



Canadian Solar Solutions Inc.
and
UC Solar Ltd.

Draft Natural Heritage Assessment
Environmental Impact Study Report

For

2176047
Solar Energy Project

H335467
Rev. G
May 20, 2011

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Project Report

May 20, 2011

**Canadian Solar Solutions Inc & UC Solar Ltd.
2176047 - Solar Energy Project**

Draft Natural Heritage Assessment Environmental Impact Study

Table of Contents

Report Disclaimer

1. Introduction	1
1.1 Project Description	1
1.2 Renewable Energy Approval Legislative Requirements	1
1.2.1 Natural Heritage Assessment Environmental Impact Study Report	1
2. General Description of Project Components and Activities	4
2.1 Construction	4
2.2 Operation	7
2.3 Decommissioning	8
3. Potential Negative Effects by Project Phase	9
3.1 Construction Phase	9
3.2 Operations Phase	10
3.3 Decommissioning Phase	11
4. Potential Negative Effects to Natural Features and Proposed Mitigation Measures	12
4.1 Significant Woodland	12
4.2 Significant Wildlife Habitat	13
4.2.1 Habitat of Seasonal Concentrations of Animals	13
4.2.1.1 Raptor Winter Feeding and Roosting Areas	13
4.2.1.2 Reptile Hibernacula	13
4.2.2 Specialized Habitats for Wildlife	14
4.2.2.1 Habitat for Area-sensitive Forest Breeding Bird Species	14
4.2.2.2 Habitat for Shrub/early Successional Breeding Bird Species	14
4.2.2.3 Forest Providing a High Diversity of Habitats	15
4.2.2.4 Specialized Raptor Nesting Habitat	15
4.2.3 Habitats of Species of Conservation Concern	16
4.2.3.1 Western Chorus Frog	16
4.2.3.2 Milksnake	16
5. Environmental Effects Monitoring Plan – Design and Operations Report	18

6. Construction Plan Report	21
7. Summary and Conclusions	23
8. References.....	24
Appendix A Site Layout 2176047 Solar Energy Project	
Appendix B Curriculum Vitae	

List of Tables

Number	Title
Table 2.1	General Description of Construction Activities for the 2176047 Solar Energy Project (Hatch Ltd., 2011e).
Table 2.2	General Description of the 2176047 Solar Energy Project Operating Activities.
Table 5.1	Summary of the Environmental Effects Monitoring Requirements with Respect to Significant Natural Features for the 2176047 Solar Energy Project.
Table 6.1	Summary of Potential Negative Environmental Effects and Proposed Mitigation – Construction Phase.

List of Figures

Number	Title
Figure 1.1	Project Components and Significant Natural Features on and within 120 m of the 2176047 Solar Energy Project Location.

1. Introduction

1.1 Project Description

UC Solar Ltd. (“UC Solar”) in partnership with Canadian Solar Solutions Inc. (“Canadian Solar”) is proposing to develop a 10 megawatt (MW) solar photovoltaic project titled 2176047 Solar Energy Project (herein referred to as the “Project”). The Project Location¹ is situated on approximately 36 hectares (ha) of land on Lots 7 & 8, Concession 3, Elizabethtown-Kitley Township (lower tier municipality), United Counties of Leeds and Grenville (upper tier Municipality). A portion of the Project Location along the north side of Centennial Road is within the boundary of the City of Brockville (Figure 1.1). The Project is located within the Smith Falls Ecodistrict 6E-11.

As stated in Sections 37 and 38 of Ontario Regulation (O. Reg.) 359/09 *Renewable Energy Approvals Under Part V.0.1 of the Act*, (herein referred to as the “REA Regulation”), an Environmental Impact Study is required for all significant natural features determined to be within a specified setback in order to obtain a Renewable Energy Approval (REA). The Environmental Impact Study identifies the potential negative environmental effects, documents the proposed mitigation measures, and describes the environmental effects monitoring plan for the natural features.

1.2 Renewable Energy Approval Legislative Requirements

As per Section 4 of the REA Regulation, ground-mounted solar facilities with a nameplate capacity greater than 10 kilowatts (kW) are classified as Class 3 solar facilities and do require an REA.

The REA process requires the preparation of several reports with respect to natural features on and adjacent to (i.e. 120 m) the Project Location, including the *Natural Heritage Assessment Records Review Report*, *Natural Heritage Assessment Site Investigation Report*, *Natural Heritage Assessment Evaluation of Significance*, and if necessary, the *Natural Heritage Assessment Environmental Impact Study*. The legislative requirements for these reports are summarized in the following sections.

1.2.1 *Natural Heritage Assessment Environmental Impact Study Report*

Subsection 38 (1) of the REA Regulation prohibits the construction, installation or expansion of any component of a solar Project within the following locations:

- a provincially significant northern wetland or within 120 m of a provincially significant northern wetland
- within 120 m of a provincially significant southern wetland
- within 120 m of a provincially significant coastal wetland
- a provincially significant area of natural and scientific interest (ANSI) (earth science) or within 50 m of a provincially significant ANSI (earth science)

¹ “Project Location means, when used in relation to a renewable energy project, 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 proposed to engage in the project” (O. Reg. 359/09, s. 1 (1)).

