



Canadian Solar Solutions Inc. and  
UC Solar Ltd.

Draft Project Description Report

For

2176047  
Solar Energy Project

H335467  
Rev. 5  
August 4, 2011

## Report Disclaimer

This report has been prepared by Hatch Ltd. for the sole and exclusive use of Canadian Solar Solutions Inc. (the “Client”) and UC Solar Ltd. (the Proponent”) for the purpose of assisting the Client and the Proponent in making decisions with respect to the development of a proposed solar photovoltaic project and shall not be (a) used for any other purpose, or (b) provided to, relied upon or used by any third party.

This report contains opinions, conclusions and recommendations made by Hatch Ltd. (Hatch), using its professional judgment and reasonable care. Any use of or reliance upon this report by the Client and the Proponent is subject to the following conditions:

- the report being read in the context of and subject to the terms of the agreement between Hatch and the Client and the Proponent including any methodologies, procedures, techniques, assumptions and other relevant terms or conditions that were specified or agreed therein;
- the report being read as a whole, with sections or parts hereof read or relied upon in context;
- the conditions of the site may change over time (or may have already changed) due to natural forces or human intervention, and Hatch takes no responsibility for the impact that such changes may have on the accuracy or validity of the observations, conclusions and recommendations set out in this report; and
- the report is based on information made available to Hatch by the Client and/or the Proponent or certain third parties; and unless stated otherwise in the Agreement, Hatch has not verified the accuracy, completeness or validity of such information, makes no representation regarding its accuracy and hereby disclaims any liability in connection therewith.

August 4, 2011

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

**Draft Project Description Report  
Table of Contents**

**Report Disclaimer**

<b>1. Introduction .....</b>	<b>1</b>
1.1 General .....	1
1.2 Renewable Energy Approval Legislative Requirements .....	1
1.3 Purpose of Report .....	2
1.4 Formal Revisions to this Report .....	2
<b>2. General Information Requirements.....</b>	<b>3</b>
2.1 General Information.....	3
2.2 Contacts.....	3
2.3 Authorizations Required.....	4
2.4 Federal Involvement.....	4
2.5 Supporting Reports.....	4
<b>3. Project Information.....</b>	<b>6</b>
3.1 Ownership of the Land.....	6
3.2 Energy Sources to Generate Electricity .....	6
3.3 Nameplate Capacity.....	6
3.4 Class of the Renewable Energy Facility.....	6
3.5 Project Components.....	6
3.6 Project Activities .....	9
3.6.1 Construction.....	9
3.6.1.1 Site Survey and Staking.....	9
3.6.1.2 Site Preparation .....	9
3.6.1.3 Access Road Construction .....	9
3.6.1.4 Installation of Foundations and Support Structures.....	9
3.6.1.5 Installation of PV Modules and Mounting Racks .....	10
3.6.1.6 Installation of Inverters and Pad-Mounted Transformers.....	10
3.6.1.7 Electrical Cable Installation.....	10
3.6.1.8 Substation Yard Construction.....	10
3.6.1.9 Electrical Distribution Line Installation and Interconnection Point.....	10

3.6.1.10	Testing and Commissioning.....	11
3.6.1.11	Site Restoration.....	11
3.6.2	Operation and Maintenance.....	11
3.6.2.1	Operation.....	11
3.6.2.2	Site Inspection and Maintenance.....	12
3.6.2.3	Storm Water Management.....	12
3.6.2.4	Water Supply Facilities.....	13
3.6.2.5	Wastewater (Sewage) Facilities.....	13
3.6.2.6	Waste Disposal Facilities.....	14
3.6.2.7	Exhaust Equipment.....	14
3.6.3	Decommissioning.....	14
<b>4.</b>	<b>Description of Environmental Effects.....</b>	<b>15</b>
4.1	General.....	15
4.2	Environmental Resource Features and Potential Effects.....	15
4.2.1	Heritage and Archaeological Resources.....	16
4.2.2	Natural Heritage Resources.....	16
4.2.3	Waterbodies.....	17
4.2.4	Air, Odour and Dust.....	17
4.2.5	Noise.....	18
4.2.6	Land Use and Resources.....	18
4.2.7	Provincial and Local Infrastructure.....	18
4.2.8	Public Health and Safety.....	19
4.2.9	Areas Protected Under Provincial Plans and Policies.....	19
4.3	Summary.....	19
<b>5.</b>	<b>References.....</b>	<b>25</b>

## List of Tables

<b>Number</b>	<b>Title</b>
Table 4.1	Summary of Potential Negative Environmental Effects during Construction, Operations and Decommissioning

## List of Figures

<b>Number</b>	<b>Title</b>
Figure 2.1	Site Layout Plan
Figure 3.1	Generalized Schematic of Electrical Equipment Connectivity
Figure 3.2	Photograph of Typical Solar PV Module Installation

## 1. Introduction

### 1.1 General

Canadian Solar Solutions Inc. (“Canadian Solar”) in partnership with UC Solar Ltd. (“UC Solar”) is proposing to develop a 10-megawatt (MW) solar photovoltaic project titled 2176047 Solar Energy Project (the “Project”). The Project Location<sup>1</sup> is situated on an approximately 36 hectares (ha) of land on Part of Lots 7 & 8, Concession 3, Elizabethtown-Kitley Township (lower tier municipality), United Counties of Leeds and Grenville (upper tier Municipality). The southern portion of the Project Location is within the City of Brockville.

The Project is proposed to be constructed on privately owned land consisting of former agricultural lands and other lands covered by successional vegetation. The Project is located immediately west of County Road 6 (North Augusta Road) and immediately north of Centennial Road (County Road 26).

The Project is a renewable energy generation facility which will use solar photovoltaic technology to generate electricity. Electricity generated by solar photovoltaic panels will be converted from direct current (DC) to alternating current (AC) by inverters and then stepped-up (via pad-mounted inverter transformers and a main substation transformer) to a voltage of 44 kV prior to being connected to the existing local distribution line. In order to meet Ontario Power Authority (OPA)’s Feed-In-Tariff (FIT) Program requirements, a specific percentage of equipment will be manufactured in Ontario.

The construction of the Project will begin once the Renewable Energy Approval (REA) has been obtained. The construction period is estimated to be approximately 8 months, with Project commissioning anticipated in October 2012. 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.

### 1.2 Renewable Energy Approval Legislative Requirements

Ontario Regulation (O. Reg.) 359/09 – *Renewable Energy Approvals Under Part V.0.1 of the Act*, (herein referred to as the REA Regulation), came into force on September 24, 2009 and identifies the Renewable Energy Approval (REA) requirements for renewable energy generation facilities in Ontario. The REA Regulation has since been amended by O. Reg. 521/10, which came in effect as of January 1, 2011. As per the REA Regulation (Part II, Section 4), ground mounted solar facilities with a name plate capacity greater than 12 kilowatts (kW) are classified as Class 3 solar facilities and require an REA.

Section 13 of the REA Regulation requires proponents of Class 3 solar projects to prepare a Project Description Report. As prescribed by Table 1 of O. Reg. 359/09, the Project Description Report shall describe the following:

1. *“Any energy sources to be used to generate electricity at the renewable energy generation facility.*

---

<sup>1</sup> “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)).

2. *The facilities, equipment or technology that will be used to convert the renewable energy source or any other energy source to electricity.*
3. *If applicable, the class of the renewable energy generation facility.*
4. *The activities that will be engaged in as part of the renewable energy project.*
5. *The name plate capacity of the renewable energy generation facility.*
6. *The ownership of the land on which the Project Location is to be situated.*
7. *Any negative environmental effects that may result from engaging in the project.*
8. *An unbound, well marked, legible and reproducible map that is an appropriate size to fit on a 215 mm by 280 mm page, showing the Project Location and the land within 300 m of the Project Location."*

A draft of the Project Description Report must be made available to the public, the local municipality and identified Aboriginal communities at least 60 days prior to the first and final public consultation meetings in accordance with O. Reg. 359/09.

### **1.3 Purpose of Report**

The Project Description Report is one of the first Project documents prepared once the REA process commences and serves several purposes. Initial drafts of the Report were used to provide preliminary information regarding the Project to the public, Aboriginal groups, municipalities and other government agencies. As the REA process progressed, the Report was updated based on information obtained from various studies and data collection activities as well as preliminary planning and engineering of the Project. The final version of the Report serves as a comprehensive overview document that summarizes all of the important information about the Project.

Section 2 of the Report describes general information about the Project including the Project name, location and contact information. Section 3 describes the Project components, the major construction activities, operational aspects and decommissioning. Section 4 describes the potential environmental effects associated with the Project's construction, operation and decommissioning phases and the proposed mitigation measures to prevent/minimize those effects. Section 5 provides the references.

This Project Description Report has been prepared in accordance with the requirements identified in Table 1 of O. Reg. 359/09, as well as the guidance provided in the Ministry of the Environment's (MOE) Draft Technical Bulletin 1 – Guidance for Preparing the Project Description Report as part of an application under O. Reg. 359/09 (MOE, 2010).

### **1.4 Formal Revisions to this Report**

The following formal revisions of this report have taken place:

- Revision 0, July 23, 2010 – Original draft issued in advance of the first public meeting.
- Revision 3, May 25, 2011 – Revised draft issued in advance of the second public meeting.
- Revision 5, August 4, 2011 – Revised draft issued to MOE following the second public meeting.

## 2. General Information Requirements

### 2.1 General Information

The name of the Project is the 2176047 Solar Energy Project (the "Project").

