth ~300 (cm)
Mean Bankfull Width pond (m) Mean Water Depth ~250 (cm)
_____% Riffle 100 % Pool _____% Run _____% Flat
Evidence of eroding banks, Comments on bank stability stable banks, rip rap surrounding pond banks - manicured pond

Substrate (% cover)
_____Bedrock 2 Cobble 8 Sand _____ Silt _____ Muck
_____Boulder _____ Gravel 90 Clay _____ Marl _____ Detritus

In-water Cover no cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
0% shade, manicured grass lawn surrounding pond
Adjacent Land Use
Luther Marsh, Ag fields

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none
Migratory Obstructions (seasonal, permanent) isolation
Note any fish observations none

Waterbody Notes ✓ natural / manicured waterbody
Natural Watercourse_____ Trapezoidal Channel _____ Grassed Swale_____ Buried Tile_____
Surficial Drainage (i.e. furrows)_____ Dugout Pond_____ Dominated by Aquatic Veg_____ Dry____

Other Habitat Notes, Incidental Wildlife Observations, etc. flock of 200 Canadian Geese in pond. property owners cleared trees + shrubs surrounding a likely once natural pond. shorelines rip rap.

Field Notes Authored by MEllah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 2-3
Watercourse Name un-named
Photos 157-159
Date 2012/10/11
Project Name Grand Valley Wind
Project # 1609 60698
Field Staff M Ellah, K Mason
Time 10:45
Weather conditions in previous 24 hrs Rain, 10°C, high winds
GPS Coordinates (Zone) 17T E 0550501 N 4861500 Datum NAD 83
Descriptive Location West of sideroad 24+25, south of concession rd 4TS, SW of proposed turbine #14.

Water Quality
Dissolved Oxygen (mg/L) 10.59 pH 8.82 Conductivity (µS/cm) 282
Water Temperature (°C) 9.00 Air Temperature (°C) 10
Time *in situ* measurements taken 10:45

Watercourse Dimensions & Morphology - pond
Mean Watercourse Width 75x180 (m) Maximum Pool Depth ~300 (cm)
Mean Bankfull Width pond (m) Mean Water Depth ~300 (cm)
____% Riffle 100 % Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability stable banks - rip rap placed around pond shoreline

Substrate (% cover)
____Bedrock 2 Cobble 8 Sand ____ Silt ____ Muck
____Boulder ____ Gravel 90 Clay ____ Marl ____ Detritus

In-water Cover
Cover Types Present (circle): ~~Undercut Banks~~ no cover Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
0% shade, grass around pond (manicured)
Adjacent Land Use
Luther Marsh, ag fields

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none
Migratory Obstructions (seasonal, ~~permanent~~ isolation)
Note any fish observations none

Waterbody Notes ✓ natural / manicured waterbody
Natural Watercourse ____ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. likely a marsh pond at one time. property owners cleared trees & shrubs around pond - manicured grass & rip rap around pond shorelines

Field Notes Authored by MEllah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 2-4
Watercourse Name unnamed pond
Photos 168-169
Date Oct 11/12
Weather conditions in previous 24 hrs Rain, high winds
GPS Coordinates (Zone) 17T E 0550257 N 4861665 Datum NAD83
Descriptive Location South of concession Rd 4-5 & of 2-5

Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 11:15

Water Quality
Dissolved Oxygen (mg/L) 8.90 pH 8.63 Conductivity (µS/cm) 285
Water Temperature (°C) 5.20 Air Temperature (°C) 10
Time *in situ* measurements taken 11:15

Watercourse Dimensions & Morphology
Mean Watercourse Width 30x100 (m) Maximum Pool Depth 60 (cm)
Mean Bankfull Width 35x105 (m) Mean Water Depth 40 (cm)
____% Riffle 100 % Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability stable banks - well vegetated.

Substrate (% cover)
____ Bedrock ____ Cobble ____ Sand 80 Silt 10 Muck
____ Boulder ____ Gravel ____ Clay ____ Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks (Deep Pool) Watercress (Aquatic Veg)
(Overhanging Vegetation) Woody Debris (Boulder) Other ____
algae duckweed floating leaf pond weed

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
<1% - scrubby vegetation, early
Adjacent Land Use
Marshland, forest, manicured lawn.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential nursery for cyprinids.
Migratory Obstructions (seasonal, permanent)
beaver dam U/S.
Note any fish observations none observed.

Waterbody Notes pond ✓
Natural Watercourse ____ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. natural pond D/S of watercourse & beaver dam.
- Mallard ducks, wood ducks, Canadian Geese overhead

Field Notes Authored by K. Mason Field Notes QA/QCed by M Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 2-5
Watercourse Name unnamed
Photos 165-169
Date Oct 11/12
Weather conditions in previous 24 hrs Rain, high wind
GPS Coordinates (Zone) 17T E 0550203 N 4861731 Datum Nad83
Descriptive Location U/S of 2-4 (pond), S of Concession Rd 4-5 East portion of Luther Marsh

Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Masri
Time 11:30

Water Quality
Dissolved Oxygen (mg/L) 9.57 pH 8.53 Conductivity (µS/cm) 197
Water Temperature (°C) 6.02 Air Temperature (°C) 10
Time *in situ* measurements taken 11:30

Watercourse Dimensions & Morphology
Mean Watercourse Width 2 (m) Maximum Pool Depth >100 (cm)
Mean Bankfull Width 3.5 (m) Mean Water Depth 75 (cm)
____% Riffle ____% Pool ____% Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - well vegetated with long grasses

Substrate (% cover)
____ Bedrock ____ Cobble ____ Sand 80 Silt ____ Muck
____ Boulder ____ Gravel ____ Clay ____ Marl 20 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (potamogeton, duckweed, floating leaf pondweed)
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional) 5% - grasses, early
Adjacent Land Use Marshland, forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings) yes - proximity to March - good nursery area & spot for spawning
Migratory Obstructions (seasonal, permanent) Beaver dam
Note any fish observations yes - larger fish splashing - carp? - did not get a good look at it

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ✓ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. water deep abav beaver dam with a wetted width of 2m, d/s of beaverdam wetted width is abav 1.5m. wood ducks in shrubs adjacent to channel. - x200

Field Notes Authored by K. Masri Field Notes QA/QCed by M Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 2-6
Watercourse Name unnamed
Photos 254-257.
Date Oct 17, 2012

Project Name Grand Valley Wind
Project # 160960698
Field Staff KM, MF
Time 10:40

Weather conditions in previous 24 hrs Mod precip., windy
GPS Coordinates (Zone) 17T E 0550712 N 4862443 Datum Abd 83
Descriptive Location On Conc 4+5 ~200m west of Sdrd 24+25

Water Quality

Too shallow

Dissolved Oxygen (mg/L) / pH / Conductivity (µS/cm) /
Water Temperature (°C) / Air Temperature (°C) 7°C
Time *in situ* measurements taken N/A

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.5 (m) Maximum Pool Depth 2.0 (cm)
Mean Bankfull Width ~3.0 (m) Mean Water Depth 1.0 (cm)
40 % Riffle % Pool % Run % Flat
Evidence of eroding banks, Comments on bank stability None observed. well veg't'd

Substrate (% cover)

Bedrock 10 Cobble 30 Sand 10 Silt Muck
Boulder 30 Gravel 20 Clay Marl Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (reed canary grass)
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
2%, terrestrial veg.
Adjacent Land Use
agricultural field

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Small bait fish only
Migratory Obstructions (seasonal, permanent)
low water levels
Note any fish observations None

Waterbody Notes

Natural Watercourse Trapezoidal Channel ✓ Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. None.
Channelized, cannot drive through. Flowing. South side of rd is tile drained.

Field Notes Authored by MF Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 3-1
Watercourse Name unknown-unnamed
Photos 67 - 69
Date 2012/10/09
Project Name Grand Valley Wind
Project # 160960698
Field Staff M Ellah, K Mason
Time 11:55
Weather conditions in previous 24 hrs Sunny ~7°C
GPS Coordinates (Zone) 19T E 0551631 N 4863540 Datum NAD83
Descriptive Location East of Sideroad 24-25, North of road 45. NE end of property in bushlot

Water Quality
Dissolved Oxygen (mg/L) 8.45 pH 8.60 Conductivity (µS/cm) 381
Water Temperature (°C) 9.40 Air Temperature (°C) ~12°C
Time *in situ* measurements taken 11:58

Watercourse Dimensions & Morphology
Mean Watercourse Width 13 x 30 (m) - pond Maximum Pool Depth 50 (cm)
Mean Bankfull Width 15 x 32 (m) Mean Water Depth 35 (cm)
____% Riffle 100 % Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability slight erosion - mostly vegetated banks - grasses & shrubs

Substrate (% cover)
____ Bedrock ____ Cobble 2.5 Sand ____ Silt ____ Muck
____ Boulder 2.5 Gravel 80 Clay ____ Marl 15 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg Overhanging Vegetation Woody Debris Boulder Other ____ Milfoils, duckweed, bur reed

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
5% shaded, shrubs & trees & grasses, intermediate successional
Adjacent Land Use
ag fields, forested area

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none
Migratory Obstructions (seasonal, permanent) isolation
Note any fish observations none

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ✓ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. - duck decoys - hunted (possible duck breeding)
isolated pond - no channel in or out
- amphibian pond
- farm wheeler trail next to pond - birch, poplars, willows

Field Notes Authored by M Ellah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 3-2
Watercourse Name Unnamed
Photos 258-261 + 262
Date Oct 17, 2012

Project Name Grand Valley Wind
Project # 160960698
Field Staff KM, MF
Time 11:00

Weather conditions in previous 24 hrs mod. precip., windy
GPS Coordinates (Zone) 17T E 0552256 N 4862898 Datum Nad 83
Descriptive Location On Conc 4+5 ~600 m west of Sixth Rd 27+28

Water Quality

Too shallow

Dissolved Oxygen (mg/L) / pH / Conductivity (µS/cm) /
Water Temperature (°C) / Air Temperature (°C) 7°C
Time *in situ* measurements taken N/A.

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.5 (m) Maximum Pool Depth 3 (cm)
Mean Bankfull Width ~4.5 (m) Mean Water Depth 2 (cm)
% Riffle % Pool % Run % Flat
Evidence of eroding banks, Comments on bank stability None observed

Substrate (% cover)

Soil = 10

Bedrock Cobble Sand 30 Silt Muck
Boulder 30 Gravel 30 Clay Marl Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Some cattail, reed canary grass, 10%
Adjacent Land Use
Agriculture, house, farm

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Bait fish only
Migratory Obstructions (seasonal, permanent)
Lack of water.
Note any fish observations None

Waterbody Notes

Natural Watercourse Trapezoidal Channel ✓ Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc.
Channelized, cannot drive through. Tile drained on north side.

Field Notes Authored by MF Field Notes QA/QCed by JC Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 3-3
Watercourse Name unnamed
Photos 326-330
Date Oct 18/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff K. Mann, M. Faiella
Time 14:40
Weather conditions in previous 24 hrs sunny, 15°C
GPS Coordinates (Zone) 17T E 0552608 N 4863713 Datum Nad83
Descriptive Location off of side road 27 28, N of Concession 4-5 (running W-E) in a hedgerow

Water Quality
Dissolved Oxygen (mg/L) 9.73 pH 8.59 Conductivity (µS/cm) 839
Water Temperature (°C) 11.26 Air Temperature (°C) 17°C
Time *in situ* measurements taken 14:45

Watercourse Dimensions & Morphology
Mean Watercourse Width 2 (m) Maximum Pool Depth 20 (cm) standing H2O
Mean Bankfull Width 4 (m) Mean Water Depth 15 (cm)
____% Riffle ____% Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability stable banks - well vegetated

Substrate (% cover)
____ Bedrock ____ Cobble 40 Sand 10 Silt ____ Muck
____ Boulder 30 Gravel 10 Clay ____ Marl 10 Detritus RCG

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
90%, meadow species & trees, intermediate
Adjacent Land Use
forest, road, ag. field

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Migratory Obstructions (seasonal, permanent) law flow
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ✓ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. Riparian area includes meadow species, willow, spruce etc.

Field Notes Authored by K. Mann Field Notes QA/QCed by MF

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 5-1
Watercourse Name unnamed
Photos 96 - 98
Date Oct 9/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 15:30
Weather conditions in previous 24 hrs sunny, 7°C
GPS Coordinates (Zone) 17T E 0553348 N 4868213 Datum Nad83
Descriptive Location west of county rd 25 south of concession road 8+9, south of proposed turbine 19, southeast corner of forest/scrubland

Water Quality
Dissolved Oxygen (mg/L) 16.99 pH 8.60 Conductivity (µS/cm) 656
Water Temperature (°C) 12.76 Air Temperature (°C) ~12°C
Time *in situ* measurements taken 15:30

Watercourse Dimensions & Morphology
Mean Watercourse Width 1 (m) Maximum Pool Depth 20 (cm)
Mean Bankfull Width 1.5 (m) Mean Water Depth 10 (cm)
_____% Riffle _____% Pool 100 % Run _____% Flat
Evidence of eroding banks, Comments on bank stability all grassed - very stable

Substrate (% cover)
_____Bedrock _____Cobble _____Sand 20 Silt 5 Muck
_____Boulder _____Gravel _____Clay _____Marl 75 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress (Aquatic Veg) Typha, horsetail, bull rush
(Overhanging Vegetation) Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
35%, grasses & small trees, early
Adjacent Land Use
forested area, dogwood thicket, ag. field (soy)

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
— maybe mudminnow & brook stickleback
Migratory Obstructions (seasonal, permanent)
low flow, thick vegetation
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel _____ Grassed Swale _____ Buried Tile _____
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry _____

Other Habitat Notes, Incidental Wildlife Observations, etc. lowlying defined channel with water present, mossy in-water vegetation

Field Notes Authored by K. Mason Field Notes QA/QCed by M Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 5-2
Watercourse Name unnamed pond
Photos 99-101
Date Oct 9/12
Weather conditions in previous 24 hrs Sunny, 7°C
GPS Coordinates (Zone) 17T E 0553400 N 4868324 Datum Nad83
Descriptive Location NE of S-1, west of County Rd 25

Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 15:45

Water Quality
Dissolved Oxygen (mg/L) 12.12 pH 8.83 Conductivity (µS/cm) 306
Water Temperature (°C) 11.88 Air Temperature (°C) ~12°C
Time *in situ* measurements taken 15:00

Watercourse Dimensions & Morphology
Mean Watercourse Width 15x10 (m) Maximum Pool Depth 50 (cm)
Mean Bankfull Width 17x12 (m) Mean Water Depth 40 (cm)
____ % Riffle 100 % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability Stable banks - vegetated

Substrate (% cover)
____ Bedrock ____ Cobble 10 Sand 10 Silt ____ Muck
____ Boulder ____ Gravel 80 Clay ____ Marl ____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (floating leaf pondweed, bullru)
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
0 % - Solidago, Queen Anne's Lace
Adjacent Land Use
meadow - thicket, ag. field

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential spawning & nursery for cyprinids
Migratory Obstructions (seasonal, permanent)
Note any fish observations Yes - small cyprinids

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ✓ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. dugout pond surrounded by meadow vegetation. Outlet has been tiled. Old beaver dam remains still present. In water cover (floating leaf pondweed) is approx. 40%. Lots of deer & raccoon tracks around pond. Not certain whether pond has been dug or if it is a natural feature

Field Notes Authored by K. Mason
Field Notes QA/QCed by M. Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 5-3
Watercourse Name unknown
Photos 213 - 216 & 217
Date Oct 12/12

Project Name Grand Valley Wind
Project # 160960698
Field Staff K. Mason, M. Ellah
Time 13:38

Weather conditions in previous 24 hrs sunny/cloud, 10°C, high winds
GPS Coordinates (Zone) 17T E 0552824 N 4868761 Datum Nad83
Descriptive Location off of concession 8-9, east of 18-3

Water Quality
Dissolved Oxygen (mg/L) 11.37 pH 8.61 Conductivity (µS/cm) 630
Water Temperature (°C) 7.98 Air Temperature (°C) 8°C
Time *in situ* measurements taken 13:41

Watercourse Dimensions & Morphology
Mean Watercourse Width 4 (m) Maximum Pool Depth 60 (cm)
Mean Bankfull Width 6 (m) Mean Water Depth 40 (cm)
____% Riffle ____% Pool ____% Run 100 % Flat
Evidence of eroding banks, Comments on bank stability all vegetated - stable banks.

