ORO 4 LINE SOLAR

SunEdison Oro 4 Line Solar Farm

Construction Plan Report

December 12, 2012

GENIVAR

Project No. MA-101-17803-00

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1. Construction Plan Report

SunEdison is proposing a single Class 3 Solar Facility with a nameplate capacity of up to 10 MW (AC) in the area of Edgar, Township of Oro-Medonte, Simcoe County, 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 (Appendix A), covers approximately 21 hectares (ha).

The major components of the projects are as follows:

- → Approximately 32,600 MEMC modules (300-Watt DC typical generation capacity) .
- → Approximately 140 combiner boxes, typically mounted on the rack posts.
- → 44 kV Substation including pole-top motor-operated disconnect switch; 44kV breaker; 10 MVA oil filled pad-mount transformer; switchgear; revenue grade PT's, CT's and metering; control house for protection, control and communication equipment and tower for communication .
- → Up to 10 inverter stations, each comprised of 2 x 500-kW inverters and 1000 kVA transformer.
- → Gravel access driveways.
- → Temporary construction/staging areas for the installation of equipment.

This 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.

2. Construction Details

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

2.1 Roads and Land Clearing

No permanent paved roads will need to be constructed to bring equipment to the solar farm. Municipal and provincial roads will be used for transportation of equipment to the construction sites. Minor modifications might be required to some of the existing roads (for example, widening the turning radius) for equipment transportation. Any road damages will be repaired.

On-site access to the array will use internal driveways. Following completion of the construction phase, the internal driveways will be used for maintenance activities for the duration of the facility's operation.

The construction of the internal 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. New culverts may be required to maintain drainage in ditches and these will be constructed sufficient to support the construction equipment and delivery trucks. The exact culvert details (if any are required), installation details and erosion-control measures will be determined in conjunction with the Nottawasaga Valley Conservation Authority as a part of their permitting process.

Vegetation will be cleared within the project location. Trees will be cleared in accordance with the County of Simcoe and/or Township of Oro Medonte by-laws.

Construction equipment will include—at minimum— trucks, graders, light cranes, tractor trailers and bulldozers.

Materials Brought On Site: Granular material for internal driveway construction, some steel culverts.

Construction Equipment Used: Equipment will include—at a minimum—trucks, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be brought via trailers. All will be temporarily stored at a Temporary Construction Laydown Area. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used. Road dust will be controlled with water, as necessary.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring or fall, depending on the amount of rainfall.

Material Generated: Some top soil will need to be stripped; however this will be disposed of or re-used on site. Vegetation, including trees, will be removed and disposed of by an approved and appropriate contractor.

2.2 Construction Laydown Areas

One area (< 2 hectares) will be used for construction activities and will be located near 4th Line N and the site entrance. The topsoil at the Construction Laydown Area will be removed and approximately 600 mm of clean compacted crushed gravel will be imported on an as-needed basis. The excavated topsoil will be re-used on site as feasible.

Materials Brought On Site: Granular material as required to maintain a stable base.

Construction Equipment Used: 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.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring or fall, depending on the amount of rainfall.

Material Generated: Some top soil will need to be stripped; however this will be disposed of or re-used on site.

Temporary Uses of Land: The topsoil will be removed and stored onsite and gravel will be laid down. 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.

2.3 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 and/or moved depending upon site topography and geotechnical conditions. During clearing or excavation, if any significant archaeological resources are found to be in conflict with the proposed facilities, then consideration will be given to modifying the location of the construction. This will be determined in consultation with the Ministry of Tourism, Culture and Sport and registered archaeologists.

The site will be surrounded by an animal friendly chain-link fence approximately 2 m tall for site security. The fence post holes will be augered 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 stations will be placed on concrete pads or piers. Pads will typically be 17 m x 3 m in size, otherwise 6-8 piers will be constructed at each inverter station. The topsoil at the inverter station will be removed and crushed gravel will be imported on an as-needed basis. The pads will be constructed of poured concrete and reinforced with rebar. The excavated topsoil will be re-used on site as feasible.

Equipment will include—at minimum—trucks, graders, light cranes, cement trucks, tractor trailers and bulldozers.

