# *Belle River Wind Project*
# Water Body Report

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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

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# Water Body Report

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Report submitted on May 28, 2015

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## 1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in April 2014 by AECOM, on behalf of SP Belle River Wind, LP, by its general partner, SP Belle River Wind, GP Inc. (Belle River Wind) to conduct a water body assessment and report in accordance with the Renewable Energy Approval (REA) Regulation, Ontario Regulation 359/09. The water body assessment includes a records review and site investigation, and the water body report includes a complete assessment of impacts to any water bodies occurring at a proposed wind energy generating facility, of up to 49 operational wind turbines totaling 100 megawatts (MW).

The Belle River Wind Project ('the project' or 'Belle River') is being proposed by Belle River Wind, a joint venture limited partnership owned by affiliates of Pattern Renewable Holdings Canada, ULC (Pattern Development) and Samsung Renewable Energy, Inc. (Samsung Renewable Energy). Belle River Wind is proposing to develop a wind project in the Town of Lakeshore in the County of Essex, Ontario. The Project will be located on public and private lands south of the community of Belle River. The Project is generally bounded by County Road 42 to the north, Lakeshore Road 111 to the west, Highway 401 and South Middle Road to the south, and Comber Sideroad to the east.

According to Ontario Regulation (O. Reg.) 359/09, the project location is defined 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. For the purposes of this report, NRSI will refer to the areas within 120m of the project location as the 'project area'.

In accordance with the REA Regulation, NRSI conducted a thorough records review of available background resources to identify any water bodies within 120m, or lake trout (*Salvelinus namaycush*) lakes within 300m, of the project location, as defined by the REA Regulation. This assessment included a detailed review of available background

information from a variety of sources, including the Ministry of Natural Resources and Forestry (MNRF), Essex Region Conservation Authority (ERCA), municipal files, existing studies, and aerial imagery, and other available online and/or published resources.

Also in accordance with the REA Regulation, NRSI conducted a site investigation to identify and characterize water bodies (lakes, seepage areas, intermittent/permanent watercourses) within 120m, or lake trout lakes within 300m, of the project location. Site investigations were conducted within the project area to confirm the presence/absence of water bodies identified within the records review, as well as to document new water bodies that were not previously identified. Field investigations also focused on the characterization of these features. The results of these assessments are provided in the *Belle River Wind Project Water Body Assessment* (NRSI 2015a). Based on a review of these results and the proposed Belle River Wind Project layout and design plans, an impact assessment was conducted to identify any potential impacts to water bodies located within the project area. The results of this impact assessment are provided in this report.

## 2.0 REA Regulations

Ontario Regulation (O. Reg.) 359/09 – *Renewable Energy Approvals* under *Part V.0.1 of the Act*, (herein referred to as the REA Regulation) made under the *Environmental Protection Act* (*EPA*) identifies the requirements for the development of renewable energy projects in Ontario. In accordance with the REA Regulation, the proposed Belle River Wind Project, classified as a Class 4 wind facility, is required to complete a REA submission.

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

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

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

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

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

## 3.0 Summary of Records Review

In accordance with the REA Regulation, a thorough records review for the proposed Belle River project area was completed (NRSI 2015a). This records review included correspondence with regional and provincial agency staff, and a review of several available online and published resources. The results of this records review have been summarized in Table 1 below. For more detail, refer to the *Belle River Wind Project Water Body Assessment* (NRSI 2015a).

**Table 1. Summary of the Records Review for the Belle River Wind Project**

| Criteria | Associated Watercourses |
|---|---|
| i. In a water body | The records review has identified 53 potential water bodies as overlapping the project location, including 8 within the Belle River drainage area, 10 within the Duck Creek drainage area, 6 within the Moison Creek drainage area, 26 within the Ruscom River drainage area, and 3 within the Puce River drainage area. These overlaps represent proposed crossing locations for access roads, cabling, and/or construction disturbance areas.<br><br>All of these water bodies represent potential permanent or intermittent watercourses and are designated as warmwater and/or coolwater fisheries. |
| ii. Within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity | None |
| iii. Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity | None |
| iv. Within 120 m of the average annual high water mark of a permanent or intermittent stream | The records review has identified 93 potential water bodies within 120m of the project location, including 13 within the Belle River drainage area, 12 within the Duck Creek drainage area, 12 within the Moison Creek drainage area, 48 within the Ruscom River drainage area, and 8 within the Puce River drainage area.<br><br>All of these water bodies represent potential permanent or intermittent watercourses and are designated as warmwater and/or coolwater fisheries. |
| v. Within 120 m of a seepage area | None |

## 4.0 Summary of Site Investigation

Comprehensive site investigations for the Belle River Wind Project were conducted on several dates in 2014 (NRSI 2015a). These site investigations included site-specific habitat assessments of water bodies throughout the project area. Of the 93 potential water bodies identified within the project area during the records review, a total of 38 of these were confirmed as water bodies based on the results of the site investigations. No lakes, lake trout lakes, or seepage areas were identified within the Belle River project area. A summary of the site investigation results is provided in Table 2 below.

**Table 2. Summary of Site Investigations for the Belle River Wind Project**

| Criteria | Associated Water Body |
|---|---|
| i. In a water body | Site investigations identified 33 confirmed water bodies to be overlapping the project location, including 7 within the Belle River drainage area, 2 within the Duck Creek drainage area, 4 within the Moison Creek drainage area, 15 within the Ruscom River drainage area and 5 within the Puce River drainage area.<br><br>These overlaps represent proposed crossing locations for access roads, cabling or construction disturbance areas. All of these water bodies represent permanent or intermittent watercourses, all of which are designated as warmwater and/or coolwater fisheries containing warmwater and/or coolwater baitfish species (Hayman et al. 2005).<br><br>Each of these water bodies will be considered in detail as part of the Water Body Report. |
| ii. Within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity | None |
| iii. Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity | None |
| iv. Within 120 m of the average annual high water mark of a permanent or intermittent stream | Site investigations identified 38 confirmed water bodies to be located within 120m of the project location, including 8 within the Belle River drainage area, 2 within the Duck Creek drainage area, 5 within the Moison Creek drainage area, 18 within the Ruscom River drainage area and 5 within the Puce River drainage area.<br><br>All of these water bodies represent permanent or |

| Criteria | Associated Water Body |
|---|---|
| | intermittent watercourses. All of which are designated as warmwater and/or coolwater fisheries containing warmwater and/or coolwater baitfish species (Hayman et al. 2005).<br><br>Each of these water bodies will be considered in more detail as part of the Water Body Report. |
| v. Within 120 m of a seepage area | None |

The results of this site investigation will be used, in conjunction with the records review, to identify potential impacts associated with the proposed development activities of the Belle River Wind Project.

## 5.0 Site Investigation

The following sections provide information pertaining to the design, construction, operation, and decommissioning activities associated with the proposed undertaking for the Belle River Wind Project.

### 5.1 Design

The proposed design layout includes the installation of up to 49 turbines, as well as associated supporting infrastructure including above and below ground electrical collector cabling, transmission lines, turbine access roads, pad-mounted transformers, collector substation, point of interconnection, and associated buildings (AECOM 2015a).

The proposed turbines include a total of up to 44 Siemens SWT-3.2-113 wind energy generating turbines for a total installed capacity of up to 100MW, although 49 proposed turbine locations will be permitted. Each turbine is to be mounted on a steel reinforced concrete foundation and equipped with a transformer located outside the base of the tower (AECOM 2015a).

Energy generated by the wind energy project will be collected via 34.5kV underground and above ground cabling and directed to a substation that will step-up the voltage from 34.5kV to 230kV. A project-owned 230kV transmission line will then travel to a connection point and from there will connect to a Hydro One Network Inc. (Hydro One) transmission line (AECOM 2015a).

A number of other supporting facilities will be required to be constructed. They include a collector substation, operations and maintenance building, interconnection station, meteorological towers, and a microwave tower (AECOM 2015a).

Access roads will be constructed to allow for access to turbines and other supporting facilities. The access roads will be gravel-based with adjacent and appropriately sized drainage channels (AECOM 2015a).

Project design details are provided in the *Design and Operations Plan Report* (AECOM 2015a).

Specific design details regarding water body crossing structures at access roads are not available at this time, although consultation with the MNRF, Fisheries and Oceans Canada (DFO), and the ERCA will occur during the design process.

## 5.2 Construction

Construction of the project is scheduled to begin in summer/fall 2016, and to be completed by the fall of 2017, although the exact timeline may shift either earlier or later depending on several other factors during the permitting and construction phases. During site preparation and construction of the proposed project, the following key activities will be undertaken (AECOM 2015b):

- Preparation of temporary work areas, including clearing and grubbing of vegetation;
- Upgrading of existing access roads and the construction of new access roads;
- Site grading as necessary;
- Preparation and establishment of construction staging areas;
- Preparation of the collector substation laydown area;
- Delivery of construction vehicles and equipment;
- Excavation and installation of wind turbine foundations;
- Installation of crane pads and turbine laydown areas;
- Erection of wind turbines;
- Installation of pad-mounted transformers;
- Installation of electrical collector lines on private lands and/or in municipal road allowances;
- Construction of collector substation;
- Installation of microwave and meteorological towers;
- Installation of a transmission line and interconnection station on private lands and/or in municipal road allowances;
- Construction of operations and maintenance building; and
- Reclamation of construction laydown and staging areas.

Based on current layouts, vegetation clearing, tree removal grubbing, and grading will occur throughout the project area to accommodate the access roads, turbines, crane pads, lay-down areas, and associated buildings. A detailed impact assessment associated with vegetation removal, related to terrestrial and wetland habitats within the

project area, is provided in the *Natural Heritage Assessment Environmental Impact Study* (NRSI 2015b).

