

BRUINING 1 SOLAR

SunE Bruining 1 Solar Farm

Executive Summary



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1. Background

SunEdison Canada is proposing to construct a 10-Megawatt (MW) (AC) ground-mounted solar PV (photovoltaic) project in the area of Ingleside, Township of South Stormont, Ontario. The project is being developed under Ontario's Feed-in Tariff (FIT) program and is a Class 3 Solar Facility. As such, the project needs to complete the Renewable Energy Approval (REA) process and receive an REA from the Ontario Ministry of the Environment. This collection of documents has been compiled to document the work undertaken as part of the REA process.

2. Project Developer

The SunEdison (SunE) Bruining 1 Solar Farm is being developed by SunEdison Canada, LLC (SunEdison). The project will be owned and operated by SunE Ray LP, which is majority owned by SunEdison. SunEdison is North America's largest solar energy services provider. The company finances, installs and operates distributed power plants using photovoltaic technologies, delivering fully managed solar energy services for its commercial, government and utility customers. SunEdison is a global leader in solar energy generation with a current operating portfolio of more than 350 facilities generating over 100 Megawatts (MW) of solar power across the globe. Active Ontario solar farms currently owned and operated by SunEdison include First Light 1 (9.1 MW) located in Stone Mills, north of Napanee, Norfolk I and II (18 MW combined) located in Norfolk County and Erie Ridge (9.3 MW) in Ridgeway, Chatham-Kent.

3. Project Location and Size

The project is located on Anderson Road, west of Ingleside, Ontario. Figure 1 in Appendix A shows the study area. The area is generally bounded by:

- Anderson Road along the south (immediately north of Stormont, Dundas and Glengarry County Road 2)
- CN Rail (Kingston Subdivision) along the north

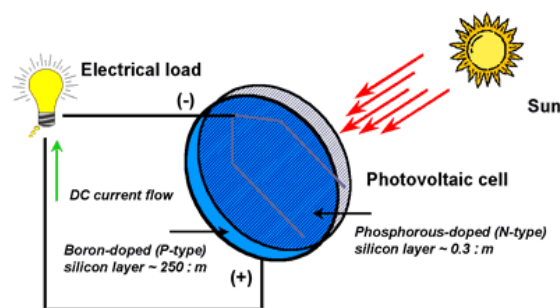
The proposed project will have a nameplate capacity of 10 MW (AC) which will be produced by approximately 40,000 solar panels. The project's electrical substation will also be located on site. The solar farm will be located on privately owned land. The project's electrical substation will also be located on site. One overhead electrical connection line would run south within the Narrows Lock Road right of way and then north-west within the County Road 42 right of way to connect to the existing Hydro One distribution line running east-west along County Road 42. The study area and site plan are shown in Appendix A.

The proposed schedule is to have the units operating by the end of 2013.

4. Project Equipment

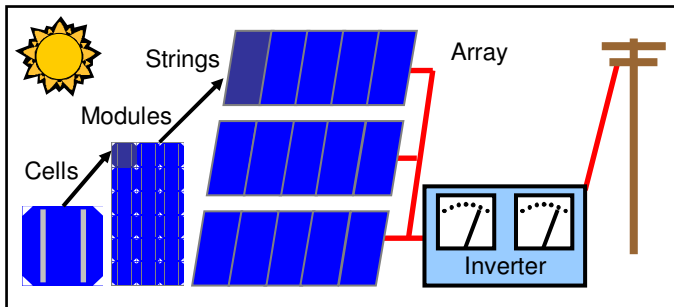
4.1 Solar PV Technology

The photoelectric effect relies on the principle that whenever light strikes the surface of certain materials electrons are released. PV systems use cells to convert solar radiation into electricity. The cell consists of one or two layers of a semi-conducting material. When light shines on the cell it creates an electric field across the layers, causing electricity to flow. The greater the intensity of the light hitting the cells, the greater the flow of electricity. However, a PV system does not need bright sunlight in order to operate and it can generate electricity even on cloudy days. PV cells



perform even better at low temperatures. This technology is thus perfectly suited to Ontario's climate.

The most common semi-conductor material used in PV cells is silicon, an element most commonly found in sand and which is the second most abundant material in the Earth's mass. PV systems produce direct-current (DC) electricity, which must be 'inverted' to alternating current (AC) and stepped-up before it can be delivered to the electricity grid. PV systems connect to the lower-voltage distribution lines commonly found along roadways; not to high-voltage transmission lines.



