Natural Heritage Assessment

Environmental Impact Study

Newboro 1

Solar Energy Project

FIT Contract Number: FIT-FGJ9196

prepared for

Genivar and SunEdison

FINAL

ECOLOGICAL SERVICES

Report Author Signature

Date

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1.0 INTRODUCTION

SunEdison, LLC (Sun Edison) is proposing to develop a 10 megawatt solar photovoltaic project titled Newboro 1 Solar Power Project. The proposed project has received a 20 year Feed-in-Tariff contract from the Ontario Power Authority (FIT Contract Number: FIT-FGJ9196). The Project Location is a 142 hectare (ha) parcel situated 5 km east of the Village of Newboro, and approximately 40 km north of the Town of Gananoque. It is bounded by Narrows Lock Road (County Road 14) to the west, McCann Road to the north, and is landlocked to the south and east by agricultural lands and woodlands. The Project Location is currently undeveloped and is designated as 'Rural' in the Township of Rideau Lakes Official Plan. It is also Part of Lots 25, 26 and 27, Concession 1, South Crosby Ward, Township of Rideau Lakes, Leeds and Grenville County, Ontario. The longitude and latitude are 44o 40' 24.31" and 76o 16' 22.28".

As stated in sections 37 and 38 of Ontario Regulation (O. Reg.) 359/09 Renewable Energy Approvals Under Part V.0.1 of the Act, (herein referred to as the "REA Regulation"), an environmental impact study is required for all significant natural heritage features determined to be within a specified distance of the Project Location. The environmental impact study identifies the potential negative environmental effects of all Project phases on these significant natural features, documents the proposed mitigation measures to prevent/minimize adverse effects, and describes the environmental effects monitoring plan.

For this document, Project Location means:

> *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)).*

1.1 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.

The REA process requires the preparation of several reports with respect to natural heritage features on and adjacent to the Project Location, including the natural heritage records review report (*NHARR*), natural heritage site investigation report (*SI*), natural heritage evaluation of significance report (*EOS*), and if necessary, an environmental impact study (*EIS*). The legislative requirements for these reports are summarized in the following sections.

1.2 Natural Heritage Records Review

The REA Regulation require the proponent to provide a summary of records searched and to identify whether the Project Location is on or within certain natural heritage features such as a provincial park, conservation reserve, wetland, woodland, valleyland, wildlife habitat, life science or earth science ANSI, savannah, prairie, or alvar. The *NHARR* (Genivar 2011) was prepared to meet these requirements.

1.3 Natural Heritage Site Investigation Report

Section 26 of the REA Regulation requires proponents of Class 3 solar projects to undertake a natural heritage site investigation for the purpose of determining:

a) whether the results of the analysis summarized in the *NHARR* (Genivar 2011) prepared under subsection 25 (3) are correct or require correction, and identifying any required corrections
b) whether any additional natural features exist, other than those that were identified in the *NHARR* (Genivar 2011)
c) the boundaries of any natural feature that was identified in the *NHARR* (Genivar 2011) or the *SI* (Ecological Services 2011) within 120 m of the Project Location, and
d) the distance from the Project Location to the boundaries determined under Clause (c).

The *SI* (Ecological Services 2012) was prepared to meet these requirements.

1.4 Natural Heritage Evaluation of Significance Report

REA Regulations require proponents of Class 3 solar projects to prepare an *EOS* for natural features identified during the *NHARR* (Genivar 2011) and *SI* (Ecological Services 2012) that sets out:

a) a determination of whether the natural feature is a provincially significant natural feature.
b) a summary of the evaluation criteria or procedures used to make the determinations.
c) the name and qualifications of any person who applied the evaluation criteria or procedures.

The *EOS* (Ecological Services 2012) for the natural features identified within 120 m of the Project Location was prepared to meet these requirements.

1.5 Environmental Impact Study Report

REA Regulation prohibits the construction, installation or expansion of any component of a solar Project is:

a) within 120 m of a provincially significant southern wetland
b) on or within 50 m of a provincially significant earth science ANSI
c) on or within 120 m of a provincially significant life science ANSI
d) within a significant valleyland or within 120 m of a significant valleyland
e) within a significant woodland or within 120 m of a significant woodland
f) within a significant wildlife habitat or within 120 m of a significant wildlife habitat
g) within 120 m of a provincial park or conservation reserve

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

a) identify and assess any negative environmental effects of the Project on a natural feature, provincial park or conservation reserve referred to in subsection 38 (1)
b) identify mitigation measures in respect of any negative environmental effects
c) describe how the environmental effects monitoring plan in the design and operations report (Genivar 2011b) addresses any negative environmental effects

d) describe how the Construction Plan Report (Genivar 2011c) addresses any negative environmental effects.

This ***EIS*** has been prepared to address these requirements for construction within 120 m of any identified significant natural feature.

1.6 Information on Natural Heritage Features

The presence of the following natural heritage features were confirmed during the ***SI*** (Ecological Services 2012), and evaluated as significant in the ***EOS*** (Ecological Services 2012b).

- **Significant Woodlands** – significant woodland is located on and within 120 m of the Project Location. The presence of this woodland was confirmed during the ***SI*** (Ecological Services 2012), and evaluated as significant in the ***EOS*** (Ecological Services 2012).

- **Significant Wildlife Habitat (woodland amphibian breeding)** – although we suspect a low probability of significance, a spring amphibian breeding survey is recommended for confirmation.

2.0 METHODOLOGY

The following steps outline the methodology that was used to prepare this *EIS*:

1. Documentation of Project components and activities during all Project phases, including construction, operations and decommissioning, including identification of temporal and spatial boundaries.

2. Background data collection on the natural features on and within 120 m of the Project location through the Records Review and Site Investigation processes.

3. Identification of the effects likely to occur to identified environmental components as result of implementing, operating and decommissioning of the project.

4. Development of mitigation measures to eliminate, alleviate or avoid the identified negative effects.

5. Design of an environmental effects monitoring program to confirm the predicted effects and the effectiveness of mitigation measures.