Materials Brought On Site: Granular material as required to maintain a stable base. Cement mix for the concrete. Steel for rebar. Metal posts and fencing.

Construction Equipment Used: Equipment will include—at a minimum—trucks, cement trucks, graders, and bulldozers. The 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.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring or fall, depending on the amount of rainfall.

Material Generated: Some top soil will need to be stripped; however this will be disposed of or re-used on site. Spent welding rods may be generated which will be disposed of as hazardous waste by a licensed contractor. Any excavated subsoil will be removed from the site and disposed of in an appropriate manner.

Temporary Uses of Land: The topsoil will be removed and stored onsite and gravel will be laid down. 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 or reused elsewhere on the site. It is anticipated that this area will be restored after approximately 8 months.

2.4 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. A traffic management plan has been developed using MTO Book 7 standards and will be reviewed with the County and the Township. Prior to the start of construction, a road assessment of County and Township roads that might be impacted will be undertaken if required.

2.5 Installation of Racking System

The racking system will consist of a fixed or a single-axis tracker rack system with the solar modules affixed to a supportive metal rack. The rack or tracker is then connected to the ground via posts. 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 specific geotechnical conditions – regardless of connection method - the post will be partially embedded into the ground.

The general procedure for rack installation varies slightly depending on rack type and geotechnical conditions as outlined above, but is essentially performed as follows:

1. Posts are either vibrated, driven or screwed into the ground, to specified/engineered depth. In cases where special foundations/footing/boreholes are required, *temporary* soil excavation and/or drilling will be required to expose subsurface conditions and prepare them for post insertion*;
2. Racking, hardware and module assembly are built over top the piles.

*The preferred pile installation method is via a vibratory system, with no pre-excavation requirements. However, if subsurface conditions are less favourable, subsurface foundation 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 step 2 above is completed.

Materials Brought On Site: Steel for rebar, steel posts, 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.

Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this can be completed in the spring or fall, depending on the amount of rainfall.

Material Generated: Spent welding rods may be generated which will be disposed of as hazardous waste by a licensed contractor. Any excavated subsoil will be removed from the site and disposed of in an appropriate manner.

2.6 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 may be required to join tubes that comprise the array skeleton, however assembly via hardware connection remains the preferred form of rack assembly.

The installation and assembly procedure consists of mounting rack components to the posts, fastening the rack elements together, joining 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: This will be completed immediately after the racking installation.

Material Generated: Some packing material waste and spent welding rods 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.

2.7 Electrical Collector System

The electrical collector system will consist of wiring from the panel strings to the combiner boxes which are in turn connected to the inverter stations, typically via direct buried cables. Underground cabling will then run from the inverter stations to a 27.6-kV / 44-kV transformer (substation) which will increase the voltage to connect to the Hydro One 44kV-distribution system. From the substation, an overhead line (approximately 0.2km) will connect the 44-kV power from the substation to the Point of Common Coupling. From here, a 44kV overhead line owned by Hydro One will travel approximately 4.3 km south along 4th Line N to Point of Connection on an existing distribution line near Highway 11.

An underground “ground grid” system will also be installed around the entire array structure to protect against electric faults as required by the Electrical Safety Authority (ESA).

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 special 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 will install the poles and one crew will dress 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 installation work will be done by the proponent or by Hydro One.

Materials Brought On Site: Electrical cabling, poles, electrical components.

Construction Equipment Used: Flatbed trailers and trenching equipment will typically be used. The construction will emit minor amounts of noise and dust. No chemicals other than fuel will be used.

