



DESIGN & OPERATIONS REPORT

Southgate Solar Project

DRAFT – December 2014

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- Appendix D: Draft Preliminary Stormwater Management Report

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1. INTRODUCTION

Southgate Solar LP proposes to develop a solar facility with a maximum nameplate capacity of 50 megawatts alternating current (MWac), located near Mount Forest, in the Township of Southgate, County of Grey, Ontario (**Figure 1**). The solar facility will be known as the Southgate Solar Project (the “Project”).

Southgate Solar LP has initiated the Project through a Power Purchase Agreement (PPA) with the Ontario Power Authority. The Project will require approval under Ontario Regulation 359/09 (O. Reg. 359/09) – Renewable Energy Approval (REA) under Part V.0.1 of the *Ontario Environmental Protection Act*.

This draft Design and Operations Report (DOR) discusses the potential for environmental effects as they relate to permanent solar facility components and their operation, within 300 m of the Project Location. The report provides a detailed site plan, facility design plan, facility operations plan and Environmental Effects Mitigation and Monitoring Plan (EEMMP) (**Appendix A**). It also contains the Emergency Response and Communications Plans (ERCPs) that cover the life of the proposed Project from construction through to and including decommissioning as detailed in **Table 1**.

Table 1: Checklist for Requirements under O.Reg. 359/09 – Design and Operations Report

Required Documentation	Location in Report
Site Plan Requirements	
One or more maps or diagrams of,	Figures 2-4
i. all buildings, structures, roads, utility corridors, rights of way and easements required in respect of the renewable energy generation facility and situated within 300 metres of the facility,	
ii. any ground water and surface water supplies used at the facility,	N/A
iii. any things from which contaminants are discharged into the air,	N/A
iv. any works for the collection, transmission, treatment and disposal of sewage,	Section 6.3.12, <i>Sewage Disposal</i>
v. any areas where waste, biomass, source separated organics and farm material are stored, handled, processed or disposed of,	N/A

Required Documentation	Location in Report
vi. the Project Location in relation to any of the following within 125 metres: the portion of the Oak Ridges Moraine Conservation Plan Area that is subject to the Oak Ridges Moraine Conservation Plan, the area of the Niagara Escarpment Plan, the Protected Countryside, the Lake Simcoe watershed, and	Figures 2-4
v. any noise receptors or odour receptors that may be negatively affected by the use or operation of the facility.	Figures 2-3
A. a description of each item diagrammed under subparagraph i, and	Section 5, <i>Site Plans</i>
B. one or more maps or diagrams of land contours, surface water drainage and any of the following, if they have been identified in complying with this Regulation: properties described in Column 1 of the Table to section 19, heritage resources, archaeological resources, water bodies, significant or provincially significant natural features and any other natural features identified in the Protected Countryside or in the portion of the Oak Ridges Moraine Conservation Plan Area that is subject to the Oak Ridges Moraine Plan.	Figures 2-4
Conceptual Plan Requirements related to Design	
If the facility includes a transformer substation, the works, facilities and equipment for secondary spill containment.	Appendix A
Conceptual Plan Requirements related to Operations	
If the facility includes a transformer substation,	Section 7.1, <i>Daily Operations, Staffing and Training</i> Section 8, <i>Environmental Effects Mitigation and Monitoring Plan</i>
i. a description of the processes in place to prevent spills,	
ii. a description of the processes to prevent, eliminate or ameliorate any adverse effects in the event of a spill, and	Section 9, <i>Emergency Response</i>

Required Documentation	Location in Report
iii. a description of the processes to restore the natural environment in the event of a spill.	<i>and Communications Plan</i> Appendix A
<i>Environmental Effects Monitoring Plan Requirements</i>	
Performance objectives in respect of negative environmental effects.	Section 8, <i>Environmental Effects Mitigation and Monitoring Plan</i>
Mitigation measures to assist in achieving the performance objectives mentioned in subparagraph i.	Appendix A
A program for monitoring negative environmental effects for the duration of the time that the Project is engaged in, including a contingency plan to be implemented if any mitigation measures fail.	
<i>Response Plan Requirements</i>	
Measures to provide information regarding the activities occurring at the Project Location, including emergencies.	Section 9, <i>Emergency Response and Communications Plan</i>
Means by which persons responsible for engaging in the Project may be contacted.	Section 9.3, <i>Non-Emergency Communications Plan</i>
Means by which correspondence directed to the persons responsible for engaging in the Project will be recorded and addressed.	Section 9.3, <i>Non-Emergency Communications Plan</i>
<i>General</i>	
If it is determined that a Project Location is not on a property described in Column 1 of the Table to section 19 of O. Reg. 359/09, provide a summary of the matters addressed in making the determination.	Section 5, <i>Site Plans</i>

Required Documentation	Location in Report
If section 20 of O. Reg. 359/09 applies in respect of the Project and it is determined that the Project Location does not meet one of the descriptions set out in subsection 20 (2) or that the Project Location is not in an area described in subsection 20 (3), provide a summary of the matters addressed in making the determination.	Section 5, <i>Site Plans</i>
If subsection 21 (3) or 23 (2) of O. Reg. 359/09 applies, provide a summary of the matters addressed in making the determination, (a) under subsection 21 (3) or clause 23 (2) (a), as the case may be, including a copy of the document completed under the applicable provision, and	Section 5, <i>Site Plans</i>
(b) under clause 23 (3) (b), if applicable.	Section 5, <i>Site Plans</i>

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SOUTHGATE SOLAR PROJECT

**FIGURE 1
GENERAL PROJECT LOCATION**



MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR

MAP CREATED BY: GM
MAP CHECKED BY: MB
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\149154 - Samsung Southgate\mxd\PDR\



PROJECT: 149154
STATUS: DRAFT
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2. THE PROPONENT

In the course of developing renewable energy projects, Southgate Solar LP strives to satisfy various environmental approval requirements and obtains regulatory approvals that vary depending on the jurisdiction, project capacity and site location. In addition, Southgate Solar LP aims to build long-term relationships with the communities that host its projects. Southgate Solar LP is committed to the health and welfare of the residents of the Township of Southgate, and to ensure that the Southgate Solar Project is successful for stakeholders.