3.0 CONSTRUCTION PHASE

SunEdison is proposing a single Class 3 Solar Facility with a nameplate capacity of 10 MW (AC) near Newboro, Ontario. If approved, this facility will convert solar energy into electricity to be fed into the Hydro One distribution grid. The defined project location, presented as Figure 1, and the major components of the projects are as follows:

- Approximately 40,000 x MEMC solar modules (260 to 300-watt generation capacity)
- Approximately 320 disconnect combiners

- 44 kV Substation including pole-top motor-operated disconnect; 44kV switchgear; 10 MVA oil filled pad-mount transformer; interrupter switches, communication equipment, etc.
- Approximately 20 x 500-kW inverters and 10 corresponding 1000 kVA transformers
- Internal access driveways
- Temporary staging areas for the installation of the solar panels
- A 30-m tall communications tower (if required by Hydro One)
- The location of the equipment has not yet been confirmed but will be limited to the defined project area.

The CPR report will detail the construction activities, the duration of these activities, any potential environmental effects that could result from these activities and proposed mitigation measures to be applied to the potential environmental effects.

3.1 Construction Details

The work will meet or exceed all local regulations and standards (such as the Ontario Electrical Safety Code, Ontario Building Code, etc.).

1.1.1 Roads and Land Clearing

Municipal and provincial roads will be used for transportation to the construction sites, and no permanent paved roads will be constructed for the solar farm. Minor modifications might be required to some existing roads (for example, widen the turning radius) for equipment transportation. Any road damage will be repaired in consultation with the applicable road authority.

On-site access to the array will require new driveways, and following completion of the construction phase, the driveways will be used for maintenance activities for the duration of the facility's operation.

The construction of the driveways typically requires excavation of the top soil layer and adding a layer of compacted material to a typical thickness of 300 mm (depending upon site specific geotechnical conditions). Clean granular material (typically "A" or "B" gravel) will be brought to the site on an as-needed basis and will not be stockpiled onsite. The topsoil will be kept and re-used on site. Culverts may be required to maintain site drainage in order to support the construction equipment and delivery trucks. If required, culvert installation details and erosion-control measures will be determined in conjunction with the Rideau Valley Conservation Authority as a part of their permitting process.
The construction equipment used will include trucks, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be brought on trailers. All will be temporarily stored in the temporary laydown area. The construction will emit minimal noise and dust, and no chemicals other than fuel will be used. Road dust will be controlled with water, as necessary.

The work will preferentially be completed after mid-July to take advantage of typically drier weather.

3.1.2. Construction Laydown Areas

The construction laydown area will be at the south end of the Project Location near County Road 14. The topsoil at the Construction Laydown Areas will be removed and approximately 600 mm of clean compacted crushed gravel will be imported on an as-needed basis. Excavated topsoil will be re-used on site as feasible. Granular material will be brought on site to maintain a stable base.

Construction equipment will include (at a minimum) cars, trucks, graders, and bulldozers. The cars, trucks and graders will be driven to the site and the bulldozers will be brought on trailers. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

This will preferentially be completed immediately following land clearing activities. Some top soil will need to be stripped; however this will be disposed of or re-used on site.

After the construction of the project is completed, the gravel will be removed, or re-used by the landowner, and the topsoil will be replaced from the stockpile. It is anticipated that the majority of the construction laydown area will be restored after approximately 8 months. A small portion might remain as a parking site for maintenance vehicles over the 20-year life of the solar farm.

3.1.3. Site Preparation and Inverter Pad Construction

Prior to construction, the construction area will need to be cleared, grubbed and fenced. The topsoil is typically removed and some material may need to be added depending upon site specific geotechnical conditions. The site will be surrounded by a chain-link fence approximately 2 m tall for site security. The fence post holes will be augured and the fence posts placed into concrete and allowed to set. Once the posts have set, the metal chain link fence will then be secured. The fencing used will allow the free passage of small animals but prevent access to large animals and humans.

Inverter pads will be constructed at the same time as the internal driveways and will typically be 14 m x 5 m in size. The topsoil at the inverter pad will be removed and approximately 600 mm of clean compacted crushed gravel will be imported on an as-needed basis. The pads will be constructed of poured concrete reinforced with rebar. The excavated topsoil will be re-used on site as feasible.

Granular material will be brought on site to maintain a stable base, as well as cement mix for the concrete, rebar steel, metal posts and fencing.

Construction equipment will include (at a minimum) cars, trucks, graders, and bulldozers. The cars, trucks and graders will be driven to the site and the bulldozers will be brought via trailers. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

This will preferentially be completed immediately following land clearing activities. Some top soil will need to be stripped; however this will be disposed of or re-used on site.

After the construction of the project is completed, the gravel will be removed, or re-used by the landowner, and the topsoil will be replaced from the stockpile. It is anticipated that the majority of the construction laydown area will be restored after approximately 8 months.

3.1.4. Delivery of Equipment

Equipment will be delivered by truck and trailer as needed throughout the construction phase and stored at the temporary construction laydown area. These deliveries will typically occur during normal construction hours, typically 8 am to 5 pm and may include weekends.

3.1.5. Installation of Racking System

The Solar Array racking system will consist of a single-axis tracker rack system with the solar modules affixed to a supportive metal rack. The rack/array is then connected to the ground via piles. Variations on the rack connections to the ground are essentially variations on a common theme, and are dependent on the mount type (fixed/tracking) and the geotechnical conditions – regardless of connection method, the piles will be buried.

The general procedure for rack installation varies slightly depending on geotechnical conditions as outlined above, but essentially uses a vibratory system, with no pre-excavation requirements. However, if subsurface conditions are less favourable, subsurface pile work may include borehole pre-drilling, rock grouting and/or cement casting. Once the piles are secured in the ground, the excavated soil will be re-filled and steps 2 and 3 above are completed. Soil directly beneath the future racking/surrounding piles is compacted and covered with crushed engineered fill (and further compacted/settled); and racking, hardware and module assembly are built over top the piles.

Materials Brought On Site: Steel for rebar, piles, racking and potentially concrete, if necessary.
Construction Equipment Used: Typical construction equipment, will include:

- Excavator for removing material;
- Pile vibration or drill rig
- Flatbed trucks (4-6) for delivery;
- Concrete trucks for delivery of concrete (if necessary)
- Construction trucks (3-4 vehicles with multiple visits); and
- Dozer, loader and trucks to backfill and compact foundation and remove surplus excavated materials

The trucks will be driven to the site and the vibration/drill rig, bulldozers and excavator will be brought via trailers. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

This will preferentially be completed as soon as the land area has been graded and access roads are present. If necessary, this can be completed in early spring, depending on the amount of rainfall.
Material Generated: Any excavated subsoil will be removed from the site and disposed of in an appropriate manner.