A total of up to 44 operational turbines will be installed as part of the Belle River Wind Project. As part of the turbine erection, laydown areas and crane pads will be placed around the base of the turbine. Within this area, the ground will be leveled. The crane pads, measuring approximately 0.2 acres, will require the removal of topsoil and addition of clean, compacted, gravel. Individual turbine laydown areas will measure 1.5 acres (AECOM 2015b).

Underground electrical collector cabling on private lands as well as throughout the roadside collector cabling system will be installed by way of open cut trenches and/or in conduits installed by directional drilling. The open cut trenches will be approximately 1.5m deep, and all excavated soil will be retained and used to fill the trench after cables have been laid. Overhead collector lines along public road allowances will require installation of wood, steel or concrete monopoles to a depth of approximately 5-6 m. Conductors will be strung from pole to pole in a manner similar to local electrical distribution circuits, and will be spaced approximately 45-60 m apart. The overhead collector lines will converge at the collector substation (AECOM 2015b).

Access roads will be constructed up to 15m wide during the construction phase to allow for large crane access. After construction, these roads will be reduced to a final post-construction width of 4-8m. Access road construction will include clearing and grubbing of any vegetation, excavation of the topsoil layer and adding a layer of compacted material. Roads will be topped with a granular base material and crushed gravel. A woven geotextile or cement-stabilized soil will be utilized where necessary (AECOM 2015b).

New culverts may be required to maintain drainage in ditches at junctions with roadways and these will be constructed to support the construction equipment and delivery trucks. The details of culverts and their installation in addition to erosion control measures will be determined in conjunction with the ERCA and the Town of Lakeshore as part of their permitting processes (AECOM 2015b).

A number of other supporting facilities will also be constructed for this project. These supporting facilities include a collector substation, operations and maintenance building, interconnection station, meteorological towers, and a microwave tower (AECOM 2015a).

Detailed construction methods are provided in the *Construction Plan Report* (AECOM 2015b).

### 5.3 Operation

The operational phase of the Belle River Wind Project will include the operation and maintenance of up to 44 wind energy generating turbines. The operation of the project is expected to begin in 2017, and the operational lifespan of the project is approximately 20 years unless otherwise extended (AECOM 2015a).

During operations and maintenance of the proposed project, the following key activities will be undertaken:

- Preventative and unplanned maintenance of project components;
- Belle River Wind staff transport;
- Natural heritage field monitoring;
- Field monitoring to evaluate the performance of the project components and to conduct investigations / field visits to follow-up with any complaints received by Belle River Wind;
- Meter calibrations;
- Remote operation of the wind turbines;
- Maintenance of electrical collector and transmission lines; and
- Grounds maintenance in the vicinity of project components.

As part of the operation of the facility, potable water will be supplied by a well(s) or through the municipal water system. A septic bed will be constructed for the disposal of sewage from the operations and maintenance building (AECOM 2015a).

To effectively manage runoff during the operation of the project, drainage channels will be constructed adjacent to the access roads, as determined appropriate. The decision on where to construct these channels will be made during the detailed design stage of the project. No additional sediment control features, such as a storm water management facility, will be implemented (AECOM 2015a)

Vegetation control will be required around the transmission line and collector lines, if installed on poles, to prevent any damage to the lines and ensure safe operation. The vegetation is typically cleared by mechanized equipment (e.g., chainsaw / hydro axe) (AECOM 2015a).

For detailed information regarding design and operations activities, refer to the *Design and Operations Plan Report* (AECOM 2015a).

## 5.4 Decommissioning

The Project is anticipated to be in operation for 20 years. Following the operational term of the project, a decision will be made by Belle River Wind whether to refurbish and extend the operational life of the project or to decommission. If the project is not extended past its current commercial operational life, the wind turbine structures will be removed to the base of the foundation and portions of the foundations will be excavated and backfilled with subsoil and topsoil to allow agricultural activities to continue. Access road removal will be dependent on the requirements and agreements in place with the individual landowner. Affected lands will be restored to pre-construction state at the discretion of landowners. Decommissioning procedures will be similar, but in reverse order to those carried out in the construction phase.

Key decommissioning activities associated with the proposed project include:

- Disassembly and removal of wind turbine infrastructure (hubs, nacelles, blades and towers);
- Removal of pad-mounted transformers;
- Reclamation of access roads (at the discretion of landowners);
- All electrical collector aboveground infrastructure will be removed (at the discretion of landowners). Where the underground collector lines come to the surface, the collector lines will be cut and excavated to a depth of approximately 1 m, below grade;
- Removal of overhead cables and transmission poles that are not shared with Hydro One or other utilities;
- Disconnection of the collector substation;
- Disassembly and removal of the collector substation, microwave and meteorological towers, and transmission and grid connection infrastructure (foundations will be removed to a depth of 1 m); and
- Disassembly and removal of the operations and maintenance building infrastructure (at the discretion of landowners).

As part of the turbine removal, laydown areas and crane pads will be re-established around the base of the turbine. Within this area, the ground may require leveling. Following the removal of turbines, the land is expected to return to land use present prior to turbine installation. In all cases this will be agricultural activities. Removal of turbine components will also include the removal of the top 1m of the underground foundation, including any rebar or anchor bolts. Excavated foundation areas will be backfilled with subsoil and topsoil to match the original soil horizons and elevation, and the area will be graded and contoured (AECOM 2015c).

Following decommissioning of select Project components, the granular base material and crushed gravel used to construct the access roads will be removed from the site, at the discretion of the landowners. Culverts that were installed during construction will also be removed unless requested by the landowner. Any removal of the culverts will be completed in consultation with, and will receive approval from the applicable regulatory agencies, if required (AECOM 2015c).

During the decommissioning of the project, the underground cabling will be cut and excavated to a depth of approximately 1m below grade. Overhead cabling and transmission poles that are not shared with Hydro One or other utilities will be removed (AECOM 2015c).

The collector substation and point of interconnection will be dismantled and removed in accordance with provincial regulatory requirements at the time of the decommissioning. The Operations and Maintenance Building would be either disposed of or changed for an appropriate use based on consultation with the landowner at that time (AECOM 2015c).

The meteorological towers and microwave towers will be removed unless otherwise requested by the County of Essex, the Town of Lakeshore or local aviation groups (and agreed to by Belle River Wind) to have the towers remain in place. If removed, the towers will be dismantled and brought offsite and the concrete foundations will be removed completely to a depth of approximately 1m to allow for the reinstatement of previous land use (AECOM 2015c).

For detailed information regarding decommissioning activities, refer to the *Decommissioning Plan Report* (AECOM 2015a).

## 6.0 Impact Assessment

### 6.1 Approach to Impact Assessment

For the purposes of this report, the analysis of potential impacts has been divided into 2 categories. Firstly, generalized potential impacts on water bodies related to each project phase including design, construction, operation and decommissioning will be presented and discussed. Secondly, specific impacts to each water body identified within the project area will be discussed based on the site specific features and functions of the water body as well as the proposed works. These impacts are grouped by water body type, as identified by O. Reg. 359/09, s. 30 and include lakes, lake trout lakes, intermittent or permanent watercourses, springs and seeps.

This approach allows for all potential impacts to water bodies as they relate to project design, construction, operation and decommissioning to be identified and addressed clearly and concisely.

All identified impacts are discussed in this section assuming no mitigations are applied, therefore, are described as a “worst case scenario” for impacts to water bodies. Recommendations to mitigate identified impacts as well as monitoring of effectiveness of these measures are discussed in Section 7.0.

### 6.2 Generalized Project Phase Impacts

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

Impacts associated with each project phase including design, construction, operation, and decommissioning are discussed below in Sections 6.2.1 through 6.2.4. Specific impacts associated with each water body within the project area are discussed in Section 6.3. A summary of monitoring recommendations is provided in Section 6.4.

### 6.2.1 Design

Impacts associated with wind energy project design are related to 1) project layout and 2) the design of project components (i.e. culvert design at a watercourse crossing).

Project layout will dictate which water bodies will be directly impacted based on project component orientation (i.e., access roads crossing a water body) and the level of risk associated with the impact based on the proximity of the project component to the water body (i.e., 25m away versus 100m away). It is inferred that the greater the distance a water body is from a project component, the lower the risk for impacts to the feature. Topography (slope to the water body), the permeability of soils, and the density of vegetation and/or ground litter (i.e. dead grass, leaves, twigs, and logs) are also factors that determine the level of risk the impact has to water bodies.

With respect to project components being located within a water body, the REA Regulation sets clear guidelines as to where wind development is acceptable. In the case of Class 4 wind facilities like the proposed Belle River Wind Project, the development of turbines and transformer stations is prohibited in, and within 30m of, all water bodies. All other ancillary project components including transmission lines and access roads can be located at any distance from, including within, a water body if it is demonstrated that it will result in no negative environmental effects, through the completion of an impact study. The location of project components for the Belle River Wind Project is in accordance with the established water body setbacks as set out in the REA Regulation.

Within the proposed Belle River project area, turbine access roads and electrical collector cabling traverse intermittent/permanent watercourses and therefore are located within these features. Although there are no physical impacts of design on the water bodies, the best way to mitigate for potential impacts is at the design stage.

### 6.2.2 Construction

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

- Preparation of temporary work areas, including clearing and grubbing of vegetation;
- Upgrading of existing access roads and the construction of new access roads;
- Site grading as necessary;
- Preparation and establishment of construction staging areas;
- Preparation of the collector substation laydown area;
- Delivery of construction vehicles and equipment;
- Excavation and installation of wind turbine foundations;
- Installation of crane pads and turbine laydown areas;
- Erection of wind turbines;
- Installation of pad-mounted transformers;
- Installation of electrical collector lines on private lands and/or in municipal road allowances;
- Construction of collector substation;
- Installation of microwave and meteorological towers;
- Installation of a transmission line and interconnection station on private lands and/or in municipal road allowances;
- Construction of operations and maintenance building; and
- Reclamation of construction laydown and staging areas.