Substrate (% cover)
____ Bedrock 40 Cobble 10 Sand 20 Silt ____ Muck
____ Boulder 30 Gravel ____ Clay ____ Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
10%, grasses & meadow species, early
Adjacent Land Use
ag field, road, forest & scrubland.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential spawning & nursery for cyprinids.
Migratory Obstructions (seasonal, permanent) (further u/s potential salmonid spawning in forested area)
none observed
Note any fish observations huge school of cyprinids

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. channel w/ base substrate of gravel & cobble, but overlaid by silt from ag. field runoff. Riparian area consists of meadow species, w/ cedar, & dead snag. Turkey vulture overhead.

Field Notes Authored by K. Mason Field Notes QA/QCed by MEllah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 6-1
Watercourse Name un-named
Photos 102 - 104 + 105 - 106
Date 2012/10/10

Project Name Grand Valley Wind
Project # 160960698
Field Staff MEllah, K Mason
Time 10:10

Weather conditions in previous 24 hrs scattered showers, ~10°C, light winds
GPS Coordinates (Zone) 17T E 0554759 N 4870343 Datum NAD 83
Descriptive Location south of 20th sideroad, east of Amaranth East Luther, east of proposed turbine 7.

Water Quality
Dissolved Oxygen (mg/L) 9.47 pH 8.34 Conductivity (µS/cm) 576
Water Temperature (°C) 8.34 Air Temperature (°C) ~9
Time *in situ* measurements taken 10:12

Watercourse Dimensions & Morphology
Mean Watercourse Width 2 (m) Maximum Pool Depth 40 (cm)
Mean Bankfull Width 2.5 (m) Mean Water Depth 30 (cm)
____ % Riffle ____ % Pool ____ % Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - vegetated with grasses

Substrate (% cover) 100 % grass base
____ Bedrock ____ Cobble ____ Sand ____ Silt ____ Muck
____ Boulder ____ Gravel ____ Clay ____ Marl ____ Detritus

In-water Cover no cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
0% shaded, grasses dominant on banks & in channel
Adjacent Land Use
ag fields

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none observed
Migratory Obstructions (seasonal, permanent)
low water levels
Note any fish observations none

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ✓ Grassed Swale ✓ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. rains over night & this morning caused grassed swale to fill up with runoff, channel completely grass based.

Field Notes Authored by MEllah Field Notes QA/QCed by K Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 6-2
Watercourse Name trib. to Grand River
Photos 107 - 110
Date Oct 10/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 10:40
Weather conditions in previous 24 hrs Rain, 10°C
GPS Coordinates (Zone) 17T E 0554561 N 4869732 Datum NAD83
Descriptive Location crossing Amaranth/E Luther townline - north of 6-3.

Water Quality
Dissolved Oxygen (mg/L) 8.21 pH 8.21 Conductivity (µS/cm) 604
Water Temperature (°C) 8.31 Air Temperature (°C) 10°C
Time *in situ* measurements taken 10:45.

Watercourse Dimensions & Morphology
Mean Watercourse Width 2 (m) Maximum Pool Depth 75 (cm)
Mean Bankfull Width 4 (m) Mean Water Depth 60 (cm)
% Riffle % Pool 100 % Run % Flat
Evidence of eroding banks, Comments on bank stability stable banks - all grassed

Substrate (% cover)
Bedrock Cobble 60 Sand 10 Silt Muck
Boulder 20 Gravel Clay Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (floating leaf burred)
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
15% - grasses, meadow species, early
Adjacent Land Use
ag. fields, road, & forested area

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential pike spawning - (grassy silty habitat) & proximity to the Grand.
Migratory Obstructions (seasonal, permanent)
none
Note any fish observations none observed.

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. defined channel & primarily grassed riparian area. Area is part of a wetland enhancement project
- look like channel has been realigned, however has some natural sinuosity.

Field Notes Authored by K. Mason Field Notes QA/QCed by M Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 6-3
Watercourse Name unnamed wetland
Photos 111-113
Date Oct 10/12
Weather conditions in previous 24 hrs Rain, 10°C
GPS Coordinates (Zone) 17T E 0554747 N 4869496 Datum Nad 83
Descriptive Location South of 6-2, off of Amaranth/East Luther Townline.

Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 10:50

Water Quality
Dissolved Oxygen (mg/L) 7.75 pH 8.36 Conductivity (µS/cm) 437
Water Temperature (°C) 8.04 Air Temperature (°C) 10°C
Time *in situ* measurements taken 11:12

Watercourse Dimensions & Morphology
Mean Watercourse Width ~200 x 300 (m) at high flows
Mean Bankfull Width ~220 x 320 (m)
Maximum Pool Depth 40 (cm) high water would be about 30 cm above
Mean Water Depth 20 (cm)
____ % Riffle 100 % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability no real banks - (wetland area

Substrate (% cover)
____ Bedrock ____ Cobble ____ Sand ____ Silt 80 Muck
____ Boulder ____ Gravel ____ Clay ____ Marl 20 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks, Deep Pool, Watercress, Aquatic Veg (floating leaf burreed, starwort, pondweed), Overhanging Vegetation, Woody Debris, Boulder, Other ____ (horsetail, sedges)

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
85% of the wetland is shaded, shrubby/small trees, early
Adjacent Land Use
road, forested area

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential spawning & nursery @ high water
Migratory Obstructions (seasonal, permanent)
low water?
Note any fish observations none observed

Waterbody Notes
wetland ✓
Natural Watercourse ____ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ✓ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. mallard ducks taking off wetland area full of willow & pooled water throughout.

Field Notes Authored by K. Mason Field Notes QA/QCed by M Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 6-4
Watercourse Name unnamed
Photos 177-183
Date Oct 11/12

Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 13:35

Weather conditions in previous 24 hrs rain, high winds, 10°C
GPS Coordinates (Zone) 17T E 0554831 N 4870763 Datum Nad83
Descriptive Location off of 20th sideroad, east of Amaranth-East Luther townline, north of 6-1

Water Quality
Dissolved Oxygen (mg/L) 6.55 pH 8.19 Conductivity (µS/cm) 1214
Water Temperature (°C) 6.95 Air Temperature (°C) 10 + windchill
Time *in situ* measurements taken 13:40

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.50 (m) Maximum Pool Depth 20 (cm) standing water
Mean Bankfull Width 1 (m) Mean Water Depth 15 (cm)
____ % Riffle ____ % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability all grassed - stable

Substrate (% cover)
____ Bedrock ____ Cobble 40 Sand 30 Silt 20 Muck
____ Boulder ____ Gravel ____ Clay ____ Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
95%, grasses, early
Adjacent Land Use
corn field, road

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Migratory Obstructions (seasonal, permanent) thick vegetation (terrestrial grasses)
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ✓ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. narrow - shallow channel (shallow banks) however defined channel has a little water, primarily terrestrial grasses in riparian area & in channel. Signs of oil slick on water at u/s side of road.

Field Notes Authored by K. Mason Field Notes QA/QCed by Mallat

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 6-5
Watercourse Name un-named
Photos 184 - 186
Date 2012/10/11
Project Name Grand Valley Wind
Project # 160916006 98
Field Staff M. Ellah, K. Mason
Time 13:55
Weather conditions in previous 24 hrs Rain, high wind, 10°C
GPS Coordinates (Zone) 17T E 0555818 N 4870091 Datum Nad83
Descriptive Location off of 10th Line, south of 20th sideroad, NE of proposed turbine #8.

Water Quality
Dissolved Oxygen (mg/L) 10.28 pH 8.82 Conductivity (µS/cm) 338
Water Temperature (°C) 6.53 Air Temperature (°C) ~10°C
Time *in situ* measurements taken 13:57

Watercourse Dimensions & Morphology
Mean Watercourse Width 2.3 (m) Maximum Pool Depth 60 (cm)
Mean Bankfull Width 2.5 (m) Mean Water Depth 40 (cm)
____% Riffle ____% Pool ____% Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - fully vegetated with grasses & shrubs

Substrate (% cover)

Bedrock	Cobble 20	Sand 60	Silt 10	Muck	
Boulder	Gravel	Clay	Marl 10	Detritus	

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg Overhanging Vegetation Woody Debris Boulder Other _____ floating leaved burreed, wild rice

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
5% shade, terrestrial grasses & shrubs, early
Adjacent Land Use
natural areas - swamp, ag fields, road

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential spawning & nursery for pike - good habitat
Migratory Obstructions (seasonal, permanent)
d/s sections of water body with low water levels & thick terrestrial vegetation
Note any fish observations
none observed.

Waterbody Notes ✓ naturalized trapezoidal channel
Natural Watercourse____ Trapezoidal Channel ____ Grassed Swale____ Buried Tile____
Surficial Drainage (i.e. furrows)____ Dugout Pond____ Dominated by Aquatic Veg____ Dry____

Other Habitat Notes, Incidental Wildlife Observations, etc. adjacent to swamp & marsh habitats - good wildlife habitat; fully naturalized banks & large riparian zones.

Field Notes Authored by MEllah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 6-6
Watercourse Name unnamed
Photos 263-266
Date Oct 17, 2012
Weather conditions in previous 24 hrs Mod. precip, windy
GPS Coordinates (Zone) 17T E 0555533 N 4870086 Datum NAD 83
Descriptive Location ~100m west 10th line + ~1km south of 20th Sideroad

Project Name Grand Valley Wind
Project # 160960698
Field Staff KM, MF
Time 11:40

Water Quality

Dissolved Oxygen (mg/L) 6.49 pH 8.37 Conductivity (µS/cm) 625
Water Temperature (°C) 9.26 Air Temperature (°C) 7°C
Time *in situ* measurements taken 11:40.

Watercourse Dimensions & Morphology

STAND. WATER ONLY

Mean Watercourse Width 1 (m) Maximum Pool Depth 20 (cm)
Mean Bankfull Width 1.5 (m) Mean Water Depth 15 (cm)
____% Riffle 100 % Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability minor scour, standing water only

Substrate (% cover)

SOIL=20

____Bedrock ____Cobble ____Sand 40 Silt ____Muck
____Boulder ____Gravel 40 Clay ____Marl ____Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress (Aquatic Veg)
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Willow sp; cattail, reed canary grass. (60%)
Adjacent Land Use
Agricultural field - soy

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Not connected. No habitat
Migratory Obstructions (seasonal, permanent)
Lack of connection
Note any fish observations None observed

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ✓ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. Feature is drainage from wetland area. Not connected to anything u/s or d/s minor def'n

Field Notes Authored by MF Field Notes QA/QCed by K. Masan

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 7-1
Watercourse Name un-named
Photos 114 - 117 + 118 - 120
Date 2012/10/10

Project Name Grand Valley Wind
Project # 160960698
Field Staff MEllah, K Mason
Time 11:45

Weather conditions in previous 24 hrs rain ~9°C, light wind
GPS Coordinates (Zone) 17 E 0548312 N 4867305 Datum Nad83
Descriptive Location west of sideroad 24d 25, alongside conc. 12 & 13.

Water Quality
Dissolved Oxygen (mg/L) 6.00 pH 8.04 Conductivity (µS/cm) 772
Water Temperature (°C) 7.62 Air Temperature (°C) 10°C
Time *in situ* measurements taken 12:00

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.30 (m) Maximum Pool Depth 25 (cm)
Mean Bankfull Width 0.75 (m) Mean Water Depth 15 (cm)
____% Riffle 10 % Pool ____% Run 90 % Flat
Evidence of eroding banks, Comments on bank stability all grassed - stable

Substrate (% cover)
Bedrock Cobble 80 Sand 10 Silt 5 Muck
Boulder 5 Gravel Clay Marl Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (Typha, duckweed, ribbon leaf pondweed)
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
100 %, grasses & Typha, early
Adjacent Land Use
ag. field, road.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Migratory Obstructions (seasonal, permanent) thick vegetation
Note any fish observations none observed

Waterbody Notes
Natural Watercourse Trapezoidal Channel ✓ Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. narrow channel buried in grasses.

Field Notes Authored by K. Mason. Field Notes QA/QCed by MEllah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 7-2
Watercourse Name un-named
Photos 204-207
Date 2012/10/12

Project Name Grand Valley Wind
Project # 1609 60698
Field Staff MEllah, K Mason
Time 12:27

Weather conditions in previous 24 hrs mix sun & cloud, rain & snow, ~ 0-10°C
GPS Coordinates (Zone) 17T E 0548969 N 4873079 Datum NAD83
Descriptive Location crossing sideroad 24+25, south of concession rd 12+13, east of proposed turbine #3.

Water Quality

Dissolved Oxygen (mg/L) 10.81 pH 8.60 Conductivity (µS/cm) 613
Water Temperature (°C) 6.16 Air Temperature (°C) ~8°C
Time *in situ* measurements taken 12:31

Watercourse Dimensions & Morphology

Mean Watercourse Width 1.2 (m) Maximum Pool Depth 25 (cm)
Mean Bankfull Width 1.5 (m) Mean Water Depth 10 (cm)
____% Riffle ____% Pool ____% Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - fully vegetated with grass.

Substrate (% cover) - substrate assessment from small pool near culvert

	Bedrock	15	Cobble	40	Sand		Silt		Muck
	Boulder	40	Gravel		Clay		Marl	5	Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation (grasses) Woody Debris Boulder Other _____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
80% shade (low water levels covered by grasses) dominant grass, early
Adjacent Land Use
ag fields, road, rural residential

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
not critical
Migratory Obstructions (seasonal, permanent)
low water levels, abundant grasses
Note any fish observations None

Waterbody Notes

Natural Watercourse ____ Trapezoidal Channel ✓ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. visual flow (slow), dominant terrestrial grass throughout channel

Field Notes Authored by MEllah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 7-3
Watercourse Name un-named
Photos 208 - 209
Date 2012/10/12

Project Name Grand Valley Wind
Project # 160960698
Field Staff MEllah, K Mason
Time 12:50

Weather conditions in previous 24 hrs mix sun & cloud, rain & snow, ~ 8°C
GPS Coordinates (Zone) 17T E 0549199 N 4871899 Datum NAD83
Descriptive Location crossing sideroad 24 + 25, SE of proposed turbine #4

Water Quality NO CHANNEL
Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) _____
Time *in situ* measurements taken _____

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 (% cover)
_____ Bedrock _____ Cobble _____ Sand _____ Silt _____ Muck
_____ Boulder _____ Gravel _____ Clay _____ Marl _____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
_____
Adjacent Land Use
ag fields, bush lot

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
_____
Migratory Obstructions (seasonal, permanent) NO FISH HABITAT
Note any fish observations _____

Waterbody Notes
Natural Watercourse _____ Trapezoidal Channel _____ Grassed Swale _____ Buried Tile ✓
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry _____

Other Habitat Notes, Incidental Wildlife Observations, etc. remanent waterbody removed by agricultural practice.