3.1.6. Solar Panel Assembly and Installation

This portion of the work is labour intensive and requires significant manual assembly. An array row typically holds up to 100 modules, and a 10-MW solar farm can have as many as 400 array rows. With the exception of light crane trucks and flatbed trailers (storage and module transfer), the assembly work is essentially manual and requires little more than hand tools; welding is required to join tubes that comprise the array skeleton (where appropriate – assembly via hardware connection remains the main form of rack assembly).

The installation and assembly procedure consists of mounting rack components to the support columns (piles), fastening the rack elements together, joining and welding tubes, mounting and assembling tracking motors and their associated hardware (where tracking systems are utilized), and finally, mounting and fastening the PV modules to the assembled rack.

Materials Brought On Site: Solar panels, racking material and tracking motors.

Construction Equipment Used: Flatbed trailers. No chemicals other than fuel will be used.
Timing: Immediately after the racking installation.

3.1.7. Electrical Collector System

The electrical collector system will consist of wiring from the panel strings to the disconnect combiner boxes which are connected to the pad-mounted inverters/transformers. Cabling will run from the inverters/transformers to a 12.47-kV / 44-kV transformer which will upgrade the voltage to connect to the Hydro One distribution system. Underground cabling will generally be used on private property and aboveground collector lines will be used along public rights-of-way.

For the installation of electricity poles, the holes are typically augured in the ground using a truck-mounted auger device. The poles are then inserted using cranes to a typical depth of 1 to 2 m below grade. The poles are then "dressed" (made ready to accept conductors) using a boom truck. Typically, one crew installs the poles and one crew dresses them. Once the poles are in place and dressed, cables are strung in place using boom trucks and special cable reel trucks. It is still to be determined, in conjunction with Hydro One, whether the pole installations work will be done by the proponent or by Hydro One.

Materials Brought On Site: Electrical cabling.
Construction Equipment Used: Flatbed trailers and trenching equipment. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

Timing: Late summer to take advantage of typically drier weather. If necessary, this can be completed in the spring, fall or winter depending on the weather.

Material Generated: Some packing material waste will be generated. Recyclable material will be separated from the non-recyclable material onsite. Both streams of waste will be removed by a licensed sub-contractor.

3.1.8. Substation

The electrical substation for the solar farm will be located on the site property. The substation equipment will include an isolation switch, a circuit breaker, a step-up power transformer (12.47 to 44 kV), switch gear, instrument transformers, grounding and metering equipment. It will be surrounded by a chainlink fence with a locked gate to meet Ontario Electrical Safety Authority requirements. The substation area will be gravelled with clean material imported to the site on an as-needed basis and sloped to facilitate drainage.

During the construction of the substation, the topsoil will be removed and approximately 600 mm of clean compacted crushed gravel will be imported on an as-needed basis. The pad will be constructed of poured concrete reinforced with rebar. The excavated topsoil will be re-used on site as feasible.
Materials Brought On Site: Gravel, an isolation switch, a circuit breaker, a step-up power transformer (12.47 to 44 kV), switch gear, instrument transformers, grounding and metering equipment, insulators, transformer oil and electrical cabling.

Construction Equipment Used: A truck mounted crane, flatbed trailers and a bulldozer. The bulldozer will be delivered to the site by a flatbed trailer. Construction will emit minor amounts of noise and dust. No chemicals other than fuel and transformer oil will be used.

Timing: Late summer to take advantage of typically drier weather. If necessary, this can be completed in the spring, fall or winter depending on the weather.

Material Generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material onsite. Both streams of waste will be removed by a licensed sub-contractor.

3.1.9. Clean-up and Reclamation

Waste and debris generated during the construction activities will be collected and disposed of at an approved facility. All reasonable efforts will be made to minimize waste generated and to recycle materials including returning packaging material to suppliers for reuse/recycling. During construction, industry best practices for spill prevention will be utilized. In the unlikely event of a minor spill, this will be cleaned up immediately and any impacted soils will be removed from site and disposed of at an approved and appropriate facility. At the conclusion of construction, vehicles and construction equipment will be removed from the site.

Stripped soil will be replaced and re-contoured in the construction areas and disturbed areas will be re-seeded, as appropriate. Erosion control equipment will be removed once inspections have determined that the threat of erosion has diminished to the original land-use level or lower.

3.1.10. Facility Commissioning

The facility commissioning will occur once the Solar Panels and electrical system are fully installed and Hydro One is ready to accept grid interconnection. The commissioning activities will consist of testing and inspection of the electrical, mechanical and communications systems.

Materials Brought On Site:	None.
Construction Equipment Used:	None
Timing:	After construction activities are completed.
Material Generated:	None.

1.2 Location and Timing of Construction

The construction activities will generally be located in two areas.

1. Transportation of equipment to the site will utilize public roadways; and
2. Construction on the leased property.

3.2.1. Schedule

Construction activities will commence once all necessary permits (REA, building permits, etc.) have been obtained and the weather conditions are conducive to construction. The following table (Table 3.1) outlines the duration each activity typically takes. Following site grading, construction will move from one end of the site to the other and will follow an assembly line like process. Therefore, there will be considerable overlap of activities. Similarly, the construction of the electrical collector system and the substation can be constructed while the foundations are being built and the panels are being installed.

Table 3.1 Duration of Construction Activities

Activity	Total Duration	Notes
Surveying	2 days	
Clearing, grubbing, grading and internal driveway construction	15 days	Will occur outside bird breeding season (May – mid July)
Tracker Foundation	1 month	Concurrent with driveway construction
Tracker Assembly and Panel Installation	2-3 months	Concurrent with foundation construction
Installation of electrical collector system	1-2 months	Concurrent with foundation construction and panel installation
Substation installation and connection to distribution grid	1 month	Concurrent with electrical collector system construction
Clean up and reclamation	Concurrent with construction activities	
Site commissioning	2 weeks	

4.0 OPERATIONS

4.1 General

The solar farm will require technical and administrative staff to maintain and operate the facility. Most operations will be controlled automatically or remotely, through a central monitoring hub. It is expected that a team of 1-2 full-time workers will be required to keep the facility operating properly and maintained regularly, along with other solar farms in the region. Primary workers will be electricians, grounds keepers and mechanics, as well as software technicians who carry out maintenance on the equipment, along with a general supervisor.