5. Approvals Process

The Ontario government introduced the Green Energy Act in May 2009 to boost renewable energy development and increase energy conservation in the province. The key drivers behind the new legislation were Ontario's commitment to phase out coal generation by 2014, the goal of boosting economic activity and the creation of new green industries and jobs. Two major components of the legislation include the FIT program and the REA process. The FIT program is managed by the Ontario Power Authority and is designed to encourage the development of renewable energy projects. The FIT program sets specific rates for energy generated from renewable sources and provides long-term contracts (20 years for solar PV) to provide stability for developers and the financial community. FIT contracts are awarded, in part, based on transmission grid capacity and the ability of the proponent to bring renewable energy projects online quickly.

For solar PV, the FIT program also requires a minimum amount of goods and services to come from Ontario – called domestic content. For the SunE Bruining 1 solar farm 60% of the goods and services going into the project must come from Ontario.

The REA process is overseen by the Ministry of the Environment (MOE) and prescribes a standardized environmental study, review and approvals process that proposed renewable energy projects need to complete before they can be approved for construction. Key aspects of the REA as outlined in Ontario Regulation 359/09, as amended, include:

- Requires that proponents consider natural heritage and water features when developing projects
- Requires that proponents consider archaeological and built heritage features when developing projects
- Ensures that public input is sought and considered when developing projects
- Mandates consultation with Aboriginal groups
- Ensures that municipal governments are consulted and that local input is considered

6. REA Reporting

Ontario Regulation 359/09 lays out the required documentation for a solar PV REA. Five main reports are required, namely:

1. A Project Description Report providing an overview of the project

2. A Construction Plan Report detailing construction activities and potential effects
3. A Design and Operations Report describing the design, operation and emergency plans
4. A Decommissioning Report describing how the solar farm will be removed at the end of its lifespan
5. A Consultation Report that documents the consultation process followed and feedback received during the study

Each of these REA reports is included as a separate section of the SunE Bruining 1 Solar Farm REA documentation package.

6.1 REA Project Schedule

Initial Public Meeting:	September 28, 2011
Final Public Meeting:	September 19, 2012
Submission of the REA Application:	November 2012
Commence Construction:	Summer 2013
Commercial Operation:	Late 2013

7. REA Studies

As part of the REA process, a number of detailed studies needed to be completed to assess the current environmental conditions and potential impacts of the proposed project. These included:

- A Natural Heritage study investigating significant woodlots, wetlands, wildlife habitat and species at risk (Appendix C)
- A Water Bodies study investigating watercourses and water bodies in the study vicinity (Appendix C)
- An Archaeological and Built Heritage study to determine if any archaeological or built heritage sites are present in the development area (Appendix D)
- A Noise study to assess potential transformer and inverter noise levels on surrounding properties (Appendix E)

Each of these studies is documented in the individual appendices noted above accompanying the REA documentation. A summary of the key findings of these studies is also provided in the following subsections of this report.

In addition, background information on the Consultation undertaken as part of the REA is included in Appendix F and Technical Support Documents are included in Appendix G. These Technical Support Documents (Stormwater Management Plan report, Groundwater Monitoring Plan report, and Geotechnical Study) are not required by the REA process but they provide information to assist in assessing the existing and proposed conditions and environmental effects of the project.

7.1 Natural Heritage Studies

7.1.1 Studies Completed

This study was completed to assess the current environmental site conditions and to meet the requirements of the Ministry of Natural Resources under the Green Energy Act. The study is composed of two portions: 1) a records review; and 2) a field program. The records review involved obtaining information from the Ministry of Natural Resources, municipal governments and the Raisin Region Conservation Authority (RRCA) to determine if there are any significant woodlots, wetlands, valley lands, wildlife habitat or presence of Species at Risk (SAR) in the study area. The purpose of the field program

was to confirm the information obtained through the records review, to evaluate the woodlots, wetlands and wildlife habitat to determine if it meets the Ministry of Natural Resources criteria for significance and to update the available information. The field program involved visits to the site in summer and fall of 2011 and spring 2012.