Field Notes Authored by MEllah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 7-4
Watercourse Name unnamed.
Photos 267-274
Date Oct 17, 2012
Project Name Grand Valley Wind
Project # 160960689
Field Staff KM, MF
Time 14:10
Weather conditions in previous 24 hrs Mod. precipitation, windy
GPS Coordinates (Zone) 17T E 0548023 N 4872137 Datum Nad 83
Descriptive Location ~600m South of Con 12+13 + ~600m east of Sideroad 21+22

Water Quality
Dissolved Oxygen (mg/L) 11.75 pH 8.47 Conductivity (µS/cm) 567
Water Temperature (°C) 13.12 Air Temperature (°C) 8°c
Time *in situ* measurements taken 14:15

Watercourse Dimensions & Morphology
Mean Watercourse Width 2.5 (m) Maximum Pool Depth 30 (cm)
Mean Bankfull Width 4.0 (m) Mean Water Depth 5 (cm)
____% Riffle 100 % Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability minor scour line on each bank

Substrate (% cover)
____ Bedrock ____ Cobble ____ Sand 40 Silt 10 Muck
____ Boulder ____ Gravel 30 Clay ____ Marl 20 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress (Aquatic Veg) (Overhanging Vegetation) Woody Debris Boulder Other ____
duckweed, sedge, rushes, cattail, willow, dogwoods

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
5% young willow sp, cattail, sedge sp
Adjacent Land Use
Agriculture, scrub land

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Not connected d/s or u/s. No habitat.
Migratory Obstructions (seasonal, permanent)
lack of connection
Note any fish observations None observed

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ✓ Dugout Pond ____ Dominated by Aquatic Veg ✓ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc.
Intermitent minor definition. No flows. Standing water only. Scrub land surrounding. Not planted. No inlet or outlet observed near pond. Leopard frogs observed

Field Notes Authored by MF Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 8-1
Watercourse Name unnamed Tributary
Photos 277-280
Date Oct 17/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Faiella, K. Mason
Time 14:50
Weather conditions in previous 24 hrs overcast, rain
GPS Coordinates (Zone) 17T E 0551551 N 4874047 Datum Nad83
Descriptive Location off of Concession 12-13, west of County rd 25

Water Quality
Dissolved Oxygen (mg/L) 9.48 pH 8.23 Conductivity (µS/cm) 927
Water Temperature (°C) 11.31 Air Temperature (°C) 10°C
Time *in situ* measurements taken 15:05

Watercourse Dimensions & Morphology
Mean Watercourse Width 3 (m) Maximum Pool Depth 75 (cm) standing water
Mean Bankfull Width 6 (m) Mean Water Depth 45 (cm)
____% Riffle ____% Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability all vegetated - fairly stable

Substrate (% cover)
____ Bedrock ____ Cobble 40 Sand 20 Silt 10 Muck
____ Boulder 20 Gravel 10 Clay ____ Marl ____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks (Deep Pool) Watercress (Aquatic Veg) RCG
(Overhanging Vegetation) Woody Debris Boulder Other ____ rushes

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
85%, grasses, early
Adjacent Land Use
forest, road, cayfield, scrubland.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential spawning for small cyprinidae species.
Migratory Obstructions (seasonal, permanent)
thick vegetation
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ✓ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. black capped chickadee
- lots of in-water grasses
- defined channel

Field Notes Authored by K. Mason. Field Notes QA/QCed by MF

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 8-2
Watercourse Name Drain
Photos 281-284
Date Oct 17/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Faiella, K. Mason
Time 15:11
Weather conditions in previous 24 hrs Rain, overcast, 10°C
GPS Coordinates (Zone) 17T E 0552592 N 4873444 Datum Nad 83
Descriptive Location off of County rd 25, south of Conc 12-13

Water Quality
Dissolved Oxygen (mg/L) 11.24 pH 8.35 Conductivity (µS/cm) 681
Water Temperature (°C) 10.57 Air Temperature (°C) 10°C
Time *in situ* measurements taken 15:25

Watercourse Dimensions & Morphology
Mean Watercourse Width 7 (m) Maximum Pool Depth >100 (cm)
Mean Bankfull Width 10 (m) Mean Water Depth 45 (cm)
% Riffle % Pool % Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable - well vegetated

Substrate (% cover)
Bedrock 30 Cobble 30 Sand 5 Silt Muck
5 Boulder 30 Gravel Clay Marl Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
1% - grasses/meadow species, early
Adjacent Land Use
road, pasture, scrubland

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential trout, pike, bass spawning due to habitat & proximity to Grand River
Migratory Obstructions (seasonal, permanent)
none observed
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. significant waterbody (Drain 5) - fish habitat.

Field Notes Authored by K. Mason Field Notes QA/QCed by MF

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 8-3
Watercourse Name Drain
Photos 285-289
Date Oct 17/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Faiella, K. Mason
Time 15:30
Weather conditions in previous 24 hrs Rain, overcast, 10°C
GPS Coordinates (Zone) 17T E 0552481 N 4873428 Datum Nad83
Descriptive Location off of County Rd 25, south of conc 12-13, connects to 8-2 (running N-S) ↳ from 8-2

Water Quality
Dissolved Oxygen (mg/L) 10.31 / 9.58 pH 8.40 Conductivity (µS/cm) 904
Water Temperature (°C) Air Temperature (°C) 10°C
Time *in situ* measurements taken 15:40

Watercourse Dimensions & Morphology
Mean Watercourse Width 1 (m) Maximum Pool Depth 30 (cm)
Mean Bankfull Width 3.5 (m) Mean Water Depth 20 (cm)
% Riffle % Pool % Run 100 % Flat
Evidence of eroding banks, Comments on bank stability all vegetated - stable

Substrate (% cover)
Bedrock 30 Cobble 20 Sand 10 Silt Muck
Boulder 40 Gravel Clay Marl Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (RCG)
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
95% grasses, early
Adjacent Land Use
rural residential, pasture, road (county rd 25)

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential spawning during high flows for cyprinids due to proximity to 8-
Migratory Obstructions (seasonal, permanent)
thick veg / low water
Note any fish observations none observed

Waterbody Notes
Natural Watercourse Trapezoidal Channel ✓ Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. defined channel full of grasses, some flow, gravel/cobble substrate. Connected directly to 8-2 (right front waterbody)

Field Notes Authored by K. Mason Field Notes QA/QCed by MF

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 9-1
Watercourse Name unnamed trib.
Photos 125-127
Date Oct 10/12.

Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 14:00

Weather conditions in previous 24 hrs Rain, 10°C
GPS Coordinates (Zone) 17T E 0550427 N 4875224 Datum Nad83
Descriptive Location off of Sideroad 27 & 28, south of Hwy 89

Water Quality
Dissolved Oxygen (mg/L) not enough for a YSI – moist pH Conductivity (µS/cm)
Water Temperature (°C) Air Temperature (°C) 10°C
Time *in situ* measurements taken

Watercourse Dimensions & Morphology
Mean Watercourse Width (m) Maximum Pool Depth (cm)
Mean Bankfull Width 4 (m) Mean Water Depth (cm)
% Riffle % Pool % Run % Flat
Evidence of eroding banks, Comments on bank stability all grassed

Substrate (% cover)
Bedrock Cobble Sand Silt Muck
Boulder Gravel Clay Marl Detritus

In-water Cover
grass & soil ✓
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
100%, grasses, early
Adjacent Land Use
ag. field, road

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Migratory Obstructions (seasonal, permanent)
thick vegetation / low water
Note any fish observations none observed

Waterbody Notes
Natural Watercourse Trapezoidal Channel ✓ Grassed Swale ✓ Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. 100% terrestrial vegetation, moist ground, defined channel → grassed swale?

Field Notes Authored by K. Mason Field Notes QA/QCed by M Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 9-2
Watercourse Name unnamed tributary
Photos 128 - 133
Date Oct 10/12

Project Name Grand valley Wind
Project # 160960698
Field Staff M Elliah, K. Mason
Time 15:00

Weather conditions in previous 24 hrs Rain 10°C
GPS Coordinates (Zone) 17T E 0550634 N 4875809 Datum Nad 83
Descriptive Location off of Sideroad 27 & 28, NE of 9-1

Water Quality
Dissolved Oxygen (mg/L) 12.68 pH 8.45 Conductivity (µS/cm) 928
Water Temperature (°C) 8.69 Air Temperature (°C) 10°C
Time *in situ* measurements taken 15:10

Watercourse Dimensions & Morphology
Mean Watercourse Width ____ (m) Maximum Pool Depth 30 (cm) standing water
Mean Bankfull Width 2.5 (m) Mean Water Depth 20 (cm)
____ % Riffle ____ % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability all vegetated

Substrate (% cover)
____ Bedrock 10 Cobble 30 Sand ____ Silt ____ Muck
____ Boulder 60 Gravel ____ Clay ____ Marl ____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (algae)
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
85%, grasses, early (meadow species ie. Solidago Salix etc)
Adjacent Land Use
ag. field, rural residential

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential in high flows
Migratory Obstructions (seasonal, permanent)
low water, thick vegetation
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ✓ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. probably dry for most of the year - terrestrial grass on bottom of channel
- leopard frogs observed. Thick riparian area - meadow species & small shrubs (willow, Redosier dogwood) (5-7m thick on either side).

Field Notes Authored by K. Mason Field Notes QA/QCed by MGillah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 10-1
Watercourse Name Unknown
Photos 290-293
Date Oct 17/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff M Faiella, K. Masan
Time 15:55
Weather conditions in previous 24 hrs Rain, 10°C, overcast
GPS Coordinates (Zone) 17T E 553844 N 4873743 Datum Nad83
Descriptive Location off of Amaranth-East Luther townline, South of Concession 12-13, North of Sideroad 25

Water Quality
Dissolved Oxygen (mg/L) 11.11 pH 8.42 Conductivity (µS/cm) 700
Water Temperature (°C) 11.67 Air Temperature (°C) 10°C
Time *in situ* measurements taken 16:00

Watercourse Dimensions & Morphology
Mean Watercourse Width 7 (m) Maximum Pool Depth 80 (cm)
Mean Bankfull Width 9 (m) Mean Water Depth 50 (cm)
5 % Riffle ____ % Pool 95 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability stable - all vegetated

Substrate (% cover)
____ Bedrock 40 Cobble 10 Sand 5 Silt ____ Muck
5 Boulder 40 Gravel ____ Clay ____ Marl ____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks, Deep Pool, Watercress, Aquatic Veg (Typha), Overhanging Vegetation, Woody Debris, Boulder, Other algae

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
<5%, grasses, early
Adjacent Land Use
Road, pasture, rural residential

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Trout & pike spawning - good hab & proximity to Grand River
Migratory Obstructions (seasonal, permanent)
log jam
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. significant waterbody

Field Notes Authored by K. Masan Field Notes QA/QCed by MF

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 11-1
Watercourse Name un-named
Photos 121-124
Date 2012/10/10

Project Name Grand Valley Wind
Project # 1609 60698
Field Staff M Ellah, K Mason
Time 13:30

Weather conditions in previous 24 hrs rain ~10°C, windy 3 BS
GPS Coordinates (Zone) 17T E 0545983 N 4872846 Datum Nad 83
Descriptive Location north of concession road 12+13, east of townline east west cluther, SW of proposed turbine #2.

Water Quality no water on site where access is permitted
Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) 10°C
Time *in situ* measurements taken _____

Watercourse Dimensions & Morphology no bank/channel morphology
Mean Watercourse Width _____ (m) Maximum Pool Depth _____ (cm) ↳ drains
Mean Bankfull Width _____ (m) Mean Water Depth _____ (cm)
_____ % Riffle _____ % Pool _____ % Run _____ % Flat
Evidence of eroding banks, Comments on bank stability _____

Substrate (% cover)
_____ Bedrock _____ Cobble _____ Sand _____ Silt _____ Muck
_____ Boulder _____ Gravel _____ Clay _____ Marl _____ Detritus

In-water Cover crop ✓
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
0% wheat field, early
Adjacent Land Use
wheat, road

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings) _____
Migratory Obstructions (seasonal, permanent) no channel
Note any fish observations none

Waterbody Notes
Natural Watercourse _____ Trapezoidal Channel _____ Grassed Swale _____ Buried Tile ✓
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry ✓

Other Habitat Notes, Incidental Wildlife Observations, etc. no channel on side where we have property access - however channel on adjacent property

Field Notes Authored by K. Mason Field Notes QA/QCed by M Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 12-1
Watercourse Name unnamed Tributary
Photos 76 - 79
Date Oct 9/12

Project Name 160960698
Project # Grand Valley Wind
Field Staff M. Ellah, K. Mason
Time 14:00

Weather conditions in previous 24 hrs sunny, 7°C
GPS Coordinates (Zone) 17T E 0552877 N 4863794 Datum Nad83
Descriptive Location east of 27th Side Road, NW of proposed turbine 10

Water Quality not enough for YSI reading
Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) ~12°C
Time *in situ* measurements taken _____

Watercourse Dimensions & Morphology
Mean Watercourse Width 1 (m) Maximum Pool Depth 10 (cm)
Mean Bankfull Width 2 (m) Mean Water Depth < 10 (cm)
_____% Riffle _____% Pool 100 % Run _____% Flat
Evidence of eroding banks, Comments on bank stability well vegetated - seem fairly stable

Substrate (% cover)
_____Bedrock _____Cobble _____Sand 20 Silt 80 Muck
_____Boulder _____Gravel _____Clay _____Marl _____Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____ Typha

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
95% - shrubs & trees, intermediate → mature
Adjacent Land Use
agricultural fields, forested area/hedgerow

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
_____
Migratory Obstructions (seasonal, permanent) dry channel / thick vegetation
Note any fish observations none observed

Waterbody Notes
Natural Watercourse_____ Trapezoidal Channel ✓ Grassed Swale_____ Buried Tile_____
Surficial Drainage (i.e. furrows)_____ Dugout Pond_____ Dominated by Aquatic Veg_____ Dry_____

Other Habitat Notes, Incidental Wildlife Observations, etc. riparian area = W. Cedar, Spruce, Poplars, Salix, dogwoods etc
- defined channel, moist on D/S end, water at culvert by road
- lots of terrestrial vegetation in channel (Salix, dogwood etc)
- currently no flow, just standing water.

