



- **Canadian Solar Developers Ltd.**

Draft Construction Plan Report

Type of Document

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Project Name

Draft Construction Plan Report
Proposed Groundmount Solar Facility L.P #8
419 Penetanguishene Road, Barrie, ON
OPA FIT Program: FIT-FBMWETC

Project Number

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Canadian Solar Developers Ltd.

Draft Construction Plan Report

Prepared for:

Canadian Solar Developers Ltd.

Ground Mount Solar PV Power Project – L.P #8

September 14, 2012

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Revision History

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1.0	September 14, 2012	Draft Report to Municipality of Oro-Medonte

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Executive Summary

Canadian Solar Developers Ltd. is the proponent for the development of a 100 kilowatt solar power project in the County of Simcoe, Township of Oro-Medonte, at 419 Penetanguishene Road. An application has been made for the site L.P#8 and a file opened under the OPA FIT Program (FIT-FBMWETC). **Exp** Services Inc is completing all REA-related reports and will be representing Canadian Solar Developers Ltd during the application and approval process.

The Construction Plan Report (CPR) has been prepared as part of an application for a Class 3 Solar Facility under O.Reg.359/09 Renewable Energy Approval (REA) under Part V.0.1 of the Ontario Environmental Protection Act as amended by O.Reg. 521/10 and O.Reg. 231/11.

This report follows the protocols and procedures set out for REA projects. Details of construction and installation activities and their timing have been set out. Negative environmental effects as a result of construction and installation activities have been identified, and mitigation and monitoring measures described in detail. The environmental impacts during the construction, operation and decommissioning phases have been determined to be able to be fully mitigable and/or manageable.

The CPR is supported by several background studies that have also identified and assessed the potential impacts of the proposed works on the environment / natural heritage, as well as other social and cultural aspects of the site.

The site plan shows the layout of the solar array field, the associated electrical components, topographical features and other amenities within the study area. This layout has been designed to minimize the footprint and the potential environmental effects, yet maximize the system capability for power generation. The setting is a cultivated farm field.

The Emergency Response Plan (ERP) along with an Emergency Communications Plan as set out in the Design and Operations report will be followed for this project. An ERP will be prepared and formalized with the local authorities.

Table of Contents

1.	Introduction.....	8
2.	General Information	8
2.1	Project Name, Applicant and Location	8
2.2	Energy Source, Nameplate Capacity and Class of Facility	10
2.3	Supporting Documentation	10
2.4	Land Ownership	10
3.	Site Preparation and Construction Activities	10
3.1	Scheduling of Construction Activities	11
3.2	Construction / Installation Activities	11
3.2.1	Site Preparation	11
3.2.2	Installation, Assembly and Connections.....	12
3.2.3	Transportation, Construction Equipment and Materials	13
3.2.4	Temporary Use of Land and Site Reclamation	16
3.2.5	Testing and Connection to the Provincial Grid	16
3.2.6	Temporary Water Takings	16
3.2.7	Materials / Waste Generated at or Transported from the Site	16
4.	Potential Environmental Effects, Mitigation Measures and Monitoring Plan.....	17
4.1	Potential Negative Environmental Effects	18
4.1.1	Dust (Air Quality) and Noise Emissions.....	18
4.1.2	Destruction of Vegetation	18
4.1.3	Impact to Water Resources	18
4.1.4	Spills	19
4.1.5	Impacts on Cultural Heritage (Protected Properties, Archaeological and Heritage Resources)	19
4.1.6	Impacts on Local Roads and Traffic.....	19
4.1.7	Land Use	20
4.1.8	Waste Management	20
4.1.9	Wildlife, and Aquatic Habitat and Biota	20
4.2	Proposed Mitigation	20
4.2.1	Dust (Air Quality) and Noise Emissions.....	20
4.2.2	Destruction of Vegetation	20
4.2.3	Impact on Water Resources	21

4.2.4	Spills	21
4.2.5	Impacts on Cultural Heritage (Protected Properties, Archaeological and Heritage Resources)	22
4.2.6	Impacts on Local Roads and Traffic	22
4.2.7	Land Use	22
4.2.8	Waste Management	23
4.2.9	Wildlife, and Aquatic Habitat and Biota Management	23
4.3	Monitoring Plan	24
4.3.1	Dust (Air Quality) and Noise Emissions	24
4.3.2	Destruction of Vegetation	24
4.3.3	Impact on Water Resources	24
4.3.4	Spills	24
4.3.5	Impacts on Cultural Heritage (Protected Properties, Archaeological and Heritage Resources)	24
4.3.6	Impacts on Local Roads and Traffic	24
4.3.7	Land Use	25
4.3.8	Waste Management	25
4.3.9	Wildlife, and Aquatic Habitat and Biota Management	25
4.4	Environmental Effects Monitoring Plan	25
5.	Conclusions	25

APPENDICES

- Appendix 1 Project Site Plan
- Appendix 2 Project Construction Schedule

List of Tables

Table 3.1: Vehicles/Construction Equipment and Materials.....	15
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List of Figures

Figure 1: Aerial Photo of the Project Location	9
Figure 2: Project Location Road Map	9

1. Introduction

As part of an application for a Renewable Energy Approval (REA) from the Ontario Ministry of Environment (MOE), all renewable energy projects are required to submit a Construction Plan Report (CPR). The CPR is prepared in accordance with the March 1, 2010 draft of Technical Bulletin Three: Chapter 5, Guidance for preparing the Construction Plan Report as part of an application under O.Reg.359/09 Renewable Energy Approval (REA) under Part V.0.1 of the Ontario Environmental Protection Act as amended by O.Reg. 521/10 and O.Reg. 231/11. This CPR describes the project activities to be undertaken during the permanent facility and ancillary component construction. The potential environmental effects and mitigation and/or monitoring measures of the construction activities within 300 metres of the project location are presented. This CPR is to be consistent with information presented in the Project Design and Operations Report, and will address and describe the following in relation to the proposed solar power project:

- Details of any construction or installation activities.
- Location and timing of any construction or installation activities.
- Any negative environmental effects that may result from construction or installation activities.
- Environmental Effects Mitigation and Monitoring Plan

A Project Description Report for the Ground Mount Solar PV Power Project – L.P #8 was prepared on November 16th, 2011, and is available for viewing at the proponent's website (www.futuresolardevelopments.com). An application was made for the site L.P#8 and a file opened under the OPA FIT Program (FIT-FBMWETC).