The Project Location, per the definition in the REA Regulation, is shown in Figure 2.1. The Project Location includes the entire footprint of the project, including all temporary and permanent parts of the land that will be utilized for the Project. This includes the following Project features:

- all areas where vegetation will be cleared
- temporary and permanent site access roads
- solar panel arrays
- inverters/pad-mounted transformer in building enclosures
- substation yard with main transformer
- temporary laydown area for construction
- project fencing
- electrical distribution line from the substation to the interconnection point.

### 2.2 Contacts

UC Solar Ltd. is the proponent of the Project. The contact information on behalf of UC Solar Ltd. is:

Jeff Roy, Program Manager, Solar Farm  
Canadian Solar Solutions Inc.  
67A Sparks Street, Suite 300  
Ottawa, ON, K1P 5A5  
Tel: 519-954-2057 (Office)  
Tel: 613-304-0072 (Cell)  
Fax: 519-837-2550  
Email: jeff.roy@canadian-solar.com

Hatch Ltd. (Hatch) has been retained to assist UC Solar in meeting the REA requirements. Contact information for Hatch is:

Paul D. Holmes, P. Eng., Environmental Coordinator  
Hatch Ltd.  
2800 Speakman Drive  
Mississauga, ON, L5K 2R7  
Tel: 905-855-7600, ext. 4625  
Fax: 905-855-8270  
Email: pholmes@hatch.ca

## 2.3 Authorizations Required

Permits, licenses and authorizations such as those listed below, in addition to the REA may be required for the Project to proceed:

- **Entrance Permit** – The United Counties of Leeds and Grenville, and the City of Brockville will likely require an entrance permit for the site access entrances to be constructed from County Road 6 and Centennial Road, respectively.
- **Building Permit** – The Township of Elizabethtown-Kitley and/or the City of Brockville may require a building permit(s) for construction of the inverter and/or substation electrical buildings.

## 2.4 Federal Involvement

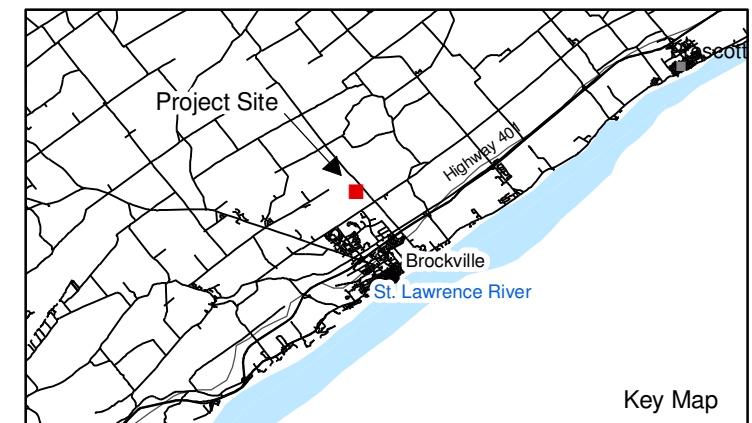
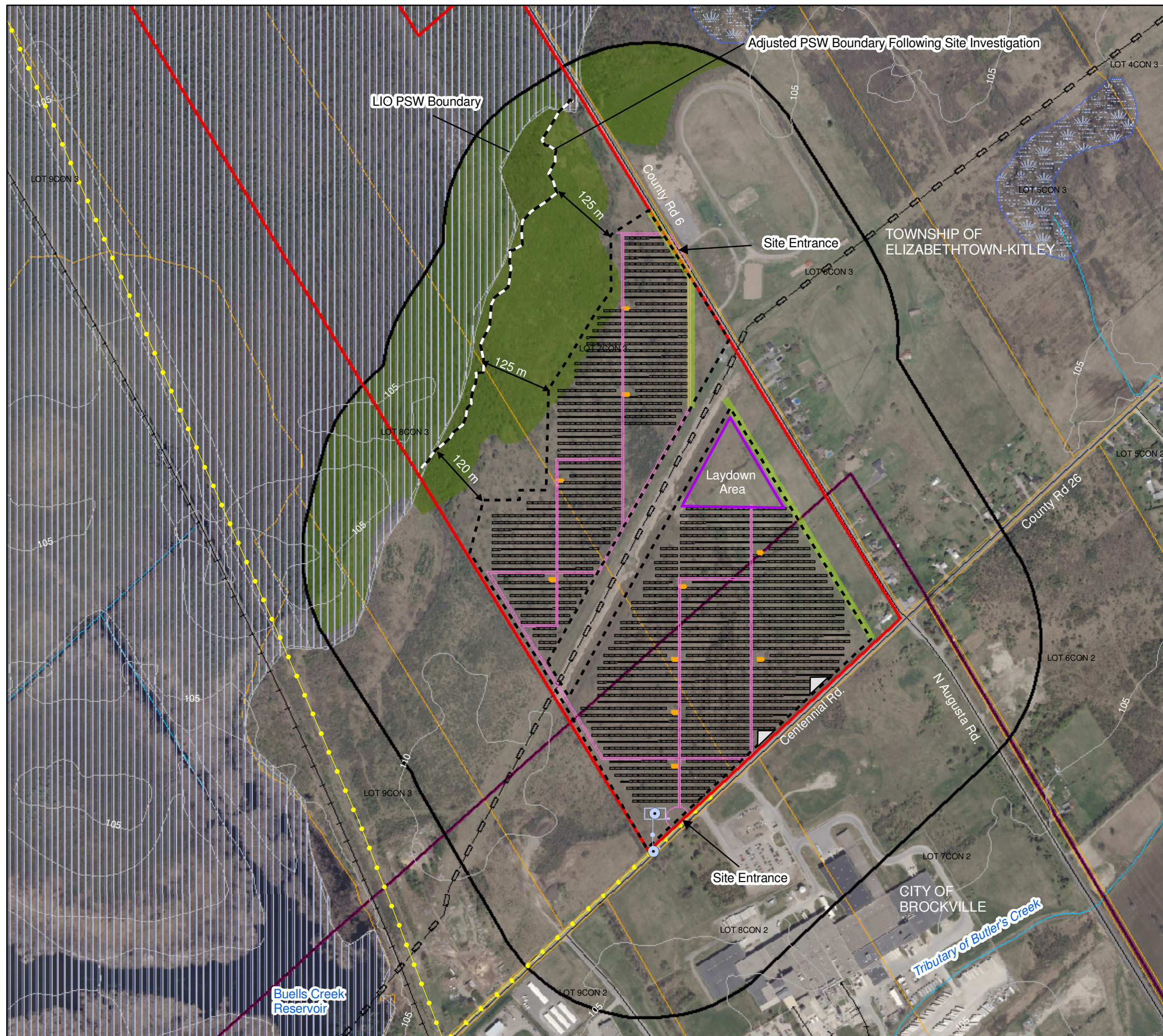
No Federal lands or resources will be utilized for the Project and based on the resources within the Project Location, issues under Federal jurisdiction are not anticipated. Therefore, no Federal involvement (including permits and approvals) is required.

## 2.5 Supporting Reports

Several reports have been prepared as part of the REA application and are provided under separate cover. These reports provide detailed information on the various natural and socio-economic features on and within proximity to the Project Location. Some of the reports include an assessment of the potential effects of the Project's construction, operation and decommissioning phases along with recommended mitigation measures to ensure that there will be no significant negative effects.

These reports should be referred to by persons seeking further detailed information.

- **Natural heritage features** can be found in the Natural Heritage Assessment Records Review Report (Hatch, 2011a), Natural Heritage Assessment Site Investigation Report (Hatch, 2011b), Natural Heritage Assessment Evaluation of Significance Report (Hatch, 2011c) and Natural Heritage Assessment Environmental Impact Study Report (Hatch, 2011d).
- **Waterbodies** can be found in the Water Body Records Review Report (Hatch, 2011e) and the Water Body Site Investigation Report (Hatch, 2011f).
- **Construction, operation and decommissioning** activities and timelines, facilities components, environmental effects, mitigation and monitoring can be found in the Construction Plan Report (Hatch, 2011g), the Design and Operations Report (Hatch, 2011h) and the Decommissioning Plan Report (Hatch, 2011i).
- **Socio-economic conditions** (e.g., land use, municipal infrastructure) are discussed in this report.
- **Protected properties and heritage resources** are discussed in this report.
- **Noise conditions** including the noise sources associated with the Project (e.g., inverters and transformers), noise receptors and the results of noise modeling of the Project during its operation can be found in the Noise Study Report (Hatch, 2011j).
- **Archaeological resources** and an assessment of potential effects can be found in the Stage 1 and 2 Archaeological Assessment Report (TAI, 2011).
- **Geotechnical conditions** (e.g., soils, groundwater, bedrock) can be found in the Geotechnical Report (Inspec-Sol, 2011).
- **Storm water runoff conditions** (e.g., existing and proposed runoff peak flows) can be found in the Storm Water Management Report (Dillon, 2011).



