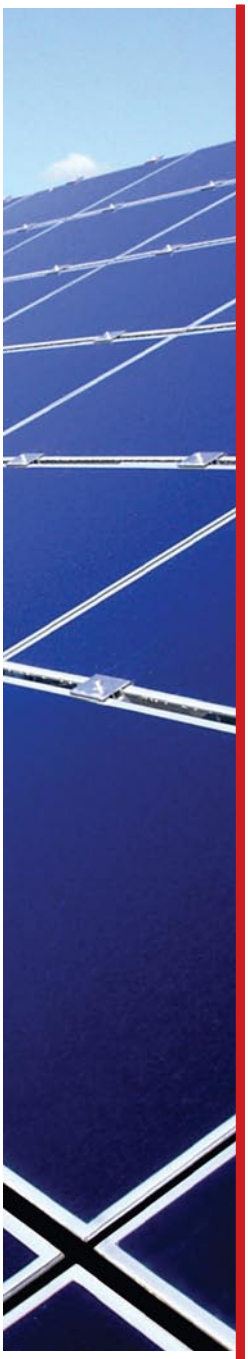

Construction Plan Report – St. Clair - Moore

Prepared by: First Solar

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Executive Summary

First Solar proposes to construct a 20 megawatt (MW) solar farm in the Geographic Township of Moore, County of Lambton, Ontario, approximately 5 km east of the St. Clair River. The proposed 20MW farm will deliver enough clean electricity to power approximately 2,800 homes.

The St. Clair - Moore Solar Farm is proposed to be constructed on a tract of land located at the intersection of King's Highway 40 and Rokeby Line that is approximately 120.2 hectares in area. The site is bordered by the Canadian National Railroad track on the North and West, Rokeby Line to the South, and King's Highway 40 to the East. It abuts industrial and agricultural properties.

The majority of the existing site is devoted to agriculture with the primary crop being soybeans. There are existing agricultural buildings on the site. A woodland exists in the northern area of the site. The wooded area will be protected during construction and will remain onsite.

The proposed solar farm consists of approximately 56 hectares of solar arrays, mounted on fixed steel supports and arrayed in long rows. Each array will be connected to a small shelter that houses electric current conversion equipment and switches. The electric power from the converter shelters will be run via underground cable to electric utility interconnect equipment at the edge of the arrays, and from that to the electricity distribution line. A 31 meter high antenna tower will provide remote monitoring capability of the solar farm by the electric utility.

The facility will be surrounded by a 2.1 meter high security fence and will have access at one location from Rokeby Line through a secured gate.

To be consistent with First Solar's core value of environmental responsibility, the planning and designing of the solar farm has been conducted with a conscious effort to minimize any negative environmental impact. Studies and assessments of the existing animal and plant populations, the terrain and water drainage requirements, and surrounding residences have been undertaken. Terrain modifications and ground disturbances will be kept to the minimum extent practical in order to maintain existing water drainage patterns. Soil erosion and sediment control measures will be employed during construction. There will be no addition of paved surfaces, and only a minimal addition of gravel for site access roads.

At the end of construction, the entire facility except for the internal gravel access roads will be planted with grass. The perimeter of the site will be landscaped to reduce visibility of the solar farm from adjacent roadways and properties where necessary. Because of the long term ground cover and plantings in conjunction with reduced tillage, the value of the site as wildlife habitat will improve. First Solar will also consider future cropland leases for sections of the property outside of the array areas. The solar farm will be a passive facility with no emissions to the atmosphere, and minimal light and noise impacts. Any potential noise generated is required to be below Ministry of Environment (MOE) noise limits. After construction is complete, the site will not create any water demand. Once in operation, traffic to the solar farm will be extremely light, with less than one trip per day anticipated.

Proposed Project Construction Plan

Photovoltaic (PV) Arrays

PV Array

The St. Clair – Moore Solar Farm Project involves the installation of 20 arrays of photovoltaic (PV) modules or panels, manufactured by First Solar, with the cumulative capacity to generate 20 MW_{AC} of power under peak solar conditions. Each 1 MW_{AC} PV array will consist of approximately 16,860 PV modules and one Power Conversion Station (PCS), which includes two 500 kilowatt (kW) inverters and one 1,000 kilovolt amp (kVA) isolation transformer. Each 1 MW_{AC} array covers approximately 2.7 hectares. The quantities listed are subject to change based on the time the project is designed and approved.

PV arrays consist of groups of PV modules called "tables". Each table consists of up to 16 modules and measures approximately 2.4 meters wide by 2.4 meters long. Tables will be mounted on an angle with respect to horizontal, to steel racking supported by vertical steel columns, spaced at approximately 3 meters center-to-center, and driven into the ground to an approximate depth of 1.1 meter below grade. Once mounted, the front of each table will reside approximately 600 mm above grade, while the rear will be no more than 2 meters above grade.

Inverter Enclosure

The arrays will be separated by access corridors (approximate width of 6-7 meters), dividing each array into quadrants. The PV modules will be electrically connected by wire harnesses and combiner boxes that feed the array's PCS via underground direct current (DC) cables. Each PCS will contain two 500 kilowatt (kWac) inverters located within a climate controlled inverter enclosure and one 1,000 kilovolt amp (kVA) transformer. The PV inverters convert the DC electric input into grid-quality AC electric output.

There will be two PV Interconnection Switchgear (PVIS) houses for St. Clair – Moore. Each PVIS house is approximately 3.6 meters in height and is elevated 500 mm above grade. The PVIS houses will be located near the connection point to the local grid. A 27.6 kV high-capacity collection system line will then connect the power output from the PVIS to the Project Substation.

PV Interconnection Switchgear

The on-site electrical collection system is designed to minimize electrical losses within the Project Site prior to delivery to the Project Substation.

A meteorological station will be

installed on site to track weather patterns. The meteorological station will include a data acquisition system (DAS) to collect data for analysis and system monitoring. The DAS system involves a network of data loggers and programmable logic controllers (PLC's). These will be connected to a Wide Area Network (WAN) and monitored onsite in the operations and maintenance (O&M) facility, as well as in a remote Network Operations Center.

Meteorological Station

Principal materials included in the PV arrays include glass, steel, and various semiconductor metals. At the end of their useful life, most of the Project materials will be recycled, including the PV modules themselves (which will be collected through First Solar's pre-funded module collection and recycling program), the steel tables and posts, and the wiring.