2. General Information

2.1 Project Name, Applicant and Location

The proposed solar power project is named Ground Mount Solar PV Power Project – L.P #8 (the Project). It is being initiated by Canadian Solar Developers Ltd., based in Barrie, Ontario. **Exp** Services Inc is completing all REA-related reports and will be representing Canadian Solar Developers Ltd during the application and approval process.

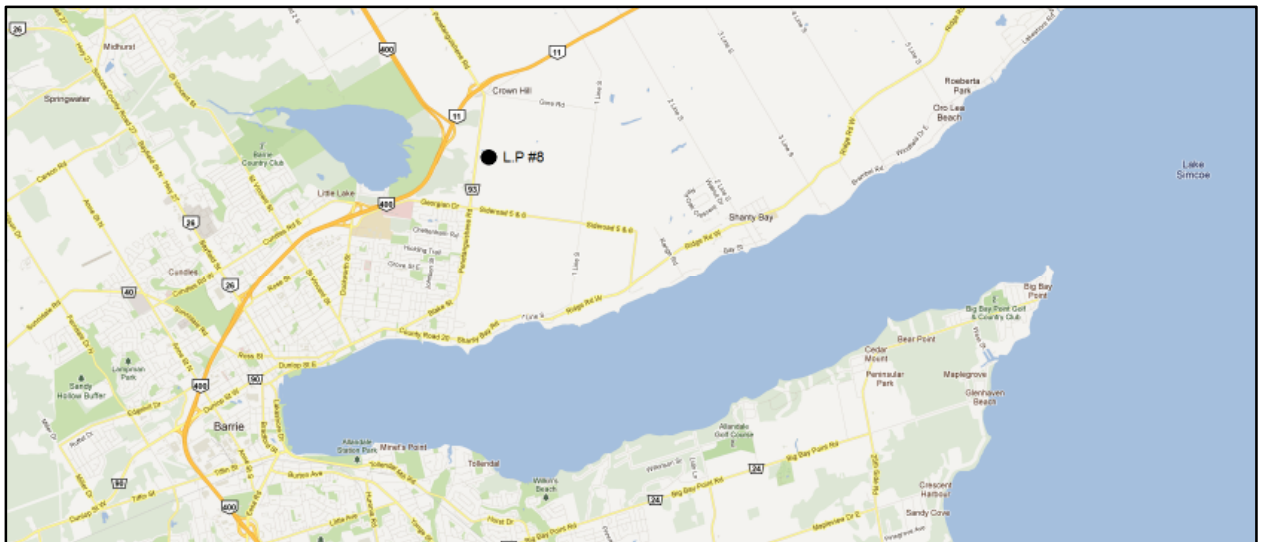
The Project is located in the County of Simcoe, Township of Oro-Medonte, and is approximately 1 km north of the City of Barrie. The project address is L.P #8, 419 Penetanguishene Road, Barrie, Ontario, L4M 0H1. The Project area and local road maps are illustrated in Figures 1 and 2.

The solar array is located in a cultivated field and is situated 90 metres west of the residence. For the Project, an access will be constructed from the gravel road 35 metres northward to the solar array site. An overhead service will be constructed along the gravel road to a connection point 350 metres to the west. The land at the solar array facility is gently sloping westward.

Figure 1: Aerial Photo of the Project Location



Figure 2: Project Location Road Map



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The project website and electronic copies of this Construction Plan Report (CPR) and supporting documents are available at: www.futuresolardevelopments.com/projects.

2.2 Energy Source, Nameplate Capacity and Class of Facility

The project will consist of a ground mounted, solar panel array used to convert solar energy into electricity using photovoltaic panels (PV). The maximum name plate capacity will be 100 kW. The facility is classified as a Class 3 solar facility. The electricity generated will be connected to the electrical distribution system of Hydro One Networks Inc.

2.3 Supporting Documentation

Supporting documentation of the draft Construction Plan Report includes:

- Project Description Report (PDR);
- Design and Operations Report (DOR);
- Decommissioning Plan Report (DPR);
- Acoustic Assessment Report (Noise);
- Natural Heritage Assessment Record Review Report;
- Natural Heritage Site Investigation Report;
- Natural Heritage Evaluation of Significance Report;
- Water Assessment Records Review Report;
- Water Assessment Site Investigation Report; and
- Archaeological Assessment Reports (Stages 1 and 2, and Supplemental Report Stage 2).

2.4 Land Ownership

Canadian Solar Developers Ltd. has entered into a long term lease agreement with the landowner.

3. Site Preparation and Construction Activities

The facility is located at 419 Penetanguishene Road in the County of Simcoe, Township of Oro-Medonte, Ontario (between Side Road 5 & 6, and Gore Road) on the north side of a gravel road / laneway. The solar equipment is to be located to the west of the existing property building (see Site Plan, Appendix 1).