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

**Table 3. Summary of Construction Activities, Potential Negative Environmental Effects, Associated Impacts and Recommended Mitigation Measures for the Belle River Wind Project**

| Construction Activity | Potential Negative Effects | Associated Impacts | Recommended Mitigation Measures |
|---|---|---|---|
| Turbine Erection | • Increased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation<br>• Water contamination by oils, gasoline, grease, and other materials<br>• Contaminant spills due to the proximity of construction vehicles and machinery to water bodies<br>• Increase in impervious surfaces and increased surface run-off resulting from clearing of forested areas and re-grading of land<br>• Soil compaction as a result of heavy machinery and the stockpiling of heavy materials (i.e. soils) in the project area<br>• Serious harm to fish or fish habitat from physical changes to the stream channel, streambed and riparian vegetation | • Changes to watercourse flow (increase or decrease)<br>• Changes to thermal characteristics of a water body (warming of a water body through increased surface water run-off contributions) which can result in changes to fish community based on thermal preferences<br>• Decreased groundwater base flow and increases and decreases in water levels of seepage areas and lakes which can ultimately alter flow regimes<br>• Decreased infiltration to key areas (areas of recharge) due to newly impervious cover leading to interruptions to the natural water cycle<br>• Soil compaction reduces the permeability of soils and their ability to retain water during rain/snow melt events resulting in an increase in surface water run-off which will ultimately increase the erosion potential and the amount of sediment being transported into adjacent water bodies<br>• Soil compaction can also restrict re-vegetation of construction and temporary lay down areas<br>• Increased impervious cover facilitates increased run-off down a steep slope (i.e. a valley), resulting in increased potential for erosion and downstream sedimentation<br>• Sedimentation/Chemicals have the ability to kill fish, reduce water clarity, absorb energy from sunlight, and increase turbidity which can reduce the feeding success of sight-feeding fish and invertebrate species, reduce the reproductive success of aquatic species through the loss of nesting habitat and the smothering of eggs, inhibit plant photosynthesis, warm the water in a system, impair respiratory functions, lower tolerance to disease and toxicants and increase physiological stress (i.e. | • Schedule construction activities near water to take place within the low flow period in the late summer months where possible to avoid or minimize impacts.<br>• If in-water work is required (for culvert installation and or cabling installation), adhere to required timing windows confirmed through consultation with regulatory agencies, including the MNRF.<br>• Time clearing, grubbing, and grading activities to avoid seasonally wet periods (i.e., spring) where possible<br>• Implement riparian planting after construction as soon as weather permits, following reconstruction to stabilize watercourse channel banks and encourage rapid re-vegetation of disturbed soils to prevent collapse and erosion which, in turn, will minimize sedimentation, support fish habitat, and protect sensitive ecological functions that occur in water bodies<br>• If insufficient time is available in the growing season to establish vegetative cover, apply overwintering treatments such as erosion control blankets, fiber matting, rock (large, clean angular rocks) reinforcement/armoring or equivalent to contain the site over the winter period, and plant vegetative cover in the next growing season, followed by and maintenance and inspection<br>• Operate construction equipment (i.e., cranes, back hoes etc.), in a manner that minimizes disturbance to the banks of the watercourse and stays outside of the watercourse and bank area. Machinery should arrive on site in clean condition and is to be checked and maintained free of fluid leaks and must be refueled, washed and serviced a minimum |
| Overhead Cabling Installation | | | |
| Underground Cabling - Directional Drilling Method | • Increased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation<br>• Water contamination by oils, gasoline, grease, and other materials<br>• Increase in impervious surfaces and increased surface run-off resulting from clearing of forested areas and re-grading of land | | |

| Construction Activity | Potential Negative Effects | Associated Impacts | Recommended Mitigation Measures |
|---|---|---|---|
| Underground Cabling – Open Trench Method | • Increased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation<br>• Water contamination by oils, gasoline, grease, and other materials<br>• Increase in impervious surfaces and increased surface run-off resulting from clearing of forested areas and re-grading of land<br>• Serious harm to fish and fish habitat caused by physical changes to the stream channel, streambed and riparian vegetation through filling, straightening and enclosing a watercourse within the crossing area<br>• Physical alteration or removal of aquatic habitat features (i.e. such as refuge pools, spawning beds etc.)<br>• Fish passage temporarily restricted and migration patterns disrupted as a result of construction activities<br>• Excess sediment suspended and carried downstream by stream flow during the installation and removal of temporary structures<br>• Minor, isolated, short term dewatering of shallow groundwater from excavation areas required when excavation intercepts an area of shallow groundwater table conditions | Newcombe and MacDonald 1991; Ward 1992; Waters 1995; Osterling *et al.* 2010)<br>• A contaminant spill can result in the degradation of water quality which may impose significant behavioral and physiological stress on fish species, leading to impaired spawning, feeding or routine activities<br>• Water quality that remains at levels unacceptable for aquatic life can result in death of aquatic organisms which in some cases may occur instantly based on contaminant<br>• Watercourses can potentially convey hazardous materials for long distances based on flow in the watercourse and can affect large areas of habitat<br>• Stockpiling construction related materials such as soil, shrubs, trees and roots wads in or near a water body can enter the water body if not properly contained which can result in the destruction or disturbance of fish habitat and flow patterns, increase the risk for flooding or erosion and sedimentation and impair water quality<br>• Disruption of fish habitat has the potential to impair spawning, feeding or routine activities of the resident fish community<br>• Potential for fish to display avoidance behavior of the actively disturbed area; this can result in the temporary displacement of fish during the construction phase of the project | of 30m away from all water bodies and other drainage features to prevent any deleterious substances from entering a watercourse<br>• Store fuel and other construction related materials securely away from any drainage features and locate construction staging areas 30m away from any water body<br>• Develop a Spill Response Plan (SRP) prior to commencement of construction to provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other hazardous liquids and chemicals; keep a spill kit on site at all times and train on-site workers in the use of this kit and the the SRP<br>• Restrict construction equipment to designated controlled vehicle access routes to minimize the potential for soil compaction,<br>• Remove construction debris from the site and stabilize it to prevent it from entering the nearby water bodies<br>• Remove and dispose of any waste generated from the site appropriately off site according to municipal standards<br>• Avoid construction during high volume rain events (20mm in 24 hours) and significant snow melts/thaws where possible and resume once soils have stabilized to avoid risk of erosion, soil compaction or the potential for sediment release into nearby watercourses<br>• Develop a Flood Response Plan to deal with on-site flooding as to mitigate any possible effects to the aquatic environment<br>• Develop an Erosion and Sediment Control Plan (ESC) to minimize the potential for construction related sediment release into nearby watercourses (ESC Guideline), and prepare ESC condition |

| Construction Activity | Potential Negative Effects | Associated Impacts | Recommended Mitigation Measures |
|---|---|---|---|
| | | | reports as part of the monitoring and maintenance plan<br>• Perform in-water work (if required) in the dry where possible. If this is not possible, short-term isolated dewatering will be required. Prior to dewatering, isolate the work area with the installation of a temporary water containment structure. The structure should form an impermeable enclosure, which also prevent escape of debris and sediment to the exterior water body. Construct a by-pass channel to maintain flow through the watercourse and prevent from back flooding and ultimately overtopping the water containment structure<br>• Prior to groundwater dewatering, evaluate anticipated discharge rates and estimated zones of influence (ZOI) in relation to the associated water bodies to ensure the volumes will not impact water body hydrologic function<br>• Where a water body is located within a groundwater dewatering ZOI, develop appropriate strategies for dewatering in consultation with regulatory agencies during the detailed design phase of the project.<br>• Monitor water levels of the water body to determine if dewatering activities are resulting in alteration of water levels within the water body<br>• If discharging to a municipal storm sewer system, ensure that groundwater quality meets the objectives of the municipal storm sewer by-law prior to discharge. To mitigate potential effects associated with the discharge, obtain water quality samples prior to discharge to ensure the quality is suitable for discharge and will not result in an impact to the receiving watercourse. If the groundwater is not suitable for discharge, identify alternate disposal locations or carry out adequate treatment. The success of all mitigation will be verified though groundwater quality sampling |

| Construction Activity | Potential Negative Effects | Associated Impacts | Recommended Mitigation Measures |
|---|---|---|---|
| | | | • Prior to surface water dewatering, collect and relocate fish to a suitable location, preferably downstream and away from the construction area. This should be executed through the development of a Fish Salvage Plan.<br>• Horizontal directional drilling should be executed at a minimum depth established by geotechnical studies to limit the potential impacts associated with the possibility of a 'frac-out'<br>• Locate drilling entry/exit shafts at least 3m from riparian vegetation or top of bank, whichever is greater, or at a distance otherwise agreed upon with regularly agencies<br>• Develop and implement an emergency frac-out response plan including steps to contain, monitor and clean-up in response to the event |
| Access Roads – Water Crossing Installations | • Increased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation<br>• Water contamination by oils, gasoline, grease, and other materials<br>• Increase in impervious surfaces and increased surface run-off resulting from clearing of forested areas and re-grading of land<br>• Serious harm to fish and fish habitat caused by physical changes to the stream channel, streambed and riparian vegetation through filling, straightening and enclosing a watercourse within the crossing area<br>• Physical alteration or removal of aquatic habitat features (i.e. such as | • Changes to watercourse flow (increase or decrease)<br>• Changes to thermal characteristics of a water body (warming of a water body through increased surface water run-off contributions)<br>• Decreased groundwater base flow and increases and decreases in water levels of seepage areas and lakes<br>• Decreased infiltration to key areas (areas of recharge) due to newly impervious cover leading to interruptions to the natural water cycle<br>• Increase in impervious cover facilitates increased runoff down a steep slope (i.e. a valley), could increase potential for erosion and downstream sedimentation<br>• Changes in water chemistry resulting in decreased water quality, ultimately resulting in changes in benthic invertebrate and fish community<br>• Loss of natural substrates and alteration of food supply | • Avoid seasonally wet periods (i.e. spring) when conducting clearing, grubbing, and grading activities. Avoid construction during high volume rain events (20mm in 24 hours) and significant snow melts/thaws where possible and resume once soils have stabilized to avoid risk of erosion, soil compaction or the potential for sediment release into nearby watercourses<br>• Develop a Flood Response Plan to deal with on-site flooding as to mitigate any possible effects to the aquatic environment<br>• Develop an Erosion and Sediment Control Plan (ESC) that will minimize the potential for construction related sediment release into nearby watercourses (ESC Guideline); Prepare ESC condition reports as part of the monitoring and maintenance plan<br>• Operate construction equipment (i.e. cranes, back hoes etc.) in a manner that minimizes disturbance |