Contact information for the Proponent is as follows:

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Prime Contacts:	<u>- Simon Kim, Project Manager</u> <u>- A. José De Armas, Manager, Project Development</u>
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Email:	<u>ssp@samsungrenewableenergy.ca</u>

Dillon Consulting Limited is the prime contractor for the preparation of this report. The contact at Dillon is:

Full Name of Company:	<u>Dillon Consulting Limited</u>
Prime Contact:	<u>Michael Enright, Project Manager</u>
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Telephone:	<u>(905) 901-2912 ext. 3401</u>
Email:	<u>menright@dillon.ca</u>

3. PROJECT LOCATION

The proposed Class 3 Solar Facility is to be located within the Township of Southgate, in the County of Grey, approximately 11 kilometres north of the community of Mount Forest. The overall optioned lands available for development consist of approximately 235 hectares (581 acres) and the proposed Project Location is contained within an area bounded on the north by Southgate Road 24, Southgate Road 14 to the south, Southgate Road 47 to the east, and Highway 6 to the west. The proposed Project Location, consisting of multiple privately-owned parcels, is to be leased by Southgate Solar LP. It has an approximate centroid at the following geographic coordinates:

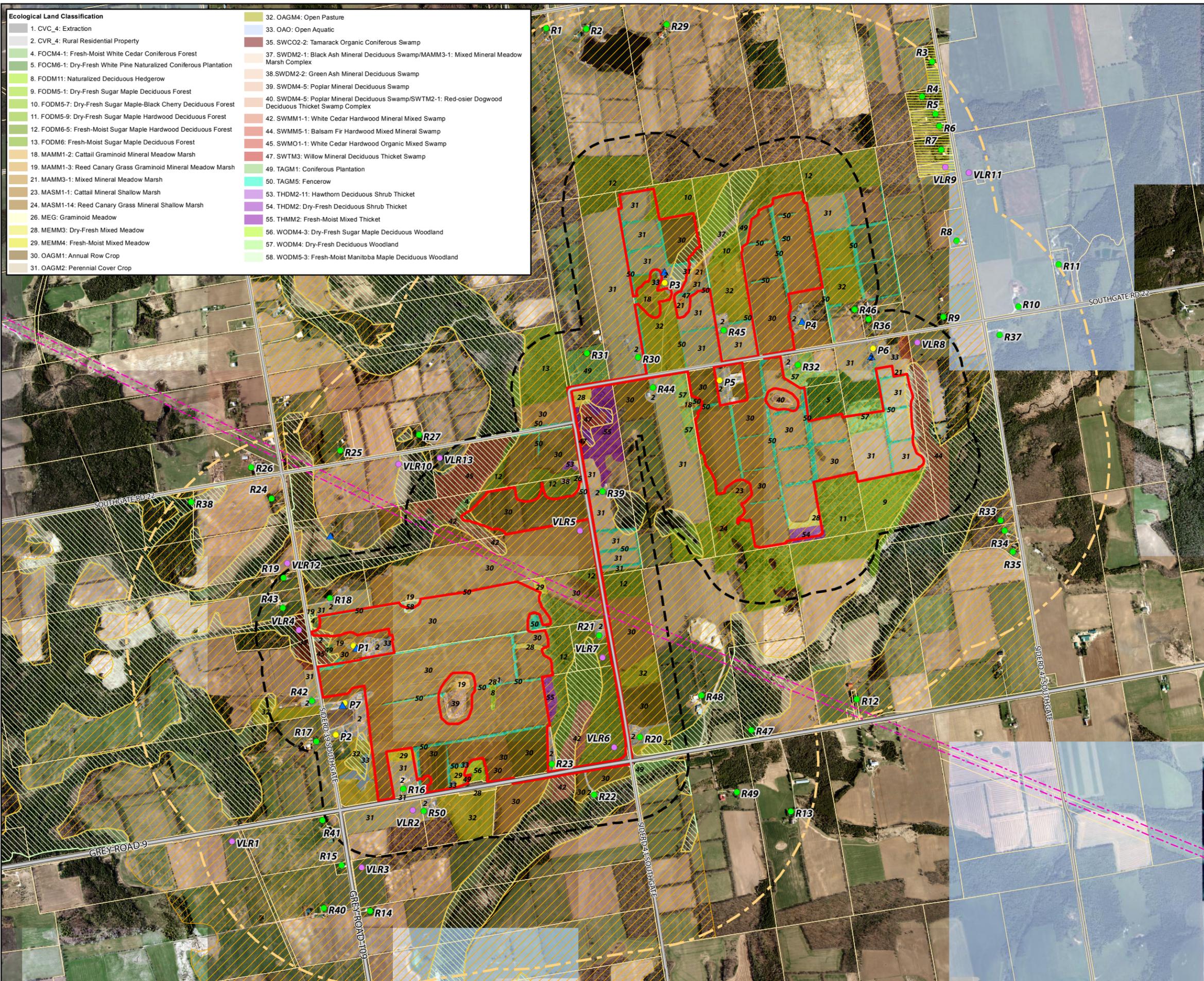
- Latitude: 44° 6' 7.78" N
- Longitude: 80° 44' 49.91" W

Figure 1 shows the general location of the Project in Southwestern Ontario. The Project Location is defined in Ontario Regulation 359/09 to be “a part of land and all or part of any building or structure in, on or over which a person is engaging in or proposes to engage in the Project”. Solar facility components making up the Project Location are discussed in **Section 6** of this report and their locations have been mapped in the site plans provided in **Section 5**.

4. OPERATIONAL FLEXIBILITY

As part of the design of the Project, Southgate Solar LP is requesting to pre-approve changes that may be made to the Project at the time of detailed design. These changes include, but are not limited to general modifications to the site plan that result in a decrease in the Project Location size, within the current boundary, and a decrease in the number of Project components or infrastructure (including transformer substation(s), solar inverter/transformer cluster(s)). Adjustments to project components may also occur, however, it is not expected that noise components would be moved greater than 10 m from their current locations. In all cases where an operational or technical change is necessary, the Project will remain within the bounds of the Project Location boundary as shown on **Figure 2**, and commitments made in the various technical reports. During operations, routine modifications to the solar facility may be implemented (e.g., repaving of entrance, repairs to fencing, etc.) provided their effects are environmentally insignificant and do not exceed the boundaries of the constructed Project.

REA documents and technical reports are developed for a Project Location which incorporates lands in excess of those required for the construction of solar facility components sufficient to generate 50 MWac. The classification (Class 3 Solar Facility) and nameplate capacity (50 MWac) of the Project are not subject to change. The approved layout will be refined during detailed design to incorporate only the quantity of project components required for a 50 MWac solar facility.