The First Solar modules used in the project employ the stable compound cadmium telluride (CdTe) as the semiconductor material. The unique advantages of CdTe PV technology include:

- Superior light absorption properties resulting in higher output, compared to traditional silicon modules, under cloudy and diffuse light conditions such as dawn and dusk;[1]
- Better performance at the high temperatures that modules are subject to under direct sunlight compared to traditional silicon modules;[2]
- Enhanced suitability for production of modules – high volume and low cost;
- Faster energy payback time – the fastest of existing PV technologies;[3] and
- Smallest carbon footprint among current PV technologies on a life cycle basis.[4]

As discussed more fully in the accompanying "Decommissioning Report", First Solar's industry-leading collection and recycling program ensures that PV module materials stay in the production cycle and out of municipal landfills. First Solar has commercial-scale recycling operations in place at all of its manufacturing facilities. Approximately 95% of the semiconductor material and 90% of the glass are recovered in First Solar's recycling program. The remaining materials (e.g. glass fines, dust) are collected and properly disposed of according to local regulations.

In 2009, an in-depth assessment of the environmental, health and safety aspects of First Solar's CdTe PV systems and manufacturing operations was carried out under the authority of the French Ministry of Ecology, Energy, Sustainable Development and the Sea. It concluded that,

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[1] Mohring, H.D., et al., "Outdoor Performance of Polycrystalline Thin Film PV Modules in Different European Climates," European project 'PYTHAGORAS."

[2] Ibid.

[3] Fthenakis, V. M, Alsema, E., "Photovoltaics Energy Payback Times, Greenhouse Gas Emissions and External Costs: 2004 – Early 2005 status," Progress in Photovoltaics: Research and Applications, 2006; 14: 275-280.

4 Fthenakis, V.M, Kim, H.C., Alsema, E., "Emissions from Photovoltaic Life Cycles," Environmental Science & Technology, 2008; 42: 2168-2174.

"During standard operation of CdTe PV systems, there are no cadmium emissions – to air, to water, or to soil. In the exceptional case of accidental fires or broken panels, scientific studies show that cadmium emissions remain negligible. Accordingly, large-scale deployment of CdTe PV can be considered safe to human health and the environment"5

A peer review of three major published studies on the environmental profile of CdTe PV organized by the European Commission, Joint Research Center and sponsored by the German Environment Ministry concluded, "…CdTe used in PV is in an environmental stable form that does not leak into the environment during normal use or foreseeable accidents, and therefore can be considered the environmental safest current use of cadmium." This review also concluded that ***"…***Large scale use of CdTe photovoltaic modules does not present any risks to public health and the environment."[6]

Independent analysis also indicates that CdTe modules do not pose a risk during fires. CdTe has an extremely low vapor pressure, high boiling and melting points and is almost completely encapsulated by molten glass when exposed to fire. Exposure of pieces of CdTe PV modules to flame temperatures from 760 to 1100^{o}C illustrated that CdTe diffuses into glass, rather than being released into the atmosphere. Higher temperatures produce further CdTe diffusion into the glass.[7]

First Solar modules have been tested in accordance with applicable waste characterization protocols and are non-hazardous waste at end-of-life in Canada, the United States and Europe

Reusable & Recyclable Materials

The project consists of numerous recyclable materials, including glass, semiconductor material, steel, and wiring. As the Project approaches the end of its useable life, the component parts will be dismantled and recycled. First Solar, as part of its commitment to the environmental philosophy of extended producer responsibility has a pre-funded collection and recycling program for all of its solar modules, which is discussed in detail in the accompanying "Decommissioning Report".

Efficient Land-Use Practices

The St. Clair - Moore Solar Farm will make an efficient use of the land being taken out of agricultural production. Parcels within the project area are presently used for farming. The Project proposes to discontinue annual tilling and harvesting and replace it with a use that is more benign for certain species. Construction of the PV arrays will involve a one-time disturbance, followed by a low-impact maintenance schedule. The PV array clearance above the surface (600 mm at its lowest point) minimizes disruption to wildlife and allows passage through the site. The PV array infrastructure is non-permanent. As a result, upon decommissioning, all

5 Summary Report, "Environmental, Health, and Safety (EHS) Aspects of First Solar Cadmium Telluride (CdTe) Photovoltaic (PV) Systems," carried out under the authority of the French Ministry of Ecology, Energy, Sustainable Development, and the Sea, July 2009.

6 "Peer Review of Major Published Studies on the Environmental Profile of Cadmium Telluride (CdTe) Photovoltaic (PV) Systems," Arnulf Jager-Waldau

7 Fthenakis, V., Fuhrmann, M., Heiser, J., Lanzirotti, A., Fitts, J., and Wang, W.,""Emissions and Encapsulation of Cadmium in CdTe PV Modules During Fires," *Progress in Photovoltaics: Research and Applications*, 6, 99-103 (1998).

above grade facilities and all below grade near-surface facilities could be removed and the land could be returned to original agricultural production or placed into other permitted use, as desired.

Benefits to the County

The energy generated by the project will typically first be consumed by the nearest connected load centers, such as Lambton County and St. Clair - Moore.

In addition to the benefits of clean energy generation, development of the St. Clair - Moore Solar Farm would confer economic benefits to thousands of people across the County, region and province. It is expected to create approximately 300 direct jobs on average during the twelve-month construction period and a few permanent direct jobs. The County is expected to collect millions of dollars of new sales tax revenues from the Project during the construction period and increased property tax revenues throughout the project's operation, largely due to the change in land ownership and conversion to non-agricultural use.

In addition, the project and other similar projects in the region offer the opportunity for Lambton County and the southwestern Ontario region to become a world leader in supporting and educating about solar power.

Fencing

Subject to regulatory approval, the site will be fenced with a 1.8 meter-high chain link fence topped with three strands of barbed wire, for security purposes. A gated 2.4 meter-high chain link fences will be constructed around the high voltage switchgear.

Security

During construction, the site will be under continual surveillance by the supervising construction staff. In addition, 24-hour onsite security will be provided. After the project is complete; the perimeter fencing with locked gates will act as a security barrier. Electronic surveillance will be evaluated for the project site.

Fire Hazard

There is limited potential for wildfire in the project site. Vegetation will be managed with minimal potential for vegetative fuel buildup. The PV modules and ancillary equipment result in a negligible increase in fire potential.

First Solar is available to work with local fire officials to provide information and education regarding this PV installation. As is the standard case involving fires involving electrical equipment, care must be taken in fighting such fires. Additional protective equipment beyond what is required when responding to other electrical fires is not required for fighting fires involving solar PV modules, including those involving First Solar modules.