| Construction Activity | Potential Negative Effects | Associated Impacts | Recommended Mitigation Measures |
|---|---|---|---|
| | refuge pools, spawning beds etc.)<br>• Temporary disruption of substrates/habitat at locations where in-water work is required<br>• Fish passage temporarily restricted and migration patterns disrupted as a result of construction activities<br>• Completion of in-water work requiring in-stream dewatering and the construction of temporary dykes or cofferdams<br>• Excess sediment suspended and carried downstream by stream flow during the installation and removal of temporary structures<br>• Minor, isolated, short term dewatering of shallow groundwater from excavation areas required when excavation intercepts an area of shallow groundwater table conditions | (i.e. benthos, macrophytes)<br>• Creating a barrier to fish passage (using culvert styles that limit fish movement and migration) | to the banks of the watercourse and stay outside of the watercourse and bank area as much as possible<br>• Machinery should arrive on site in clean condition and is to be checked and maintained free of fluid leaks and must be refueled, washed and serviced a minimum of 30m away from all water bodies and other drainage features to prevent any deleterious substances from entering a watercourse<br>• Store fuel and other construction related materials securely away from any drainage features and locate construction staging areas 30m away from any water body<br>• Develop a Spill Response Plan (SRP) prior to commencement of construction to provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other hazardous liquids and chemicals, a spill kit must also be kept on site at all times and on-site workers must be trained in the use of this kit and be fully aware of the SRP<br>• Restrict construction equipment to designated controlled vehicle access routes to minimize the potential for soil compaction<br>• Remove construction debris from the site and stabilize the debris to prevent it from entering the nearby water bodies<br>• Remove and dispose of any waste generated from the site appropriately according to municipal standards<br>• Develop fish habitat compensation measures, as required, should serious harm to fish habitat be anticipated |
| Access Roads and Ancillary Facilities | • Increased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation<br>• Water contamination by oils, gasoline, grease, and other materials<br>• Increase in impervious surfaces and increased surface run-off resulting from clearing of forested areas and re-grading of land<br>• Soil compaction as a result of heavy machinery and the stockpiling of | • Changes to watercourse flow (increase or decrease)<br>• Changes to thermal characteristics of a water body (warming of a water body through increased surface water run-off contributions) which can result in changes to fish community based on thermal preferences<br>• Decreased groundwater base flow and increases and decreases in water levels of seepage areas and lakes which can ultimately alter flow regimes<br>• Decreased infiltration to key areas (areas of recharge) due to newly impervious cover leading to interruptions to | |

| Construction Activity | Potential Negative Effects | Associated Impacts | Recommended Mitigation Measures |
|---|---|---|---|
| | heavy materials (i.e. soils) in the project area | the natural water cycle<br>• Soil compaction reduces the permeability of soils and their ability to retain water during rain/snow melt events resulting in an increase in surface water run-off which will ultimately increase the erosion potential and the amount of sediment being transported into adjacent water bodies<br>• Soil compaction can also restrict re-vegetation of construction and temporary lay down areas<br>• Increased impervious cover facilitates increased run-off down a steep slope (i.e. a valley), resulting in increased potential for erosion and downstream sedimentation<br>• Sedimentation has the ability to reduce water clarity, absorb energy from sunlight, and increase turbidity which can reduce the feeding success of sight-feeding fish and invertebrate species, reduce the reproductive success of aquatic species through the loss of nesting habitat and the smothering of eggs, inhibit plant photosynthesis, warm the water in a system, impair respiratory functions, lower tolerance to disease and toxicants and increase physiological stress (i.e. Newcombe and MacDonald 1991; Ward 1992; Waters 1995; Osterling *et al.* 2010)<br>• A contaminant spill can result in the degradation of water quality which may impose significant behavioral and physiological stress on fish species, leading to impaired spawning, feeding or routine activities<br>• Water quality that remains at levels unacceptable for aquatic life can result in death of aquatic organisms which in some cases may occur instantly based on contaminant<br>• Watercourses can potentially convey hazardous materials for long distances based on flow in the watercourse and can affect large areas of habitat<br>• A release of contaminant or 'spill' into a water body is | • If dewatering is required, isolate the work area and establish a by-pass channel to maintain flow quantity through the watercourse<br>• Collect and relocate fish to a suitable location, preferably downstream and away from the construction area prior to surface water dewatering. This should be executed by a qualified fisheries biologist.<br>• Verify the success of all mitigation though groundwater quality sampling |

| Construction Activity | Potential Negative Effects | Associated Impacts | Recommended Mitigation Measures |
|---|---|---|---|
| | | considered a release of a 'deleterious substance' and is prohibited under the *Fisheries Act*, the *Environmental Protection Act* and *Ontario Water Resources Act*<br><br>• Stockpiling construction related materials such as soil, shrubs, trees and roots wads in or near a water body can enter the water body if not properly contained which can result in the destruction or disturbance of fish habitat and flow patterns, increase the risk for flooding or erosion and sedimentation and impair water quality | |

### 6.2.3 Operation

During the operational phase of the project, it is anticipated that impacts to water bodies will be limited and associated with increased traffic access within the project area as well as ongoing maintenance activities. This includes a risk of contaminant spills, and erosion and sedimentation from maintenance activities (i.e. removal of vegetation). Contaminant spills, erosion and sedimentation result in the degradation of surface water quality within receiving water bodies.

Operational related impacts resulting from the maintenance of the Belle River Wind Project and associated mitigation measures for these impacts are summarized in Table 4.

**Table 4. Summary of Operational Activities, Potential Negative Environmental Effects, Associated Impacts and Recommended Mitigation Measures for the Belle River Wind Project**

| Operational Activity | Potential Negative Effects | Associated Impacts | Recommended Mitigation Measures |
|---|---|---|---|
| Vegetation Control<br><br>Increased Vehicle Access | • Increased erosion, sedimentation, and turbidity resulting from removal of upland and riparian vegetation<br>• Water contamination by oils, gasoline, and grease, which could result in a fish kill or serious harm to fish habitat<br>• increase in surface run-off resulting from clearing of vegetation | • Changes to thermal characteristics of a water body (warming of a water body through increased surface water run-off contributions) which can result in changes to fish community based on thermal preferences<br>• increased potential for erosion and downstream sedimentation<br>• Sedimentation has the ability to reduce water clarity, absorb energy from sunlight, and increase turbidity which can reduce the feeding success of sight-feeding fish and invertebrate species, reduce the reproductive success of aquatic species through the loss of nesting habitat and the smothering of eggs, inhibit plant photosynthesis, warm the water in a system, impair respiratory functions, lower tolerance to disease and toxicants and increase physiological stress (i.e. Newcombe and MacDonald 1991; Ward 1992; Waters 1995; Osterling *et al.* 2010)<br>• A contaminant or spill can result in the degradation of water quality which may impose significant behavioral and physiological stress on fish species, leading to impaired spawning, feeding or routine activities | • Develop an Erosion and Sediment Control Plan (ESC) that will minimize the potential for construction related sediment release into nearby watercourses (ESC Guideline), and prepare ESC condition reports will be prepared as part of the monitoring and maintenance plan<br>• Store fuel and other construction related materials securely away from any drainage features<br>• Implement a Spill Response Plan (SRP) to provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other hazardous liquids and chemicals, a spill kit must also be kept on site at all times and on-site workers must be trained in the use of this kit and be fully aware of the SRP<br>• Restrict vehicles to designated controlled access routes to minimize the potential for soil compaction |

### 6.2.4 Decommissioning

The decommissioning phase impacts are essentially the same as the construction-phase impacts, albeit to a potential lesser extent due to the lack of removal of water body crossings if landowners request that access roads remain in place. Please see Section 6.2.2 for impacts and mitigation measures associated with decommissioning of the Belle River Wind Project.

During the decommissioning phase, if a decision is made to discontinue the project and remove all turbines and associated infrastructure, it is recommended that all watercourse crossing structures will remain in place. Leaving structures in place will eliminate the need for additional in-water work which will reduce the potential for sedimentation, contaminant spills, fish kill and physical impacts to habitat commonly associated with this type of work. Additionally, this will minimize the necessary remediation activities that are required to rehabilitate the site following the destruction and alteration of riparian vegetation and in-stream aquatic habitat.

If a decision is made to remove all crossing structures upon decommissioning of the project, it is recommended that a comprehensive management plan be prepared prior to the commencement of any activities. This plan will include the proper steps required for removing structures and creating the lowest collective footprint on the site. Steps must be taken in consultation with the appropriate agencies while respecting in-water timing windows provided by the local district MNRF. Finally, a mitigation and rehabilitation strategy will be prepared to counteract any and all negative environmental impacts caused by decommissioning activities.

## 6.3 Site Specific Water Body Impacts and Mitigations

In accordance with the REA Regulation, the proposed Belle River Wind Project area has been assessed by NRSI Biologists for the presence of water bodies through the completion of a records review and site investigations. Water bodies identified within 120m of the project location were further evaluated for potential impacts as they relate to the proposed undertaking. General project phase impacts are discussed in Section 6.2. Site specific impacts to identified water bodies are discussed below.

For the purposes of this report, the analysis of potential impacts has been divided by water body type, as defined by the REA Regulation. These water body types include permanent/intermittent water bodies (further separated into crossings and those within 0.1 to 120m). Since there were no lakes, lake trout lakes, or seepage areas identified within the project area, these features have not been specifically addressed in this report.