Ecological Land Classification	
1. CVC_4: Extraction	32. OAGM4: Open Pasture
2. CVR_4: Rural Residential Property	33. OAO: Open Aquatic
4. FOCM4-1: Fresh-Moist White Cedar Coniferous Forest	35. SWCO2-2: Tamarack Organic Coniferous Swamp
5. FOCM6-1: Dry-Fresh White Pine Naturalized Coniferous Plantation	37. SWDM2-1: Black Ash Mineral Deciduous Swamp/MAMM3-1: Mixed Mineral Meadow Marsh Complex
8. FODM11: Naturalized Deciduous Hedgerow	38. SWDM2-2: Green Ash Mineral Deciduous Swamp
9. FODM5-1: Dry-Fresh Sugar Maple Deciduous Forest	39. SWDM4-5: Poplar Mineral Deciduous Swamp
10. FODM5-7: Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest	40. SWDM4-5: Poplar Mineral Deciduous Swamp/SWTM2-1: Red-osier Dogwood Deciduous Thicket Swamp Complex
11. FODM5-9: Dry-Fresh Sugar Maple Hardwood Deciduous Forest	42. SWMM1-1: White Cedar Hardwood Mineral Mixed Swamp
12. FODM6-5: Fresh-Moist Sugar Maple Hardwood Deciduous Forest	44. SWMM5-1: Balsam Fir Hardwood Mixed Mineral Swamp
13. FODM6: Fresh-Moist Sugar Maple Deciduous Forest	45. SWMO1-1: White Cedar Hardwood Organic Mixed Swamp
18. MAMM1-2: Cattail Graminoid Mineral Meadow Marsh	47. SWTM3: Willow Mineral Deciduous Thicket Swamp
19. MAMM1-3: Reed Canary Grass Graminoid Mineral Meadow Marsh	49. TAGM1: Coniferous Plantation
21. MAMM3-1: Mixed Mineral Meadow Marsh	50. TAGM5: Fencerow
23. MASM1-1: Cattail Mineral Shallow Marsh	53. THDM2-11: Hawthorn Deciduous Shrub Thicket
24. MASM1-14: Reed Canary Grass Mineral Shallow Marsh	54. THDM2: Dry-Fresh Deciduous Shrub Thicket
26. MEG: Graminoid Meadow	55. THMM2: Fresh-Moist Mixed Thicket
28. MEMM3: Dry-Fresh Mixed Meadow	56. WODM4-3: Dry-Fresh Sugar Maple Deciduous Woodland
29. MEMM4: Fresh-Moist Mixed Meadow	57. WODM4: Dry-Fresh Deciduous Woodland
30. OAGM1: Annual Row Crop	58. WODM5-3: Fresh-Moist Manitoba Maple Deciduous Woodland
31. OAGM2: Perennial Cover Crop	

SOUTHGATE SOLAR PROJECT

**FIGURE 2
SITE PLAN AND LAND USE**

- ▲ Heritage Resource
 - Noise Receptor
 - Noise Receptor Involved with the Solar Project as Land Owners
 - Vacant Lot Noise Receptor
 - HONI Transmission Line Easement
 - Project Location
 - Project Location 300 m Setback
 - Project Location 1000 m Setback
 - Parcel Boundary
- Zone (Township of Southgate Zoning Bylaw)**
- Agricultural
 - Environmental Protection
 - Residential

The project location is not on or adjacent to areas subject to Land Use Plans.

The project location is not on or adjacent to a protected property as described in S.19(1) of Ontario Regulation 359/09. Cultural heritage features were identified at the project location and are discussed in the Cultural Heritage Assessment and shown in this figure.

Archaeological resources were identified within the Project Location. Stage 3 and 4 Archaeological Assessments will be undertaken if development in these areas cannot be avoided. Please refer to Section 4.2 of the Design and Operations Report.

1:20,000
0 100 200 400 600 m

MAP DRAWING INFORMATION:
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AERIAL IMAGERY PROVIDED BY FIRST BASE SOLUTIONS

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5. SITE PLANS

The following site plans (**Figures 2 – 4**) detail the location of solar facility components, natural features, noise receptors, land uses, setbacks and other features in accordance with Table 1 of Ontario Regulation 359/09. The following (and their associated infrastructure) are *not* shown in the site plans because they will not be collected, transmitted, treated, stored, handled, processed or disposed of in the construction, operation or decommissioning of the solar facility: groundwater, sewage, biomass or source separated organics. The solar facility will not discharge contaminants to air during its operation.

Figure 2 identifies the Project Location boundary and lands within 1,000 m. It provides the larger context for the solar facility components and natural features that will be shown in more detail in **Figures 3** and **4**. **Figure 2** shows the location of all potential noise receptors within 1,000m of the Project Location (more information is provided in **Section 5.1**). **Figure 2** also identifies any buildings, structures, roads, utility corridors, rights of way, municipal land use designations, on-ground land uses, property parcels, lots/concessions, railways, and orthographic imagery. The locations of the assessed cultural heritage features are also provided.

Figure 3 provides the location of all proposed solar facility components. In addition, the preliminary components include: PV panels (and associated racking and supports), MV Stations, main HV substation transformer, communication tower, operations and maintenance building, access roads, and the permanent fences and gated entrances. The preliminary solar facility layout and detailed information on components is provided in **Section 6** and **Appendix B**. **Appendix C** provides the UTM coordinates for the noise sensitive receptors within 1,000 m of the Project Location. The temporary laydown areas will be located within the Project Location boundary as per REA operational flexibility. **Figure 3** shows the location and distance between the Project components that produce noise (i.e., MV Stations and main transformer) and closest noise receptors to the east, west, south and north (more information is provided in **Section 5.1**).

Figure 4 identifies applicable natural features and water bodies within the Project Location and surrounding 300 m. Distances from each applicable natural feature to the Project Location are provided. Setbacks apply only to those natural features evaluated as ‘significant’, ‘assumed provincially significant’ or ‘provincially significant’ as outlined in the *Natural Heritage Assessment Evaluation of Significance Report*. Details regarding applicable water bodies are provided in the *Water Assessment Report*.

5.1 Transformers and Noise Receptors

The Project is designed to operate 365 days per year. The solar panels are only able to generate electricity when the sun is shining; however, the inverters and transformers operate continuously. The operating load for the inverters and transformers is dependent on the amount of electricity generated by the panels, which is at a maximum (100% load) when the sunlight is most intense. To be conservative, the *Noise Study Report* assumed that inverters and transformers would be operational at maximum load during both daytime and night-time hours.