Buffer Zones

Buffer zones are incorporated into the site layout to minimize visual obtrusiveness from public roads and adjacent private lands. A buffer zone with a minimum width of 27 meters will be maintained between the PV arrays and the adjacent railway line at the property line. In many locations around the site, the buffer zone will be wider. For instance, adjacent to the King's Highway 40, the buffer zone is 54 meters.

To keep the water consumption to a minimum, intensive landscape screening is not proposed. However, a row of evergreen screening may be considered between the facility and residential properties. In order to prevent soil erosion, provide dust control, and maintain an annual grassland appearance beneath the PV modules, the First Solar may plant a vegetated understory that will mimic annual grassland vegetation. This vegetation would require only minimal, if any, initial irrigation, and would help prevent the invasion of non-native plant species.

Utility Connection Facilities

Distribution Facilities

This section describes the project's distribution facilities proposed to interconnect the project to the 27.6 kV distribution system located directly adjacent to the site. The proposed project includes a total of 20 MW, made out of two (2) 10 MW facilities. Each 10 MW facility will be connected individually to the distribution system with separate poles, metering and medium voltage switchgear equipment.

Project Transformation

The inverters output of 208 V will be stepped up to 27.6 kV at each Photovoltaic conversion station (PVCS) with a 1000 KVA step up liquid cooled transformer. Ten PVCS stations will be connected to each other in parallel and ultimately connected to the PVIS. An approximate 30 square meter control building and grid interconnection switchgear (PVIS) will be used to connect the solar project to the distribution system. The PVIS site will be graded and compacted to an approximately level grade. Several concrete pads will be constructed as foundations for electrical equipment and the remaining area will be graveled. Electrical switchgear, dead end line structures, and related facilities will be present. There will also be trenching within the PVIS for grounding grid installation, buried power cables, and control cables.

Interconnection to Distribution Grid

Generation from each project will be delivered to Hydro One's Distribution M5 distribution circuit. The M5 circuit is supplied from Lambton Transformer Station located near the community of Courtright Ontario approximately 10 km away from the project.

Interconnection Configuration

One PVIS will be required for each 10 MW project. The PVISs will be located perpendicular to the existing Hydro One M5 distribution line located on Rokeby road, thus avoiding the visual impacts of an additional medium-voltage distribution line within or near the facility.

Structures

New 50 foot wooden poles will be installed to mount the overhead revenue metering equipment, and load break switch. The transition from an overhead circuit to an underground circuit will occur at the Load break switch connection the interconnection station (PVIS) to the Utility's 27.6 kV line.

Conductors

The Generation facility will be connected to the Utility's distribution grid with overhead 3/0 ACSR conductors.

Construction of Interconnection Facilities

Each 10 MW project will be connected to the distribution system individually with its own poles, metering systems, and PVIS. Construction of the interconnection between the existing 27.6 kV line and the new St Clair 1 & 2 PVISs will be undertaken by local contractors. Construction of the distribution facilities will be scheduled to occur after the PVIS has been completed to allow the distribution circuit to be placed back in service immediately after it is interconnected to the new switching station.

Project Construction

The construction of the project will begin once all applicable approvals and permits have been obtained. It will take approximately twelve months from the commencement of the construction process to complete the project. During construction, the expected number of employees will be approximately 200 on average, with a peak workforce of approximately 300 employees. Once construction is completed, the Project will potentially be in operation for 25 years or more, given opportunities for equipment repowering and replacement.

First Solar's Engineering, Procurement, and Construction (EPC) group has considerable experience building solar farms. The 58 MW_{AC} El Dorado Energy Solar project, owned by Sempra Generation, was started in 2008, with 38 MW_{AC} complete to date. First Solar has just completed the 80 MW_{AC} Sarnia solar farm, owned by Enbridge Ontario Wind Power, LP. The Blythe, California solar project (21 MW-ac) was also completed recently. Additional near-term projects include PV farms Cimarron, New Mexico; and Tilbury, Ontario.

Construction will occur in two basic phases: (i) site preparation and (ii) construction and installation of the solar modules and electrical components.

Site Preparation

Site preparation involves improvement of most onsite construction access roads, installation of drainage crossings, setup of construction staging areas, storm-water management works, preparation of land areas for array installation, and other activities needed before installation of the solar arrays can begin. This work may involve removal or trimming of vegetation, agricultural rolling of PV array areas, selected compacting and leveling, and setup of modular offices and other facilities needed for construction.

The temporary construction staging areas will then be cleared and fenced, and the construction access roads will be improved. Existing structures on the property will be razed after all required permits are secured. All demolition materials will be recycled or disposed of in accordance with all applicable codes and regulations.

The PV arrays require a relatively level and stable surface for installation. Topographic, geotechnical, and hydrologic studies will be used to determine if any leveling or compaction is necessary to ensure safe and efficient PV array installation. Based on site visits and preliminary studies, First Solar believes that a portion of the site may be able to accommodate PV arrays after preparation by common agricultural techniques. However, grading and compaction may be required in select areas.

Construction access on the site will occur on newly constructed roads. These roads will be made of gravel, recycled concrete, or other suitable, pervious material. The use of gravel roads will not

impact stormwater flow and will reduce water use for dust control during construction.

Trenching will occur within each 1 MW array to bury the AC and DC electrical cables. The trenches will vary from 0.5 meter to one meter in width and will be about one meter deep. Each 1 MW array will have three to four separate trenches for a total length of approximately 450 to 580 meters, depending on the array's proximity to the PVCS. Minimal ground disturbance will occur within the trenched corridors and they will be restored with backfill so that the corridor can conform to the surrounding surface contours. In the absence of annual tilling for agricultural purposes, the Project Site is expected to regain some habitat value.

Construction and Installation

The construction and installation phase involves installation of the PV solar modules and all the necessary electrical equipment to make the facility operational.

First, vertical support posts are driven into the ground. These will hold the support structures (tables) on which PV modules will be mounted. Trenches are dug for the underground AC and DC cabling, and the foundation for the inverter enclosures and transformers are prepared. While cables are being laid and combiner boxes are being installed, the prefabricated PV module support tables are installed. Tilt brackets connect the steel support tables to the vertical posts and provide for proper orientation to the sun. Rubber-padded clips attach the glass PV modules to the tables. The modules are connected electrically via wire harnesses and jumpers to the electrical collection system, through the combiner boxes, and on to the Power Collection Station (PCS). Underground cables connect the PCS's to the onsite AC electric infrastructure, and a single overhead circuit connects the solar farm to the adjacent distribution grid.