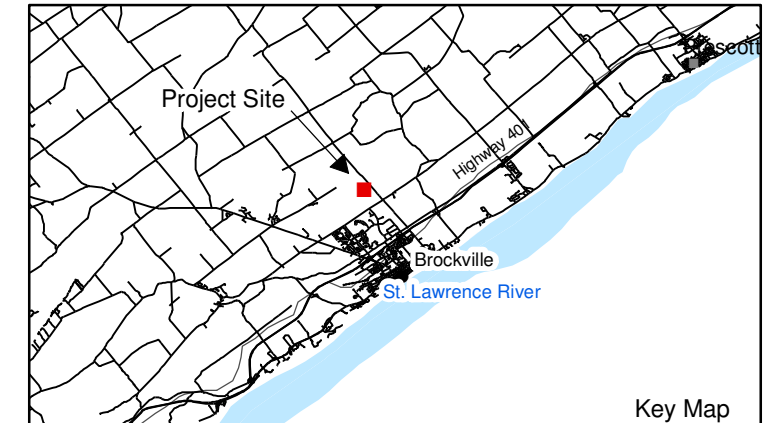
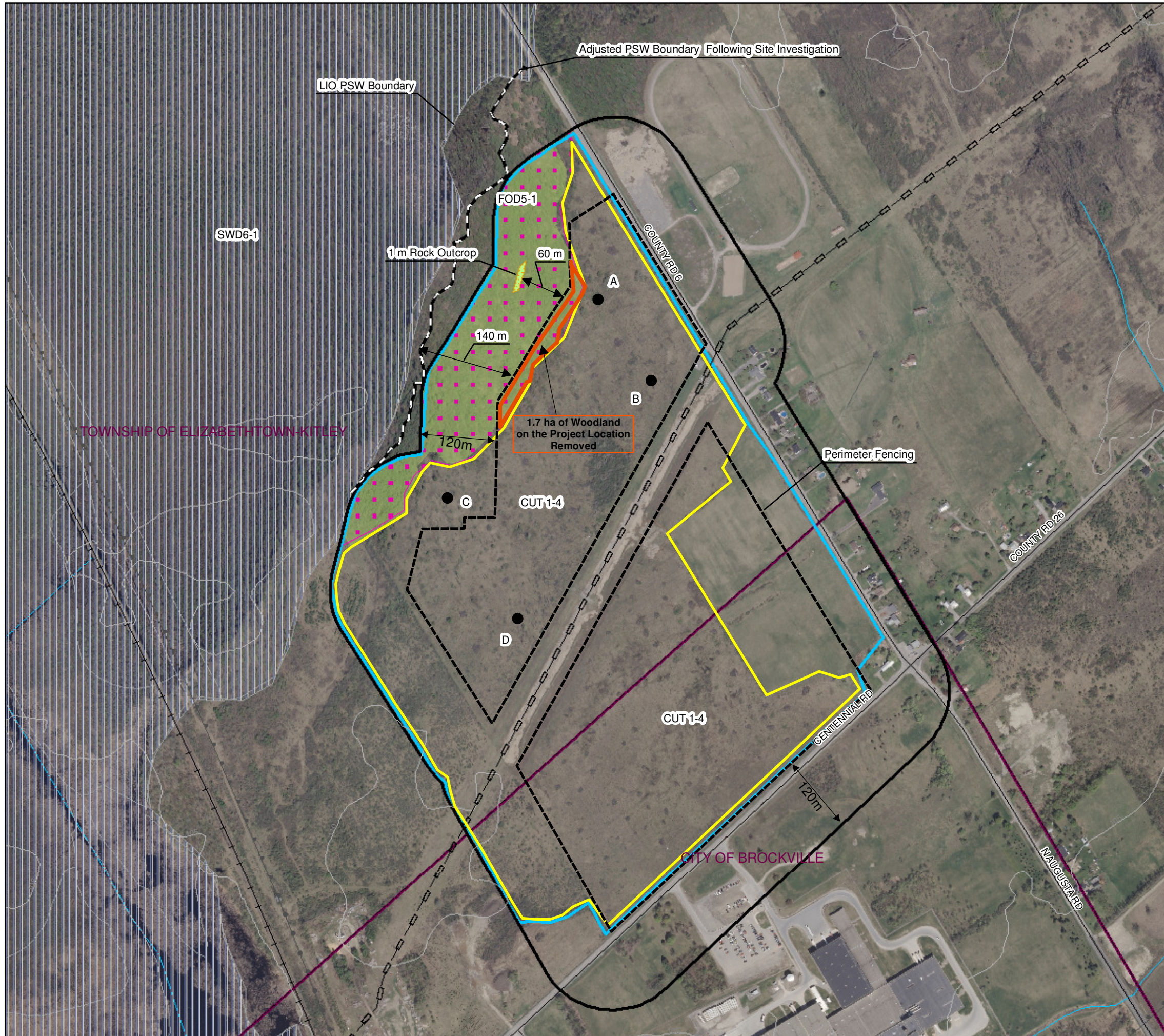
- a provincially significant ANSI (life science) or within 120 m of a provincially significant ANSI (life science)
- a significant valleyland or within 120 m of a significant valleyland
- a significant woodland or within 120 m of a significant woodland
- a significant wildlife habitat or within 120 m of a significant wildlife habitat
- within 120 m of a provincial park
- within 120 m of a conservation reserve.

However, pursuant to subsection 38 (2), construction within the locations noted above may be permitted, subject to the completion of an environmental impact study to assess negative effects and evaluate appropriate mitigation and monitoring measures.

Subsection 38 (2) of the REA Regulation indicates that the *Natural Heritage Environmental Impact Study Report* must:

- identify and assess any negative environmental effects of the Project on a natural feature, provincial park or conservation reserve referred to in subsection 38 (1)
- identify mitigation measures in respect of any negative environmental effects
- describe how the environmental effects monitoring plan in the *Design and Operations Report* addresses any negative environmental effects
- describe how the *Construction Plan Report* addresses any negative environmental effects.

This *Natural Heritage Assessment Environmental Impact Study Report* has been prepared to address these requirements for the construction of Project components within 120 m of the significant natural features identified in the *Natural Heritage Assessment Evaluation of Significance Report* (Hatch Ltd., 2011c).



LEGEND

- ABCD = Breeding Bird Survey Points
- Electrical Transmission Line
- Pipeline
- +— Railway
- Road
- Topographic Contour (5 m Interval)
- Watercourse
- ▭ Municipality
- ▭ Project Location
- ▭ 120 m from Project Location
- ▭ Rock Outcrop

Natural Features

- ▭ Buells Creek Reservoir Provincially Significant Wetland (PSW)
- ▭ Significant Woodland

Significant Habitat of Seasonal Concentrations of Animals

- ▭ -- Raptor Winter Feeding and Roosting Areas
- ▭ -- Reptile Hibernacula

Significant Specialized Habitats for Wildlife

- ▭ -- Forest Providing a High Diversity of Habitats
- ▭ -- Highly Diverse Areas
- ▭ -- Specialized Raptor Nesting Habitat
- ▭ -- Habitat for Area-sensitive Forest Breeding Bird Species
- ▭ -- Habitat for Area-sensitive Shrub/Early Successional Breeding Bird Species

Significant Habitat of Species of Conservation Concern

- ▭ -- Milksnake Hibernacula
- ▭ -- Western Chorus Frog

ELC Codes

CUT1- 4 - Gray Dogwood Cultural Thicket Type
 FOD5 -1 - Fresh Sugar Maple Deciduous Forest Type
 SWD6-1 - Red Maple Organic Deciduous Swamp Type

Notes:
 1. OBM and NRVIS data downloaded from LIO, with permission.
 2. Spatial referencing UTM NAD 83, August 2010.
 3. Ortho photos obtained from Cataraqui Region Conservation Authority, Scale 1:2000, flown 2008.

0 80 160 320 Meters NORTH
 Scale 1:6,000

Figure 1.1
 UC Solar Ltd.
 2176047
 Significant Natural Heritage Features **HATCH™**

2. General Description of Project Components and Activities

The following sections briefly describe the construction, operation and decommissioning phases of the Project. More detailed information on the project phases can be found in the *Construction Plan Report* (Hatch Ltd., 2011e), *Design and Operations Report* (Hatch Ltd., 2011d) and *Decommissioning Plan Report* (Hatch Ltd., 2011f). The proposed site layout is provided in Appendix A and shows the locations of the solar panels and inverters, laydown area, access roads, substation and electrical connection point.

The proposed layout for the 10 MW solar facility (including solar PV panels, access roads, substation and laydown area) is situated within the southern portion of the Project Location (Figure 1.1). A TransCanada inter-provincial gas pipeline and associated easement bisects the site layout into north and south portions. The facility will be constructed on lands identified in the *Natural Heritage Assessment Site Investigation Report* (Hatch Ltd., 2011b) as cultural thicket and woodlands. The Project layout has been designed to respect the significant natural features in the area identified at the Project Location by maintaining a 120 m setback from the Buells Creek provincially significant wetland and by not altering the characteristics and ecological functions of the significant woodland as determined by the criteria in the Natural Heritage Reference Manual (MNR, 2010). The Project will be constructed primarily on lands identified as cultural thicket.

2.1 Construction

Construction is anticipated to occur over an approximately six month period. The activities associated with construction are summarized in Table 2.1.

Table 2.1 General Description of Construction Activities for the 2176047 Solar Energy Project (Hatch Ltd., 2011e).