The following section outlines potential site specific impacts on water bodies associated with the proposed Belle River Wind Project.

### 6.3.1 Intermittent/Permanent Watercourses

A total of 38 intermittent/permanent watercourses have been identified within the Belle River project area. These water bodies contribute to water quality and quantity and also provide direct or in-direct habitat for fish and other aquatic organisms and must be given consideration in order to protect them from immediate or prolonged degradation.

NRSI identified 33 water bodies that will be crossed by project components (access road, cabling, and/or construction disturbance area) at 73 individual locations (specific water bodies may have infrastructure crossing at multiple locations). Each of these 73 crossing locations involves at least one type of project component, but typically involves multiple project components (i.e. access road and underground cabling). Each of these individual crossing locations has been summarized in Table 5 below. Refer to Maps 2-12 for specific crossing and assessment locations.

**Table 5. Summary of Intermittent/Permanent Watercourse Crossing Locations, Site Specific Considerations, Potential Impacts and Recommended Mitigation Measures**

| Drainage Area | Water Body | Survey Location(s) | Crossing Infrastructure | Site Specific Considerations* | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| Belle River | Belle River | WB131<br>WB184 | • Cabling (2 locations)<br>• Construction Activity (2 locations) | Permanent water body, naturalized, defined channel, aquatic vegetation present<br><br>Moderate sensitivity habitat, multiple species present, large watercourse, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | Outlined in Section 6.2. | Outlined in Section 6.2 |
| | Diesbourg Drain | WB40 | • Access Road<br>• Cabling<br>• Construction Activity | Intermittent drainage channel, straightened, aquatic vegetation present, tile drain outlets<br><br>Low sensitivity habitat, in-water work will apply if cabling will be used to cross the watercourse via open cut trench and a culvert will be needed for access road, potential to be done in the dry, should consider overhead lines or directional drilling | | |
| | Unknown Drain CC | WB135 | • Cabling<br>• Construction Activity | Roadside drainage ditch with intermittent water body, channelized with some flow, aquatic vegetation present<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, potential to be done in the dry, should consider overhead lines or directional drilling | | |
| | Poisson Drain | WB178 | • Access Road<br>• Cabling<br>• Construction Activity | Drainage ditch with intermittent flow, aquatic vegetation present, tile drain outlets<br><br>Low sensitivity habitat, in-water work will apply if cabling will be used to cross the watercourse via open cut trench and a culvert will be required for the access road, should consider overhead lines or directional drilling | | |

| Drainage Area | Water Body | Survey Location(s) | Crossing Infrastructure | Site Specific Considerations* | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| | Lower Part of Browns Creek Drain | WB179<br>WB183<br>WB189<br>WB220 | • Access Road (1 location)<br>• Cabling (4 locations)<br>• Construction Activity (4 locations) | Permanent water body with meanders, aquatic vegetation, defined channel, flowing<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling. In-water work will be required if culvert is required for access road. | | |
| | Beauchene Drain Branch | WB186 | • Cabling<br>• Construction Activity | Drainage ditch with intermittent flow, aquatic vegetation present, tile drain outlets<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | 3rd Concession and King and Tap Drain | WB193<br>WB194 | • Cabling (2 locations)<br>• Construction Activity (2 locations) | Permanent water body with defined channel, aquatic vegetation, high flow<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| Duck Creek | Duck Creek | WB1<br>WB2<br>WB3<br>WB4<br>WB5<br>WB6<br>WB7<br>WB8<br>WB42<br>WB175 | • Access Road (6 locations)<br>• Cabling (9 locations)<br>• Construction Activity (9 locations)<br>• Supporting Infrastructure (1 location) * | Permanent water body, naturalized, defined channel, tile drain outlets present, flows through agricultural field<br><br>Moderate sensitivity habitat, fish species present, in-water work will apply as a new culvert installation is required and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling. | Outlined in Section 6.2. | Outlined in Section 6.2 |

| Drainage Area | Water Body | Survey Location(s) | Crossing Infrastructure | Site Specific Considerations* | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| | 2nd Concession Road Drain East Side | WB51 | • Access Road<br>• Cabling<br>• Construction Activity | Roadside drainage ditch with intermittent water body, channelized with some flow, aquatic vegetation present<br><br>Low sensitivity habitat, in-water work will apply a culvert will be required for the access road and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| Moison Creek | Moison Creek | WB9<br>WB95<br>WB61<br>WB106<br>WB153<br>WB152 | • Access Road (1 location)<br>• Cabling (6 locations)<br>• Construction Activity (6 locations)<br>• Supporting Infrastructure (1 location)* | Permanent water body, defined, natural channel with flow, aquatic vegetation present, flows through agricultural field (WB9, WB61, WB95, and WB106). Portions channelized with grass with aquatic vegetation and flow (WB106 and WB153), pools with algae (WB152)<br><br>Moderate sensitivity habitat, fish species present, no in-water work as directional drilling is being used for cabling (WB9). In-water work will be required as a new culvert installation will be necessary for access roads and for any cabling that crosses via open cut trench, should consider overhead lines or directional drilling | Outlined in Section 6.2. | Outlined in Section 6.2 |
| | Doran Drain | WB58 | • Access Road<br>• Cabling<br>• Construction Activity | Channelized, grassed drainage ditch with intermittent water body, flow and aquatic vegetation present<br><br>Low sensitivity habitat, in-water work will apply as a culvert will be required for the access road and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | Doran Relief Drain | WB57 | • Access Road<br>• Cabling<br>• Construction Activity | Roadside drainage ditch with intermittent flow, aquatic vegetation present<br><br>Low sensitivity habitat, in-water work will apply as a culvert will be required for the access road and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |

| Drainage Area | Water Body | Survey Location(s) | Crossing Infrastructure | Site Specific Considerations* | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| | Caza Drain | WB60<br>WB136 | • Access Road (1 location)<br>• Cabling (2 locations)<br>• Construction Activity (2 locations) | Channelized, grassed drainage ditch with intermittent flow and aquatic vegetation present<br><br>Low sensitivity habitat, in-water work will apply as a culvert will be required for the access road and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| Ruscom River | Ruscom River | WB74<br>WB76<br>WB130 | • Cabling (3 locations)<br>• Construction Activity (3 locations) | Permanent water body, defined, natural channel with flow. Meanders through meadow (WB74) and through residential area (WB130). Narrow riparian buffer from agricultural field (WB76)<br><br>Moderate sensitivity habitat, fish species present, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | Outlined in Section 6.2. | Outlined in Section 6.2 |
| | 4th Concession Drain | WB62<br>WB63<br>WB17<br>WB44 | • Access Road (3 locations)<br>• Cabling (4 locations)<br>• Construction Activity (4 locations)<br>• Supporting Infrastructure (3 locations)* | Roadside drainage ditch with intermittent flow, channelized and defined, aquatic vegetation present, tile drain outlets present<br><br>Low sensitivity habitat, in-water work will apply as a culvert will be required for the access road and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | Dupuis Drain | WB19 | • Access Road<br>• Cabling<br>• Construction Activity | Channelized, grassed drainage ditch with intermittent flow<br><br>Low sensitivity habitat, in-water work will apply as a culvert will be required for the access road and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |

| Drainage Area | Water Body | Survey Location(s) | Crossing Infrastructure | Site Specific Considerations* | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| | Souligny Drain | WB66<br>WB69<br>WB21 | • Access Road (1 location)<br>• Cabling (3 locations)<br>• Construction Activity (3 locations) | Permanent defined, natural channel with flow (WB66, WB69, WB21), no riparian buffer from agricultural field, heavily eroded, steep banks, tile drain outlets present (WB66, WB69)<br><br>Low sensitivity habitat, no in-water work if overhead cabling used, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider directional drilling. In-water work will also apply if culvert installed for access road. | | |
| | Turnbull Drain | WB117<br>WB121 | • Cabling (4 locations)<br>• Construction Activity (4 locations) | Channelized drainage ditch with intermittent flow, tile drain outlets present<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | Mailloux Drain | WB125<br>WB127 | • Cabling (2 locations)<br>• Construction Activity (2 locations) | Channelized drainage ditch with intermittent flow, aquatic vegetation present, tile drain outlets present<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | Marentette Drain | WB83 | • Access Road<br>• Cabling<br>• Construction Activity | Roadside drainage ditch with intermittent flow, channelized, aquatic vegetation present, tile drain outlets present<br><br>Low sensitivity habitat, in-water work will apply as a culvert will be required for the access road and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |

| Drainage Area | Water Body | Survey Location(s) | Crossing Infrastructure | Site Specific Considerations* | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| | Baseline Drain | WB96<br>WB142 | • Access Road (1 location)<br>• Cabling (2 locations)<br>• Construction Activity (2 locations) | Roadside drainage ditch with permanent/intermittent water present, channelized with some flow, aquatic vegetation present, tile drain outlets present<br><br>Low sensitivity habitat, in-water work will apply as a culvert will be required for the access road and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | North Rear Road Drain | WB100<br>WB102 | • Cabling (2 locations)<br>• Construction Activity (2 locations) | Channelized drainage ditch with intermittent flow, tile drain outlets present. Portions with aquatic vegetation present (WB102)<br><br>Low sensitivity habitat, no in-water work if overhead cabling used, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider directional drilling | | |
| | 6-7 Sideroad Drain | WB108<br>WB115 | • Cabling (2 locations)<br>• Construction Activity (2 locations) | Channelized drainage ditch with intermittent flow, aquatic vegetation present<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | West Townline Drain | WB120 | • Cabling<br>• Construction Activity | Channelized drainage ditch with intermittent flow, aquatic vegetation present<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | North Townline Drain 2 | WB122 | • Cabling<br>• Construction Activity | Channelized drainage ditch with intermittent flow, aquatic vegetation present<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |

| Drainage Area | Water Body | Survey Location(s) | Crossing Infrastructure | Site Specific Considerations* | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| | Malden Road Drain | WB159<br>WB161 | • Cabling (2 locations)<br>• Construction Activity (2 locations) | Channelized drainage ditch with permanent/intermittent flow, aquatic vegetation present<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | Brown Drain | WB165 | • Cabling<br>• Construction Activity | Channelized drainage ditch with permanent/intermittent flow, aquatic vegetation present<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | Alexander Bendit Drain | WB168 | • Cabling<br>• Construction Activity | Channelized drainage ditch with permanent/intermittent flow, aquatic vegetation present<br><br>Low sensitivity habitat, no in-water work if overhead cabling used, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider directional drilling | | |
| Puce River | Renaud Line Drain North Part | WB196<br>WB204 | • Access Road (1 location)<br>• Cabling (2 locations)<br>• Construction Activity (2 locations) | Intermittent drainage ditch with flow, some gravel present. Defined channel<br><br>Low sensitivity habitat, in-water work will apply as a culvert will be required for the access road and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | Outlined in Section 6.2. | Outlined in Section 6.2 |
| | Cronmiller Drain | WB219<br>WB217<br>WB222 | • Access Road (1 location)<br>• Cabling (3 locations)<br>• Construction Activity (3 locations) | Intermittent drainage ditch with flow, aquatic vegetation present, defined channel<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling. In-water work will also apply if a culvert is needed for the access road | | |

| Drainage Area | Water Body | Survey Location(s) | Crossing Infrastructure | Site Specific Considerations* | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| | Bauer Branch of 4th Concession Drain | WB211 | • Cabling<br>• Construction Activity | Intermittent drainage ditch with flow, aquatic vegetation present, defined channel<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | 4th Concession Drain | WB212<br>WB214<br>WB215 | • Access Road (1 location)<br>• Cabling (3 locations)<br>• Construction Activity (3 locations) | Permanent water body with flow, aquatic vegetation present, defined channel<br><br>Low sensitivity habitat, in-water work will apply as a culvert will be required for the access road and if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |
| | Unknown Drain BB | WB213 | • Cabling<br>• Construction Activity | Permanent water body with flow, no connectivity from perched culvert, defined channel<br><br>Low sensitivity habitat, in-water work will apply if cabling will cross the watercourse via open cut trench, should consider overhead lines or directional drilling | | |

**On the mapping, this watercourse appears to be overlapped; however, the supporting infrastructure at this location will be located >30m from the watercourse*

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

In addition to the crossing locations identified above, there are 9 intermittent/permanent water bodies that have infrastructure proposed within 120m of the project location, without the infrastructure specifically crossing the water body. Of these 9 water bodies, each may have more than 1 location where project infrastructure is located within 120m. The water body locations are summarized in Table 6 below.

**Table 6. Summary of Intermittent/Permanent Watercourses within 0.1m to 120m of the Belle River Project Location, Site Specific Considerations, Potential Impacts and Recommended Mitigation Measures**

| Drainage Area | Water Body | Survey Location(s) | Closest Distance to Project Components within 120m (m) | Site Specific Considerations | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| Belle River | Belle River | No WB Point (near WB179, adjacent to W Belle River Road) | AR- 60<br>CB- 60<br>CA- 60 | Permanent water body, naturalized, defined channel, aquatic vegetation present<br><br>Moderate sensitivity habitat, no in-water work, increased risk of impacts based on proximity to water body (closer = greater risk) | Outlined in Section 6.2., in-water work does not apply, new crossing structures do not apply | Outlined in Section 6.2 (excluding mitigation measure associated with in-water works, drilling and new water crossing design) |
| | Hostine Drain | WB201 | AR- 40<br>CB- 40<br>CA- 40 | Permanent drainage ditch with defined channel, high flows<br><br>Low sensitivity habitat, no in-water work, increased risk of impacts based on proximity to water body (closer = greater risk) | | |
| | Lower Part of Browns Creek Drain | WB220 | WT- 55<br>CB- 64<br>CA- 64 | Permanent water body with meanders, aquatic vegetation, defined channel, flowing<br><br>Low sensitivity habitat, no in-water work, increased risk of impacts based on proximity to water body (closer = greater risk) | | |

| Drainage Area | Water Body | Survey Location(s) | Closest Distance to Project Components within 120m (m) | Site Specific Considerations | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| Moison Creek | Bondy Drain | WB155 | CB- 2<br>CA- 2 | Channelized, grassed drainage ditch with intermittent water body, minimal flow and aquatic vegetation present<br><br>Low sensitivity habitat, no in-water work, increased risk of impacts based on proximity to water body (closer = greater risk) | | |
| Ruscom River | Ruscom River | WB13<br>WB170 | WT-93<br>AR- 38<br>CB- 15<br>CA- 15 | Permanent water body, defined, natural channel with flow. Riparian buffer present (WB13 and WB170)<br><br>Moderate sensitivity habitat, no in-water work, increased risk of impacts based on proximity to water body (closer = greater risk) | | |
| | Turnbull Drain | WB25 | WT- 32<br>AR- 3<br>CB- 3<br>CA- 3 | Channelized drainage ditch with intermittent flow, tile drain outlets present | | |

| Drainage Area | Water Body | Survey Location(s) | Closest Distance to Project Components within 120m (m) | Site Specific Considerations | Potential Impacts | Recommended Mitigation Measures |
|---|---|---|---|---|---|---|
| | Trepanier Drain | WB33<br>WB34<br>WB129 | AR- 3<br>CB- 3<br>CA- 3 | Low sensitivity habitat, no in-water work, increased risk of impacts based on proximity to water body (closer = greater risk) | | |
| | Middle Road Drain | WB169 | CB- 1<br>CA- 1 | Channelized drainage ditch with permanent/intermittent flow, aquatic vegetation present<br><br>Low sensitivity habitat, no in-water work, increased risk of impacts based on proximity to water body (closer = greater risk) | | |
| | Knister Drain | WB171 | CB- 16<br>CA- 16 | | | |

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

**Legend**
WT: Wind Turbine
AR: Access Road
CB: Cabling
CA: Construction Activity/Temporary Infrastructure/Balance of Operations
SI: Supporting Infrastructure - Building/Substation/Laydown Area/Point of Interconnect

## 6.4 Monitoring

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

Pre-construction monitoring is recommended where baseline conditions must be determined (i.e., water quality, water levels etc.). Active construction monitoring will be required at all locations where drainage features and water bodies are located within 120m of project components. Post-construction monitoring may also be required to certify that proper restoration, stabilization, and overall quality of runoff is returned to pre-construction conditions, as assessed by the EM, as well as to satisfy regulatory permitting and/or authorizations. Detailed monitoring plans will be developed within the detailed design phase and will incorporate other monitoring required by regulatory permitting and authorizations (i.e., Fisheries Act Authorization etc.). They will also incorporate specific detail of developed plans (i.e. ESC Plan, Flood Response Plan etc.).

General recommended monitoring activities are summarized in Table 7 below.

**Table 7. Summary of General Monitoring Recommendations**

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

| Recommended Monitoring | Timing of Monitoring | Estimated Frequency of Monitoring |
|---|---|---|
| Identify changes to existing aquatic habitat | • Pre-construction (to document existing conditions)<br>• Construction Phase | • Once during pre-construction<br>• Daily during in-water work and work within 30m of a water body<br>• Weekly for work occurring within 31-120m of a water body |
| Monitor end point of dewatering discharge for water quality and erosion (if dewatering) | • Construction phase | • Daily erosion checks during discharge<br>• Water quality prior to discharge, once a week thereafter or as described by agencies |
| Monitor by-pass channel (if applicable) | • Construction phase | • Daily checks of the channel to ensure it is functioning appropriately and water is flowing through as designed |
| Monitor aquatic habitat at drilling locations (if drilling) | • Construction phase | • Continuous monitoring of aquatic habitat conditions when drilling underneath a water body |
| Monitor surface water quality for general parameters (i.e. temperature, pH, dissolved oxygen, conductivity, TSS, turbidity) | • Pre-construction (to document baseline conditions)<br>• Construction Phase | • Pre-construction sampling should meet agency requirements as to adequately establish baseline conditions<br>• Frequent measurements of in-situ parameters and turbidity during construction<br>• Other general water quality parameters as required by agency |
| Monitor water levels within water bodies during groundwater dewatering | • Pre-construction (to document baseline conditions)<br>• Construction Phase<br>• Post-construction | • Pre-construction monitoring frequency adequate to characterize baseline levels<br>• Staff gauge readings daily during dewatering<br>• Continuous level loggers (logged in 1 hour increments and downloaded weekly) during active dewatering<br>• Monitor post-construction until water levels return to baseline |

## 7.0 Environmental Impact Study Summary

A summary of general project phase potential impacts, recommended mitigation measures and resulting significance of impacts to water bodies within the project area is presented in Table 8. With the appropriate application of the recommended mitigation measures outlined in this report, it is anticipated that there will be no significant impacts to water bodies within the project area.