Upon completion of construction, the solar farm will undergo a final system validation and commissioning process. The Data Acquisition System (DAS) and monitoring systems are brought online, the equipment is tested, and operational readiness is verified. The project will be brought online and connected to the grid sequentially, in 10MW_{AC} increments, as each 10 MW_{AC} block is completed.

The construction workforce is estimated to be 200 employees on average for the approximately one-year construction period, with a peak of approximately 300 employees. The construction workforce will be recruited from within the local Ontario area to the greatest extent practicable.

Typical construction work hours are expected to be from 7:00am to 5:00pm, Monday through Friday. In the event that construction work takes place outside these typical hours, activities will comply with county and municipal standards for construction noise levels. Select tasks must be performed after dark for safety reasons since PV modules are active any time that they are exposed to sunlight. The project is expected to use restricted nighttime lighting during construction, and such uses would be limited to task-specific lighting. In addition, 24-hour onsite security will be provided.

During construction, the only wastes produced will be typical construction wastes, such as broken PV modules, wood, and miscellaneous packaging materials. Construction waste will be disposed of in accordance with local, provincial, and federal regulations and with a view to maximizing recycle availability and minimizing landfill material. PV modules damaged or broken during construction will be returned to First Solar's manufacturing facility in Ohio USA, where they will be recycled into new modules or other products.

Safety is of primary concern to the company. The project will follow all applicable Canadian Centre for Occupational Health and Safety (CCOHS) requirements in its construction and operating activities. A safety and compliance director and a site nurse will be assigned to the Project. A site-specific Health and Safety Plan will be developed, identifying the roles and responsibilities of every employee with respect to safety and provide emergency contacts information for local first responders and emergency facilities.

There is limited potential for wildfire in the facility. Vegetation will be managed with minimal potential for vegetative fuel buildup. The PV modules and ancillary equipment result in a negligible increase in fire potential. The project will have a fire prevention plan in compliance with applicable local regulations.

During construction, the area will be under continual surveillance by the supervising construction staff. Special inspections will be conducted in conformance with the environmental protection measures adopted by the project.

Considerable engineering design has been completed that has sought to anticipate problems or issues that could arise prior to the start of construction. Should unforeseen problems occur; the construction department will identify them as early as possible and work with the county, municipality, and other agencies to implement any necessary changes in a manner that complies with all relevant regulations.

Seasonal Considerations

The above sequence of installation may be modified due to seasonal or weather constraints. Site preparation work will be scheduled to the greatest extent practicable to avoid disruption wildlife breeding patterns and to take advantage of drier conditions for road building and PV array area leveling activities.

Temporary Facilities/Construction Staging/ Water Usage

Part of the site includes a construction staging area of approximately five hectares, which will be graded and fenced for security. The staging areas will include construction offices, a first aid station, worker parking, and truck loading and unloading facilities. Temporary toilet facilities and washing stations will serve the sanitary needs during the construction process. These staging areas will be decommissioned and removed when construction is completed.

During the construction period, water may be needed for dust control and temporary sanitary facilities. The project is expected to use a maximum of 100,000 liters per day (lpd) during very dry, dusty days. During normal rainfall, construction water usage will be minimal (approximately 500 liters per day). The maximum daily water demand is expected to be during the first 65 days of construction, before site preparation is complete and after array construction has commenced.

Site Access and Transportation

A large portion of the traffic generated will be for the delivery of components and equipment during construction.

The primary roadway to the St. Clair - Moore area is Rokeby Line, typically accessed via King's Highway 40. A traffic study completed by Golder, dated July 2, 2009, and has been prepared as a part of the EIS process.

Table 1 describes the estimated number of daily traffic trips to and from the site in each category during construction for a typical 20 MWac project.

Table 1: Estimated Construction Traffic

Purpose	Traffic During Site Preparation	Traffic During Construction and Installation
Workers (daily roundtrips)	40 vehicles, assuming each worker drives individual vehicle	200 vehicles, assuming workers are a mixture of car pools and drive individual vehicles
Trucks Delivering Road Aggregate (daily roundtrips)	10 (25-ton trucks)	0
Construction Vehicles (one way only)	10 vehicles	0
Deliveries (daily roundtrips)	8 - 10 vehicles	10 - 15 vehicles
Substation and Switching Station Equipment Deliveries (daily roundtrips; approx. 20 total)	5 vehicles (may require wide load trucks)	
Total	75 vehicles	215 vehicles

Upon reaching the site, delivery trucks will enter the construction access road as shown on the Site Plan. The trucks will use the onsite roads, improved with gravel, to deliver supplies to the area under construction. The trucks will exit the site at the same entrance on Rokeby Line.

Construction vehicles used for construction will be brought to the on-site at the beginning of the construction process, and will remain onsite throughout construction. These vehicles will generally not be used on public roads, and will be stored while not in use. Table 2 lists the type and maximum number of construction vehicles expected to be in use during the approximately twelve-month construction period.

Construction equipment and vehicles will access arrays under construction by driving across the Project Site. Approximately two to three vehicles will drive along each row of tables under construction, resulting in only slight temporary ground disturbance in ungraded areas away from the main construction access roads.

Table 2: Construction Equipment and Vehicles Located and Stored On-Site

Site Preparation and Clearing/Leveling			
Approximate Number of Units	Equipment	Purpose	Duration (Months)
1 – 2	8,000 Gal Water Truck	Dust Control / Compaction	5
2	Graders	Road/Staging Prep	2
2	25 Cubic Yard Paddle Scrapers	Road/Staging Prep	2
2	10 Ton Rollers	Road/Staging Prep	2
2	Farm Roller	Field Preparation	2
Underground work (boring, trenching, installing conduit)			
Approximate Number of Units	Equipment	Purpose	Duration (Months)
6	Small Backhoe	Excavation/Backfill	2
6	Small Sheepsfoot Roller	Compaction	2
6	5 CY Dump Truck	Excavation/Backfill	2

System Installation			
Approximate Number of Units	Equipment	Purpose	Duration (Months)
12	4x4 Forklift	Material Staging	5
12	ATV Vehicles	Material Staging / Transportation	6
20	Pick-Up Trucks	Material Staging / Transportation	6
6	Truck-Mounted Pile Driver	Post Installation	2
Testing			
Approximate Number of Units	Equipment	Purpose	Duration (Months)
12	Pick-Up Trucks	Transportation	2

Construction Noise/Dust

Construction will involve temporary use of construction equipment during site preparation, leveling activities, construction of the operations building, and assembly of PV module arrays, which includes driving foundation posts (similar to steel posts used in highway guard rails) to support the array tables.