Solar panels operate during daytime hours, in both direct and diffuse light conditions (although at a lesser power output). Each 1-MW block (i.e., a series of array rows connected to two 500-kW inverters) has a comprehensive control system that monitors the panel and electrical subsystems, as well as the local insolation conditions to determine whether operations should be carried out. If an event occurs which is considered to be outside the normal operating range of the array (such as electrical trips, panel weight overload (e.g., snow, extremely high winds), the array will take itself out of service and report the condition to the SCADA system. A communication line connects each 1-MW block to the monitoring hub, which closely monitors and, as required, controls the operation of the array.

4.2. Routine Maintenance

Routine preventative maintenance activities are scheduled at six-month intervals with maintenance tasks scheduled for each interval. Maintenance is performed by removing the MW block from service and inspecting the electrical, control and mechanical systems on the array. Consumables are used, such as the greases used to keep the mechanical components operating at peak performance. Following all maintenance work on the MW block, the area is cleaned. All surplus lubricants and grease-soaked rags are removed and disposed of in a prescribed manner. All maintenance activities will adhere to the same spill prevention industry best practices undertaken during the construction phase. Additional maintenance activities will include grass cutting, vegetation removal and fence repair. No pesticides or herbicides will be used during maintenance activities.

4.3. Unplanned Farm Maintenance

Solar panels are designed to operate for over 25 years. However, with large numbers of modules it is inevitable that component failures will occur. Most commonly, the failure of small components such as switches, fans, or sensors will take a MW block, or even the entire farm out of service until the faulty component is replaced. These repairs can usually be carried out by a single technician visiting the farm for several hours.

4.4.Electrical System

The collector lines and substation will require periodic preventative maintenance activities. Routine maintenance will include condition assessment and protective relay maintenance of the substation as well as vegetation control.

5.0 DECOMMISSIONING

The anticipated life of the project is a minimum of 25 years. If the economics of solar power remain viable at that time, the facility would likely be “repowered” with new technology.

5.1. Decommissioning During Construction

It is unlikely that the project would be dismantled during construction. Should this occur the procedures used would depend on the state of construction at the time of project cancellation. The procedures used would be the same as those used after ceasing operation. Any exposed soils would be re-seeded, depending on the preference of the landowner.

5.2. Decommissioning After Ceasing Operations

If the project is not repowered, then the equipment will be dismantled and the lands restored to a pre-construction state of open meadow.

5.3 Procedures for Dismantling

If the facility is to be decommissioned and the solar array is to be removed at the end of its Feed-in-Tariff contract, the impacts will be similar to the construction phase, but in reverse sequence. The procedures will include:

- The creation of temporary work areas to provide for the lay-down of the disassembled panels and racking and loading onto trucks.
- Equipment will include, at a minimum: cranes to remove the panels, racking, inverters and transformers and trucks for the removal of panels, racking, inverters and transformers;
- Driveways and culverts (if installed) will be removed unless the landowner requests that they be left in place. Driveway bedding material will be removed and replaced with sub- and top-soil for reuse by the landowner for agricultural or other purposes. If requested by the landowner, and subject to approval by the Rideau Valley Conservation Authority and the Ministry of Natural Resources, the culverts (if installed) will be removed and the land will be contoured to maintain the current drainage patterns; and
- Decommissioning of onsite electrical lines and foundations.

5.4 Restoration of Land

Once the equipment has been removed the land will be restored for pre-existing uses with stockpiled subsoils and topsoil. If there is insufficient material onsite, topsoil and/or subsoil will be imported from a source acceptable to the landowner.

Although spill prevention procedures will be in place, there is the potential through the decommissioning process for small spills of solvents or fuels. The soil conditions of the site will be surveyed to the standards of the day to determine if any impacts have occurred. Should soil impacts be noted, the impacted soils will be delineated,

excavated and removed, to the standards of the day, from the site for disposal at an approved and appropriate facility. The removed soils will be replaced with stockpiled sub- and topsoil, if available. If none are available, clean fill and topsoil will be imported. If possible, native plant species will be used for the re-vegetation of disturbed areas.

As previously discussed, waste generated by the installation, operation and decommissioning of the solar farm should be minimal, with no toxic residues. Any wastes generated will be disposed of according to standards of the day with the emphasis of recycling materials whenever possible.

6.0 POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

1.1 Vegetation Removal Impacts on Significant Natural Features

Prior to construction, existing tree and shrub vegetation will be removed from the Project Location and the site will be graded. The implications of developing the site to the natural features that were identified in the EOS report (Ecological Services 2012b) are discussed below along with mitigation measures that are intended to limit the extent of impact.

6.1 Woodland – size

Woodlands greater than 50 hectares in this region are considered significant. The Project Location woodlands are about 50 hectares, but are in association with a larger woodland complex providing a combined size of about 210 hectares. There are plans to clear about 3.3 hectares of this woodland to accommodate the solar panels. This loss will be compensated for on a 1:1 basis by planting in field areas adjacent to the woodland and by infilling gaps left by logging. The 3.3 hectare is a conservative estimate, and it will be possible to provide a more detailed estimate on the ground once land clearing takes place.

6.2 Woodland – wetland protection

The woodland on and within 120 m of the Project Location is part of a larger woodland that borders a candidate significant wetland (see Figure 6.1). This wetland proximity imparts significance to the woodland as it is assumed it provides a buffering function to the wetland. The closest wetland location to the Project Location is beyond 120 m (see Figure 6.1), whereas the bulk of the wetland is about 400 m north. There are no plans to clear vegetation in the intervening 120 m lands north of the Project Location, and so any buffering function between the Project Location and the wetland should remain intact. Furthermore, the woodland has been heavily logged and the intervening lands are mostly in a state of regeneration so the protection of wetland function should improve over the life of the solar project.

