Environment

NextEra Energy Canada, ULC
Goshen Wind Energy Centre

DRAFT Water Assessment and Water Body Report

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Project Number:

60155032

Date:

September, 2012

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Glossary of Terms

Access Roads	The access roads will be 11 m wide during the construction phase to accommodate the large cranes, and will be maintained during operation.
Area of Disturbance	The Area of Disturbance consists of: • A 60 m wide area for construction of access roads. The actual access road will be sited within this area of disturbance in consultation with the landowner and taking into consideration potential environmental effects. • A 122 m square area around each turbine for the laydown and assembly of the wind turbine components. • A 20 m wide area for construction of collection lines. The actual collection line will be sited within this area of disturbance in consultation with the landowner and taking into consideration potential environmental effects.
Area of Investigation	Area within 120 m from Project Location.
Ecological Land Classification (ELC)	A system to delineate natural regions based on ecological factors. In Ontario, the Ministry of Natural Resources defines ecological units on the basis of bedrock, climate, physiography, and corresponding vegetation, creating an Ecological Land Classification System.
Geographic Information System (GIS)	A system for creating, storing, analyzing and managing spatial data and associated attributes.
Harmful Alteration, Destruction or Disruption of Fish Habitat (HADD)	According to Section 35(1) of the *Fisheries Act*, no one is allowed to cause a HADD unless an authorization, according to Section 35(2) of the *Fisheries Act*, has been obtained. "No net loss of the productive capacity of existing fish habitat" is the conservation goal guiding an authorization to cause a HADD.
Project Components	Refers to the turbine, access roads, collection lines, meteorological towers, transmission line and substation / breaker switch station.
NextEra	NextEra Energy Canada, ULC
O. Reg. 359/09	Renewable Energy Approval under the Environmental Protection Act.
Project Study Area (Study Area)	Wind Energy Centre Study Area and Transmission Line Study Area
Water Body Report	A report that identifies and assesses any negative environmental efforts of the project on a water body and on land within 30 m of the water body.

Acronyms

ABCA ..... Ausable Bayfield Conservation Authority
DFO ..... Federal Department of Fisheries and Oceans
MOE..... Ontario Ministry of the Environment
MNR..... Ontario Ministry of Natural Resources
MW..... Megawatt
NextEra ..... NextEra Energy Canada, ULC
O.Reg. 359/09..... Ontario Regulation 359/09
PDR ..... Project Description Report
The Project..... Goshen Wind Energy Centre
REA..... Renewable Energy Approval
TC ..... Transport Canada
UTRCA..... Upper Thames River Conservation Authority

1. Introduction

Goshen Wind, Inc., a wholly owned subsidiary of NextEra Energy Canada, ULC (NextEra), is proposing to construct a wind energy project in the Municipalities of Bluewater and South Huron, Huron County, Ontario. The Project will be referred to as the Goshen Wind Energy Centre (the "Project") and will be located on private lands in the vicinity of the shoreline of Lake Huron (see Figure 1-1). The wind turbine technology proposed for this Project is up to 71 GE 1.6-100 Wind Turbines and one GE 1.56-100 Wind Turbine. With a nameplate capacity of 102 megawatts (MW), the Project will be categorized as a Class 4 facility. Although NextEra is seeking a Renewable Energy Approval (REA) for 72 wind turbines, only 63 are proposed to be constructed for the Project.

This report was prepared in accordance with the Water Assessment and Water Body requirements of Ontario Regulation 359/09 (*O. Reg. 359/09*) and the Technical Guide to Renewable Energy Approvals developed by the Ministry of the Environment (MOE, 2011). The REA process combines previous requirements under the Ontario Environmental Assessment Act with clear provincial rules and standards in *O. Reg. 359/09* under the *Environmental Protection Act*.

1.1 The Proponent

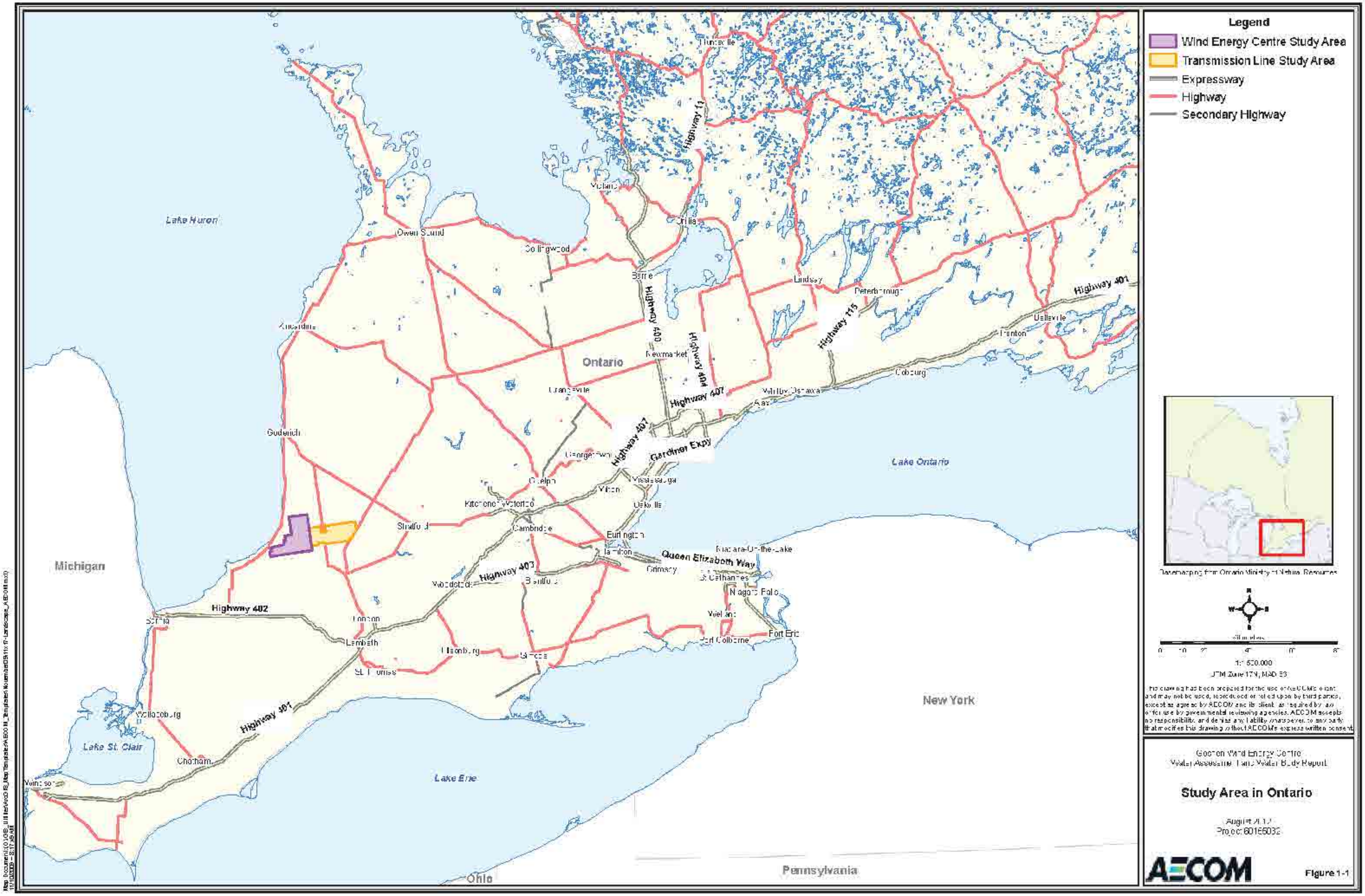
The Project will be owned and operated by Goshen Wind, Inc., a subsidiary of NextEra. NextEra Energy Canada's parent company is NextEra Energy Resources, LLC, a global leader in wind energy generation with a current operating portfolio of over 85 wind energy projects in North America. Wind farms currently owned and operated by NextEra Energy Canada include: Mount Copper and Mount Miller, (both 54 MW) located in Murdochville, Quebec; Pubnico Point, (31 MW) located near Yarmouth, Nova Scotia; and Ghost Pine (82 MW), located in Kneehill County, Alberta.

The primary contacts for the project are as follows:

Project Proponent	Project Consultant
Derek Dudek Community Relations Consultant NextEra Energy Canada, ULC 5500 North Service Road, Suite 205 Burlington, Ontario, L7L 6W6 Phone: 1-877-257-7330 Email: Goshen.Wind@nexteraenergy.com Website: www.NextEraEnergyCanada.com	Marc Rose Senior Environmental Planner AECOM 300-300 Town Centre Blvd. Markham, Ontario, L3R 5Z6 Phone: 905-477-8400 x 388 Email: marc.rose@aecom.com

1.2 Project Location and Description

The proposed Project is located in Huron County, within the Municipalities of Bluewater and South Huron (refer to Figure 1-1). The Project Study Area consists of the areas being studied for the wind farm components (Wind Energy Centre Study Area), as well as for the interconnection route (i.e., the area being studied for transmission lines to connect the Project to the electrical grid) (Transmission Line Study Area). The Wind Energy Centre Study Area is generally bounded by Klondyke Road to the west, Rogerville Road to the north, Parr Line to the east, and Mount Carmel Drive to the south, in the Municipalities of Bluewater and South Huron. The Transmission Line Study Area is located to the east of the Wind Energy Centre Study Area, and is generally bounded by Parr Line to the west, Thames Road to the north, Perth 164 Road to the east, and Park Road to the south, extending into the Municipality of South Huron.


Legend
Wind Energy Centre Study Area
Transmission Line Study Area
Expressway
Highway
Secondary Highway
Lake Huron
Lake Ontario
Lake Erie
Lake St. Clair
Michigan
New York
Pennsylvania
Ohio
Ontario
Highway 11
Highway 400
Highway 404
Highway 407
Highway 115
Highway 401
Highway 403
Highway 402
Gardiner Expy
Queen Elizabeth Way
Owen Sound
Collingwood
Barrie
Orillia
Lindsay
Peterborough
Belleville
Trenton
Cobourg
Newmarket
Goderich
Stratford
Guelph
Mississauga
Oakville
Cambridge
Burlington
Hamilton
Grimsby
St. Catharines
Niagara-On-the-Lake
Welland
Port Colborne
Fort Erie
London
Lambeth
Woodstock
Brantford
Simcoe
Tillsonburg
St. Thomas
Sarnia
Wallaceburg
Chatham
Windsor
1:1 500,000
Goshen Wind Energy Centre
Water Assessment and Water Body Report
Study Area in Ontario
Figure 1-1

The location of the Project Study Area was defined early in the planning process for the proposed wind energy facility, based on the availability of wind resources, approximate area required for the proposed project, and availability of existing infrastructure for connection to the electrical grid. The Project Study Area was used to facilitate information collection.

The following co-ordinates define the external boundaries of the Project Study Area:

Longitude	Latitude
-81.6753290	43.4155312
-81.3011931	43.3810955
-81.3303330	43.3036317
-81.7743607	43.2379854

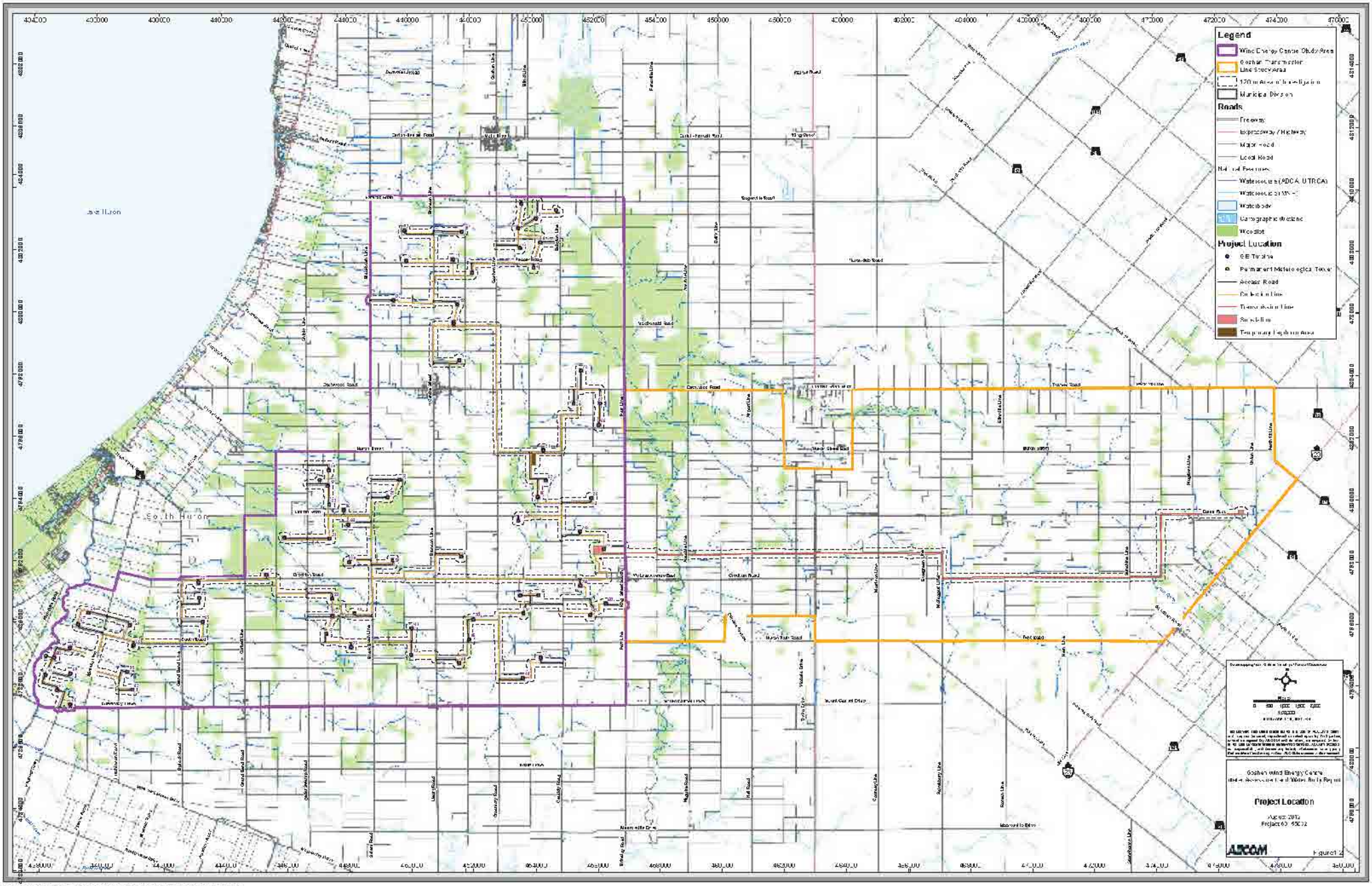
Some overhead electrical lines are expected to be located in municipal road rights-of-way. The transformer substation will be located on privately owned lands with lease arrangements.

The Project Location is defined as per *O. Reg. 359/09* 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*". As described therein, the Project Location boundary is the outer limit of where site preparation and construction activities will occur (i.e., Disturbance Areas described below) and where permanent infrastructure will be located, including the air space occupied by turbine blades. The proposed Project Location is shown on Figure 1-2, and includes the locations of the components of the Project listed below.

The major components of the Project include:

- Up to 71 GE 1.6-100 Wind Turbine generator locations and pad mounted step-up transformers and one GE 1.56-100 Wind Turbine generator location and pad mounted step-up transformer (however, only 63 turbines will be constructed);
- Laydown and storage areas (including temporary staging areas, crane pads and turnaround areas surrounding each wind turbine);
- Underground 34.5 kV electrical collection lines to connect the turbines to the transformer substation and other ancillary equipment such as above-ground junction boxes;
- Temporary electrical service line for the purpose of providing power to the construction trailer located at the laydown area;
- A transform substation;
- 115 kV transmission line to run from the transformer substation to a breaker switch station which will connect the electricity generated by the project to the existing Hydro One 115 kV transmission line;
- Turbine access roads;
- Three permanent meteorological towers; and,
- An operations and maintenance building including an electrical service line connected to the local distribution service.

Disturbance Areas have been identified surrounding various Project components, and are depicted on Figure 1-2. These denote areas where temporary disturbance during the construction phase may occur as a result of: temporary project component laydown and storage areas, crane pad construction, turbine turnaround areas, and construction of access roads and electrical collection system. With the exception of the project components described above, no permanent infrastructure is proposed within these areas. Following construction activities, the land will be returned to pre-construction conditions.


Legend
Wind Energy Centre Study Area
Goshen Transmission Line Study Area
120 m Area of Investigation
Municipal Division
Roads
Freeway
Expressway / Highway
Major Road
Local Road
Natural Features
Watercourse (ABCA, UTRCA)
Waterbody
Cartographic Wetland
Woodlot
Project Location
GE Turbine
Permanent Meteorological Tower
Access Road
Collection Line
Transmission Line
Substation
Temporary Laydown Area
Lake Huron
South Huron
Project Location
August 2012
Project #: 60202
AECOM
Figure 2

For the purposes of completing the Water Bodies Assessment, a 120 m Area of Investigation was defined, based on the requirements of O. Reg. 359/09 and the *Technical Guide to Renewable Energy Approvals* (MOE, June 2011). The Area of Investigation encompasses the Project Location and an additional 120 m measured from the Project Location boundary as described above. As part of the REA process, features located within the 120 m Area of Investigation must be investigated and evaluated to determine whether they are significant or provincially significant, in order to ascertain whether development prohibitions apply as per O. Reg. 359/09. The location of the 120 m Area of Investigation is shown on Figure 1-2.

More information on the Project Location and the specific project components, including predicted areas of disturbance associated with construction of each of the project components, are found in the Construction Plan Report.

1.3 Water Assessment and Water Body Report Requirements

Under the REA process, a person who proposes to engage in a renewable energy project is required to conduct a Water Assessment (O.Reg. 359/09, Section 29), consisting of the following:

- A Records Review (Section 30);
- A Site Investigation (Section 31).

Through this process, applicants identify water bodies near the proposed Project Location and determine prohibitions and setbacks provisions.

According to O. Reg. 359/09, a water body includes a lake, permanent stream, intermittent stream and a seepage area, defined as:

- Permanent stream – a stream that continually flows in an average year;
- Intermittent stream – a natural or artificial channel, other than a dam, that carries water intermittently and does not have established vegetation within the bed of the channel, except vegetation dominated by plant communities that require or prefer the continuous presence of water or continuously saturated soil for their survival;
- Lake Trout Lake – a lake that has been designated by the Ministry of Natural Resources for Lake Trout management, as set out in records maintained by and available from that Ministry, and;
- Seepage Area – a site of emergence of groundwater where the water table is present at the ground surface, including a spring.

Under O. Reg. 359/09, a water body 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 and spillways;
(d) Roadside ditches that do not contain a permanent or intermittent stream;
(e) Temporarily ponded areas that are normally farmed;
(f) Dugout ponds, and;
(g) Artificial bodies of water intended for the storage, treatment or recirculation or runoff from farm animal yards, manure storage facilities and sites and outdoor confinement areas.

The prohibition/setback requirements stipulate restrictions on the location of project components. Section 39 of O.Reg. 359/09 prohibits construction or installation of turbines and sub-stations in or within 30 m of the average annual high water mark of a lake, a permanent or intermittent stream or a seepage area. However, ancillary equipment, such as a transmission line, access road, and collection line, can be built within those setbacks provided that a Water Body Report is prepared. The Water Body report identifies and assesses any negative environmental effects of the project on a water body and on the land within 30 m of the water body nearest to the Project Location, thereby capturing any potential impacts to the riparian zone as well.

Section 40, O.Reg. 359/09 allows all project components, including wind turbines, to be constructed or installed within 120 m of the average annual high water mark of a lake, permanent or intermittent stream or seepage area, provided that a Water Body Report is prepared.

The setbacks described above apply to the footprint of the project components and to the area required to construct those components. The Area of Disturbance is defined as the area around the turbine which includes the construction footprint of the turbine, equipment laydown area, and turnaround areas. The tip of blade is the furthest extent of the actual turbine and water body setbacks were measured from this point.

Required setbacks for the construction of turbines and other facility components were applied in accordance with O.Reg 359/09, including the exemption that development of other project components such as transmission lines, collection lines and roads can be constructed within the 30 m water body setbacks (section 39(2)).

Water bodies that are within the 120 m Area of Investigation of the project components and land within 30 m of the water body are identified and assessed in this Water Body Report.

This Water Assessment and Water Body Report is intended to satisfy the requirements of O. Reg. 359/09 outlined below (**Table 1-1**) and is to be submitted as a component of the REA application.

Table 1-1 Water Body and Water Assessment Report Requirements

Requirement	*O.Reg. 359/09* Section	Completed	Corresponding Section
Records Review	Section 30	Yes	3
Site Investigation	Section 31	Yes	4
Negative environmental effects of the project on a water body within the Area of Investigation and on land within 30 m of the water body that may result from the project	Section 40	Yes	5
Mitigation measures in respect of any negative environmental effects	Section 40	Yes	5

2. Overall Methodology

The assessment of water bodies for the purpose of submitting an application for a Renewable Energy Approval requires a staged approach to first identify the water bodies within the Area of Investigation and then to identify potential effects and mitigations on any water bodies and associated land. Sections 29-31 and 39-40 of O.Reg. 359/09 outlines the requirements for the assessment.

Figure 2-1 outlines the approach undertaken to identify, analyze, and evaluate all water bodies identified within the Project Location, in compliance with O. Reg. 359/09.