Activity	Description
Temporary Power Installation	A temporary connection to the existing electrical system will be constructed to supply power for construction activities.
Survey and Stake Facility	The site will be surveyed and staked to delineate the outline of excavations, roads and foundation locations.
Laydown Area Preparation and Setup	<p>Part of the site area will be graded and fenced for security and used as a construction staging area. The staging areas will include construction offices, a first-aid station, worker parking, and truck loading and unloading facilities; temporary construction trailers will be used for the offices and the first-aid station. Temporary toilets and washing stations will be maintained to meet the daily sanitary needs during the construction. These staging areas will be decommissioned and removed when construction is completed. Activities associated with this activity include:</p> <ul style="list-style-type: none"> • clear and grub laydown area • strip and remove all topsoil • shape and proof-roll subgrade • shape ditches and swales • place, shape and compact granular sub-base and base materials • revegetate ditches and swales.
Access Road Construction	<p>The construction of a new 5-m wide asphalt site access road will be necessary to support construction activities and will provide access to the site during the operation phase of the Project. In addition, several gravel roads, about 3.7 m wide will be constructed to allow maintenance access to the solar arrays during operation of the Project. Activities associated with construction of internal access roads will include:</p> <ul style="list-style-type: none"> • clear and grub laydown area • strip and remove all topsoil • shape and proof-roll subgrade • shape ditches and swales • place, shape and compact granular sub-base and base materials • revegetate ditches and swales
Water Usage	In order to meet the water demand during construction, the contractor will have a temporary water-storage facility and bring the water from outside sources using a tanker. The water supply demand is estimated to be less than 50,000 litres per day and therefore doesn't require additional details for the permit. The water will be used for construction, sanitary and dust-control purposes
Vegetation Removal and Grading	Tree and shrub removal is proposed within the woodland along the northern boundary of the Project Location. Larger trees will be felled by chainsaw; smaller brush will be removed by a bulldozer with a brush rake. Material will be re-used on site or managed in accordance with regulatory requirements and the creation of wildlife habitat. Minor grading will be undertaken as required.

Activity	Description
Substation Preparation	The substation area (~ 20 m by 20 m) will be excavated for the transformer foundation and oil containment area. The substation site will be prepared and excavated for the footings required for the termination equipment and control house foundation pad.
Array Foundation Installation	Array foundations will consist of structural footings (e.g., steel piles, screw piles, concrete piers or a foundation on bedrock) designed and installed depending on the geotechnical conditions.
Foundations for Substation, Transformer and Inverters	Foundations will be formed with plywood and reinforced with structural steel. Concrete will be poured from a ready-mix concrete truck to create foundations.
Cable Trench and Conduit Installation	Cable trench and conduits will be installed for the PV collection and aggregation system. Activities include: <ul style="list-style-type: none"> • trench excavation by backhoe • installation of levelled layer of compacted stone on base of trench • installation of conduit within trench • installation of cables within the conduit • burying of conduit a minimum of 46 cm below grade.
Dead End Structures	Wood pole dead end structures consisting of wood poles and associated insulators and connectors will be installed to connect the substation to the distribution line.
Control House Installation	A pre-fabricated control house (approximately 6 m by 9 m) will be installed on the foundation pad in the substation area.
Fencing	The site will be gated and fenced. The fence design consists of a chain-link fence, about 2.7-m (9-ft) high with provision for topping with barbed wire. Fencing will be erected around the perimeter of the Project Location as indicated on Figure 1.1.
PV Array Installation	Activities include: <ul style="list-style-type: none"> • installation of outdoor transformers and inverter units on the foundation pads • erection of PV support structures • installation of PV modules in the support structures • installation of combiner boxes on the rear of the finished PV arrays.
Substation Installation	Installation of main power transformer, switchgear cells, metering, service transformer and disconnect switches in the substation area.
Testing and Commissioning	The substation equipment, inverters, collector system and PV array systems will be tested and commercial operations will commence. Activities will include testing, calibration and troubleshooting.
Site Restoration	Once major construction has been completed, the site will be reseeded/revegetated with native seed. Note: Hatch Ltd. and the proponent are currently working with the MNR to identify a seed mix that will provide good ground cover and provide natural heritage benefits.

2.2 Operation

The facility will operate 365 d/yr when sufficient solar radiation exists to generate electricity. The facility will be remotely monitored with no regular on-site employees. Periodic inspections will be conducted during the operations phase with maintenance conducted as required. Operations and maintenance requirements are summarized in Table 2.2. Operationally, the lifespan of the Project will be at least 20 years, which can be extended up to 30 years or more with proper maintenance, component replacement and repowering.

Table 2.2 General Description of the 2176047 Solar Energy Project Operating Activities.

Activity	Description
Expected Commercial Operation Date	Summer/Fall 2012
On-Site Employees	No permanent on-site employees. Two to three part-time maintenance personnel.
Periodic Inspection and Maintenance	<p>Periodic inspections will be conducted with minor maintenance undertaken as required. Activities may include vegetation control, panel washing, transformer inspection, inspection of primary system components, replacement of air filters and other minor adjustments or maintenance as needed. Maintenance activities associated with the maintaining the fence, if required, will be conducted from the Project side (i.e., within the fence).</p> <p>Vegetation control through mowing is anticipated to occur infrequently (about once per year) and will only be conducted inside the fenced area and if required immediately around the perimeter fencing, excluding the north boundary. Perimeter fencing is indicated by the Project Location line on Figure 1.1.</p> <p>Mowing will be conducted in mid to late summer (after July 31) to avoid incidental take of nesting birds.</p> <p>There will be no activities, including vegetation control occurring within the 120 m setback from the PSW.</p>
Major Maintenance	In the event of a component failure, all major maintenance can be performed utilizing existing roads and site access.
Water Use/Cleaning of Panels	The Project operation does not require any on site facilities to supply groundwater (wells) or surface water (ponds, watercourses). Rainwater is expected to be sufficient to clean the panels. If required, water will be brought to the site by truck. Water only is used for cleaning – no cleaning solutions of any kind are used to wash the panels.
Fuel Consumption	None.
Solid Waste	None. Operation of the project will not produce waste of any type. All debris as a result of equipment repairs, facility maintenance or cleaning will be removed from the site immediately by the contracted party.
Air Emissions	None. The Project does not have any facilities (e.g. emergency back-up diesel generators) that will discharge contaminants or pollutants to the air.
Wastewater	None. The Project will not generate any wastewater or discharge any liquid effluent from its operation.

2.3 Decommissioning

Decommissioning would occur when the decision has been made that it is no longer economically feasible to continue operation or refurbish generating equipment. It is anticipated that decommissioning would not occur until at least 2042.

All decommissioning and site restoration activities would adhere to the requirements of appropriate regulatory authorities and would be conducted in accordance with all applicable federal, provincial and municipal permits and other requirements. The decommissioning and restoration process comprises the following activities:

- removal of above-ground structures (i.e., solar panels, upper racking, inverters, distribution line and interconnection equipment, fencing and access road materials)
- removal of below ground structures to a depth of at least 1.2 m (i.e., below ground racking/piers, transformer/inverter pads and footings)
- site grading (to remove ditches, access road, etc) and replacement of topsoil where moved and reseed with native grass species.

3. Potential Negative Effects by Project Phase

The following sections (3.1 to 3.3) outline the potential negative environmental effects of the solar Project by phase of development as they generally relate to natural features, wildlife habitat and wildlife species. Specific effects to natural features identified in the *Natural Heritage Assessment Evaluation of Significance Report* are discussed in Section 4. Details of the effects of the Project on hydrology and proposed mitigation measures are found in the *Construction Plan Report* (Hatch Ltd., 2011e) and the *Waterbodies Report* (Hatch Ltd., 2011g).