6.3 Woodland Diversity

The woodlands on and within 120 of the Project Location are mostly comprised of regenerating sugar maple dominated deciduous woodlands, although patches of other smaller woodland types such as white pine, or aspens can be found. As can be seen in Figure 6.1 some of these woodlands in the eastern corner will be cleared to accommodate the placement of some solar panels. However, this small loss will have no effect on the dominance of sugar maple in the retained woodlands. Woodland regeneration within the wooded part of the Project Location will be undertaken after site decommissioning.

6.4 Amphibian Breeding Habitat

Most amphibian breeding is expected to occur outside of the 120 m buffer, in association with the wetland that is greater than 120 m from the Project Location. Much of the intervening land between the Project Location and the wetland is dry thicket, and has no value as amphibian breeding habitat.

The logged woodland north of the Project Location contains some wetland patches (see Figure 6.2). No standing water was observed in these patches, but if they are used for amphibian breeding, there will be no impacts as this woodland is outside of the Project Location and inadvertent intrusion will be prevented by fencing.

The main potential impact to amphibian breeding habitat will be to the small patch of woodland in the top east corner of the Project Location (see Inverter Structure in Figure 6.1, as well as Figure 6.2), where the woodland is to be cleared for solar panel placement. It contains wetland patches, and if it is determined that they are significant breeding areas, their loss would be considered a significant impact. We doubt that this will be the case because no standing water was observed and the woodland has been heavily

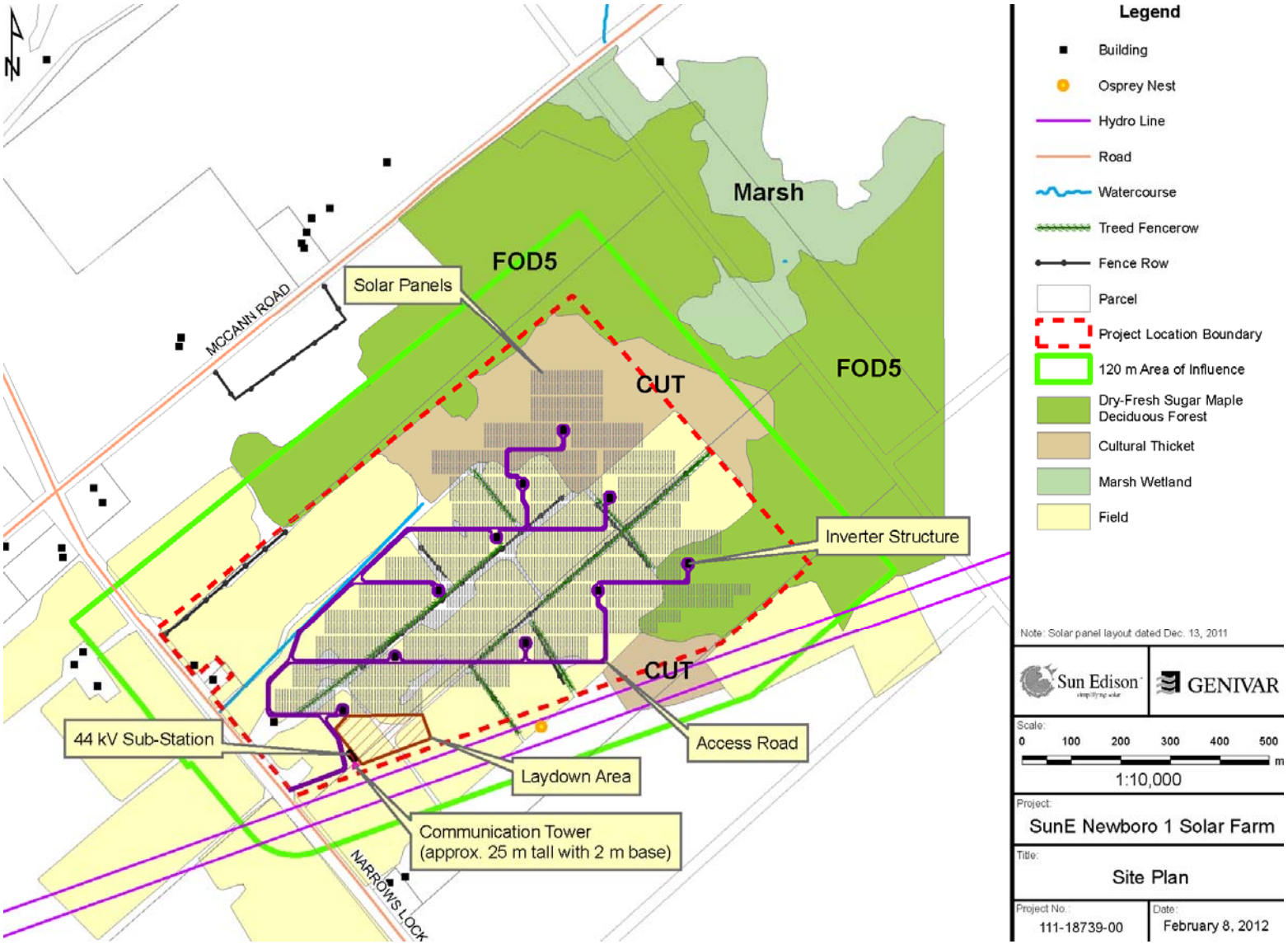

Figure 6.1 Project Location and associated ELC. Note the FOD5 within the Project Location.