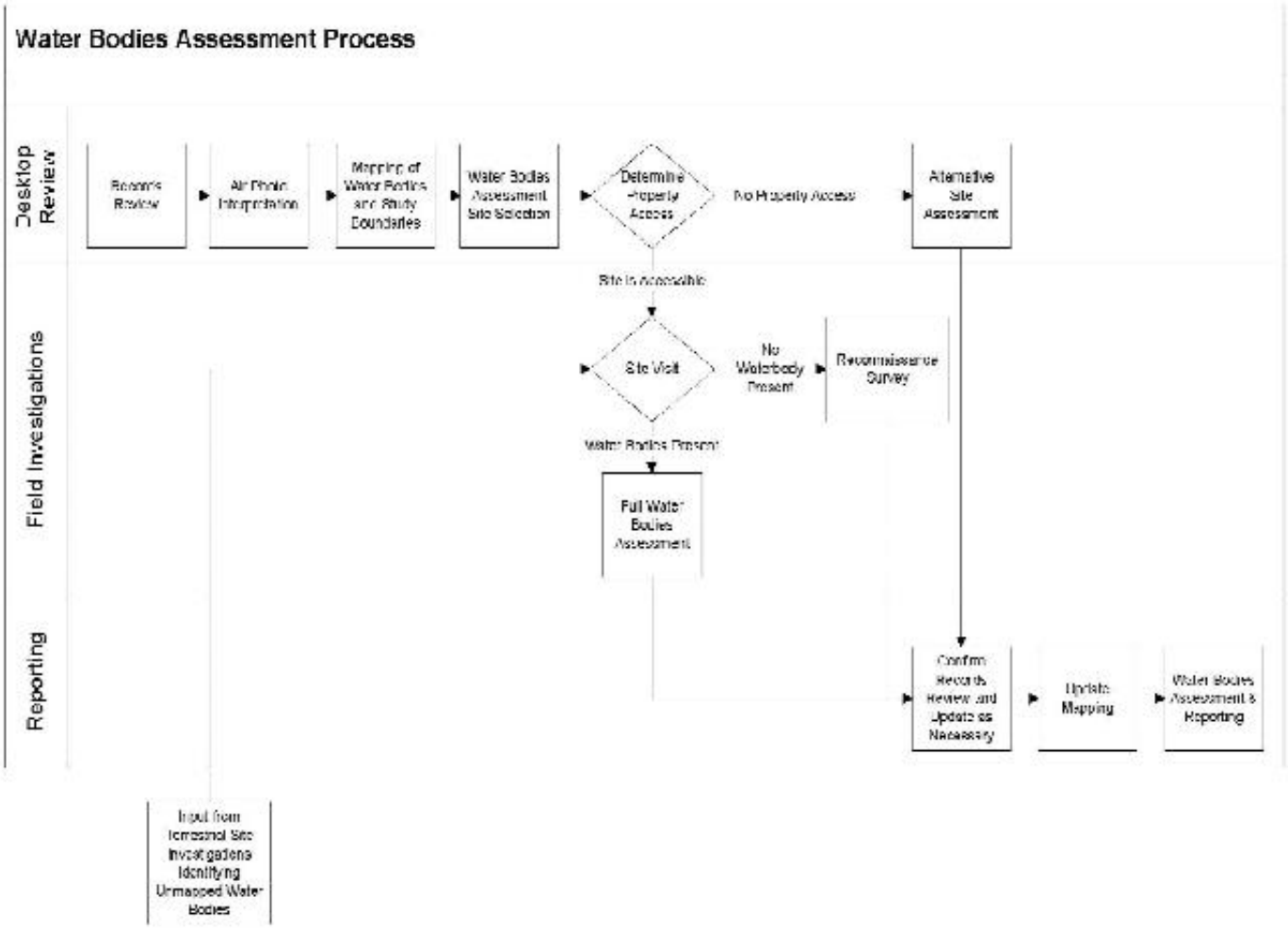


Figure 2-1 Overall Methodology Employed for the Water Body Assessment

3. Records Review and Summary of Background Information

3.1 REA Requirements and Methods

Under Section 30 of O. Reg. 359/09, a Records Review is required to determine if water bodies exist in the vicinity of the Project Location. The records that are required to be searched and analyzed are listed in Table 3-1, along with applicable distances from the Project Location. Information gathered under this stage of the process was used to determine if water bodies may exist in the Area of Investigation for the Goshen Wind Energy Centre.

As part of the REA process, features located with the 120 m Area of Investigation, must be investigated and evaluated to determine whether they are significant or provincially significant, in order to ascertain whether development prohibitions apply as per O.Reg. 359/09. Additional information was therefore collected from agencies and background sources, where available, to help inform not only where water bodies were located, but also to provide some indication of their form and function. This information collected during the Records Review phase was assessed by qualified ecologists to determine whether the information collected during this stage was useful in determining the status of water bodies, i.e. non-REA or REA water bodies, and to further provide background information that could be used in the Effects Assessment.

Table 3-1 Requirements of Records Review (Section 30 O. Reg. 359/09)

Item	Records to Be searched and Analyzed	Determination to be Made
1.	Records that relate to natural features and that are maintained by: i. The Ministry of Natural Resources, ii. The Crown in right of Canada, iii. A Conservation Authority, if the Project Location is in the area of jurisdiction of the Conservation Authority, iv. Each local and upper-tier municipality in which the Project Location is situated, v. The planning board of an area of jurisdiction of a planning board in which the Project Location is situated, vi. The municipal planning authority of an area of jurisdiction of a municipal planning authority in which the Project Location is situated, vii. The local roads board of a local roads area in which the Project Location is situated, viii. The Local Services Board of a board area in which the Project Location is situated, and, ix. The Niagara Escarpment Commission, if the Project Location is in the area of the Niagara Escarpment Plan.	Whether the Project Location is: i. In a water body ii. Within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity iii. Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity iv. Within 120 m of the average annual high water mark of a permanent or intermittent stream v. Within 120 m of a seepage area

The Records Review was conducted via online databases and contact with regulatory agencies and municipalities through: meetings; telephone requests; or email correspondence. A summary of agencies contacted is provided below and a detailed summary of the agency consultation in relation to this project is provided in **Appendix A**.

Agencies contacted for Records Review information include:

- Ausable Bayfield Conservation Authority (ABCA);
- Ministry of Natural Resources (MNR), Clinton Office;
- MNR, Guelph District Office;
- Ministry of the Environment (MOE);
- Huron County;
- Municipality of Bluewater;
- Municipality of South Huron; and,
- Upper Thames Conservation Authority (UTRCA)

3.2 Summary of Records Received

The records received from the regulatory agencies are shown in Table 3-2. The type of information provided and the Project Study Area coverage is noted. All water bodies identified from this Records Review were mapped and set as the basis for further site investigation as required under Section 31 of O.Reg 359/09 (**Figure 3-1**). The additional background information collected during the Records Review, where relevant, was incorporated into the assessment for each water body and the subsequent effects assessment.

Table 3-2 Summary of Records Received

Agency	Record Type	Project Study Area Coverage
MNR	Water body, watercourse, wetland layers	Entire Project Study Area
	Thermal Regime	Entire Project Study Area
	Fish Records	Fish Records (36) for seven watercourses within Project Study Area.
	Fish Habitat	Records(112) of fish habitat with the associated Fish Records within the Project Study Area
	Water Quality	Records (11) of water quality (mostly water temperature) with the associated Fish Records within the Project Study Area
	Benthic Invertebrates	Records(3) of benthic invertebrate sampling surveys within the Project Study Area
ABCA	Regulated Areas (*O.Reg. 97/04*)	Entire Project Study Area
	Natural Features	Entire Project Study Area
	Floodline Mapping	Entire Project Study Area
	Thermal Regime	Entire Project Study Area
	Municipal Drain Classifications	Entire Project Study Area
	Fish Records	Records (22) for seven watercourses within Project Study Area. Reference to (18) Fish Records located outside of the Project Study Area.
	Source Water Protection	Entire Project Study Area
	Watercourse Names	Entire Project Study Area
UTRCA	Regulated Areas (*O.Reg. 97/04*)	Entire Project Study Area
	Natural Features	Entire Project Study Area
	Floodline Mapping	Entire Project Study Area
	Thermal Regime	Entire Project Study Area
	Municipal Drain Classifications	Entire Project Study Area
	Fish Records	Records (13) for five watercourses within Project Study Area
	Watercourse Names	Entire Project Study Area
Upper and Lower Tier Municipalities	Municipal Drain Classifications	Entire Project Study Area

3.2.1 Records Related to Lakes

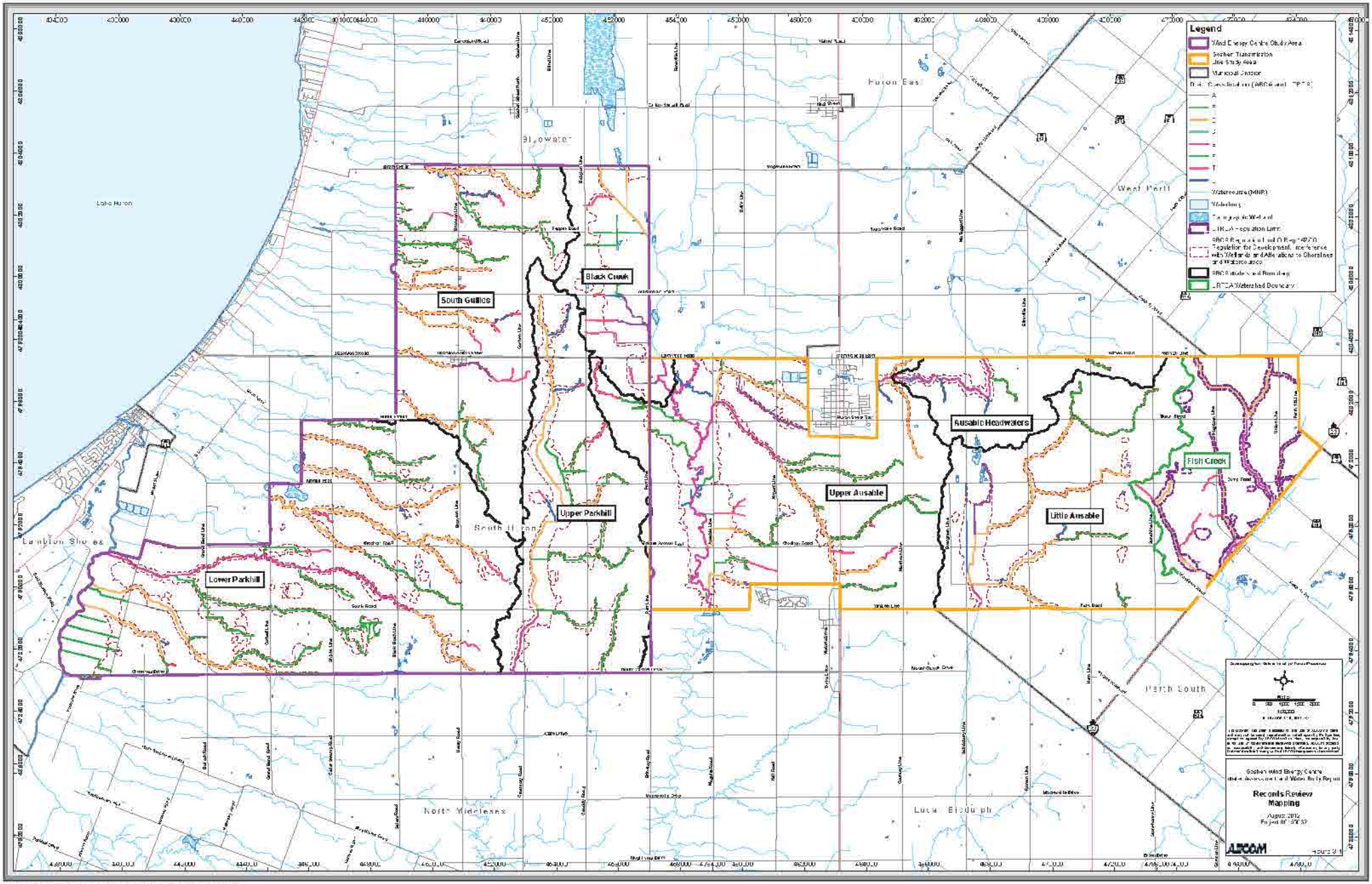
The Project Study Area does not include any inland lakes and is not located within 120 m of the average annual high water mark of a lake. This was confirmed using the NRVIS layers as Ontario Base Maps (OBM) published by MNR and calculation of distances using GIS tools.

No records were therefore reviewed for these water bodies as they do not exist in the Project Study Area.

3.2.2 Records Related to Lake Trout Lakes

The Project Study Area does not contain any Lake Trout lakes and is not located within 300 m of the average annual high water mark of a Lake Trout lake that is at or above development capacity. This was determined through review of the Inland Ontario Lakes Designated for Lake Trout document produced by MNR (2006).

No records were therefore reviewed for these water bodies as they do not exist in the Project Study Area.


Legend
Wind Energy Centre Study Area
Bruce Transmission Line Study Area
Municipal Boundary
Watercourse (MNR)
Waterbody
Drainage in Wetland
LRCA Regulation Limit
Regulation for Development, Interference with Wetlands and Alterations to Shorelines and Watercourses
SBCA Boundary and Buffer
LRCA Watershed Boundary
Lake Huron
Bluewater
Huron East
West Perth
Lambton Shores
South Huron
North Middlesex
Perth South
Lucan Biddulph
South Gullies
Black Creek
Upper Parkhill
Lower Parkhill
Ausable Headwaters
Upper Ausable
Little Ausable
Fish Creek
Records Review Mapping
August 2012
AECOM

3.2.3 Records Related to Seepage Areas

Mapping was obtained from the Upper Thames River Conservation Authority website regarding a Groundwater Modelling Project conducted by six conservation authorities including ABCA (UTRCA, 2010). The Estimated Zones of Potential Recharge and Discharge Areas were determined and presented in Figure A-1 (**Appendix C**). This mapping indicates that there are no discharge areas identified in the Project Study Area, however this area is classified as a recharge area.

There is no specific mapping available which identifies groundwater seepage areas within the Project Study Area.

3.2.4 Records Related to Permanent or Intermittent Streams

The Project Study Area is within 120 m of the average annual high water mark of permanent or intermittent streams. Therefore the Records Review process was initiated and background information was collected from various sources to confirm the location of these water bodies (as required under O.Reg 359/09), as well as to provide more detailed information to aide in the water bodies effects assessment.

The following sections outline records and data provided by various agencies and other sources, all related to permanent or intermittent streams in the Project Study Area.

3.2.4.1 Ausable Bayfield Conservation Authority (ABCA)

The Project Study Area is located in the Ausable Bayfield Watershed. ABCA provided 2010/2011/2012 watercourse and wetland shapefiles, drain classifications, as well as mapping for Regulated Areas (flooding and erosion hazards) under the Generic Regulation; *Ontario Regulation 97/04 – Development, Interference with wetlands and Alterations to Shorelines and Watercourses*. These layers were applied to the base mapping to identify potential water bodies within the Study Area.

The Project Study Area includes five major subwatersheds within the Ausable Bayfield watershed: South Gullies; Lower Parkhill; Upper Parkhill; Upper Ausable; and Little Ausable subwatersheds. A small portion of the Project Study Area also extends into the Black Creek and Ausable Headwaters watersheds. A summary of the key findings from the 2007 Ausable Bayfield Watershed Report Card (ABCA, 2007) for each subwatershed is provided below in Table 3-3. Two parameters for water quality are summarized, total phosphorus and benthic invertebrates. Sources of phosphorus include human and animal waste; soil erosion; and fertilizers. Excess phosphorus can lead to eutrophication, leading to algal blooms and a decrease in oxygen available in the water. Benthic macroinvertebrates are commonly used as indicators of watershed health. Their sedentary life history and species differences in tolerance levels to pollutants, means that benthic communities can be used as reliable indicators of water quality.

Table 3-3 Summary of ABCA 2007 Subwatershed Report Cards

Watershed	Geology	Soils	Land Use	Fisheries	Water Quality
South Gullies	56% Bevelled Till plains 27% Till Moraines 13% Sand plains 4% sand beaches and shore cliffs	60% clay loam 27% sandy loam 7% loam 6% bottomland	85% agriculture 10% woodlot 3% urban	Warm water baitfish community	• Total Phosphorus **– B** • Benthic Invertebrates - C
Black Creek	37% till plains 37% spillways 26% till moraines	59% clay loam 29% sandy loam 8% organics 3% bottomland	78% agriculture 18% woodlot 3% urban	Warm water fishery in the main channel, cold water fishery in the tributaries	• Total Phosphorus **– C** • Benthic Invertebrates - D

Watershed	Geology	Soils	Land Use	Fisheries	Water Quality
Lower Parkhill	35% Till Moraines 25% Bevelled Till plains 23% Sand plains 10% Clay plains 4% sand beaches and shore cliffs	27% silty clay loam 24% clay loam 23% sandy loam 11% loam 6% silty loam 5% clay	83% agriculture 14% woodlot 1% urban	Warm water fishery in the main channel, baitfish in tributaries	• Total Phosphorus – C • Benthic Invertebrates - C
Upper Parkhill	82% Till Moraines 12% Bevelled Till plains 4% Sand plains 1% sand beaches and shore cliffs	46% silty loam 25% clay loam 8% loam 7% sandy loam 7% silty loam	82% agriculture 13% woodlot 2% urban	Warm water fishery in the main channel, baitfish in tributaries	• Total Phosphorus – C • Benthic Invertebrates - B
Upper Ausable	55% Till plains 25% till moraines 6% spillways 6% sand plains 6% bevelled till plains 2% sand beaches and shore cliffs	40% clay loam 35% silty clay loam 9% sandy loam 7% loam 6% silty loam 2% bottom land	84% agriculture 10% woodlot 4% urban	Warm water fishery in the main channel, baitfish in tributaries. Potential habitat for fish SAR.	• Total Phosphorus – C • Benthic Invertebrates - B
Little Ausable	61% Till plains 21% spillways 18% Till moraines	45% clay loam 17% silty loam 15% silty clay loam 15% loam 5% sandy loam 2% bottom land	91% agriculture 6% woodlot 2% urban	Warm water fishery in the main channel, baitfish tributaries. Potential habitat for fish SAR.	• Total Phosphorus – B • Benthic Invertebrates - F
Ausable Headwaters	54% till plains 24% till moraines 19% spillways 3% kame moraines	77% clay loam 10% silt loam 7% bottomland 3% loam 2% sandy loam	89% agriculture 9% woodlot 1% urban	Warm water fishery in the main channel, baitfish in tributaries	• Total Phosphorus – A • Benthic Invertebrates - C

Notes: Watershed Report Card Grades and Explanation (ABCA, 2007):
A – Indicates excellent ecosystem conditions and protection may be required. Some areas may require enhancement.
B – Indicates good ecosystem conditions. Some areas may require enhancement.
C – Indicates ecosystem conditions that need to be enhanced.
D – Indicates poor ecosystem conditions that need to be improved.
F – Indicates degraded ecosystem conditions that need considerable improvement.

In general terms, geology in most subwatersheds is dominated by Till Plains, followed by Till Moraines, and bevelled till plains spillways and some Sand Plains. Soils across all subwatersheds are dominated by Clay Loam, Silty Loam, Sandy Loam, loam and Bottomland. Land use in the area is dominated by agriculture with some woodlots across all seven subwatersheds.

According to the ABCA Watershed Report Cards (ABCA, 2007), water quality is fairly similar across all of the subwatersheds in the Project Study Area. The majority of the subwatersheds have ecosystem conditions that need improvements with regard to *E. Coli* (Escherichia coli) and benthic invertebrates, and overall good ecosystem conditions with regard to total phosphorus levels, with some enhancements required. The MOE has established an environmental health objective concentration of 0.03 mg/L for Total Phosphorus (TP). All of the TP concentrations in 6 of the seven subwatersheds were above this concentration and ranged from 0.05 mg/L (Little Ausable) to 0.16 mg/L (Upper Ausable), indicating nutrient run-off from primarily agricultural sources. The Ausable Headwaters concentration was exactly 0.03 mg/L at the upper limit of the recommended concentration. The highest concentration of TP was observed in the Upper Ausable and likely reflects that it is a larger river system that is the receiving water body to several tributaries that primarily flow through agricultural lands. The Family Biotic Index (FBI) was used to describe the benthic invertebrates found in sediment samples throughout the subwatersheds. FBI values provide stream health information and the values range from 1 (healthy) to 10 (degraded). FBI values ranged from 4.7 indicating good ecosystem conditions in the Upper Ausable to 6.6 indicating a degraded ecosystem in the Little Ausable.

ABCA did not have any data on the average high water mark for water bodies within the Project Study Area.

The watercourses located within the Project Study Area all drain into Lake Huron (**Figure 3-1**). The fish community in all subwatersheds is warm water, with a warm water fishery, with the exception of the Black Creek watershed which supports a coldwater fishery in the tributaries (ABCA, 2007).

ABCA provided 22 fish records for the seven different watercourses located within the Project Study Area. **Appendix B** presents the locations of the fish records. The fish records identify a total of 44 different fish species within the watercourses found within the Project Study Area. The fish communities located within the seven watercourses are a mix of warm water, cool water as well as cold water species including two introduced species, Rainbow Trout (*Oncorhynchus mykiss*) which are found in Centralia Drain a tributary to the Ausable River, and Chinook Salmon (*Oncorhynchus tshawytscha*) which are found in the Upper Ausable River, north of the Project Study Area. Table 3-4 provides the fish species identified in the Project Study Area by ABCA as well as their preferred thermal regime, Provincial Ranking (S-Rank), ABCA watershed location and watercourse sampled. The S-Ranks are a provincial ranking to set protection priorities for rare and natural communities. Some records are from further upstream in the Ausable River, which is outside of the Project Study Area, but are included here to provide a comprehensive review.