SOUTHGATE SOLAR PROJECT

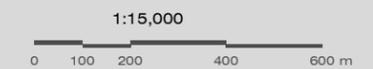
**FIGURE 3
SITE PLAN -
CONCEPTUAL COMPONENT LAYOUT**

- Site Entrance
- Point of Common Coupling
- Communications Tower
- Noise Receptor
- Noise Receptor Involved with the Solar Project as Land Owners
- Vacant Lot Noise Receptor
- Overhead Cable
- Fence
- Access Road
- Solar Panel
- Project Location
- Project Location 50 m Setback
- Project Location 120 m Setback
- Project Location 300 m Setback
- Inverter
- Substation Transformer
- Substation
- Operations and Maintenance Building
- Parking Lot
- Parcel Boundary

The area between the fence line and the Project Location is the Area of Operational Flexibility.

Below ground collection system will primarily follow access roads. Cabling on municipal roads will be within the municipal right-of-way.

Temporary construction laydown areas will be located within the project location boundary where the internal access roads meet the parcels to be developed.



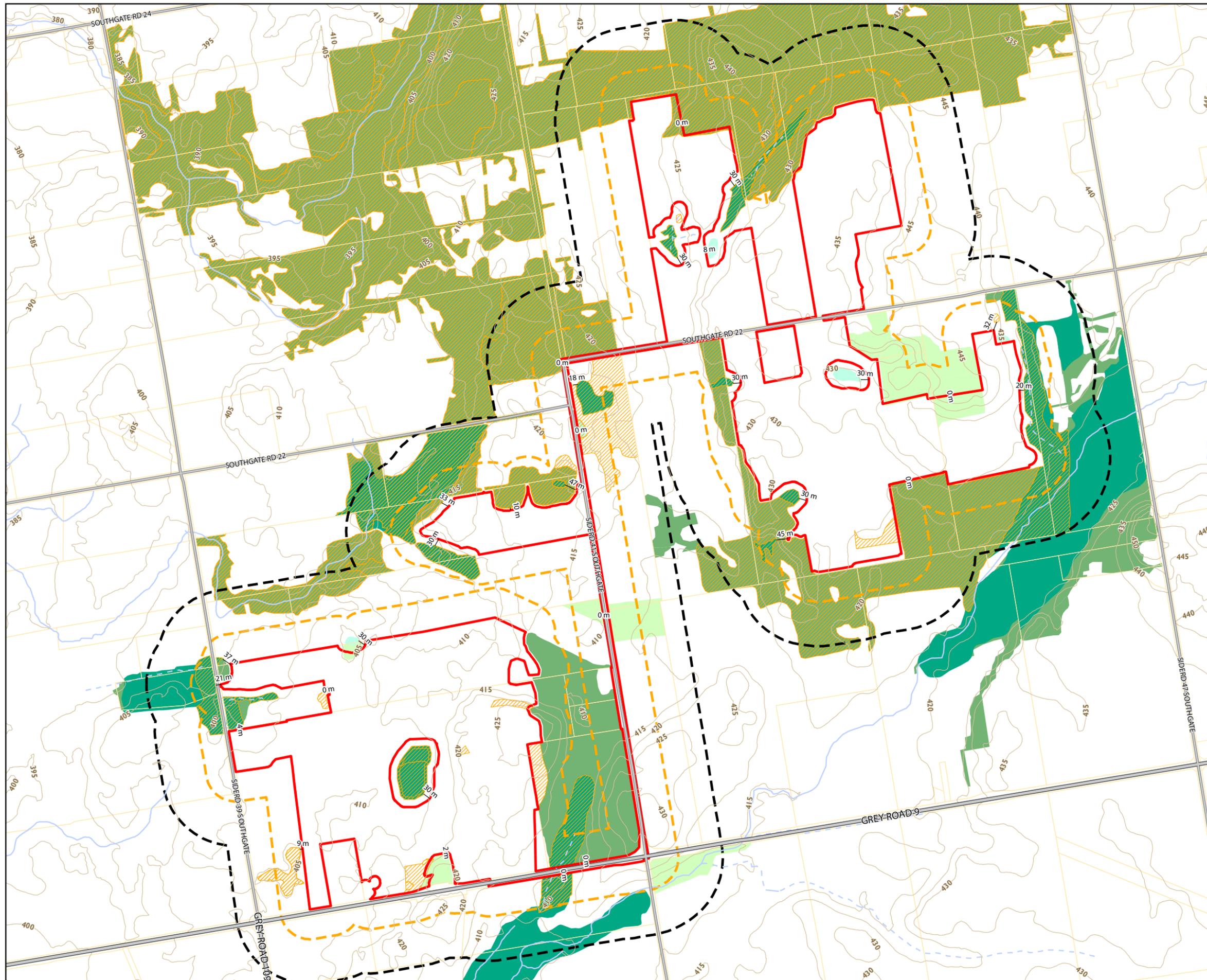
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SOUTHGATE SOLAR PROJECT

**FIGURE 4
SITE PLAN -
NATURAL HERITAGE FEATURES**

- Permanent Watercourse
- Intermittent Watercourse
- 5 m Contour
- Project Location
- Project Location 120 m Setback
- Project Location 300 m Setback
- Parcel Boundary
- Significant / Treated as Significant Wildlife Habitat
- Assumed Provincially Significant Wetland
- Dillon Delineated Wetland (Non-Provincially Significant)
- Significant Woodland
- Dillon Delineated Woodland (Non-Significant)

An Environmental Impact Study has been submitted to the Ministry of Natural Resources and Forestry for natural features deemed significant.

A Water Bodies Report has been prepared.



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DATA PROVIDED BY MNR

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MAP CHECKED BY: JP
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\149154 - Samsung Southgate\mxd\ICPR



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Appendix C provides a list of the assessed noise receptors, their UTM coordinates and distance to the MV Stations and/or main HV substation transformer. Noise receptors analyzed included residential properties or vacant lots within 1,000 m of the Project Location. Noise receptors for the Project are shown in **Figures 2** and **3**. The closest noise receptor is 20 m from the Project Location and 230 m from the nearest MV Station.

Based on the results of the *Noise Study Report* noise mitigation measures are not required for any of the noise sources at the Project Location to ensure that noise levels meet MOECC requirements. The results of the *Noise Study Report* indicate that the Project complies with the applicable MOECC environmental noise guidelines without mitigation measures. For more information refer to the *Noise Study Report*.