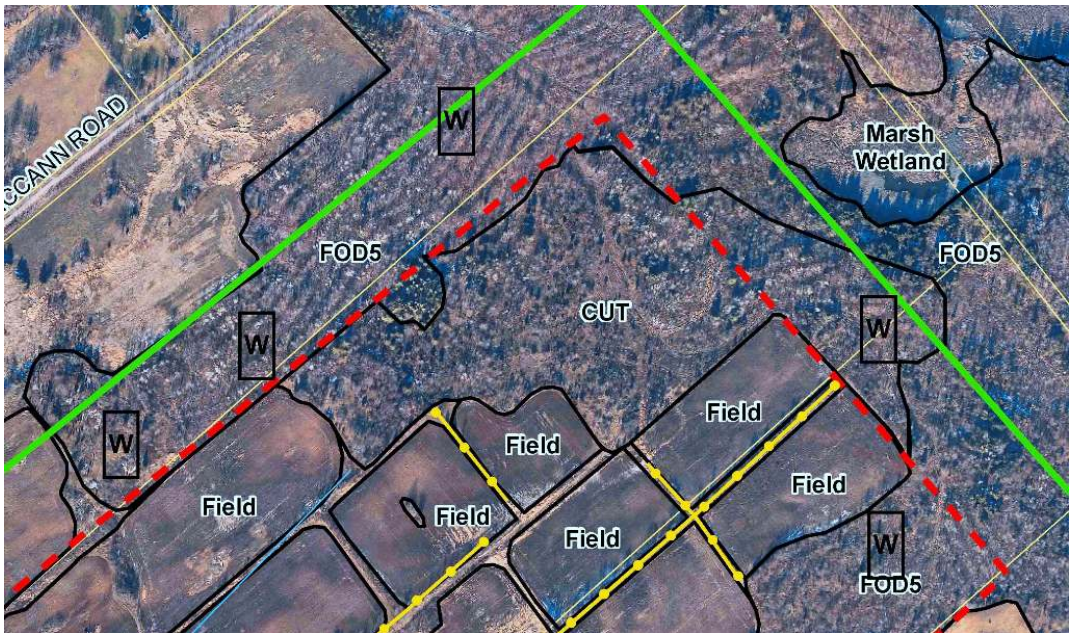

Figure 6.2 Potential amphibian breeding sites marked with a “W”

logged. However, if it they are significant, site clearing will have to take place outside of the spring breeding period (early April to late June) and the construction of new ponds in the nearby woodlands will need to be undertaken. Confirmation of significance will be known by June 2012.

6.5 Dust and Noise

Some minor noise and dust will be generated during the construction and decommissioning phases. Noise will typically be limited to daylight hours and dust will be controlled with watering, as necessary.

6.6 Stormwater Runoff

Given the distance (>120 m) between ground disturbances and wetland north of the Project Location, it is felt there is no need for stormwater management for this significant feature.

6.7 Water Takings

No water takings are planned for this project.

6.8 Fuels Spills

All equipment operators will be trained to avoid spills and to respond to spills should they occur. No re-fuelling will be permitted within 120 m of a water body. Should a spill occur the following protocol will be implemented:

1. Spill response kits kept onsite will be used to contain the spill;
2. A SunEdison representative will be notified;
3. If the spill is of sufficient quantity, the MOE Spill Action Centre will be notified;
4. An environmental contractor will be brought in to remove any excess fuel and impacted soils; and
5. An environmental consultant will be retained to ensure that all impacted soil and groundwater has been properly removed and the site returned to pre-spill condition.

6.9 Potential Impacts and Mitigation Measures by Activity (Construction Phase)

Identification of potential impacts and mitigation measures related to specific activities during the construction phase of development are presented below.

6.9.1. Site Clearing

Potential Environmental Component Affected	Woodland, Amphibian Breeding Habitat (ABH)
Potential Impacts	Woodland - Loss of trees, but no loss of indentified significant functions anticipated. ABH – direct loss of habitat
Mitigation Measures	Woodland - Site clearing kept within Project Location by on-site by staking and marking off the areas that define limits of the work to be done. ABH – Site clearing will take place outside of the spring breeding season (late April to late June).
Residual Impacts	None anticipated.

6.9.2 Road Construction

Potential Environmental Component Affected	Woodland, ABH
Potential Impacts	Woodland - Loss of trees, but no loss of indentified significant functions anticipated. ABH – direct loss of habitat
Mitigation Measures	Woodland - Site clearing kept within Project Location by on-site by staking and marking off the areas that define limits of the work to be done. ABH – Site clearing will take place outside of the spring breeding season (late April to late June).
Residual Impacts	None anticipated.

6. 9.3 Laydown Areas

Potential Environmental Component Affected	None anticipated due to separating distance of more than 120 m.
Potential Impacts	None anticipated.
Mitigation Measures	Re-seeding with forbs and grasses to the owners specifications.
Residual Impacts	None anticipated

6.9.4. Solar Array Construction

Potential Environmental Component Affected	None anticipated. At this point the site will have been cleared.
Potential Impacts	None anticipated.
Mitigation Measures	Insure no intrusion into 120 m buffer lands with boundary fencing.
Residual Impacts	None anticipated

6.9.5 Installation of Racking System

Potential Environmental Component Affected	None anticipated. At this point the site will have been cleared.
Potential Impacts	None anticipated.
Mitigation Measures	Insure no intrusion into 120 m buffer lands with boundary fencing.
Residual Impacts	None anticipated

6.9.6 Solar Panel Assembly and Installation

Potential Environmental Component Affected	None anticipated. At this point the site will have been cleared.
Potential Impacts	None anticipated.
Mitigation Measures	Insure no intrusion into 120 m buffer lands with boundary fencing.
Residual Impacts	None anticipated

6.9.7 Electrical Collector System

Potential Environmental Component Affected	None anticipated. At this point the site will have been cleared.
Potential Impacts	None anticipated.
Mitigation Measures	Insure no intrusion into 120 m buffer lands with boundary fencing.
Residual Impacts	None anticipated

6.9.8 Substation Construction

Potential Environmental Component Affected	>120 m to any Natural Feature

Potential Impacts	N/A
Mitigation Measures	N/A
Residual Impacts	N/A

6.10 Potential Impacts and Mitigation Measures by Activity (Operating Phase)

6. 10.1. Noise Impacts

Potential Environmental Component Affected	None anticipated due to set-back distances.
Potential Impacts	No noise above background levels is expected at any receptor.
Mitigation Measures	None required.
Residual Impacts	No residual impacts are anticipated.

6. 10.2 Maintenance Activities

Activities	The solar array will be visited by maintenance staff for routine inspections monthly after commissioning.
Potential Environmental Component Affected	None anticipated
Potential Impacts	Maintenance activities include regular lubrication of the tracking units which generates some waste material.
Mitigation Measures	Waste material from the maintenance activities will be properly disposed of by authorized and approved offsite vendors. All work to be within fenced areas.
Residual Impacts	Infrequent visits by maintenance staff will have little residual impacts.

6.11 Potential Impacts and Mitigation Measures by Activity (Decommissioning Phase)

6.11.1 Road Removal

Potential Environmental Component Affected	None anticipated due to setback distances
Potential Impacts	None anticipated to significant natural features.
Mitigation Measures	Site clearing and restoration will be conducted by staking off the work areas and excavated soil will be re-used where feasible, or disposed in a proper facility off-site.
Residual Impacts	None anticipated.