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

| Potential Impact | Recommended Mitigation Measure(s) | Resulting Impact Significance[1] |
|---|---|---|
| **Design Phase** | | |
| • Alteration of local drainage patterns | • design to maintain existing surface water drainage patterns and functions (including project layout, grading, storm water management facilities and structure designs)<br>• utilize existing roads and road crossing structures where possible<br>• crossing structures should be sized appropriately according to municipal engineering standards as to not result in alterations in stream hydrology, scouring or flooding crossing structures<br>• newly impervious surfaces should consider use of permeable materials | • Not Significant |
| • Serious harm to fish or fish habitat | • consideration of design layout to minimize number of crossings<br>• consider layout distances to water bodies and sensitivity of those features<br>• crossing locations should be selected as to avoid key habitat features (i.e. refuge pool) and cross the watercourse in a perpendicular fashion on a straight reach of the channel to avoid meanders and bends<br>• crossing structures should be designed to reduce loss and alteration of habitat (i.e. reduce affected area by cutting back from grading limit to road and install headwall, open bottom culvert etc. and follow BMP guidelines)<br>• crossing structure should be properly sized and positioned appropriately (angle and embedded) as to avoid erosion issues and creation of potential fish barriers<br>• crossing structures should be sized appropriately according to municipal engineering standards as to not result in alterations in stream hydrology, scouring or flooding crossing structures<br>• crossing structure type should be determined in consultation with agency and municipality staff and should consider sensitivity of the water body and location of crossing<br>• implement trenchless (i.e. directional drilling) technology at crossings where possible | • Not Significant |
| **Construction Phase** | | |
| • Erosion and sedimentation | • implement trenchless (i.e. directional drilling) technology at crossings where possible<br>• minimize potential for soil compaction (see Soil Compaction)<br>• controlled vehicle and machinery access routes, keep away from water bodies<br>• avoid clearing, grubbing and grading activities during seasonally wet periods (i.e. spring)<br>• avoid work if high volume rain events (>20mm in 24hrs) or snow melts are observed, resuming once soils have stabilized<br>• implement Flood Response Plan if on-site flooding occurs<br>• implement Erosion and Sediment Control Plan<br>• stabilize banks as soon as possible after construction disturbance (i.e., plantings, rock, etc.), if insufficient time is available in the growing season to establish vegetative cover, an overwintering treatment such as erosion control | • Not Significant |

[1] Considers if recommended mitigation measures are applied

| Potential Impact | Recommended Mitigation Measure(s) | Resulting Impact Significance[1] |
|---|---|---|
| | blankets, fibre matting etc. should be applied to contain the site over the winter period<br>• minimize disturbance by keeping construction equipment outside and away from water bodies<br>• work in dry conditions (i.e., low flow period) or isolate in-water work area with use of a water containment structure (i.e., cofferdams)<br>• install silt fencing in-water downstream of water containment structures<br>• dewatering discharge rates should be evaluated as to not result in erosion and sedimentation to receiving water body<br>• dewatering discharge should be dissipated (i.e. splash pads, sand bags, hay bales etc.) and may require to be split to more than one location<br>• implement Stormwater Management Plan | |
| • Water Quality Impairment | • implement Erosion and Sediment Control Plan<br>• implement Spill Response Plan<br>• keep machinery clean and refuel a minimum of 30m away from any water body<br>• fuel and other construction related chemical stored securely away from water bodies<br>• any discharges to a water body must meet MOECC Policy 2 standards (at or better water quality than that of the receiving water body)<br>• adequately treat any discharge water prior to discharge as to meet MOECC policy 2 standards (i.e. filer bags)<br>• implement Stormwater Management Plan<br>• limit the use of ammonium nitrate explosives | • Not Significant |
| • Temporary disruption of fish habitat (in-water work) | • restrict construction to the appropriate in-water work timing windows, as indicated by regulatory agencies, including local MNRF<br>• work in the dry (i.e. low flow) or isolate work area with a water containment structure or by working in dry conditions using accepted methods to bypass flows such as damming<br>• machinery should be operated in a manner that minimizes disturbance to the banks and bed of the watercourse<br>• when using a water containment structure, a qualified fisheries biologist will remove any fish prior to dewatering work area and after any flooding or inundation of the work area<br>• stabilize banks as soon as possible after construction disturbance (i.e. plantings, erosion control blanket, rock protection, etc.) | • Not Significant |
| • Water Level Alteration | • dewatering ZOI and rates should be determined prior to dewatering and assessed for impact on affected water bodies<br>• maintain temporary by-pass channel (when required) during in-water work as to maintain flow and prevent back flooding and overtopping of water containment structure | • Not Significant |
| • Soil Compaction | • controlled vehicle access routes<br>• staging areas should be located away from water bodies (i.e. 30m) | • Not Significant |
| • Debris entering a water body | • construction debris should be stabilized (i.e. tarps) away from water bodies<br>• refuse and other material should be appropriately disposed of off-site<br>• staging areas should be located away from water bodies (i.e. 30m)<br>• drilling shafts should be located at least 3m from any riparian vegetation or top of bank (whichever is greater), or as otherwise agreed upon with regulatory agencies | • Not Significant |

| Potential Impact | Recommended Mitigation Measure(s) | Resulting Impact Significance[1] |
|---|---|---|
| • Drilling Frac-out | • horizontal directional drilling should be conducted at a minimum depth determined through geotechnical studies and engineering review to limit potential impacts associated with a 'frac-out'<br>• develop emergency response plan in the event of a 'frac-out' when drilling below a water body, this plan will deal with issues associated with water level alteration, water quality and erosion & sedimentation | • Moderate Significance |
| **Operational Phase** | | |
| • Water quality impairment | • implement Spill Response Plan<br>• address any impacts resulting from design or construction phases | • Not Significant |
| **Decommissioning** | | |
| • see construction related impacts and recommended mitigation | | |

[1] Considers if recommended mitigation measures are applied

## 8.0 Summary and Conclusions

A detailed assessment of the water bodies within and adjacent to the proposed Belle River Wind Project occurred through the use of a detailed records review and site investigations conducted by NRSI biologists (NRSI 2015a).

Through the completion of these studies, NRSI confirmed the presence of 38 water bodies within the project area, all of which were identified as intermittent/permanent watercourses. These water bodies are present within 120m of, or crossing, the project location. Thirty-three of the 38 watercourses have been identified as crossing the project location in at least one location, totaling 73 individual crossing locations. The remaining water bodies are found within 120m of the project location without specifically overlapping with the project location.

No lakes, lake trout lakes or seepage areas were identified within the Belle River project area.

If recommended mitigation measures are employed as described in this report, no significant impacts are anticipated on the identified water bodies as a result of the development of the Belle River Wind Project.

## 9.0 References


AECOM. 2015a. Belle River Wind Project – Design and Operations Report Draft. February 2015.

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AECOM. 2015c. Belle River Wind Project – Decommissioning Plan Report Draft. February 2015.

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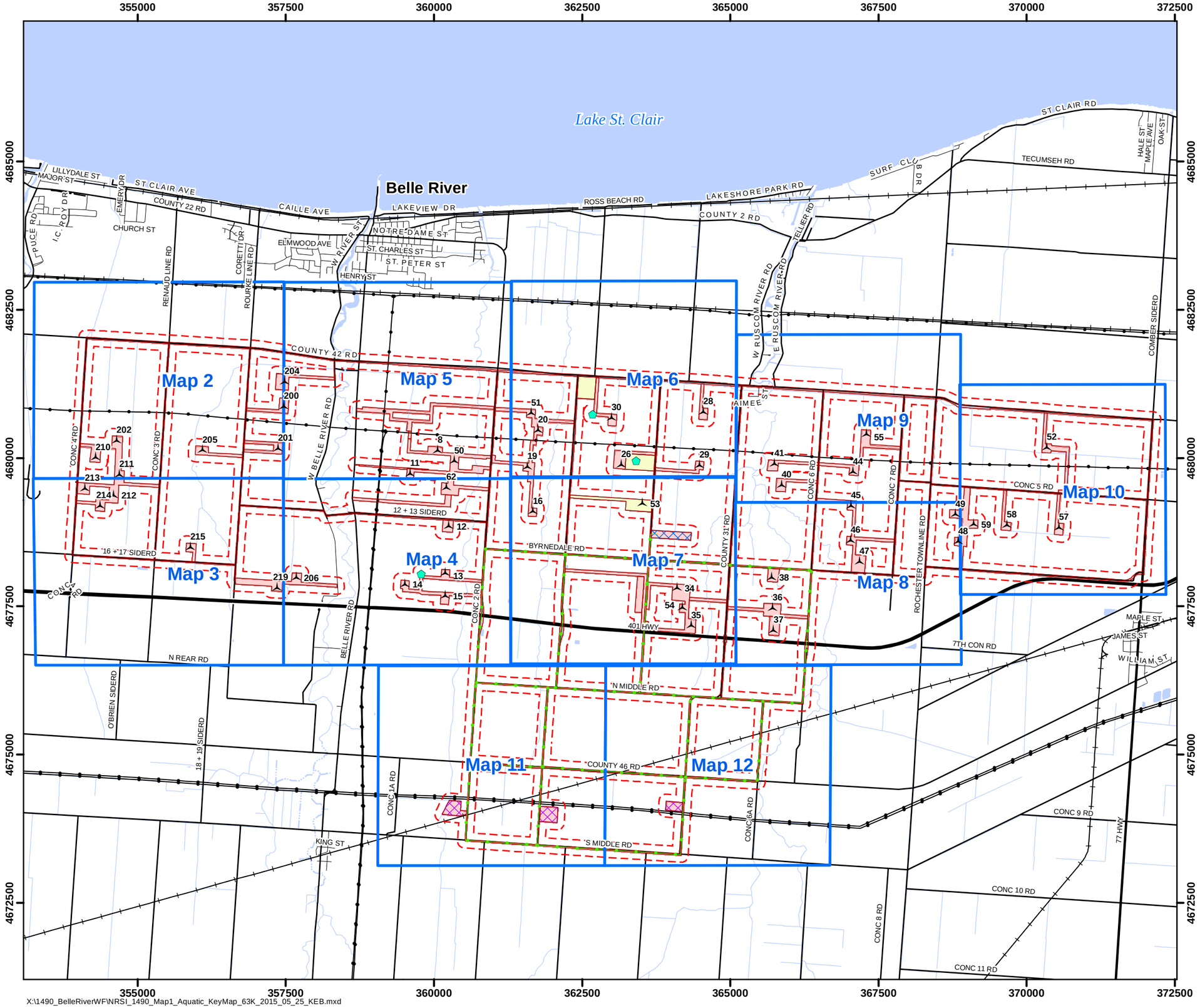
Waters, T.F. 1995. Sediment in Streams, biological effects and control. American Fisheries Society.