3.1 Scheduling of Construction Activities

When all regulatory permits and municipal approvals have been received, a contract will be let by Canadian Solar Developers Ltd. for the supply, installation, commissioning and connection to the regional power grid for the L.P #8 solar array facility. Local contractors will be given preference in the selection of qualified service providers. Construction of the facility is anticipated to commence in April 2013 and be completed by the end of June 2013. The actual construction start date can vary depending on material procurement, contractor scheduling, and site conditions / weather. A three month construction period is deemed adequate to bring the site to a functional stage starting when the contractor has mobilized. A Project Construction Schedule (Appendix 2) has been prepared identifying the activities, timeline and duration. The site will be prepared and planted in the fall of 2012 by the landowner (see 3.2.1). Testing and commissioning will occur at the end of the construction period (June 2013) and will be undertaken according to ESA and Hydro One requirements and under their supervision.

3.2 Construction / Installation Activities

The main activities include site preparation and installation of all components including electrical assembly and service connections for the solar array facility. The work force for the construction will be well qualified and have experience in the installation of solar array materials. Typically the work crew consists of: a site superintendent who coordinates the material delivery and daily crew activities to meet the schedule; equipment operators; and skilled and general labourers. The construction workforce is estimated to be 5 to 8 persons on site (depending on the stage of construction), for the three month project duration. Work hours will follow municipal bylaws which are typically from 7:00 a.m. to 7:00 p.m. Monday to Friday. If there are scheduling completion issues, then work may also occur on a Saturday.

3.2.1 Site Preparation

Site preparation is undertaken to prepare the work area for construction and typically includes camp set-up, clearing and grubbing, topsoil stripping, grading, access, haul road upgrading, layout for the works, and sediment and erosion control.

The solar array assembly is situated at a cultivated field to the west of a residential yard. Arrangements will be made with the landowner (farmer) to cultivate and seed the work area in the fall of 2012 with a low growing grass such as alfalfa or timothy. Similarly, arrangements will be made to locate the construction camp including material laydown area within the existing yard. The farm field has a gradient that is gently sloping westward. There will be no clearing and grubbing, nor grading in the area of the solar array panels. The site access from the road / laneway to the array panels and the foundation area for the main electrical components will be stripped of topsoil (depth of 0.25 metres), a compacted Granular 'B' travel surface placed with a westward cross-fall. The access road will be 5 metres in width and will widen to 10 metres at the west end of the solar array. This soil will be stockpiled in a small ridge at the south limit of the site for future use at decommissioning. Soil will be placed to not restrict surface drainage. An experienced survey crew will layout the various components to the requirements of the design drawings. As there will be minimal disturbance to the grassed work area, sediment and erosion control measures are not deemed necessary. If there should be potential for site erosion at the time of construction, then straw bales or other sediment containment measures can be installed along the southerly limit. The straw bales will be removed at the completion of the work.

The closest arterial road is Highway No. 400. To drive to the site, take the Georgian Drive exit east 3 km to Penetanguishene Road. Travel north on Penetanguishene Road 0.8 km to a gravel road / laneway (between Side Road 5 & 6, and Gore Road). Turn east and travel 0.75 km to a driveway on the north side.

The private gravel road / laneway from Penetanguishene Road to the site will be the primary access for all construction materials and equipment. The existing overgrowth of the hedgerow will be trimmed. The road / laneway surface will be upgraded with gravel (Granular 'A') to create a suitable surface for haulage of equipment and materials. The electrical service connection from the solar field to the road / laneway will be buried and markers placed to identify the cable location. The overhead powerline to the F1 feeder will be constructed on the north side of the road beyond the hedgerow. No special access is required to install the hydro pole with cable.

All related passenger and construction road vehicles will be duly licensed. Haulage vehicles will adhere to the load limits posted by the local municipality. The contractor's crew will be trained to respond to an emergency response for personal injury, fire and environmental spills.

3.2.2 Installation, Assembly and Connections

The materials for a solar array system include the foundation anchors, the racking (support frame) and the PV panels. The electrical system includes PV panel wiring to the Inverters, and direct buried cables to the housing for the Disconnect Switch, Splitter and Revenue Meter, to the 100 kVA Transformer, and to the high voltage Interrupter and Isolation Switch. A ducted direct buried service will feed the electricity generated by the solar array to the new overhead feeder line at the road / laneway. Three hydro poles will be installed and electrical cable mounted to these poles. Access to the hydro poles will be gained from the road. This may require some selective tree cutting of the hedgerow. This new service will connect to the HONI F1 Feeder of Crown Hill DS at Penetanguishene Road. The actual connection point is on the south side of the existing laneway at a service to a farmyard on the north side of this private road.

The foundation supports are based on a ground mount system and will consist of concrete blocks approximately 0.5m in diameter and 0.3m high with a steel plate mounted to threaded rods cast into the concrete. These blocks will be produced by a concrete manufacturer under the direction of the contractor. There will be approximately 30 supports per assembled racking unit (13 panels per row / 5 to 6 rows). A backhoe or Bobcat can take the foundation blocks from the laydown area and set them directly on the grassed surface.

Each racking assembly is separated by a distance of 3 metres to aid in assembly and maintenance. The design of the racking will be based on the final layout of the panel arrays and foundation support and anchorage. The racking assembly will be designed and produced under the direction of the contractor. The contractor will assemble the racking on site. The approximate size of a frame is 21.5 metres by 9 metres. The frame materials will be stockpiled at the staging area and assembled at the working site. A backhoe or small crane can transport the frame materials for mounting to the foundation supports.

The PV panels consist of a poly-crystalline material with internal busbars underlying a tempered glass cover, and refined silicon and copper electrical leads, supported on an anodized aluminum frame. A 230W PV panel has been selected for the 100 kW system. A string will consist of 13 modules. Strings in rows of 5 and 6 will be mounted on a rigid racking frame to create an array. The 507 PV panels for L.P#8 can be shipped in one 12 metre

container on a flat bed trailer. A crane or backhoe can lift the container from the truck. The panels are stacked in crates. A Bobcat or front end loader can move the crates from the storage area to the site for assembly. Each PV panel is 20 kg and can be manually manoeuvred.