3.1 Construction Phase

Construction is currently scheduled to occur outside of the breeding bird period (generally May through to the end of July); therefore, direct impacts to wildlife species breeding at the Project Location, such as nesting birds are not expected to occur. If activities such as land grading, excavations, construction of access roads, and trenching, are required during the breeding wildlife period, the areas potentially impacted will be searched by a trained biologist within 48 hours of the proposed activity in order to determine if birds are currently nesting in these areas. If an active nest of a species covered under the federal *Migratory Birds Convention Act* (MBCA) or the provincial *Fish and Wildlife Conservation Act* (FWCA) is located within a proposed work area, a mitigation plan (which may include 100 m buffer around the nest location until such time as the nest is successful or abandoned) will be developed to prevent impacts on birds or their active nests, and submitted to Environment Canada (EC) (for MBCA species) or Ontario Ministry of Natural Resources (MNR) (for FWCA species) for review prior to implementation. Use of these mitigation measures is anticipated to prevent potential effects to nesting wildlife.

The installation of the fence may trap wildlife within the Project Location. Once the fence is completed, a visual search of the Project Location will be conducted to search for any trapped wildlife species. If species are observed, they will be either directed off of the Project Location (i.e., in the case of deer) or collected by a designated employee (e.g., in the case of turtles), who has been provided with protocols for the safe handling and transport of wildlife, and transported to the nearest available location off-site and released.

In order to minimize the potential for incidental take of wildlife, speeds on access roads of the Project will be restricted. In addition, the construction workforce will be made aware of the potential for wildlife occurring at the Project and that measures should be taken to avoid wildlife wherever possible. If wildlife are observed at the Project Location, they will be either directed off of the site by the worker (without the use of vehicles) or collected by a designated employee, who has been provided with protocols for the safe handling and transport of wildlife, and transported to the nearest available location off-site and released.

Known occurrences of incidental take will be documented in the monthly environmental report. If a species at risk is noted, work within the area will be ceased immediately, and the Ministry of Natural Resources (MNR)/Environment Canada (EC) will be contacted to make them aware of the occurrence. Work in the area will remain ceased until a survey is conducted by a trained biologist to ensure that there are no species at risk present in the area.

The presence of the construction workforce and construction activities associated with the Project will also result in auditory and visual disturbance of local wildlife populations. Wildlife populations within the significant natural features may retreat from these areas as a result of the disturbance. It is expected that wildlife populations that typically occurred at the Project Location will abandon these sites throughout the duration of construction.

3.2 Operations Phase

Regular maintenance of the solar facility is anticipated to occur infrequently during the year. This activity would be consistent with levels of disturbance similar to agricultural operations.

The assemblage of wildlife species on the Project Location during the Operation Phase may differ in respect to composition and density depending on individual species ability to make use of the new habitat. It is anticipated that many bird and small mammal, and insect species will readily use the habitat found on the Project Location. Some species, such as area-sensitive shrub/early successional breeding bird species will likely not re-inhabit the area due to avoidance of man-made structures.

In order to minimize the potential for incidental take of wildlife, speeds on access roads will be restricted. Further, visual monitoring of the access roads will be completed. In addition, the construction workforce will be made aware of the potential for wildlife occurring at the Project Location and that measures should be taken to avoid wildlife wherever possible. If wildlife are observed at the Project Location, they will be either directed off of the site by the worker (without the use of vehicles) or collected by a designated employee, who has been provided with protocols for the safe handling and transport of wildlife, and transported to the nearest available location off site and released.

Mowing of vegetation beneath and around the solar panels, if required, may result in incidental take. It is anticipated that ground-nesting birds will use the Project Location. Mowing will occur outside the nesting period (May through to the end of July) to minimize the incidental take. Known occurrences of incidental take will be reported, and the species impacted will be determined. If the species is determined to be a Species of Conservation Concern, work within the area will be ceased immediately, and the MNR/EC will be contacted to make them aware of the occurrence. Work in the area will remain ceased until a survey is conducted by a trained biologist to ensure that there are no further species of conservation concern present in the area. Milksnake are habitat generalists and may be impacted through incidental take.

Travel along the access roads will be infrequent with no anticipated negative impact on wildlife populations. Though fencing will be in place during the operations phase around the perimeter of the facility, there will be no fencing installed across the inter-provincial pipeline corridor in order to ensure animal movement is maintained. The installation of fencing along the perimeter of the Project Location is of sufficient height to prevent deer and other large wildlife from entering, but will be raised off the ground so as not to restrict wildlife movement across the Project Location. Barriers to wildlife movement as a result of fencing are expected to be negligible given the amount of natural areas and opportunities for continued wildlife movement north and west of the Project Location.

3.3 Decommissioning Phase

During the decommissioning phase, disturbances present in the area will be similar to those that may occur during the construction phase as described in Section 3.1. In order to minimize potential impacts to wildlife communities of the significant natural feature, decommissioning will be scheduled to occur outside of breeding wildlife period (May through to the end of July). Though there may be some avoidance of the significant natural feature near the Project Location during decommissioning, these effects are temporary, and following decommissioning the site will be restored to as close to existing conditions as possible.

4. Potential Negative Effects to Natural Features and Proposed Mitigation Measures

This section describes potential negative environmental effects that could occur as a result of construction, operation and decommissioning phases of the Project.

Mitigation measures are proposed to minimize, eliminate or alleviate any potential negative environmental effects. Potential negative effects are discussed by environmental component, where development of a solar facility could negatively affect the natural features and significant wildlife habitats. The relevant environmental components that may be impacted by the proposed Project include:

- **Significant Woodlands** – the woodlands found on and within 120 m of the Project Location have been evaluated as significant as they meet the size requirement and / or provide important ecological functions (i.e. interior forest habitat, water protection).
- **Significant Wildlife Habitat**
 - ◆ **Habitat of seasonal concentration of animals** - raptor winter feeding and roosting areas and reptile hibernacula.
 - ◆ **Specialized habitats for wildlife** – habitat for area-sensitive forest bird breeding habitat and area-sensitive shrub/early successional bird breeding habitat, forest providing a high diversity of habitats, highly diverse areas and specialized raptor nesting habitat.
 - ◆ **Habitats of species of conservation concern** – western chorus frog and milksnake.

These significant natural features and their locations in relation to the Project development area are shown in Figure 1.1.

4.1 Significant Woodland

The proposed layout of the solar facility encroaches upon the significant woodland along the northern boundary of the Project Location (Figure 1.1). As a result, there will be direct and indirect impacts to this natural feature. The following potential impacts and recommended mitigation measures have been identified to minimize any negative environmental effects that may occur during all phases (i.e. construction, operation and decommission) of the proposed development and ensure the long-term ecological health and integrity of the significant woodland.

Potential Impacts

- Tree and shrub removal is proposed within the woodland along the northern boundary of the Project Location. As a result, approximately 1.72 ha of the significant woodland will be removed. This will reduce the size of the woodland and interior forest habitat. Edge effects and fragmentation is not expected as tree removal is proposed along the periphery of the existing woodland.
- Damage to adjacent trees/shrubs and disturbance to the rooting zone through soil compaction and rutting for species outside of the area proposed for clearing.

- Changes in species composition and woodland function as a result of hydrological changes associated with the proposed development.
- Fencing along the perimeter may restrict wildlife movement.

Recommended/Implemented Mitigation Measures

- The Project layout minimizes the amount of significant woodland loss at the site.
- The layout also minimizes the amount of forest edge created.
- Tree removal within the woodland should not change the significance of the natural feature in terms of minimum size requirements, interior forest habitat, forest edge effects and fragmentation.
- To minimize the incidental take of tree-nesting birds, tree removal will be conducted outside the breeding period for birds (May through to the end of July).
- Felled woody debris will be used to create dense brush piles at the forest edge suitable for wildlife habitat.