- LEGEND**
- Existing Features**
- +— Railway
  - Transmission Line
  - Road
  - Pipeline
  - Topographic Contour (5 m Interval)
  - Watercourse
  - Project Location
  - Project Site
  - 300 m from Project Location
  - Municipal Boundary
- Natural Features**
- Wetland
  - Significant Woodland
  - Provincially Significant Buells Creek Reservoir Wetland
- Proposed Project Components**
- Tree Planting
  - Panel Layout
  - Transmission Line
  - Access Roads
  - Fence
  - Inverter
  - Laydown Area
  - Substation
  - Connection Point
- Heritage and Archaeological Resources**
- △ Historic Site (Stage 1/2 Archaeology)

Notes:  
 1. OBM and NRVIS data downloaded from LIO, with permission.  
 2. Spatial referencing UTM NAD 83, August 2010.  
 3. Air Photos from CRCA, flown Spring 2008, scale 1:2000

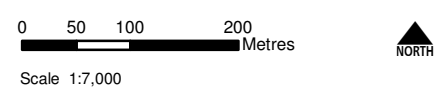


Figure 2.1  
 UC Solar Ltd.  
 2176047  
 Site Layout Plan **HATCH**

### 3. Project Information

The following sections are intended to satisfy the requirements of Table 1 in O. Reg. 359/09 (Section 10 – Project Description Report) and MOE Draft Technical Bulletin 1 (MOE, 2010). Further details on the Project are provided in other required reports as per O. Reg. 359/09, including the Construction Plan Report, Design and Operations Report and the Decommissioning Plan Report.

#### 3.1 Ownership of the Land

The Project is located on privately owned lands owned by 2176047 Ontario Inc. c/o Canadian Solar Solutions Inc. The Project Location is situated on approximately 36 hectares of land on Part of Lots 7 & 8, Concession 3, Township of Elizabethtown-Kitley. The southern portion of the Project Location is within the City of Brockville. The lands within the Township are currently zoned Rural and the lands within the City are zoned Industrial. The Civic address is 12 Centennial Road East, Brockville.

#### 3.2 Energy Sources to Generate Electricity

Solar energy will be used to generate electricity. No supplementary fuel sources are used in the generation of this renewable energy.

#### 3.3 Nameplate Capacity

The nameplate capacity of the Project will be up to 10 MW AC. The project may be up to approximately 12.2 MW DC.

#### 3.4 Class of the Renewable Energy Facility

The Project will be a Class 3 solar facility. That is, the Project is ground-mounted and greater than 12 kilowatts (kW).

#### 3.5 Project Components

Figure 2.1 provides a conceptualized depiction of the Project including the Project Location boundaries, existing local roads, topographic contours, existing transmission line, land uses, significant natural features and waterbodies on and within 300 m of the Project Location. Also depicted are the Project components including the construction laydown area, access roads, solar PV module arrays, inverter/transformer clusters, substation yard, and the connecting electrical line. Setback distances from identified significant natural features and waterbodies are also shown.

The main components of the Project will include the following:

- Approximately 52,260 solar PV modules, Canadian Solar CS6P-230P Model 230 watt (W) solar module. The module's dimensions are 1638 mm long by 982 mm wide by 40 mm thick, and each weighs 20 kg.
- Twenty 500 kW (kilowatt) AC inverters that will convert the direct current supplied by the PV modules to alternating current. Ten pad-mounted 1 MVA (Megavolt-ampere) three-phase, liquid-filled transformers that will 'step up' the voltage to 27.6 kV. Each installation will consist of a pair of 500 kW inverters and a single 1 MVA transformer in one of ten building enclosures (E-House) to protect the equipment from the weather and to reduce noise emissions.

- A gravel substation yard that will house a 10 MVA three-phase substation transformer that will 'step up' the voltage from 27.6 kV to 44 kV, switchgear, control and monitoring equipment.
- Two paved site entrance roads and several gravel interior access roads.
- Galvanized chain link fence around the perimeter of the Project Location and a gated entrance.
- A temporary laydown / staging area to be used for construction trailers, material and equipment storage and vehicle parking during construction of the Project.
- A surface water drainage system comprised of grassed swales, roadside ditches and culverts.

Figure 3.1 depicts a generalized schematic illustrating how electricity will be generated, inverted, transformed and transmitted by the electrical equipment used for the Project.

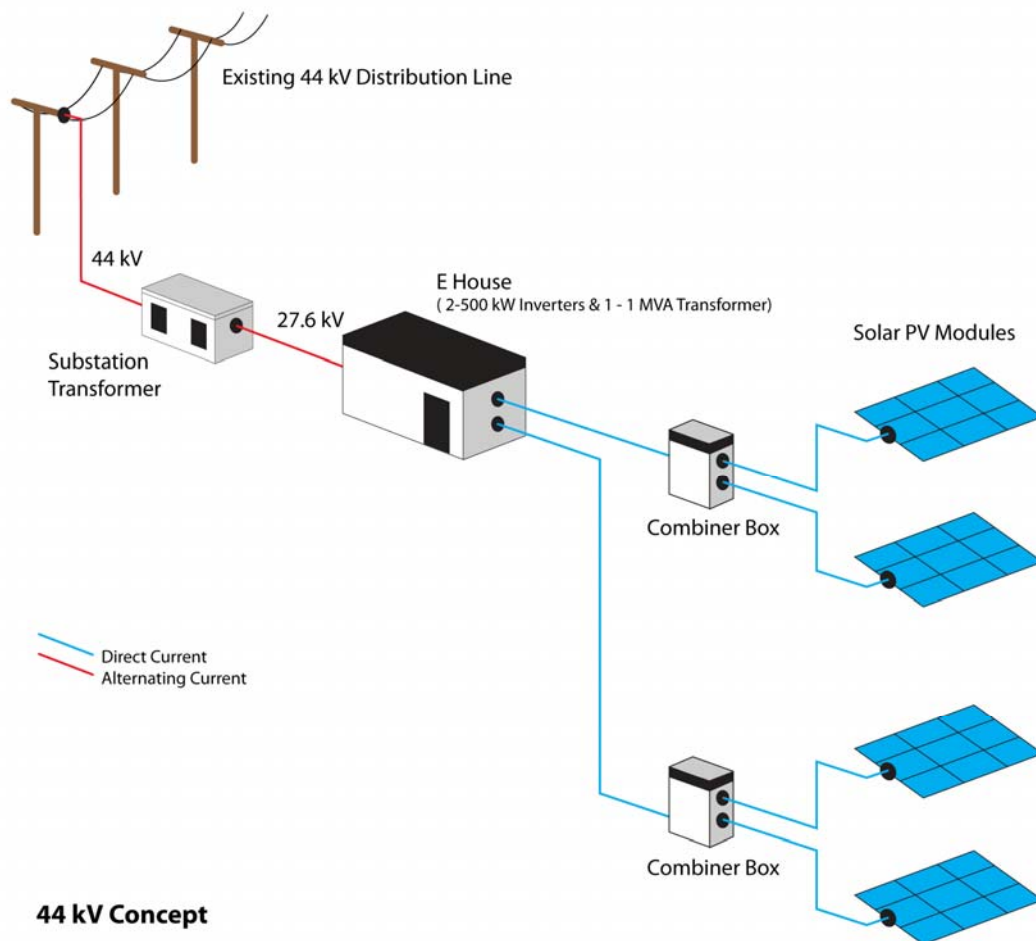


Figure 3.1 Generalized Schematic of Electrical Equipment Connectivity

Upon exposure to sunlight, the solar modules convert solar radiation into direct current (DC) electricity through a process referred to as the photovoltaic effect. This effect occurs when the sunlight energy is transferred to semiconductors in the modules, which creates a corresponding electric current. For the Project, the solar PV modules will be mounted on steel racks with a fixed tilt 35° angle facing south. Each rack will typically contain twenty-four 230 watt PV modules connected together by electrical wiring. The racks of modules will be arranged in long rows, typically spaced about 7.8 m apart.

The DC electrical current from the solar PV modules will be transmitted across the back of the modules and through underground wires connected to combiner boxes. The combiner boxes allow the connection of numerous incoming wires from the racks of modules into a single outgoing electrical cable. The DC electrical current from the combiner boxes will be transmitted through underground cabling connected to one of two 500 kW inverters housed in a building enclosure. Each inverter will convert the DC electrical current to alternating current (AC) and an inverter transformer will step-up the voltage to 27.6 kV.

The electricity, now at 27.6 kV (AC), will be transmitted through underground cabling to the main transformer situated in the substation yard, which will step up the voltage from 27.6 kV to 44 kV. Electricity will then flow from the substation yard through overhead electrical lines and connect to the local distribution line at its existing voltage of 44 kV.



**Figure 3.2** Photograph of Typical Solar PV Module Installation

### 3.6 Project Activities

The Project activities involved in the construction, operation and decommissioning phases of the Project are outlined in the following sections. For Information regarding the construction, operation and decommissioning of these components, please refer to the Construction Plan Report, the Design and Operations Report, and the Decommissioning Report.

#### 3.6.1 Construction

The construction period is estimated to be approximately 8 months. The initial site preparation activities are anticipated to begin in mid-January 2012 and be completed by end of March. Construction and installation activities are then anticipated to begin in April and continue to the end of September. Following testing and commissioning of the facilities, the Project is expected to achieve commercial operation by mid-October 2012.

##### 3.6.1.1 Site Survey and Staking

An Ontario land surveyor will survey and stake the locations of the Project Location perimeter fencing, access roads and foundations as well as any buried utilities, infrastructure and associated easements. Any designated environmental features (e.g., waterbodies, woodlands) and their setbacks will be demarcated and protected by means of staking, flagging, fencing or signage to prevent any intrusion into these areas by construction vehicles.