The installation of the electrical wiring is a combination of above-ground and direct bury. Direct current (DC) wiring mounted to the underside of the PV array and strung along the racks connects to the 20 - 5kW Aurora Photovoltaic Inverters. These inverters will be mounted to wood posts in a 1 metre square grid (4 rows of 5 inverters). The inverters take the direct current and converts it to single phase alternating current, and steps the voltage to 240V. The Cooper 100 kVA single phase Transformer steps up the voltage to 4.8kV to match that at the HONI F1 feeder. The weatherproof steel enclosure housing the station service disconnect switch, splitter and revenue meter, and the high voltage interrupter and isolation switch will each rest on a small concrete pad approximately 1 square metre in size. The transformer will be placed on a precast concrete pad approximately 1.5 metres by 1.2 metres. The cable for the single phase power will be buried (trenched) approximately 1 metre deep. A single duct for the L.P #8 will be surrounded in a sand bedding approximately 0.3 metres deep. Trenching for the electrical cable will be carried out by a small excavator to control the trench width to 0.75 metres. It is estimated the disturbed area for this excavation will be approximately 3 metres wide. Topsoil will be separated from subsoil during the excavation. The trench will be backfilled with the native soil and consolidated with a small mechanical packer (electrical powered jumping jack). A yellow demarcation tape will be placed 0.3 metres above the sand to the Electrical Safety Authority (ESA) requirements. Steel posts with an electrical warning marker will be also placed along the route of the buried electrical service. Topsoil will be replaced in the trenched area and the area levelled to match the original ground. The disturbed area will be vegetated to the original condition.

Should the landowner request, a paige wire fence with gate may be installed to surround the single phase electrical aboveground structures. ESA warning signs would be placed on this fence.

There are no constructed internal roads within the array field. There are typically 3 rows of arrays which will be separated by 3 metres to provide access for maintenance. This area will be grassed.

The three hydro poles, electrical cable, bracing anchors and granular backfill (in sacks) will be brought to the site on a small flat bed trailer. Holes for the poles will be drilled using conventional powerline auger drilling equipment. After insertion of the pole into each hole, coarse gravel will be placed into the cavity. The excavated soil is generally broadcast in the immediate area. Electrical cable will be strung and mounted to each pole. All excess materials will be taken off site and returned to the contractor's yard.

3.2.3 Transportation, Construction Equipment and Materials

An estimate has been made for the transportation and site construction requirements for manpower, equipment and materials, during the course of the work to commissioning of the electrical system (Table 3-1). The Project Schedule is set out in Appendix 2. The Tasks (T#) include:

- T1 Site Cultivation and Seeding
- T2 Surveying and Staking of Project Location

- T3 Drainage and Erosion Control
- T4 Construction of Access Road / Upgrades to Haul Road
- T5 Laydown/Construction Staging Areas and Temporary Facilities
- T6 Preparation of Main Electrical Component Foundations and Supports
- T7 Installation of Support Foundations, Racks and Solar PV Modules
- T8 Installation of Electrical Collection System, Wiring, Components and System Testing
- T9 Installation of Fence at Main Electrical Components
- T10 Overhead Feeder / Connection to the Provincial Grid
- T11 Remediation and Clean-Up of Work Area
- T12 Site Landscaping and Vegetation
- T13 Facility Operation

Table 3.1: Vehicles/Construction Equipment and Materials

Type Vehicle / Construction Equipment (Approx. No. Units)	Task	Frequency	Estimated Time on Site Per Trip	Materials / On-Site
Farm Tractor with Cultivator (1)	1	Once	0.5 day	Landowner/Farmer
Farm Tractor with Seeder (1)	1	Once	0.5 day	Landowner/Farmer
Farm Tractor with Hay Wagon (1)	3	Once	0.5 day	60 straw bales Landowner/Farmer
Delivery Trucks / Solar Panels and Aluminum Frame (1)	7	Once	0.5 day	1 crate
Delivery Trucks / Mounting Frame (2)	7	Once	1.0 day	
Delivery Trucks / Precast Concrete (7)	7, 8	Once	0.5 day	220 foundation supports / 2 electrical component bases
Delivery Trucks / Electrical Equipment (4)	8, 10	Once	0.5 day	Inverters, Transformer Other (cables, switches, ducts, power poles)
Delivery Trucks / Gravel (42)	4	Once	0.15 days	325 cum
Delivery Trucks / Sand (2)	8	Once	0.15 days	10 cum
On-Site / Front-end Loader (1)	3, 4, 5, 8, 9, 11	Once	3 months	
On-Site / Backhoe (1)	4, 6, 8	Once	2 months	
On-Site / Truck Crane or Boom Lift (1)	5, 7, 8	Once	2 months	
On-Site / Truck (Hydro Pole Install) (1)	10	Once	1 week	
On-Site / Drum Packer (1)	4	Once	0.5 weeks	
On-Site / Mobile Fuel Truck (1)	5	Daily	0.2 days	
On-site / Small Equipment Bobcat (2), packer (2)	3, 4, 5, 6, 7, 8, 9, 11, 12	Once	3 months	
Pick-Up Trucks (3)	3 - 12	Daily	3 months	
Cars (3)	3 - 12	Daily	3 months	

3.2.4 Temporary Use of Land and Site Reclamation

The staging area for the construction camp can be sited within the existing yard. An area of 25 metres by 20 metres will be required for equipment, temporary material storage and the contractor's crew trailer. No fencing of this area is planned. The existing yard presently has a travelled granular surface, and grassed areas. No new granular surfacing materials will be required. Alternatively, the farm laneway which is serving as a haul road could be used for equipment storage. A secondary laydown area has been shown on the Site Plan at the solar array field. This is for material stockpiling for the solar array. At the end of the day, all equipment will be placed in the yard or haul road. A designated area will be laid out for fueling and maintenance of equipment. This area will be monitored for any spills of fuel and other contaminants.