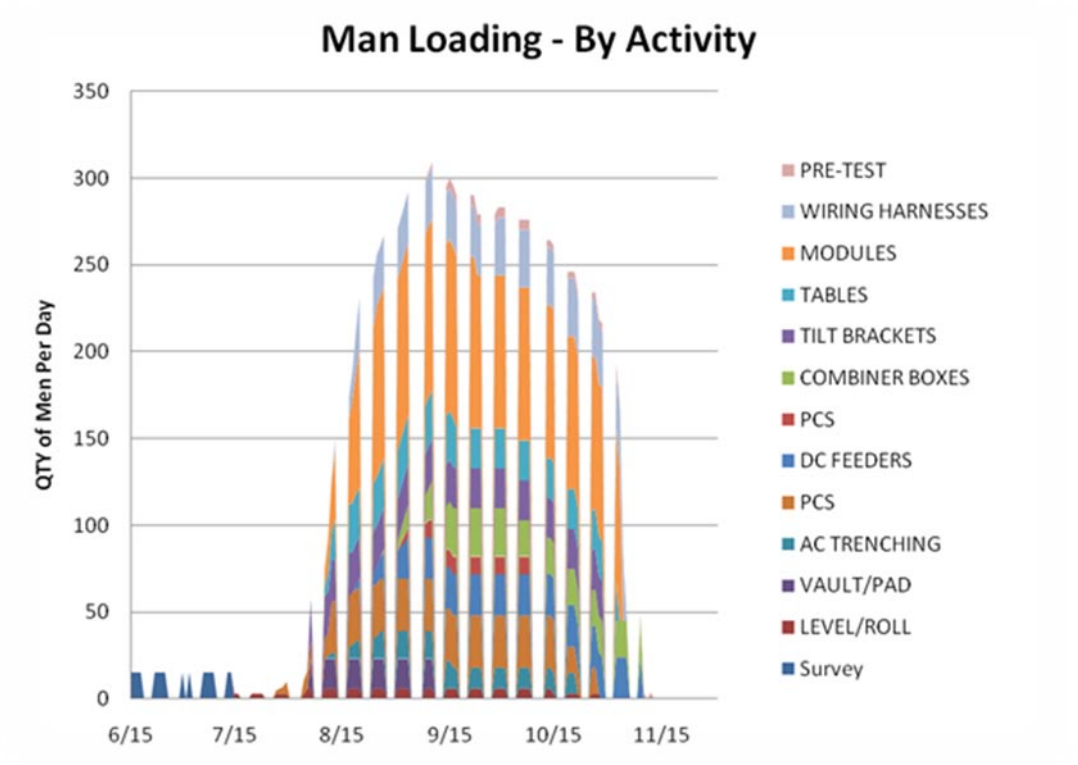
The primary source of noise during construction will be driving foundation support posts. The Project will comply with applicable noise standards, which generally restrict construction noise impacts on neighboring residential properties before 7:00 am and after 7:00 pm on weekdays and before 8:00 am and after 5:00 pm on Saturdays and Sundays.

Depending on the prevailing weather conditions, construction vehicles can generate dust during travel over internal gravel access roads, similar to agricultural operations. In addition, clearing, grubbing, and leveling activities can also produce dust. First Solar maintains onsite water trucks to moisten the traveled roads in order to suppress any dust.

Construction Population and Housing

In order to minimize the impact on the local community, the project does not require temporary onsite housing for the construction workforce. First Solar will employ subcontractors expected to rely heavily on the local labour pool. The project is not expected to have a significant impact on population or housing during operation.

Below represents a typical man-loading chart for a 20 MW_{AC} project, over a 5 month example construction schedule. This will vary depending on the length of the project and availability of local labor. For a typical 20 MW_{AC} project; the project will peak at approximately 300 craft workers over the course of the project with the majority associated with the installation of the solar modules.



Hazardous Products

The products described in Table 3 will be present during Project construction.

Table 3: Products Present On-site During Project Construction

Product	Use
Diesel	Vehicles
Gasoline	Vehicles
Motor Oil	Vehicles
Mineral oil	Transformers

Project Operations and Maintenance

There will be approximately two permanent employees of the facility. Employees will monitor and report the performance of the Project, conduct preventive and corrective maintenance, receive students and other visitors, and maintain the security.

While the project will largely be self-sufficient upon completion of construction, periodic operations and maintenance (O&M) activities will be required. Key elements of the O&M plan include management of lighting, reflectivity, noise, facility replacement materials storage, safety, and repair.

The PV arrays are designed to withstand code prescribed seismic activity and wind forces. Any realignment of the modules and structures will be handled on an as needed operational basis.

Electrical Maintenance and Fire Safety

The project is not located adjacent to either urbanized areas or wild-lands. There is no reasonably foreseen risk of the Project being the source of a fire, nor will it contribute to spreading an existing fire. As with all electrical installations, there is some electrical fault risk. However, this risk is mitigated during installation as a careful engineering review of all electrical components has been completed in accordance with all relevant requirements. Once operating, the facility is subject to a long-term operations and maintenance agreement. It will be regularly monitored to ensure proper power output. Regular on-site inspections and maintenance will also be performed and will ensure proper vegetation management. As the construction of the project is primarily glass, concrete, and steel, the facility is not flammable.

Traffic

The facility will employ a permanent workforce of approximately two people. Only limited deliveries will be necessary for replacement PV modules and equipment during operation. Table 4 details the expected daily traffic during operations.

Table 4: Daily Vehicle Trips during Operation

Purpose	Operations Traffic
Employees (daily roundtrips)	2 vehicles
Deliveries (daily roundtrips)	2 vehicles

Lighting

For security and maintenance purposes, shielded, task-specific lights will be installed at the construction offices, the construction staging areas, and possibly on or near each PCS station. These lights will be turned on either by a local switch, or by motion sensors that will be triggered by movement at a human's height during maintenance or emergency activities. No lights are currently planned around the Project perimeter to minimize the Project's visual impact on surrounding development and roads. All exterior lights will be shielded to minimize their impact to the night sky and neighbors.

Drainage Improvements

The Project will be designed such that the volume and quality of storm water runoff are maintained, if not improved, from the existing condition. This will be based on detailed hydrologic and topographic studies that will be performed in conjunction with the permitting process. Due to the limited increase in impervious areas, it is not expected that the PV arrays within the Project Site will affect site runoff.