Table 3-4 Fish Records Obtained from ABCA for Seven Watercourses within the Project Study Area

Common Name	Latin Name	Thermal Regime	Provincial Ranking (S-Rank)*[1]	Record Location (Subwatershed)*[2]	Record Location (Watercourse)
Black Bullhead	*Ameiurus melas*	Warmwater	S4	UA	Ausable River
Black Crappie	*Pomoxis nigromaculatus*	Coolwater	S4	UA	Ausable River
Blacknose Dace	*Rhinichthys atratulus*	Coolwater	S5	LP, UA	McGregor Young Drain, Ausable River
Blackside Darter	*Percina maculata*	Coolwater	S4	UA	Ausable River
Bluegill	*Lepomis macrochirus*	Warmwater	S5	UA	Ausable River
Bluntnose Minnow	*Pimephales notatus*	Warmwater	S5	LP, UA, LA, AH	McGregor Young Drain, Dietrich Ext 1974, Ausable River, Centralia Drain Ext, Elimville Drain
Brook Stickleback	*Culaea inconstans*	Coolwater	S5	LP, UA, LA	McGregor Young Drain, Dietrich Ext 1974, Ausable River, Centralia Drain Ext, Elimville Drain
Brown Bullhead	*Ameiurus nebulosus*	Warmwater	S5	UA	Ausable River
Central Stoneroller	*Campostoma anomalum*	Coolwater	S4	UA, LA	Ausable River, Centralia Drain Ext, - Elimville Drain
Chinook Salmon	*Oncorhynchus tshawytscha*	Coldwater	SNA	UA	Ausable River
Common Carp	*Cyprinus carpio*	Warmwater	SNA	UA	Ausable River
Common Shiner	*Luxilus cornutus*	Coolwater	S5	LP, UA, LA, AH	McGregor Young Drain, Dietrich Ext 1974, Ausable River, Centralia Drain Ext, Elimville Drain
Creek Chub	*Semotilus atromaculatus*	Coolwater	S5	LP, UA, LA, AH	McGregor Young Drain, Dietrich Ext 1974, Ausable River, Centralia Drain Ext, Elimville Drain
Fathead Minnow	*Pimephales promelas*	Warmwater	S5	UA, AH	Ausable River, Centralia Drain Ext
Golden Redhorse	*Moxostoma erythrurum*	Warmwater	S4	UA	Ausable River
Golden Shiner	*Notemigonus crysoleucas*	Coolwater	S5	AH	Ausable River
Greater Redhorse	*Moxostoma valenciennesi*	Warmwater	S3	UA	Ausable River
Greenside Darter	*Etheostoma blennioides*	Warmwater	S4	UA, LA	Ausable River, Elimville Drain
Hornyhead Chub	*Nocomis biguttatus*	Coolwater	S4	AH, UA	Ausable River
Iowa Darter	*Etheostoma exile*	Coolwater	S5	AH, UA	Ausable River
Johnny Darter	*Etheostoma nigrum*	Coolwater	S5	UA, LA, AH	Ausable River, Centralia Drain Ext, Elimville Drain
Largemouth Bass	*Micropterus salmoides*	Warmwater	S5	AH, UA	Ausable River

Common Name	Latin Name	Thermal Regime	Provincial Ranking (S-Rank)*[1]	Record Location (Subwatershed)*[2]	Record Location (Watercourse)
Least Darter	*Etheostoma microperca*	Warmwater	S4	UA, LA, AH	Ausable River, Centralia Drain Ext, Elimville Drain
Longear Sunfish	*Lepomis megalotis*	Warmwater	S3	UA, AH	Ausable River
Mimic Shiner	*Notropis volucellus*	Warmwater	S5	UA	Ausable River
Northern Hogsucker	*Hypentelium nigricans*	Warmwater	S4	AH, UA	Ausable River
Northern Pike	*Esox lucius*	Coolwater	S5	LP, UA	Dietrich Ext 1974, Ausable River
Northern Redbelly Dace	*Phoxinus eos*	Coolwater	S5	LP, UA	McGregor Young Drain, Centralia Drain Ext
Pumpkinseed	*Lepomis gibbosus*	Warmwater	S5	UA, AH	Ausable River
Rainbow Darter	*Etheostoma caeruleum*	Coolwater	S4	UA, AH	Ausable River
Rainbow Trout	*Oncorhynchus mykiss*	Coldwater	SNA	UA	Ausable River
Redfin Shiner	*Lythrurus umbratilis*	Coolwater	S4	UA	Ausable River
River Chub	*Nocomis micropogon*	Coolwater	S4	UA	Ausable River
Rock Bass	*Ambloplites rupestris*	Coolwater	S5	UA, LA, AH	Ausable River, Elimville Drain
Rosyface Shiner	*Notropis rubellus*	Warmwater	S4	UA	Ausable River
Silver Redhorse	*Moxostoma anisurum*	Coolwater	S4	UA	Ausable River
Smallmouth Bass	*Micropterus dolomieu*	Coolwater	S5	AH, UA	Ausable River
Spotfin Shiner	*Cyprinella spiloptera*	Warmwater	S4	LP	Dietrich Ext 1974
Stonecat	*Noturus flavus*	Warmwater	S4	LA, AH, UA	Elimville Drain, Ausable River
Striped Shiner	*Luxilus cornutus*	Coolwater	S4	UA, AH	Centralia Drain Ext, Ausable River
White Crappie	*Pomoxis annularis*	Warmwater	S4	UA, AH	Ausable River
White Sucker	*Catostomus commersonii*	Coolwater	S5	LP, UA, LA, AH	Dietrich Ext 1974, Ausable River, Centralia Drain Ext, Elimville Drain
Yellow Bullhead	*Ameiurus natalis*	Warmwater	S4	UA, AH	Ausable River
Yellow Perch	*Perca flavescens*	Coolwater	S5	AH	Ausable River

*Notes: *1 SRank - Subnational conservation status ranks are assigned for Ontario by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species. S1 – Critically Imperiled, S2 – Imperiled, S3 – Vulnerable, S4 – Apparently Secure, S5 – Secure, SNA – Not Applicable*

**2 AH = Ausable Headwaters; LA = Lower Ausable; LP = Lower Parkhill; UA = Upper Ausable*

The majority of fish species located in the study area were ranked as S4 or S5 meaning that they are not rare or of conservation concern, but rather common and demonstrably secure.

All records provided by ABCA were used to identify both potential water bodies in the Project Study Area and as a basis for assessing the characteristics and significance of the water body.

3.2.4.2 Upper Thames River Conservation Authority (UTRCA)

Only a small portion of the Goshen transmission line study area falls within the Fish Creek subwatershed and under the UTRCA jurisdiction. The transmission line will cross three tributaries of Fish Creek including Washburn Drain, Stone Drain and Gardiner Drain. Fish Creek is a tributary of the North Thames River and is considered mainly warm water fish habitat (pers. comm. UTRCA, 2012).

UTRCA provided watercourse and wetland shapefiles, drain classifications, as well as mapping for regulated areas (flooding and erosion hazards) under the Generic Regulation; *Ontario Regulation 97/04 – Development, Interference with wetlands and Alterations to Shorelines and Watercourses*. These layers were applied to the base mapping to update constraints mapping and identify water bodies within the Project Study Area.

Stream flow for Fish Creek at Prospect Hill (located approximately 15 km downstream) was measured by UTRCA up until 1995. The mean annual stream flow was 2.2 cubic metres per second during this period. Based on historical flow records, Fish Creek contributes about 5% of the flow to the Thames River downstream of London (UTRCA, Watershed Report Card, 2007).

A review of the 2007 UTRCA Watershed Report Card for Fish Creek indicates that the Fish Creek subwatershed drains an area of 149 sq. km. and is 91% agriculture and 8% forest. The dominant soil type is clay loam (56%) and silty loam (18%). Surface water quality in Fish Creek was given an overall score of C indicating that ecosystem conditions need to be enhanced. Benthic invertebrates were given a score of C and described as overall steady conditions in stream health since 2001. Phosphorus levels in Fish Creek were ranked a B indicating good ecosystem conditions, while Bacteria was ranked as C, indicating ongoing sources of human and animal waste (UTRCA, 2007).

According to the UTRCA Watershed Report Card (2007), there are a total of 39 fish species that have been recorded in the Fish Creek subwatershed and 13 freshwater mussel species. UTRCA provided 13 fish records for five different watercourses located within the Project Study Area. The fish records identify a total of 24 different fish species within the Fish Creek watercourses found within the Project Study Area. The fish communities located within the five watercourses are a mix of warm water and cool water species that are commonly found in Southern Ontario. Coldwater fisheries are usually more sensitive than warm water or cool water due to the influence of groundwater; however there are no coldwater fisheries identified in the Project Study Area through UTRCA records. Table 3-5 shows the complete list of fish species identified in the Project Study Area.

Table 3-5 Fish Records Obtained from UTRCA for Five Watercourses within the Project Study Area

Common Name	Latin Name	Thermal Regime	Provincial Ranking (S-Rank)*[1]	Record Location (Subwatershed)*[2]	Record Location (Watercourse)
Blacknose Dace	*Rhinichthys atratulus*	Warmwater	S5	FC	Fish Creek, Sawyer Drain, Anderson Drain
Blackside Darter	*Percina maculata*	Coolwater	S4	FC	Gardiner Drain, Fish Creek, Anderson Drain
Bluntnose Minnow	*Pimephales notatus*	Warmwater	S5	FC	Washburn Drain, Fish Creek, Sawyer Drain, Anderson Drain
Brook Stickleback	*Culaea inconstans*	Coolwater	S5	FC	Washburn Drain, Fish Creek, Sawyer Drain, Anderson Drain
Central Mudminnow	*Umbra limi*	Coolwater	S5	FC	Anderson Drain
Central Stoneroller	*Campostoma anomalum*	Coolwater	S4	FC	Washburn Drain, Gardiner Drain, Fish Creek, Sawyer Drain, Anderson Drain
Common Shiner	*Luxilus cornutus*	Coolwater	S5	FC	Washburn Drain, Gardiner Drain, Fish Creek, Anderson Drain
Creek Chub	*Semotilus atromaculatus*	Coolwater	S5	FC	Washburn Drain, Gardiner Drain, Fish Creek, Sawyer Drain, Anderson Drain
Fantail Darter	*Etheostoma flallare*	Coolwater	S4	FC	Anderson Drain
Fathead Minnow	*Pimephales promelas*	Warmwater	S5	FC	Washburn Drain
Green Sunfish	*Lepomis cyanellus*	Warmwater	S4	FC	Fish Creek, Anderson Drain
Greenside Darter	*Etheostoma blennioides*	Warmwater	S4	FC	Gardiner Drain, Fish Creek, Anderson Drain
Hornyhead Chub	*Nocomis biguttatus*	Coolwater	S4	FC	Anderson Drain
Johnny Darter	*Etheostoma nigrum*	Coolwater	S5	FC	Gardiner Drain, Fish Creek, Sawyer Drain, Anderson Drain
Least Darter	*Etheostoma microperca*	Warmwater	S4	FC	Fish Creek
Longear Sunfish	*Lepomis megalotis*	Warmwater	S3	FC	Fish Creek
Northern Hogsucker	*Hypentelium nigricans*	Warmwater	S4	FC	Gardiner Drain, Anderson Drain
Northern Pike	*Esox lucius*	Coolwater	S5	FC	Fish Creek
Northern Redbelly Dace	*Phoxinus eos*	Coolwater	S5	FC	Fish Creek, Sawyer Drain
Pumpkinseed	*Lepomis gibbosus*	Warmwater	S5	FC	Fish Creek
Redfin Shiner	*Lythrurus umbratilis*	Coolwater	S4	FC	Fish Creek
Rock Bass	*Ambloplites rupestris*	Coolwater	S5	FC	Gardiner Drain, Fish Creek
White Sucker	*Catostomus commersonii*	Coolwater	S5	FC	Washburn Drain, Gardiner Drain, Fish Creek, Sawyer Drain, Anderson Drain

*Notes: *1 SRank - Subnational conservation status ranks are assigned for Ontario by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species. - S1 – Critically Imperiled, S2 – Imperiled, S3 – Vulnerable, S4 – Apparently Secure, S5 – Secure, SNA – Not Applicable*

**2 AH = Ausable Headwaters; LA = Lower Ausable; LP = Lower Parkhill; UA = Upper Ausable*

The majority of fish species located in the Project Study Area were ranked as S4 or S5 meaning that they are not rare or of conservation concern, but rather common and demonstrably secure

All records provided by UTRCA were used both to identify potential water bodies in the Project Study Area as well as to provide a basis for assessing the characteristics and significance of the water body.

3.2.4.3 Ministry of Natural Resources

The Project Study Area is located in the Guelph MNR District. Water body, watercourse, wetland layers (NRVIS 2007) and drain classifications were obtained from MNR to identify potential water bodies within the Project Study Area.

Fish records, fish habitat data and water quality data were provided by MNR for seven watercourses within the Project Study Area. **Appendix B** presents the locations of the MNR fish records. Generally, the watercourses within the study provide suitable habitat for a mix of coldwater, coolwater and warmwater species that are commonly found in Ontario The majority of fish species located in the Project Study Area were ranked as S4 or S5 on a provincial scale, meaning that they are not rare or of conservation concern, but rather common and demonstrably secure. Two introduced (non-native) species are also found in the Project Study Area- Common Carp (*Cyprinus carpio*) and Rainbow Trout. Fish species identified in the Project Study Area are presented in Table 3-6 below.

Table 3-6 Fish Records Obtained from MNR for Seven Watercourses within the Project Study Area

Common Name	Latin Name	Thermal Regime	Provincial Ranking (S-Rank)*[1]	Record Location (Subwatershed)*[2]	Record Location (Watercourse)
Blacknose Dace	*Rhinichthys atratulus*	Coolwater	S5	FC, LP	Centralia Drain Ext., Ratz Drain, Khiva Main Drain
Blackside Darter	*Percina maculata*	Coolwater	S4	LP	Shipka Drain
Bluntnose Minnow	*Pimephales notatus*	Warmwater	S5	FC, LP	Centralia Drain Ext., Issac Drain
Brook Stickleback	*Culaea inconstans*	Coolwater	S5	FC, LP	Centralia Drain Ext., Ratz Drain, Khiva Main Drain, Regier Drain, Issac Drain
Brown Bullhead	*Ameiurus nebulosus*	Warmwater	S5	LP	Shipka Drain
Common Carp	*Cyprinus carpio*	Warmwater	SNA	LP, UP	Regier Drain, Issac Drain, Mud Creek Drain
Common Shiner	*Luxilus cornutus*	Coolwater	S5	FC, LP	Centralia Drain Ext., Ratz Drain, Shipka Drain, Regier Drain, Issac Drain
Creek Chub	*Semotilus atromaculatus*	Coolwater	S5	FC, LP, UP	Centralia Drain Ext., Ratz Drain, Khiva Main Drain, Regier Drain, Issac Drain, Mud Creek Drain
Emerald Shiner	*Notropis atherinoides*	Coolwater	S5	LP	Shipka Drain
Fathead Minnow	*Pimephales promelas*	Warmwater	S5	LP	Ratz Drain, Khiva Main Drain, Regier Drain, Issac Drain
Johnny Darter	*Etheostoma nigrum*	Coolwater	S5	LP	Shipka Drain, Regier Drain
Least Darter	*Etheostoma microperca*	Warmwater	S4	FC	Centralia Drain Ext.
Northern Redbelly Dace	*Chrosomus eos*	Coolwater	S5	FC, LP	Centralia Drain Ext., Ratz Drain, Khiva Main Drain, Issac Drain
Rainbow Darter	*Etheostoma caeruleum*	Coolwater	S4	FC, LP	Centralia Drain Ext., Shipka Drain
Rainbow Trout	*Oncorhynchus mykiss*	Coldwater	SNA	LP	Shipka Drain
Rock Bass	*Ambloplites rupestris*	Coolwater	S5	LP	Ratz Drain
White Sucker	*Catostomus commersonii*	Coolwater	S5	FC, LP	Centralia Drain Ext., Ratz Drain, Shipka Drain, Regier Drain, Issac Drain

*Notes: *1 SRank - Subnational conservation status ranks are assigned for Ontario by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species. - S1 – Critically Imperiled, S2 – Imperiled, S3 – Vulnerable, S4 – Apparently Secure, S5 – Secure, SNA – Not Applicable*

**2 AH = Ausable Headwaters; LA = Lower Ausable; LP = Lower Parkhill; UA = Upper Ausable*

The NRVIS layers were used to identify potential water bodies within the Project Study Area and fish records from the MNR were used to assess habitat sensitivity of water bodies in the Area of Investigation, where data was available.

3.2.4.4 Upper Tier and Lower Tier Municipalities

Municipal drain information was provided via hardcopy from the Municipality of Bluewater and the Municipality of South Huron. Drain classifications (under the *Drainage Act*) were obtained from the Huron County website (http://www.huroncounty.ca). The Project Study Area contains several municipal Drains that are located within the Hay, Stephen and Usborne wards.

These records were used to identify the Municipal Drainage Wards within the Project Study Area.

3.2.4.5 Ministry of the Environment

The MOE operates the Provincial Water Quality Monitoring Network (PWQMN) (http://www.ene.gov.on.ca/en/water/lakepartner/index.php) which collects information on the quality of stream-water from over 400 locations across Ontario. There are no PWQMN stations in the Project Study Area; however there are 10 stations within 5 to 10 km of the Project Study Area. **Appendix B** presents the locations of the PWQMN sites. There are five PWQMN stations on the Ausable River north and south of the Project Study Area, two on Parkhill Creek, one on Elimville Drain and one located on Pergel Gully. Water quality sampling was discontinued on all but two of the sites prior to 2006 (one Ausable River station and Elimville Drain). Water quality data were not available for the Elimville Drain site.

Aside from the identification of PWQMN sites, the records from MOE PWQMN site were not used any further to aide in the classification of water body sensitivities as there were no relevant records from within the Project Study Area.

3.2.4.6 Environment Canada

Environment Canada's Water Survey of Canada Water Office (http://www.wateroffice.ec.gc.ca) website was used to access water level and flow data for the Project Study Area. **Appendix B** presents the locations of the Environment Canada flow stations. Only one site (02FF009) within the Project Study Area was found on the Ausable River near where it crosses Thames Road west of the Town of Exeter. This station provides real-time hydrometric data and has been recording flow since 1984 and flow and water level since 2002. Data downloaded during the timeframe of field investigations from April 2012 to July 2012 indicated that the river has maintained a mean water level of approximately 3.4 m with a maximum water level of 4.3 m. One other site was located just outside the Project Study Area in the Black Creek watershed. This station (02FF014) is located on Black Creek near the crossing of London Road, south of the Town of Hensall. This station has been recording data since 2005.

Aside from this summary of available data, the records from Environment Canada were not used any further to aide in the classification of water body sensitivities as there were no relevant records from within the Project Study Area.

3.2.4.7 Ontario Ministry of Agriculture, Food and Rural Affairs and Drain Classification

Municipal and agricultural drains were identified by using the OMAFRA Agricultural Information Atlas available at http://www.omafra.gov.on.ca/english/landuse/drain-map.htm. Constructed drain mapping was overlaid on the Goshen Study area and water bodies were classified as channelized, natural or tiled and this information was used to help inform water body sensitivity, in addition to site investigations.

In addition, the Department of Fisheries and Oceans (DFO) Drain Classification was obtained from ABCA, UTRCA and MNR. Construction and maintenance of agricultural drains is regulated under the Ontario Drainage Act. The Class Authorization process was developed by DFO to help streamline the review and approval process for drain maintenance to protect fish and fish habitat under the *Fisheries Act*. The Class Authorization System classifies drains into six categories based on the sensitivity of the fish habitat. ABCA provided two additional drain types (T) which indicates a tiled feature and (U) which indicates a drain that is not classified. Drains are classified by local Conservation Authorities and are based on field data and knowledge of the area. The sensitivity of drains is classified according to the following parameters (DFO, 2012):

Flow ..... Permanent watercourses are more sensitive than intermittent watercourses that are dry for more than two consecutive months.

Temperature..... Cold/cool water watercourses are more sensitive than warm water watercourses.

Fish Species ..... The presence of sensitive fish species (e.g., trout, bass, sculpin and pike) and fish species identified under the federal *Species at Risk Act* indicates the presence of a more sensitive habitat.

Stability..... A watercourse that has not recently undergone a full clean-out has most likely reached a higher state of ecological stability. The combined productivity of riparian vegetation and in-stream habitat components can be easily disrupted by maintenance activities.

Table 3-7 provides the Drain Classifications used for the water body assessments below.

Table 3-7 DFO Drain Classification System

Drain Type	Flow	Temperature	Drain Classification
A	Permanent	Cold/Cool	No sensitive species and/or communities present
B	Permanent	Warm	Sensitive species and/or communities present
C	Permanent	Warm	No sensitive species and/or communities present
D	Permanent	Cold/Cool	Sensitive species and/or communities present
E	Permanent	Warm	Sensitive species and/or communities present
F	Intermittent/Ephemeral	Not Applicable	Not Applicable

Source: http://www.dfo-mpo.gc.ca/regions/central/pub/factsheets-feuilletsinfos-on/l2-eng.htm (DFO, 2010)

The drain classification information obtained from MNR differed from that obtained from the ABCA data. The differences in drain classifications were likely because the MNR data was older. MNR drain classifications were from 1996 while ABCA data were from 1999. The most recent classifications were used for this assessment of the water bodies (i.e., the data provided by ABCA and UTRCA rather than the MNR drain classification data).

The majority of the watercourses within the Goshen Project Study Area are classified as F-class (intermittent/ephemeral systems) and C-class (permanent warm water systems – no sensitive species or communities), with some watercourses classified as E-class (permanent warmwater systems with some sensitive species and/or communities present). There are several watercourses that are unclassified or tiled.

All drain classifications provided by ABCA and UTRCA were used to either identify potential water bodies in the Project Study Area and provided a basis for assessing the characteristics of the water body. The drainage information downloaded from the OMAFRA website was used to confirm findings from the site investigations (e.g., where a tiled watercourse was observed in the field)

3.2.4.8 Air Photo Interpretation

The air photo interpretation was conducted using 2006 aerials for the 2011 site investigations and 2010 aerials for the 2012 site investigations. In addition, NRVIS layers, Conservation Authority (CA) GIS layers and 1 m contours were used to identify low lying areas. Air photo interpretation was also conducted to locate potential first order tributaries that may now be tile drained. Specific features identified were:

- Vegetated swale features;
- Potential ponding areas;
- Branched swales.

Several swale features were identified from this review process, mainly from the presence of darker areas indicating the potential location of water or wetted areas. These areas were ground-truthed during the site investigations. Six potential swale features were identified through this process and carried forward to site investigations.

3.2.5 Species at Risk (SAR) and Species of Conservation Concern

The Natural Heritage Information Centre (NHIC) Biodiversity Explorer was searched for records of species at risk and conservation concern. Three fish species of conservation concern that were identified as occurring or having the potential to occur within the Project Study Area (Table 3-8). This was confirmed from a screening of the MNR fish records, DFO Species at Risk mapping and DFO SAR screening.

Species at risk listed under the federal Species at Risk Act (SARA; 2002) and the provincial Endangered Species Act (ESA, 2007), with the potential to be within the Project Location and/or adjacent lands, are being considered in consultation with the appropriate agencies. Reporting related to the protection of these Species at Risk is being provided to the appropriate agency under separate cover. This meets the requirements as set out in O. Reg. 359/09, and is consistent with the direction provided by the MNR and the MOE.

Table 3-8 Species of Conservation Concern

Common Name	Scientific Name	Type of Species	S-rank	COSEWIC Status	MNR Status	Preferred Habitat	Last Observed Date	Source
Greater Redhorse	*Moxostoma valenciennesi*	Fish	S3	NAR	NAR	The Greater Redhorse prefers moderate to swift current riffles, runs and pools of medium to large rivers with clear water and substrates of gravel, cobble or boulders; lakes	(2007) Ausable River	ABCA Fish Records
Longear Sunfish	*Lepomis peltastes*	Fish	S3	NAR	NAR	Prefers rocky and sandy pools with clear, nearly still, warm waters and aquatic vegetation in creeks and small to medium rivers, ponds and small lakes; preferred water temperature 21°C	(2007) Ausable River (2007) Kirkton CA	ABCA and UTRCA Fish Records
River Redhorse	*Moxostoma carinatum*	Fish	S2	Special Concern	Special Concern	Moderate to large rivers where the current is fast, and the bottom is composed of stones, rubble and bedrock with very little siltation.	8/10/1936 (NHIC)	NHIC, DFO SAR Mapping (2012)

1. ***S-rank:*** *The Natural Heritage provincial ranking system (provincial S-rank) is used by the MNR Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities.*

   Definitions are as follows:
   - *S1 .....Extremely rare in Ontario; usually 5 or fewer occurrences in the province or very few remaining individuals; often especially vulnerable to extirpation.*
   - *S2 .....Very rare in Ontario; usually between 5 and 20 occurrences in the province or with many individuals in fewer occurrences, often susceptible to extirpation.*
   - *S3 .....Rare to uncommon in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.*
   - *S4 .....Common and apparently secure in Ontario; usually with more than 100 occurrences in the province.*
   - *S5 .....Very common and demonstrably secure in Ontario.*
   - *SE .....Exotic; not believed to be a native component of Ontario's flora.*
   - *SH .....Possibly Extirpated (Historical)— Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years.*

2. **COSEWIC *Status*** *COSEWIC (Committee on the Status of Endangered Wildlife in Canada) assigns a federal status ranking for all species that it assesses.*
   - *EXT .....Extinct. A species that no longer exists*
   - *EXP .....Extirpated. A species that no longer exists in the wild in Canada, but occurring elsewhere in the world*
   - *END .....Endangered. A species facing imminent extirpation or extinction throughout its range.*
   - *THR .....Threatened. A species likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction*
   - *SC .....Special Concern. A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events, but does not include an extirpated, endangered or threatened species.*
   - *IND .....Indeterminate. A species for which there is insufficient information to support a status designation.*
   - *NAR .....Not at Risk. A species that has been evaluated and found to be not at risk.*

3. **MNR *Status:*** *Based on consultation with COSSARO (Committee on the Status of Species at Risk in Ontario). COSSARO is the Ministry of Natural Resources (MNR) committee that evaluates the conservation status of species occurring in Ontario.*

   Definitions are as follows:
   - *EXT Extinct.....A Species that no longer exist anywhere.*
   - *EXP Extirpated.....Any native species no longer existing in the wild in Ontario, but existing elsewhere in the wild.*
   - *END R Endangered (Regulated).....A species facing imminent extinction or extirpation in Ontario which has been regulated under Ontario's Endangered Species Act*
   - *END Endangered (not regulated).....A species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under the Ontario Endangered Species Act*
   - *THR Threatened.....Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a significant portion of its Ontario range if the limiting factors are not reversed.*
   - *SC Special Concern [formerly Vulnerable].....A species with characteristics that make it sensitive to human activities or natural events.*
   - *NAR Not at Risk [formerly Not In Any Category].....A species that has been evaluated and found not to be at risk.*
   - *DD Data Deficient [formerly Indeterminate].....Any native species for which there is insufficient scientific information on which to base a status recommendation*

3.3 Summary of Key Findings from the Records Review

Data collected during the Records Review stage, in particular the NRVIS layer mapping overlaid with natural features mapping and the locations of project components, as well as air photo interpretation, determined that there were a total of 98 locations where the Project Location overlapped with a water body or potential water body.