##### 3.6.1.2 Site Preparation

Prior to commencement of construction, sediment and erosion controls (e.g., silt fencing, rock flow check dams) will be installed throughout the Project Location in accordance with the Sediment and Erosion Control Plan prepared as part of detailed design. Trees and large standing vegetation will be cleared from areas where the photovoltaic arrays will be constructed. Meadow vegetation will be left in place to the extent possible. Where practical, merchantable timber, non-merchantable timber (e.g., firewood) and other cleared vegetation, along with any removed topsoil will be stockpiled adjacent to the access roads. Locations of topsoil, timber and vegetation stockpiles will be determined and not within 30 m of a water body.

##### 3.6.1.3 Access Road Construction

Two new site access roads, about 5 m wide each, will be constructed of asphalt from County Road 6 and Centennial Road into the Project Location. In addition, several smaller gravel roads, about 3.7 m wide each, will be constructed within the interior areas of the Project Location. Road construction will involve vegetation clearing (if necessary) and topsoil removal prior to the placement of a granular base. Ditches and culverts will be constructed, as necessary, to maintain site drainage.

##### 3.6.1.4 Installation of Foundations and Support Structures

Foundations will be installed beneath each inverter/transformer cluster (i.e., building enclosures) and support structures installed to support the PV modules and their mounting racks. Detailed design of the foundations and support structures is yet to be completed, however, it is expected that the foundations for the inverters and transformers will be precast concrete pads. The module racks are expected to be supported by either a drilled steel pier foundation and/or concrete CIDH (Cast-In-Drilled-Hole) into the ground. An estimated 4,360 piles will be installed within the Project Location

to support the racking structures and the PV modules. Foundation construction and the installation of support structures will be inspected prior to the installation of PV modules and wiring.

#### *3.6.1.5 Installation of PV Modules and Mounting Racks*

The solar PV modules will be mounted on a fixed tilt, ground mounted racking system comprised of a steel and/or aluminum lattice structure. Each lattice structure will be assembled on-site and will typically hold 24 individual PV modules. The modules will be mounted on the racking system by installers with the help of a small mobile crane. The racking system will be supported by steel uprights mounted on steel piles. An estimated 2180 racks will be required for the Project.

#### *3.6.1.6 Installation of Inverters and Pad-Mounted Transformers*

The Project will have a total of twenty 500 kW AC inverters and ten intermediate 1 MVA pad-mounted transformers. The inverters will convert the DC power collected by the solar PV modules into AC power and this voltage will be stepped up by the pad-mounted transformers to a voltage of 27.6 kV. Each inverter/transformer cluster installation will consist of two 500 kW inverters and a single 1 MVA pad-mounted transformer installed together in one of ten prefabricated buildings to protect the equipment from the weather and to reduce noise emissions. The inverters, transformers and prefabricated building enclosures will be trucked to the site and installed on either a precast or cast-in-place concrete pad by means of a crane.

#### *3.6.1.7 Electrical Cable Installation*

Trenches will be excavated for electrical cabling (including DC cables from the modules to the inverters and AC cables from the inverters to the substation yard). Trenches will typically be 1 m deep by 0.5 m wide and given the shallow bedrock conditions, they will be excavated using pneumatic or hydraulic breakers such as hoe rams (Inspec-Sol, 2011). Trenches will have a sand base layer below and above the cabling, and once the cabling is laid, the trenches will be backfilled and levelled to match the existing grade. Where necessary, high density polyethylene (HDPE) conduits will be installed beneath road crossings and in areas of shallow bedrock to house and protect the cables.

#### *3.6.1.8 Substation Yard Construction*

The substation yard will be located in the southwest corner of the Project Location (Figure 2.1). Construction will include excavation of topsoil, installation of ground grid, foundation construction, covering of surface area with crushed stone, installation the substation transformer and other electrical equipment. Switchgear, protection and control equipment will be housed in a prefabricated, weatherproof building enclosure. The building enclosure will be trucked to the site and installed on a precast concrete pad. The substation transformer will step-up the voltage from 27.6 kV to 44 kV prior to connecting to the existing Hydro One Networks Inc. (HONI) 44 kV distribution line.

#### *3.6.1.9 Electrical Distribution Line Installation and Interconnection Point*

Connecting to the existing HONI 44 kV distribution line along Centennial Road will require about 80 m long overhead 44 kV electrical distribution line be constructed between the Project substation and the point of interconnection (POI) with the HONI distribution line (Figure 2.1). The Proponent will construct the overhead distribution line from the substation yard to the Project property line in

accordance with the Ontario Electrical Safety Code. HONI will construct the section of the line from the Proponent's property line to the POI.

### *3.6.1.10 Testing and Commissioning*

Following the installation of all electrical components, testing and commissioning will be performed prior to start up and connection to the power grid. The solar modules, inverters, transformers and electrical cables will be checked for system continuity, reliability and performance. If problems or issues are identified, remedial corrections will be made prior to start up.

### *3.6.1.11 Site Restoration*

Site restoration will occur during and following the final stages of the completion of the Project construction and installation activities. The main objective will be to stabilize and re-instate vegetation within all areas disturbed by the Project construction. Site restoration will include the removal of all construction material, equipment, temporary facilities and waste from the Project Location. Topsoil will be redistributed where required, followed by finished grading and landscaping to achieve proper drainage. Re-vegetation will include planting of native plants and hydro-seeding where required.

## **3.6.2 Operation and Maintenance**

### *3.6.2.1 Operation*

The Project will operate year round and generate electricity during daylight hours. The amount of power generated will depend on daily weather conditions and sufficient solar irradiation. The Project will be operated remotely and does not require a permanent on-site operator. Any damage or faults with the PV modules and electrical systems will be alerted to staff remotely and repaired (or replaced) by facility staff or qualified professionals. To ensure the safety and integrity of the Project facilities, access to the Project site will be limited to Project personnel and unauthorized public access to the site will be prevented by fences, gates and security procedures.

A Project Facility Manager, appointed by the Proponent will be responsible for the day-to-day management of all Project facilities, including supervising site activities, site inspections, facility maintenance and repair. The Project Facility Manager, or his/her designate and/or other Proponent staff will be responsible for staff training, health and safety training and compliance, environmental regulatory compliance and public/municipal communications. For general monitoring and site maintenance purposes, two part time or full-time local personnel would be dispatched from a central operations office as needed. Proper health and safety procedures for on-site maintenance personnel will be implemented as per provincial and federal regulations.

Operationally, there are no significant hazards involved in the operation of the Project, nor are hazardous materials used in, stored on the site or created by the Project during its operation. The Project will not generate significant quantities of waste from its operation nor will the Project generate any wastewater (sewage) or discharge any liquid effluent from its operation.

Project operation will not result in the discharge of contaminants or pollutants to the air. The only noise emissions associated with the Project operation will be from the inverters and transformers, which will only operate during daylight hours. A Noise Study Report (Hatch, 2011j) involving computer modeling simulations of the Project inverters and transformers has confirmed that the

applicable Ministry of Environment noise level limits will not be exceeded at the locations of the nearest noise receptors. Sound level monitoring, if required by MOE, as a condition in the REA for the Project will be implemented and annual compliance reports submitted to the MOE. In addition, the Proponent will use feedback obtained from nearby noise receptors to confirm that noise emissions are within reasonable levels.

#### 3.6.2.2 *Site Inspection and Maintenance*

The Project solar PV modules, inverters and transformers and other electrical equipment, wiring and electrical connections will be routinely inspected, typically on a monthly basis. Any broken or malfunctioning PV modules, electrical cabling or components will be repaired or replaced by facility staff. Trash, debris and equipment parts replaced during maintenance and repair activities will be collected and properly stored in waste disposal bin(s). All waste collected during operation of the Project will be removed from the site in accordance with provincial and municipal requirements.

The Project Location grounds including vegetation coverage, drainage systems and trees will be monitored and maintained regularly. Since suitable ground cover will be established under the PV modules, some form of vegetation abatement such as grass cutting may be required several times throughout the summer months. No hazardous chemicals would be used for this vegetation control.

The Project Location, including any constructed drainage features (e.g., grassed swales, culverts) and any sediment and erosion control measures (e.g., rip rap protection, rock flow checks) will be visually inspected for any signs of erosion or sedimentation and recorded in a log book. Regular maintenance such as the cleanout of accumulated sediment and/or the removal of any debris blockage would be conducted at that time. If required, remedial works (e.g., stabilizing and/or reseeded of identified erosion areas) and repairs to any drainage or mitigation measures will be implemented to prevent environmental impacts.

The need to clean the solar PV modules will be determined according to local weather conditions, such as the quantity and frequency of rain and snow at the Project Location. At the very most, it is expected that the modules will require cleaning quarterly, but it is possible that cleaning the modules will not be necessary at all. If required, water trucks will bring water to the site to supply the water required. No chemicals will be used for the cleaning of the modules.

Secondary spill containment will be installed around the pad-mounted inverter transformers and the substation transformer. All transformers will be visually inspected on a monthly basis and their status recorded in a log book. Any faulty equipment that could result in an oil leak will be repaired and any observed leaks will be cleaned up immediately by maintenance personnel. Spill response equipment will be left on site or in the maintenance trucks should leaks be observed.

During winter, Project access roads will be ploughed to clear snow to maintain access of personnel to Project facilities. Under most winter conditions, snow is expected to melt due to the module heating and its 35° tilt. Under some conditions, manual snow removal may be performed by maintenance personnel who will clear the snow using a brush attached to a long pole.