The proposed Project is not expected to alter the site's pre-development hydrologic conditions. The Project has been designed to contain the following low environmental impact features:

- Hard-scape and impermeable surfaces are minimal;
- PV modules are elevated above grade, which preserves permeability of the Project Site;
- Existing natural drainage flows have been maintained; and
- Vegetated waterways provide filtration and increased percolation for storm-water

runoff.

- By reverting to a non-agricultural use and a cessation in the use of pesticides, runoff water quality is improved.

Water

The annual demand for water supply for the operation of the facility is expected to be negligible. The Project uses no water for electricity generation or cooling. Water is not required for PV module washing; rain water and snow are sufficient for cleaning modules.

First Solar does not plan to utilize the existing wells, nor drill any new water wells onsite and will use a trucked in water supply during construction for dust control purposes as needed.

Reflectivity

The PV modules used in the installation absorb over 90 percent of the light received; as a result, glare from reflected sunlight is not expected to be a concern. PV panels have been installed at numerous airports in the United States, including Denver International Airport and Nellis Air Force Base, and studies found that the reflections from PV installations would not cause problems for airplanes in the vicinity.

A Reflectivity Study prepared by First Solar examines potential reflections from PV modules at various key observation points. The study will be submitted as part of the visual analysis.

Operational Noise

The project will employ passive solar power generation through the use of fix-mounted PV solar modules. These PV modules do not require heat transfer fluids or mechanical equipment, and do not generate noise like other solar energy facilities can. Each 1 MW PV array occupies approximately 2.7 hectares, and is equipped with a Power Conversion Station (PCS), which includes two inverters and one transformer. The PCS serves to convert DC to AC at each 1 MW_{AC} array. The only noise sources associated will be from the PCS.

A detailed noise analysis has been prepared as part of the permit process and the project will meet all applicable local noise standards. A noise contour analysis of a solar farm in Sarnia using similar equipment indicated that the applicable local noise standards were met, even though noise receptors (residences) were more numerous and located closer to the solar farm than at this project. The project will not exceed Ministry of Environment's noise level limits. For further details please refer to the Acoustical Assessment Report.

Power/Communication

The facility will consume a very small amount of power for security lighting during the nighttime while the facility is not in operation and for PCS shelter HVAC. This power will be supplied from the existing electrical distribution system in the area. The project will not require any additional power sources for standby or emergency power supply.

For transmission of operational data and to support any employees working on site, existing wired or wireless telecommunications facilities. In the event that these facilities are not available in the vicinity, the project will supplement with small aperture (less than one meter) satellite communication gear.

Vegetation Management & Maintenance

First Solar is currently undertaking testing at sites in the vicinity to evaluate vegetation types which can support the relevant local wildlife populations, and not interfere with ongoing operations.

The existing hydrologic conditions will be maintained and storm water will be able to travel in existing drainage patterns across the site beneath the PV modules.

Shading under the modules may reduce evapo-transpiration of local plants and allow vegetation to grow taller than vegetation exposed to direct sunshine throughout the day. There will be a vegetation management plan implemented to control the height of vegetation and to control any invasive exotics. This plan will be established based on the First Solar's findings at the vegetation test site.

Depending on the native and planted vegetation growth rates, occasional grass cutting may be required to avoid the panels being shaded. Maintenance will maintain the grass height at about 460 mm.

Environmental Effects Monitoring Plan

Identification of Sensitive Natural Features

Construction activities can be a significant source of stress to the natural environment. Pollutants that are commonly discharged from construction sites include: sediment, solid and sanitary wastes, various fertilizers and pesticides, oil and grease, fuels, construction chemicals, and debris. Review of the Project's Layout drawings and Site Plans indicates that disturbance via construction activity within the potentially environmentally sensitive areas, has been minimized through due diligence planning and design efforts. However, certain project activities must occur within and adjacent to some of the environmentally sensitive areas. Specifically, the following is noted:

- Significant Woodlot – Woodlot A is located in the northern portion of the site adjacent to the railroad line. The proposed construction activities will occur adjacent to the woodlot; however, proper protection measures will be implemented to protect this area from impact.
- Two (2) municipally identified Natural environmental areas were located in the immediate area. The Baby Creek is located approximately 300 meters west of the site and the Marsh Creek is 550 meters to the north. There will be no short or long term impacts to either area.
- Several open air municipal drains are located along the property's northern, western, and southern boundaries. A minimum 15 meter buffer will be respected on each side of the municipal drain. Historical drainage patterns will be maintained. The long-term screening berms are a minimum of 15 meters from the top-of-bank or the drains. Water quality will be improved by converting the farm land into a grassed area. This will decrease pollutant and sediment loading to the receiving drain.

Potential Negative Impacts

The proposed solar farm will involve only minor physical changes to the site and the surrounding

area, which can lead to potentially negative impacts of a minor nature. The majority of the potential impacts will be short-lived throughout the various stages of construction (between 8 and 12 months). Other impacts may remain throughout the life of the Project. The most intense construction will occur during the site preparation phase of the Project, lasting approximately 2 to 3 months. Construction will become less impactful as the solar panels are placed into the system.

An Environmental Management Plan will be generated for the site before construction starts. A First Solar environmental monitor will be assigned by the Construction Manager to advise construction personnel of the requirements and to insure adherence during construction to the Plan and to all permits and specifications. The monitor will report any deviations and will coordinate immediate mitigation efforts. Following are environmental effects and construction processes to be monitored. The potential impacts and changes that the site and surrounding area will go through are expected to be as follows:

Stormwater Runoff Impacts -

- Construction will require the removal of existing vegetation from a portion of the site. The loss of existing vegetative cover, temporarily during construction, can lead to soil erosion and sediment control problems if not properly designed for and actively managed.
- The predominant historic use of the site was agricultural and farming. In order to develop the site as a solar farm the land will be prepared including clearing, grubbing, leveling, and compacting areas as needed to provide a suitable base for the solar arrays.
- There is a potential for short-term negative water quality impacts during the construction of the project due to sedimentation and disturbance. Implementation of the project will necessitate the temporary disturbance of an estimated 82 hectares of land.
- Compaction can decrease the infiltration and absorption rates of the existing land. This could lead to ponding and saturated soil conditions, which can drastically alter the site characteristics.

Dust & Noise Emissions -

- Introduction of construction machinery and activities which will increase the noise in the immediate area during the construction season will be limited to the hours of 7am to 5 pm (Monday through Friday), and as required on weekends.
- Construction equipment can release emissions into the air that can affect the air quality in the immediate area.
- Traffic in the immediate vicinity of the site will increase during the construction phase of the project this could lead to an increase in vehicular noise for the immediate area.