Of these 98 sites, 80 locations were identified as permanent or intermittent streams within the Project Location. In addition, 18 potential ponds were identified and an additional 6 potential swales were identified through air photo interpretation. These were included in the mapping for site investigations as it is important to assess their current ecological function and to determine whether they meet the criteria for REA water body after field assessment. Therefore a total of 104 sites were carried forward to field investigations as shown in Table 3-9.

The Records Review determined that there is no separate planning board and the project is not located within the Oak Ridges Moraine, Lake Simcoe Protection area, Niagara Escarpment or the Great Lakes area.

The majority of the water bodies located within the Project Study Area are classified as municipal drains.

Review of background records show that water quality within these drains is largely impacted from surrounding agricultural land use. All seven watersheds show impacted systems with a watershed report card (ABCA and UTRCA) score of C with the exception of the Ausable Headwaters which was given a B. A report card score of C indicates that ecosystem conditions needs to be enhanced, while a score of B indicates good ecosystem conditions, some areas may require enhancement. The main water quality concern within these watersheds is related to the concentrations of total phosphorus and *E.coli*.

The Records Review suggested that water bodies in the Project Study Area may provide habitat for a mix of coolwater and warmwater fish species in particular, cyprinids, centarchides, catostomidae and percidae. The majority of species found from the background review were Provincially Ranked (SRank) as S4 or S5 meaning that they are common and demonstrably secure.

The Records Review highlighted only three fish species of conservation concern in the Project Study Area. The Greater Redhorse and Longear Sunfish ranked as S3 (vulnerable) and the River Redhorse ranked as S2 (very rare in Ontario). These species were only recorded in the Ausable River in the Project Study Area (with the last observation of the River Redhorse in 1936).

During the Records Review three (3) fish and six (6) mussel species at risk were identified as occurring or having the potential to occur, within the Project Study Area. The occurrence of these species is largely concentrated within the Ausable River and its tributaries as well as Fish Creek. The protection of these Species at Risk is being reported under separate cover and will not be considered further in this report.

Table 3-9 Summary of Potential Water Bodies in the Project Study Area Identified from Records Review that were Carried Forward to Site Investigations

Feature	Number of Water Bodies
Within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity	0
Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity	0
Within 120 m of the average annual high water mark of a permanent or intermittent stream	104
Within 120 m of a seepage area	0

4. Site Investigation

4.1 REA Requirements and Methods

Site investigations were completed to confirm the findings of the Records Review, as required by Section 31 of O. Reg. 359/09, which states that a person who proposes to engage in a renewable energy project shall ensure that a physical investigation of water bodies within 120 m of the Project Location and of land within 30 m of such water bodies is conducted for the purpose of determining:

- Whether the results of the Records Review are correct or require correction, and to identify any required corrections.
- Whether any additional water bodies exist, other than those identified in the Records Review.
- The boundaries, located within 120 m of the Project Location, of any water body that was identified in the Records Review or the site investigation.
- The distance from the Project Location to the boundaries of any water body that was identified in the Records Review.

4.2 Site Investigation Methodology

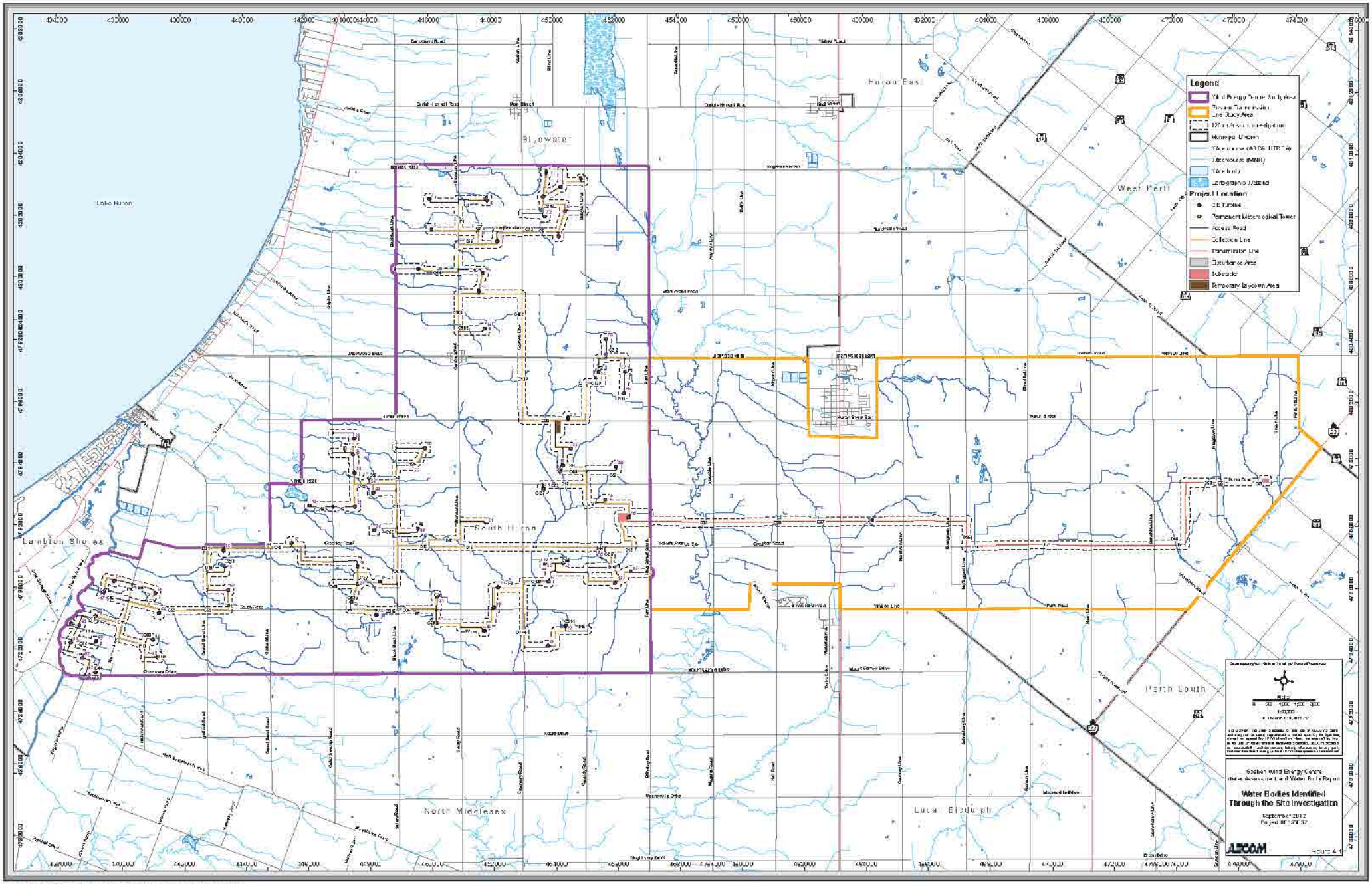
Site investigations were conducted for water bodies within 120 m of the Project Location (see Section 1.2 for further details on the project components and infrastructure). Water bodies identified through the Records Review process were assessed to determine their presence, composition, form and function. Any corrections to the Records Review, including changes to the boundaries of water bodies or new water bodies, were identified and are documented in Section 4.5.

AECOM incorporated a three step process to ensure all water bodies within the Area of Investigation were identified and physically investigated. Within this three step process, protocols were developed for detailed field surveys (Step 1) provided below in Section 4.2.2 and reconnaissance level field surveys (Step 2). Detailed field surveys were undertaken for water bodies identified through the Records Review process and reconnaissance level surveys were undertaken at sites where water bodies were not identified through the Records Review (**Figure 4-1**).

To ensure additional accuracy, efforts were co-ordinated with the team of site investigators conducting the Natural Heritage Assessment (NHA) for the same Area of Investigation. During their site investigations in the Project Study Area, any seepage areas and water bodies were recorded. These were cross-referenced with the mapping to determine if these sites were identified during the Records Review and initial site selection. If water was noted at these sites, a full water bodies assessment was conducted (Step 3).

4.2.1 Reconnaissance Surveys

Reconnaissance-level investigations were conducted on sites where no water body features were identified during the Records Review process. If a potential water body was identified during the air photo interpretation stage or identified from one of the other field teams (NHA or micrositing), a reconnaissance survey of the physical features of the water body was conducted. This involved visiting the potential water body, detailing the feature, taking photographs and documenting if water was present. If water was present and the feature was deemed to be a water body (according to O.Reg. 359/09), a full water body assessment was completed. If no water body was found to be present, this information was documented and mapping was updated and noted in the correction to Records Review (Section 4.5).


Legend
Project Location
Lake Huron
Bluewater
Huron East
West Perth
South Huron
Lambton Shores
North Middlesex
Lucan Biddulph
Perth South
Goshen Wind Energy Centre
Water Bodies Identified Through the Site Investigation
September 2012
AECOM

4.2.2 Water Body Assessment

Water bodies were identified according to O.Reg. 359/09 and classified as either a permanent stream; an intermittent stream; or a seepage area based on observations made at the time of the field visit. The following nomenclature describes how the water bodies were labelled:

- C and D – identified water courses within the vicinity of project components (*e.g.,* C12); C and D are arbitrary letters and do not correspond to any defining characteristics;
- P prefix – identified potential ponds (*e.g.,* P1)

The area of site investigation for each of the water body assessments consisted of the entire stretch of the water body that was within the Area of Investigation. This approach allowed for a thorough characterization and for an accurate assessment of effects and appropriate mitigation measures.

A field work form (see **Appendix D**) was completed for each water body investigated (or feature, if no water body was found). Information recorded including date of investigation, field staff, start and end time of assessment, weather conditions and location of the assessment. An overall assessment of the water body was conducted based on a number of criteria, such as whether the watercourse was a natural feature or modified feature (*i.e.*, channelized, straightened), as well as the type of surrounding natural features and land uses.

Channel dimensions, substrate composition, channel morphology and bank stability were collected in the field. Measurements were taken at more than one location along the water course and mean values were averaged in the field and recorded, including:

- Mean wetted depth (MWD) (m);
- Mean wetted width (MWW) (m);
- Mean bankfull depth (MBW) (m); and,
- Mean bankfull width (MBW) (m)

Average high water mark data were not available from the Conservation Authorities or any other information sources contacted in the Records Review phase. Therefore, in its place the protocol under the Department of Fisheries and Oceans (DFO) Fish Habitat Management Program (2005) was applied to determine the Ordinary High Water Mark using the active channel/bank-full measurement. Mean bank full width and depth were collected by taking a measurement where indicators such as the active scour mark, location of perennial vegetation and root hair exposure were located.

Substrate composition (e.g., clay, silt, sand, gravel, cobble, rock, boulder, muck and detritus) was recorded in descending order of dominance. Visual observations of water clarity, water colour, presence and type of macrophytes and algal growth, evidence of runoff, and surrounding land use, were recorded as indicators for water quality. Basic field parameters of water chemistry (pH, conductivity, dissolved oxygen and temperature) were collected at selected locations. Bank height measurements and presence of mature riparian vegetation, exposed root structures, and slumping or scouring were used to determine bank stability.

Fish community surveys were not completed as the existing data from the Records Review stage were considered to provide sufficient information. However, the quality and quantity of potential fish habitat was recorded, based on technical knowledge and the parameters recommended by DFO under its definition of fish habitat. Along with background data, including thermal regime and species occurrence records, an assessment of the likelihood of fish presence was presented. These parameters include the availability and quality of habitat features such as in-stream and riparian covers, as well as morphological conditions and connectivity of the water bodies to allow fish passage.

Fish habitat was defined according to the federal *Fisheries Act*, 'spawning grounds and nursery, rearing, food supply, migration, and any other areas on which fish depend directly or indirectly in order to carry out their life processes'. The following characteristics were assessed and recorded for each water body and used in determination of habitat sensitivity for each water body.

In-stream cover was documented based on the percent of cover provided by woody debris, boulders (<256 mm diameter), cobble (256-64 mm diameter), gravel (64-2 mm), aquatic vegetation and undercut banks. In-stream cover was classified as high if there was in-stream coverage between the areas of 76-100%; moderate 31-75%; and low 0-30%. Riparian vegetation canopy cover was provided as a percentage of cover over the site of investigation. Overall canopy cover was classified as: high 61-100%; moderate cover 31-60%; and low cover 0-30%. Obstructions to fish passage were also noted within the area of site investigation, including possible low-flow barriers.

Adjacent land uses were noted for potential influences or impacts to the water bodies. This included observation of residential, agriculture uses (crops and livestock), meadows, forests and wetland features. Farming practices were noted as well as the type of crops or livestock located within adjacent fields. Pollution sources were recorded, such as tile drain discharges, other piped discharges, road runoff and any other surface runoff features causing potential nutrient loading or sediment loading. Topography of the land located within the 120 m Area of Investigation was documented to identify areas of rolling hills or flat areas where water is more likely to accumulate in depressions versus flowing towards the watercourse.

Ecological Land Classification (Lee *et al.* 1998), undertaken as part of the NHA, was used to describe the lands within 30 m of a water body and provide an indication of the riparian zone. This included documenting vegetation species present (e.g., trees, shrubs, grasses and herbaceous cover), percent of cover within study reach and width of the riparian zone.

During all site investigations, groundwater seepage areas were identified using the following indicators, as outlined in the Technical Guide to Renewable Energy Approvals (MOE, 2011):

- Occurrence of watercress (*Nasturtium officinale*), bittercress (*Cardamine pensylvanica*) and water speedwell (*Veronica anagallis-aquatica*);
- Presence of iron staining as indicated through red rust coloured soils along banks and stream beds;
- Bank seepage;
- Air bubbles in the stream bed.

A representative photolog and site sketches were included to detail the general site layout as well as the layout of each water body.

4.2.3 Alternative Site Investigation

As discussed in section 4.4.3 below, in certain instances, it was necessary to conduct an Alternative Site Investigation, as described in Section 31 (4) 7 of O.Reg 359/09. Alternative site investigations were conducted on water bodies where property access was restricted by landowners.

Alternative site investigations consisted of a desktop-based investigation of the data collected from the Records Review, which included:

- ABCA watercourse layer;
- UTRCA watercourse layer;
- MNR NRVIS water body layer;

- ABCA Regulation Limit mapping;
- UTRCA Regulation Limit mapping;
- Municipal Drain classification data;
- MNR fish records;
- ABCA fish habitat information;
- UTRCA fish habitat information; and,
- Air photo interpretation.

Where possible, field investigations of water bodies upstream or downstream of the Area of Investigation were undertaken at road crossings or adjacent properties with land access.

This information was used to assess the general characteristics of the water body such as flow regime, thermal regime and habitat quality, while air photos and reconnaissance field investigations determined if the features are classified as a water body (under REA) and examined the surrounding natural features or land use.

Sites that were assessed by an Alternative Site Investigation are presented below in table 4-4.

4.3 Sensitivity Classification

To aid in the assessment of each water body and to inform the potential environmental effects and mitigation measures, a sensitivity classification was designed and applied to each feature within the Area of Investigation. The overall objective was to assess the resiliency of the aquatic ecosystem – *i.e.* the ability of the system to recover from changes in the environmental conditions. Each water body feature was classified as high, moderate or low sensitivity based on the parameters identified in **Table 4-1**. This system provided some objectivity to the assessment process and incorporated the attributes of DFO's Risk Management Framework (species sensitivity; habitat resiliency; species dependence on habitat; rarity) that is used to analyze fish and fish habitat sensitivity and to then categorize project risk. Not all indicators had to be present at one water body for an assignment into a particular classification, and water bodies were assigned based on where the majority of indicators occurred. For example, a water body with a cold water regime could be classified as moderate sensitivity if it was a channelized channel, with unstable banks, with intermittent flow. Where there were an equal number of indicators, professional opinion and consideration of the overall site was used to assign the water body to one classification.

Table 4-1 Sensitivity Classification Indicators

High Sensitivity	Moderate Sensitivity	Low Sensitivity
• Cool/cold water thermal regime • Headwater area • Permanent flow • Natural channel • Natural stream process observed (e.g., riffle/run/pool sequence and meanders) • Located in natural area (e.g., woodland, wetland) • Groundwater seepage indicators present • High quality and quantity fish habitat • No fish barriers • Water quality appears good (e.g., clear, no obvious agricultural runoff, no algae)	• Cool/warm water thermal regime • Permanent or intermittent flow • Natural or channelized channel • Natural stream process observed (e.g., riffle/run/pool sequence and meanders) • In natural or impacted areas • Groundwater seepage indicators present • Overall moderate quality and quantity fish habitat • No fish barriers • Some concern for water quality (e.g., suspended solids or algae growth)	• Warm water thermal regime • Permanent or intermittent flow • Channelized channel • Uncontrolled stream processes (e.g., erosion, unstable banks) • Within highly impacted areas • No groundwater indicators present • Low quality and quantity fish habitat • Fish barriers • Concern for water quality (e.g., turbid water, high suspended solids or uncontrolled algae growth)
System is generally considered not to be resilient to environmental perturbations and cannot easily buffer change.	**System is somewhat stable and should be resilient to change and perturbation**	**System is quite stable and resilient to change and perturbation.**

As some of the survey sites were found not to contain water bodies after a reconnaissance survey, these features were assigned a classification of 'Not sensitive' as they did not meet the criteria for a water body under O.Reg. 359/09, and therefore were not assessed further. However, these sites may still be subject to mitigation measures, to ensure that sites that are important for seasonal surface water conveyance are appropriately protected.

4.4 Results of Site Investigations

4.4.1 Summary of Site Investigations

A summary of site investigations is presented below in Table 4-2, and includes the date of investigation, duration, sites investigated that day, weather conditions, and names and qualifications of AECOM staff conducting the investigations. In some cases, sites were visited more than once if the 120 m Area of Investigation was updated or changed during the micro-siting process by NextEra. **Appendix D** contains detailed field notes for each site visit, and **Appendix E** contains the relevant qualifications (i.e., curriculum vitae) for all investigators.

Table 4-2 Summary of Site Investigations

Date of Investigation	Location	Weather	Duration	Field Notes	Name of Investigator(s) / Qualifications
July 13, 2011	P2, C5, C7, C74, C75, C89, C76, C86, C62, C78, C73	22.0°C; 0 mm of precipitation	9:00-17:25	N. Lower S. Aitken	S. Aitken, B.Sc. N. Lower, M.Sc., Ph.D.
July 14, 2011	C80, C68, C48, C124	26.5°C; 0 mm of precipitation	8:15-13:10	S. Aitken	S. Aitken
July 27, 2011	C15, C31, C43, D55, C46	27.0°C; 14.6 mm of precipitation	8:45-16:10	C. Boros	C. Boros, B.Sc.
September 7, 2011	C64, C44	17.0°C; 3.8 mm of precipitation	10:50-18:20	C. Boros	C. Boros
September 8, 2011	C89, C53, C9	20.0°C; 0.4 mm of precipitation	8:15-14:25	C. Boros N. Lower	C. Boros N. Lower
September 13, 2011	C6, C7	24.0°C; 0 mm of precipitation	9:15-13:00	C. Boros S. Aitken	C. Boros S. Aitken
September 27, 2011	C36, C42, C124	22.0°C; 4.0 mm of precipitation	13:20-16:45	C. Boros	C. Boros
September 28, 2011	C43, C46, C52, C48, D19	21.5°C; 2.4 mm of precipitation	8:30-14:40	C. Boros	C. Boros
October 6, 2011	C57, C61, C63	23.0°C; 0 mm of precipitation	8:10-13:35	C. Boros	C. Boros
November 17, 2011	C6, C5, C11, D55, C67, C109, C66, C82, C83, C81, P19	4.5°C; Trace of precipitation	10:20-16:43	S. Aitken A. Dart	S. Aitken. A. Dart, Env. Dip.
November 18, 2011	C139, C144, C63, C137, C124, C106, P17, P5	7.5°C; 0 mm of precipitation	8:20-13:39	A. Dart	G. Ferris, B.Sc. A. Dart
December 9, 2011	C96, C33, C127, C37, C189,	0.5°C; 3.0 mm of precipitation	9:45-16:20	C. Boros	C. Boros
December 15, 2011	C210, C11, C15, C206, C14, C209, C208, C211, C110, P7	11.0°C; 1.6 mm of precipitation	10:30-15:40	C. Boros	C. Boros
December 16, 2011	C56, D14, C144, C52, C63, C45	1.0°C; 2.0 mm of precipitation	9:00-15:40	C. Boros	C. Boros
December 22, 2011	C189, C80, D09, P10, P19	5.0°C; 2.8 mm of precipitation	8:55-11:30	S. Aitken	S. Aitken
January 13, 2012	D12, C212, C213, C217, C214, C215, C216	-5.0°C; 3.0 mm of precipitation	10:15-16:00	C. Boros	C. Boros
April 17, 2012	D15, D14, D18, P15, P16	12.0°C; 0 mm of precipitation	11:58-17:15	C. Boros J. Piette	C. Boros S. Lohnes, B.Sc. J. Piette, B. ES
April 18, 2012	C78, C75, D11, C74, D13, D04, P8, D01	15.0°C; 0 mm of precipitation	7:50-17:00	C. Boros	C. Boros S. Lohnes
April 19, 2012	P17	16.0°C; 1.2 mm of precipitation	10:00-10:40	J. Piette	J. Piette
April 26, 2012	D16, D20, D17, C68, P18, D36	11.5°C; 0 mm of precipitation	8:30-14:50	S. Lohnes S. Aitken	S. Aitken S. Lohnes
May 1, 2012	D26, D35	13.0°C; Trace of precipitation	14:45-16:05	C. Boros	C. Boros
May 2, 2012	P20	24.0°C; Trace of precipitation	10:20-10:40	J. Piette	J. Piette
May 9, 2012	D32, D31, D30, D27	15.5°C; 1.0 mm of precipitation	11:15-15:40	C. Boros	C. Boros J. Epp, B.Sc.
May 10, 2012	D12, D07, D23, D19	13.0°C; 0 mm of precipitation	8:43-17:50	C. Boros	C. Boros J. Epp

Table 4-2 Summary of Site Investigations

Date of Investigation	Location	Weather	Duration	Field Notes	Name of Investigator(s) / Qualifications
May 11, 2012	C48	23.5 0 mm of precipitation	8:00-10:17	C. Boros	C. Boros J. Epp
June 11, 2012	D43	28.0°C; 4.0 mm of precipitation	15:40-16:30	C. Boros	C. Boros J. Epp
June 13, 2012	D36, P13, D37, D35	17.0°C; 0 mm of precipitation	8:35-12:05	C. Boros	C. Boros J. Epp
June 21, 2012	P6	34.5°C; 16.8 mm of precipitation	10:15-10:30	J. Epp	J. Epp
June 22, 2012	D32, D40, D41, D23	25.5°C; 0 mm of precipitation	11:10-13:45	C. Boros J. Epp	C. Boros. J. Epp
June 25, 2012	D39, D14, D16, P8, P14	18.5°C; 0 mm of precipitation	9:00-14:20	C. Boros	C. Boros J. Epp
July 12, 2012	D11, D38, D39, D45, D46, D47, D48	29.5°C; 0 mm of precipitation	9:45-14:40	S. Aitken	S. Aitken G. Ferris
July 25, 2012	P1, D57	29.0°C; 9.2 mm of precipitation	9:00-10:30	C. Boros	C. Boros J. Epp

Note: Weather taken from Environment Canada Website, accessed July 26, 2012
Temperature = Maximum Temperature recorded
Precipitation = total mm of precipitation on given day

Several water body assessments were completed during November, December and January. Given the weather conditions experienced during the winter of 2011-2012, it resulted in watercourses that were open and flowing, therefore making it possible to conduct the water body assessments.