4.2 Significant Wildlife Habitat

4.2.1 Habitat of Seasonal Concentrations of Animals

4.2.1.1 Raptor Winter Feeding and Roosting Areas

The proposed development will encroach on raptor winter feeding and roosting areas on the Project Location which includes the woodland and cultural thicket and meadow communities.

Potential Impacts

- Loss of roosting sites within the 1.7 ha of woodland that will be removed, although forest edge roosting sites will remain approximately the same.
- Loss of approximately 35 ha of cultural thicket and cultural meadow habitat used for hunting.

Recommended/Implemented Mitigation Measures

- Development is not recommended during the breeding bird season (May through to the end of July) to minimize the amount of human-wildlife interactions.
- Revegetating the Project Location with native plants will promote prey species for raptors and the return of some cultural habitat.
- The Project layout minimizes fragmentation to habitat.

4.2.1.2 Reptile Hibernacula

Reptile hibernacula were identified in the site investigation as potentially occurring in the woodland rock piles found within 120 m of the Project Location.

Potential Impacts

- Disturbance and loss of non-hibernating animals during the construction phase.
- Loss of some woodland hibernacula sites.

Recommended/Implemented Mitigation Measures

- To reduce the incidental take of snakes and other wildlife land clearing will work from the centre of the Project Location to the periphery to allow wildlife to move to adjacent habitat. It is anticipated that snakes and other wildlife will reoccupy the site post construction.
- The rock piles will not be disturbed as a result of the Project.

4.2.2 Specialized Habitats for Wildlife

4.2.2.1 Habitat for Area-sensitive Forest Breeding Bird Species

The woodlands are identified as significant as they provide habitat for area-sensitive forest species.

Potential Impacts

- Direct and indirect habitat loss for area-sensitive species on and within 120 m of the Project Location.
- Increased human-wildlife interactions during construction, operation and decommissioning phases.
- Avoidance of habitat due to noise impacts during construction and decommissioning phases (and possibly operation).

Recommended/Implemented Mitigation Measures

- Development is not recommended during the breeding bird season (May through to the end of July) to minimize the amount of human-wildlife interactions and incidental take of area-sensitive species.
- Site the solar facility as to minimize the encroachment of Project on areas sensitive species habitat.
- The Project layout is designed to minimize the fragmentation of habitat.

4.2.2.2 Habitat for Shrub/early Successional Breeding Bird Species

The cultural thicket habitat is identified as significant it provides habitat for area-sensitive shrub/early successional breeding bird species.

Potential Impacts

- Direct loss of approximately 35 ha of habitat for area-sensitive species on the Project Location.
- Increased human-wildlife interactions during construction, operation and decommissioning phases.

- Avoidance of habitat due to noise impacts during construction and decommissioning phases (and possibly operation).

Recommended/Implemented Mitigation Measures

- Development is not recommended during the breeding bird season (May through to the end of July) to minimize the amount of human-wildlife interactions and incidental take of area-sensitive species.

4.2.2.3 *Forest Providing a High Diversity of Habitats*

The woodland was evaluated as a forest providing a high diversity of habitats primarily because of the transitional nature between upland and wetland components found therein. The solar facility will not significantly impact this transitional habitat type.

Potential Impacts

- Reduction in the size of the woodland and interior forest habitat.
- Changes in wetland hydrology associated with groundwater, surface drainage patterns, flow volumes and stormwater runoff due to construction, operation and decommissioning activities.
- Changes to the hydrology and physical and chemical properties of a wetland may affect community structure, species composition, suitability and quality of wildlife habitat.
- Conversion of natural areas to impervious surfaces may increase the volume and concentration of surface runoff, storm flows, flooding, sedimentation, erosion and deleterious substances into wetlands and reduce the amount of water available to replenish groundwater aquifers.
- Fugitive dust generation.

Recommended/Implemented Mitigation Measures

- A grading plan should be developed to ensure that post-development surface flow mimics pre-development flow volumes and drainage patterns.
- Bio-swales or ditches should be incorporated into the site plan to help convey, filter and reduce surface runoff.
- Sedimentation and erosion control measures (e.g. silt fencing) should be applied prior to, during and post-construction activities. These areas should be monitored frequently to maintain their effectiveness.
- The proposed layout minimizes the amount of forest and interior forest loss on the site.

4.2.2.4 *Specialized Raptor Nesting Habitat*

The *Natural Heritage Assessment Evaluation of Significance Report* (Hatch Ltd., 2011c) identified specialized raptor nesting habitat specifically for woodland raptors. Forests provide cover, shelter, roosts sites, nest sites and habitat to hunt prey.

Potential Impacts

- Loss of potential nesting habitat and perches through the removal of trees within the woodland, although no raptor nests were observed during the site investigations. Forest edge habitat will remain approximately the same.
- Development of the solar facility may also reduce the amount of available land to hunt for prey species. Use of the area by raptors post development is uncertain.
- Increased human disturbance during construction and decommissioning phases.

Recommended/Implemented Mitigation Measures

- To reduce the amount of human-wildlife interactions and minimize incidental take of raptor species, tree removal will be conducted outside the breeding bird season (May through to the end of July).
- The Project layout is designed to minimize the fragmentation of habitat.

4.2.3 Habitats of Species of Conservation Concern

4.2.3.1 Western Chorus Frog

Significant wildlife habitat for the western chorus frog was identified in the *Natural Heritage Assessment Evaluation of Significance Report* (Hatch Ltd. 2011c). There will be some loss of summer habitat with the removal of the trees and shrubs, but it is not anticipated to have any population-level effect as limiting factors are predominantly associated with the breeding ponds.

Potential Impacts

- Direct habitat loss associated with tree removal along the northern portion of the Project Location.
- Indirect habitat loss through changes in hydrology including groundwater, surface drainage patterns, flow volumes and stormwater runoff associated with construction, operation and decommissioning activities.

Recommended/Implemented Mitigation Measures

- If this species is observed during the construction and decommissioning phases, development must be ceased and the MNR contacted.
- A grading plan should be developed to ensure that post-development surface flow mimics pre-development flow volumes and drainage patterns.
- The Project layout is designed to minimize the fragmentation of habitat.
- The Project layout is designed to minimize incursion into breeding habitat.

4.2.3.2 Milksnake

Milksnakes are habitat generalists. They can be found in all habitats found on the Project Location, and they are commonly found around manmade structures.

Potential Impacts

- Habitat loss associated with development of the cultural thicket, cultural meadow and woodland habitats.
- Increased human-wildlife interactions during construction and decommissioning phases.
- Incidental take of wildlife during construction, operation, maintenance and decommissioning phases.

Recommended/Implemented Mitigation Measures

- Vegetation ground cover to be used on the Project Location should be selected in consideration of promotion of wildlife features.
- Construction of wildlife habitat along the northern edge of the Project Location using logs and brush. (The client will work with MNR to determine exact design, location and spacing).
- To reduce the incidental take of milksnake and other wildlife land clearing will work from the centre of the Project Location to the periphery to allow wildlife to move to adjacent habitat. It is anticipated that milksnake and other wildlife will reoccupy the site post construction.

5. Environmental Effects Monitoring Plan – Design and Operations Report

As discussed in the *Design and Operations Report* (Hatch Ltd., 2011d), environmental effects monitoring is proposed in respect of any negative environmental effects that may result from engaging in the Project. As per the REA Regulation, the monitoring plan identifies:

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

For the purposes of this *Natural Heritage Assessment Environmental Impact Study Report*, the effects monitoring measures with respect to negative effects on the significant natural features have been reproduced here, in Table 5.1.