#### 3.6.2.3 *Storm Water Management*

Drainage works including grassed swales, ditches and roadside culverts will be designed and constructed as part of the facility civil components. Overall, major alteration to the existing surface

drainage patterns is not expected as part of the Project's construction and operation. A storm water management study has been prepared for the Project (Dillon, 2011) which confirmed that only a minor increase in runoff peak flows would occur as a result of the Project and that implementation of storm water mitigation measures would ensure that runoff from the Project Location will not exceed existing condition levels.

The following storm water management practices will be implemented to ensure that significant negative environmental effects to existing drainage conditions (e.g., increased runoff, erosion) will not occur as a result of the Project:

- Existing drainage patterns within the Project Location will be maintained to the extent possible and/or as required to maintain the common law drainage rights of upstream or downstream riparian landowners. Following construction, the entire Project Location, with the exception of the access roads, will be re-vegetated with native grass or other suitable ground cover to promote surface water infiltration, filter storm water runoff and to prevent erosion.
- New drainage swales and channels will be constructed as enhanced (flat-bottom) grassed swales to provide extended flow times, filtering of runoff and reduce the potential for erosion.
- The vehicle parking area for maintenance personnel and all interior access roads will be constructed with gravel to promote infiltration and reduce the quantity of storm water runoff.
- Rainfall runoff from the solar modules, inverter building rooftops, transformer concrete pads (if not enclosed in the inverter building), interior roads and parking area will be directed to grassed or vegetated areas, a minimum of 15-m wide, to promote infiltration and filtering of runoff by vegetation prior to its conveyance to on-site grassed swales.
- Final transformer selection is expected to use an organic based vegetable oil (e.g., BIOTEMP®, Envirotemp® FR3™), which is non-toxic, non-bioaccumulating and readily biodegradable in the environment. In addition, secondary spill containment will be installed around the pad-mounted inverter transformers and the substation transformer. All transformers will be routinely inspected and any faulty equipment that could result in an oil leak will be repaired. Spill response equipment will be left on-site and any observed leaks will be cleaned up immediately by maintenance personnel.
- All identified water body features will be protected and no solar modules will be installed within 120 m of a water body.

#### 3.6.2.4 *Water Supply Facilities*

The Project does not require any on-site facilities to supply groundwater (wells) or surface water (ponds, watercourses) for operation of the Project. It is anticipated that water from rain and snow will be sufficient for cleaning the solar PV modules; if not, the Proponent will contact local suppliers to provide water in tankers from off-site sources for this purpose. No chemicals will be used in the cleaning of the PV models.

#### 3.6.2.5 *Wastewater (Sewage) Facilities*

The Project will not generate any wastewater (sewage) or discharge any liquid effluent from its operation nor does not the Project require any on-site facilities for the collection, transmission,



## 4. Description of Environmental Effects

### 4.1 General

This section summarizes the potential negative environmental effects that may result from the Project, including its construction, operation and decommissioning. With the exception of transporting construction materials and the workforce to and from the Project Location, all construction and operational activities will occur at the Project Location. However, potential environmental effects have been considered within 300 m of the Project Location.

Figure 2.1 depicts the Project components and the various natural heritage, water body and other features on and within proximity to the Project Location. Setback distances from identified significant natural features and waterbodies are also shown.

Information presented herein, including the existing cultural heritage, natural heritage, water body, socio-economic and other features, and potential environmental effects has been summarized from the following documents:

- Natural Heritage Assessment Records Review Report (Hatch, 2011a)
- Natural Heritage Assessment Site Investigation Report (Hatch, 2011b)
- Natural Heritage Assessment Evaluation of Significance Report (Hatch, 2011c)
- Natural Heritage Assessment Environmental Impact Study (Hatch, 2011d)
- Water Body Records Review Report (Hatch, 2011e)
- Water Body Site Investigation Report (Hatch, 2011f)
- Construction Plan Report (Hatch, 2011g)
- Design and Operations Report (Hatch, 2011h)
- Decommissioning Plan Report (Hatch, 2011i)
- Noise Study Report (Hatch, 2011j)
- Stage 1 and 2 Archaeological Assessment Report (TAI, 2010)
- Geotechnical Investigation Report (Inspec-Sol, 2011)
- Storm Water Management Report (Dillon, 2011)

### 4.2 Environmental Resource Features and Potential Effects

The following provides a summary discussion of the identified environmental resource features on and within proximity of the Project Location along with references of the specific REA report(s) where this information was obtained from.

Table 4.1 summarizes the identified potential negative environmental effects associated with the Project's construction, operation and decommissioning phases along with the recommended

mitigation measures to ensure that no significant residual negative environmental effects will occur as a result of the Project.

#### **4.2.1 Heritage and Archaeological Resources**

The Project is not located on a protected property (e.g., cultural heritage property designated under the *Ontario Heritage Act*) as defined in Column 1 of the Table in Section 19(1) of O. Reg. 359/09. In addition, research and consultation with the municipality and completion of the Ministry of Tourism and Culture (MTC) – *Check Sheet for Environmental Assessments: Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* has determined that there is no need to conduct a heritage impact assessment for the Project under Section 23 of O. Reg. 359/09.

Stage 1 and 2 Archaeological Assessments were completed by The Archaeologists Inc. in 2010 and a report (TAI, 2010) was submitted to the Ministry of Tourism and Culture. Two (2) historic sites on the Project Location were identified from the Stage 1 and 2 archaeological study (TAI, 2010). The report was submitted to the MTC and a Letter of Confirmation was obtained on January 20, 2011 from the MTC confirming their agreement and acceptance of the findings and recommendations of the archaeological assessments.

#### **4.2.2 Natural Heritage Resources**

Natural heritage resources on and within 300 m of the Project Location are shown in Figure 2.1.

There are no valleylands, provincial parks, conservation reserves or Areas of Natural and Scientific Interest (ANSIs) on or within 120 m of the Project Location (Hatch, 2011a and b).

The provincially significant Buells Creek Reservoir Wetland is situated within 300 m of the north boundary of the Project Location (Hatch, 2011c). This feature does not pose a constraint to the Project since is located greater than 120 m from the Project Location.

There is a woodland within 120 m of the north side of the Project Location. This woodland was assessed as a significant woodland and provides significant wildlife habitat for forest breeding bird species, raptors (winter feeding and roosting) and species of conservation concern (e.g., western chorus frog and milksnake hibernacula) (Hatch, 2011c). Under the REA Regulation, an environmental impact study (EIS) is required for Project facilities proposed within 120 m of significant woodlands or significant wildlife habitat. Based on the assessment finding of the EIS, construction and operation of the Project will not result in significant adverse impact to this feature (Hatch, 2011d). As such, this feature does not pose a constraint to the Project and no specialized mitigation measures or setbacks from this feature are required for the Project.

There is approximately 35 ha of cultural thicket and cultural meadow vegetation that is present within the Project Location, which provides significant wildlife habitat for shrub/early successional breeding bird species, and raptor winter feeding and roosting (Hatch, 2011c). Under the REA Regulation, an environmental impact study (EIS) is required for Project facilities proposed within 120 m of significant wildlife habitat. Based on the assessment finding of the EIS, construction of the Project will result in the loss of these vegetation communities and wildlife habitats (Hatch, 2011d).

A Natural Heritage Assessment Environmental Impact Study was conducted to assess potential adverse effects and required mitigation and monitoring measures for the above noted significant

natural features on and within 120 m of the Project Location. This report along with the other Natural Heritage Assessment Reports were submitted to the Ministry of Natural Resources (MNR) Kemptville District Office. A Letter of Confirmation was obtained on May 19, 2011 from the MNR confirming their agreement and acceptance of the findings and recommendations of the Natural Heritage Assessment Reports.

Potential adverse effects on significant natural features and other (non-significant) natural features are summarized in Table 4.1. Additional information on potential effects and mitigation is provided in the Construction Plan Report (Hatch, 2011g), the Design and Operations Report (Hatch, 2011h) and the Natural Heritage Assessment Environmental Impact Study Report (Hatch, 2011d).

#### **4.2.3 Waterbodies**

Water body features (e.g., permanent streams, lakes, seepage areas) on and within 300 m of the Project Location are shown in Figure 2.1.

There are no waterbodies on or within 120 m of the Project Location nor are there any lake trout lakes at development capacity within 300 m of the Project Location (Hatch, 2011f). The nearest water body is the Buells Creek Reservoir situated about 500 m west of the Project Location and a tributary of Butler's Creek situated about 550 m south of the Project Location. These features do not pose a constraint to the Project since they are located greater than 120 m from the Project Location.

As discussed in Section 3.6.2.3, a storm water management study (Dillon, 2011) was conducted to assess existing and proposed runoff peak flows from the Project and identify any required mitigation. The study concluded that that construction and operation of the Project would not result in significant increases to runoff peak flows and that the runoff from the Project will be similar to pre-construction conditions once the site has been restored and the ground cover has re-established.

An assessment of potential adverse effects to groundwater resources (i.e., groundwater quality and quantity), including potential impacts due to dewatering of construction excavations, installation of the support foundations and accidental spills, was conducted based on the findings of the Geotechnical Investigation Report (Inspec-Sol, 2011). No significant adverse impacts to groundwater conditions were identified for the construction, operation and decommissioning of the Project. As a precautionary measure, the Proponent will prepare a groundwater monitoring plan, which will involve testing the water quality of domestic water wells in proximity to the Project Location. Sampling will be conducted prior to construction to establish a baseline reference and then again, during and following construction, if a complaint arises.