Field Notes Authored by K. Mason Field Notes QA/QCed by MEllah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 12-2
Watercourse Name un-named
Photos 70-73-75
Date Oct 9/13

Project Name Grand Valley Wind
Project # 160960698
Field Staff K. Mason, M. Ellah
Time 13:25

Weather conditions in previous 24 hrs sunny, 7°C
GPS Coordinates (Zone) 17T E 0552897 N 4863752 Datum NAD83
Descriptive Location west of county rd 25, 300m east of sideroad 27+28, N of proposed turbine 10

Water Quality
Dissolved Oxygen (mg/L) 9.59 pH 8.68 Conductivity (µS/cm) 279
Water Temperature (°C) 11.25 Air Temperature (°C) ~12°C
Time *in situ* measurements taken 13:25

Watercourse Dimensions & Morphology
Mean Watercourse Width 20×15 (m) pond Maximum Pool Depth 80 (cm)
Mean Bankfull Width 20×15 (m) Mean Water Depth 50 (cm)
____ % Riffle 100 % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability stable banks - abundant cattail surrounding pond

Substrate (% cover)
____ Bedrock ____ Cobble ____ Sand 30 Silt 30 Muck
____ Boulder ____ Gravel ____ Clay ____ Marl 40 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (plantain)
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
0% shade, dominant cattail surrounding banks, white spruce, white cedar
Adjacent Land Use ag fields, willow shrubs, dogwood, poplars early successional surrounding cattails.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none observed
Migratory Obstructions (seasonal, permanent) Isolation
Note any fish observations yes - cyprinids

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. surrounding area natural corridor providing wildlife habitat - deer trails observed, song birds observed, good amphibian habitats & reptile hibernacula, rock piles possible

Field Notes Authored by M. Ellah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 12-3
Watercourse Name unnamed Trib.
Photos 80-87
Date Oct 9/12

Project Name Grand Valley Wind
Project # 160960098
Field Staff M Ellah, K Mason
Time 14:10
Weather conditions in previous 24 hrs sunny, 7°C
GPS Coordinates (Zone) 17T E 0552557 N 4864058 Datum NAD83
Descriptive Location East of Sideroad 27 & 28, N of 12-1 & 12-2

Water Quality
Dissolved Oxygen (mg/L) dry pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) ~12°C
Time *in situ* measurements taken _____

Watercourse Dimensions & Morphology
Mean Watercourse Width _____ (m) Maximum Pool Depth Dry (cm)
Mean Bankfull Width 2 (m) Mean Water Depth _____ (cm)
_____ % Riffle _____ % Pool _____ % Run _____ % Flat
Evidence of eroding banks, Comments on bank stability _____

Substrate (% cover)
_____ Bedrock _____ Cobble _____ Sand 50 Silt 50 Muck
_____ Boulder _____ Gravel _____ Clay _____ Marl _____ Detritus same

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (Typha)
Overhanging Vegetation Woody Debris Boulder Other ~95% terrestrial vegetation by road & 100% d/s ~50m.

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
95%, grasses, meadow species, early
Adjacent Land Use
ag. fields, road

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none
Migratory Obstructions (seasonal, permanent)
dry channel
Note any fish observations none

Waterbody Notes
Natural Watercourse _____ Trapezoidal Channel ✓ Grassed Swale _____ Buried Tile _____
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry _____

Other Habitat Notes, Incidental Wildlife Observations, etc. moist defined channel with Typha & terrestrial vegetation
Potentially REA waterbody but road, however d/s the definition is minimal & the corridor/channel is all terrestrial vegetation & completely dry (~50m)
- west side of 27+28 standing water - lack of culvert connection to east side of road. connected

Field Notes Authored by K. Mason Field Notes QA/QCed by MEllah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 12-4
Watercourse Name un-named - Trib to Grand River
Photos 88 - 95
Date 2012/10/09
Project Name Grand Valley Wind
Project # 160960698
Field Staff MEllah, KMason
Time 14:30
Weather conditions in previous 24 hrs Sunny, 7°C
GPS Coordinates (Zone) 17T E 0552407 N 4864851 Datum Nad83
Descriptive Location off of sideroad 28-27, N of 12-3

Water Quality
Dissolved Oxygen (mg/L) 10.48 pH 8.53 Conductivity (µS/cm) 6.116
Water Temperature (°C) 7.32 Air Temperature (°C) ~12°C
Time *in situ* measurements taken 14:37

Watercourse Dimensions & Morphology
Mean Watercourse Width 1 (m) Maximum Pool Depth 10 (cm)
Mean Bankfull Width 4 (m) Mean Water Depth 5-10 (cm)
20 % Riffle ____ % Pool 80 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability very stable - all vegetated.

Substrate (% cover)
____ Bedrock ____ Cobble 20 Sand ____ Silt ____ Muck
____ Boulder 80 Gravel ____ Clay ____ Marl ____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg Overhanging Vegetation Woody Debris Boulder Other ____
Reed Canary Grass

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
75% - mature treed meadow species, mostly mature
Adjacent Land Use
forested riparian corridor, road, ag. field.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potentially during high flows due to proximity & connection to the Grand River
Migratory Obstructions (seasonal, permanent)
thick vegetation, low flows
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ✓ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. double culvert @ road
riparian area comprised of maples, Solidago, RCG, Ash
- watercress present

Field Notes Authored by KMason Field Notes QA/QCed by MEllah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Station # 12-5 | Project Name Grand Valley Wind
Watercourse Name unnamed | Project # 160960698
Photos 311-314 | Field Staff KM, MF
Date Oct 18, 2012 | Time 10:35
Weather conditions in previous 24 hrs windy, no rain, sunny, 15°C
GPS Coordinates (Zone) 17T E 0552949 N 4864225 Datum
Descriptive Location ~400m east of SideRd 27+28 & 1.5km north of Conc 4+5 in field

Water Quality
Dissolved Oxygen (mg/L) 9.48 pH 8.54 Conductivity (µS/cm) 416
Water Temperature (°C) 9.34 Air Temperature (°C) 10°c
Time *in situ* measurements taken 10:38

Watercourse Dimensions & Morphology
Mean Watercourse Width ~0.5 (m) Maximum Pool Depth ~10.0 (cm) STANDING WATER ONLY
Mean Bankfull Width ~2.0 (m) Mean Water Depth ~ 5.0 (cm)
____ % Riffle 100 % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability Stable

Substrate (% cover)
____ Bedrock ____ Cobble 10 Sand 60 Silt ____ Muck
____ Boulder ____ Gravel 20 Clay ____ Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress (Aquatic Veg)
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Cattail, sedge sp, dogwoods, meadow sp.
Adjacent Land Use
agricultural field

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
None
Migratory Obstructions (seasonal, permanent)
Lack of water throughout
Note any fish observations None observed

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ✓ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. Defined (dredging). No flows cannot drive through, not planted. Dogwoods in channel

Field Notes Authored by MF Field Notes QA/QCed by K Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 13-1 + side channel — same habitats & features
Project Name Grand Valley Wind
Watercourse Name un-named
Project # 1609 60698
Photos 134-139 140-142 (side channel)
Field Staff MEllah, K Mason
Date 2012/10/10
Time 15:45
Weather conditions in previous 24 hrs rain, ~9°C, windy BS 3
GPS Coordinates (Zone) 17T E 0553438 N 4875908 Datum NAD83
Descriptive Location west of tourline Amaranth East Luther, south of highway 89

Water Quality - isolated pool
Dissolved Oxygen (mg/L) 9.82 pH 8.56 Conductivity (µS/cm) 1048
Water Temperature (°C) 8.93 Air Temperature (°C) ~10
Time *in situ* measurements taken 10:46

Watercourse Dimensions & Morphology - isolated pool
Mean Watercourse Width 1.2 (m) Maximum Pool Depth 30 (cm)
Mean Bankfull Width 1.2 (m) Mean Water Depth 30 (cm)
____% Riffle 100 % Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability stable banks - grassed

Substrate (% cover) - isolated pool
____ Bedrock 10 Cobble ____ Sand 5 Silt ____ Muck
____ Boulder ____ Gravel 80 Clay ____ Marl 5 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other algae

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
0% shade, grasses/meadow species/early successional
Adjacent Land Use
ag fields, rural residential

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none
Migratory Obstructions (seasonal, ~~permanent~~) isolation, low water levels
Note any fish observations
none

Waterbody Notes
Natural Watercourse____ Trapezoidal Channel ✓ Grassed Swale ✓ Buried Tile____
Surficial Drainage (i.e. furrows)____ Dugout Pond____ Dominated by Aquatic Veg____ Dry____

Other Habitat Notes, Incidental Wildlife Observations, etc. Small pool with water, rest of channel dry & dominated by terrestrial grasses. - no defined channel found beneath grasses. does not appear to be wet for much of the year. only wet because of recent rainfall events. side channel @ 0553340, 4895888 - grassy swale

Field Notes Authored by MEllah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 13-2
Watercourse Name unknown/unnamed
Photos 143-145
Date Oct 10/12.
Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 16:15
Weather conditions in previous 24 hrs Rain, 10°C.
GPS Coordinates (Zone) 17T E 0552928 N 4875364 Datum Nad83
Descriptive Location west of Amaranth East Luther, south of highway 89, SW of 13-1

Water Quality

Dry - no waterbody, no channel - only meadow field

Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) 10°C
Time *in situ* measurements taken _____

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 (% cover)

_____ Bedrock _____ Cobble _____ Sand _____ Silt _____ Muck
_____ Boulder _____ Gravel _____ Clay _____ Marl _____ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)

Adjacent Land Use
ag fields, rural residential

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)

Migratory Obstructions (seasonal, permanent)

Note any fish observations _____

Waterbody Notes

Natural Watercourse _____ Trapezoidal Channel _____ Grassed Swale _____ Buried Tile _____
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry _____

Other Habitat Notes, Incidental Wildlife Observations, etc. evidence of bush clearing as there are large piles of trees & shrubs around property. elements of swamp or possible water body removed by property owner.

Field Notes Authored by M Ellah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 13-3
Watercourse Name unnamed
Photos 294-298
Date Oct 17/12

Project Name Grand Valley Wind
Project # 160960698
Field Staff JC Mason, M. Faiella
Time 16:10

Weather conditions in previous 24 hrs Rain, 10°C, overcast
GPS Coordinates (Zone) 17T E 0553634 N 4874880 Datum Nad83
Descriptive Location off of Amaranth/E. Luther Townline, North of Conc 12-13

Water Quality
Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) 10°C
Time *in situ* measurements taken _____ too shallow

Watercourse Dimensions & Morphology no channel definition
Mean Watercourse Width _____ (m) Maximum Pool Depth _____ (cm) standing water
Mean Bankfull Width _____ (m) Mean Water Depth _____ (cm)
_____ % Riffle _____ % Pool _____ % Run _____ % Flat
Evidence of eroding banks, Comments on bank stability _____

Substrate (% cover)
_____ Bedrock _____ Cobble _____ Sand 50 Silt 50 Muck
_____ Boulder _____ Gravel _____ Clay _____ Marl _____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (Plantain)
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
100%, grasses, early
Adjacent Land Use
scrubland, forest, road

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none
Migratory Obstructions (seasonal, permanent)
thick vegetation, low water, no channel
Note any fish observations none

Waterbody Notes
Natural Watercourse _____ Trapezoidal Channel _____ Grassed Swale ✓ Buried Tile _____
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry _____

Other Habitat Notes, Incidental Wildlife Observations, etc. no real channel definition, farmer isn't plowing through it however you could drive through it
Reed Canary grass drainage swale

Field Notes Authored by K. Mason
Field Notes QA/QCed by MF

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 13-4
Watercourse Name unnamed
Photos 299-304
Date Oct 17 12
Project Name Grand Valley Wind
Project # 160960698
Field Staff M Faella, K Mason
Time 16:35
Weather conditions in previous 24 hrs Rain, 10°C, overcast
GPS Coordinates (Zone) 17T E 0553141 N 4874542 Datum Nad83
Descriptive Location off of concession 12-13, west of Amaranth East Luther Townline

Water Quality
Dissolved Oxygen (mg/L) 10.72 pH 8.66 Conductivity (µS/cm) 564
Water Temperature (°C) 9.52 Air Temperature (°C) 10°C
Time *in situ* measurements taken 16:38

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.5 (m) Maximum Pool Depth 20 (cm) standing water
Mean Bankfull Width 4 (m) Mean Water Depth 15 (cm)
% Riffle % Pool % Run % Flat
Evidence of eroding banks, Comments on bank stability all vegetated - stable

Substrate (% cover)
Bedrock 20 Cobble 10 Sand 30 Silt 10 Muck
Boulder 20 Gravel Clay Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Waterfalls Aquatic veg (Typha, RCG)
Overhanging Vegetation Woody Debris Boulder Other algae

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
5%, meadow species, early
Adjacent Land Use
Road, pasture, forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Potential none
Migratory Obstructions (seasonal, permanent)
low water
Note any fish observations observed Brook Stickleback

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. defined channel w/ low water, banks & culvert size suggest high flows during the spring.

Field Notes Authored by K. Mason Field Notes QA/QCed by MF

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 14-1
Watercourse Name unknown
Photos 170-172
Date Oct 11/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff K. Mason, M Ellah
Time 12:25
Weather conditions in previous 24 hrs Rain high winds, 10°C
GPS Coordinates (Zone) 17T E 0555201 N 4866143 Datum Nad83
Descriptive Location off of Amaranth/East Luther Townline, north of 14-2.

Water Quality
Dissolved Oxygen (mg/L) 10.42 pH 8.37 Conductivity (µS/cm) 607
Water Temperature (°C) 7.15 Air Temperature (°C) 10°C
Time *in situ* measurements taken 12:35

Watercourse Dimensions & Morphology
Mean Watercourse Width 2 (m) Maximum Pool Depth 100 (cm) above dam
Mean Bankfull Width 4 (m) Mean Water Depth 40 (cm) above beaver dam
____% Riffle ____% Pool ____% Run 100 % Flat
Evidence of eroding banks, Comments on bank stability all banks are stable

Substrate (% cover) standing water below dam
____ Bedrock ____ Cobble ____ Sand 80 Silt ____ Muck
____ Boulder ____ Gravel ____ Clay ____ Marl 20 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
5%, grasses & small trees, early - inter
Adjacent Land Use
road, rural residential

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential for pike in high flows
Migratory Obstructions (seasonal, permanent)
beaver dam
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. Riparian area comprised of grasses, meadow species & small-med. sized trees (Populus tremuloides, Dogwoods)
@ see other notes @ station 14-2 for description of further d/s of waterbody

Field Notes Authored by K. Mason Field Notes QA/QCed by MEllah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 14-2
Watercourse Name unknown
Photos 173-176
Date Oct 11/12

Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 12:43

Weather conditions in previous 24 hrs Rain, high winds, 10°C
GPS Coordinates (Zone) 17T E 0555376 N 4865108 Datum Nad83
Descriptive Location South of 14-1 off of Amaranth - East Luther Townline.

Water Quality
Dissolved Oxygen (mg/L) 8.53 pH 8.25 Conductivity (µS/cm) 634
Water Temperature (°C) 5.42 Air Temperature (°C) 10°C +wind chill
Time *in situ* measurements taken 12:50

Watercourse Dimensions & Morphology
Mean Watercourse Width 2 (m) Maximum Pool Depth 50 (cm) standing H2O
Mean Bankfull Width 5 (m) Mean Water Depth 30 (cm)
____% Riffle ____% Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability well vegetated, stable banks

Substrate (% cover)
____ Bedrock ____ Cobble 40 Sand 10 Silt 10 Muck
____ Boulder 20 Gravel ____ Clay ____ Marl 20 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
95% trees & shrubs, intermediate
Adjacent Land Use
ag. fields, road

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential pike during high flows
Migratory Obstructions (seasonal, permanent)
thick vegetation
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ✓ (naturalized) Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. willows in water
- morphology of waterbody on satellite image on maps depicts a waterbody REM. riparian habitats also show waterbody - investigation further d/s shows waterbody draining into the Grand River natural

Field Notes Authored by K. Mason Field Notes QA/QCed by MEllah

further d/s.