At the completion of construction, the farm laneway and any staging area will be back-bladed with the front end loader to bring the site to original condition or better. With the landowner approval, excess gravel used for the haul road and site access can be placed at the yard access.

Areas of vegetation damaged by the construction activities will be scarified (raked), top-dressed with topsoil and similar seed broadcasted on this surface. A site visit will be carried out in two to three weeks time to confirm germination.

3.2.5 Testing and Connection to the Provincial Grid

The components will be tested and calibrated prior to start-up and connection to the power grid. ESA and Hydro One representatives will be present. After confirmation documentation has been received from these parties, the system will be brought on-line to the requirements of the REA FIT program.

The existing HONI F1 feeder to the farmyard east of Penetanguishene Road (provincial grid) is on the south side of the farm road access. Discussions will be held with Hydro One as to the connection to the existing hydro pole.

3.2.6 Temporary Water Takings

No stormwater facilities to capture and treat surface runoff are required. The work site will be planted with a grass cover prior to construction activities and this will mitigate any potential erosion.

No water well is planned for the L.P #8 site. Construction activities do not require a source of water. Cleaning of the solar array panels is generally not undertaken.

3.2.7 Materials / Waste Generated at or Transported from the Site

At the completion of the construction activities, all equipment will be demobilized. Flat bed trailers will be used. An estimated three trips will be required to remove all equipment.

Surplus materials from the solar array racking will be returned to the supplier or kept by the Owner for future maintenance. A flat bed trailer may be required for this delivery. The shipping materials for the PV panels will be separated as to type and taken in pick-up trucks to a recycling facility. No burning of materials will be permitted. Five trips are estimated for this delivery. Electrical materials will be saved for reuse and/or recycling to the greatest extent possible. This waste will be taken to approved receiving facilities. It is estimated that two pick-up trucks can haul this waste.

No soil will be removed from the site. Granular and sand materials not used for the construction will be spread at the farm laneway. Topsoil not replaced in its original location will be mounded in a small row on the south side of the solar array field. The topsoil will be seeded with a similar seed mix to that at the solar array field.

4. Potential Environmental Effects, Mitigation Measures and Monitoring Plan

The Ministry of Environment has released a draft Technical Bulletin for Preparing the Construction Plan Report which sets out the requirements for the identification of the negative environmental effects and how these effects will be mitigated and monitored. These environmental effects are to be identified within a 300 metre radius of the Project site.

The key environmental impact areas from construction activities and solar system operation that the Technical Bulletin notes are:

- Dust (Air Quality) and Noise Emissions;
- Destruction of Vegetation;
- Impacts on Water Resources;
- Spills;
- Impacts on Cultural Heritage (Protected Properties, Archaeological and Heritage Resources;
- Impacts on Local Roads and Traffic;
- Land Use;
- Waste Management; and
- Wildlife, and Aquatic Habitat and Biota.

A summary of all potential negative environmental effects caused by the project was described in the Project Description Report. These effects were further expanded on in the Design report where:

- For each potential negative effect, performance objectives were stated such that, in achieving the objective, the negative environmental effect will be mitigated;
- A description of all mitigation strategies planned to achieve performance objectives was provided;
- If an on-going risk of potential negative environmental effects was identified, a description was included as to how the project will be monitored to ensure that mitigation strategies were meeting performance objectives; and
- Contingency measures were provided where monitoring revealed that negative effects were continuing to occur.

The following sections expand on the description of the negative environmental effects, the mitigation measures, and any post-construction monitoring plans that were identified in the Design and Operations report.

4.1 Potential Negative Environmental Effects

Given the nature of solar power generation, few if any negative environmental effects are expected during the operations period. The associated Project reports for the L.P #8 solar array facility have documented the potential environmental effects of construction and operating activities.

4.1.1 Dust (Air Quality) and Noise Emissions

The existing site is farmed. Farming equipment for tillage, planting, and harvesting, and chemicals (herbicides and pesticides) for weed and pest control can create air borne dust, generate noise and produce an odour. These activities are carried out intermittently over the crop growing season of 5 to 7 months. These environmental impacts are generally site specific and considered part of farming life.

Travel in and around the site by farm and construction equipment on gravel and soil surfaces can result in air-borne dust being generated which impacts on the air quality. This impact is very local to the Project site. The tilling and planting for a grass cover will not be different than the normal farming operation. There will be a greater level of dust and noise during excavation activities for the access road and the burial of the electrical cable. Construction for each is estimated to take 3 days each. There will be emissions (e.g. CO₂, NO₂, SO₂, and VOCs) from the diesel engines of construction equipment which will cause temporary negative odour to the local air quality. These emissions will not have any long term impact and are similar to that produced by farm machinery.

4.1.2 Destruction of Vegetation

The Project site is cultivated. There are no trees in the working area. No clearing and grubbing at the site is required. A few select trees may need to be removed from the hedgerow along the farm road / laneway to gain access to the solar field and to install the power poles. As there is overgrowth at the hedgerow extending into the farm road, there will also be pruning of shrubs and trees to create an unobstructed construction access for haulage equipment. Dust from construction activities can become air-borne and land on vegetation external to the working area. This can impact the plants ability for photosynthesis. Rainfall has a cleaning affect.