Potential adverse effects on waterbodies (i.e., surface water features and drainage conditions) and groundwater resources are summarized in Table 4.1. Additional information on potential effects and mitigation is provided in the Storm Water Management Report (Dillon, 2011), the Construction Plan Report (Hatch, 2011g) and the Design and Operations Report (Hatch, 2011h).

#### **4.2.4 Air, Odour and Dust**

Potential adverse effects on air quality due to vehicle emissions and potential fugitive dust emissions during construction, operation and decommissioning are summarized in Table 4.1. Additional information on potential effects and mitigation is provided in the Construction Plan Report (Hatch, 2011g) and the Design and Operations Report (Hatch, 2011h).

#### **4.2.5 Noise**

Potential adverse effects on nearby noise receptors during construction of the Project are discussed in Table 4.1. The only noise emissions associated with the Project operation will be from the inverters and transformers, which will only operate during daylight hours. The locations of the inverters and transformers within the Project Location have been designed to minimize off-site effects to nearby noise receptors (Figure 2.1). A Noise Study Report (Hatch, 2011j) involving computer modeling simulations has confirmed that the applicable Ministry of Environment noise level limits will not be exceeded at the locations of the nearest noise receptors.

#### **4.2.6 Land Use and Resources**

Portions of the Project Location have historically been used for agricultural crops, but are now vacant and covered by successional vegetation. There is no known contamination of the Project Location from past land uses (no on-site field investigations were conducted by Hatch to verify this). An inter-provincial pipeline corridor passes through the center of the Project Location dividing it into north and south portions.

To lands west of the Project Location are sparsely forested and there is an electrical transmission corridor and a railway line. The Buells Creek Reservoir and wetland feature is present further to the west that are part of the Mac Johnson Wildlife Area, a 532 ha conservation area under the jurisdiction of the Cataraqui Region Conservation Authority (CRCA). Industrial buildings are present to the south side of Centennial Road. Vacant lands and rural residential dwellings are present east of the Project Location along County Road 6. A Hydro One Networks Inc (HONI) 44 kV distribution line is situated south of the Project Location along Centennial Road.

The Project Location lands within the Township of Elizabethtown-Kitley are designated Rural in the Official Plan (2006) (Schedule A3, Elizabethtown-Kitley South) and zoned A1 and OS1 in zoning by-law 1717. Appendix 1-A3 of the Official Plan identifies the woodlands on and north of the Project Location as 'Potentially Significant Woodlands'. The Buells Creek Reservoir Provincially Significant Wetland situated north and west of the Project Location is designated as Natural Heritage. The Project Location lands within the City of Brockville are designated Vacant/Rural in the Official Plan (2010) and zoned industrial (H1-M1) in the implementing zoning by-law.

There are no known aggregate resources, landfill sites, petroleum wells or recreational uses on or within 300 m of the Project Location.

Potential adverse effects on availability of resources and current land uses during construction, operation and decommissioning are summarized in Table 4.1. Additional information on adverse effects and mitigation is provided in the Construction Plan Report (Hatch, 2011g) and the Design and Operations Report (Hatch, 2011h).

#### **4.2.7 Provincial and Local Infrastructure**

Provincial and local infrastructure identified within 300 m of the Project Location include:

- Municipal roads and associated rights of ways include Centennial Road immediately south of the Project Location and County Road 6 and N. Augusta Road east of the Project Location.

- A Hydro One Network Inc. (HONI) 44 kV electrical distribution line is situated south of the Project Location along Centennial Road. The Project will connect to this line.
- An underground interprovincial (Transcanada) pipeline and associated easement traverses through the central portion of the Project Location in an east-west direction. An appropriate setback from the Project has been provided from the pipeline.
- An abandoned Bell Canada Easement is present in the south portion of the Project Location. A release of the easement from Bell Canada will be obtained by the Proponent.

Potential adverse effects on provincial and local infrastructure (i.e., impacts to local traffic and roads) during construction, operation and decommissioning are summarized in Table 4.1. Additional information on adverse effects and mitigation is provided in the Construction Plan Report (Hatch, 2011g) and the Design and Operations Report (Hatch, 2011h).

#### **4.2.8 Public Health and Safety**

Potential adverse effects on public health and safety during construction, operation and decommissioning are summarized in Table 4.1. Additional information on adverse effects and mitigation is provided in the Construction Plan Report (Hatch, 2011g) and the Design and Operations Report (Hatch, 2011h).

#### **4.2.9 Areas Protected Under Provincial Plans and Policies**

The Project Location is not located within any of the following Provincial Plan areas:

- Protected Countryside or Natural Heritage System of the Greenbelt Plan and *Greenbelt Act*
- Oak Ridges Moraine Conservation Plan Area
- Niagara Escarpment Plan Area
- Lake Simcoe Watershed Plan Area.

### **4.3 Summary**

Based on the findings of the various assessment studies conducted as part of this REA application (as noted in Section 4.1) and the proposed mitigation measures identified (as summarized in Table 4.1), no significant adverse residual environmental effects are expected to occur as a result of the Project construction, operation and decommissioning.

**Table 4.1 Summary of Potential Negative Environmental Effects during Construction, Operations and Decommissioning**

Environmental Component	Project Phase	Sources of Negative Effect	Potential Negative Effect	Mitigation Measures	Residual Negative Effect
<b>Natural Environment Components</b>					
Soil Quantity	Construction and Decommissioning	Topsoil stripping for access roads, laydown, parking area, substation yard and inverter/transformer building pads.	Loss of the quantity of topsoil resulting in reduced productivity of the soil to support vegetation growth.	Stripped topsoil will be stockpiled on-site for use during site restoration after construction. Following decommissioning, topsoil will be replaced to facilitate revegetation. If necessary, topsoil will be brought in from off-site sources.	No residual effect given effective mitigation.
Soil Quality	Construction, Operations and Decommissioning	Wind and/or water erosion of soils within the Project Location.	Loss of soils from the Project Location, potentially affecting other environmental components (e.g., air quality, vegetation, surface water quality).	Sediment and erosion controls installed and maintained during construction and decommissioning. Dense non-invasive vegetation ground cover planted throughout disturbed areas of the Project Location following construction. Drainage features with erosion protection (e.g., grass lined, rip rap protection) during operations.	No residual effect given effective mitigation.
	Construction and Decommissioning	Soil compaction from heavy equipment, construction vehicles and/or stockpiling of heavy materials.	Soil compaction resulting in changes to soil structure which could cause decreased productivity for plant growth, reduced infiltration and increased runoff.	Project Location will be assessed for compaction following construction and decommission activities. Areas of significant compaction will be restored using mechanical discing or other soil loosening methods.	No residual effect given effective mitigation.
Groundwater	Construction and Decommissioning	Installation (i.e., construction) or removal (i.e., decommissioning) of support foundations (e.g., driven or screwed steel piles) into the ground to support the PV modules and racks.	No adverse effects on groundwater quantity or quality are expected since driven/screw piles do not require soil excavation and will not affect groundwater recharge conditions due to small area of supports relative to Project Location.	None identified. As a precaution, the Proponent will conduct water quality sampling of participating local residents' wells in proximity to the Project Location prior to construction and then again during construction, if a complaint arises to assess any potential changes. The findings will be reported to MOE and participating well owners.	None.
	Construction	Dewatering of excavations for foundations for inverter/transformers and trenching for electrical cabling to keep the work area dry.	No adverse effect on water table or nearby water wells since significant pumping of groundwater is not required. Some pumping of rainwater out of excavations may occur.	If pumping is required, water will be discharged to a heavily vegetated area or pumped through a filtration bag so that turbid water is not discharged directly to receiving watercourses.	No residual effect given effective mitigation.
	Operation	Decreased groundwater recharge (i.e., infiltration) due to addition of impervious (e.g., inverter buildings) and less pervious areas (e.g., gravel roads).	No adverse effect on groundwater recharge conditions is expected since the amount of impervious and less impervious areas is small.	Dense vegetation cover beneath solar modules and around Project components will help offset minor reduction in infiltration due to addition of impervious and less impervious areas.	No residual effect given effective mitigation.
Surface Water Quantity	Construction, Operations and Decommissioning	Alteration of existing topography and surface drainage patterns from earth grading and excavation activities. Runoff from impervious (e.g., inverter buildings) and less pervious areas (e.g., gravel roads). Installation of new drainage swales, ditches and culverts.	No direct effect since no watercourses within 300 m of the Project Location. Minor increase in surface water runoff from Project Location to off-site receiving drainage swales, ditches and/or watercourses resulting in erosion (Dillon, 2011). Potential adverse effects to receiving water quality due to increased turbidity in runoff due to soil erosion.	Maintain existing drainage patterns as much as possible. Sediment and erosion controls installed and maintained during construction and decommissioning. Dense vegetation cover beneath solar modules and around Project components to promote infiltration and reduce quantity of runoff. Storm water management measures installed to control increases in runoff peak flows from the Project Location to pre-construction levels.	No residual effect given effective mitigation.
	Operations	Washing of solar panels during maintenance activities.	Minor increase in surface water runoff from the Project Location if not all wash water infiltrates into the underlying soils.	Amount of water used for cleaning will be limited to the extent possible. Natural infiltration of wash water into underlying soils and storm water management measures will prevent any adverse off-site increase in runoff.	No residual negative effects anticipated. Washing of panels during summer will be positive benefit to vegetation and subsoils beneath the solar panels.
Surface Water Quality	Construction, Operations and Decommissioning	Wind and/or water erosion of soils within the Project Location.	Erosion of soils from the Project Location could result in adverse effects on surface water quality in receiving waterbodies, with associated effects on aquatic biota and habitat.	Sediment and erosion controls installed and maintained during construction and decommissioning. Dense non-invasive vegetation ground cover planted throughout disturbed areas of the Project Location following construction. Drainage features with erosion protection (e.g., grass lined or rip rap if necessary) during operations.	No residual effect given effective mitigation.
	Operations	Washing of solar panels during maintenance activities.	Adverse effects on the quality of the surface water running off the panels if cleaning agents used.	Rainfall is expected to be sufficient or water will be brought on-site for cleaning purposes. If water from off-site is required, the amount used will be less than that occurring during a normal rainstorm event.	No residual effect given effective mitigation.