The monitoring proposed in Table 5.1 will serve to verify that mitigation measures are functioning as designed to meet performance objectives. If monitoring shows that performance objectives are not being met, the contingency measures documented in Table 5.1 will be used to ensure that remedial action is undertaken as necessary to meet the performance objectives.

Table 5.1 Summary of the Environmental Effects Monitoring Requirements with Respect to Significant Natural Features for the 2176047 Solar Energy Project.

Negative Effect	Mitigation Strategy	Performance Objective	Monitoring Plan				Contingency Measures	
			Methodology	Monitoring Locations	Frequency	Rationale		Reporting Requirements
Construction Phase								
Dust generation and off-site transport	Standard construction site best management practices to prevent fugitive dust.	Minimize fugitive dust from the construction site.	Visual monitoring of visible dust plumes during construction.	Throughout construction site.	Periodically during all construction activities.	Visual dust monitoring would identify if dust plumes are an issue and where their source may be.	Reported in monthly environmental monitoring report during construction.	Dust control measures implemented as necessary to prevent/minimize dust generation.
Incidental take of wildlife	Daily visual monitoring of work areas and construction equipment prior to start of work. Wildlife observed will be removed from areas of impact through established protocols. Speeds to be limited on Project Location and construction workforce to be made aware of potential for wildlife on the Project Location.	Avoid occurrences of incidental take.	Daily visual monitoring will be conducted by workers on foot of the areas to be worked on the given day. Any wildlife observed will be either directed off of the Project or collected by a designated employee and transported to the nearest available location off-site and released.	Throughout construction site.	Ongoing during construction on a continued basis.	Incidental take will be reported by construction workforce to the on-site personnel responsible for environmental protection if incidents occur.	Reported in monthly environmental monitoring report during construction, unless the species is a species of conservation concern in which case reporting will be immediate to the MNR/EC.	If incidental take of species of conservation concern are recorded, work will be ceased until such time as a trained biologist can state that the species is no longer present in the area.
Operations Phase								
Incidental take of wildlife	Speeds to be limited on Project Location and maintenance workforce to be made aware of potential for wildlife on the Project Location. Visual monitoring of access roads for wildlife species.	Avoid occurrences of incidental take.	Occasions of incidental take to be reported as they are identified.	Throughout Project Location.	Ongoing during maintenance activities.	Incidental take will be reported by maintenance staff to the on-site personnel responsible for environmental protection if incidents occur.	No requirement; unless the incident involves a species of conservation concern in which case reporting will be immediate to the MNR/EC.	If incidental take of species of conservation concern are recorded, work will be ceased until such time as a trained biologist can state that the species is no longer present in the area.
Decommissioning Phase								
Dust generation and off-site transport	Standard site best management practices to prevent fugitive dust.	Minimize fugitive dust from the Project.	Visual monitoring of visible dust plumes during construction.	Throughout Project Location.	Periodically during all decommissioning activities.	Visual dust monitoring would identify if dust plumes are an issue and where their source may be.	Reported in monthly environmental monitoring report during decommissioning.	Dust control measures implemented as necessary to prevent/minimize dust generation.

Negative Effect	Mitigation Strategy	Performance Objective	Monitoring Plan				Contingency Measures	
			Methodology	Monitoring Locations	Frequency	Rationale		Reporting Requirements
Incidental take of wildlife	<p>Daily visual monitoring of work areas and decommissioning equipment prior to start of work.</p> <p>Speeds to be limited at Project and construction workforce to be made aware of potential for wildlife on the Project Location.</p>	Avoid occurrences of incidental take.	<p>Daily visual monitoring will be conducted by workers on foot of the areas to be worked on the given day.</p> <p>Any wildlife observed will be either directed off of the Project Location or collected by a designated employee and transported to the nearest available location off-site and released.</p>	Throughout decommissioning site.	Ongoing during decommissioning on a continued basis.	Incidental take will be reported by decommissioning workforce to the on-site personnel responsible for environmental protection if incidents occur.	Reported in monthly environmental monitoring report during decommissioning, unless the species is a species of conservation concern in which case reporting will be immediate to the MNR/EC.	If incidental take of species of conservation concern are recorded, work will be ceased until such time as a trained biologist can state that the species is no longer present in the area.

6. Construction Plan Report

The REA Regulation requires proponents of Class 3 solar projects to prepare a *Construction Plan Report*. Hatch Ltd. (2011e) prepared the *Construction Plan Report* which outlines the potential negative effects and mitigation measures. The *Construction Plan Report* is a stand-alone report that will be included as part of the REA application.

The *Construction Plan Report* details the construction and installation activities, location and timing of construction and installation activities, any negative environmental effects that result from construction activities within 300 m of the Project and mitigation measures for the identified negative environmental effects. The *Construction Plan Report* addresses all potential effects of construction on natural features within 300 m of the Project Location in a general manner. The mitigation proposed in the *Construction Plan Report* with respect to preventing/minimizing negative effects on natural features is the same as that discussed in this *Natural Heritage Assessment Environmental Impact Study*. Additional mitigation is proposed to address negative effects during construction not related to natural features (Table 6.1). Therefore, the *Construction Plan Report* and this *Natural Heritage Assessment Environmental Impact Study* should be read in conjunction with each other, although all negative effects and mitigation requirements with respect to significant natural features are contained within this *Natural Heritage Assessment Environmental Impact Study* and duplicated in the *Construction Plan Report*.

Table 6.1 Summary of Potential Negative Environmental Effects and Proposed Mitigation – Construction Phase.

