NEWBORO 1 SOLAR

SunE Newboro 1 Solar Farm

Construction Plan Report

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GENIVAR

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1. Construction Plan Report

SunEdison is proposing a single Class 3 Solar Facility with a nameplate capacity of 10 MW (AC) in the area of Crosby, Township of Rideau Lakes, 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 142 hectares (ha).

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 25-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.

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 for 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, widen the turning radius) for equipment transportation. Any road damages will be repaired in consultation with the applicable road authority.

On-site access to the array will require new internal roads/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 but will not be stockpiled onsite. The topsoil will be kept and re-used on site. New culverts may be required to maintain site 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 Rideau Valley Conservation Authority and/or the Cataraqui Region 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 Township of Rideau Lakes by-laws and no woodlands will be cleared outside of the Project Location and no vegetation will not be cleared during the early April to late June period.

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 in the southwest end of the Project Location close to Narrows Lock Road. 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 depending upon site specific 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 Project Location will be surrounded by a chain-link fence approximately 2.5 m tall and topped with barbed wire 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.

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 was developed using MTO standards. Prior to the start of construction, a road assessment of Narrows Lock and/or McCann Road will be undertaken. An agreement with the Township of Rideau Lakes for rehabilitation of Narrows Lock and/or McCann Road following the completion of construction will be put in place prior to the start of construction.

2.5 Installation of Racking System

The 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 which are buried. Variations on the rack connections to the ground are dependent on the geotechnical conditions.

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

- piles 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 pile insertion*;
- soil directly beneath the future racking/surrounding inserted piles is compacted and covered with crushed engineered fill (and further compacted/settled); and
- racking, hardware and module assembly are built over top of 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 pile work may include borehole pre-drilling, rock grouting and/or cement casting. No blasting is required for either installation method. Once

the piles are secured in the ground, the excavated soil will be re-filled and steps 2 and 3 above are completed.

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 for periods of time. 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 44 modules, and a 10-MW solar farm can have as many as 900 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: 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 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 into 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, combiner boxes, pad mounted inverters and transformers.

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 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 and topped with barbed wire 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. 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. If possible, native plant species will be used for the re-vegetation of disturbed areas. 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.

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	45,000	Laydown area
Racking and Trackers	Semi-trailer	30	1,030	Laydown area
Steel Support Piles	Semi-trailer	15	5,150	Laydown area
Inverters and Transformers	Semi-trailer	11	12	On-site
Electric conduits and cables	Semi-trailer	192	736,000 m	Laydown area
Disconnects, combiner boxes and connectors	Semi-trailer	2		Laydown 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	Quantity
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	15 days	

Activity	Total Duration	Notes
driveway construction		
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. Potential Environmental Effects and Mitigative Measures

4.1 Archaeological Resources

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

Consideration must be given to the potential impact which the project may have on Archaeological and Heritage resources as well as Protected Properties. Stage 1 & 2 archaeological surveys have been completed with the results reported in Appendix D. There were 3 significant archaeological finds (H1, H2 and H3) were identified within the project location. However, only H1 is located in close proximity to the project development area. A Stage 3 site-specific assessment was conducted in August-September 2012. Site H1 is located close to the proposed solar infrastructure. Stage 3 findings were used to determine the extent of the affected area surrounding H1 and the modifications needed for the solar panel layout. Based on the findings it was determined that the layout should be modified with a shift of some of the solar panels north on the site to provide a greater buffer between the infrastructure and the archaeological site. The Project Layout remained the same between the previous and revised layouts.

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

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

4.2 Destruction of Vegetation and Habitat

The SunE Newboro 1 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 the Township of Rideau Lakes. Details of the potential impacts and mitigation measures can be found in the *Natural Heritage Assessment Environmental Impact Study Report*, Appendix B.

The project has received a Letter of Confirmation from the Ministry of Natural Resources and all regulatory requirements will be adhered to.

4.3 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.

4.4 Stormwater Runoff Impacts

No impacts are anticipated from stormwater runoff. No impervious surface treatments are planned and no construction activities will occur near water bodies, as there are none present within the Project Location. An environmental impact study has been conducted and the results can be seen in the *Water Body Environmental Impact Study*, Appendix C.