7.1.2 General Findings

The studies identified water features, wetlands and woodlots within the study area, which are shown in Figure 2. The property vegetation is typically characterized by fresh-moist mixed thickets in the east and west portions of the project location, fresh-moist mixed forests to the north (including the northwest corner of the project location), east and south of the project location and wetlands dominating to the north and south of the project location. The property has a water feature in the vicinity which is a creek that flows north and east within 120 m of the project location.

The MNR was consulted for further information of natural features in the area and any known significant features.

The natural features (on or within 120 m of the project location) were evaluated for their significance (*Natural Heritage Assessment Evaluation of Significance Report*, Appendix C) and the following significant natural features were identified:

- Two provincially significant wetlands (Ingleside Swamp Wetland (to the north) and Upper Canada Migratory Bird Sanctuary Wetland (to the south)), neither of which will be directly impacted by the proposed project;
- Amphibian breeding habitat (woodland);
- Shrub/early successional bird breeding habitat;
- Waterfowl Nesting Area Habitat; and
- Marsh Bird Breeding habitat.

The project has been designed to avoid natural features and wildlife habitat as much as possible and to minimize impacts. Natural features and wildlife habitat may be affected during construction due to site grading or other earth-moving activities, accidental spills, removal of vegetation or direct loss of areas. In order to prevent and/or minimize adverse effects on these features the mitigation measures proposed are shown in Table 1 and detailed in the *Natural Heritage Assessment Environmental Impact Study Report*, Appendix C.

Table 1 – Proposed Mitigation Measures

Significant Natural Feature	Proposed Mitigation Measures
Significant Wetlands	Maintain 30 m vegetated buffer from project components Standard Best Management Practices (BMPs) for dust control, road construction and erosion control
Shrub/early successional bird breeding habitat	No vegetation clearing adjacent between May and July Standard BMPs for dust control, road construction and erosion control Site will be re-vegetated as an open meadow after construction Mowing of grass during operation will be delayed until mid-July Standard BMPs for dust control, road construction and erosion

	control
Amphibian breeding	<p>No vegetation clearing adjacent between May and July</p> <p>Standard BMPs for dust control, road construction and erosion control</p> <p>Site will be re-vegetated as an open meadow after construction</p> <p>Mowing of grass during operation will be after construction</p> <p>Mowing of grass during operation will be delayed until mid-July</p> <p>Standard BMPs for dust control, road construction and erosion control</p>

The Natural Heritage Report was accepted as complete by the Ministry of Natural Resources June 13, 2012.

7.2 Water Bodies Study

7.2.1 Studies Completed

This study was completed to determine if there were water bodies within the project area and to meet the requirements of the MOE under the Renewable Energy Approvals regulation (O.Reg. 359/09, as amended). The study is composed of three portions: 1. a records review; 2. a field program and 3. an Environmental Impact Study. The water body studies noted that within 120m of the project location, the property has a water feature, an unnamed watercourse (man-made ditch) which runs southwest to County Road 14. Site investigations were undertaken from June to September 2011.

7.2.2 General Findings

The project location will maintain a minimum 30 m setback from the creek in the southeast portion of the site. An environmental impact study has been conducted and the results can be seen in the *Water Report*. Potential impacts include potential loss of riparian vegetation and increased sedimentation.

The following is a list of measures for controlling the release of sediments during construction:

- Light Duty Sediment Fence – a sediment fence will be placed at the edge of the work area to prevent sediments from reaching the water feature. Filter fabric is the only acceptable fencing material to be used (i.e. no plastic-braided fencing). Fencing shall be secured along the base by digging in the filter fabric and backfilling with earth to grade, to prevent runoff from flowing underneath the bottom edge. In the area where the work area drains overland flow towards the watercourse, the fencing will be doubled with a row of hay bales installed between the fencing and on the upstream side. The hay bales will be installed in a shallow (~5 cm) trench packed tightly together and staked into position.
- Sediment fencing shall be placed along the base of all spoil piles to prevent sediment-laden runoff from entering ditches or watercourses.
- Rock check dams and/or hay bales should be installed in project-affected drainage ditches to entrap sediments and reduce water velocities to facilitate sediment deposition. Rock check dams will be installed via a standard sediment fence installed perpendicular to the flow and then filled with fine gravel or filter sand on either side. Alternatively, double sediment fencing and the associated hay bales may be installed to achieve the same result; however additional staking may be required to prevent hay bales from floating in the associated deeper waters.