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

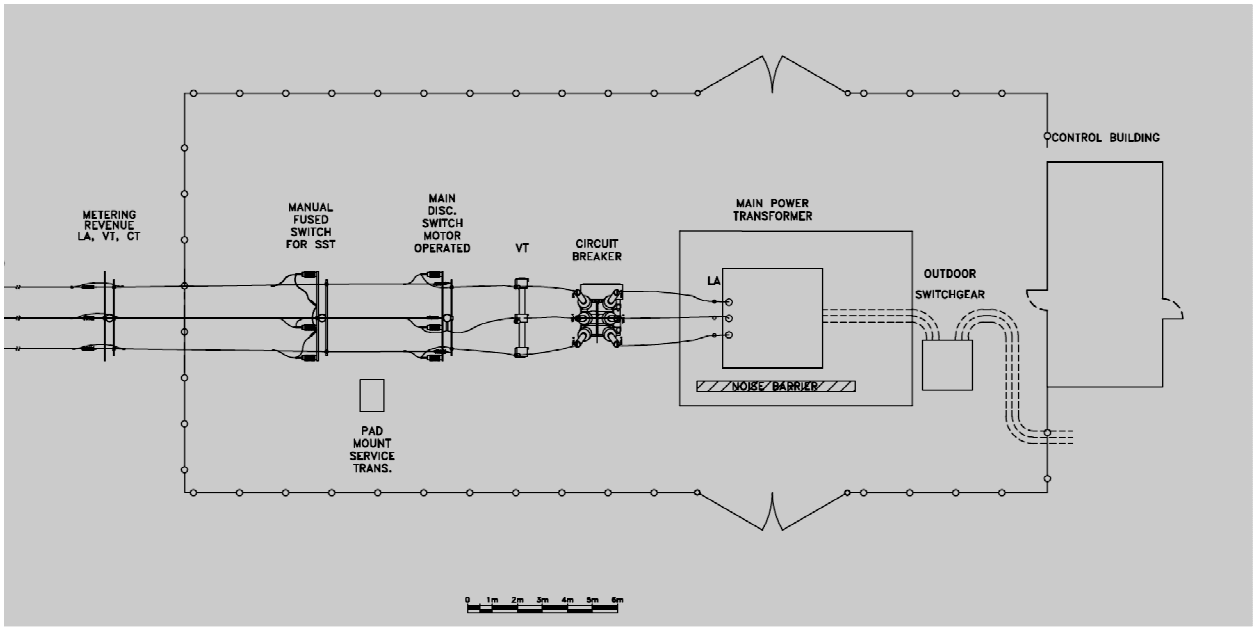
Material Generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material onsite. Both streams of waste will be removed by a licensed sub-contractor.

2.8 Substation

The electrical substation for the solar farm will be located on the site near the south west corner of the property. The substation equipment will include a motor-operated disconnect switch, a 44kV circuit breaker, a main power transformer (27.6 to 44 kV) with secondary oil containment, switchgear, station service transformers; revenue grade PT’s, CT’s and metering, a control house for protection, control and communication equipment and tower for communication equipment, if required. The substation area will be surrounded by a chainlink fence with a locked gate to meet ESA 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.

Noise caused by inverters and transformers are cited as potential concerns by local residents. The noise study undertaken for this project indicates that the 40 dBA limit will not be exceeded at any receptor. However, upon completion of the consultation with nearby residents, a noise barrier may be installed at the substation to further reduce the noise levels beyond the southern boundary of the property. A conceptual layout is provided in the figure below, the noise barrier is circled in red. The barrier will require a small concrete foundation and will have panels that are made of a sound absorbing material.



Materials Brought On Site: Gravel, motor-operated disconnect switch, a 44kV circuit breaker, a main power transformer (27.6 to 44 kV) with secondary oil containment, switchgear, station service transformers; revenue grade PT's, CT's and metering, a control house for protection, control and communication equipment.

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

Timing: This will preferentially be completed in 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.

2.9 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.

High-voltage warning signs will be installed at the substation and elsewhere, as appropriate and as required by the ESA.

2.10 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: This will be completed after the construction activities are completed.

Material Generated: None.

2.11 Summary of Equipment and Material Requirements

The estimated amount of materials and truckloads required for site preparation and construction are included in Table 1. The construction equipment to be used during construction is included in Table 2.