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 14-3
Watercourse Name un-named
Photos 218-222 + 223
Date Oct 12/12

Project Name Grand Valley Wind
Project # 160960698
Field Staff K. Mason M. Ellah
Time 14:15

Weather conditions in previous 24 hrs Sunny, partly cloudy, high winds, 10°C
GPS Coordinates (Zone) 17 E 0554961 N 4865178 Datum NAD83
Descriptive Location west of Townline Amaranth East Luther, east of County Rd 25

Water Quality
Dissolved Oxygen (mg/L) 10.22 pH 8.69 Conductivity (µS/cm) 649
Water Temperature (°C) 7.64 Air Temperature (°C) 8°C
Time *in situ* measurements taken 14:15

Watercourse Dimensions & Morphology
Mean Watercourse Width 2.5 (m) Maximum Pool Depth 25 (cm)
Mean Bankfull Width 3.0 (m) Mean Water Depth 15 (cm)
20 % Riffle 30 % Pool 30 % Run 20 % Flat
Evidence of eroding banks, Comments on bank stability slight erosion along banks - water body flowing through forest - banks soil, undercut on meanders - tree roots provide stability

Substrate (% cover)
Bedrock 50 Cobble Sand 10 Silt Muck
5 Boulder 25 Gravel Clay Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
95% shaded, sugar maple, white ash, shrubs mature (white birch)
Adjacent Land Use
ag fields, forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential spawning & nursery for salmonids from Grand River
Migratory Obstructions (seasonal, permanent)
low water levels
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. meandering waterbody in forest ecosystem

Field Notes Authored by M. Ellah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 14-4
Watercourse Name unnamed trib of Grand River
Photos 224-229
Date Oct 12/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff K. Mason, M. Ellah
Time 14:40
Weather conditions in previous 24 hrs sun, partly cloudy, high winds, 10°C
GPS Coordinates (Zone) 17T E 0554811 N 4865477 Datum NAD83
Descriptive Location East of Amaranth/East Luther Townline, South of Concession 6-7, north of 14-3

Water Quality
Dissolved Oxygen (mg/L) 10.77 pH 8.73 Conductivity (µS/cm) 482
Water Temperature (°C) 7.45 Air Temperature (°C) 8°C
Time *in situ* measurements taken 14:45

Watercourse Dimensions & Morphology
Mean Watercourse Width 2-5 (m) Maximum Pool Depth 30 (cm)
Mean Bankfull Width 8 (m) Mean Water Depth 20 (cm)
50 % Riffle 50 % Pool % Run % Flat
Evidence of eroding banks, Comments on bank stability some erosion & scouring on both banks

Substrate (% cover)
Bedrock 45 Cobble 10 Sand Silt Muck
10 Boulder 30 Gravel Clay Marl 5 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
85%, ironwood, maples, mature
Adjacent Land Use
forest, ag. field.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential trout spawning
Migratory Obstructions (seasonal, permanent)
log jam & big boulders during low flows
Note any fish observations lots of Cyprinids

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. forested habitat
1.5m bank scar (height)
(5 to 5m high)

Field Notes Authored by K. Mason Field Notes QA/QCed by M. Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 16-1
Watercourse Name unnamed swale
Photos 230-232 & 233
Date Oct 12/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 15:20
Weather conditions in previous 24 hrs sun/cloud, high wind 10°C
GPS Coordinates (Zone) 17T E 0553056 N 4871667 Datum Nad 83
Descriptive Location east of County rd 25, North of 16-2 off of Concession 10-11

Water Quality
Dissolved Oxygen (mg/L) no water pH Conductivity (µS/cm)
Water Temperature (°C) Air Temperature (°C) 6°C
Time *in situ* measurements taken

Watercourse Dimensions & Morphology
Mean Watercourse Width (m) Maximum Pool Depth (cm)
Mean Bankfull Width 2 (m) Mean Water Depth (cm)
% Riffle % Pool no water % Run % Flat
Evidence of eroding banks, Comments on bank stability stable banks - all vegetated.

Substrate (% cover)
Bedrock Cobble Sand Silt Muck
Boulder Gravel Clay Marl Detritus

In-water Cover
terrestrial grasses & soil ✓
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other a apple cattails

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
100% terrestrial grasses, early successional
Adjacent Land Use
ag fields, road

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none
Migratory Obstructions (seasonal, permanent)
thick vegetation, no water
Note any fish observations none

Waterbody Notes
Natural Watercourse Trapezoidal Channel ✓ Grassed Swale ✓ Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. defined channel however (done to dredging)
filled with terrestrial grasses. No channel at all on north side of road. Most likely only receives rainwater overflow to Grand River (no source of water U/S)

Field Notes Authored by K. Mason Field Notes QA/QCed by MGillah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 16-2
Watercourse Name un-named
Photos 234-242
Date 2012/10/12
Project Name Grand Valley Wind
Project # 1609 60 698
Field Staff MEllah, K Mason
Time 15:30
Weather conditions in previous 24 hrs mix sun & cloud, ~10°C, rain & snow
GPS Coordinates (Zone) 17T E 0553114 N 4870900 Datum Nad83
Descriptive Location south of 16-1, off of County rd 25, south of concession 10-11

Water Quality
Dissolved Oxygen (mg/L) 3.80 pH 8.13 Conductivity (µS/cm) 1595
Water Temperature (°C) 7.15 Air Temperature (°C) 6°C
Time *in situ* measurements taken 15:35

Watercourse Dimensions & Morphology
Mean Watercourse Width 5 (m) Maximum Pool Depth 75 (cm)
Mean Bankfull Width 8 (m) Mean Water Depth 50 (cm)
____ % Riffle 50 % Pool ____ % Run 50 % Flat
Evidence of eroding banks, Comments on bank stability banks are fairly stable - all covered in Typha

Substrate (% cover)
____ Bedrock ____ Cobble ____ Sand 70 Silt 25 Muck
____ Boulder ____ Gravel ____ Clay ____ Marl 5 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks (Deep Pool) Watercress (Aquatic Veg) duckweed
(Overhanging Vegetation) Woody Debris Boulder Other ____ Typha

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
100%, Typha, early
Adjacent Land Use marshland, road, forest (spruce, trembling aspen)

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings) potential nursery - proximity to Marsh & Grand River
Migratory Obstructions (seasonal, permanent) low flow @ any times of the year
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ – marsh with channel Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ✓ Dry ____
Banks don't have a gradual slope - just drops into a deep channel
Other Habitat Notes, Incidental Wildlife Observations, etc. Typha corridor/marsh with defined channel running through it. This channel runs along County rd 25. Cattail corridor widens along County rd 25. On west side of road there is a dredged channel and marshland

Field Notes Authored by K. Mason Field Notes QA/QCed by MEllah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 16-3
Watercourse Name Unnamed tributary
Photos 319-324 & 325
Date Oct 18/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff K. Mason, M. Faiella
Time 13:50
Weather conditions in previous 24 hrs Sunny, 15°C
GPS Coordinates (Zone) 17T E 0552413 N 4870049 Datum Nad 83
Descriptive Location off of County rd 25, south of Concession 10-11 (Eside road)

Water Quality
Dissolved Oxygen (mg/L) 11.95 pH 8.60 Conductivity (µS/cm) 696
Water Temperature (°C) 11.50 Air Temperature (°C) 17°C
Time *in situ* measurements taken 13:58

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.5 (m) Maximum Pool Depth 25 (cm)
Mean Bankfull Width 2.5 (m) Mean Water Depth 20 (cm)
20 % Riffle ____ % Pool 80 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability stable - well vegetated

Substrate (% cover)
Bedrock ____ Cobble 50 Sand ____ Silt ____ Muck
Boulder 40 Gravel ____ Clay ____ Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg RCG
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
80% grasses, early
Adjacent Land Use
forest, ag. field

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential trout spawning & small cyprinids
Migratory Obstructions (seasonal, permanent)
low water
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. flows into forested area

Field Notes Authored by K. Mason Field Notes QA/QCed by MF

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 17-1
Watercourse Name unnamed Trib to the Grand
Photos 187-190+191
Date Oct 12/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff M. Ellah, K. Mason
Time 10:15
Weather conditions in previous 24 hrs Sunny/partly cloudy, high winds, 10°C
GPS Coordinates (Zone) 17T E 0552021 N 4866989 Datum Nad 83
Descriptive Location North of concession 6-7, off of Side road 27-28

Water Quality
Dissolved Oxygen (mg/L) 10.66 pH 8.19 Conductivity (µS/cm) 707
Water Temperature (°C) 6.40 Air Temperature (°C) 8°C
Time *in situ* measurements taken 10:21

Watercourse Dimensions & Morphology
Mean Watercourse Width 2 (m) Maximum Pool Depth 40 (cm)
Mean Bankfull Width 4 (m) Mean Water Depth 20 (cm)
____% Riffle 10 % Pool ____% Run 90 % Flat
Evidence of eroding banks, Comments on bank stability Stable - all vegetated

Substrate (% cover)

	Bedrock	75	Cobble	5	Sand	Silt	Muck
5	Boulder	10	Gravel		Clay	Marl 5	Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
80%, meadow sp. & grasses, early
Adjacent Land Use
ag. field, road.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential trout spawning & nursery - gravel/cobble
Migratory Obstructions (seasonal, permanent)
thick vegetation, perched culvert in low water
Note any fish observations none observed

Waterbody Notes (naturalized trapezoidal)
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. Northern Harrier flying in adjacent field

Field Notes Authored by K. Mason
Field Notes QA/QCed by M Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 18-1
Watercourse Name Grand River
Photos 192 - 195
Date 2012/10/12
Project Name Grand Valley Wind
Project # 1609 609698
Field Staff MEllah, K Mason
Time 10:45
Weather conditions in previous 24 hrs sun cloud mix, rain & snow, ~ 0 - 10°C
GPS Coordinates (Zone) 17T E 0551748 N 4868421 Datum NAD83
Descriptive Location intersection of concession rd 8+9 and sideroad 27+28

Water Quality
Dissolved Oxygen (mg/L) 11.86 pH 8.67 Conductivity (µS/cm) 339
Water Temperature (°C) 5.98 Air Temperature (°C) ~3
Time *in situ* measurements taken 10:57

Watercourse Dimensions & Morphology
Mean Watercourse Width 17 (m) Maximum Pool Depth 150 (cm)
Mean Bankfull Width 19 (m) Mean Water Depth 100 (cm)
20 % Riffle 40 % Pool 40 % Run % Flat
Evidence of eroding banks, Comments on bank stability stable banks - fully vegetated & supported by cobbles & boulders

Substrate (% cover)
Bedrock 50 Cobble 10 Sand 15 Silt Muck
5 Boulder 30 Gravel Clay Marl Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
10% cover shade, white cedar - mature, white ash & maple - early, > meadow grasses & herbs
Adjacent Land Use
ag fields, roads, rural residential

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
critical habitat for salmonids - both spawning & nursery
Migratory Obstructions (seasonal, permanent)
none
Note any fish observations
none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. blue jays, chickadees, large river - good riparian habitats

Field Notes Authored by MEllah Field Notes QA/QCed by K Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 18-2
Watercourse Name un-named
Photos 196-197
Date 2012/10/12
Project Name Grand Valley Wind
Project # 1609 60698
Field Staff MEllah, KMason
Time 11:10
Weather conditions in previous 24 hrs sun/cloud mix, ~ 6°C, rain & snow
GPS Coordinates (Zone) 17T E 0550408 N 4860821 Datum NAD83
Descriptive Location west of 18-1 off of Concession Road 8-9, east of Sideroad 24 & 25.

Water Quality
Dissolved Oxygen (mg/L) 11.31 pH 9.30 Conductivity (µS/cm) 154
Water Temperature (°C) 5.64 Air Temperature (°C) 1°C
Time *in situ* measurements taken 11:20

Watercourse Dimensions & Morphology
Mean Watercourse Width 7 (m) Maximum Pool Depth >100 (cm)
Mean Bankfull Width 10 (m) Mean Water Depth 75 (cm)
% Riffle % Pool % Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - vegetated

Substrate (% cover)

	Bedrock	20	Cobble	30	Sand		Silt		Muck
5	Boulder	40	Gravel		Clay		Marl	5	Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg Overhanging Vegetation Woody Debris Boulder Other sedges.

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
5%, small trees & shrubs, early
Adjacent Land Use
ag. fields, roads, rural residential

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
yes - spawning & nursery
Migratory Obstructions (seasonal, permanent)
none observed
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. riparian vegetation consists of willows, dogwoods, golden rod & grasses, elm.

Field Notes Authored by K. Mason. Field Notes QA/QCed by MEllah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 18-3
Watercourse Name un-named
Photos 210 - 212
Date 2012 | 10 | 12

Project Name Grand Valley Wind
Project # 160960698
Field Staff MEllah, K mason
Time 13:20
Weather conditions in previous 24 hrs mix Sun & cloud, rain & snow, ~ 0°C - 10°C
GPS Coordinates (Zone) 17T E 0551998 N 4868524 Datum NAD83
Descriptive Location adjacent to concession rd 8 & 9, east of sideroad 27 & 28

Water Quality
Dissolved Oxygen (mg/L) 11.91 pH 8.75 Conductivity (µS/cm) 627
Water Temperature (°C) 7.35 Air Temperature (°C) ~8°C
Time *in situ* measurements taken 13:22

Watercourse Dimensions & Morphology
Mean Watercourse Width 2.5 (m) Maximum Pool Depth 30 (cm)
Mean Bankfull Width 3.0 (m) Mean Water Depth 20 (cm)
30 % Riffle 50 % Pool 20 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability stable banks - supported by trees, shrubs & grasses

Substrate (% cover)
____ Bedrock 70 Cobble 15 Sand ____ Silt ____ Muck
5 Boulder 15 Gravel ____ Clay ____ Marl 5 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
70% shade, ash, poplar, cedar, dogwood, goldenrod, intermediate successional
Adjacent Land Use
residential, roads, Grand River

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
spawning & nursery potential for salmonids of the Grand River
Migratory Obstructions (seasonal, permanent)
none observed
Note any fish observations
none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. Belted Kingfisher
- meandering riffle pool run water body connected to the Grand River
- definite potential for spawning, nursery & rearing for fish

Field Notes Authored by MEllah Field Notes QA/QCed by K. Mason.

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 19-1
Watercourse Name unknown
Photos 198-201
Date Oct 12/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff N. Ellah, K. Major
Time 11:30
Weather conditions in previous 24 hrs sunny, cloudy, 10°C high winds
GPS Coordinates (Zone) 17T E 0549493 N 4870207 Datum Nad 83
Descriptive Location south of county rd 15, crossing sideroad 24+25, north of station 19-2

Water Quality
Dissolved Oxygen (mg/L) 11.15 pH 8.61 Conductivity (µS/cm) 5.63
Water Temperature (°C) 5.93 Air Temperature (°C) 1°C
Time *in situ* measurements taken 11:30

Watercourse Dimensions & Morphology
Mean Watercourse Width 4 (m) Maximum Pool Depth 40 (cm)
Mean Bankfull Width 6 (m) Mean Water Depth 20 (cm)
10 % Riffle 20 % Pool 70 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability stable banks - all vegetated

Substrate (% cover)
____ Bedrock 70 Cobble 5 Sand ____ Silt ____ Muck
5 Boulder 20 Gravel ____ Clay ____ Marl ____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks, Deep Pool, Watercress, Aquatic Veg (Bullrushes, Typha, RCG), Overhanging Vegetation, Woody Debris, Boulder, Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
U/S 209a; grasses & shrubs, early
Adjacent Land Use
ag. field, road

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential trout spawning & nursery
Migratory Obstructions (seasonal, permanent)
log jam on u/s side of bridge
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. Riparian area is comprised of elm, Trembling Aspen, grasses, willow, maples etc. U/S side has more mature trees, D/S has more grasses & shrub species in riparian area.