5.2 Heritage and Archaeological Resources

A Heritage Assessment was undertaken to identify resources of potential cultural heritage value or interest. The assessment included background research, consultation with appropriate agencies, review of historical and archival documents, and field surveys. The assessment identified nine heritage resources within the study area, however only seven built heritage resources and one cultural heritage landscape were determined to satisfy criteria under *Ontario Regulation 9/06* indicating the presence of cultural heritage value or interest (see **Figure 3**). The assessment identified two potential indirect impacts from the project, including vibration during construction, and anticipated change in land use during operations. The change in land use is considered reversible; therefore no mitigation measures were recommended. The potential vibration impacts during construction were identified for five of the eight cultural heritage resources. Where development cannot be avoided within 50 m of these resources, the Heritage Assessment recommends that a vibration study be completed prior to construction by a qualified engineer. The Ministry of Tourism, Culture and Sport (MTCS) provided their acceptance of the Heritage Assessment and agreement with recommended mitigation measures in their comment letter dated December 10, 2014. A copy of this letter is provided as part of the *Heritage Assessment*.

The Stage 1 Archaeological Assessment included a desktop background study and property investigation, and was conducted in June 2014, in accordance with the Ministry of Tourism, Culture and Sport (MTCS) 2011 *Standards and Guidelines for Consultant Archaeologists*. The Stage 1 Assessment identified the potential for archaeological finds to occur, citing moderate to high potential for pre-contact Aboriginal, post-contact Aboriginal, and Euro-Canadian sites to be discovered. The Stage 1 Archaeological Assessment recommended that the Project Location be subject to a Stage 2 archaeological assessment. MTCS provided their acceptance of the Stage 1 Archaeological Assessment into the Ontario Public Register on July 14, 2014.

The Stage 2 Archaeological Assessment was undertaken between July 23, 2014 and December 1, 2014. Nine archaeological finds were identified, including four pre-contact Aboriginal sites and five Euro-Canadian sites. Further archaeological investigation was recommended for all nine finds prior to development. Additional archaeological investigation will occur prior to

development for finds within 20 m of planned infrastructure. Further detail is available as part of the *Stage 2 Archaeological Assessment*. The *Stage 2 Archaeological Assessment* is currently being reviewed by MTCS.

5.3 Land Uses and Land Use Plans

The proposed solar facility will be located primarily within lands currently Zoned by the Township of Southgate as Agricultural. The Official Plan for the Township of Southgate designates the Project Location as Agricultural, Rural, Hazard Lands and Wetlands. The upper-tier municipality (County of Grey) designates the lands as Agricultural and Rural, with some Hazard Lands. Temporary loss of agricultural land will occur for the duration of the Project. **Figure 2** depicts the current land uses within the Project Location and surrounding 120 m as identified by the Ecological Land Classification (conducted as part of the Natural Heritage Assessment).

Mitigation measures will be undertaken to minimize impacts to surrounding land uses (see **Appendix A**). Short native vegetation will be grown beneath and between the panel rows to control erosion. The Project Location will be returned to its original condition or similar after decommissioning.

A search and analysis of available records identified that the Project is not located in areas subject to Land Use Plans; specifically, the Project does not lie within the Niagara Escarpment, Lake Simcoe Watershed, Oak Ridges Moraine or the Greenbelt.

5.4 Natural Heritage and Water Bodies

The Project has been subject to numerous field investigations and a thorough review of development constraints was undertaken prior to delineating the Project Location.

Based on the field studies conducted, the Project Location was refined to minimize, and, where possible, avoid impacts to significant natural heritage features and water bodies. The layout of the Project has been developed to minimize its footprint and avoid all significant natural features.

5.4.1 Natural Heritage Features

The Project Location is within 50 m of the following significant natural features:

- 16 southern wetlands;
- 5 southern woodlands;
- Deer Winter Congregation Area (1 unit);
- Amphibian Breeding Habitat (Wetland) (1 unit);
- Amphibian Breeding Habitat (Woodland) (3 units);
- Woodland Area- Sensitive Bird Breeding Habitat (1 unit);
- Redheaded Woodpecker Habitat (1 unit);
- Generalized Candidate Significant Wildlife Habitat.

In addition, the following natural features have been treated as significant and will be assessed pre-construction:

- Turtle Nesting Area (1 unit);
- Turtle Wintering Areas (2 units);
- Amphibian Breeding Habitat (Wetland) (11 units);
- Hill's Pondweed Habitat (5 units);
- Harlequin Darner Habitat (3 units).

Colonially- Nesting Bird Breeding Habitat (Tree/ Shrub) (2 units), American Gromwell Habitat (1 unit), and Soft- hairy False Gromwell Habitats (3 units), are within areas adjacent to the Project Location for which access was not granted. These habitats have been treated as significant and addressed in the NHA *Environmental Impact Study*.

Of the natural features evaluated to be significant or assumed to be provincially significant, the layout of the Project as shown on **Figure 4** will allow for the persistence of these natural features after the Project is constructed and operational. For detailed information on natural heritage features within and surrounding the Project Location, please refer to the *Natural Heritage Assessment*.

The *Natural Heritage Assessment* is currently under review with the MNRF, and has not been finalized to date. Therefore, significant natural features listed within this section are subject to change pending confirmation from the MNRF.

5.4.2 Water Bodies

Eleven water bodies meeting the definition of a water body under Ontario Regulation 359/09, occur within the Project Location and/or the surrounding 120 m (**Figure 4**). They include eight permanent and/or intermittent streams, and three seepage areas.

Based on the water body information collected during the site investigation, the Project Location was refined to avoid impacts to sensitive water body features, where possible. The layout of the solar facility has been developed to prioritize the protection of sensitive features and minimize environmental effects where possible.

As required by Section 39 of Ontario Regulation 359/09, no solar facility components are to be constructed, installed or expanded in the Project Location within 30 m of the average annual high water mark of a water body. By completing a *Water Body Report* in accordance with the procedures established by the MOECC, Subsection (1) of Section 40 (Ontario Regulation 359/09) project components may be constructed and installed within 120 m of the average annual high water mark of a water body, if deemed appropriate by the MOECC. A *Water Body Report* was completed for the Project, and identifies mitigation measures for negative environmental effects that may occur. For detailed information on water bodies, refer to the *Water Assessment Report* and the *Water Body Report*.

6. FACILITY DESIGN PLAN

The following subsections describe the solar facility components that are currently planned to be in place for the life of the Project. The locations of the Project components are shown in **Figure 3** and manufacturer technical specifications are provided in **Appendix B**. Temporary features related to construction and decommissioning activities are described in the *Construction Plan Report* and *Decommissioning Plan Report*. They are also shown in **Figure 3** for context.