4.1.3 Impact to Water Resources

Surface water runoff can be impacted by the removal of vegetation, placement of impervious surfaces, re-grading, and compaction of soils through construction activities. As referenced in Section 4.1.2, there is no clearing of vegetation required at the solar facility. The site access will be constructed with granular materials which will permit infiltration, and with a cross-fall to allow runoff to flow unimpeded. The Project site is not being re-graded. There are no stormwater facilities required to treat surface runoff as the quality of the storm runoff is not impacted by the solar array field. The construction equipment working at the site is small and will have minimal impact on native soil compaction. The soil at the Project site and any topsoil stockpile is being vegetated with a grass cover. There is the potential of erosion from runoff should the soil become exposed.

A Records Review and Site Investigation were undertaken at the Project site. No significant water bodies (permanent watercourses, intermittent watercourses, seepage areas, or lake) were identified within the site or adjacent lands within 120 metres. A small man-made pond is

situated to the east between the solar field and the site building. The natural gradient is westward towards the array facility. The proposed site access does not cross any watercourse. The footprint of the foundation for the solar array field is minimal, estimated at 2%. The Design and Operations report noted there would be no identifiable change in the water balance. The establishment of a grass ground cover will enhance infiltration of runoff.

There is no requirement to divert flow in any watercourse or other drainage works. There are no wells being developed or other water takings.

4.1.4 Spills

Spills and/or leakage of petroleum hydrocarbon products (fuel, solvent, grease) from on-site equipment could occur during the construction of the solar array field. Spills could result in negative environmental effects as follows;

- Contamination of soil, surface water, and groundwater impacting biological life either directly or indirectly; and
- Loss of crop production.

The magnitude and location of any spill will have a direct bearing on the environmental impact as does the timing and nature of the response. The Design and Operation report set out an Emergency Response Plan and Emergency Communication Plan that will be followed.

4.1.5 Impacts on Cultural Heritage (Protected Properties, Archaeological and Heritage Resources)

There are no provincial parks or conservation reserves at or within 120 metres of the Project site. Similarly, there are no Natural Heritage Resources (Provincial Significant Wetlands (PSW), Areas of Natural and Scientific Interest (ANSI), and Environmentally Significant Areas (ESA)) within 50 metres of the Project Site or a natural feature other than an ANSI within 120 metres of the site. Woodlands are situated further away to the north and east. The Nottawasaga Valley Conservation Authority (NVCA) has no regulated area within the solar facility site.

Stages 1 and 2 Archaeological Resources studies have been undertaken at L.P #8. The Stage 1 property inspection exhibited archaeological potential. The Stage 2 field inspection has determined that the site has low cultural heritage value. A Stage 3 study is not required.

A cultural heritage self-assessment completed for this property concluded that there was low potential for heritage resources at this project location.

4.1.6 Impacts on Local Roads and Traffic

The use of local roads for the haulage of construction equipment and materials could result in roadway damage. The haulage distance on secondary (local) roads is relatively short (approximately 4 km). These roads are paved. The condition and construction of these local roads has not been assessed. The impact of construction traffic on the roadway is not readily definable. The roads are used by the local farm community possibly for hauling implements and transporting grains and other feedstock to external markets. The farm access road is a private road. Measures have been identified to upgrade the surface for construction traffic.

The number of construction vehicles has been described in Table 3-1. This volume of traffic is considered to be light and will not impact on the local use of roads. Traffic control measures will be implemented at the existing entrance to the farm road / laneway off the local road.

4.1.7 Land Use

The zoning for the Project site is agriculture / rural. The site is farmed. Construction of the solar array facility will remove the site from agricultural production. The site can be returned to agricultural production at decommissioning of the solar array facility. The solar panels cover an area of approximately 0.25 ha. These works are low profile, considered to be non-intrusive in nature and will not interfere with other nearby land uses.

4.1.8 Waste Management

Construction materials being brought to site include: granulars and sand for the haul road and site access, and the underground electrical service; precast concrete for the solar array foundation blocks and electrical structures; the metal framing for the panels; and the PV panels themselves. Generation of product waste materials as well as from site work (equipment maintenance and sanitary) is expected at a construction site. Wastes and recyclables will be transported to the nearest approved receiving facility for disposal and recycling.

4.1.9 Wildlife, and Aquatic Habitat and Biota

Wildlife could be impacted as a result of construction activities which would result in loss of habitat, migration disruption, and mortality. Impacts to aquatic habitat and biota would likely occur as a result of a diversion of a water source, changes to runoff water quality (sediment from soil erosion), impact on groundwater level, environmental spills, and other site alterations (vegetation and grading). These issues have been described in the related sections.

4.2 Proposed Mitigation

The associated Project reports have outlined the proposed mitigation measures for the respective environmental effect.

4.2.1 Dust (Air Quality) and Noise Emissions

The Performance Objective regarding dust and noise emissions is there be no long term environmental effect due to construction and site alteration.

Mitigation measures for dust generation, noise emissions and odour production at the construction site will use standard construction best management practices including the following;

- Minimize vehicle travel on exposed soils;
- Prohibit idling of construction equipment where possible;
- Service and maintain equipment; repair any equipment producing unnecessary excessive noise where possible;
- Limit hours of work to the requirements of the local municipal bylaws; and
- Test noise (sound) levels of electrical equipment during the commissioning phase if deemed necessary.

4.2.2 Destruction of Vegetation

The Performance Objectives regarding vegetation destruction are that the impact to the existing vegetation during construction be minimized, and that any site restoration be compatible with existing land usage and vegetation.

As there is no clearing and grubbing, there are no mitigation measures identified for the destruction of vegetation. Dust may impact existing vegetation. Mitigation measures for the production of dust are described in Section 4.2.1. Ground cover will be maintained to mitigate any potential soil erosion.

4.2.3 Impact on Water Resources

The Performance Objectives regarding water resources are that there be no long-term increase in runoff turbidity that would impact water bodies, and vegetation removal, site re-grading and soil disturbance with related infiltration loss is to be minimized.