Table 1: Estimated Construction Materials

Material	Truck Type	Number of Loads	Estimated Quantity	Storage Location
PV Modules	Semi-trailer	190	32,600	Laydown area
Racking and Trackers	Semi-trailer	30	1,000	Laydown area
Steel Support Posts	Semi-trailer	15	4,000	Laydown area
Inverters stations	Semi-trailer	10	10 (20 inverters + 10 transformers)	On-site
Electric conduits and cables	Semi-trailer	192	736,000 m	Laydown area
Combiner boxes and connectors	Semi-trailer	2	--	Laydown area
Control House	Semi-trailer	1	1	Substation area
Main power Transformer	Semi-trailer	1	1	Substation area
Concrete	Concrete truck	11	250 m^3	n/a
Gravel	Dump truck	600	60 m^3	n/a

Table 2: Estimated Construction Equipment

Equipment	Weight	Number
Track-type tractor	37.6 T	2
Wheel-type tractor	25.6 T	1

Excavator	25.9 T	1-2
Backhoe Loader	8.9 T	1
Wheel Loader	20.5 T	1
Dump Truck	19.5 T	2-4
Motor Grader	18.8 T	1
Compactor	10.9 T	1-2
Crane	49.9 T	1
Pile Driving Equipment	19.5 T	4
Telescopic handler	10.0 T	1-2
Concrete mixer	20-25 T	1-4
Container Boxes	7-16 T	1-2
Pick-up trucks	2.6 T	5
Generators	N/A	3
Hand tools	N/A	15+

3. 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.

3.1 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 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	
Tracker Foundation	1 month	Concurrent with driveway construction
Tracker Assembly and Panel Installation	2-3 months	Concurrent with foundation

Activity	Total Duration	Notes
		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. Potential Environmental Effects and Mitigative Measures

4.1 Archaeological Resources

Construction of the proposed solar farm will result in solar panels covering large portions of the proposed study area. 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. The following are the findings:

Stage 1:

- The area included active agricultural lands and treelines/woodlots with archaeological potential.
- Study area contains archaeological potential for both Aboriginal and Euro-Canadian settlements and settlement roads.

Stage 2:

- Systematic Stage 2 pedestrian survey was completed on ploughed and planted agricultural lands and test pit surveys were conducted on non-agricultural lands, along the farm lane and in adjacent woodlots.
- Two historic period Euro-Canadian archaeological sites were identified (Site BdGv-38 and BdGv-39). Sites were deemed to have cultural heritage value or interest and a Stage 3 Site-specific assessment should be undertaken if the sties cannot be avoided by the project or protected from development impacts.

Should any additional archaeological resources be found during construction, work will 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 make recommendations on avoidance or removal should the find be determined to be significant.

Letters of Concurrence were received on August 5, 2011 from MTCS for Stage 1 and Stage 2 and are included in Appendix D.

4.2 Cultural Heritage Resources

A cultural heritage assessment was undertaken in November 2012. The report was submitted to MTCS to obtain the letter of concurrence. The results have been reported in Appendix D. The findings and recommendations are discussed below.

There are cultural heritage resources present that may be impacted by the solar farm development. The project location was shown to retain cultural heritage landscapes which evoke the past agricultural landscape of the Township of Oro. Among the settlers on these lots was John Bush an early African-American settler. The cultural heritage landscapes present are made up of boulder and snake fences, culturally-created ponds and channels and tree lines marking historic property lines and circulation routes. These features retain cultural heritage significance as evidence of the farming activities which took place within the township and throughout Ontario in the nineteenth and early twentieth centuries. Apart from the ruins of a barn (which dates to the nineteenth century) there are no standing buildings within the project location.

Present on the site are two runs of boulder fences, a series of culturally-modified water features and treelines marking historic property boundaries and circulation routes. Most of these features are located on or adjacent to the boundaries of the project location and are not expected to be impacted. One of the two boulder fences which is located in the middle of the project location is expected to be impacted through removal and/or alteration. There is a historic woodlot containing runs of both boulder and snake fencing located approximately 30 m outside of the project location.

Based on the results of background data collection, filed review, heritage evaluation and impact assessment there are recommendations for the project. Heritage attributes lying outside of the project location should be retained in whole. Any tree removal along the southern boulder fence should be planned in such a way as not to impact the heritage attributes of the cultural heritage landscape. The project location retains a series of important heritage attributes and if they are altered or removed these should be fully documented prior to landscape alternation. If cultural heritage landscapes are impacted these resources should be commemorated. Vegetation and landscaping should be placed along chain link fence surrounding the project, where appropriate.