As discussed in **Section 4**, the Project has been designed such that it allows for operational flexibility during the detailed design stage. The Project Layout may be subject to changes during detailed design through a reduction in the number of project components. Any changes made during detailed design will remain within the Project Location boundary.

6.1 Existing Features

The Project will not require the use of any existing features (e.g., buildings); however, the solar facility will be connected to the IESO controlled grid and the Project Location will be accessed from Grey Road 9, Southgate Road 22, and Southgate Sideroad 41.

6.2 Electricity Generation Process

PV panels will be the technology used to convert solar energy into electricity. With exposure to sunlight, the solar modules convert solar radiation into direct current (DC) electricity through a PV process. The PV process occurs when the energy from the sunlight is transferred to semiconductors contained in the modules. DC electricity generated from the panels will be collected and converted into AC electricity by inverters, which will be contained in multiple Medium Voltage (MV) Stations. An MV Station houses multiple components, including inverters and an MV transformer. The AC energy output from the MV Stations will be collected via underground/overhead cables and connected to the main HV substation transformer. At the main HV substation transformer, the voltage will be stepped up to 230 kV and connected to the IESO transmission grid.

6.3 Solar Facility Components

The following sub-sections provide detail on the individual components that will be used over the lifetime of the Project and may cause negative environmental effects.

6.3.1 Solar Modules and Mounting System

Approximately 197,000 to 207,000 solar panels of 290-305 (or higher) watts (DC) each will be installed for the Project. The estimated number of panels uses a conservative 1.2 DC to AC conversion rate. This results in a high level estimate for the number of modules (panels) to be installed. It is anticipated that the following panels, or equivalent, may be used: MaxPower

CS6X – Canadian Solar Panels. However, this may be subject to change until a final decision on the selection of the module supplier is made.

The panels will be aligned in rows between 8 to 12 m apart, and will be mounted on racking structures. The modules will be arranged with 18 modules in series and 11,111 strings in parallel. The racking system will be in a fixed position and tilted to 28-42 degrees, subject to refined modeling to achieve optimal energy yields. It is estimated that 5,000 - 6,000 racks will be required for the Project, which will be arranged in long rows and spacing set to maximize the site area. Each of the racking structures will be assembled on-site. To support the racks, approximately 25,000-55,000 piles will be installed for the 50 MWac solar facility. The final foundation selection will occur during the detailed design stage of the Project prior to construction. Based on the results of a geotechnical assessment, it is anticipated that helical ground screws will be used to minimize potential negative environmental effects.

6.3.2 Medium Voltage Stations and Equipment

MV Stations house multiple components, including inverters, MV transformer and SCADA monitoring equipment. The AC voltage created by the inverters will be “stepped-up” to 34.5 kV through the multiple MV stations. Approximately 34 MV Stations will be required for the Project. The MV transformer consists of a three-phase high-voltage winding and two separate low-voltage windings each rated for 360 volts. It is anticipated that the inverter used will be SMA Sunny Central 800 CP-PA, or a similar 800 kW model, and the MV transformer used will be a 1600 KVA 34.5kV-360/360 V delta HV connection with an ungrounded wye low voltage connection; however, this may be subject to change until a final decision on the selection of inverter and MV transformer suppliers is made. Engineered foundations will be constructed for the MV Stations, and will be determined based on the final engineering design, and the preliminary geotechnical assessment. It is anticipated that conventional spread footings will be used.

6.3.3 Electrical Collector System

The AC electrical energy output from the MV Stations will be collected via underground and overhead cables and connected to the main HV substation transformer. The location of these lines will be within the Project Location as shown in **Figure 2**. Lines will generally follow the internal access roads, public road networks, and the lines will be directionally drilled under existing water bodies, where necessary. The lines will all be connected to the main HV substation transformer, which will ultimately be connected to the HONI 230 kV transmission line.

The collection system will be installed using overhead cables along the right-of-way, and by underground cables within private property.

6.3.4 Substation and Other Equipment

The collector system voltage will be stepped up to 230 kV transmission grid voltage at one main HV substation transformer to be located on Parcel 11 off of Southgate Sideroad 41, immediately adjacent to the HONI corridor, which contains an existing 230 kV transmission line. Specifically, the Project will be transmission connected to the IESO controlled grid and the Point of Common Coupling (PCC) will be east of the main HV substation transformer and north of the HONI corridor within the Project Location boundary. HONI will be responsible for the necessary equipment outside of the Project Location boundary.

The main HV substation transformer will be sized appropriately for a 50 MWac solar facility and the required VAR compensation. Electrical equipment supplied must be CSA approved, meet Electrical Safety Authority (ESA) requirements and be acceptable to HONI/IESO with respect to protection, control and SCADA requirements. Dynamic VAR compensation (DSTATCOM) as well as static VAR (capacitors and reactors) will be required by the IESO to regulate the grid voltage during generation. The IESO will establish the voltage set point. The size of the VAR compensation will ultimately be determined by the IESO via the SIA process.

The main HV substation transformer will require an auxiliary source in the event that its power supply is interrupted from the grid. The auxiliary power source is assumed to be a secondary power supply from the Local Distribution Company. The load is assumed to be approximately 200kW.

6.3.5 Access Roads

The main entrances to the solar facility will be located off Grey Road 9, Southgate Sideroad 41, and Southgate Road 22. Permanent gravel access roads will be constructed to facilitate maintenance requirements during operations. The roads will be granular and approximately 6 m wide and will be constructed as appropriate for the Project and engineering design. Geotextile fabric may be used to improve structural integrity and preserve the granular. If necessary, culverts will be installed beneath the access roads at locations where conveyance of surface water drainage is required.

6.3.6 Fencing and Lighting

For the safety of the public and for security purposes, a perimeter fence will be installed. This will be a chain link fence of standard height (approximately 1.8 m) that will be installed around the entire Project Location. Alternatively, consideration will also be given to the installation of an anti-climb fence or predator-proof fence to facilitate potential livestock grazing during operations. The perimeter fence is a requirement of the Electrical Safety Authority (ESA) and will be built to their specifications. Gates will be installed where the fence intersects access roads.

For security and maintenance purposes, lighting may be installed near the entrances of the solar facility and task-specific lights will be provided as necessary. They may also be motion-sensored to address potential negative impacts.