Field Notes Authored by K. Major Field Notes QA/QCed by M Ellah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 19-2
Watercourse Name un-named
Photos 202-203
Date 2012/10/12
Project Name Grand Valley Wind
Project # 1609 60698
Field Staff MEllah, K Mason
Time 11:45
Weather conditions in previous 24 hrs sunny cloud mix, 10°C, windy
GPS Coordinates (Zone) 17T E 0549637 N 4869547 Datum NAD83
Descriptive Location east of sideroad 24 & 25, south of 19-1

NO WATER, NO CHANNEL

Water Quality
Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) 1°C
Time *in situ* measurements taken _____

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 (% cover)
_____ Bedrock _____ Cobble _____ Sand _____ Silt _____ Muck
_____ Boulder _____ Gravel _____ Clay _____ Marl _____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Adjacent Land Use ag fields, rural residential, bush lot

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Migratory Obstructions (seasonal, permanent) NO fish habitat
Note any fish observations _____

Waterbody Notes ✓drained / tiled
Natural Watercourse _____ Trapezoidal Channel _____ Grassed Swale _____ Buried Tile _____
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry _____

Other Habitat Notes, Incidental Wildlife Observations, etc. no water body due to agriculture practice & drainage & tiling of small streams - slight depression in ag field shows remenant location of water body.

Field Notes Authored by MEllah Field Notes QA/QCed by K. Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 12-5
Watercourse Name unnamed
Photos 311-314
Date Oct 18, 2012

Project Name Grand Valley Wind
Project # 160960698
Field Staff KM, MF
Time 10:35

Weather conditions in previous 24 hrs windy, no rain, sunny, 15°C
GPS Coordinates (Zone) 17T E 0652949 N 4864225 Datum
Descriptive Location ~400m east of SideRd 27+28 & 1.5km north of Conc 4+5 in field

Water Quality
Dissolved Oxygen (mg/L) 9.48 pH 8.54 from standing pool Conductivity (µS/cm) 416
Water Temperature (°C) 9.34 Air Temperature (°C) 10°c
Time *in situ* measurements taken 10:38

Watercourse Dimensions & Morphology
Mean Watercourse Width ~0.5 (m) Maximum Pool Depth ~10.0 (cm)
Mean Bankfull Width ~2.0 (m) Mean Water Depth ~ 5.0 (cm)
STANDING WATER ONLY
____% Riffle 100 % Pool ____% Run ____% Flat
Evidence of eroding banks, Comments on bank stability Stable

Substrate (% cover)
____ Bedrock ____ Cobble 10 Sand 60 Silt ____ Muck
____ Boulder ____ Gravel 20 Clay ____ Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress (Aquatic Veg)
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
Cattail, sedge sp, dogwoods, meadow sp.
Adjacent Land Use
agricultural field

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
None
Migratory Obstructions (seasonal, permanent)
lack of water throughout
Note any fish observations None observed

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ✓ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ✓ in most places

Other Habitat Notes, Incidental Wildlife Observations, etc. Defined (dredging), No flows cannot drive through (not planted - Dogwoods in channel) very little section w/ defined banks/channel, followed by a long ill-defined feature

Field Notes Authored by MF Field Notes QA/QCed by K Mason

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # VQ-1
Watercourse Name unnamed trib.
Photos 25-29
Date Nov 29/12
Project Name Grand Valley Wind
Project # 160960698
Field Staff K. Macan, N. Burnett
Time 10:10
Weather conditions in previous 24 hrs cloudy, light (mw), -1°C
GPS Coordinates (Zone) 17T E 0553331 N 4863047 Datum NAD83
Descriptive Location off of concession 4-5, East of sideroad 27 #28 (South of con. 4-5) by proposed turbine 11

Water Quality
Dissolved Oxygen (mg/L) 11.06 pH 8.08 Conductivity (µS/cm) 691
Water Temperature (°C) 4.83 Air Temperature (°C) -1°C
Time *in situ* measurements taken 10:20

Watercourse Dimensions & Morphology
Mean Watercourse Width 2 (m) Maximum Pool Depth 20 (cm)
Mean Bankfull Width 10 (m) Mean Water Depth 10 (cm)
% Riffle % Pool 100 % Run % Flat
Evidence of eroding banks, Comments on bank stability - all grassed - fairly stable

Substrate (% cover)
Bedrock Cobble 30 Sand 30 Silt Muck
Boulder 30 Gravel Clay Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg (RCG)
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
95, grasses, small shrubs, early
Adjacent Land Use
ag. land, bushlot

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none observed
Migratory Obstructions (seasonal, permanent)
thick vegetation low water
Note any fish observations None observed

Waterbody Notes
Natural Watercourse Trapezoidal Channel ✓ Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg ✓ Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. observed Trichoptera (RCG) & Isopod in channel by drainage outlet from field

Field Notes Authored by K. Macan Field Notes QA/QCed by

Appendix D

DFO Operational Statements

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.

3. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site and to excavate the bell holes. This removal is to be kept to a minimum and within the utility right-of-way.

4. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the water body. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

5. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.

- **5.1.** If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
- **5.2.** Grading of the stream banks for the approaches should not occur.
- **5.3.** If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
- **5.4.** Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
- **5.5.** Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

6. Operate machinery on land above the ordinary high water mark (HWM) (see definition below) and in a manner that minimizes disturbance to the banks of the watercourse.

- **6.1.** Machinery is to arrive on-site in a clean condition and is to be maintained free of fluid leaks.
- **6.2.** Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
- **6.3.** Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.

7. Excavate bell holes beyond the HWM, far enough away from any watercourse to allow containment of any sediment or deleterious substances above the HWM.

- **7.1.** When dewatering bell holes, remove suspended solids by diverting water into a vegetated area or settling basin, and prevent sediment and other deleterious substances from entering the watercourse.
- **7.2.** Stabilize any waste materials removed from the work site (including bell holes) to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.
- **7.3.** After suitably backfilling and packing the bell holes, vegetate any disturbed areas (see Measure 11).

8. Monitor the watercourse to observe signs of malfunction during all phases of the work.

9. For the duration of the work, keep on-site and readily accessible, all material and equipment needed to contain and clean-up releases of sediment-laden water and other deleterious substances.

10. Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance. This plan is to include measures to: a) stop work, contain sediment-laden water and other deleterious substances and prevent their further migration into the watercourse; b) notify all applicable authorities in the area, including the closest DFO office; c) promptly clean-up and appropriately dispose of the sediment-laden water and deleterious substances; and d) ensure clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse.

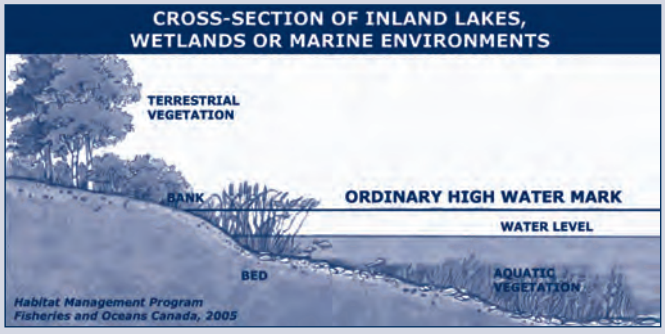
11. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

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

Definition:

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

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



CROSS-SECTION OF INLAND LAKES, WETLANDS OR MARINE ENVIRONMENTS

CROSS-SECTION OF FLOWING WATERS (RIVERS, STREAMS)

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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

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).

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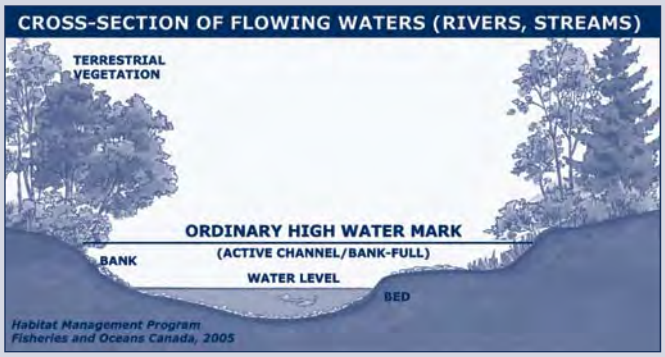

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Aussi disponible en français

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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Thunder Bay and Kenora
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http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

DFO/2007-1329

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:

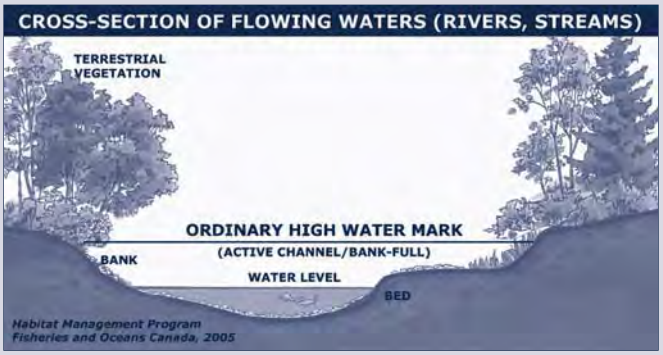
22. Stabilize the **streambed** and restore the original channel shape, bottom gradient and substrate to pre-construction condition.

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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http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

DFO/2007-1329

Appendix E

Curricula vitae

Mark C. Pomeroy B.Sc.

Fisheries Biologist / Project Manager

Mark has 14 years of experience designing, coordinating, and implementing small and large scale aquatic habitat and impact assessments, encompassing numerous habitat types including lakes, ponds, large rivers, warmwater and coldwater streams. Mark has also developed and implemented many monitoring, mitigation, compensation and inventory processes. Past employment with Fisheries and Oceans Canada (DFO), and both the Grand River and St. Clair Region Conservation Authorities contributes to Mark's extensive working experience with regulatory and approvals processes related to the *Fisheries Act*, the *Conservation Authorities Act* and the *Drainage Act*. Mark's familiarity with *Fisheries Act* mitigation and compensation includes an understanding of the Habitat Alteration Assessment Tool (HAAT). He has extensive experience involving permitting and issues resolution related to the federal *Species at Risk Act* and the provincial *Endangered Species Act*. His experience also includes several transportation-related Environmental Assessments.

EDUCATION

Honours B.Sc. (Agriculture), University of Guelph / Natural Resources Management, Guelph, Ontario, 2000

Royal Ontario Museum / Freshwater Fish Identification Course, Toronto, Ontario, 2011

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

Fisheries Assessment Specialist and Fisheries Contracts Specialist, MTO/DFO/OMNR Fisheries Protocol Course, Downsview, Ontario, 2006

PROJECT EXPERIENCE

Environmental Assessments

Locks 24 and 25 – VLH Turbine Installation, Canadian Projects Limited, Lakefield, Ontario (Aquatic Biologist)
Conducted aquatic assessments including walleye and bass spawning and habitat surveys in support of an Environmental Assessment (EA) for the installation of Very Low Head (VLH) turbines at Dams 24 and 25 on the Otonabee River. As part of the EA, will provide an analysis of impacts to walleye and bass spawning habitat and habitat use by small-bodied fish. The impact assessment will also be used as during the assessment of the project using the Fisheries & Oceans Canada (DFO) Risk Management Framework.

Pier 27 Dockwall and Dredging, Hamilton Port Authority, Hamilton, Ontario (Aquatic Biologist)
Coordinated and conducted aquatic assessments in support of the installation of a new dockwall and dredging to facilitate shipping traffic. Coordinated with DFO regarding need for Fisheries Act approval.

Pier 22 Environmental Assessment, Hamilton Port Authority, Hamilton, Ontario (Aquatic Biologist)
Coordinated and conducted aquatic assessments in support of site improvements. Negotiated compensation measures and drafted letter of intent in pursuit of Fisheries Act Authorization.

Bruce to Milton Transmission Line, 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.

Mark C. Pomeroy B.Sc.

Fisheries Biologist / Project Manager

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

King Street and Fountain Street Improvements Class Environmental Assessment Study, Cambridge, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat at watercourse crossings within the project study area. Data collected during field investigations was used to assess potential impacts of preferred option. Drafted text for relevant sections of Class EA document.

Franklin Boulevard Widening Class Environmental Assessment Study, Cambridge, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat at watercourse crossings within the project study area. Data collected during field investigations was used to assess potential impacts of preferred option. Drafted text for relevant sections of Class EA document.

Highway 69 - Patrol Yards between Parry Sound and Sudbury, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat at watercourses within the project study area. Data collected during field investigations was used to assess potential impacts of proposed maintenance patrol yards located adjacent to Highway 69. Drafted text for inclusion in Fisheries and Aquatic Ecosystems Report. All work was conducted in accordance with the MTO/DFO/MNR Protocol (2006).

Highway 11 - High Falls Road Access Improvements Class Environmental Assessment, Bracebridge, Ontario (Fisheries Biologist)
Planned and conducted field investigations to assess aquatic habitat at watercourse crossings within the project study area. All work was conducted in accordance with the MTO/DFO/MNR Protocol (2006).

Highway 11 - Intersection Improvements, Powassan, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat at watercourse crossings within the project study area. Data collected during field investigations was used to assess potential impacts of preferred option, including potential impacts to Brook Trout. Drafted text for inclusion in Fisheries and Aquatic Ecosystems Report. All work was conducted in accordance with the MTO/DFO/MNR Protocol (2006).

Highway 3 - Rehabilitation between Jarvis and Renton, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat at watercourse crossings within the project study area. Data collected during field investigations was used to assess potential impacts of preferred option, including potential impacts to Brook Trout. Drafted Fisheries and Aquatic Ecosystems Report. All work was conducted in accordance with the MTO/DFO/MNR Protocol (2006), and included preparation and submission of "no HADD forms" to satisfy Fisheries Act requirements.

Highway 69 - Key River Bridge Replacement, Britt, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat in Key River at proposed location of bridge replacement. Data collected during field investigations was used to assess potential impacts of bridge replacement activities. Drafted Fisheries and Aquatic Ecosystems Report. All work was conducted in accordance with the MTO/DFO/MNR Protocol (2006), and included preparation and submission of "no HADD forms" to satisfy Fisheries Act requirements.

Replacement of Coutts Line Bridge over Baptiste Creek, Tilbury, Ontario (Fisheries Biologist)
Facilitated acquisition of provincial Endangered Species Act (ESA) approval (letter of advice) through provision of advice regarding construction techniques. Planned, coordinated and conducted field investigations to assess freshwater mussel community and habitat at bridge site.

** denotes projects completed with other firms*

Mark C. Pomeroy B.Sc.

Fisheries Biologist / Project Manager

Replacement of Dawn Mills Bridge over Sydenham River Creek, Dresden, Ontario (Fisheries Biologist)
Dawn Mills Bridge is located over a reach of the Sydenham River known to contain one of the largest number of taxa of federally regulated Species at Risk fish and mussels in Canada. Facilitated acquisition of federal approvals (Fisheries Act and Species at Risk Act, letter of advice) through provision of advice regarding construction techniques. Planned, coordinated and conducted field investigations to assess freshwater mussel habitat at bridge site.

Chinguacousy Road Widening, Brampton, Ontario (Fisheries Biologist)
Conducted fish community assessment to determine presence of Redside Dace (a provincially Endangered species). Drafted applications for Fisheries Act Authorization, Conservation Authorities Act approval, and Endangered Species Act approval. Provided input to engineering design for compensation measures related to Redside Dace habitat.

Detroit Windsor Truck Ferry Improvements (Design) (GWP 3071-06-00), Windsor, Ontario (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. Negotiated compensation measures with Conservation Authority prior to project design change, resulting in no HADD.

Highway 24 - Intersection Improvements, Cambridge, Ontario (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, Ontario (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.

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.

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. Issued Letters of Advice and Authorization under 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. Acquired familiarity with the Habitat Alteration Assessment Tool (HAAT).

Renewable Energy

St. Columban Wind Project, Huron County, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess potential aquatic impacts resulting from proposed wind project consisting of fifteen turbines. Drafted Water Assessment and Water Body Report as mandated under Ontario Reg. 359/09.