4.3 Destruction of Vegetation and Habitat

The SunEdison Oro 4 Line Solar Farm has been designed to minimize impacts to vegetation and habitat. Some trees, shrubs and grasslands will be removed during construction. All trees will be removed in accordance with Simcoe County and/or the Township of Oro Medonte by-laws and no vegetation will be removed within 30 m of the Hawkstone Swamp PSW and waterbodies. Details of the potential impacts and mitigation measures can be found in the *Natural Heritage Assessment Environmental Impact Study Report*, Appendix C.

The project submitted the reports and obtained a Letter of Confirmation from the Ministry of Natural Resources on November 8, 2012.

4.4 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.

4.5 Storm water Runoff Impacts

No impacts are anticipated from storm water runoff. No impervious surface treatments are planned and no construction activities will occur within 30m of waterbodies (e.g., all construction work will occur away from watercourse). An environmental impact study has been conducted and the results can be seen in the *Water Body Environmental Impact Study Report*, Appendix C.

Drainage of the existing undeveloped property is primarily via overland sheet flow towards both the south east and west property limits. The property has a pond located at the north near the existing barn which receives runoff from the north west portion of the property. The project location is primarily cultivated farmland with some treed areas around the extremities of the field and remnants of an existing building towards the north. The topography varies from 306m in elevation at the south-east corner to over 320m at the center of the site.

The proposed development includes, but is not limited to, gravel access lanes, foundations and racking equipment for numerous solar panels and necessary appurtenances. The majority of the land will remain as topsoil and grass which will be left in a natural state after construction. During construction earth excavation and placement activities will take place and it will be required to implement the proposed Sediment and Erosion Controls as specified on the Control Plans.

The stormwater management plan for the project location will ensure that storm drainage is consistent with the pre-development drainage patterns. Runoff will be directed over the grassed slopes providing opportunity for infiltration and large particle settlement towards the adjacent property to the south east and west. Through consultation with the Nottawasaga Valley Conservation Authority the post-development flow rates will be restricted in order to match the pre-development levels. The proposed stormwater management design will examine both the 5- and 100-year storm events. The off take ditches to be constructed on-site will be equipped with a permanent rock flow check dam designed to allow specific flow rates. A large portion of the flows exceeding pre-development levels in Drainage Area B2 and B3 will be stored within the stormwater management swale. The relatively wide flat-bottom channel at an estimated gradient of 0.3%, will provide ample opportunity for temporary stormwater storage. The channel will be constructed with 3:1 side slopes when in earth, and will be graded such that the adjacent solar panel arrays can be drained into the channel. The estimated amount of stormwater storage required to accommodate the 5- and 100-year storm events will be confirmed within the final stormwater management design.

The entire proposed development will employ Best Management Practices (BMP's) wherever possible. The intent of implementing stormwater BMP's throughout the entire development is to ensure that water quality and quantity concerns are addressed at all stages of construction. The stormwater BMP's will be implemented at the lot and conveyance levels.

The conveyance system to be used in the development is a combination of swales and roadside ditches. All swales and ditches will be constructed at minimal gradient where possible, thus promoting absorption and infiltration, as well as providing some opportunity for particle filtration. The gradient of the system will be enough to ensure the continuous flow of stormwater, avoiding any standing water. Rip rap will be placed at erosion-prone areas, and all disturbed areas shall be landscaped as soon as possible.

4.6 Impacts on Water Bodies

Watercourse WC1 exists within 30 m of the northwest boundary of the Project Location. It originates approximately 1.2 km north of the Project Location and flows in a southerly direction for roughly 950 m until it joins another watercourse. It is within 120 m of the Project Location for approximately 200 m. Although no fish were observed within the reach surveyed, the watercourse is thought to be warm-water fish habitat based on information discovered within the background review.

An unnamed water body (WB1) is associated with WC1 northwest of the Project Location. WB1 appears to be a dugout pond approximately 30 m from the Project Location and was likely used for agricultural purposes. While it does not appear to provide high quality habitat for fish, it is connected to warm water fish habitat by a small channel. Without additional surveys to determine the potential for the pond as fish habitat, and for the purposes of this report, it is assumed to be fish habitat.

The project location will maintain a minimum 30 m setback from the unnamed watercourse and the associated waterbody northwest of the Project Location. There are no development activities within 30 m of the water bodies. Based on the information from the Records Review, it is assumed that these water features are warm water fish habitat. An environmental impact study has been conducted and the results can be seen in the *Water Body Environmental Impact Study Report,* Appendix C. Potential impacts include potential loss of riparian vegetation and increased sedimentation.