Environmental Component	Project Phase	Sources of Negative Effect	Potential Negative Effect	Mitigation Measures	Residual Negative Effect
				No cleaning agents will be used for panel washing purposes. Water will be the only substance used for cleaning purposes.	
		Runoff of herbicide residue if used to control vegetation.	Adverse effects on surface water quality due to potential use of herbicides to control vegetation communities.	Vegetation will be properly managed and maintained using mechanical methods (grass mowing, tree branch trimming); no chemical herbicides will be used for vegetation control. Some very limited herbicide use may be required to control weeds around electrical equipment and if so, in accordance with all local and provincial procedures.	No residual effect given effective mitigation.
Aquatic Habitat and Biota	Construction, Operations and Decommissioning	Erosion and increased runoff resulting in increased turbidity in runoff and sedimentation in receiving watercourses. Accidental spills on Project Location.	Indirect effects to aquatic habitat and biota in receiving watercourses due to increased turbidity in runoff, sedimentation or accidental spills.	Work areas will be demarcated in order to ensure that the Contractor does not work beyond those bounds. Trees will be felled into cleared areas. Soil loosening methods for compacted soils. Mitigation measures for: Soils and Surface Water will minimize potential for increased runoff and erosion.	Minor reduction in woodland size, but no overall change to woodland significance. Loss of cultural thicket vegetation within Project Location will be offset by planting other native ground species.
Vegetation	Construction	Clearing of 1.72 ha of trees and shrubs within the woodland in the northern portion of the Project Location. Clearing and alteration of 35 ha of cultural thicket and cultural meadow vegetation within the Project Location.	Reduced size of the woodland and potential damage to adjacent trees/shrubs and/or disturbance to the rooting zone through soil compaction. Loss of cultural thicket and cultural meadow vegetation within Project Location could result in increased runoff and erosion.	Work areas will be demarcated in order to ensure that the Contractor does not work beyond those bounds. Trees will be felled into cleared areas. Soil loosening methods for compacted soils. Mitigation measures for: Soils and Surface Water will minimize potential for increased runoff and erosion.	Minor reduction in woodland size, but no overall change to woodland significance. Loss of cultural thicket vegetation within Project Location will be offset by planting other native ground species.
		Generation of airborne dust from construction activities.	Indirect effects to adjacent off-site woodland, cultural thicket and wetland north, east and south of Project Location could include deposition of dust on leaves.	Mitigation measures for: Air Quality and Soils will minimize generation of airborne dust to adjacent off-site vegetation communities.	Minor potential for residual effect associated with generation of airborne dust during construction activities that occur on extremely windy days.
Wildlife Habitat	Construction and Operations	Clearing of 1.72 ha of woodland vegetation that supports wildlife habitat. Clearing and/or alteration of 35 ha cultural thicket and cultural meadow habitat vegetation that supports wildlife habitat.	Loss of woodland wildlife habitat associated with raptor nesting and roosting, forest breeding bird species. Reduced size of interior forest habitat. Loss and alteration of wildlife habitat associated with cultural thicket and cultural meadow (e.g., shrub/ early successional breeding bird species within the Project Location.  No adverse effects to off-site wildlife habitats in woodland, cultural thicket and wetland north and east of Project Location.	Tree removal will be conducted outside the breeding period for birds (May to July). Felled woody debris will be used to create dense brush piles at the forest edge suitable for wildlife habitat such as hibernacula sites for reptiles. Retain and/or plant dense vegetation ground cover beneath solar panels to provide wildlife habitat for bird, reptile and small mammal species. Sediment and erosion controls and storm water management mitigation measures implemented during construction will prevent adverse effects off-site effects to wildlife habitats.	Long-term wildlife use of the Project Location will be altered, but no overall change in local composition or population is anticipated to occur. No residual negative effects to off-site wildlife habitats.
Wildlife	Construction and Decommissioning	Construction activities and presence of workforce.	Avoidance of Project Location by wildlife due to equipment, noise and human presence. Possible disturbance to breeding birds adjacent to Project Location.	Major noise generating construction activities to avoid peak hours of breeding bird singing (one half hour before sunset to 8:30 am) during breeding bird period (May through July).	Minor periodic disturbance of local wildlife during construction.
		Construction activities and vehicles travelling on access roads within Project Location.	Incidental take of wildlife due to construction vehicles within Project Location.	To reduce incidental take of nesting birds, vegetative clearing, excavation or grading will be timed outside of the breeding bird period. If this is not possible, the area(s) potentially impacted will be searched by a trained biologist within 48 hours of the proposed activity to determine if birds are nesting. Daily visual monitoring of construction work areas prior to start or work. Limit on-site vehicles speeds to avoid incidental take.	Mitigation will effectively reduce risk of incidental take of wildlife, but not completely eliminate. No long-term effects on species composition or local populations anticipated.
	Construction	Installation of perimeter fencing around the Project Location.	Trapping of larger wildlife within the Project fence.	Prior to fence completion, a visual search of the area within the fence will be completed. If species are observed, they will be directed off the Project site or collected by a designated employee using approved	No long term residual effect on wildlife.

Environmental Component	Project Phase	Sources of Negative Effect	Potential Negative Effect	Mitigation Measures	Residual Negative Effect
				handling protocols and transported off-site and released.	
	Operations	Maintenance vehicles and activities (e.g., grass cutting) and installation of the fence around the Project Location.	Disturbance of wildlife due to maintenance equipment noise and human presence resulting in wildlife avoidance of Project Location. Restricted wildlife movement across Project Location due to fence. Incidental take of wildlife due to maintenance vehicles or activities (e.g., grass cutting).	Vehicle speeds on Project access roads will be restricted. Maintenance workforce will be alerted to the potential for wildlife and that measures should be taken to avoid wildlife wherever possible. If wildlife are observed on the Project Location, they will be either directed off of the site or collected by a designated employee using approved handling procedures released off-site. If possible, maintenance activities (e.g., grass cutting) to avoid breeding bird season of ground nesting birds May through early July).	Minor potential for incidental take of wildlife due to maintenance vehicles or vegetation mowing.
<b>Socio-Economic Environmental Components</b>					
Air Quality	Construction and Decommissioning	Generation of airborne dust from land clearing and excavation activities, and vehicle travel on dirt roads, Exhaust emissions from construction vehicles and equipment.	Reductions in local air quality from airborne dust and exhaust emissions from construction vehicles and equipment.	Construction practices to suppress dust (e.g., limit soil exposure, road watering, stabilize and cover stockpiles) and restrict soil working activities during windy conditions. Contractor to ensure that all construction vehicles and equipment have properly functioning emission controls (e.g., mufflers and no excessive vehicle idling).	Some short term minor effects on local air quality due to fugitive dust generation and vehicle emissions.
	Operations	Emissions from Project operations and maintenance vehicles.	Project operation will not discharge any pollutants into the air and emissions from maintenance vehicles or equipment (e.g., grass mowers) will be negligible.	None required.	None.
Noise	Construction and Decommissioning	Noise emissions from construction vehicles and equipment use.	Disturbances to nearby sensitive receptors (i.e., houses and institutions) due to noise emissions.	Contractor to comply with municipal Noise Control By-Laws for construction working times and ensure that vehicles and equipment have proper functioning sound baffling equipment (e.g., mufflers). Notification to adjacent noise receptors to report noise complaints.	Some short-term, temporary 'nuisance' disturbance to sensitive nearby noise receptors during particular construction activities.
	Operations	Noise emissions from transformers and inverters and/or from maintenance vehicles or equipment (e.g., grass movers).	Disturbances to nearby sensitive receptors (i.e., houses and institutions) due to noise emissions.	Inverters and transformers will be housed in a building enclosure that will provide mitigation of noise emissions from this equipment. Proponent will conduct auditory monitoring and obtain feedback from nearby noise receptors to confirm that noise emissions are within reasonable levels. Facility personnel to ensure maintenance vehicles and equipment have proper sound baffling equipment (e.g., mufflers) and work is done in compliance with municipal Noise Control By-Law.	Noise emissions will meet Ministry of Environment's requirements for rural area sound levels of 45 dBA for day time and 40 dBA for night time at the nearest noise receptors.
Public and Facility Safety	Construction, Operations and Decommissioning	Construction or facility equipment malfunction, fire or accidents resulting in injury to public, construction workers or facility maintenance personnel.	Personal injury to the public if trespassing on-site or to construction workers or facility maintenance personnel due to accidents, fire or equipment malfunction.	Public access to the facility will be prevented through the use of fences, gates, and any other necessary security procedures. Proper health and safety procedures for construction workers and facility maintenance personnel will be implemented as per provincial and federal regulations.	No risk to public safety unless trespassers obtain access to the site. Health and safety procedures will reduce risk of personal injury to workers and facility maintenance personnel, but some risk from accidents will remain.
Traffic and Municipal Roadways	Construction and Decommissioning	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. Construction flag-person to direct vehicles into and out of the site.	Some possible minor, short-term traffic delays on local roads in vicinity of Project Location during construction. No post-construction residual effects.
		Heavy construction and equipment haulage 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 by the Contractor.	No residual effect given effective mitigation.
	Operations	Facility operation and maintenance personnel travelling to and from the Project.	None. The number and frequency of facility personnel travelling to the Project is negligible.	None required.	None.