6.11.2 Solar Array Removal

Potential Environmental Component Affected	None anticipated due to setback distances
Potential Impacts	None anticipated due to setback distances
Mitigation Measures	Site clearing and grubbing will be kept to a minimum area by staking off work areas and excavated soil will be re-used where feasible, or disposed of in a proper facility off-site. Exposed soils will be reseeded to naturalized meadow.
Residual Impacts	None anticipated

6.11.3 Removal of Racking System

Potential Environmental Component Affected	None anticipated due to setback distances
Potential Impacts	None anticipated due to setback distances
Mitigation Measures	Any surface disturbance will be re-contoured with stockpiled material removed during excavation. Areas that define the limits of the work will be staked and marked, and equipment movement will be limited to specified travel areas to minimize impacts on land use. Noise and dust control measures will be utilized where required.
Residual Impacts	No residual impacts are anticipated.

6.11.4. Electrical Collector System Removal

Potential Environmental Component Affected	None anticipated due to setback distances
Potential Impacts	None anticipated due to setback distances
Mitigation Measures	Electrical lines are within access road allowances.
Residual Impacts	No residual impacts are anticipated.

6.11.5. Substation Deconstruction

Potential Environmental Component Affected	None anticipated due to setback distances
Potential Impacts	None anticipated due to setback distances
Mitigation Measures	None anticipated due to setback distances
Residual Impacts	No impacts are anticipated.

Table 6.1 Development phase potential negative environmental effects and associated mitigation measures.

Natural Feature(s)	Characteristics and Functions	Potential Negative Environmental Effect		Mitigation Measures	Residual Effects on Natural Feature
		Direct	***Indirect***		
Significant Woodland	*Characteristics* Heavily logged site in the process of regeneration. Dominated by sugar maple, but also including white ash, ironwood, elm, white pine, and aspens. Community types: *Dry-Fresh Sugar Maple Deciduous Forest Ecosite* *Features* - woodland diversity (sugar maple dominated) *Functions* - protection of wetland	*i. Vegetation Removal (Construction Phase)*			
		Removal of some woodland	None to identified features and functions.	Ensure no loss of woodland outside of Project Location.	No residual effects on features and/or functions expected
		ii. Site Grading (Construction Phase)			
		None anticipated	None to identified features and functions.	Visual monitoring of work area to ensure no loss of woodland outside of Project Location. Cleared areas within Project Location will be re-seeded to meadow	No residual effects on features and/or functions expected
		iii. Road Construction (Construction Phase)			
		None anticipated	None to identified features and functions.	Standard BMP measures for road construction	No residual effects on features and/or functions expected
		iv. Dust Generation (Construction Phase)			
		None anticipated	None to identified features and functions.	Standard construction BMP measures	No residual effects on features and/or functions expected
		v. Facility Operations (Operation Phase)			
		None anticipated	None to identified features and functions.	No mitigation needed for solar array Transformer will not be situated near woodland	No residual effects on adjacent woodland habitat features and/or functions expected
		vi. Vegetation Management (Operation Phase)			
		None anticipated	No indirect effects	None needed if no encroachment into woodland.	No residual effects on adjacent woodland habitat features and/or functions expected
		vii. Component removal and site restoration (Decommissioning Phase)			
		None anticipated	None to identified features and functions.	Site will be re-vegetated and reforested at discretion of Municipality or resource authority (MNR)	No impact to adjacent woodland features and/or functions expected from site decommissioning

Characteristics and Functions	Potential Negative Environmental Effect		Mitigation Measures	Residual Effects on Natural Feature
	Direct	***Indirect***		
Characteristics Heavily logged site in the process of regeneration. Dominated by sugar maple, but also including white ash, ironwood, elm, white pine, and aspens. Possible amphibian breeding ponds. Community types: *Dry-Fresh Sugar Maple Deciduous Forest Ecosite* *Functions* – providing forest cover and ponds for breeding habitat.	*viii. Vegetation Removal (Construction Phase)*			
	Removal of some woodland containing possible breeding habitat.	None to identified functions.	Ensure no loss of woodland outside of Project Location. Site clearing outside of breeding season (early April to late June)	Area lost is small relative to the adjacent wetland and compensation (if needed) should minimize residual effects.
	ix. Site Grading (Construction Phase)			
	None anticipated	None to identified functions.	Visual monitoring of work area to ensure no loss of woodland outside of Project Location. Cleared areas within Project Location will be re-seeded to meadow	No residual effects on features and/or functions expected
	x. Road Construction (Construction Phase)			
	None anticipated	None to identified functions.	Standard BMP measures for road construction	No residual effects on features and/or functions expected
	xi. Dust Generation (Construction Phase)			
	None anticipated	None to identified functions.	Standard construction BMP measures	No residual effects on features and/or functions expected
	xii. Facility Operations (Operation Phase)			
	None anticipated	None to identified functions.	No mitigation needed for solar array Transformer will not be situated near woodland	No residual effects on adjacent woodland habitat features and/or functions expected
	xiii. Vegetation Management (Operation Phase)			
	None anticipated	No indirect effects	None needed if no encroachment into woodland.	No residual effects on adjacent woodland habitat features and/or functions expected
	xiv. Component removal and site restoration (Decommissioning Phase)			
	None anticipated	None to identified features and functions.	Site will be re-vegetated and reforested at discretion of Municipality or resource authority (MNR)	No impact to adjacent woodland features and/or functions expected from site decommissioning

7.0 ENVIRONMENTAL EFFECTS MONITORING PLAN

Environmental effects monitoring is proposed in respect of any negative environmental effects that may result from engaging in the Project. As per the REA Regulation, the monitoring plan identifies

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

For the purposes of this ***EIS*** report, the effects monitoring measures with respect to negative effects on the significant natural features are presented in Table 7.1. This will serve to verify that mitigation measures are functioning as designed to meet performance objectives. If monitoring shows that performance objectives are not being met, the contingency measures documented in Table 7.1 will be used to ensure that remedial action is undertaken as necessary to meet the performance objectives.