Destruction of Vegetation & Habitat –

- Wildlife may avoid the site during construction.

- Construction will require the removal of existing vegetation from a portion of the site. The loss of existing vegetative cover, temporarily during construction, can also lead to soil erosion and sediment control problems if not properly designed for and actively managed.

Impacts to Water bodies –

- Receiving waters can become contaminated with sediment, soils, and debris if the projects' *Soil Erosion Control Plan* is not properly designed. This could have a detrimental effect on wildlife which utilizes the water courses for food, water, and habitat, as well as, all downstream receiving waters.

- The introduction of culverts and/or bridges needed to traverse the sites. If not properly designed and maintained, these components could also have an effect on wildlife that makes use of the waters. In addition, the proposed infrastructure, if not implemented correctly could impact historic flow patterns and rates up and downstream of the subject property.

Impacts related to water takings –

- The use of water by taking it from ground or surface waters for the sole purpose to aid in construction activities could deplete the resources and lower anticipated flows.

Waste Management & Recycling -

- During construction, the system components are shipped from various locations and come in packing which protects them during transit. Without proper waste management, the site could be come over-run with litter and debris. This can lead to a safety hazards, pollution problems, and an aesthetics issues.

- In an effort to not stress the underlying soil surface with the addition of a septic system for all of the craft on-site, the site will use the implementation of portable bathrooms. Without proper installation and maintenance, these devices can prove to be an environmental nuisance.

Fuel Spills -

- The potential for fuel spills is increased with the addition of the construction machinery on site. If fuel spills adjacent to waterways there is a potential for contamination of the environmentally sensitive areas.

- Fuel storage, if not properly installed and maintained, could leak and compromise the surrounding areas.

Impacts to Archaeological Resources –

- Valuable artifacts from historical significant periods could become unearthed during construction. Without a proper procedure in place for potential discovery, these artifacts could become damaged.

Mitigation/Reduction of Impacts

While this type of facility and the methods of its construction are expected to have small short-term and minimal long-term effects to the environment First Solar will establish a program to insure maximum respect for the environment through monitoring and quick mitigation of environmental impacts. As indicated above, the Project will have certain unavoidable impacts. Several measures are being proposed to reduce the amount of temporary and permanent adverse impacts to the resources outlined above. Perhaps the biggest challenge will be to maintain the integrity of the site before and after construction especially with regard to sensitive features. In order to mitigate any unavoidable impacts, the following measures will be instituted to help maintain the integrity and viability of the land:

Stormwater Runoff Impacts –

- Existing topography will be maintained to the greatest extent possible to minimize the amount of grading required. However, when grading is necessary, top soil will be removed and temporarily stockpiled (with silt fence around the base of the pile) while the subsurface soil is graded to ensure that potential mixing of the subsurface and top soil is minimized. Long term screening berms will be implemented to ensure that during decommissioning activities native soils are available to fill the voids created by removing the gravel roadways and shelters. To the greatest extent practical, the soil material will be reused on-site. If the material is not suitable for re-use, it will be disposed of in accordance with all applicable local, provincial, and federal rules and regulations.

- The proposed preparation activities will not alter historic drainage patterns and will not significantly alter the elevations throughout the site.

- The project's design includes a "Soil Erosion and Sediment Control Plan" specifically developed to minimize potential adverse impacts. For example, filter fences will be erected around and/or down slope of disturbed areas to prevent sediment from being transported off-site. All work will be done in accordance with the "Erosion & Sediment Control Guideline for Urban Construction", dated December 2006.

- Upon completion of final land preparations, all disturbed areas will receive a final seeding in accordance with the conceptual site plans.

- Water quality will be improved on the site. Specifically, at the present time, storm water runoff from the existing farmed areas is conveyed overland and collected into the surrounding drain system. Once the site is stabilized and vegetation established, the site will act as a vegetated buffer strip by filtering pollutants. Additionally, farming activities which introduce chemicals and pesticides into the land will cease.

- By utilizing gravel access roads, the project can eliminate the need for asphalt and concrete drives. Concrete use will be limited to the fence post foundations, transformer pads, PCS shelters, and PVIS foundations. The fence posts will be cast-in-place concrete, while the transformer pads, PCS Shelters, and PVIS structures will have pre-cast bases.

- Geo-technical testing is being completed to verify the stability of the land. Compaction rates will be minimized to the greatest extent allowable and might not be required in certain areas throughout the site, since the majority of soil types are clays. Compaction will be required in areas under 75-85% compression under the arrays, and 85-95%

compression under structure foundations and roadways.

Dust & Noise Emissions –

- A crushed stone-tracking pad will be installed at the site access to reduce tracking of sediment onto adjacent roadways during construction activities. Street sweeping and cleaning will be scheduled as necessary, should the adjacent roadway become dirty.
- In an effort to maintain traffic patterns, deliveries will mostly occur during off-peak hours so a direct impact to the surrounding area will be minimized during typical commuting times.
- Disposal of waste by open burning will not be permitted.
- Exhaust systems and emission control devices on all construction machinery will be maintained in good operating condition. Noise abatement devices will be utilized on construction and support equipment present on the site with the objective of keeping the noise level within the acceptable construction noise standards and help maintain air quality.

Destruction of Vegetation & Habitat –

- Long term impacts will be minimal since the wildlife present on site can be tolerant to the Projects' presence. The Project as developed will continue to offer food and shelter for these animals after the site is re-vegetated and the construction has ceased. The increased area of permanent grasslands and additional tree plantings on the site will provide increased wildlife forage opportunities and habitat.
- The impact of the loss of vegetation will be minimized through landscaping. This will be a permanent impact that will be mitigated by a compensation planting. In addition, landscaping is being proposed to enhance the aesthetics of the site. Trees, shrubs, and grasses will provide a plethora of new vegetation dispersed throughout the site. Further landscaping details can be found in the Landscaping Plans.
- The project's design includes a "Soil Erosion and Sediment Control Plan & Details" (See plans REA-08 and 13) specifically developed to minimize potential adverse impacts. All work will be done in accordance with the "Erosion & Sediment Control Guideline for Urban Construction", dated December 2006.