7.3 Archaeological and Built Heritage

Under the REA Regulation, consideration must be given to the potential impact which the project may have on Archaeological and Heritage resources as well as Protected Properties. The following sub-sections detail the examination of the potential for impacts on these resources.

7.3.1 Consideration of Protected Properties and Heritage Resources

A records review was undertaken to determine if there were any built heritage resources such as historical buildings or landscapes at the project location which may be impacted by the proposed project. The review noted that there are no protected properties within 125 m of the project area.

7.3.2 Consideration of Archaeological and Built Heritage Resources

Archaeology

Construction of the SunE Bruining 1 Solar Farm will result in the installation of approximately 40,000 solar panels, 10 inverter/transformer huts, one transformer substation, a temporary construction laydown yard and internal driveways. As such, construction has the potential to disturb archaeological resources, should they exist on the site.

Stage 1 & 2 surveys have been completed with the results reported in Appendix D. No significant archaeological finds were identified within the project location.

Should any archaeological resources be found during construction, work will be suspended within the immediate area of the find site and the MTCS will be contacted immediately. A licensed archaeologist will be contracted to assess the find and make recommendations on avoidance or removal should the find be determined to be significant.

The project has received a Letter of Confirmation from the Ministry of Tourism, Culture and Sport, and all regulatory requirements will be adhered to.

Built Heritage

A built cultural heritage assessment was conducted on the Bruining 1 solar farm and is reported in Appendix D. Cultural heritage resources were identified adjacent to the project location retain a level of significance based on their exterior architectural styles, their historical associations with early settlers in the former Township of Osnaburck and the retention of physical and visual links to their late eighteenth and early nineteenth-century agricultural roots.

Based on the results of the background data collection, the field review and a cultural heritage evaluation of the identified features and impact assessment the following recommendations were refined for the project as follows:

1. There are no identified cultural heritage resources within the project location, however as the solar facility will be located to the north of three sites there may be impacts to vegetation and views. It was recommended, where possible, to maintain portions of the extant woodlots and brush area in order to provide screening between these resources and the solar facility.
2. Vegetation should be maintained and/or replacement plantings should be planted as much as possible in the grassy area between Highway 2 and Anderson Road in order to provide screening and to preserve the current visual experience of travelling along Highway 2.
3. Should the proposed work plans be revised significantly, all activities should be reviewed by a qualified heritage consultant in order to ensure that the cultural heritage resources are not impacted.

A letter of confirmation from the MTCS was received on July 18, 2012 that agreed with the recommendations in the Built Cultural Heritage Assessment.

7.4 Noise Study

Noise generated by the operation of the inverters and electrical substation has been cited as a potential concern by the MOE. Based on past experience operating solar farms, SunEdison has found this noise to be negligible. In order to meet the MOE requirements a modelling study was completed. Prior to commencement of these studies a field visit was conducted to map all potential receptors including: residences, campgrounds, schools, hospitals and long-term care facilities within 1.5 km of the site.

The purpose of the noise study was to determine what the sound levels at nearby residences would be if the project was built as proposed. This study was conducted in accordance with Appendix A of the publication of the Ministry of the Environment entitled, "*Basic Comprehensive Certificates of Approval (Air) – User Guide*", dated April 2004 and subsequent amendments.

The results of this study shows that noise levels are below the 40 dBA standard specified by the REA Regulation for all potential receptors.

8. Conclusions

The SunE Bruining 1 Solar Farm is proposed in response to the Provincial Government's policy to increase the supply of renewable energy in the province. The project has a FIT contract for the purchase of electricity from the Ontario Power Authority. It is expected that the construction, operation maintenance, and subsequent decommissioning of the SunE Bruining 1 Solar Farm will not have significant negative effects on human and natural environments based on the proposed project layout and design, construction practices, and operating procedures. The Project will provide an important electricity resource for Ontarians.

9. Contacts for Comments and Further Information

Patricia Becker, MES
Project Manager
GENIVAR
600 Cochrane Drive, 5th Floor
Markham, ON, Canada L3R 5K3
Phone: 905-713-2837
Fax: 905-475-5994
Email: pat.becker@genivar.com

Simon Gill,
Manager, Product & Business Development
SunEdison Canada
595 Adelaide Street East, Suite 400
Toronto, ON, Canada M5A 1N8
Phone: 647-258-9082 Ext. 3512
Fax: 416-907-3995
Email: sgill@sunedison.com