6.3.7 Control Building / Communication Tower

A control building and microwave (communication) tower will also be installed to provide transfer of operation data to HONI during operations. These components will be located within the substation yard on Parcel 11, off of Southgate Sideroad 41, as shown on **Figure 2**.

6.3.8 Operations and Maintenance Building

An operations and maintenance building will be constructed as part of the Project and would provide a reception area, office(s) for operation staff, a washroom, lunch room, warehouse and parking area. The location for the operations and maintenance building will be on Parcel 11, off of Southgate Sideroad 41 near the substation yard. Foundations for the operations and maintenance building will be based on the results of a geotechnical assessment.

6.3.9 Water Crossings

As shown in **Figure 4**, water bodies have been mapped in relation to the Project Location. It is not anticipated that the design of the Project will require installation of new water crossings. Appropriate buffers have been applied to water bodies found within 300 m of the Project Location. For more information, please refer to the *Water Assessment Report* and *Water Body Report*.

6.3.10 Equipment Related to Stormwater Management

Once operational, the solar facility is not anticipated to have significant negative impacts to existing stormwater runoff or off-site drainage patterns. If necessary, the detailed stormwater management plan (to be developed at detailed design) will identify requirements for permanent features at the Project Location to minimize potential negative environmental effects from stormwater. Stormwater management measures and equipment related to construction activities are discussed in the draft *Stormwater Management Report (Appendix D)* and in the *Construction Plan Report*.

6.3.11 Water Supply

If feasible and readily available, water for use in toilets and sinks will be supplied from the municipal system. If not feasible, water would either be taken from an on-site well or be trucked in from a municipal supply using a local water hauler and stored in an above ground water tank within the building. Bottled water will be provided for drinking purposes.

6.3.12 Sewage Disposal

The operations and maintenance building will contain a washroom and kitchen facilities. Sewage from the washroom and kitchen facilities will be directed to a septic holding tank, designed in accordance with the Ontario Building Code and Township building standards. A level gauge will be provided to monitor the need for emptying the tank by a licensed septic tank hauler and high level alarms with audible and visual warning will be provided to prevent overflowing.

6.3.13 Other Equipment

During the operation and maintenance phases, the solar facility will not engage in, nor will any equipment be required for, the following activities:

- the use or taking of groundwater or surface water;
- the production, handling, storing or processing of any waste, biomass, source separated organics, farm material or biogas; or
- discharges of contaminants to air.

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7. FACILITY OPERATIONS PLAN

7.1 Daily Operations, Staffing and Training

The Project will operate year round and generate electricity during daylight hours only. The solar facility will be continuously monitored and managed remotely using an online system that will track performance in real time and identify any problems that may occur, although, there could be some permanent on-site employees working out of the operations and maintenance building.

Minimal on-site activity is required for daily operation; however, there will be some permanent on-site employees working out of the operations and maintenance building. Operating reports for the Project, which will track persons on-site and the frequency of maintenance or any incidents, will be produced on an annual basis. Maintenance and transportation crews will be made aware of the contents of the site-specific health and safety plan and procedures to follow in the instance of accidental spills. Spill kits will be made available on-site.

During the operations phase, the only minor potential negative environmental effects to natural features would be due to routine maintenance at the Project Location. These are outlined in greater detail in the EEMMP. No hazardous materials will be stored on-site with the exception of oil for transformers, which will be adequately contained and accompanied by a Spills Response Plan.

7.1.1 Stormwater Management

Given the topography and location of the Project, it is not anticipated that significant ongoing stormwater management activities will be required during the operation of the solar facility. It is anticipated that the existing off-site drainage patterns and conditions off-site will be maintained and impacts to the existing site drainage that the proposed solar facility may cause will be mitigated accordingly. Any requirement for permanent stormwater management control structures will be determined during development of a detailed stormwater management report to be completed prior to the start of construction.

7.1.2 Sewage Management

If a septic holding tank is installed for the operations and maintenance building it would have a level monitoring system and include a high level alarm. It would be designed in accordance with the Ontario Building Code and Township building standards and daily flows would be very minimal. No significant impacts on groundwater or surface water are predicted.

7.1.3 Water Taking

If the water needed for the washrooms and kitchen facilities in the operation and maintenance building is taken from an on-site well, the estimated water usage would be very minor. Therefore, no negative effects are predicted.

7.2 Operations and Maintenance Activities

The activities outlined in **Table 2** are associated with the operation and maintenance of the solar facility. Overall, few activities are associated with the operational phase of the Project. It will operate year round and generate electricity during daylight hours only, and the amount of daily power generated will depend on weather conditions. The proposed Project will be monitored and managed remotely; therefore, minimal on-site activity is required for its daily operation. There will be some permanent on-site employees working out of the operations and maintenance building. Security and minor maintenance are the only regular activities anticipated on-site.

Table 2: Operations and Maintenance Activities

Activity	Description
Monitoring and meter calibrations	The solar facility will be monitored remotely twenty-four hours a day off-site to ensure proper power output and to alert the operations staff to potential issues. Most issues can be remotely diagnosed so that the correct individual(s) can be dispatched to the solar facility to correct any problems or potentially corrected by permanent staff working out of the operations and maintenance building.
Routine periodic maintenance and inspection of project components	Site visits will occur as scheduled to visually inspect the solar facility and Project Location and ensure that the solar facility is in proper working order. Activities that will occur during these visits may include data collection, regular maintenance (as described below) and any necessary minor repairs such as replacement of weathered electrical components. Security visits may also occur periodically. Some of these activities may be undertaken by permanent staff working out of the operations and maintenance building. Transformers, inverters, panels and arrays will be visually inspected during scheduled visits.
Lighting	For security and maintenance purposes, lighting may be installed near the entrances of the solar facility and task-specific lights will be provided as necessary. These will be appropriately shielded or directed to avoid impacts to neighbours and will be inspected for burned/broken bulbs. Perimeter lighting is not anticipated. Regularly scheduled maintenance will occur.
Cleaning of panels	It is anticipated that the rain would generally be sufficient for cleaning the solar panels; however, depending on the quantity and frequency of rain at the Project Location, the modules may require periodic cleaning. If required, water trucks would bring water to the site. It is not anticipated that chemical detergents will be used to clean panels.