Impacts to Water bodies –

- Workers and machinery will avoid, wherever possible, working inside the drain buffers. Replacement compensation planting will be required to be completed by hand, should any damages occur.
- All soil erosion and sediment control measures shall be kept in place and in working condition until construction is complete and/or the disturbed area is stabilized. An Environmental Monitoring Plan (EMP) will be created and implemented and regular inspections will occur to insure soil erosion and sedimentation will be minimized.
- Where temporary bridges are proposed for construction activities only, the bridge shall

be designed to “clear span” the watercourse past the top of bank. This will allow for the preservation of the watercourse, bed, and banks and with minimal impacts. Any permanent crossings will be designed to be of sufficient size as to not alter the current hydrologic conditions in the drains. Any work that needs to be completed in and around the watercourse will need to be approved prior to any work commencing. Additionally, improvements would need to be installed around any restrictions from the Department of Fisheries and Oceans (DFO) regarding wildlife activities.

Impacts related to water takings –

- During the construction period, water may be needed for dust control and temporary sanitary facilities. The project is expected to use a maximum of 100,000 liters per day (lpd) during very dry, dusty days. During normal rainfall, construction water usage will be minimal (approximately 500 liters per day). The maximum daily water demand is expected to be during the first 65 days of construction, before site preparation is complete and after array construction has commenced. Water trucks will be bought in as needed to control dust emissions.

Waste Management & Recycling -

- Proper trash receptacles will be stationed throughout the entire active construction site, including the trailers and staging areas. All materials will be recycled, as much as possible, in accordance with all applicable regulations and standards. Regular trash hauling will occur, with additional pick-ups added as necessary.

- Restroom facilities shall be inspected on a daily basis to ensure they are functioning correctly and are cleaned of debris and sanitary. If during the inspection the restrooms are found to be non functional (leaking, not flushing properly or in need of tank pumping services, etc.) the sanitary rental company will be contacted immediately to service the units.

- The mobile restroom facility trailers will be used for the duration of construction activity and remain onsite until the site’s completion at which time they will be removed by the sanitary rental company.

Fuel Spills -

- Where an adverse effect may occur as a result of a spill, the Ontario Ministry of Environment (MOE) Spills Action Center will be notified at 1-800-268-6060.

- All re-fueling activities will occur in a designated “refueling area” inside the proposed construction staging and lay-down area, and away from environmentally sensitive areas. All fuels will be stored in locked storage container and be clearly demarcated for safety.

Impacts to Archaeological Resources –

- A Stage 3 archaeological assessment was carried out for a Euro-Canadian historic era domestic site (Location 2) on the subject property as identified in the Stage 3 Archaeological Assessment Report prepared by Timmins Martelle Heritage Consultants, dated May 2009 (report provided as part of the REA submission). In addition, a very

significant pre-contact native site was identified. As outlined in the report, these sites were deemed to be a significant cultural heritage resource and the preferred mitigation option recommended is long term preservation and avoidance. The Ontario Ministry of Culture will review and approve/comment on First Solar's plan for preservation and protection of these cultural heritage resources as part of the REA permitting process.

Environmental Monitoring Program

The overall objective of the project should be positive and beneficial. With environmentally-aware management and sensitive contractor implementation, all environmental risks can be avoided or significantly minimized. Maximum resource benefits will be achieved through the completion of environmental restoration and enhancement efforts. The Project as developed will also benefit the community through efforts to restore and enhance the environment

Throughout the construction period, regular site inspections will be made to monitor the effectiveness of environmental protection measures, as well as to check that no previously unforeseen impacts are occurring. In the event of the latter, recommendations will be made for additional environmental protection measures to be adopted. The frequency of site inspections will vary depending on the nature of works being carried out at any one time. Attention will be concentrated on those operations and locations where the most potentially damaging impacts can be anticipated.

There will be an individual responsible for environmental monitoring (Environmental Monitor). It is their duty to monitor all construction practices involving the any of the following areas:

- Erosion Control
- Noise and Vibration
- Waste Management/minimization
- Contaminated Materials and Wastes
- Emergency Response Procedures
- Air Quality
- Water Quality
- Litter
- Storage of Chemicals and Fuels
- Cleanliness of the road from site traffic;
- Hours of work in the vicinity of residential dwellings;
- Movement and generation of surface water;
- Pedestrian and vehicle diversion and safety;
- Siltation and blockage of drains and water courses

The frequency of inspection will be highest at the initiation of works at the site so that any problems can be recognized at an early stage and remedial works or procedures can be implemented before irreparable damage has occurred. Particular attention will be paid to checking that no undue erosion and sedimentation problems are occurring and that all temporary measures, such as silt traps, are functioning efficiently.

The Environmental Monitor will ensure contractor compliance with the Environmental Management Plan (EMP) as well as all local, provincial, and federal permits. The following responsibilities are assigned to the Environmental Monitor:

1. Surveillance of all construction activities to ensure that all work is completed in compliance with the site's EMP and satisfies requirements of all local, provincial, and federal regulatory requirements and permit approvals.

2. Insure that temporary and permanent sedimentation and erosion controls are installed and maintained in accordance with the Soil Erosion and Sediment Control Plan and the site's EMP.

3. Ensure that all construction personnel and equipment stay within the designated construction area and use only approved access roads.

4. Ensure that fuel handling and equipment maintenance operations are executed away from water bodies and drainage ways. Also, make sure that the contractor maintains the required spill response material as mandated by the EMP and the projects spill control plan.

5. Be familiar with previously identified sensitive areas where unique construction techniques will be required. Make certain that work in these areas is performed as per the specifications approved for these areas and in accordance with applicable l local, provincial, and federal regulatory requirements and permit conditions.

6. Ensure that all environmental mitigation and restoration plans (i.e. drainage crossings, seeding, erosion control, etc.) are properly implemented in accordance with specifications and in accordance with applicable local, provincial and federal regulatory requirements and permit conditions.

7. Train construction management and crew on various aspects of the environmental compliance program, including the EMP, and expectations.

The Environmental Monitor will need to also complete incident investigations, restoration projects, document preparation, and record- keeping. The Environmental Monitor will conduct routine environmental monitoring audits throughout the construction period to ensure that the EMP policy is implemented and adhered to. Where noncompliance with the EMP or local, provincial, and federal regulatory requirements and permit conditions occurs, corrective measures will be formulated and implemented accordingly. As part of the EMP plan, an "Environmental Contingency Plan" shall be created. An overview of this plan can be found in the "Design & Operations Report" which is part of this submission.

Conclusion

The proposed St. Clair Moore solar farm will produce 20 MW of clean electricity, enough to power 2,800 homes in the Lambton County area. This solar farm has been designed with environmental and neighborly responsibilities in mind. Detailed erosion control, environmental monitoring and emergency response plans will be in place during construction and operation of the solar farm. This project will cause no long-term environmental damage, and will have positive environmental impacts of clean power and increased quality of runoff from the site.