Addressing and preventing erosion of soil which could be directed to off-site watercourses and ditches during the construction period can be addressed as follows;

- Minimizing the time that bare soil is present by providing a grass cover prior to construction commencement;
- Seeding topsoil stockpiles to create a continuous grass cover;
- Having erosion containment measures (straw bales) on site to address areas of potential erosion;
- Should erosion control measures be installed, check their performance regularly and repair and replace measures as necessary; and
- Revegetate disturbed areas as soon as possible.

Construction best management practices will be carried out at the site. Working boundaries will be clearly defined. Equipment movement will be contained within the working area. Mitigation of environmental spills is addressed in Section 4.2.4.

Post-construction, the site will be visually inspected for soil erosion during the regular visits. Repairs consisting of trimming the site with topsoil if required, preparing a seed bed and seeding will be undertaken as required.

As there is no other impact on the water resources, no mitigation measures are required.

4.2.4 Spills

The Performance Objective regarding spills is there be no long-term environmental effect due to toxic spills.

Accidental spills of hazardous materials are to be documented and reported immediately to the Ministry of Environment Spills Action Centre (1-800-268-6060).

These type of spills can be mitigated through following construction best management practices, which include;

- A contractor site environmental coordinator be identified and available on site;
- Contractor staff be made familiar with hazardous and toxic materials handling (WHIMS);
- Contractor site meetings be held regularly at which environmental management issues will be discussed;
- No fuel or other hazardous material be stored on site where possible. Otherwise the WHIMS requirements for storage and handling be followed including offsetting any storage area 30 metres away from any waterbody including drains;
- A designated equipment fueling and maintenance area be established with spill containment measures installed (i.e. heavy polyethylene tarp);

- Spill containment and clean-up supplies be maintained on site;
- Contractor to service equipment before bringing to site; and
- Contractor to inspect equipment daily.

4.2.5 Impacts on Cultural Heritage (Protected Properties, Archaeological and Heritage Resources)

The Performance Objectives for Cultural Heritage including protected properties, archaeological and heritage resources are to undertake an assessment to regulatory requirements, and to mitigate the impact to the greatest extent possible.

Should archaeological artifacts or human remains be found within the work area, all work in the vicinity of the discovery is to be halted and the Ministry of Tourism and Culture, Heritage Libraries Branch, Heritage Operations, Development Plans Review and/or the Ontario Ministry of Consumer and Commercial Relations, Registrar of Cemeteries contacted. Work is to be discontinued until such time as the site has been investigated and cleared by a qualified party (archaeologist, police, other).

There are no protected properties, significant archaeological resources or designated heritage resources at or within the prescribed offsets as set out in O.Reg. 359/09 identified at this time. Therefore there are no adverse effects and no mitigation measures required.

No permit is required from NVCA under Ontario Regulation 172/06, Development, Interference with Wetlands and Alterations to Shorelines and Watercourses as the solar array field is not within any regulated area.

4.2.6 Impacts on Local Roads and Traffic

The Performance Objectives regarding local roads and traffic are to mitigate damage to local roads, and to minimize the risk to the public.

Increased traffic volume on local roads as a result of construction traffic may result in some negative impacts. Mitigation measures will include:

- Communicating with the local municipality regarding the use of their roads, identifying a haul route, and applying for any haul permit as required;
- Undertaking a condition assessment of the haul road and advising the municipality of the findings;
- Obeying all load restrictions;
- Contacting utility companies with overhead wires that may be impacted by construction activities and arranging for temporary support or relocation;
- Arranging for escort services for oversize loads;
- Providing traffic flagpersons when heavy construction traffic is entering or leaving the construction site onto local roads; and
- Repairing all damage to roads to the requirements and satisfaction of the local municipality.

4.2.7 Land Use

The Performance Objective regarding land usage is to maintain the present land usage to the greatest extent possible.

At project decommissioning, the site can be returned to agricultural production. Topsoil removed for the construction of the works will remain on site and can be placed in the disturbed areas at decommissioning.

4.2.8 Waste Management

The Performance Objectives regarding Waste Management are to maximize the recycling potential of construction materials, and to deal with hazardous and sanitary waste to the requirements of existing regulations.

Mitigation measures for the handling and disposal including recycling of waste include:

- At construction meetings, discuss, provide and maintain facilities for proper storage on site including segregation of type of materials (metal, wood, paper, plastic, other) and handling (packaging) for delivery to the approved receiving facility;
- Provision of sanitary waste facilities by a qualified hauler and disposal to a local licensed waste receiving station;
- Proper storage of hazardous waste in secure containers until disposal off-site at a registered receiving station; and
- Re-cycling of excess assembly materials including returning parts to the supplier or storing by the Owner at their maintenance yard.

4.2.9 Wildlife, and Aquatic Habitat and Biota Management

The Performance Objective regarding Wildlife, and Aquatic Habitat and Biota is to have no long-term effect due to construction and site alteration.

The site is farmed. There is no vegetation within the solar facility that would provide habitat for wildlife. There are wooded areas to the north and east of the site and a hedgerow of trees west of the site and along the farm road / laneway. The Natural Heritage Assessment Records Review did not identify any migration corridors or species of interest. The site is beyond the limits set for disturbance to water bodies. Impacts from sediment and erosion have been considered and monitoring and mitigation measures identified. There are no alterations to drainage patterns or drainage ditches. No wells are being installed and impacts to groundwater as a result of soil compaction and constructed works are considered minimal. Other best management practices will include:

- Minimize the time of construction outside the breeding bird period (May through July) where possible. If work is to be undertaken in this period, retain a trained avian biologist to inspect the work area and surrounds (100 metres) and demarcate any nests. Develop a mitigation plan to avoid nesting disturbance and undertake no construction activity within the described area unless approved by Environment Canada (Migratory Bird Convention Act – MBCA) and Ontario Ministry of Natural Resources (Fish and Wildlife Conservation Act –FWCA).
- Walk slowly in a zig-zag pattern through the site prior to commencement of construction each day to encourage wildlife to move from the work area. Check under all parked construction equipment for wildlife prior to starting.