Potential impacts to the hydrological form and function of the watercourse and waterbody are most likely to occur during the construction and decommissioning phases of the project. During the construction phase, impacts may arise due to vegetation removal, grading and trenching, and result in changes to surface water drainage, increased sedimentation, erosion and dust generation. Potential impacts to water

features associated with the construction are outlined in detail within Table A along with standard mitigation measures.

Table A: Water body potential negative effects and mitigation measures

Activity	Potential Physical Impact	Potential Impact on Water Body Form and/or Function	Potential Mitigation Measures
Construction Phase			
Road construction, land grading, ditching and land clearing	Changes in surface water run-off, natural drainage and altered stream flow due to grading changes and soil compaction	- alterations to water body hydrology and geomorphology - loss of fish habitat and food organisms - change in fish species composition and abundance, changes in aquatic and riparian plant communities	- maintain a minimum 30 m vegetated buffer from waterbodies; enhance vegetation within buffer zone where deficient (use native species) - minimize changes to land contours and natural drainage through appropriate rehabilitation following extraction operations
Land clearing and vegetation removal	Increased erosion, sedimentation and turbidity due to exposed soil and/or generation of dust and particulate matter	- alterations to surface water quality - loss of fish habitat and food organisms - decreased photosynthesis and loss of productivity	- minimize area of disturbance on the construction site - implement an erosion and sedimentation control plan - time activities to avoid spawning events or other sensitive periods of habitat use - minimize dust generation through standard best management practices
Accidental fuel spills	Surface water and groundwater contamination due to fuel and/or chemical spills	- lethal or sublethal toxic effects on aquatic, wetland and terrestrial biota - changes in fish species composition and aquatic and riparian plant communities	- ensure site plan comments incorporate a designated area for equipment maintenance and fuelling -storage of fuel should not be permitted on-site - maintain an emergency spill kit on site in case of emergency

The unnamed watercourse and the associated water body exist approximately 30 m from the northwest Project Location boundary, thereby satisfying the setback requirements outlined by the Township of Oro Medonte Official Plan and the 30 m buffer specified by MNR for sensitive aquatic systems. Based on the construction activities scheduled within the immediate area, it is recommended that a 30 m vegetated buffer be retained between the proposed development and these water features. To ensure that the form and function of these surface water features are not negatively impacted by the proposed development, the following detailed mitigation measures are recommended:

- A naturally vegetated buffer should be established or maintained between the proposed development and the water bodies to reduce or eliminate increased turbidity due to the transport of sediments, nutrients and contaminants into these surface water features. Minimum vegetated buffers of 30 m are recommended to ensure that changes to surface water run-off, water temperature and overall productivity of these watercourses are minimized. Existing vegetation types may be used as a vegetated buffer, or planted vegetation may act as a buffer in conjunction with existing habitat.

- If removal of vegetation within the vicinity of the unnamed watercourse is necessary it should be conducted when the channel is dry thereby reducing the potential for increased erosion and sediment transport into the watercourse
- Temporary siltation fencing should be utilized during the construction and decommissioning phases of the project between the areas of proposed development and the water bodies, to reduce or eliminate the transport of sediments, nutrients, contaminants, and increased turbidity within these features. Siltation fencing should be installed before any work on the Project Location begins, and removed after the threat of siltation effects has ceased. The siltation fencing should be checked periodically during the construction and decommissioning phases to ensure it remains in good condition. Further details concerning the quality and installation of suitable erosion control fencing is provided in the Draft Design and Operations Report (GENIVAR, 2012e).
- Grading activities should aim to minimize changes in land contours and natural drainage in order to reduce the potential for changes to hydrological patterns.

4.7 Water Takings

No water takings are planned for this project.

The MOE has regulations related to water takings. Provided less than 50,000 litres per day is taken, no permit is required if there is greater than 50,000 litres per day taken, this requires a Permit to Take Water from the MOE. Regardless for the Oro 4 Line project, there will not be any installing of a well, or taking of any surface water. If any water is required it will be trucked in by a licensed hauler

4.8 Fuels Spills

It is possible that fuel spills could occur during construction. All equipment operators will be trained to avoid spills and to respond to spills should they occur. No re-fueling 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. The 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.