# Maps




**Map 1**

# Belle River Wind Project

## Aquatic Habitat Assessment Key Map

**Legend**

- Map Extents
- Project Area (120m Buffer)
- Construction Disturbance Area
- Proposed Turbine
- Proposed MET Tower
- Proposed Transmission Line
- Potential POI Parcel
- Proposed Substation/Laydown/O&M
- Potential Laydown Area
- Existing Trasmission Line
- Railway
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Intermittent Watercourse
- Open Water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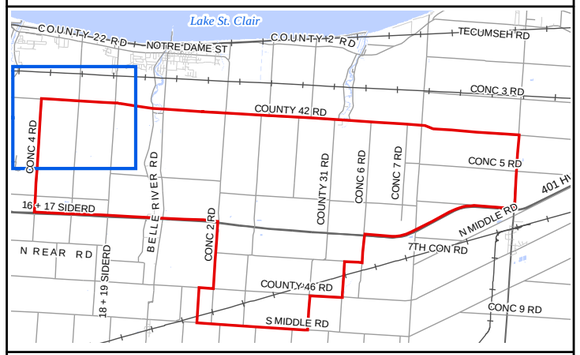
# Map 2

# Belle River Wind Project

## Aquatic Habitat Assessment




**Legend**

- Project Area (120m Buffer)
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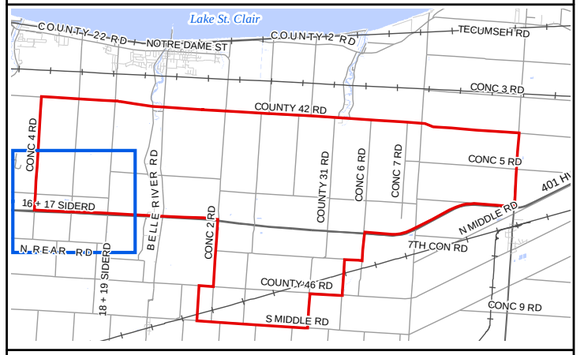
Map 3

# Belle River Wind Project

## Aquatic Habitat Assessment

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Project: P1490
Date: May 25, 2015

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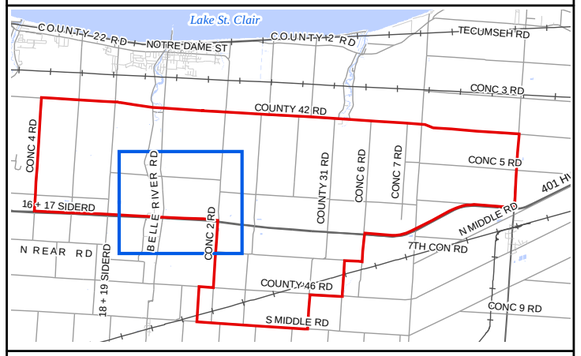
Map 4

# Belle River Wind Project

## Aquatic Habitat Assessment

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Project: P1490
Date: May 25, 2015

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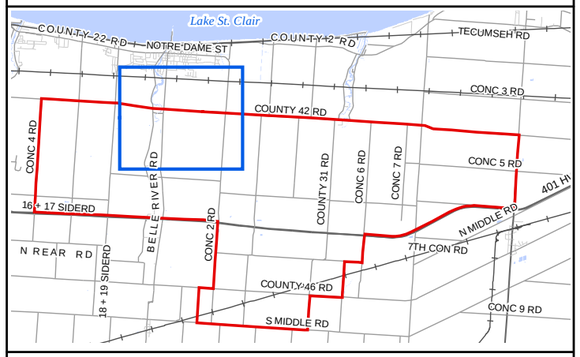
Map 5

# Belle River Wind Project

## Aquatic Habitat Assessment

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Project: P1490
Date: May 25, 2015

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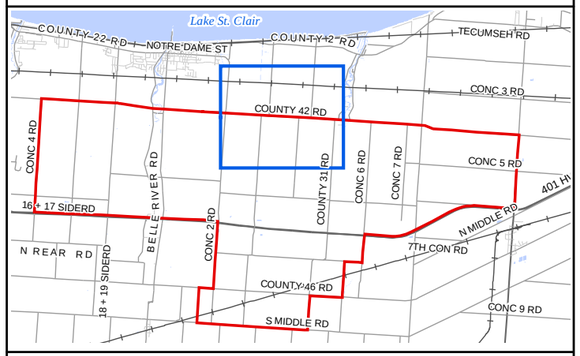
# Map 6

# Belle River Wind Project

## Aquatic Habitat Assessment

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Project: P1490
Date: May 25, 2015

NAD83 - UTM Zone 17
Size: 11x17"
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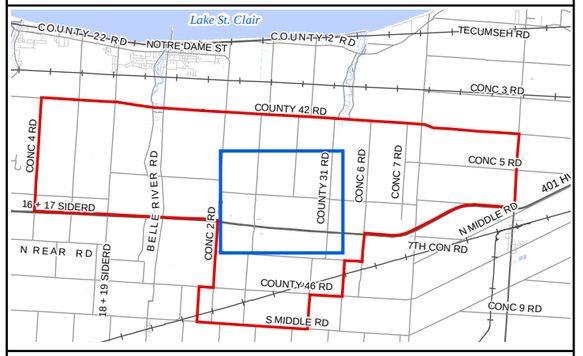
# Map 7

# Belle River Wind Project

## Aquatic Habitat Assessment

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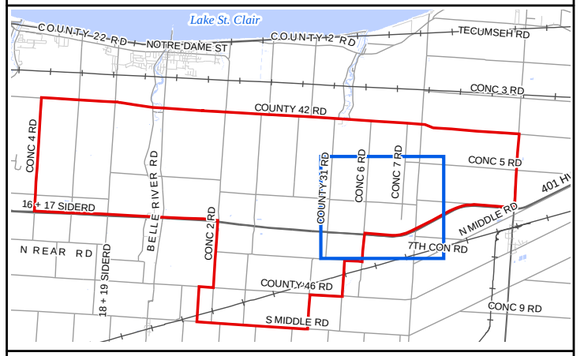
Map 8

# Belle River Wind Project

## Aquatic Habitat Assessment

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Project: P1490
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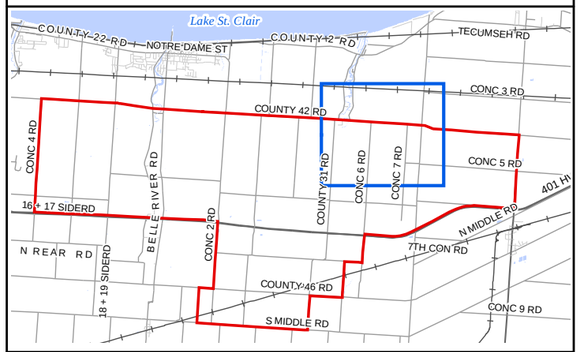
Map 9

# Belle River Wind Project

## Aquatic Habitat Assessment

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Project: P1490
Date: May 25, 2015

NAD83 - UTM Zone 17
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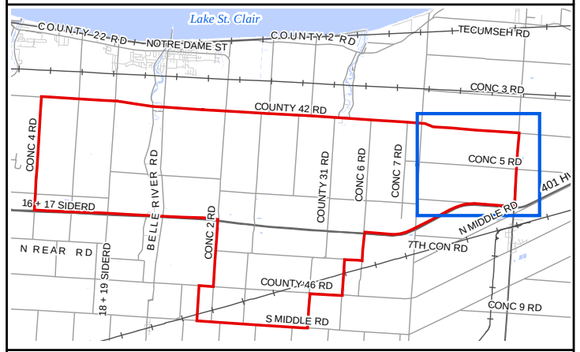
# Map 10

# Belle River Wind Project

## Aquatic Habitat Assessment

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Project: P1490
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NAD83 - UTM Zone 17
Size: 11x17"
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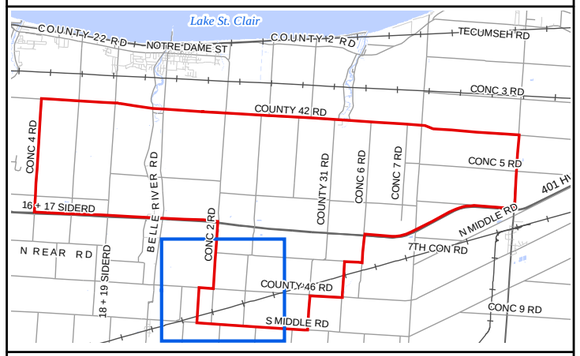
Map 11

# Belle River Wind Project

## Aquatic Habitat Assessment




**Legend**

- Project Area (120m Buffer)
- Construction Disturbance Area
- Proposed Turbine
- Aquatic Habitat Points
- Proposed MET Tower
- Proposed Collection Line
- Proposed Collection ROW
- Proposed Transimission Line
- Proposed Access Road
- Potential POI Parcel
- Proposed Substation/Laydown/O&M
- Potential Laydown Area
- Existing Transmission Line
- Railway
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Intermittent Watercourse
- Open Water

**NATURAL RESOURCE SOLUTIONS INC.**
Aquatic, Terrestrial and Wetland Biologists



Project: P1490
Date: May 25, 2015

NAD83 - UTM Zone 17
Size: 11x17"
**1:15,000**

0 200 400 600 800 Meters

N

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Map 12

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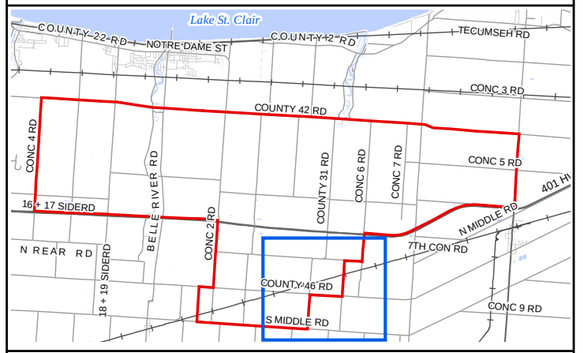


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