Environmental Component	Project Phase	Sources of Negative Effect	Potential Negative Effect	Mitigation Measures	Residual Negative Effect
Archaeological Resources	Construction	Excavations for foundation construction and trenching for underground electrical cables.	Potential for adverse effects on buried archaeological resources not observed during the Stage 2 Archaeological Assessment.	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.
Protected Properties, Built Heritage and Cultural Heritage Landscapes	Construction	Construction and installation of Project facilities resulting in the loss (e.g., demolition of existing built structures) and/or alteration to significant cultural heritage features or landscapes.	No protected properties, as defined in Section 19(1) of O. Reg. 359/09, exist in the vicinity of the Project location. No negative effects to built heritage and cultural heritage landscapes since such features were either not present in the Project Location or potential effects (if any) were assessed as not significant.	None required.	None.
Change in Visual Landscape	Construction and Decommissioning	Presence of construction site equipment, activities and personnel.	Portions of the facility will be visible from County Road 6, Centennial Road and from adjacent properties. This may be perceived as a negative environmental effect.	Existing vegetation along County Road 6 and Centennial Road will be maintained the extent possible during construction to provide some visual screening.	Short term change in local visual landscape during construction. Visual disturbance reduced with retention of existing vegetation.
	Operations	Presence of facility.	Portions of the facility will be visible from County Road 6, Centennial Road and from adjacent properties. This may be perceived as a negative environmental effect.	Retain trees and vegetation around the Project Location to extent possible to provide natural screening. Plant trees along the east side of the Project Location to screen the Project from County Road 6.	Long-term change in local visual landscape. Visual disturbance reduced with retention of existing vegetation, tree planting and fencing.
Reflectivity	Operations	Reflection from solar PV modules during early morning and late day when sun is low.	Potential visual disturbance to adjacent observers for short periods of time under site-specific conditions and viewing angles between March to September.	The 2.1 m high fence, retention of existing vegetation and tree planting along the east side of the Project Location will prevent/minimize any adverse reflectivity effects. If complaints from adjacent landowners are received, the Proponent will discuss appropriate mitigation measures with the resident.	None.
Property Values	Operations	Presence of the Project within the local rural community and changes due to visual aesthetics and noise emissions from the site.	Installation of the facility has the potential, though unproven, to result in a change in the value of nearby properties based on aesthetic preference of potential landowners. Though subjective, the potential reduction in property values for the purpose of this assessment is considered a potential negative effect.	Mitigation measures to minimize visual disturbance to neighbouring properties and noise emissions that could potentially be audible will minimize the impact of the facility on neighbours, which will in turn, reduce impacts on property values.	Potential reduction in property values if buyers subjectively feel that the Project poses a potential impact to them.
Availability of Resources	Operations	Presence of the Project within an area identified as a potential aggregate, petroleum or mineral resource area.	None expected since these resources are not known to be present on the Project Location. If present, the impact would be a potential loss of access to these resources during the life of the Project. The future availability of the resources would not be changed.	None required.	Loss of access to potential aggregate, petroleum or mineral resources within the Project Location during the life of the Project. Actual potential to develop those resources during that time period is unknown.
Recreational Land Use	Construction, Operations and Decommissioning	Presence of the Project and associated fencing.	None expected since no recreational resources (e.g., trails) are present on the Project Location.	None required.	None.
<b>Effects due to Accidental Spills</b>					
Groundwater, Surface Water, Soil Quality, Vegetation, Aquatic Habitat	Construction and Decommissioning	Accidental spills or leakage of fuel, oil or hydraulic fluid from construction vehicles or equipment, on-site refuelling or storage of toxic liquids on-site.	Impairment of groundwater, soil and/or surface water quality due to contamination. Potential adverse effects to aquatic habitats and vegetation.	Proper storage and handling of toxic liquids (if used) in designated areas. Routine inspections of vehicles, equipment and storage containers. Spill control kits will be available on-site and spill response procedures implemented in the event of a spill. Contractor's personnel will be trained in spill response and reporting procedures. No construction vehicle refuelling or storage of toxic liquids on-site or	No residual effect given effective mitigation and spill response and clean-up measures if a spill occurs.

Environmental Component	Project Phase	Sources of Negative Effect	Potential Negative Effect	Mitigation Measures	Residual Negative Effect
and Biota				within 30 m of a watercourse.	
	Operations	Accidental spills or leakage of fuel, oil, hydraulic fluid, etc., from maintenance vehicles or equipment, on-site refuelling or storage of toxic liquids on-site. Accidental spills or leakage of transformer oil from a transformer.	Impairment of groundwater, soil and/or surface water quality due to contamination. Potential adverse effects to aquatic habitats and vegetation.	Inverter pad-mounted transformers and the substation transformer will have secondary spill containment. All transformers will be inspected by facility maintenance personnel for signs of oil leakage. Facility personnel will be trained in spill response procedures. Spill control kits will be stored on-site and spill response/cleanup procedures implemented if a spill or oil leak is detected. Transformers will use an organic based oil (BIOTEMP®, Envirotemp®FR3™) that is non-toxic and biodegradable. No refuelling or storage of toxic liquids on-site within 30 m of a watercourse.	None. Mitigation and procedures for transformer equipment inspection, monitoring and spill response/cleanup are anticipated to be effective in preventing residual negative effects.

## 5. References

- City of Brockville. 2010. City of Brockville Official Plan. Available on-line at <http://city.brockville.on.ca/index.cfm?ID=332>. Accessed August 19, 2010. Last Updated January, 2010.
- Dillon Consulting Limited (Dillon) 2011. UC Solar 2176047 Solar Energy Project Stormwater Management Report.
- Government of Ontario. 2009. Ontario Regulation 359/09 made under the Environmental Protection Act 2007, Renewable Energy Approvals under Part V.0.1. of the Act. September 8, 2009 version. Printed in the Ontario Gazette: October 10, 2009. Available on-line at: [http://www.elaws.gov.on.ca/html/source/regs/english/2009/elaws\\_src\\_regs\\_r09359\)e.htm](http://www.elaws.gov.on.ca/html/source/regs/english/2009/elaws_src_regs_r09359)e.htm).
- Government of Ontario. 2010. Ontario Regulation 521/10 made under the Environmental Protection Act, Renewable Energy Approvals under Part V.0.1 of the Act. December 15, 2010 version. Printed in The Ontario Gazette: January 8, 2011. Available on-line at: [http://www.elaws.gov.on.ca/html/source/regs/english/2010/elaws\\_src\\_regs\\_r10521\\_e.htm](http://www.elaws.gov.on.ca/html/source/regs/english/2010/elaws_src_regs_r10521_e.htm).
- Hatch Ltd. 2011a. 2176047 Solar Energy Project Natural Heritage Assessment Records Review Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.
- Hatch Ltd. 2011b. 2176047 Solar Energy Project Natural Heritage Assessment Site Investigation Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.
- Hatch Ltd. 2011c. 2176047 Solar Energy Project Natural Heritage Assessment Evaluation of Significance Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.
- Hatch Ltd. 2011d. 2176047 Solar Energy Project Natural Heritage Assessment Environmental Impact Study. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.
- Hatch Ltd. 2011e. 2176047 Solar Energy Project Water Body Records Review Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.
- Hatch Ltd. 2011f. 2176047 Solar Energy Project Water Body Site Investigation Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.
- Hatch Ltd. 2011g. 2176047 Solar Energy Project Construction Plan Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.
- Hatch Ltd. 2011h. 2176047 Solar Energy Project Design and Operations Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.
- Hatch Ltd. 2011i. 2176047 Solar Energy Project Decommissioning Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.
- Hatch Ltd. 2011j. Solar 2176047 Solar Energy Project Noise Study Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.
- Hatch Ltd. 2011k. 2176047 Solar Energy Project, Project Description Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.

Hatch Ltd. 2011i. Solar 2176047 Solar Energy Project Approval and Permitting Requirements Document Report. Canadian Solar Solutions Inc. and UC Solar Ltd. Niagara Falls, Ontario.

Inspec-Sol Inc. 2011. Final Geotechnical Investigation CS-1: Upper Canada Solar 01, 12 Centennial Road, Brockville, Ontario.

Ministry of the Environment (MOE). 2010. Technical Bulletin One – Guidance for Preparing the Project Description Report as part of an application under O.Reg.359/09. Draft Document posted for public comment on the Environmental Registry March 1, 2010. 27 pp.

The Archaeologists Inc. (TSI). 2010. Stage 1&2 Archaeological Assessment of UC Solar Project 21706047, Part of Lots 7 and 8, Concession 3, Township of Elizabethtown-Kitley, City of Brockville, Regional Municipality of Leeds and Grenville, Ontario. September, 2010.

Township of Elizabethtown – Kitley (TEK). 2006. Official Plan. Available on-line at <http://www.elizabethtownkitley.on.ca/siteengine/ActivePage.asp?PageID=76>. Accessed August 19, 2010.



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