Environmental Component	Sources of Negative Effect	Potential Negative Effect	Mitigation Measures	Residual Negative Effect
Soils	Mechanical vegetation stripping, excavations for foundation supports and cable trenches. Soil compaction from heavy equipment vehicles.	Changes to soil structure resulting in decreased productivity for plant growth and reduced infiltration capacity resulting in increased runoff.	Standard construction best management practices and mitigation measures will be implemented to mitigate impacts to soils, including development of an Erosion and Sediment Control Plan. Restoration efforts to include mechanical discing or other soil loosening methods to restore compacted soils.	Mitigation will be effective in preventing excessive soil erosion and off-site impacts to receiving watercourses. Some minor soil erosion on-site within the Project Location may be unavoidable due to runoff from exposed soils during heavy rainfalls events.
	Erosion of topsoil due to wind and water erosion from exposed surfaces following vegetation removal and excavation activities.	Loss of soil and increased turbidity in surface water runoff that could impair receiving water quality and aquatic habitat and biota.		
Groundwater	Accidental spills or leakage of fuel, oil, hydraulic fluid, etc., from construction vehicles or equipment, on-site refuelling or storage of toxic liquids on-site.	Impairment of groundwater (and soil) quality due to contamination.	Visual monitoring and reporting procedures to identify spills. Spill control kits on site and spill response procedures implemented in the event of an accidental spill. No refuelling or storage of toxic liquids within 30 m of a watercourse.	Mitigation will reduce risk of accidental spills, but not completely eliminate the possibility of occurrence during construction. If a spill occurs, clean-up methods will be effective in preventing residual negative effects.
Surface Water, Aquatic Habitat and Biota		Impairment of surface water quality in receiving watercourses.		
		Disruption of existing drainage patterns, impairment of surface water quality and loss or alteration of aquatic habitat is not expected since no watercourses on-site.		
	Alteration of existing surface drainage patterns and watercourses from earth filling, grading and excavation activities and facility installation.	Indirect effects to aquatic habitat and biota in receiving watercourses due to increased turbidity in runoff and sedimentation in receiving watercourses.	Maintain existing drainage patterns as much as possible. No construction or installation of Project facilities within 30 m of a watercourse. Retain and/or plant dense vegetation as soon as possible following construction. Implement sediment and erosion control measures as identified for: Soils.	Mitigation anticipated to be effective in preventing residual negative effects during construction. Minor potential for residual effects following construction until disturbed areas become completely stabilized by vegetative cover and plant growth.
	Changes to surface water quality (increased turbidity due to soil erosion and sedimentation) and surface water runoff rate.			
Vegetation Communities	Tree-cutting and vegetation clearing for facility installation.	No significant tree-cutting or vegetation removal is required for the Project. Indirect effects to adjacent vegetation communities could include deposition of dust on leaves.	Implement mitigation measures for: Air Quality and Soils to minimize generation of airborne dust. Retain and/or plant dense vegetation as soon as possible following construction to restore and protect wildlife habitat present within existing agriculture fields. Construction scheduling to avoid breeding bird season to ensure no impact to nesting birds. Direct or capture and release wildlife trapped within fenced areas. Limit on-site vehicles speeds to avoid incidental take.	Minor potential for residual effect associated with generation of airborne dust from exposed soils during construction activities that occur on extremely windy days. Mitigation will effectively reduce risk of incidental take of wildlife, but not completely eliminate.
Wildlife Communities	Construction activities and installation of the fence around the Project Location.	Loss or alteration of wildlife habitat due to vegetation clearing. Avoidance of Project Location by wildlife due to equipment, noise and human presence. Trapping of wildlife within fenced areas. Incidental take of wildlife due to construction vehicles.		
Air Quality	Generation of airborne dust from land clearing and excavation activities, and from exhaust emissions from construction vehicles and equipment.	Reductions in local air quality from airborne dust and exhaust emissions.	Construction practices to suppress dust (e.g., limit soil exposure, road watering) and proper emission controls (e.g., mufflers) on vehicles and equipment.	Minor potential for off-site dust generation as noted above. Mitigation will be effective in preventing off-site residual effects associated with exhaust emissions. No post-construction residual effects.
Noise	Noise emissions from construction vehicles and equipment.	Disturbances to nearby receptors due to noise emissions.	Compliance with municipal Noise Control By-Laws for construction working times. Proper sound baffling equipment (e.g., mufflers) on vehicles and equipment. Notification to adjacent noise receptors of construction timelines and call number to report noise complaints.	Some short-term, temporary 'nuisance' disturbance to sensitive nearby noise receptors during particular construction activities.
Public and Facility Safety	Construction equipment malfunction, fire or accidents resulting in injury to public or construction workers.	Personal injury to the public if trespassing on-site or to construction workers due to accidents, fire or equipment malfunction.	Public access to construction site will be prevented by fences, gates and security procedures. Proper health and safety procedures for construction workers will be implemented as per provincial and federal regulations.	Mitigation will reduce risk to public and facility safety, but some risk to workers resulting from accidents will remain throughout construction.
Traffic and Municipal Roadways	Construction vehicles and workforce commuters travelling to and from the Project.	Increased local area traffic resulting in temporary traffic delays.	Prepare transportation route plan and implement construction scheduling as required to avoid bottlenecks of equipment deliveries to site.	Some possible minor, short-term traffic delays on local roads in vicinity of Project Location during construction. No post-construction residual effects.
	Construction vehicles travelling to and from the Project.	Heavy construction vehicles may damage local roadways.	Municipal 'half-load' requirements for roads will be adhered to. Any damage to local roadways will be repaired.	None. Mitigation will be effective in preventing residual negative effects during construction.
Archaeological Resources	Vegetation stripping and excavations for foundation construction and trenching for underground electrical cables.	Excavations may result in the discovery of human remains or archaeological resources.	Complete Stage 3 archaeological assessment for two Euro-Canadian historic sites identified from the Stage 1 and 2 assessment. Otherwise, Project Location is considered clear of any archaeological resources. If construction results in discovery of human remains or archaeological resources, work is to stop and Ministry of Tourism and Culture will be notified.	None. Mitigation will be effective in preventing residual negative effects to human remains or archaeological resources if discovered during construction. No post-construction residual effects.

7. Summary and Conclusions

As discussed in the *Natural Heritage Assessment Records Review Report* (Hatch Ltd., 2011a), the *Natural Heritage Assessment Site Investigation Report* (Hatch Ltd., 2011b) and the *Natural Heritage Assessment Evaluation of Significance Report* (Hatch Ltd., 2011c), there are several significant natural heritage features within 120 m of the Project Location. This *Natural Heritage Assessment Environmental Impact Study* has been prepared to identify potential negative environmental effects that all phases of the Project may have on the significant natural features.

Mitigation measures have been proposed to prevent these effects from occurring or minimize the magnitude, extent, duration and frequency in the event that they do occur. The primary mitigation measure that will prevent adverse effects on the natural features is the careful placement of the project components on the Project Site to reduce encroachment onto the features themselves. Facility operations will also be conducted in a manner that reduces negative environmental effects. Monitoring measures have been proposed to confirm that mitigation measures are having the intended effect and that performance objectives are being met.