Based on the water body assessments that were conducted (as outlined in sections 4.2.1- 4.2.3), the occurrence of water bodies within 120 m of the Project Location is documented below (**Table 4-3**). These results include a description of the surrounding topography and general area, the physical features of the water body and the riparian zone, and ELC of the land within 30 m of the water body, as well as an assessment of the sensitivity of the feature as described in section 4.3. Project Components are also presented in relation to each water body. Potential impacts are differentiated between water bodies that are either crossed by a project component (e.g., road crossing) or water bodies that are located within the 120 m Area of Investigation to a project component, and where no direct crossing is proposed (e.g., water body that runs parallel to a road). Representative photos are provided for each site, but physical characteristics were often conducted on longer reaches than identified in the photos.

4.4.2 Water Body Assessments

A summary of each of the feature characteristics is summarized in Table 4-3. This includes the relevant information from both records review and field-based site investigations for each feature, and provides some indication of the overall sensitivity of the site based on the available information. The table is organized according to Feature ID and includes:

- Associated proposed infrastructure within 120 m of the feature;
- Details of the site investigation, including date of site visit;
- A brief description of the site and surrounding land use;
- Description of the feature summarized from the field notes;
- Channel morphology measurements taken at the time of the investigation;
- Watercourse/drain name;
- Fish records, if available;
- Presence of groundwater indicators;
- DFO drain classification; and,
- Feature sensitivity based on criteria outlined in Table 4-1.

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D36	• Transmission Line Crossing	June 13, 2012	• The watercourse flows through a mix of deciduous swamp, swamp thicket and cultural plantation (classified as SWD2-2, CUP-3, SWT2-2, ELC Feature ID 609). No tile drain inputs were observed at time of investigation. Surrounding topography was slightly sloping valley. Riparian buffer is 7-15 m of forest.	• The watercourse is a defined natural feature. The watercourse is meandering with flat channel. The water was turbid and had slow flow at time of investigation. It is classified as a permanent warm water system by ABCA. Banks are stable with no signs of erosion. Substrate consists of sand, silt and clay followed by muck. Canopy cover is moderate and consists of trees and shrubs. Instream habitat cover could not be determined due to turbidity and unwadeable water depth. No groundwater indicators were observed. Upstream and downstream fish species consist of baitfish community, sunfish, catfish, Northern Pike (*Esox lucius*), and Rainbow Trout (*Oncorhynchus mykiss*) (ABCA, 2002, 2004, 2007, 2009).	High

Watercourse Name	Ausable River
DFO Drain Classification	E

	D36
MWW(m):	7.0
MBW(m):	8.25

	D36
MWD(m):	n/a
MBD(m):	n/a

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C80	• Turbine 56	December 22, 2011	• The watercourse flows through a crop agricultural field with a 5 m riparian buffer of cultural meadow (CUM1-1). Tile drain inputs were observed. Surrounding topography is flat.	• The watercourse is a defined channelized feature. The channel may be naturalizing as there is a riffle, run, pool sequence. The water was turbid and had high flow at time of investigation. It is classified as a permanent warm water system by ABCA. The banks are stable and well vegetated. Substrate is dominated by sand and silt followed by gravel. Canopy cover is moderate dominated by grasses and herbaceous vegetation followed by shrubs and trees. Instream habitat cover is moderate and dominated by woody debris followed by aquatic vegetation. No groundwater indicators were noted.	Moderate

Watercourse Name	Sitter Drain
DFO Drain Classification	C

	C80
MWW(m):	1.35
MBW(m):	2.5

	C80
MWD(m):	0.22
MBD(m):	0.6

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

Photograph 3. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C81	• Collection Line Crossing	November 17, 2011	• The watercourse flows through a mix of deciduous forest and cultural meadow (classified as FOD7-2, FOD7-1, CUM1-1, ELC Feature ID 210) into a crop agricultural field with a 5 m riparian buffer. Tile drain inputs were observed. Surrounding topography is flat.	• The watercourse is a defined channelized feature. The channel may be naturalizing as there is a riffle, run, pool sequence. The water was clear and flowing slowly during time of investigation. It is classified as a permanent warm water system by ABCA. The banks are moderately unstable with evidence of erosion and exposed soils. Substrate consists of sand followed by gravel and silt. Canopy cover is high and dominated by trees followed by grasses. Instream habitat cover is moderate and a mix of woody debris and cobble followed by boulders. No groundwater indicators observed. Upstream community consists of a baitfish community (ABCA, 1999).	Moderate

Watercourse Name	Turner Drain
DFO Drain Classification	C

	C81
MWW(m):	2.4
MBW(m):	7.0

	C81
MWD(m):	0.18
MBD(m):	1.3

Photos

Photograph 1. Channel overview, forest ↑

Photograph 2. Channel overview, forest ↑

Photograph 3. Channel overview, agricultural field ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C82	• Collection Line Crossing	November 17, 2011	• The watercourse flows through a mix of deciduous forest and cultural woodland (classified as FOD54-2, CUW1m, ELC Feature ID 210). No tile drain inputs were observed during time of investigation. Surrounding topography is flat.	• The watercourse is a defined channelized feature. The channel may be naturalizing as there is a riffle, run, pool sequence. The water was clear and flowing slowly during time of investigation. It is classified as a permanent warm water system by ABCA. The banks are moderately unstable with evidence of erosion. Substrate consists of sand followed by gravel and silt. Canopy cover is high and dominated by trees followed by shrubs. Instream habitat cover is moderate and dominated by woody debris followed by boulders and cobble. No groundwater indicators observed. Upstream fish species consist of a baitfish community (ABCA, 1999).	Moderate

Watercourse Name	Turner Drain
DFO Drain Classification	C

	C82
MWW(m):	2.4
MBW(m):	7.0

	C82
MWD(m):	0.2
MBD(m):	1.3

Photos

Photograph 1. Channel overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C83	• Collection Line Crossing	November 17, 2011	• The watercourse flows through a crop agricultural field with a 5 m riparian buffer of cultural meadow (CUM1-1). Tile drain inputs were observed. Surrounding topography is flat.	• The watercourse is a defined channelized feature. The channel may be naturalizing as there is a riffle, run sequence. The water was clear and flowing slowly during time of investigation. It is classified as intermittent by ABCA. The banks are slightly unstable with evidence of erosion. Substrate consists of sand and silt. Canopy cover is low and dominated by herbaceous vegetation and grasses. Instream habitat cover is moderate and comprised of aquatic vegetation. Large mats of groundwater indicator, watercress, were observed. Fish species found at South Road crossing consist of baitfish community (MNR, 1994, 2004).	Moderate

Watercourse Name	Eagleson Drain
DFO Drain Classification	F

	C83
MWW(m):	0.5
MBW(m):	1.5

	C83
MWD(m):	0.1
MBD(m):	2.0

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

Photograph 3. Watercress ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D31	• Transmission Line Crossing	May 9, 2012	• The watercourse flows through agricultural fields and crosses Dump Road. No tile drain inputs were observed at time of investigation. Surrounding topography is flat. Riparian buffer consists of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The watercourse was straight flat channel with a few riffles. The water was clear and had slow flow at time of investigation. It is classified as a permanent warm water system by ABCA. The banks are stable and well vegetated. Canopy cover is low and dominated by grasses. Instream habitat cover is moderate and consists of aquatic vegetation followed by cobble and boulders. No groundwater indicators were observed. A few Cyprinids were observed during time of investigation. Fish species downstream consist of common baitfish community, Rock Bass (*Ambloplites rupestris*) and Northern Pike (UTRCA, 1974, 2000, 2001, 2003, 2005, 2007, 2008).	Moderate

Watercourse Name	Stone Municipal Drain
DFO Drain Classification	C

	D31
MWW(m):	1.5
MBW(m):	2.0

	D31
MWD(m):	0.15
MBD(m):	0.4

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C96	• Collection Line Buffer	December 19, 2011	• The watercourse is located in crop agricultural fields with a 1.5 m riparian buffer of cultural meadow (CUM1-1). No tile drain inputs were observed, however drainage from a roadside ditch enters the watercourse. Surrounding topography is flat.	• The watercourse is a defined channelized feature. The watercourse is run with some riffle present. The water was clear and had moderate flow during the time of investigation, however it is classified as intermittent by ABCA. Banks are slightly unstable with evidence of erosion. Substrate consists of cobble, sand and gravel. Canopy cover is low and is dominated by grasses, followed by shrubs and trees. Instream habitat cover is high and consists of aquatic vegetation followed by cobble, boulder and undercut banks. No groundwater indicators were noted.	Moderate

Watercourse Name	Masse Drain
DFO Drain Classification	F

	C96
MWW(m):	1.3
MBW(m):	1.5

	C96
MWD(m):	0.3
MBD(m):	0.45

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D17	• Collection Line Crossing • MET Tower Buffer	April 26, 2012	• Watercourse runs through crop agricultural fields and a mix of cultural meadow and deciduous forest (classified as FOD6-4, CUM1-1, ELC Feature ID 282) to the north. One tile drain was present within the reach. Surrounding topography is flat. Riparian buffer was less than 1 m on left bank and less than 0.5 m on right bank. The riparian buffer in the upstream section is greater than 3 m.	• The watercourse is a defined channelized feature that is starting to naturalize. The watercourse has a straight run channel with a few pools and riffles present. The water was clear and had very low flow at time of investigation. It is classified as a permanent warm water system by ABCA. The banks are slightly unstable with a very steep slope and bare soil under top layer of vegetation. Substrate consists mainly of silt followed by gravel and boulder. Canopy cover is low and a mix of trees and shrubs. Instream habitat cover is low and consists of detritus with aquatic vegetation and cobble. Groundwater indicator watercress was noted with individual plants scattered throughout the site.	Moderate

Watercourse Name	Adams Drain
DFO Drain Classification	C

	D17
MWW(m):	1.2
MBW(m):	6.0

	D17
MWD(m):	0.15
MBD(m):	1.0

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D18	• Collection Line Crossing	April 17, 2012	• Watercourse has crop agricultural fields to the south and residential on the north. Tile drain inputs were noted on the agricultural field side. Surrounding topography is flat. Riparian buffer is 4 m of cultural meadow (CUM1-1) consisting of grass and cedars.	• The watercourse is a defined channelized feature that is starting to naturalize. There is a very slight meander with one pool (2 m by 3 m and 0.4 m deep) and riffle present. The water was slightly turbid and had very low flow at time of investigation. It is classified as a permanent warm water system by ABCA. The banks were vegetated but slightly unstable with some erosion evident. Substrate consists of sand and silt followed by clay, gravel and cobble. Canopy cover is moderate with trees dominating. Instream habitat cover is moderate and consists of plant debris and cobble, followed by aquatic vegetation, undercut banks and woody debris. Groundwater indicators watercress and water speedwell were present. One low flow barrier of sediment and debris build up was present. Fish were observed at time of investigation. Downstream and upstream fish species consist of a baitfish community (MNR, 1981, 2007).	Moderate

Watercourse Name	Regier Drain
DFO Drain Classification	C

	D18
MWW(m):	0.9
MBW(m):	3.0

	D18
MWD(m):	0.2
MBD(m):	0.8

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D20	• Collection Line Crossing	April 26, 2012	• Watercourse is surrounded by crop agricultural fields and adjacent to a hydro line and is bordered by a mix of deciduous forest, meadow marsh and deciduous swamp (classified as FOD7c, SWD6-3, MAM3-2, ELC Feature ID 279 and 300) to the east. Tile drain and roadway drainage inputs are present at the roadside. Surrounding topography slightly sloped towards watercourse on the east and flat on the west. Riparian buffer was 5 m on left bank and greater than 30 m on right bank.	• The watercourse is a defined channelized feature. The watercourse is a straight run channel. The water was clear and had very low flow at time of investigation. It is classified as a permanent warm water system by ABCA. The banks are stable and well vegetated. Substrate consists of silt followed by boulders. Canopy cover is moderate. Instream habitat cover is high and consists of aquatic vegetation and a few boulders. Mats of groundwater indicator watercress were observed. Upstream fish species consist of baitfish community (MNR, 1995).	Moderate

Watercourse Name	Mud Creek Drain
DFO Drain Classification	C

	D20
MWW(m):	2.6
MBW(m):	4.25

	D20
MWD(m):	0.35
MBD(m):	0.9

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D19	• Collection Line Crossing	September 28, 2011 May 10, 2012	• The watercourse is surrounded by corn fields and crosses Bronson Line. Flowing tile drain inputs were observed at time of investigations. Surrounding topography is rolling towards the watercourse. Riparian buffer is 2 to 5 m of cultural meadow (CUM1-1) containing grasses and shrubs.	• The watercourse is a defined channelized feature that is starting to naturalize. The watercourse is flat with some riffle run pool sequences. The water was clear and had moderate flow at time investigations. It is classified as a permanent warm water system by ABCA. The banks range from slightly- to moderately- unstable with undercutting and slumping occurring throughout the reach on both banks. Canopy cover is moderate and is dominated by shrubs and grasses. Instream habitat cover is moderate and consists of aquatic vegetation followed by cobble, woody debris, boulders and undercut banks. Groundwater indicator water speedwell was found in sparse clumps upstream. Cyprinids were observed at time of both site investigations. Fish species at Bronson Line crossing and downstream consist of a baitfish community (MNR, 1981, 2007).	Moderate

Watercourse Name	Khiva Main Drain
DFO Drain Classification	C

	D19
MWW(m):	1.4
MBW(m):	2.3

	D19
MWD(m):	0.3
MBD(m):	0.65

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C64	• Collection Line Crossing	September 7, 2011	• The watercourse is surrounded by deciduous forest (classified as FOD7-2, ELC Feature ID 216) adjacent to agricultural fields. No tile drain inputs were observed at time of investigation. The surrounding area is flat. Riparian buffer is 5 m the right bank and greater than 25 m on the left bank of meadow vegetation.	• The watercourse is a defined natural feature. The watercourse follows a riffle run pool sequence with some flat areas. The water was clear and had moderate flow at time of investigation. It is classified as an intermittent system by ABCA. The banks are stable. Substrate consists of silt and clay followed by sand, gravel and cobble. Canopy cover is high and is dominated by trees. Instream habitat cover is moderate and consists of woody debris and aquatic vegetation followed by cobble. No groundwater indicators were observed. Downstream fish species consist of baitfish community (MNR, 2004).	Moderate

Watercourse Name	Issac Drain
DFO Drain Classification	F

	C64
MWW(m):	1.5
MBW(m):	2.5

	C64
MWD(m):	0.25
MBD(m):	0.5

Photos

Photograph 1. Site overview ↑

Photograph 2. Substrate ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D12	• Collection Line Crossing • Road Crossing	January 13, 2012 May 10, 2012	• The watercourse is surrounded by agricultural fields and a residential area and crosses Babylon Line. Tile drains were present with a few flowing at time of investigation. Surrounding topography is flat. Riparian buffer is 1 m of cultural meadow (CUM1-1) consisting primarily of grasses and shrubs.	• The watercourse is a defined channelized feature that is starting to naturalize. The watercourse follows a riffle run pool sequence with some flat areas. The water was clear and had slow flow at time of investigations. It is classified as a permanent warm water system by ABCA. The banks are slightly unstable with minor erosion. Substrate consists of clay and gravel followed by sand, silt and cobble. Canopy cover is low and dominated by grasses. Instream habitat cover is moderate and consists of aquatic vegetation followed by cobble and small woody debris. Groundwater indicator water speedwell was found sparsely throughout the site. Schools of minnows were observed during the site investigation in May. Restoration works have recently occurred by Babylon Line and 200 m from road and the banks are lined with boulders.	Moderate

Watercourse Name	Schwartz Drain
DFO Drain Classification	C

	D12
MWW(m):	1.25
MBW(m):	1.5

	D12
MWD(m):	0.2
MBD(m):	0.5

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C5	• Turbine 10	November 17, 2011	• The watercourse flows from a mix of cultural meadow and cultural woodland (classified as CUW1h, CUM1-1, ELC Feature ID 373) into an agricultural field. No tile drain inputs were noted at time of investigation. The surrounding landscape has sloping fields towards the watercourse. Riparian buffer is 3 m of cultural meadow (CUM1-1) consisting of mainly grasses.	• The watercourse is a defined channelized feature. There is a riffle, run sequence observed throughout the site. The water is clear and there was moderate flow during the time of investigation. It is classified as unknown by ABCA. The banks are slightly unstable. Substrate consists of sandy silty gravel. Canopy cover is high consisting of grasses. Instream habitat cover is high dominated by undercut banks then grasses. No groundwater indicators were observed. Low water depth and depositional area create potential low flow barriers throughout the site.	Moderate

Watercourse Name	Masse Drain Trib B
DFO Drain Classification	U

	C5
MWW(m):	0.75
MBW(m):	2.3

	C5
MWD(m):	0.08
MBD(m):	0.80

Photos

Photograph 1. Channel overview in forest ↑

Photograph 2. Channel overview ↑

Photograph 3. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C6	• Collection Line Crossing • Road Crossing	September 13, 2011	• The watercourse flows through a crop agricultural field and the surrounding topography is flat. No tile drain inputs were observed. Riparian buffer was 2 m on the right bank and 1.5 m on the left bank of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The watercourse consisted of flat run and pools with an average depth of 0.25 m. The water was clear and there was no visible flow during the time of investigation. It is classified as intermittent system by ABCA. The banks are slightly unstable with signs of erosion and slumping. Substrate consists of silt, clay, muck and some cobble. Canopy cover is moderate consisting of grasses, shrubs then trees. Instream habitat cover is low and is dominated by aquatic vegetation and cobble followed by woody debris. No groundwater indicators were observed. Fish were observed in pools at the time of investigation. Fish barrier noted in form of perched culvert at north end at Bronson Line.	Moderate

Watercourse Name	Masse Drain
DFO Drain Classification	F

	C6
MWW(m):	1.5
MBW(m):	3.0

	C6
MWD(m):	0.12
MBD(m):	0.7

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

Photograph 3. Bank erosion↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C7	• Turbine 11	September 13, 2011	• The watercourse runs through cultural woodland (classified as CUW1e, ELC Feature ID 369) surrounded by crop agricultural fields with a riparian buffer of 3 m. Tile drain inputs were noted throughout the site. The surrounding topography is slightly rolling hills sloping towards the watercourse.	• The watercourse is a defined natural channel. The watercourse is mostly flat with some riffles and pools present. No visible flow was observed during the site visit and the watercourse is classified as intermittent by ABCA. The banks are unstable and evidence of slumping and erosion was noted throughout. Substrate was a mix of cobble, gravel and sand followed by clay and detritus. Canopy cover is high and dominated by trees. Instream habitat cover is moderate with cobble dominating followed by woody debris and boulders. Groundwater indicator iron staining was observed.	Moderate

Watercourse Name	Masse Drain
DFO Drain Classification	F

	C7
MWW(m):	2.0
MBW(m):	6.2

	C7
MWD(m):	0.2
MBD(m):	1.5

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

Photograph 3. Iron staining ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C33	• Collection Line Crossing	December 9, 2011	• The watercourse flows a mix of deciduous forest and swamp (classified as FOD7-4, SWD3-3, ELC Feature ID 309) and adjacent crop agricultural field, under Huron Street, emerging in a crop agricultural field. The surrounding topography was flat. There were multiple tile drain inputs and one flowing watercourse observed to be feeding into the main channel approximately 80 m from Huron Street. Riparian buffer is 5 m on the right bank and 30 m on the forested left bank.	• The watercourse is a defined channelized feature, and is classified as a permanent warm water system by ABCA. It is a straight channel that is uniform run. The water was clear and had a moderate flow at the time of investigation. The banks are stable and vegetated. Substrate is dominated by sand followed by gravel and clay and then detritus. Canopy cover is high and dominated by trees then shrubs and grasses. Instream habitat cover is low and dominated by leaf detritus followed by woody debris and aquatic vegetation. Groundwater indicator watercress was noted. Upstream fish species consist of baitfish community (MNR, 1995).	Moderate

Watercourse Name	Mud Creek Drain
DFO Drain Classification	C

	C33
MWW(m):	2.0
MBW(m):	3.5

	C33
MWD(m):	0.23
MBD(m):	0.75

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

Photograph 3. Tile drain fed watercourse feeding into C33 ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C89	• Turbine 42 • Collection Line Buffer • Road Buffer	July 13, 2011 September 8, 2011	• The watercourse flows along cultural woodland to the edge of a deciduous forest (classified as CUW1c, FOD9-4, ELC Feature ID 206) surrounded by agricultural fields. No tile drain inputs were noted. The surrounding topography is flat. Riparian buffer is 3.5 m along the agricultural field and greater than 3.5 m in the forest area.	• The watercourse is a defined natural feature. There is little morphological diversity- only run or flats. The water was clear and water was slow flowing at time of investigations. It is classified as a permanent warm water system by ABCA. The banks are slightly unstable with evidence of slumping noted. Substrate consists of silty sand with gravel, muck and cobble. Canopy cover is moderate and is a mix of grasses, shrubs and trees. Instream habitat cover is moderate and is a mix of aquatic vegetation, cobble, and woody debris. No groundwater indicators were noted.	Moderate