4.9 Potential Impacts by Activity

Potential impacts related to construction activities are presented below.

4.9.1 Road and Lands Clearing

Environmental Component Affected	Terrain, Wildlife and Birds, Watercourse, Archaeological Resources
Potential Impacts	Sensory disturbance of wildlife and birds due to construction. Clearing and grubbing and soil excavation for on-site access roads and laying of gravel base will cause disturbance to the terrain and will remove shrub/early successional bird breeding habitat and potential amphibian habitat. The access roads will remain for project life. Increased sedimentation and changes in surface water run-off, natural drainage and altered watercourse flow due to grading changes and soil

	compaction. Municipal and provincial roads may be damaged during use.
Mitigation Measures	Site clearing and grubbing will be kept to a minimum area on-site by staking and marking off the areas that define limits of the work to be done. Excavated soil will be re-used on-site where feasible, or disposed of in a proper facility off-site No vegetation clearing adjacent between May and July (breeding bird season) Standard BMPs for dust control, road construction and erosion control Site will be re-vegetated as an open meadow after construction Standard BMPs for dust control, road construction and erosion control During construction activities if any archaeological resources are found to be in conflict with the proposed facilities, activities in the immediate vicinity of the find will be halted and the MTCS will be contacted immediately. A licensed archaeologist will be contracted to assess the find make recommendations on avoidance or removal should the find be determined to be significant Sedimentation controls will be put in place around stockpiled soils, ditches and disturbed areas within 120 m of a watercourse. Any damage to municipal roads will be repaired and the road returned to its previous condition. No permanent paved roads will need to be constructed for the construction activities. Municipal and provincial roads will be used for transportation of equipment to the construction sites. Any road damages will be repaired in conjunction with the relevant authorities.
Residual Impacts	Some minor loss of bird breeding or amphibian habitat will occur. This is considered to be minor as there is sufficient comparable habitat on adjacent lands and some habitat will be restored after construction is completed.

4.9.2 Construction Laydown Areas

Environmental Component Affected	Terrain, Wildlife and Birds, Watercourse, archaeological resources
Potential Impacts	Clearing and grubbing and soil excavation for the construction laydown area will cause disturbance to the terrain and will remove shrub/early successional bird breeding habitat and potential amphibian habitat.. Increased sedimentation and changes in surface water run-off, natural drainage and altered watercourse flow due to grading changes and soil compaction.
Mitigation Measures	No vegetation clearing adjacent between May and July (breeding bird season).

	Standard BMPs for dust control, road construction and erosion control.
	Site will be re-vegetated as an open meadow after construction.
	Standard BMPs for dust control, road construction and erosion control.
	During construction activities if any archaeological resources are found to be in conflict with the proposed facilities, activities in the immediate vicinity of the find will be halted and the MTCS will be contacted immediately. A licensed archaeologist will be contracted to assess the find, make recommendations on avoidance or removal should the find be determined to be significant.
Residual Impacts	Some minor loss of bird breeding or amphibian habitat will occur. This is considered to be minor as there is sufficient comparable habitat on adjacent lands and some habitat will be restored after construction is completed.

4.9.3 Solar Array Construction

Environmental Component Affected	Terrain, Wildlife and Birds, Watercourse, archaeological resources
Potential Impacts	Sensory disturbance of wildlife and birds due to construction.
	Clearing and grubbing and soil excavation for solar arrays will cause disturbance to the terrain and will remove shrub/early successional bird breeding habitat and potential amphibian habitat.
	Increased sedimentation and changes in surface water run-off, natural drainage and altered watercourse flow due to grading changes and soil compaction.
Mitigation Measures	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.
	Standard BMPs for dust control, road construction and erosion control
	During construction activities if any archaeological resources are found to be in conflict with the proposed facilities, activities in the immediate vicinity of the find will be halted and the MTCS will be contacted immediately. A licensed archaeologist will be contracted to assess the find make recommendations on avoidance or removal should the find be determined to be significant
Residual Impacts	Some minor loss of bird breeding or amphibian habitat will occur. This is considered to be minor as there is sufficient comparable habitat on adjacent lands and some habitat will be restored after construction is completed.