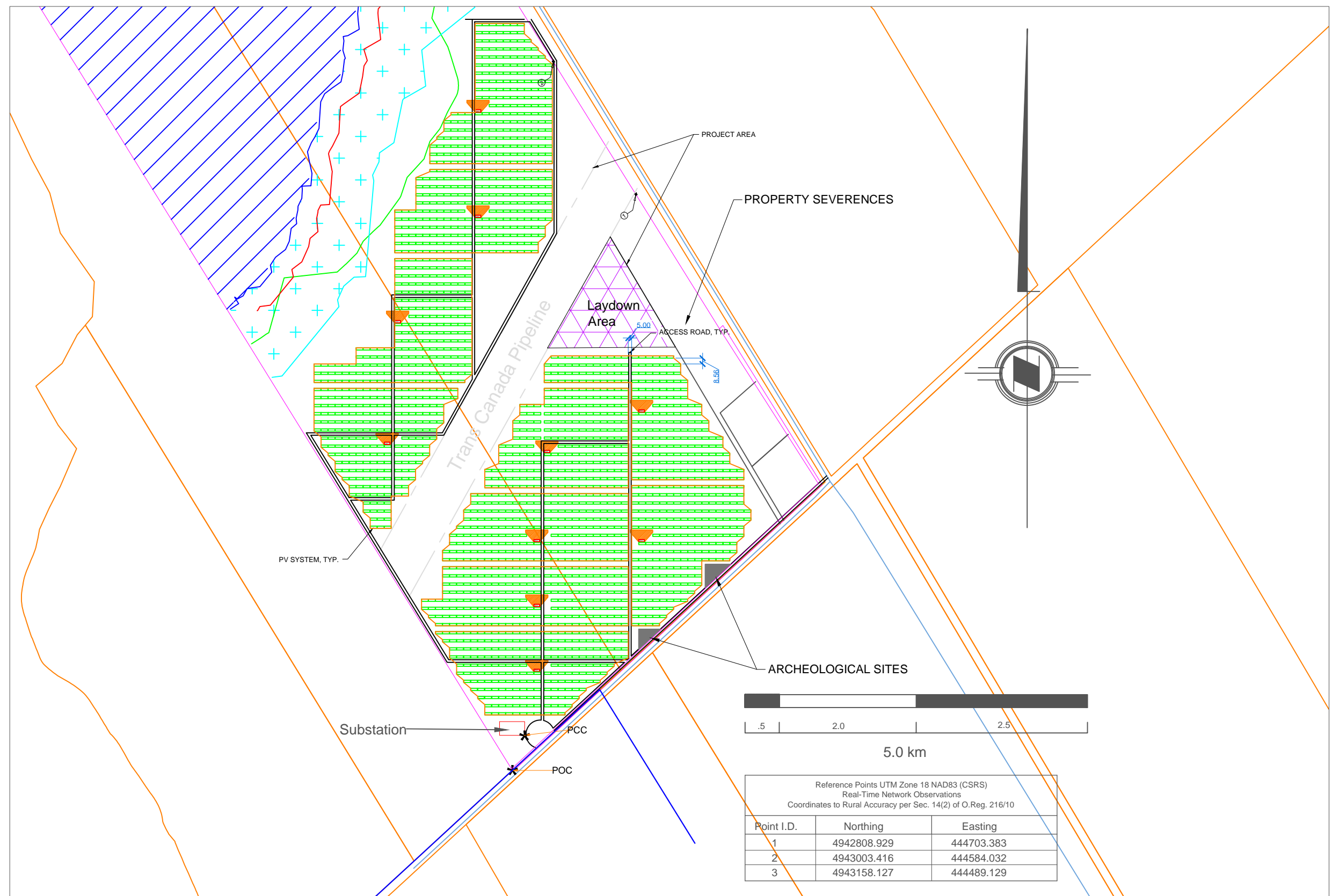
Overall, the Project will not change the ecological characteristics of the woodland and wetland natural features. Both features will preserve their ecological features and retain their classification as significant and provincially significant respectively. Encroachment into the woodland will result in the loss of 1.7 ha of specialized wildlife habitat for area-sensitive species, woodland raptors, western chorus frog. Loss of this habitat is considered minimal in comparison to the contiguous woodland. Milksnake habitat will be temporarily lost during the construction phase, but replaced post-construction. Some species of wildlife may avoid the Project due to the dominance of the site by man-made structures.

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Appendix A

Site Layout 2176047 Solar Energy Project



Project Size
10MW AC

Location
44-38'08.75"N
75-42'12.52"W

Legend

- Property Boundary
- Lot Lines
- Laydown Area
- Roads
- Transmission Line
- PSW
- Substation
- Inverter
- Rack - 24 Panels in total
- 120m Setback from PSW
- 30m Setback from PSW
- Tree Line

- Notes**
- 10MW AC (12.01MW DC) system shown. 52,260 panels @ 230W each.
 - Rack offsets are based off a 35 degree module tilt angle and 15 degree sun angle with UNIRAC's IGM system.
 - Modules facing perfect south.
 - Connection point is located at the South Western Corner of the property.
 - Incoming Transmission line is shown in blue. Feeder Name: 24M27, Voltage: 44kv.
 - 20*500KW AC Satcon Inverters have been indicated on the layout.
 - 120m setback from Watercourses and Provincially Significant Wetlands.
 - Access roads are a standard single lane width of 3.67m wide. With an additional half meter of buffer space on either side.

Reference Points UTM Zone 18 NAD83 (CSRS)
Real-Time Network Observations
Coordinates to Rural Accuracy per Sec. 14(2) of O.Reg. 216/10

Point I.D.	Northing	Easting
1	4942808.929	444703.383
2	4943003.416	444584.032
3	4943158.127	444489.129

Appendix B

Curriculum Vitae

Paul Ashley

SENIOR ECOLOGIST

EDUCATION

MSc, Biology, University Western Ontario, London, Ontario, Canada, 2005

BSc, Environmental Science, Trent University, Peterborough, Ontario, Canada, 1990

Diploma, Biology, Fleming College, Lindsay, Ontario, Canada, 1986

SUMMARY OF EXPERIENCE

Paul is a Senior Ecologist with over 20 years of experience working terrestrial, wetland and aquatic ecosystems. He has led many management and rehabilitation projects related to forests, savannahs, wetlands and riparian corridors. He also has extensive experience working with wildlife, and is a recognized expert on waterfowl and other wildlife, having written several peer-reviewed articles on waterfowl, white-tailed deer, amphibians and reptiles. He has represented various government agencies on national and international committees and working groups. Before joining Hatch, Paul designed and implemented long-term ecosystem monitoring programs for Arctic National Parks, particularly to monitor their responses to climate change. Much of this work involved collaboration with all tiers of government, universities across Canada, non-governmental organizations and private clients. Several monitoring projects he developed involved working with Inuit and using traditional knowledge. He has also managed two National Wildlife Areas, and was responsible for the delivery of the biological program.

Paul joined Hatch in 2010 and is actively involved in the environmental aspects of Canadian Solar Projects and the Renewable Energy Approval Process. He draws upon all his experience to teach a course each spring on Environmental Monitoring at the Central European University in Budapest.

RELEVANT EXPERIENCE

Biologist. Paul managed the Long Point and Big creek National Wildlife Area; two of southern Ontario's largest wetland complexes and natural areas.

Paul was responsible for leading the biological program at the National Wildlife Areas, which included:

- leading a multi-agency infrastructure project to mitigate the effects of a roadway on wildlife and impacted wetlands
- representing the agency on the international tri-lateral Monarch Butterfly Reserve Network
- managing and restoring forest and savannah habitats
- managing and inventorying white-tailed deer and other wildlife populations

- conducting restoration work with species at risk, including: bald eagle, prothonotary warbler, king rail, spiny soft-shell, spotted turtle, American chestnut, common hop-tree and cucumber tree
- leading the waterfowl banding program
- managing wetlands in diked impoundments
- working with community and groups, special interest groups, non-government organizations and universities

Ecosystem Scientist. As the ecosystem scientist for the Nunavut National Parks, Paul lead the development of the ecosystem monitoring program.

Paul worked with colleagues from Parks Canada, universities and other government agencies to monitor:

- glaciers, sea ice, and permafrost through remote sensing
- wildlife populations, including polar bears, colonial seabirds, snow geese, and lemmings
- water quality and active layer
- tundra vegetation change and phenology
- sea ice conditions using Traditional Knowledge.

Canadian Solar Projects, Niagara Falls, Ontario, Canada, Senior Ecologist. Paul has worked as Hatch's Senior Ecologist for Canadian Solar Projects in Ontario. He has conducted site investigations which include ecological land classification, wetland evaluations, bird surveys, amphibian surveys, and other wildlife inventories. He has also conducted water body site investigations. Paul has prepared natural heritage records review reports, site investigation reports, evaluation of significance reports and environmental impact study reports as required under the Renewable Energy Approval process. He has also worked closely with clients and government representatives to advance Canadian Solar projects.

CAREER HISTORY

- | | |
|-------------|--|
| 2010 - 2010 | Hatch, Niagara Falls, Ontario, Canada. Senior Ecologist |
| 2008 - 2010 | Parks Canada, Iqaluit, Nunavut, Canada. Ecosystem Scientist |
| 1990 - 2007 | Environment Canada, Port Rowan, Ontario, Canada. Site Manager Big Creek/Long Point National Wildlife Areas |

TECHNICAL PAPERS

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LANGUAGES

English



Suite 500, 4342 Queen Street
Niagara Falls, Ontario, Canada L2E 7J7
Tel 905 374 5200 ♦ Fax 905 374 1157