Watercourse Name	Dietrich Main Drain
DFO Drain Classification	C

	C89
MWW(m):	1.1
MBW(m):	2.2

	C89
MWD(m):	0.12
MBD(m):	0.5

Photos

Photograph 1. Channel overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C42	• Collection Line Crossing	September 27, 2011	• The watercourse flows through a deciduous forest (classified as FOD6-1, FOD7-2, ELC Feature ID 266), crosses Blackbush Line and continues into a crop agricultural field. No tile drain inputs observed and surrounding topography is flat. Riparian buffer is 1 m in agricultural field and greater than 5 m in the forest area.	• The watercourse flows through two distinct land use areas and as a result has differing characteristics throughout (forest and agricultural field). Overall the watercourse is classified as a permanent warm water system by ABCA. • The section of watercourse running through the forest area is a defined natural channel. The banks are stable and substrate consists of silt muck and detritus. Canopy cover is high and is dominated by trees. Instream cover is low and dominated by woody debris. No groundwater indicators observed. • The section of watercourse running through the agricultural field is a defined channelized feature. The banks are stable and substrate consists of silt and clay. Canopy cover is high and dominated by shrubs followed by grasses. Instream cover moderate and dominated by aquatic vegetation. Groundwater indicator watercress observed. Downstream fish species consists of a baitfish community (MNR, 1995).	Moderate

Watercourse Name	De Block Drain
DFO Drain Classification	C

	C42 forest	C42 agri
MWW(m):	1.0	2.5
MBW(m):	1.5	3.0

	C42 forest	C42 agri
MWD(m):	0.25	0.3
MBD(m):	0.5	0.5

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview forest ↑

Photograph 3. Channel overview agricultural field ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C43	• Turbines 20 and 66 • Collection Line Crossing	July 27, 2011	• The watercourse runs through a crop agricultural field into a deciduous forest (classified as FOD7-2, ELC Feature ID 267) north of Kirkton Road. No tile drain inputs were noted and the surrounding area is flat. The riparian buffer in the agricultural fields is 3 m.	• The watercourse is a defined channelized feature. There is a slight meander with a riffle run pool sequence. The water was slightly turbid and had a slow flow during the time of investigation. It is classified as a permanent warm water system by ABCA. The banks are stable to slightly unstable. Substrate consists of silt and clay followed by gravel, sand, cobble and boulder. Canopy cover is high and a mix of grasses and trees. Instream habitat cover is moderate and a mix of undercut bank, woody debris, aquatic vegetation, cobble and boulder. Groundwater indicator watercress was noted. Fish were observed during time of investigation. Downstream and upstream fish species consists of a baitfish community and Rock Bass (MNR, 1980, 1981, 1994).	Moderate

Watercourse Name	Ratz Drain
DFO Drain Classification	C

	C43
MWW(m):	1.5
MBW(m):	2.3

	C43
MWD(m):	0.17
MBD(m):	0.5

Photos

Photograph 1. Site overview agricultural field ↑

Photograph 2. Channel overview forest ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C46	• Turbine 16 • Collection Line Buffer • Road Buffer	July 27, 2011 September 28, 2011	• The watercourse flows through a crop agricultural field that has a 1 m riparian buffer, into deciduous forest (classified as FOD7-1, ELC Feature ID 258). Tile drain inputs were observed throughout the agricultural field area. The surrounding landscape has slightly rolling hills. • The morphology of the watercourse changes as it moves from agricultural field into forest and will be described separately in the feature description.	• The watercourse is a defined feature that begins as channelized then moves into a natural feature. In both portions of the stream it is uniform run with no obvious riffles or pools. The water was turbid and had some flow during site investigations. It is classified as a permanent warm water feature by ABCA. The banks are stable in the agricultural field, but slightly unstable in the forest. Substrate is a mix of gravel, sand, silt and clay with some cobble, boulder and detritus. Canopy cover is low in the agricultural field, but high in the forest and dominated by trees. Instream habitat cover is low in the agricultural field consisting of cobble and aquatic vegetation, but moderate in the forest which consists of woody debris followed by undercut bank, boulder and cobble. No groundwater indicators were noted. Fish observed in the forest area during site investigation in July. Upstream fish species consist of a baitfish community (MNR, 1981, 2007).	Moderate

Watercourse Name	Khiva Main Drain
DFO Drain Classification	C

	C46 Agri	C46 Forest
MWW(m):	1.3	4.0
MBW(m):	2.0	6.0

	C46 Agri	C46 Forest
MWD(m):	0.4	0.2
MBD(m):	0.9	0.8

Photos

Photograph 1. Site overview agricultural field ↑

Photograph 2. Site overview forest ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D27	• Transmission Line Crossing	May 9, 2012	• The watercourse flows through a crop agricultural fields and crosses Crediton Road. Tile drain inputs were present with one flowing at time of investigation. The surrounding topography is flat. Riparian buffer is 2 m of cultural meadow (CUM1-1) consisting of grasses, trees and shrubs.	• The watercourse is a defined channelized feature that appears to be naturalizing. The watercourse is mainly flat with some pools present. The water was clear and had slow flow at the time of investigation. It is classified as a permanent warm water feature by ABCA. The banks are slight unstable with evidence of slumping. Substrate consists of sand, gravel and cobble followed by silt and clay. Canopy cover is moderate and is dominated by trees. Instream habitat cover is high and consists of aquatic vegetation followed by cobble, woody debris and undercut banks. Groundwater indicator watercress was observed. Schools of minnows were observed at time of investigation. Downstream fish species consist of baitfish community, Stonecat (*Noturus flavus*) and Rock Bass (ABCA, 2000).	Moderate

Watercourse Name	Pym Drain Branch C
DFO Drain Classification	C

	D27
MWW(m):	1.0
MBW(m):	2.0

	D27
MWD(m):	0.18
MBD(m):	0.6

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D38	• Transmission Line Crossing	July 12, 2012	• The watercourse flows through cultural meadow (classified as CUM1-1, ELC Feature ID 648) surrounded by soybean fields. No tile drain inputs were observed. D39 flows into watercourse. The surrounding topography is sloped towards the watercourse. Riparian buffer is 20 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature that appears to be naturalizing. The watercourse is mainly flat with some riffles present. The water was clear and had low flow at the time of investigation, however it is classified as an intermittent system by ABCA. The banks are slight unstable with signs of erosion and undercut banks. Substrate consists of silt followed by gravel and cobble. Canopy cover is moderate and is dominated by grasses. Instream habitat cover is low and consists of cobble and aquatic vegetation followed by undercut banks. Small pockets of groundwater indicator watercress were observed. Downstream and upstream fish species consist of a baitfish community (ABCA, 2009; MNR, 1980).	Moderate

Watercourse Name	Prout Drain
DFO Drain Classification	F

	D38
MWW(m):	1.5
MBW(m):	2.1

	D38
MWD(m):	0.08
MBD(m):	0.9

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C52	• Collection Line Crossing • Road Crossing • Turbine 86	September 28, 2011 December 16, 2011 April 26, 2012	• The watercourse is surrounded by crop agricultural fields and crosses Blackbush Line. The northwestern reach is at the edge of deciduous swamp (classified as SWD2-2, ELC Feature ID 249). No tile drain inputs were observed. The surrounding topography is flat. Riparian buffer is 1.5 to 5 m.	• The watercourse is a defined channelized feature that appears to be naturalizing. The water was turbid and had a moderate flow during the time of first two site investigations. The water was clear and had low flow in April. The system is classified as a permanent warm water system by ABCA. Banks are slightly unstable. Substrate consists of silt, sand with gravel followed by clay, cobble and boulder. Canopy cover is moderate and is a mix of shrubs, trees and grasses. Instream habitat cover is moderate consisting of aquatic vegetation and woody debris. Groundwater indicator watercress was noted. An obstruction to fish passage exists at a man-made crossing of concrete dumped into the watercourse. A low flow barrier exists in the form of vehicles driving straight through the watercourse. Upstream fish species consists of baitfish community (MNR, 1981, 2007).	Moderate

Watercourse Name	Khiva Main Drain
DFO Drain Classification	C

	C52
MWW(m):	3.0
MBW(m):	5.0

	C52
MWD(m):	0.45
MBD(m):	1.0

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

Photograph 3. Potential barrier ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C139	• Collection Line Crossing	October 6, 2011 November 18, 2011	• The watercourse flows through a crop agricultural field with a 1.5 m riparian buffer of cultural meadow (CUM1-1). Tile drains input were noted throughout the site. Surrounding topography is flat with a little sloping from the southwest.	• The watercourse is a defined channelized feature. There was low morphological diversity as the channel was only classified as run. The water was turbid and there was moderate flow during the time of investigations. It is classified as a permanent warm water system by ABCA. The banks are slightly unstable but vegetated. Substrate consists of silt clay followed by muck and detritus. Canopy cover is low consisting of trees, shrubs and grasses. Instream habitat cover is low and dominated by aquatic vegetation followed by woody debris and undercut banks. No groundwater indicators were noted. Upstream fish species consist of baitfish community (MNR, 1995).	Moderate

Watercourse Name	Mud Creek Drain
DFO Drain Classification	C

	C139
MWW(m):	3.0
MBW(m):	4.5

	C139
MWD(m):	0.5
MBD(m):	1.0

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

Photograph 3. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C61	• Collection Line Crossing	October 6, 2011	• Watercourse runs through crop agricultural fields with a 1 m riparian buffer of cultural meadow (CUM1-1). Tile drain inputs are present throughout the site. Surrounding topography is flat.	• The watercourse is a defined channelized feature. The channel contains mostly run with a few riffles. The water was clear and there was moderate flow during the time of investigation, however it is classified as intermittent by ABCA. The left bank was stable, while the right bank was slightly unstable with signs of erosion. Substrate consists of gravel and cobble followed by silt and clay. Canopy cover is moderate consisting grasses and some shrubs. Instream habitat cover is moderate and dominated by cobble followed by overhanging and aquatic vegetation. No groundwater indicators were noted. Upstream fish species consist of a baitfish community (MNR, 1994).	Moderate

Watercourse Name	O'Brien Drain
DFO Drain Classification	F

	C61
MWW(m):	1.3
MBW(m):	1.5

	C61
MWD(m)	0.15
MBD(m):	0.45

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C66	• Collection Line Buffer • Road Buffer	November 17, 2011	• The watercourse flows through cultural thicket (classified as CUT1i, ELC Feature ID 210) surrounded by crop agricultural field with a 2 m riparian buffer. No tile drain inputs were observed. Surrounding topography is flat.	• The watercourse is defined channelized feature. The channel may be naturalizing as there are riffle, run, pool sequences is present. The water was clear and had moderate flow during time of investigation. It is classified as a permanent warm water system by ABCA. Banks are moderately unstable with exposed soils and evidence of slumping. Substrate consists of sandy silty clay with gravel. Canopy cover is moderate and is a mix of trees, grasses and shrubs. Instream habitat cover is moderate and dominated by woody debris followed by undercut banks. No groundwater indicators were noted. Upstream fish species consists of a baitfish community (ABCA, 1999).	Moderate

Watercourse Name	Turner Drain
DFO Drain Classification	C

	C66
MWW(m):	2.1
MBW(m):	3.1

	C66
MWD(m):	0.33
MBD(m):	1.5

Photos

Photograph 1. Channel overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C67	• Collection Line Crossing • Turbine 57	November 17, 2011	• The watercourse flows through a deciduous forest (classified as FOD7-2, ELC Feature ID 198) surrounded by crop agricultural field with a 2 m riparian buffer. Tile drain inputs were observed. Surrounding topography is flat.	• The watercourse is a defined channelized feature. A riffle, run, pool sequences occur in the reach. The water was slightly turbid and had visible flow. It is a permanent warm water system by ABCA. Banks are slightly to moderately unstable with scouring and exposed tree roots present. Substrate is dominated by sand followed by gravel and clay. Canopy cover is high and dominated by trees followed by shrubs, grasses and herbaceous vegetation. Instream habitat cover is low and dominated by woody debris followed by undercut banks. No groundwater indicators were observed. Upstream fish species consist of a baitfish community (ABCA, 1999).	Moderate

Watercourse Name	Turner Drain
DFO Drain Classification	C

	C67
MWW(m):	3.0
MBW(m):	5.9

	C67
MWD(m):	0.3
MBD(m):	0.65

Photos

Photograph 1. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D44	• Collection Line Buffer • Turbine 63	April 18, 2012	• The watercourse is located in a crop agricultural field with a 1 m riparian buffer of cultural meadow (CUM1-1). No tile drain inputs were observed. Surrounding topography is flat.	• The watercourse is a defined channelized feature. The watercourse is straight flat channel. The water was clear and stagnant during the time of investigation. The system is classified as intermittent by ABCA. Banks are stable and vegetated. Substrate consists of sand and silt. Canopy cover is high and is dominated by shrubs, followed by trees and grasses. Instream habitat cover is moderate and consists of aquatic vegetation and detritus followed by woody debris. Groundwater indicator watercress was observed. Small fish were observed at time of investigation.	Moderate

Watercourse Name	Unknown Tributary to Parkhill Creek
DFO Drain Classification	F

	D44
MWW(m):	0.8
MBW(m):	1.3

	D44
MWD(m):	0.05
MBD(m):	0.5

Photos

Photograph 1. Site overview ↑

Photograph 1. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C124	• Collection Line Crossing • Road Buffer • Turbine 22	September 27, 2011 November 18, 2011	• The watercourse begins with a crop agricultural field to the north and a mix of deciduous swamp and forest (classified as FOD4e, SWD2-2, ELC Feature ID 266) to the south. The watercourse continues to flow in crop agricultural fields after the forest area. Tile drain inputs were observed in the agricultural fields. Surrounding topography is flat. Riparian buffer in the agricultural fields is 2 m and is greater than 15 m in the forest area.	• The watercourse is a defined channelized feature. The watercourse is mainly flat with some riffles, runs and pools present. The water was clear and had moderate flow during the time of investigations, however it is classified as intermittent by ABCA. Banks are slightly unstable with evidence of erosion. Substrate consists of silt, clay, sand followed by gravel, cobble and boulders. Canopy cover is high in the forest and dominated by trees and shrubs. Canopy cover is moderate in the agricultural field and is dominated by grasses and shrubs. Instream habitat cover is moderate consisting of mainly aquatic vegetation followed by detritus and woody debris. Groundwater indicator watercress was observed.	Moderate

Watercourse Name	Adams Drain
DFO Drain Classification	F

	C124
MWW(m):	1.4
MBW(m):	2.5

	C124
MWD(m):	0.15
MBD(m):	0.65

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview agricultural fields ↑

Photograph 3. Channel view forest ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C137	• Collection Line Crossing	November 18, 2011	• The watercourse begins in mix of deciduous forest, meadow marsh, cultural meadow, deciduous swamp and cultural thicket (classified as FOD9b, FOD7-2, MAM2-2, CUM1-1, CUT1h, SWD2-2, ELC Feature ID 236) emerging into agricultural fields. No tile drain inputs were noted during time of investigation. Surrounding topography is flat with a slight slope from the east.	• The watercourse is a defined channelized feature. A riffle, run sequences occurs in the reach. The water was turbid and had slow flow during the time of investigation. It is classified as a permanent warm water system by ABCA. Banks are slightly to moderately unstable with exposed soils and evidence of erosion. Substrate consists of silt followed by clay, silt and sand followed by gravel. Canopy cover is high in the forest area dominated by trees and is moderate in the agricultural field dominated by grasses and shrubs. Instream habitat cover is low in the forest area consisting of woody debris and moderate in the agricultural field consisting of undercut banks followed by woody debris. No groundwater indicators were observed. Downstream fish species consist of a baitfish community, Brown Bullhead (*Ameiurus nebulosus*), Rainbow Trout and Northern Pike (ABCA, 2001; MNR 2003).	Moderate

Watercourse Name	Dietrich Main Drain
DFO Drain Classification	E

	C137
MWW(m):	2.35
MBW(m):	3.05

	C137
MWD(m):	0.2
MBD(m):	0.85

Photos

Photograph 1. Site overview agricultural field ↑

Photograph 2. Site overview forest ↑

Photograph 3. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C208	• Collection Line Crossing • Road Crossing	December 15, 2011	• The watercourse is located in crop agricultural fields. Multiple flowing tile drain inputs were present throughout the site. Surrounding topography is flat. Riparian buffer is 2 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The water was turbid and had moderate flow during the time of investigation. It is classified as a permanent warm water system by ABCA. Banks are slightly unstable. Substrate consists of silt followed by gravel, cobble, boulder, clay and detritus. Canopy cover is moderate and consists of trees and shrubs. Instream habitat cover is moderate and consists of boulders, undercut banks, cobble and aquatic vegetation. Groundwater indicator watercress was observed throughout the site. A perched culvert is located to the south creating an obstruction to fish passage.	Moderate

Watercourse Name	Radar-Hoffman Drain
DFO Drain Classification	C

	C208
MWW(m):	2.0
MBW(m):	3.5

	C208
MWD(m):	0.3
MBD(m):	0.45

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D57	• Turbine 85	July 25, 2012	• The watercourse is located in a mix of deciduous forest and cultural meadow (classified as FOD6-4, CUM1-1, ELC Feature ID 271) surrounded by corn fields. No tile drain inputs were observed at time of investigation. Surrounding topography is flat. Riparian buffer is greater than 5 m of deciduous forest and cultural meadow.	• The watercourse is a defined channelized feature that is starting to naturalize. The watercourse has a straight flat channel. The watercourse was dry with some isolated pools present at the time of investigation. It is classified as an intermittent water system by ABCA. Banks are slightly unstable with exposed soils. Substrate consists of clay, silt and sand followed by gravel, cobble and boulders. Canopy cover is moderate and dominated by trees. Instream habitat cover is moderate and consists of cobble followed by aquatic vegetation and boulders. Groundwater indicator watercress was present in small isolated clumps.	Moderate

Watercourse Name	De Block Drain
DFO Drain Classification	F

	D57
MWW(m):	0.8
MBW(m):	1.1

	D57
MWD(m):	0.4
MBD(m):	1.5

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C15	• Road Buffer • Collection Line Crossing • Turbine 13	July 27, 2011	• The watercourse flows from a deciduous forest (classified as FOD5-2, ELC Feature ID 352) into a crop agricultural field. No tile drain inputs were observed at time of investigation. Surrounding land topography is flat. Riparian buffer is 1 m consisting of trees and grasses.	• The watercourse is a defined channelized feature. Overall the channel straight uniform with some pools present. Water was clear and slow flowing at time of investigation. It is classified as a permanent warm water system by ABCA. Banks are stable and well vegetated. Substrate consists of silt and clay followed by sand, gravel, cobble and boulder. Canopy cover is high consisting of grasses and trees. Instream habitat cover is high and dominated by aquatic vegetation followed by cobble and boulders. Groundwater indicator watercress was observed. A few fish were observed during time of investigation.	Moderate

Watercourse Name	Datars Millers Drain Branch F
DFO Drain Classification	C

	C15
MWW(m):	1.0
MBW(m):	1.5

	C15
MWD(m)	0.15
MBD(m):	0.3

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

Photograph 3. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C74	• Collection Line Crossing • Road Crossing • Turbine 60 • MET Tower Buffer	July 13, 2011 April 18, 2012	• The watercourse flows through a soybean field to the south and wheat field to the north. No tile drain inputs were noted during time of investigation. Surrounding topography is flat. Riparian buffer is 3 m of cultural meadow (CUM1-1) consisting of trees, shrubs and grasses.	• The watercourse is a defined channelized feature. There was no flow during the time of investigation. It is classified as intermittent system by ABCA. Banks are stable and vegetated. Substrate consists of silt and sand. Canopy cover is high consisting of shrubs, trees and grasses. Instream habitat cover is moderate and consists of aquatic vegetation, detritus and woody debris. Groundwater indicator watercress was observed. Minnows were observed during time of investigation in April.	Moderate

Watercourse Name	Unknown Tributary to Parkhill Creek
DFO Drain Classification	F

	C74
MWW(m):	0.8
MBW(m):	1.4

	C74
MWD(m):	0.05
MBD(m):	0.6

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D43	• Collection Line Crossing	June 11, 2012	• The watercourse begins at Crediton Road and flows south through soybean fields. Tile drain inputs were noted at time of investigation with one flowing. Surrounding topography is flat. Riparian buffer is less than 0.5 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The watercourse is a straight flat channel with some pools present. The water was slightly turbid and had slow flow at time of investigation. It is classified as an intermittent system by ABCA. Banks are stable and well vegetated. Substrate consists of muck, silt and clay followed by sand. Canopy cover is moderate and consists of grasses, shrubs and some trees. Instream habitat cover is high and consists of aquatic vegetation followed by vegetation debris. Groundwater indicator water speedwell was observed.	Moderate

Watercourse Name	Finkbeiner Municipal Drain
DFO Drain Classification	F

	D43
MWW(m):	1.7
MBW(m):	2.5

	D43
MWD(m):	0.15
MBD(m):	0.5

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D37	• Transmission Line Crossing	June 13, 2012	• The watercourse flows through a 15 m cultural meadow and cultural thicket (classified as CUT1j, CUM1-1, ELC Feature ID 635) riparian buffer surrounded by agricultural fields. Tile drain inputs were observed at time of investigation with some flowing. Surrounding topography is flat.	• The watercourse is a defined channelized feature. The watercourse is mostly straight flat channel with some riffle pool run sequences. The water was clear and had moderate flow at time of investigation. It is classified as a permanent warm water system by ABCA. Banks were slightly unstable with some areas of erosion and bare soil. The substrate consists of clay followed by sand, silt and cobble. Canopy cover is low and dominated by grasses. Instream habitat cover is low and dominated by aquatic vegetation followed by cobble. Groundwater indicators water speedwell and watercress were observed. Cyprinids and darters were observed at time of investigation. Downstream and upstream fish species consist of a baitfish community (ABCA, 2009; MNR, 1980).	Moderate

Watercourse Name	Centralia Drain Ext
DFO Drain Classification	C

	D37
MWW(m):	1.75
MBW(m):	3.0

	D37
MWD(m):	0.25
MBD(m):	1.0

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D35	• Transmission Line Crossing	May 1, 2012 June 13, 2012	• The watercourse runs adjacent to McTaggart Line and adjacent to a corn field. Tile drain inputs were observed at time of investigation, they were not flowing. Surrounding topography is flat. Riparian buffer is 1 m of cultural meadow (CUM1-1) on the right bank and 1.5 m of cultural meadow consisting of grasses and tree row on the left bank.	• The watercourse is a defined channelized feature. The watercourse is straight uniform flat channel. The water was clear and had very low flow at time of first investigation. The water was clear and was stagnant at time of second site investigation. It is classified as unknown by ABCA. The banks are stable and well vegetated. The substrate consists of muck followed by silt, sand and clay. The canopy cover is low and dominated by grasses. Instream habitat cover is high and consists of only aquatic vegetation. The majority of the channel was vegetation choked. Groundwater indicators watercress, water speedwell and bittercress were present throughout the site. Downstream fish species consist of baitfish community, Stonecat and Rock Bass (ABCA, 2000).	Moderate