** denotes projects completed with other firms*

Mark C. Pomeroy B.Sc.

Fisheries Biologist / Project Manager

Plateau Wind Project, Grey County, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to update previous field work to assess potential aquatic impacts resulting from proposed wind project consisting of eighteen turbines. Drafted relevant sections of the Environmental Screening Report (ESR) as mandated under Ontario Reg. 116/01. Provided advice concerning provincial species at risk concerns.

Grand Renewable Energy Park, Haldimand County, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess potential aquatic impacts resulting from proposed wind and solar project consisting of sixty-seven turbines and 425,000 solar panels. Drafted Water Assessment and Water Body Report as mandated under Ontario Reg. 359/09.

Springwood Wind Project, Belwood, Ontario (Fisheries Biologist)
Conducted field investigations to assess potential aquatic impacts resulting from proposed wind project consisting of and assisted with draft Water Assessment and Water Body Report under Ontario Reg. 359/09.

Whittington Wind Project, Dufferin County, Ontario (Fisheries Biologist)
Planned and coordinated field investigations to assess potential aquatic impacts resulting from proposed wind project consisting of three turbines. Drafted Water Assessment and Water Body Report as mandated under Ontario Reg. 359/09.

Fairview Wind Project, Stayner, Ontario (Fisheries Biologist)
Planned and coordinated field investigations to assess potential aquatic impacts resulting from proposed wind project consisting of eight turbines. Drafted Water Assessment and Water Body Report as mandated under Ontario Reg. 359/09.

White Pines Wind Project, Prince Edward County, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess potential aquatic impacts resulting from proposed wind project consisting of twenty-nine turbines. Drafted Water Assessment and Water Body Report as mandated under Ontario Reg. 359/09 (in progress).

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)
Drafted Fisheries Act application and Endangered Species Act application for pipeline crossing of Medway Creek. Coordinated and completed aquatic habitat assessment and relocation of freshwater mussels. Negotiated compensation measures prior to project design change, resulting in no HADD.

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.

** denotes projects completed with other firms*

Kelly Mason B.Sc. (Env.)

Ecologist

Kelly Mason is a member of the Environmental Management Group at Stantec Consulting with four years of industry experience. She has a Graduate Certificate in Ecosystem Restoration and a Bachelor of Environmental Science, majoring in environmental geography and area of emphasis in biotic systems. Kelly has gained valuable experience through her formal employment and her extensive participation in volunteer projects in Ontario, as well as the United States of America. Her experience at teaching college-level environmental monitoring has imbued Kelly with a practical ability to apply Ecological Monitoring and Assessment Network (EMAN) and Ontario Stream Assessment Protocol (OSAP) protocols.

Kelly has conducted a wide array of environmental monitoring that includes bird migration surveys, salmon spawning counts, butterfly and odonate surveys, as well as fish assessment and vegetation surveys. She is familiar with the use of all manner of such survey equipment as GPS and radio telemetry equipment, seine nets, hoop nets, gill nets, fyke nets, minnow traps, basking traps and spring haul traps. Kelly is experienced at the identification of flora and fauna, and is capable of handling wildlife. Certified in ELC (Ecological Land Classification), Class II Electrofishing, and Ontario Benthic Biomonitoring Network, Kelly has the ideal background to support a wide variety of both Terrestrial and Aquatic natural heritage studies. Her laboratory experience has honed Kelly's skills in data processing and analysis, and she has a demonstrated ability to interpret and report findings accurately.

EDUCATION

B.Sc. (Env.), University of Guelph / Environmental Science, Guelph, Ontario, 2007

Graduate Certificate, Niagara College / Ecosystem Restoration, Niagara-on-the-Lake, Ontario, 2009

Ontario Benthic Biomonitoring Network Certificate, Niagara College / Ecosystem Restoration, St. Catharines, Ontario, 2009

Certificate, Ecological Land Classification (ELC), Lindsay, Ontario, 2010

Certificate, Tallgrass Ontario / Seed Collector, Burlington, Ontario, 2010

Certificate, Ontario Wildlife Rehabilitation Network (OWREN), London, Ontario, 2010

Certificate, St. Johns Ambulance / CPR and First Aid, Burlington, Ontario, 2010

Workplace Hazardous Materials Information System (WHMIS), Burlington, Ontario, 2010

Licence, Boat Smart / Pleasure Craft Operators, Orangeville, Ontario, 2008

Certificate, ROM / Ontario Fish Identification Workshop, Toronto, Ontario, 2011

Certificate, Class I Electrofishing, Lindsay, Ontario, 2012

PROJECT EXPERIENCE

Education

Niagara College Environmental Monitoring Program*, Niagara-on-the-Lake, Ontario (Part-time Teacher)

Taught two sections of students at a second-year, college level. Demonstrated and explained Ontario Stream Assessment Protocol (OSAP) and Ontario Benthic Biomonitoring (OBBN) protocols. Discussed proper field and lab sampling/analysis techniques for water, sediment, and benthos. Prepared assignments, lectures, and exams (both written and practical). Evaluated students based on performance.

Linear Infrastructure

Thunder Bay Generating Station Pipeline Project, Thunder Bay, Ontario (Aquatic Ecologist)

Researched and summarized data for existing conditions report as part of the EA process.

** denotes projects completed with other firms*

Kelly Mason B.Sc. (Env.)

Ecologist

Union Gas Pipeline Construction, Nanticoke, Ontario (Aquatic Ecologist)
Researched and summarized data for existing conditions report as part of the EA process.

Mining

Environmental Effects Monitoring (EEM) Program: Vale Inco, Sudbury, Ontario (Aquatic Ecologist)
Collected fish and water samples for toxicity testing.

Environmental Effects Monitoring (EEM) Program: Hudson Bay Mining and Smelting, Flin Flon, Manitoba (Aquatic Ecologist)
Collected Hyalella, water samples and sediment samples for toxicity testing.

Natural Sciences & Heritage Resources

Proposed Melancthon Quarry, Melancthon, Ontario (Aquatic Ecologist)
Conducted fish community surveys (electrofishing).

New Hamburg Oxbow, New Hamburg, Ontario (Aquatic Ecologist)
Collected water samples and water quality data twice monthly.

Blue Springs Creek Ground and Surface Water Monitoring, Arkell, Ontario (Aquatic Ecologist)
Downloaded weekly temperature and water level data and performed stream discharge measurements.

Ontario Power Generation - Lake Gibson Project, Thorold, Ontario (Aquatic Ecologist)
Collected benthic invertebrate and water samples. Safety boat operator.

Mill Creek Surface Water Monitoring Program, Milton, Ontario (Aquatic Ecologist)
Performed monthly stream discharge measurements and downloaded water level and temperature logger data. Graphed hydrological data and conducted trout emergent surveys and redd surveys.

Greenhouse Effluent Filtration Design Team, Niagara College*, Niagara-on-the-Lake, Ontario (Biologist)
Conducted environmental impact assessment on receiving stream and suggested several filtration design methods.

Bird Studies Canada Marsh Monitoring Program*, Hamilton, Ontario (Volunteer)
Conducted amphibian surveys on Royal Botanical Gardens property. Aided in the development of the BSC database.

Species at Risk Inventory at Legends on the Niagara Golf Course*, Chippewa, Ontario (Student Consultant)
Designed and conducted survey methods. Produced research and consultant proposals. Made recommendations for further restoration efforts.

St. Clair River Horizontal Directional Drill, Sarnia, Ontario (Aquatic Ecologist)
Performed analysis and presentation of in-situ and laboratory water quality data. Reported on results of water quality monitoring program.

Island Lake Conservation Area, Credit Valley Conservation*, Orangeville, Ontario (Conservation Technician)
Served as a client services representative, which entailed conservation awareness education. Maintained conservation area grounds.

Royal Botanical Gardens*, Hamilton, Ontario (Restoration Ecologist)
Coordinated summer students and assisted in the planning and implementation of restoration activities. Participated in habitat rehabilitation strategies (cattail and waterlily plantings). Maintained floodplain connections.
Assisted the Species at Risk Biologist in the creation of snake hibernacula. Assisted in turtle monitoring using radio telemetry, basking traps and hoop nets. Assisted Terrestrial Ecologist with Prairie grassland rehabilitation techniques (Prescribed burns and Prairie plantings). Conducted environmental monitoring (salmon spawning count, waterfowl migration count, aquatic vegetation surveys, butterfly and odonate counts).
Performed wildlife population management (carp (Cyprinus carpio) seining in Cootes Paradise Marsh and RBG ponds, electrofishing for carp), and beaver dam maintenance.
Operated Cootes Paradise Fishway carp barrier (to separate non-native species from native) and ran educational presentations at Cootes Paradise Fishway.
Collected water quality measurements and performed data entry, data quality control and analysis, in addition to report writing. Assisted in development of educational materials (pamphlets and signage).

** denotes projects completed with other firms*

Kelly Mason B.Sc. (Env.)

Ecologist

Various Environmental Effects Monitoring (EEM) Studies, Ontario (Aquatic Ecologist)
Conducted fish population monitoring, benthic invertebrate identification and report writing/data management in support of various EEM studies for both Mining and Pulp and Paper industry projects.

Renewable Energy

White Pines Wind Farm, Picton, Ontario (Aquatic Ecologist)
Performed water-body assessments on mapped watercourses.

Fairview Wind Farm, Stayner, Ontario (Aquatic Ecologist)
Performed water-body assessments on mapped watercourses.

Pristine Power Wind Power, St. Columban, Ontario (Aquatic Ecologist)
Conducted fish community surveys (electrofishing).

Algonquin Power Wind Project, Amherst Island, Ontario (Aquatic Ecologist)
Conducted shoreline habitat mapping and fish community surveys.

Solar Power Plan Design Team, University of Guelph, City of Guelph*, Guelph, Ontario (Student)
Designed a solar power plan for the City of Guelph to coordinate with Community Energy Plan. Conducted public surveys on solar power interest. Coordinated with key stakeholders. Conducted cost/benefit analysis, baseline research regarding solar power use, prepared proposal, and presented plan to key stakeholders.

Port Dover Wind Farm, Port Dover, Ontario (Assistant Aquatic Ecologist)
Fish population monitoring (electrofishing).

Melancthon Wind Power Project, Melancthon and Amaranth Townships, Ontario (Biologist)
Conducted bat and bird mortality monitoring studies and raptor monitoring (winter raptor counts) as well as habitat assessments and data analysis.

Transportation Planning

MTO Highway 3, 6 and 24, Simcoe, Ontario (Aquatic Ecologist)
Conducted fish community surveys (electrofishing).

** denotes projects completed with other firms*

Kelly Mason B.Sc. (Env.)
Ecologist

PUBLICATIONS

Fuller, M.M., K. Clayton, N. Ward. Project Paradise Season Summary Report 2009. *Royal Botanical Gardens. Hamilton, Ontario. RBG Report No. 2010-01*, 2010.

Clayton, K. Carroll's Bay Recovery and Management Strategy. *Royal Botanical Gardens. Hamilton, Ontario*, 2010.

Clayton, K. Recovery and Management Strategy for Carroll's Bay Marsh. *Presentation at the Project Paradise Workshop*, 2010.

Kathleen R. O. Todd M.Sc.

Aquatic Ecologist / Project Manager

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

MEMBERSHIPS

Member, North American Benthological Society

PROJECT EXPERIENCE

Environmental Assessments

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.

Kathleen R. O. Todd M.Sc.

Aquatic Ecologist / Project Manager

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
- 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.

** denotes projects completed with other firms*

Kathleen R. O. Todd M.Sc.

Aquatic Ecologist / Project Manager

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.

Proposed Acton Quarry Extension, Dufferin Aggregates, 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.

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:

** denotes projects completed with other firms*

*- 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.

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

** denotes projects completed with other firms*

Kathleen R. O. Todd M.Sc.

Aquatic Ecologist / Project Manager

- 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.
Aquatic Ecologist / Project Manager

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.

Marc A. Faiella Tech. Dipl., CEPIT

Environmental Technician

Marc Faiella's experience has included industry and development sector projects. He has conducted field investigations, liaised with representatives of government agencies, regulators and worked with First Nations, synthesized data and produced reports. Marc's specific areas of expertise include Environmental Effects Monitoring (EEM), Environmental Impact Studies (EIS) and Fish Habitat Assessments. He has assessed potential impacts to aquatic habitats at a number of mining and development-related sites, such as metal mines, quarries, pulp and paper mills, subdivisions, city drainage systems and wind energy projects. Marc's technical experience has focused mainly on aquatic habitats. He has conducted fisheries inventories and Species at Risk project surveys based on provincial protocols, trout spawning surveys, collected benthic invertebrate samples, and collected water, sediment and non-lethal and lethal fish tissue samples for mercury. Marc has gained practical experience with all construction phases of DFO applied work sites. In addition, Marc has on-site experience at remote northern sites where access is gained via helicopter, ATV, boat and hiking.

EDUCATION

Tech. Dipl., Sir Sanford Fleming College / Ecosystem Management, Lindsay, Ontario, 2005

Training Certificate, Royal Ontario Museum Fish Identification Workshop, Royal Ontario Museum, Ontario, 2006

Certificate, MTO/DFO/OMNR Protocol, Toronto, Ontario, 2006

Certificate, St. John Ambulance / First Aid and CPR, Guelph, Ontario, 2010

P.A.L. and Firearms, Brampton, Ontario, 2005

Sir Sanford Fleming College / Short Wave Radio, Lindsay, Ontario, 2004

Sir Sanford Fleming College / Chainsaw Operator, Lindsay, Ontario, 2004

Certificate, Pleasure Craft Operator, Toronto, Ontario, 2005

Training Certificate, Class 1 Electrofishing Certificate, MNR, Ministry of Natural Resources, Ontario, 2012

Fisheries and Oceans Canada / Ontario Freshwater Mussel Identification Workshop, Burlington, Ontario, 2011

MEMBERSHIPS

Canadian Environmental Practitioner In Training (CEPIT), Canadian Environmental Certification Approvals Board

PROJECT EXPERIENCE

Environmental Assessments

Communal Irrigation Study, Township of Melancthon, Ontario (Crew Lead)

Obtained appropriate licences to conduct presence / absence and fish utility surveys within the Pine and Noisy River watersheds. Served as crew lead, overseeing fish surveys that were conducted in 2008 and preparations for proposed surveys in the spring / summer of 2009. Responsible for assembling report figures, maps and analysis of collected fisheries data, in tandem with Stantec's in-house GIS / graphics department.

Bruce to Milton Transmission Reinforcement Project, Multiple Sites, Ontario (Crew Lead)

Key member of the study team for the proposed hydro corridor expansion from Bruce Nuclear to a Milton, Ontario. Liaised with several Ministry of Natural Resources offices to coordinate issuance of permits and processing of historical fisheries data requests. Worked directly with the project manager to complete a work plan to safely and efficiently complete spring and summer fisheries surveys along the approximate 180 km corridor. Led a 2-person crew to conduct stream cross section surveys used to determine appropriate sizing of culverts. Coordinated production of detailed mapping and figures upon completion of the surveys, in tandem with Stantec's in-house GIS / graphics department, and was key in production of the independent Class EA report.

Marc A. Faiella Tech. Dipl., CEPIT

Environmental Technician

Port Alma Wind Power Project, Port Alma, Ontario (Field Crew / Data Analyst)
Exclusively responsible for conducting background topography research. Performed tree measurements for entire survey area, identified and mapped tree species locations using aerial photo base. Constructed tests for future heights (software) and produced reports detailing results. These results had significant bearing on wind turbine selection and placement.