4.9.4 Delivery of Equipment

Environmental Component Affected	Local Public and Traffic Patterns, Vegetation
Potential Impacts	Potential short term traffic delays on local roads to provide room for trucks to deliver project components. Short term increase in truck traffic during construction period. Disturbance to vegetation when equipment is delivered

	onto the site.
Mitigation Measures	Delivery of equipment will be coordinated with local traffic patterns. County roads and main local roads will be utilized as much as possible to reduce impact to local residents since these roads are designed for truck traffic and higher traffic volumes. Area of disturbance will be minimized and mitigated as appropriate through re-vegetation with native plants and/or re-seeding to open meadow.
Residual Impacts	None anticipated

4.9.5 Installation of Racking System

Environmental Component Affected	Terrain, Unknown Archaeological Resources, Noise (from piles), Groundwater Quality
Potential Impacts	Increased potential for soil erosion due to necessary surficial disturbance by trucks and other heavy equipment used. Increased sedimentation and loss of riparian vegetation. There will be a significant amount of on-site traffic (vehicle and heavy equipment) involved in the construction. Potential impact to local groundwater quality if piles are installed in bedrock.
Mitigation Measures	Any area of surficial disturbance will be re-contoured, with stockpiled material removed during excavation, to match original landscape. Areas that define the limits of the work will be staked and marked. Equipment movement on-site will be limited to specified travel areas to minimize impacts on land use. Noise and dust control measures will be utilized where required for the construction period. Sedimentation controls will be put in place around stockpiled soils, ditches and disturbed areas within 120 m of a watercourse. During construction activities if any archaeological resources are found to be in conflict with the proposed facilities, activities in the immediate vicinity of the find will be halted and the MTCS will be contacted immediately. A licensed archaeologist will be contracted to assess the find make recommendations on avoidance or removal should the find be determined to be significant. Avoid installing piles in bedrock, where possible. If not possible, install pile in bedrock using industry best practice (grout, bentonite, etc.) to prevent the migration of surface water. Due to groundwater issues in the area, there is sensitivity to potential impacts to existing wells. Monitoring of the wells will be undertaken before and after construction activities, including installation of the racking system.
Residual Impacts	No residual impacts are anticipated, unless unknown archaeological resources are discovered during construction activities.

4.9.6 Solar Panel Assembly and Installation

Environmental Component Affected	Local Residents
Potential Impacts	Noise from construction activities could disturb local residents for the duration of the construction period.
Mitigation Measures	Construction period is of short duration and conducted during the daylight hours to minimize impact on residents living in nearby houses.
Residual Impacts	Solar panel assembly and installation will result in no residual impacts.

4.9.7 Electrical Collector System

Environmental Component Affected	Vegetation and Terrain, Wildlife and Birds, Watercourse
Potential Impacts	Terrain disturbance may occur from trenches between the inverters and the sub-station. Some wildlife and birds may be impacted by noise for a short term due to the use of backhoes used for excavation. Increased sedimentation, loss of riparian vegetation and changes in surface water run-off and natural drainage due to grading changes and soil compaction.
Mitigation Measures	Locating the electrical lines within access road allowances (and array area where the vegetation has been previously disturbed for the road to be constructed and maintained), Sedimentation controls will be put in place around stockpiled soils and disturbed areas within 120 m of a watercourse. Specifically the watercourse and waterbody within 30 m.
Residual Impacts	No residual impacts are anticipated.

4.9.8 Substation Construction

Environmental Component Affected	Terrain, Public Safety, Watercourse
Potential Impacts	Construction of the substation will be on the previously disturbed construction laydown area. The electrical substation could potentially have public safety issues due to the presence of high-voltage equipment.
Mitigation Measures	To ensure protection of the public, the substation will have a perimeter fence with only authorized personnel wearing proper safety equipment permitted within. All electrical design will meet Ontario Electrical Safety Code requirements.
Residual Impacts	No impacts are anticipated.

5. Environmental Effects Monitoring Plan

The Environmental Effects Monitoring Plan for construction is presented in the Design and Operations report.