4.5 Impacts on Water Bodies

There is a watercourse (minor agricultural drain) within the Project Location but there is no water present and the drain is heavily vegetated with reed canary grass. Potential impacts may include possible alteration to watercourse hydrology and geomorphology, loss of riparian vegetation and increased sedimentation. Details of the potential impacts and mitigation measures can be found in the *Water Body Environmental Impact Study Report*, Appendix C.

The following are potential mitigation measures:

- Maintain a minimum vegetated buffer form the watercourse and enhance vegetation within the buffer zone of the watercourse, where deficient.
- Minimize changes to land contours and natural drainage through appropriate rehabilitation following construction operations.

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

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

4.6 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 Newboro 1 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.

4.7 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 Spills 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.

4.8 Potential Impacts by Activity

Potential impacts related to construction activities are presented below.

4.8.1 Road and Lands Clearing

Environmental Component Affected	Terrain, Wildlife and Birds, Watercourse/Pond Areas, 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, potential woodland raptor breeding habitat and 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. Maintain a minimum vegetated buffer from the watercourse and enhance vegetation within the buffer zone, where deficient.
	Excavated soil will be re-used on-site where feasible, or disposed of in a proper facility off-site.
	No vegetation clearing adjacent between early April and late June and no loss of woodlands outside of the Project Location
	Standard BMPs for dust control, road construction and erosion control
	Site will be re-vegetated as an open meadow after construction
	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 and 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 or pond areas (if found). Minimize changes to land contours and natural drainage through appropriate rehabilitation following construction. 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.

4.8.2 Construction Laydown Areas

Environmental Component Affected	Terrain, Wildlife and Birds, Watercourse/Pond Areas, 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, potential woodland raptor breeding habitat and 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 early April and late June and no loss of woodlands outside of the Project Location. Maintain a minimum vegetated buffer from the watercourse and enhance vegetation within the buffer zone, where deficient. Standard BMPs for dust control, road construction and erosion control Minimize changes to land contours and natural drainage through appropriate rehabilitation following construction. Site will be re-vegetated as an open meadow after construction 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.

4.8.3 Solar Array Construction

Environmental Component Affected	Terrain, Wildlife and Birds, Watercourse/Pond Areas, 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, potential woodland raptor breeding habitat and 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 early April and late June and no loss of woodlands outside of the Project Location. Maintain a minimum vegetated buffer from the watercourse and enhance vegetation within the buffer zone, where deficient.
	Standard BMPs for dust control, road construction and erosion control.
	Site will be re-vegetated as an open meadow after construction.
	Minimize changes to land contours and natural drainage through appropriate rehabilitation following construction.
	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.

4.8.4 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 Road 42 and main local roads will be utilized as much as possible to reduce impact to local residents since these roads were designed for truck traffic and higher traffic volumes.
	Area of disturbance on site will be minimized and mitigated as appropriate through re-vegetation with native plants and/or re-seeding to open meadow.
Residual Impacts	None anticipated

4.8.5 Installation of Racking System

Environmental Component Affected	Terrain, Unknown Archaeological Resources, Watercourse/Pond Areas, Noise (from piles)
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.
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. Minimize changes to land contours and natural drainage through appropriate rehabilitation following construction. 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 or pond areas (if found). Maintain a minimum vegetated buffer from the watercourse and enhance vegetation within the buffer zone, where deficient. 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. 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.

4.8.6 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.

4.8.7 Electrical Collector System

Environmental Component Affected	Vegetation and Terrain, Wildlife and Birds, Watercourse/Pond Areas
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, natural drainage and altered watercourse flow 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 or pond areas (if found). Maintain a minimum vegetated buffer from the watercourse and enhance vegetation within the buffer zone, where deficient. Minimize changes to land contours and natural drainage through appropriate rehabilitation following construction.
Residual Impacts	No residual impacts are anticipated.

4.8.8 Substation Construction

Environmental Component Affected	Terrain, Public Safety
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.