Table 7.1 Environmental Effects Monitoring Requirements with Respect to Significant Natural Features

Mitigation Measures by Stage	Performance Objective	Methodology	Monitoring Locations	Frequency	Reporting Requirements	Contingency Measures
Vegetation Removal (Construction Phase)						
Visual monitoring of work area to ensure compliance (i.e., no encroachment beyond Project Location)	Maintain features and associated functions of significant woodland and amphibian breeding ponds.	Marking and flagging to demarcate off-limit areas Visual monitoring of work area to ensure compliance Wildlife and habitat relocation will follow established protocols with trained staff	Mainly in association with significant woodland.	Ongoing during construction.	Reported in monthly environmental monitoring report during construction	Loss of woodland or amphibian breeding areas outside of demarcated area will require remediation to restore impacted area including but not limited to reforestation with native species appropriate to the site, or re-building ponds to create new amphibian habitat. Site re-vegetation of ponds not recommended as open ponds preferred, and local wetland vegetation will establish naturally by the second year.
Site Grading (Construction Phase)						
Soil grading will occur only within demarcated areas within Project Location Open areas of Project Location will be re-vegetated as open meadow following construction of solar array panel	Minimize stormwater sediment runoff.	Preparation of a RVCA approved Stormwater Management Plan. Site re-seeded Monitoring conducted over growing season to ensure vegetation established	Site re-vegetation monitored across Project Location	Periodically during all site grading activities and following storm events Twice during growing season (May-Sept) to ensure meadow establishment and once in following year	Reported in monthly environmental monitoring report during construction.	Evidence of offsite sediment transport in vulnerable areas (within 120 m of water) will be dealt with through standard BMP measures including immediate erection of a silt fence followed by evaluation of source of problem and consultation with RVCA as to remedial actions required Failure to establish vegetation within any portion of the Project Location in or after the first year will be dealt with through reseeding and additional monitoring
Road Construction(Construction Phase)						
Standard BMP measures for road construction	Stay within Project Location.	Visual monitoring of work area to ensure compliance Speeds limited on road network within Project Location	Throughout construction site.	Ongoing during construction.	Reported in monthly environmental monitoring report during construction	None required.
Dust Generation (Construction Phase)						
Standard construction BMP measures taken for dust control measures	Limit dust related impacts to adjacent vegetation function and growth	Visual monitoring of work area to ensure compliance	Throughout construction site.	Ongoing during construction.	Reported in monthly environmental monitoring report during construction	Dust control measures implemented as necessary to prevent/minimize dust generation.
Facility Operations (Operation Phase)						
No mitigation needed for solar array Transformer will be situated near County Rd. 14 and not near adjacent woodland	Stay within Project Location	Noise Report prepared	Across construction site.	Breeding bird point counts once during breeding season in Year 1 of operation.	Reported following monitoring session in memorandum to MNR Kemptville District	None required.
Vegetation Management (Operation Phase)						
Visual monitoring of work area to ensure compliance	Stay within Project Location	Visual monitoring of work area to ensure compliance	Throughout construction site.	Ongoing during vegetation control operations	Reported in environmental monitoring report during construction	None required
Component removal and site restoration (Decommissioning Phase)						
Site will be re-vegetated as open meadow or reforested at discretion of regulatory authority. Any lost ponds will be re-dug.	Stay within Project Location	Visual monitoring of work areas to ensure compliance.	Throughout decommissioning stage	Ongoing during decommissioning.	Reported in environmental monitoring report during decommissioning.	Failure to establish natural features will be dealt with through reseeding, pond modifications and additional monitoring

8.0 CONSTRUCTION PLAN REPORT

The REA Regulation requires proponents of Class 3 solar projects to prepare a Construction Plan Report (*CPR*). The CPR details the location and timing of construction and installation activities, any negative environmental effects that result from construction activities within 300 m of the Project Location and mitigation measures for the identified negative environmental effects. The *CPR* addresses all potential effects of construction on natural features as well as socio-economic considerations such as air quality, noise and traffic within 300 m of the Project Location in a general manner.

The mitigation proposed in the *CPR* with respect to preventing or minimizing negative effects on significant natural features is the same as discussed in this *EIS*. Additional mitigation is proposed in the *CPR* to address negative effects to socio-economic considerations and other non-significant natural features that are not discussed in this Report. Therefore, the *CPR* and this *EIS* should be read in conjunction with each other.

9.0 SUMMARY AND CONCLUSIONS

As discussed in the *SI* (Ecological Services, 2011) and the *EOS* (Ecological Services, 2011) there is significant woodland within 120 m of the Project location.

This *EIS* has been prepared to identify potential negative environmental effects that all phases of the Project may have on these significant natural features. Mitigation measures have been proposed to prevent these effects from occurring or minimize the magnitude, extent, duration and frequency in the event that they do occur to an acceptable level. Monitoring measures have been proposed to confirm that mitigation measures are having the intended effect and that performance objectives are being met.

A summary table is provided below which documents significant natural features identified in the ***SI*** and the associated mitigation measures and monitoring requirements.

Table 8.1 Natural Features on and within 120 m of the Project Location

Feature	Attributes/Composition	Function	Significant?	Mitigation Strategy (C=Construction, O=Operation, D=Decommissioning)
Woodlands				
Woodland	Dry-Fresh Sugar Maple Deciduous Forest Ecosite (FOD5)	Protection of significant wetland. Woodland diversity Feature.	Significant	C – Demarcation of work areas; Dust control measures; O – None required D – Re-vegetation
Amphibian Breeding Habitat	Possible ponds within Dry-Fresh Sugar Maple Deciduous Forest Ecosite (FOD5)	Providing amphibian breeding habitat.	Significant (unless determined otherwise)	C – Demarcation of work areas; Dust control measures; For pond areas (if present), site clearing outside of amphibian breeding season (early April to late June) O – None required D – Re-ponding if needed

10.0 REFERENCES

Ecological Services. 2012. Natural Heritage Assessment Site Investigation Report Newboro 4 Solar Farm.

Ecological Services. 2012b. Natural Heritage Assessment Evaluation of Significance Report for Newboro 4 Solar Farm.

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Genivar. 2011. SunE Newboro 4 Solar Farm – *Construction Plan Report*. SunEdison.

Genivar. 2011b. Newboro 4 Solar Farm – *Design and Operations Report*. SunEdison.

Genivar. 2011c. SunE Newboro 4 Solar Farm – *Decommissioning Plan Report*. SunEdison.