Brampton MESP, Phase I, Springdale Environmental Site Assessment, Brampton, Ontario (Habitat Assessor)
Responsible for obtaining background information and conducted field work to assess study area. Compiled field notes and detailed data using an air photo base. Prepared final technical memorandum for submission.

Environmental Site Management

Randall Drain Branch A Restoration, Environment Inspection and Post-construction Monitoring, Waterloo, Ontario (Environmental Inspector)
Responsible for overseeing that approved plans to remediate a damaged watercourse on the City of Waterloo's airport property, as outlined by The Department of Fisheries and Oceans, Grand River Conservation Authority and Stantec Consulting Ltd., were carried out accordingly. Works included properly diverting flow downstream, efficiently dewatering the damaged area and relocating any stranded aquatic species downstream. Worked closely with the construction crew to ensure all remediation phases met Fisheries Act requirements. Prepared final report.

Mining

Vale Technology Development - Hydrology and Aquatic Assessment, Sudbury, Ontario (Aquatic Technician)
Marc was part of a two person crew that conducted a fishery presence/absence survey in a number of lakes associated with mining practices. Fish were identified, measured and tissue samples were collected for laboratory analysis.

Environmental Effects Monitoring (EEM) Program: Periodic Monitoring Phase, Hudson Bay Mining and Smelting, 2007, Flin Flon, Manitoba (Aquatic Technician)
Participated in metal mine EEM Periodic Monitoring phase, involving fisheries and benthic invertebrate surveys. Collected benthic and water samples in the field as well as fish, using various collection techniques. Completed habitat assessments, plume measurements and fish necropsies. Upon completion of field work, performed data analysis and reporting for the EEM report.

Environmental Effects Monitoring (EEM) Program: Focused Monitoring Phase, Hudson Bay Mining and Smelting, 2009, Flin Flon, Manitoba (Aquatic Technician)
Participated in metal mine EEM Focused Monitoring phase, involving fisheries and benthic invertebrate surveys. Collected benthic and water samples in the field as well as fish, using various collection techniques. Completed habitat assessments, plume measurements and fish necropsies. Upon completion of field work, performed data analysis and reporting for the final EEM report.

Environmental Effects Monitoring (EEM) Program: Periodic Monitoring Phase, Hudson Bay Mining and Smelting, 2007, Snow Lake, Manitoba (Aquatic Technician)
One of a 2-person crew stationed in Snow Lake for metal mine EEM Periodic Monitoring phase, involving fisheries and benthic invertebrate surveys. Collected benthic and water samples in the field as well as fish, using various collection techniques. Completed habitat assessments, plume measurements and fish necropsies. Upon completion of field work, performed data analysis and reporting for the EEM report.

Environmental Effects Monitoring (EEM) Program: Focused Monitoring Phase, Hudson Bay Mining and Smelting, 2009, Snow Lake, Manitoba (Aquatic Technician)
One of a 2-person crew stationed in Snow Lake for metal mine EEM Focused Monitoring phase, involving fisheries and benthic invertebrate surveys. Collected benthic and water samples in the field as well as fish, using multiple collection techniques. Completed habitat assessments, plume measurements and fish necropsies. Upon completion of field work, performed data analysis and reporting for the final EEM report.

Natural Sciences & Heritage Resources

Hydro One Series Capacitor Station (Project Manager)
Responsible for a fisheries sampling survey to determine the presence or absence of fish species near a proposed capacitor station. Secured a Fish Collection Licence from OMNR, compiled maps to assist in field investigations, assembled field staff, initiated survey and prepared report for internal and external circulation.

** denotes projects completed with other firms*

Marc A. Faiella Tech. Dipl., CEPIT

Environmental Technician

Melancthon Wind Energy Project Tree Surveys, Melancthon, Ontario (Aquatic Technician)
Measured tree heights and the species identified with use of a laser-sighted measuring device. Performed a desktop exercise, whereby heights were projected over a 20 year period. These projections were then synthesized on aerial photos, showing potential hazards to turbines, thus assisting with selection of wind turbine placement and selection of site-appropriate turbine models.

Oil & Gas

Enbridge Pipeline Crossing, Sarnia, Ontario (Aquatic Construction Monitor)
Marc was responsible for monitoring the St. Clair River for "frak-outs" that may occur during the horizontal drilling and pipe line installation under the St. Clair River. Marc was also responsible for collecting water samples for laboratory analysis and recording current river conditions using a YSI water quality meter.

Power

Biological Monitoring for the Shekak-Nagagami Generating Station, Hearst, Ontario (Field Crew Lead)
Responsible for compiling appropriate field gear to complete the Year-13 monitoring study along the Shekak and Nagagami Rivers in the vicinity of a hydroelectric dam. Participated in surveys, which included: fish inventories through electrofishing, fish tissue collection via gillnets, benthic sampling and water quality and sediment quality collection through several collection techniques. Performed data analysis and completion of the report. Worked closely with Brookfield Power, the MNR and Hearst employees to obtain necessary information and data to complete the project.

Hydro One Series Capacitor Station, Huntsville, Ontario (Project Management / Crew Leader)
Undertook a fisheries sampling survey to determine the presence or absence of fish species near a proposed capacitor station. Duties included securing fisheries permits from related agencies, compilation of maps to assist with surveys, assembly of staff, planned and implemented the field program and prepare report for internal and external circulation.

Yellow Falls Hydroelectric Project, Smooth Rock Falls, Ontario (Aquatic Technician)
Crew member responsible for extensive fish, benthic, water and habitat surveys along the Matagami River. Fish surveys included setting and retrieving gillnets, electrofishing, identification of fish species, retrieving age indicators from fish, characteristic measurements and collecting non-lethal samples for mercury analysis. Collected benthic invertebrates using various sampling techniques for later sorting and identification. Collected water samples and substrate samples using various sampling techniques and equipment for lab testing. Worked closely with a First Nations crew member for the duration of the project and, upon completion of the field surveys, performed data analysis and report writing.

Roads and Highways

Highway 11 Access Improvements. Preliminary Design. MTO Northeastern Region, Huntsville, Ontario (Fisheries Specialist)
Marc conducted an inventory of aquatic resources adjacent to the existing highway. The fish and fish habitat investigations were completed on three watercourses in the Study Area, and were conducted in accordance with the 2006 MTO/DFO/OMNR Protocol

Highway 11 Access Improvements. Preliminary Design. MTO Northeastern Region, Huntsville, Ontario (Fisheries Specialist)
Marc conducted an inventory of aquatic resources adjacent to the existing highway. The fish and fish habitat investigations were completed on three watercourses in the Study Area, and were conducted in accordance with the 2006 MTO/DFO/OMNR Protocol

Highway 8 and Highway 401 Interchange Improvements. Preliminary Design. MTO Southwestern Region, Kitchener, Ontario (Fisheries Specialist)
Marc conducted an inventory of aquatic resources within the study area. The fish and fish habitat investigations were completed following the 2006 MTO/DFO/OMNR Protocol. An exception to this occurred at the Grand River, where fish inventories were not conducted in order to avoid disturbances to mussel Species at Risk that are known to occur in the area

Highway 3 Rehabilitation, Renton to Jarvis. Detail Design. MTO West Region, Ontario (Fisheries Specialist)
Marc participated in detailed Natural Heritage features assessments and a Fish Habitat Existing Conditions Report in accordance with the 2006 MTO/DFO/OMNR Protocol. Three major water crossings (Nanticoke Creek and two crossings of Black Creek) were assessed in addition to other smaller crossings

** denotes projects completed with other firms*

Marc A. Faiella Tech. Dipl., CEPIT

Environmental Technician

Wind Power

White Pines Wind Energy, Prince Edward County, Ontario (Field Crew Lead)

Marc conducted aquatic habitat assessments and a fisheries presence/absence surveys to determine aquatic features under REA (Renewable Energy Act). He also assisted in producing a photo log and figures that assisted in the application process for construction work permits.

Fairview Wind Energy, Staynor, Ontario (Field Crew Lead)

Marc conducted aquatic habitat assessment surveys to assess their designation under the REA (Renewable Energy Act). In addition, Marc conducted electrofishing surveys to assess the presence or absence of fish species and was also part responsible for producing a photo log and figures to assist in the application process for associated construction work permits.

Port Dover Wind Energy, Port Dover, Ontario (Aquatic Technician)

Marc conducted field surveys to assess aquatic features and to determine its designation under the REA (Renewable Energy Act). Marc was also part responsible for producing reports, photo logs and figures to aid in the application process to gain associated construction work permits.

Amherst Island Wind Energy, Amherst, Ontario (Field Crew Lead)

Responsible for collecting fisheries habitat characteristics along the proposed shoreline of Lake Ontario to aid in obtaining associated construction work permits. Marc was also responsible for conducting a presence/absence survey using several capture methods such as, gill nets, boat electrofishing, Fyke nets and minnow traps.

** denotes projects completed with other firms*

Mitch Ellah Tech. Dipl., B.Sc. (Hons.)

Aquatic Ecologist

Mitch Ellah is an aquatic ecologist who serves Stantec's Environmental Services group. He has significant experience conducting field research in the Canadian Arctic and various locations in southern and northern Ontario and Quebec. Mitch has been involved in all aspects of aquatic and terrestrial projects, including the review of background data, correspondence with government agencies, site investigation and data collection, and report writing. He is knowledgeable in, and proficient at field surveys and standardized protocols involving data collection for water quality and quantity, benthic macroinvertebrates, fish, bird, herpetofauna, aquatic plants and forest communities. Mitch has performed vegetation surveys using Ecological Land Classification (ELC) and Ontario Wetland Evaluation (OWES) protocols. He has excellent fish identification skills, and is proficient at conducting aquatic habitat and fish community assessments using electrofishing equipment, gill nets, fyke nets, seine nets and minnow traps. Mitch worked progressively for three field seasons in the Canadian Arctic investigating treatment wetlands in Nunavut and NWT Inuit communities. Mitch's knowledge of ecology and biotic identification, his strong communication skills and proven abilities at multi-discipline teamwork are complemented by his research experience, providing him with valuable technical expertise to meet a variety of project needs.

EDUCATION

B.Sc. (Honours), Trent University / Environmental Resource Science, Peterborough, Ontario, 2011

Tech. Dipl., Sir Sandford Fleming College / Environmental Technologist Diploma, Lindsay, Ontario, 2009

Tech. Dipl., Sir Sandford Fleming College / Environmental Technician Diploma, Lindsay, Ontario, 2008

Certificate, Ministry of Natural Resources / Ontario Wetland Evaluation System (OWES), Lindsay, Ontario, 2009

Certificate, Royal Ontario Museum / Fish Identification Workshop, Toronto, Ontario, 2011

Certificate, Stantec Consulting Ltd. / Class 2 Electrofishing Training, Guelph, Ontario, 2012

PROJECT EXPERIENCE

Natural Sciences & Heritage Resources

Hydro One Clarington Transformer Station, Clarington, Ontario (Field Ecologist)
Conducted fisheries and aquatic habitat assessment for proposed transformer station development

Shell Oil and Gas, Montreal, Quebec (Field Ecologist)
Conducted site investigation for amphibian and reptile populations, and amphibian breeding call surveys

Natural Heritage Site Inventories and Reporting*, Various Locations (Field Ecologist)
Bat maternity roost surveys in forest settings, various wildlife surveys including amphibians, reptiles, mammals, and birds; data collection and report writing for renewable energy REA environmental assessment projects; ELC vegetation community and wildlife habitat assessments; online database research for technical report preparation, including MNR Biodiversity Index and various atlases

Proposed Melancthon Quarry, Melancthon, Ontario (Field Ecologist)
Conducted species at risk surveys targeting Whip-poor-will using standardized MNR protocol

** denotes projects completed with other firms*

Mitch Ellah Tech. Dipl., B.Sc. (Hons.)

Aquatic Ecologist

Proposed Simpson's Quarry EA, Bancroft, Ontario (Field Ecologist)
Conducted field sampling, including breeding bird, waterfowl breeding, and amphibian surveys, aquatic assessments, habitat characterizations, as well as species at risk surveys that included Blanding's Turtle and Whip-poor-will

Renewable Energy

Niagara Region Wind Corp. Wind Farm, Niagara Region, Ontario (Field Ecologist)
Conducted aquatic assessments using REA water body designations, fish community presence/absence study and habitat characterization related to proposed wind farm

Bow Lake Wind Farm, Montreal River Harbour, Ontario (Field Ecologist)
Conducted fieldwork related to natural heritage terrestrial assessment that included locating bat maternity roosts, amphibian surveys, and habitat delineation. Aquatic fieldwork included habitat characterization and water body determination congruent with the Renewable Energy Act (REA) and fish community assessments

Cedar Point Wind Farm, Middlesex County, Ontario (Field Ecologist)
Conducted snake cover board searches to determine presence/absence of snake population and diversity

Capital Power (K2) Wind Farm, Goderich, Ontario (Field Ecologist)
Conducted aquatic assessments using REA water body designations, fish community presence/absence study and habitat characterization related to proposed wind farm

Research / Laboratories

Centre for Alternative Wasewater Treatement (CAWT), Sir Sandford Fleming College*, Baker Lake, Nunavut (Arctic Field and Laboratory Research Technician)
Remote study site in Baker Lake, NU; researcher for an International Polar Year project and United Nations Environmental Program

Centre for Alternative Wastewater Treatment (CAWT), Sir Sandford Fleming College*, Various Sites, Nunavut and Northwest Territories (Arctic Field and Laboratory Research Technologist)
Remote study sites in Baker Lake, NU, Gjoa Haven, NU and Holman, NT; results used for the continuation of the International Polar Year research project

Centre for Alternative Wastewater Treatment (CAWT), Sir Sandford Fleming College*, Alert, Nunavut (Arctic Field and Laboratory Research Technician)
A partnership project with Department of National Defense and Environment Canada Wastewater Division; remote study site in Alert, NU; sole researcher to plan, research, organize equipment, work with partners and set-up laboratory; conducted bird surveys for Environment Canada

Water

Komoka Wastewater Treatment Plant, Komoka, Ontario (Field Ecologist)
Conducted benthic macroinvertebrate and water quality sampling for wastewater treatment plant discharge

Fox Meadow Subdivision EEM, Peterborough, Ontario (Field Ecologist)
Conducted benthic macroinvertebrates and water quality sampling for EEM of subdivision encroachment on PSW

Canagagigue Creek EEM, Elmira, Ontario (Field Ecologist)
Water quality and quantity measuring, benthic macroinvertebrate, and fish community assessment at chemical plant discharge site

Blue Springs EEM, Guelph, Ontario (Field Ecologist)
Routine flow measurement, monitoring and maintenance of rain gauges, Barologgers, air temperature loggers and in-stream water level loggers to assess potential effects of aggregate operations and groundwater draw down on fish habitat in a coldwater stream

Mill Creek EEM, Guelph, Ontario (Field Ecologist)
Routine flow measurement, monitoring and maintenance of rain gauges, Barologgers, air temperature loggers and in-stream water level loggers to assess potential effects of aggregate operations and groundwater draw down on fish habitat in a coldwater stream

** denotes projects completed with other firms*

Mitch Ellah Tech. Dipl., B.Sc. (Hons.)
Aquatic Ecologist

PUBLICATIONS

Chemical and Biological Changes in an Arctic Treatment Watershed to Assess the Value of Macroinvertebrate Biomonitoring. *Undergraduate Thesis, Trent University, Peterborough, Ontario*, 2011.