Watercourse Name	Drainage Ditch
DFO Drain Classification	U

	D35
MWW(m):	1.7
MBW(m):	2.5

	D35
MWD(m):	0.16
MBD(m):	0.75

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D32	• Transmission Line Crossing • Breaker Switch Station Buffer	May 9, 2012 June 22, 2012	• The watercourse is surrounded by a mix of deciduous forest, swamp, cultural thicket and cultural meadow (classified as FOD5-6, SWD4-1, CUM1-1, CUT1k, ELC Feature ID 738) and agricultural fields. The watercourse also crosses Dump Road. One tile drain input that was not flowing was observed at time of investigation. Surrounding land topography is flat with slight rolling towards the watercourse. Riparian buffer is greater than 10 m in the forest area and 3 m in the agricultural area.	• The watercourse is a defined natural feature in the forest and channelized in the agricultural field. The watercourse meanders and follows a riffle pool run sequence in a few locations. The water was clear and had moderate flow at time of investigations. It is classified as a permanent warm water system by UTRCA. The banks are stable to slightly unstable with evidence of erosion. The substrate consists of silt, cobble, gravel and sand followed by boulders. The canopy cover is moderate and is dominated by trees in the forest and low in the agricultural field. Instream habitat cover is high and consists of aquatic vegetation and cobble followed by boulders, undercut banks and woody debris. No groundwater indicators were observed. Cyprinids and darters were observed at time of investigations. One live Giant Floater mussel was observed in June. Fish species upstream and downstream include common baitfish community, Rock Bass and Northern Pike (UTRCA, 1974, 2000, 2001, 2003, 2005, 2007, 2008).	Moderate

Watercourse Name	Gardiner Drain
DFO Drain Classification	E

	D32
MWW(m):	3.5
MBW(m):	4.4

	D32
MWD(m):	0.26
MBD(m):	0.9

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D40	• Transmission Line Crossing	June 22, 2012	• The watercourse is located in soybean fields. Flowing tile drain inputs were observed at time of investigation. Surrounding topography is flat. Riparian buffer is 1 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The watercourse is straight flat channel. The water was clear and had slow flow at time of investigation. It is classified as a permanent warm water system by UTRCA. The banks are stable and well vegetated. Substrate consists of silt, sand and muck. Canopy cover is high and is dominated by grasses. Instream habitat cover is high and consists of aquatic vegetation followed by undercut banks. The majority of the channel is vegetation choked. Groundwater indicators watercress, water speedwell and bittercress cover the majority of the reach. A school of fish was observed in a pool near one of the culverts. Fish species found in Washburn Drain and downstream include common baitfish community, sunfish and Rock Bass (UTRCA, 2000, 2005).	Moderate

Watercourse Name	Washburn Drain
DFO Drain Classification	C

	D40
MWW(m):	3.0
MBW(m):	3.75

	D40
MWD(m):	0.45
MBD(m):	0.7

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D23	• Transmission Line Crossing	June 22, 2012	• The watercourse is surrounded by soybean and corn fields and a residential property. No tile drain inputs were observed at time of investigation. Surrounding topography is flat. Riparian buffer is 2.5 m of cultural meadow (CUM1-1) and trees on the left bank and greater than 10 m of cultural meadow and trees on the right bank.	• The watercourse is a defined channelized feature. The watercourse is straight flat channel with some riffle pool fun sequences. The water was clear and had slow flow at time of investigation. It is classified as an intermittent system by ABCA. The banks are slightly unstable with some evidence of erosion. Substrate is silt, gravel and sand followed by cobble. Canopy cover is high and is dominated by trees. Instream habitat cover is moderate and consists of cobble followed by aquatic vegetation, woody debris and boulders. Small clumps of groundwater indicators watercress and water speedwell were present throughout the site. Brook Stickleback (*Culaea inconstans*) were observed at time of investigation.	Moderate

Watercourse Name	Brand Drain
DFO Drain Classification	F

	D23
MWW(m):	1.0
MBW(m):	1.2

	D23
MWD(m):	0.12
MBD(m):	0.25

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D39	• Transmission Line Buffer	June 25, 2012 July 12, 2012	• The watercourse originates as a tile drain in a mix of deciduous forest, cultural plantation and cultural meadow (classified as FOD8-1, FOD9a, CUM1-1, CUP3 ELC Feature ID 648) surrounded by agricultural fields. The water course then flows into D38. Surrounding land topography is flat. Riparian buffer is 15 m of forest and greater than 20 m of meadow.	• The watercourse is a channelized feature in the meadow and is starting to naturalize in the forest. The watercourse is straight flat channel with some riffles and pools present. The water was dry the first 50 m downstream of the tile drain. The water was clear and had slow flow at time of investigations. It classified as tiled by ABCA. The banks are stable to slightly unstable with evidence of erosion. Substrate is silt, clay, sand and cobble followed by boulders. Canopy cover is high and consists of trees and grasses. Instream habitat cover is high and consists of cobble and woody debris followed by boulders and undercut banks in the forest. Instream habitat cover is high and consists of only aquatic vegetation in the meadow. The channel is chocked with grasses. Groundwater indicator bank seepage was present, however seepage could be due to buried tile drains. Downstream and upstream fish species consist of a baitfish community (ABCA, 2009; MNR, 1980).	Moderate

Watercourse Name	Tributary to Prout Drain
DFO Drain Classification	T

	D39
MWW(m):	0.75
MBW(m):	2.4

	D39
MWD(m):	0.07
MBD(m):	0.45

Photos

Photograph 1. Site overview forest ↑

Photograph 2. Site overview meadow ↑

Photograph 3. Channel view forest ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D11	• Collection Line Crossing	April 18, 2012 July 12, 2012	• Watercourse runs through agricultural fields and crosses Mollard Line. Roadside drainage was present. Surrounding topography is flat. Riparian buffer is 1 m on left bank and 3 m on right bank of cultural meadow (CUM1-1) consisting of trees and grasses.	• The watercourse is a defined channelized feature with some slight meander. The water was clear during first site investigation and turbid during second site investigation. The water had very low flow at time of investigations. It is classified as a permanent warm water system by ABCA. The banks are stable and well vegetated. Substrate consists of silt, sand and clay. Canopy cover is high and dominated by trees. Instream habitat cover is high and consists of aquatic vegetation followed by woody debris. Groundwater indicator water speedwell was observed. Schools of cyprinids were observed during the first site investigation.	Moderate

Watercourse Name	Sitter Drain
DFO Drain Classification	C

	D11
MWW(m):	1.3
MBW(m):	3.0

	D11
MWD(m):	0.2
MBD(m):	0.7

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

Photograph 3. Water speedwell ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D04	• Collection Line Crossing	April 18, 2012	• Watercourse begins at a dammed pond and runs through agricultural fields crossing South Road. Tiles drains were flowing at time of investigation. Surrounding topography was flat. Riparian buffer was less than 0.5 m of cultural meadow (CUM1-1) consisting of grasses.	• The watercourse is a defined channelized feature. Pool areas were present after tile drain inputs. There was very low flow at time of investigation. It is classified as a permanent warm water system by ABCA. The banks are slightly unstable. Substrate consists of clay followed by sand and silt. Canopy cover is high with shrubs dominating. Instream habitat cover is high and consists of woody and plant debris followed by boulders, aquatic vegetation and undercut banks. No groundwater indicators were noted. Fish were observed during time of investigation. A potential low flow barrier of woody/vegetation debris was present approximately halfway through the reach. Downstream fish species consist of a baitfish community, Brown Bullhead, Rainbow Trout and Northern Pike (ABCA, 2001; MNR, 2003).	Moderate

Watercourse Name	Dietrich Main Drain
DFO Drain Classification	E

	D04
MWW(m):	1.5
MBW(m):	3.0

	D04
MWD(m):	0.3
MBD(m):	0.6

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C45	• Collection Line Buffer • Road Buffer	December 16, 2011	• The watercourse is located in a crop agricultural field with livestock pasture to the south. Flowing tile drain inputs were observed at time of investigation. The surrounding topography is flat. Riparian buffer is 2.5 m of cultural meadow (CUM1-1) consisting mainly of grasses.	• The watercourse is a defined channelized feature. There is a slight meander in the channel however no riffles or pools were observed. The water was turbid and moderately flowing at the time of investigation. It is classified as a permanent warm water system by ABCA. The banks are stable and well vegetated. Substrate consists of silt and clay. Canopy cover is low and consists of grasses followed by few trees. Instream habitat cover could not be determined due to turbid water. No groundwater indicators were noted. Upstream fish species consist of a baitfish community (MNR, 1981, 2007).	Moderate

Watercourse Name	Khiva Main Drain
DFO Drain Classification	C

	C45
MWW(m):	1.5
MBW(m):	3.0

	C45
MWD(m):	0.4
MBD(m):	0.8

Photos

Photograph 1. Site overview from Shipka Line ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C144	• Collection Line Crossing	December 16, 2011	• The watercourse is located in crop agricultural fields. Flowing tile drain inputs were noted. Surrounding topography is flat with some depression areas. Riparian buffer 2.5 m consisting of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The watercourse has uniform channel that is all run. The water was turbid and had slow flow during the time of investigation. It is classified as a permanent warm water system by ABCA. The banks are stable. Substrate consists of silt and clay. Canopy cover is low and consists of only grasses. No groundwater indicators were observed. Downstream fish species consist of baitfish community (MNR, 1995).	Moderate

Watercourse Name	Mud Creek Drain
DFO Drain Classification	E

	C144
MWW(m):	5.0
MBW(m):	6.5

	C144
MWD(m):	n/a
MBD(m):	n/a

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C44	• Collection Line Crossing	September 7, 2011	• The watercourse flows is surrounded by cultural plantation (classified as CUP1-7, CUP1a, ELC Feature ID 266) and crosses Blackbush Line. No tile drain inputs were observed at time of investigation. Surrounding topography is flat.	• The watercourse is a defined natural feature. The watercourse is flat channel. The water was turbid and had no visible flow during time of investigation. It is classified as a permanent warm water system by ABCA. The banks are stable and well vegetated. Substrate consists of muck, clay and silt. Canopy cover is moderate and dominated by trees. Instream habitat cover is low and consists of aquatic vegetation followed by woody debris. Groundwater indicator watercress was observed. Downstream fish species consists of a baitfish community and Rock Bass (MNR, 1981, 1994).	Low

Watercourse Name	Ratz Drain
DFO Drain Classification	C

	C44
MWW(m):	2.0
MBW(m):	n/a

	C44
MWD(m):	0.25
MBD(m):	n/a

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C76	• Collection Line Crossing • Road Crossing • Turbine 62	July 13, 2011	• The watercourse flows through a soybean field with a 5 m riparian buffer into a deciduous forest (classified as FOD7-2, ELC Feature ID 177). No tile drain inputs were observed. Surrounding topography is flat.	• The watercourse is a defined channelized feature. It is a straight run uniform channel. The water was clear and not flowing at time of investigation, and is classified as intermittent by ABCA. The banks are stable and vegetated. Substrate consists of sand and silt. Canopy cover is moderate and a mix of grasses, trees and shrubs. Instream habitat cover is moderate and a mix of woody debris and aquatic vegetation. No groundwater indicators were observed. Potential low flow fish barrier present due to low water levels.	Low

Watercourse Name	Unknown Tributary to Parkhill Creek
DFO Drain Classification	F

	C76
MWW(m):	0.3
MBW(m):	1.5

	C76
MWD(m):	0.05
MBD(m):	0.3

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D05	• Collection Line Buffer	May 11, 2012	• The watercourse is located in mixed forest (classified as FOM5-2, ELC Feature ID 255) and runs along Credition Road for 10 m. No tile drain inputs were observed at time of investigation. Riparian buffer is greater than 5 m of mixed forest.	• The watercourse is classified as an intermittent system by ABCA. The channel is cattail and grass choked throughout. No groundwater indicators were observed.	Low

Watercourse Name	Shipka Drain
DFO Drain Classification	F

	D05
MWW(m):	0.5
MBW(m):	n/a

	D05
MWD(m):	<0.2
MBD(m):	n/a

Photos

Photograph 1. Site overview ↑

Photograph 2. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D01	• Collection Line Buffer	April 18, 2012	• The watercourse runs along roadside that is adjacent to crop agricultural fields and a residential property. Tile drain inputs were observed. Surrounding topography is flat. Riparian buffer is 3 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. It is a straight and uniform channel – appears to have been recently dug out. The water was clear and had very low flow at time of investigation. It is classified as tiled by ABCA. The banks are stable but sparsely vegetated. Substrate consists of sand and gravel followed by cobble, silt and clay. Canopy cover low. Instream habitat cover is low and consists of aquatic vegetation and cobble. No groundwater indicators were noted.	Low

Watercourse Name	Latta Drain
DFO Drain Classification	T

	D01
MWW(m):	0.75
MBW(m):	1.5

	D01
MWD(m):	0.05
MBD(m):	0.6

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel substrate ↑

Photograph 3. Outlet pipe at Grand Bend Line ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C78	• Road Crossing • Turbine 63	April 18, 2012 July 13, 2011	• The watercourse runs along roadside that is adjacent to crop agricultural fields. Surrounding topography is flat. Riparian vegetation is 1 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The watercourse has a straight flat channel. The water was clear and had very low flow at time of investigation at time of second site investigation. It is classified as intermittent by ABCA. The banks are stable and very well vegetated. Substrate is soft, consisting of silt, clay and muck. Canopy cover moderate with equal amounts of shrubs and grasses. Instream habitat cover is high and consists of aquatic vegetation. Channel was cattail choked creating a potential low flow barrier. No groundwater indicators were noted.	Low

Watercourse Name	Woodburn Drain
DFO Drain Classification	F

	C78
MWW(m):	1.0
MBW(m):	1.7

	C78
MWD(m):	0.1
MBD(m):	0.5

Photos

Photograph 1. Site overview ↑

Photograph 2. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C75	• Collection Line Crossing • Road Crossing • Turbines 61 and 59	April 18, 2012	• The watercourse runs between crop agricultural fields. Flowing tile drain inputs were observed. Surrounding topography is flat. There is no riparian buffer on the right bank and 1.5 m on the left bank of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The watercourse is straight and there was low flow only at tile drain inputs. It is classified as intermittent by ABCA. The banks are stable and well vegetated. Substrate consists of silt and clay. Canopy cover moderate with shrubs dominating. Instream habitat cover moderate and consists of aquatic vegetation and woody debris. Groundwater indicator watercress was the dominate instream vegetation.	Low

Watercourse Name	New Venice-Eagleson Drain
DFO Drain Classification	F

	C75
MWW(m):	1.5
MBW(m):	2.2

	C75
MWD(m):	0.2
MBD(m):	0.6

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

Photograph 3. Watercress ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
P8	• Collection Line Buffer	April 18, 2012 June 25, 2012	• Pond is located in a mix of cultural plantation and cultural thicket (classified as CUT1, CUP3-2, CUP2b, ELC Feature ID 209). Pond is approximately 250 m by 50 m. Riparian buffer is 10-100 m of cultural plantation.	• Pond is dammed and is online pond supplying flow to D04 watercourse. It is classified as a permanent warmwater system by ABCA. Pond has and outlet/inlet pipe located at the east end. The water was clear at time of investigation. Substrate is silt and sand followed by muck. *In-situ* cover is high and consists of aquatic vegetation and woody debris. The pond is pondweed chocked. No groundwater indicators were observed. Young of the year fish were observed at time of investigation.	Low

Watercourse Name	Dietrich Main Drain
DFO Drain Classification	E

	P8
MWW(m):	n/a
MBW(m):	n/a

	P8
MWD(m):	n/a
MBD(m):	n/a

Photos

Photograph 1. Dam ↑

Photograph 2. Pond overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C68	• Collection Line Crossing • Road Crossing • Turbine 57	April 26, 2012	• The watercourse runs through cultural meadow (classified as CUM1-1, ELC Feature ID 198) and is surrounded by crop agricultural fields. Road drainage and tile drains present. Surrounding topography is flat. Riparian buffer is approximately 5 m primarily consisting of grasses.	• The watercourse is a defined channelized feature and intermittent. The watercourse has very low gradient and appears to be tile drain fed as watercourse begins at the road culvert. There was no flow at time of investigation. It is classified as intermittent by ABCA. The banks are stable and well vegetated. Substrate consists of sand and silt. Canopy cover is low. Instream habitat cover is high and dominated by cattails. Groundwater indicator watercress was observed. The beginning of the watercourse is cattail choked causing a potential low flow barrier. Fish were observed downstream of the cattail choked area at time of investigation.	Low

Watercourse Name	Sideroad 5 Drain
DFO Drain Classification	F

	C68
MWW(m):	0.8
MBW(m):	1.0

	C68
MWD(m):	0.1
MBD(m):	0.2

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C73	• Collection Line Crossing • Road Crossing • Turbine 58	July 13, 2011	• Watercourse runs through agricultural fields. No tile drain inputs were noted at time of investigation. Surrounding topography is flat. Riparian buffer is 1 m on left bank and 3 m on right bank of cultural meadow (CUM1-1) consisting of trees and grasses.	• The watercourse is a defined channelized feature. There was no flow at time of investigation. It is classified as a permanent warm water system by ABCA. The banks are stable and well vegetated. Substrate consists of silt and sand. Canopy cover is high and dominated by grasses. Instream habitat cover is high and consists of aquatic vegetation. The channel is cattail choked. No groundwater indicators were observed.	Low

Watercourse Name	Unknown Tributary to Parkhill Creek
DFO Drain Classification	C

	C73
MWW(m):	n/a
MBW(m):	1.5

	C73
MWD(m):	n/a
MBD(m):	0.5

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D13	• Collection Line Crossing	April 18, 2012	• Watercourse runs through agricultural fields. Tile drains are present along watercourse. Surrounding topography is flat. Riparian buffer was 0.75 m of cultural meadow (CUM1-1) containing grasses with some shrubs.	• The watercourse is a defined channelized feature. It is a straight and uniform channel – appears to have been recently dug out. The water was clear and had very low flow at time of investigation. It is classified as intermittent by ABCA. The banks are stable and well vegetated. Substrate consists of sand and silt. There is no canopy cover. Instream habitat cover is low and consists of aquatic vegetation and plant debris. No groundwater indicators were observed. Fish were observed at time of investigation.	Low

Watercourse Name	Pfaff Drain
DFO Drain Classification	F

	D13
MWW(m):	1.5
MBW(m):	2.0

	D13
MWD(m):	0.05
MBD(m):	0.2

Photos

Photograph 1. Site overview south ↑

Photograph 2. Site overview north ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D14	• Collection Line Crossing • Road Buffer • Turbine 76	September 28, 2011 April 17, 2012 June 25, 2012	• Watercourse is originates as a tile drain and flows through a deciduous forest (classified as FOD6-5, FOC6-4, ELC Feature ID 245) into crop agricultural fields. Flowing tile drains were observed throughout the site. Surrounding topography is flat. Riparian buffer was 1 m on right bank and 3 m on left bank primarily consisting of grasses in the agricultural field. In the forest the riparian buffer is greater than 15 m.	• The watercourse is a defined channelized feature. The watercourse has a straight flat channel in the agricultural fields and has a few riffle run pool sequences in the forest. The water was clear and had very low flow at time of investigations. It is classified as intermittent by ABCA. The banks are stable and well vegetated in the agricultural field and slightly unstable in the forest. Substrate consists of silt, clay, gravel and muck followed by cobble and boulders. Canopy cover is low in the agricultural field and high in the forest. Instream habitat cover in the agricultural field is high and consists of aquatic vegetation. Areas of the watercourse were cattail choked. Instream habitat cover in the forest is moderate and consists of cobble followed by woody debris and boulders. No groundwater indicators were noted. One low flow barrier of sediment and vegetation build up was present. Young of the year fish were observed in the forest during the second site investigation.	Low

Watercourse Name	Finkbeiner Municipal Drain
DFO Drain Classification	F

	D14
MWW(m):	1.0
MBW(m):	3.0

	D14
MWD(m):	0.1
MBD(m):	0.7

Photos

Photograph 1. Site overview agricultural fields ↑

Photograph 2. Channel view forest ↑

Photograph 3. Low flow barrier ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D15	• Road Buffer	April 17, 2012	• The watercourse is surrounded by crop agricultural fields. Tile drains were present on both sides of the watercourse. Surrounding topography is flat. Riparian buffer is 0.5 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The watercourse has a straight flat channel. The water was clear and had very low flow at time of investigation and may have been the result of flowing tile drains. It is classified as intermittent by ABCA. The banks are stable. Substrate consists of silt followed by clay and muck. Canopy cover is low. Instream habitat cover is high and consists of aquatic vegetation and woody debris. No groundwater indicators were noted. Downstream fish species consists of baitfish community (MNR, 1995).	Low

Watercourse Name	Chamber Municipal Drain
DFO Drain Classification	F

	D15
MWW(m):	0.7
MBW(m):	2.5

	D15
MWD(m):	0.35
MBD(m):	0.75

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D07	• Turbine 82	May 10, 2012	• The watercourse is surrounded by crop agricultural fields and flows into another watercourse. Tile drain inputs were present with one flowing at the time of investigation. Surrounding topography is flat. Riparian buffer is 2.5 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The watercourse is mainly flat with pools and a few riffles present. The water was clear and had moderate flow at time of investigation. It is classified as an intermittent system by ABCA. The banks are slightly unstable with evidence of erosion and slumping. Substrate consists of gravel and sand followed by silt, clay, muck and boulders. Canopy cover is low and consists of trees and shrubs. Instream habitat cover is moderate and consists of aquatic vegetation followed by woody debris, undercut banks and boulders. No groundwater indicators were observed. A debris jam was present, with the potential to cause a low flow barrier. Schools of minnows and a few darters were observed upstream and downstream of the debris jam.	Low

Watercourse Name	Gaiser Drain
DFO Drain Classification	F

	D07
MWW(m):	1.5
MBW(m):	2.5

	D07
MWD(m):	0.25
MBD(m):	0.5

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D26	• Transmission Line Crossing	May 1, 2012	• Watercourse is surrounded by crop agricultural fields. Tile drain inputs were observed and flowing very slowly at time of investigation. Surrounding topography is flat. Riparian vegetation is 1 m of cultural meadow (CUM1-1) primarily consisting of grasses.	• The watercourse is a defined channelized feature. It is a straight and potentially a regularly maintained channel. The water was clear and had very low flow at time of investigation. It is classified as a permanent warm water system by ABCA. The banks are slightly unstable with exposed soils but no evidence of meandering. Substrate consists of silt and clay followed by gravel. Canopy cover is low. Instream habitat cover is low and consists of aquatic vegetation. No groundwater indicators were noted. Downstream fish species consist of baitfish community, Stonecat and Rock Bass (ABCA, 2000).	Low