4.3 Monitoring Plan

The associated Project reports have described the monitoring plans during and post-construction for potential negative environmental effects that are not readily mitigable.

4.3.1 Dust (Air Quality) and Noise Emissions

Monitoring for dust generation, noise emissions and odour production at the construction site will include the following;

- Discussion of operational mitigation strategies at construction meetings;
- Monitoring of construction activities during windy conditions. If excessive dust is being generated, modify or stop construction activities until weather conditions change;
- Post-construction, ensure ground cover (grass) is continuous. Where soil is exposed, place seed to establish new grass;
- Test noise (sound) levels of electrical equipment during the operational phase if deemed necessary; and
- Document and address dust, noise and odour complaints. Provide a formal response to the municipality and/or others regarding action taken.

4.3.2 Destruction of Vegetation

The Project site is being grassed. Monitoring of the continuity of the ground cover during and post-construction will allow for a timely identification of any potential erosion areas.

4.3.3 Impact on Water Resources

The site will be visually inspected for soil erosion. Repairs to the vegetation will be made as required.

As there is no other impact on the water resources, no additional monitoring is required.

4.3.4 Spills

A long-term monitoring plan for spills is required for some of the electrical components, namely transformers. As the transformer is set on a concrete pad, any leakage will be identifiable. Should maintenance require construction equipment to be mobilized, the same requirements as set out for the original construction are to be followed.

4.3.5 Impacts on Cultural Heritage (Protected Properties, Archaeological and Heritage Resources)

There are no protected properties, significant archaeological resources or designated heritage resources at or within the prescribed offsets as set out in O.Reg. 359/09 identified at this time. Therefore, there are no adverse effects and no long-term monitoring programs are required.

4.3.6 Impacts on Local Roads and Traffic

The impacts on local roads are mitigable and no post-construction monitoring is required. The impacts on local traffic are short term and are able to be managed to mitigate the risk to the public.

4.3.7 Land Use

The Project site will be managed as an electrical facility for its life expectancy. Regular inspections will be undertaken as well as maintenance of the facility. As there are no changes to the land use, a post-decommissioning monitoring plan is not required.

4.3.8 Waste Management

Proper waste handling and disposal will not result in any long-term environmental impacts. No post-construction monitoring will be required.

4.3.9 Wildlife, and Aquatic Habitat and Biota Management

Some disturbance to wildlife is anticipated but this is considered to be minor, temporary and reversible. Construction activities will have a negligible effect on population size at the local and regional levels. A long-term monitoring program is not required.

4.4 Environmental Effects Monitoring Plan

The identified measures to address the negative environmental effects associated with the construction of the solar array field will provide full mitigation or these effects are considered manageable. The latter are considered to be minor and temporary. The environmental mitigation measures as set out in the related reports will be provided to the contractor for their review and implementation. The Owner and their contract representative will work with the contractor on ensuring the mitigation measures are properly installed, maintained and functioning according to the design objectives and specifications. One key area of post-construction monitoring is the potential for site erosion. A continuous ground cover is to be maintained. Repairs can be readily made.

5. Conclusions

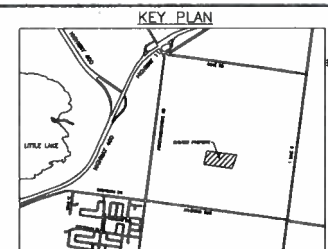
The Construction Plan Report has been prepared as part of an application for a Class 3 Solar Facility under O.Reg.359/09 Renewable Energy Approval (REA) under Part V.0.1 of the Ontario Environmental Protection Act as amended by O.Reg. 521/10 and O.Reg. 231/11.

A site plan has been prepared showing the layout of the solar array field, the associated electrical components, topographical features and other amenities within the study area.

The environmental impacts during the construction, operation and decommissioning phases have been identified, and have been determined to be able to be mitigated and/or managed. There are no long-term monitoring requirements other than for potential site erosion during the operation phase. The vegetation and hence erosion potential can be checked during the regular facility inspections for system operation and maintenance. Environmental spills have been referenced and a designated contractor staff member will coordinate the site response.

Public communications and an Emergency Response Plan and Emergency Communications Plan have been set out in the Design and Operations report and are part of the requirements for the construction of the solar array field.

Appendix 1 – Project Site Plan



LEGEND

 POINT OF CONNECTION
 PROPERTY LIMIT



STATISTICS: SOLAR ARRAY

NUMBER OF MODULES	507
NUMBER OF MODULES PER STRING:	13
NUMBER OF STRINGS:	39
PANEL TYPE:	CANADIAN SOLAR CS6P-230
FEEDER NAME:	F1
CONNECTION VOLTAGE:	4.8Kv

CONTRACT IDENTIFICATION # F-001253-SPV-130-505
FIT REFERENCE # FIT-FBMWETC

NOTES

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

[illegible]

SCALE

DESAIGNS, INC.

REVIEWS

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C.	BASIC PLAN	K.H.
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010	K.H.
PROJ. MAN	

	G.B.
APPROVED	G.B.

FUTURE SOLAR

419 PENETANGUISHENE RD, BARRIE, ON

SITE PLAN

LP8

PROJ NO.	WSL-2250
SUMMARY	

FBS
OCT 7, 201

ORDER NO.

SP 5

Appendix 2 – Project Construction Schedule