Watercourse Name	Kerslake Drain
DFO Drain Classification	C

	D26
MWW(m):	2.2
MBW(m):	3.5

	D26
MWD(m):	0.18
MBD(m):	0.9

Photos

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C11	• Collection Line Crossing	December 15, 2011	• The watercourse runs through crop agricultural field and passes Bronson Line into another crop agricultural field and residence. Flowing tile drains were observed. The surrounding topography is flat. The riparian buffer is 3 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. It is a straight uniform channel. The water was turbid and had high flow at the time of investigation, however it is classified as an intermittent system by ABCA. The banks are stable and well vegetated. Substrate consists of sand and gravel followed by muck and clay. Canopy cover is low and is dominated by grasses and some shrubs. Instream habitat cover is moderate consisting primarily of aquatic vegetation. No groundwater indicators were observed.	Low

Watercourse Name	Smith Radar Drain
DFO Drain Classification	F

	C11
MWW(m):	2.0
MBW(m):	2.5

	C11
MWD(m):	n/a
MBD(m):	n/a

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C14	• Collection Line Crossing • Turbines 9	December 15, 2011	• The watercourse runs through crop agricultural fields with an average riparian buffer of 2 m. A small section to the northeast is located in deciduous forest (classified as FOD5-2, ELC Feature ID 352) and flows through a small patch of a mix of deciduous forest, cultural plantation and cultural meadow (classified as FOD7, CUM1-1, CUP, ELC Feature ID 346) in the middle of the reach. Tile drain inputs were noted at the west end of the site. The surrounding topography is flat.	• The watercourse is a defined channelized feature. It is a straight uniform channel with a few pools present. The water was clear and slow flowing at time of first site investigation. The water was turbid and was at high flow during time of investigation. It is classified as a permanent warm water system by ABCA. The banks are stable and vegetated. Substrate consists of silt, gravel and clay with some cobble, boulder and sand. Canopy cover is low and consists of grasses and some trees. Instream habitat cover is high and is dominated by grasses followed by cobble, boulder and undercut banks. Groundwater indicator watercress was observed. An elevation drop was observed that may be a potential low flow fish barrier. Fish species found at Bronson Line crossing consist of baitfish community (MNR, 1994).	Low

Watercourse Name	Datars Millers Drain Branch F
DFO Drain Classification	C

	C14
MWW(m):	1.15
MBW(m):	2.0

	C14
MWD(m):	0.30
MBD(m):	0.8

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view in forest ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C36	• Collection Line Crossing	September 27, 2011	• The watercourse is located in a crop agricultural field with a riparian buffer of 1.5 m. No tile drain inputs were observed and the surrounding topography is flat. A bridge with a culvert placed in the watercourse is present approximately 90 m from Babylon Line. Riparian buffer is 1.5 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. It is a straight uniform channel. The water was clear and flowing at the time of investigation, however it is classified as intermittent by ABCA. The banks are stable and well vegetated. Substrate consists of silt, clay with some sand, cobble and boulder. Canopy cover is moderate and dominated by grasses followed by trees. Instream habitat cover is moderate and dominated by aquatic vegetation followed by cobble and boulder. Channel was choked with cattails. No groundwater indicators were noted.	Low

Watercourse Name	Pfaff Drain Branch A and B
DFO Drain Classification	F

	C36
MWW(m):	1.5
MBW(m):	2.75

	C36
MWD(m):	0.15
MBD(m):	0.4

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D48	• MET Tower Buffer	July 12, 2012	• The watercourse flows through corn fields. No tile drain inputs were observed, however several channel flow into watercourse on the left bank. The surrounding topography is flat with slight sloping towards the watercourse. Riparian buffer is 6 m of cultural meadow (CUM1-1).	• The watercourse is a defined natural feature. The watercourse is all flat. The water was turbid and had low at the time of investigation. It is classified as a permanent warm water feature by ABCA. The banks are stable and well vegetated. Substrate consists of silt. Canopy cover is low and consists of trees and shrubs. Instream habitat cover is low and consists of woody debris and aquatic vegetation. No groundwater indicators were observed.	Low

Watercourse Name	Parkhill Creek
DFO Drain Classification	E

	D48
MWW(m):	19
MBW(m):	25

	D48
MWD(m):	0.4
MBD(m):	1.3

Photos

Photograph 1. Site overview ↑

Photograph 2. Site Overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C56	• Turbine 48	December 16, 2011	• The watercourse flows through a crop agricultural field with a 1.5 m riparian buffer of cultural meadow (CUM1-1). Tile drain input was observed. Surrounding topography is flat.	• The watercourse is a defined channelized feature. It is a straight run channel. The water was turbid and had a moderate flow during the time of investigation, however it is classified as intermittent by ABCA. The banks are stable and well vegetated. Substrate consists of silt clay with gravel. Canopy cover is low and dominated by grasses. Instream habitat cover is low and dominated by grasses. No groundwater indicators were observed.	Low

Watercourse Name	Gaiser Drain
DFO Drain Classification	F

	C56
MWW(m):	2.0
MBW(m):	2.5

	C56
MWD(m)	0.5
MBD(m):	0.8

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C62	• Collection Line Crossing • Turbine 38	July 7, 2011	• The watercourse flows through a wheat field with a 2 m riparian buffer of cultural meadow (CUM1-1). No tile drain inputs were noted. Surrounding topography is flat.	• The watercourse is a defined channelized feature. It is a straight channel that is all flat run. There was no flow during the time of investigation, only stagnant water. It is classified as an intermittent system by ABCA. The banks are slightly unstable. Substrate consists of muck and is algae choked. Canopy cover is low and consists of grasses and herbaceous vegetation. Instream habitat cover is high and is dominated by aquatic algae followed by aquatic vegetation. No groundwater indicators were observed. Potential low flow fish barrier observed due to build-up of algae. Downstream fish species consist of a baitfish community, Brown Bullhead, Rainbow Trout and Northern Pike (ABCA, 2001; MNR, 2003).	Low

Watercourse Name	Clarke Drain
DFO Drain Classification	F

	C62
MWW(m):	2.0
MBW(m):	2.5

	C62
MWD(m):	0.1
MBD(m):	2.0

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

Photograph 3. Algae growth ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C63	• Road Buffer	October 6, 2011 December 16, 2011	• The watercourse flows through a crop agricultural field with a 2 m riparian buffer of cultural meadow (CUM1-1) both east and west of Shipka Line. Flowing tile drain inputs were observed. Surrounding topography is flat.	• The watercourse is a defined channelized feature. The water was clear to slightly turbid and flowing during the time of investigations. It is classified as intermittent by ABCA, and is a straight channel that is all run. The banks are stable and well vegetated. Substrate is dominated by silt and clay followed by a mix of muck, gravel, detritus, cobble and boulder. Canopy cover is low and is a mix of grasses and shrubs followed by trees. Instream habitat cover is high and dominated by aquatic vegetation followed by cobble and boulder. No groundwater indicators were noted. Downstream fish species consist of a baitfish community, Brown Bullhead, Rainbow Trout and Northern Pike (ABCA, 2001; MNR, 2003).	Low

Watercourse Name	Clarke Drain
DFO Drain Classification	F

	C63
MWW(m):	1.25
MBW(m):	2.5

	C63
MWD(m):	0.2
MBD(m):	0.6

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview east↑

Photograph 3. Channel overview west ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D46	• Collection Line Crossing	July 12, 2012	• The watercourse flows through corn and soybean fields and crosses Crediton Road. Roadside ditches were present. Surrounding topography is fairly flat and sloped towards the watercourse. Riparian buffer is 5 m of cultural meadow (CUM1-1) consisting of shrubs.	• The watercourse is a defined channelized feature. The watercourse is all flat. The water was turbid and had low flow at time of investigation. It is a permanent warm water system by ABCA. Banks are stable and well vegetated. Substrate is dominated by silt. Canopy cover is moderate and dominated by shrubs. Instream habitat cover is low and dominated by aquatic vegetation and woody debris. No groundwater indicators were observed. Upstream fish species consist of baitfish community (MNR, 1995).	Low

Watercourse Name	Mud Creek Drain
DFO Drain Classification	C

	D46
MWW(m):	1.5
MBW(m):	4.5

	D46
MWD(m):	0.16
MBD(m):	0.25

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D47	• Collection Line Crossing • Road Buffer	July 12, 2012	• The watercourse is surrounded by soybean field and pasture land and crosses Credition Road. Water from the roadside ditch collects in the watercourse. The surrounding topography is flat. Riparian buffer is 5 m of cultural meadow (CUM1-1) consisting of grasses.	• The watercourse is a defined channelized feature. The watercourse is mostly flat with some pools present. The water was turbid and had low flow at time of investigation. It is classified as an intermittent system by ABCA. Banks are stable and well vegetated. Substrate is dominated by silt. Canopy cover is high and consists of grasses and sedges. Instream habitat cover is high and consists of only aquatic vegetation. The channel is slightly choked with cattails and sedges. No groundwater indicators were observed.	Low

Watercourse Name	Gaiser Drain
DFO Drain Classification	F

	D47
MWW(m):	0.6
MBW(m):	3.0

	D47
MWD(m):	0.08
MBD(m):	0.4

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D09	• Turbine 52	December 22, 2011	• The watercourse is located in agricultural fields and flows through a deciduous forest (classified as FOD7d, ELC Feature ID 189) at the northern reach.	• The watercourse is choked with cattails. It is classified as a permanent warm water upstream and intermittent system downstream by ABCA. The banks are stable and well vegetated.	Low

Watercourse Name	Sitter Drain
DFO Drain Classification	F, C

	D09
MWW(m):	1.5
MBW(m):	2.0

	D09
MWD(m):	0.2
MBD(m):	n/a

Photos

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C86	• Turbine 41	July 13, 2011	• The watercourse is located in a crop agricultural field with a 2 m riparian buffer of cultural meadow (CUM1-1). No tile drain inputs were observed. Surrounding topography is flat.	• The watercourse is a defined channelized feature. The watercourse is all flat channel. The water was clear and slow moving during the time of investigation. The system is classified as intermittent by ABCA. Banks are stable and vegetated. Substrate consists of muck and cobble. Canopy cover is moderate and is dominated by grasses, followed by shrubs and trees. Instream habitat cover is low and consists of cobble and undercut banks. Channel is choked with grasses and shrubs in some areas. No groundwater indicators were noted. Upstream fish species consist of baitfish community (MNR, 1994).	Low

Watercourse Name	O'Brien Drain
DFO Drain Classification	F

	C86
MWW(m):	0.7
MBW(m):	1.5

	C86
MWD(m):	0.1
MBD(m):	0.3

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C110	• Turbine 65	December 15, 2011	• The watercourse is located in crop agricultural fields. Tile drain inputs were observed. Surrounding topography is flat. Riparian buffer is 1 m of cultural meadow (CUM1-1) exists on the left bank, while the buffer on the left was recently removed.	• The watercourse is a defined channelized feature that was newly dug out. The morphology is all run. The water was turbid and had moderate flow during the time of investigation; however it is classified as intermittent by ABCA. The banks are stable. Substrate consists of clay followed by silt, gravel and cobble. There is no canopy cover. Instream habitat cover is high and consists of only cobble. No groundwater indicators were noted. A perched culvert is present at the edge of the property, obstructing fish passage.	Low

Watercourse Name	Wein Drain
DFO Drain Classification	F

	C110
MWW(m):	1.5
MBW(m):	2.3

	C110
MWD(m):	0.15
MBD(m):	0.45

Photos

Photograph 1. Site overview ↑

Photograph 2. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C37	• Collection Line Buffer • Road Buffer	December 9, 2011	• The watercourse is located agricultural fields. There is a 1.5 m riparian buffer of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The water was clear and had visible flow during the time of investigation; however it is classified as intermittent by ABCA. Substrate consists of silt and clay followed by cobble and boulders. Canopy cover is low. Instream habitat cover is high consisting of mainly aquatic vegetation. Some areas of the channel are cattail choked.	Low

Watercourse Name	Schwartz Drain
DFO Drain Classification	F

	C37
MWW(m):	2.0
MBW(m):	2.5

	C37
MWD(m):	n/a
MBD(m):	n/a

Photos

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C209	• Collection Line Crossing	December 15, 2011	• The watercourse is located in crop agricultural fields, crossing Bronson Line. No tile drain inputs were observed at time of investigation. Surrounding topography is flat. Riparian buffer is 2 m of cultural meadow (CUM1-1) consisting of grasses and trees.	• The watercourse is a defined channelized feature. The morphology is all run. The water was turbid and had high flow during the time of investigation. It is classified as a permanent warm water system by ABCA. Banks are slightly unstable due to 90 degree bends. Substrate consists of gravel and sand followed by clay. Canopy cover is low and is dominated by grasses. No groundwater indicators were observed. Fish species at Bronson Line crossing consist of baitfish community (MNR, 1994).	Low

Watercourse Name	Hartman Drain
DFO Drain Classification	C

	C209
MWW(m):	1.5
MBW(m):	2.5

	C209
MWD(m):	n/a
MBD(m):	n/a

Photos

Photograph 1. Site overview ↑

Photograph 2. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C48	• Collection Line Crossing • Road Crossing • Turbine 17	May 11, 2012	• The watercourse originates at a tile drain into a deciduous forest (classified as FOD7-2, FOD4c, ELC Feature ID 232) and then in an agricultural field and travels along the roadside of Crediton Road beside another agricultural field. Flowing tile drain inputs were noted during time of investigation and providing flow to the watercourse. Surrounding topography is flat. Riparian buffer is 1.5 m on the north bank and 0.5 m on the south bank and great in the forest area.	• The watercourse is a defined channelized feature. The watercourse meanders slightly in the north bank and is mainly flat with some riffles and pools present. The water was clear and had low flow during the time of second site investigation. It is classified as an intermittent water system by ABCA. Banks are slightly unstable with signs of erosion and slumping. Substrate consists of detritus, muck and clay followed by gravel, cobble, sand and silt. Canopy cover is high in the forest and low in the agricultural fields. Instream habitat cover is moderate and consists of aquatic vegetation and detritus followed by cobble, boulders and undercut banks. Groundwater indicator water speedwell was observed. Downstream fish species consist of baitfish community, Brown Bullhead and Rainbow Trout (ABCA, 2001; MNR, 2003).	Low

Watercourse Name	Shipka Drain
DFO Drain Classification	F

	C48
MWW(m):	1.2
MBW(m):	2.5

	C48
MWD(m):	0.2
MBD(m):	0.65

Photos

Photograph 1. Site overview ↑

Photograph 2. Site overview ↑

Photograph 3. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D51	• Turbine 16	June 11, 2012	• The watercourse originates from a tile drain at the edge of a corn field and flows through a deciduous forest (classified as FOD7-1, ELC Feature ID 258). Surrounding topography is flat. Riparian buffer is greater than 15 m of forest.	• The watercourse is defined intermittent feature. The watercourse is a straight flat channel. The water was turbid and had no flow at time of investigation. It is not mapped by ABCA. Banks are stable with no signs of erosion. Substrate consists of sand, silt and clay. Canopy cover is high and is dominated by trees. Instream habitat cover is low and consists of woody debris. No groundwater indicators were observed. Low flow barriers exist as parts of the channel are dry.	Low

Watercourse Name	Not mapped
DFO Drain Classification	Not mapped

	D51
MWW(m):	0.4
MBW(m):	3.0

	D51
MWD(m):	0.05
MBD(m):	0.1

Photos

Photograph 1. Site overview ↑

Photograph 2. Low flow barrier ↑

Photograph 3. Tile drain ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D52	• Turbine 35	June 11, 2012	• The watercourse is located within a deciduous forest (classified as FOD5-6, ELC Feature ID 290) surrounded by crop agricultural fields. No tile drain inputs were observed at time of investigation. Surrounding topography is flat and slightly sloped to the south in the forest. Riparian buffer is greater than 15 m of forest.	• The watercourse is an ephemeral natural feature. There was no water at time of investigation. It is not mapped by ABCA. Banks are stable with no signs of erosion. Substrate consists of sand, silt and clay. Canopy cover is high and is dominated by trees. No groundwater indicators were observed.	Low

Watercourse Name	Not mapped
DFO Drain Classification	Not mapped

	D52
MWW(m):	n/a
MBW(m):	1.2

	D52
MWD(m):	n/a
MBD(m):	0.15

Photos

Photograph 1. Site overview ↑

Photograph 2. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D53	• Collection Line Buffer	June 13, 2012	• The watercourse originates from a tile drain at the edge of a soybean field and flows through a mix of deciduous forest and swamp (classified as FOD8-1, SWD3-3, ELC Feature ID 273). Surrounding topography is flat. Riparian buffer is 20 m on the left bank and 5 m on the right bank of deciduous swamp and forest.	• The watercourse is an ephemeral natural feature. There was no water present at time of investigation. It is not mapped by ABCA. The banks are stable. Substrate consists of silt, sand and clay followed by organics. Canopy cover is high and is dominated by trees. Groundwater indicator water speedwell was observed.	Low

Watercourse Name	Not mapped
DFO Drain Classification	Not mapped

	D53
MWW(m):	n/a
MBW(m):	n/a

	D53
MWD(m):	n/a
MBD(m):	n/a

Photos

Photograph 1. Site overview ↑

Photograph 2. Channel overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
P11	• Transmission Line Buffer	June 22, 2012	• The pond is located in a soybean field. The pond is 15 by 10 m and 0.25 m deep. The riparian buffer is 0.5 to 2 m of cultural meadow (CUM1-1).	• The pond is a natural feature that appears to be seasonal. The pond is a natural depression area that is offline. The substrate consists of silt and clay. *In-situ* cover is low and consists of aquatic vegetation. No groundwater indicators were observed.	Low

Photos

Photograph 1. Pond overview ↑

Photograph 2. Pond view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D16	• Collection Line Crossing	April 26, 2012 June 25, 2012	• The watercourse surrounded by cultural meadow (classified as CUM1-1, ELC Feature ID 220), soybean and row crop fields and crosses Grand Bend Line. Tile drain inputs were noted east of Grand Bend Line. Surrounding land topography is flat with sloping towards the watercourse. Riparian buffer is 1.5 m west of Grand Bend Line and greater than 5 m east consisting of meadow and trees.	• The watercourse is a defined channelized feature that is starting to naturalize. The watercourse is straight flat channel that has a few riffle pool run sequence. The water was slightly turbid and had slow flow at time of investigations. It is classified as a permanent warm water system by ABCA. Banks are slightly unstable with signs of erosion and old slumping present. Substrate is silt and clay followed by cobble, gravel and boulders. Canopy cover is high and dominated by trees and shrubs. Instream habitat cover is moderate and consists of cobble followed by boulders, aquatic vegetation, woody debris and undercut banks. No groundwater indicators were observed. Cyprinids were observed during April and young of the year fish were observed during June. Upstream fish species consist of a baitfish community, Brown Bullhead, Rainbow Trout and Northern Pike (ABCA, 2001; MNR 2003).	Low

Watercourse Name	Dietrich Ext. 1974
DFO Drain Classification	E

	D16
MWW(m):	1.62
MBW(m):	3.1

	D16
MWD(m):	0.2
MBD(m):	1.75

Photos

Photograph 1. Site overview west↑

Photograph 2. Site overview east ↑

Photograph 3. Channel view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D45	• Collection Line Buffer	July 12, 2012	• The watercourse runs parallel to Credition Road in a corn field. Roadside drainage is present. Surrounding topography is rolling towards the watercourse. Riparian buffer is 5 m of cultural meadow (CUM1-1).	• The watercourse is a defined channelized feature. The watercourse has a straight flat channel. The water was clear and had low flow at time of investigation. It is classified as a permanent warm water system by ABCA. Banks are stable and well vegetated. Substrate consists of silt followed by boulders. Canopy cover is high and is a mix of grasses and herbaceous vegetation. Instream habitat cover is high and consists of only aquatic vegetation. The channel is choked with grasses. No groundwater indicators were observed. Cyprinids were observed at time of investigation. Fish species at Bronson Line crossing consist of a baitfish community (MNR, 2007).	Low

Watercourse Name	Khiva Main Drain
DFO Drain Classification	C

	D45
MWW(m):	1.25
MBW(m):	3.0

	D45
MWD(m):	0.08
MBD(m):	0.8

Photos

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
D55	• Collection Line Buffer • Turbine 38	July 27, 2011	• The watercourse is located in a crop agricultural field and the riparian buffer is 1 m of cultural meadow (CUM1-1). No tile inputs were noted and the surrounding topography is flat.	• The watercourse is a defined channelized feature that appears to be naturalizing. During the time of investigation there was no flow, only standing water. It is classified as intermittent by ABCA. The banks are stable and vegetated. Substrate consists of muck followed by clay and silt. Canopy cover is low and consists of shrubs and trees. Instream cover is moderate dominated by aquatic vegetation followed by undercut bank and woody debris. Groundwater indicator watercress was observed.	Low

Watercourse Name	Pfaff Drain
DFO Drain Classification	F

	D55
MWW(m):	0.5
MBW(m):	1.5

	D55
MWD(m):	0.1
MBD(m):	0.3

Photos

Photograph 1. Site overview ↑

Photograph 2. Site overview ↑

Photograph 3. Channel close-up ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
P19	• Collection Line Crossing • Road Crossing	November 17, 2011 December 22, 2011	• The pond is located in an agricultural field. Riparian buffer of grasses exists.	• The pond is a dugout offline feature. Water was present at time of investigation.	Low

Photos

Photograph 1. Pond overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
P1	• Collection Line Buffer	July 25, 2012	• The feature is located in a corn field. There was no water body present.	• No water body was present. Some Common Reed was present in the corn field.	Not Sensitive

Photos

Photograph 1. Site view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C212	• Turbine 72	January 13, 2012	• The feature is located in an agricultural field. No water body was present.	• No water body feature present.	Not Sensitive

Photos

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C213	• Collection Line Crossing • Road Crossing • Turbine 73	January 13, 2012	• The feature is located in an agricultural field. No water body was present.	• No water body feature present.	Not Sensitive

Photos

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C217	• Turbine 76	January 13, 2012	• The feature is located in an agricultural field. No water body was present.	• No water body feature present.	Not Sensitive

Photos

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C214	• Turbine 77	January 13, 2012	• The feature is located in an agricultural field. No water body was present.	• No water body feature present.	Not Sensitive

Photos

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C215	• Turbine 78	January 13, 2012	• The feature is located in an agricultural field. No water body was present.	• No water body feature present.	Not Sensitive

Photos

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C216	• Turbine 79	January 13, 2012	• The feature is located in an agricultural field. No water body was present.	• No water body feature present.	Not Sensitive

Photos

Photograph 1. Site overview ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*

Table 4-3 Site Investigations

Feature ID	Project Component	Investigation Date	Description of Site	Feature Description	Feature Sensitivity
C9	• Collection Line Crossing	September 8, 2011	• The site investigation revealed a dry channel along the road that is ploughed through in the crop agricultural field	• No water body feature present. It is classified as intermittent by ABCA.	Not Sensitive

Watercourse Name	Masse Drain
DFO Drain Classification	F

Photos

Photograph 1. Site overview ↑

Photograph 2. Site view ↑

*Note: * Denotes feature where an Alternative Site Investigation was conducted*