Activity	Description
Periodic landscape maintenance	Short native vegetation may be planted once construction activities are complete. It will be necessary to maintain the land in such a way that vegetation does not shade or in other ways impact the solar panels. Regular scheduled maintenance will also occur to manage weed growth as required. There is also potential for maintenance of the vegetation by grazing livestock (sheep), however details of this will be determined during the detailed design stage This will be done in consideration of any seasonal limitations outlined in the NHA. It is not anticipated that herbicides will be used to manage vegetation.
Major maintenance	Unforeseen, large repairs are not anticipated. Should major maintenance be required it will be performed using existing roads and site access points.
Third party inspections and testing	Activities will be carried out as required by the local utility and other governing bodies in addition to any regularly scheduled inspections and testing.
Traffic	No major deliveries are anticipated for maintenance. Minimal vehicle traffic is associated with regular maintenance.
Drainage and erosion control	If necessary, stormwater runoff at the Project Location will be managed as per a Stormwater Management Plan to be developed by the appropriate contractor at the detailed design stage. This will be done with consideration to maintaining pre-construction drainage patterns and recommendations or limitations outlined in the <i>Natural Heritage Assessment</i> or <i>Water Reports</i> . Implemented measures will be inspected during routine maintenance reviews.
Waste	The operation of the system does not produce waste. All debris as a result of maintenance or cleaning will be removed from the site immediately by the contractor. An exception is sewage disposal from the washrooms and kitchen facilities, which will be directed to a septic tank designed to building code requirements.

8. ENVIRONMENTAL EFFECTS MITIGATION AND MONITORING PLAN

The EEMMP outlines how potential negative environmental effects of the proposed Project will be mitigated and how ongoing monitoring will occur to meet the requirements set out in Ontario Regulation 359/09. The EEMMP includes information on potential negative effects associated with all phases of the Project from construction through decommissioning. The potential negative environmental effects associated specifically with the construction phase are also described in the *Construction Plan Report*. Given the nature of solar power generation, few (if any) effects are expected during the operations period.

The purpose of the EEMMP is to:

- ensure that commitments to minimize environmental effects in general, and specific regulatory requirements, will be met;
- provide clear and concise instructions regarding measures for protecting the environment and minimizing potential negative environmental effects;
- document environmental concerns and describe appropriate protection measures associated with all phases of the Project;
- outline suggested monitoring activities;
- provide a reference document for planning and/or conducting specific activities that may have an effect on the environment;
- function as a training aid for environmental education and orientation; and,
- communicate changes in the program through a revision process.

Appendix A presents the EEMMP for the Project, which includes identification of the potential negative environmental effects, performance objectives, mitigation strategies and the proposed monitoring plan for each affected feature or environmental component.

9. EMERGENCY RESPONSE AND COMMUNICATIONS PLANS

Emergency events associated with a solar facility are unlikely. The proponent will develop Emergency Response and Communications Plans (ERCs) that cover the entire life of the Project including construction, operation and decommissioning phases. The plans will be in place prior to construction and will be reviewed and updated on an annual basis or when necessary due to changes in operation. Information dissemination to stakeholders on significant changes will follow the same procedures as described in **Section 9.3**.

9.1 Emergency Response Plan

The Township of Southgate has established an Emergency Management Plan, developed by the Township of Southgate Emergency Management Committee¹. The Plan provides a definition of an emergency, and details regarding the Township emergency control groups, notification system, and responsibilities of groups and individuals.

The County of Grey has also established an Emergency Management Plan². The Plan provides details regarding the Emergency Notification System, declaration of emergencies, emergency control groups, implementation and procedures, responsibilities of groups and individuals, and emergency site management.

Prior to construction, Southgate Solar LP will establish an Emergency Response Plan (ERP) for the Project. In preparing this Plan, Southgate Solar LP will discuss potential emergency scenarios that could arise during construction, operation, maintenance and decommissioning of the Project with related parties such as the County of Grey, Township of Southgate, Fire Department, etc. and finalize the plan. At the time of construction, this plan will be reviewed with the chosen contractor and may be further updated. Copies of the plan will be kept on-site and in relevant offices.

9.2 Emergency Communications Plan

An Emergency Communications Plan will be included in the ERP and will provide key contact information for relevant responders, regulators, landowners and other stakeholders. It will contain a description of the chain of communications between Southgate Solar LP and relevant responders under emergency scenarios applicable to the Project. Emergency issues could potentially occur including fire, personal injury and spill incidents. A log book including key contacts and their information (names, emergency phone numbers) will be posted in the construction trailers as well as at the municipal clerk's office and Southgate Solar LP offices for easy access during an emergency.

¹ Township of Southgate Emergency Management Plan, current to August 27, 2013. (Accessed from <http://www.southgate.ca/content/community-emergency-management>).

² By-Law 4772-12 Schedule A: County of Grey Emergency Management Plan, adopted in November 2012. (Accessed from <http://www.grey.ca/government-administration/emergency-preparedness/>).

In the event of an emergency, relevant responders will be contacted by phone based on the chain of communication included in the ERP. If required during a major emergency, Southgate Solar LP will provide information releases to the community. Technical staff will recommend action plans and assist with responses to the public, stakeholders, and first responders such as the local fire department and police services.

9.3 Non-Emergency Communications Plan

This section provides information on the methods of communication and information dissemination in non-emergency situations.

9.3.1 Ongoing Stakeholder Engagement

Public consultation and stakeholder engagement activities are welcome and will continue throughout the life of the Project. Information will be mailed to stakeholders as necessary. During construction and operations phases of the Project, a sign will be erected at the entrances to the solar facility, which will include the appropriate contact information, including telephone number, email and mailing address should the public have any questions, concerns or complaints.

The following consultation activities are up-coming:

- publish first and second newspaper notices announcing the second public meeting;
- second public meeting;
- draft and final copies of REA documents posted on website;
- notice announcing application to MOECC and posting on EBR;
- responses to communications received from the public throughout MOECC technical review;
- announcement on Project website when MOECC review is complete and OPA Notice to Proceed has been issued;
- notices announcing construction dates and any traffic disruptions; and,
- ongoing liaison with public.

Members of the public can contact Southgate Solar LP at any time with questions or comments about this project via phone or email. Contact information is provided in **Section 2** of this and other REA technical reports and is available on the website and in newspaper notices.

9.3.2 Communications Methods, Records and Complaints Resolution Process

Correspondence received by Southgate Solar LP will be recorded in an electronic file and/or log book. If received during the REA process, this correspondence will be included in the Consultation Report. If received after the final REA submission to the MOECC it will be recorded, filed, and provided to the MOECC as an addendum to the Consultation Report if requested. In both cases, if the correspondence requires a response, this will be provided in a timely fashion and the response will be recorded.

Complaints and other communications received during the construction, operations, maintenance and decommissioning phases will be recorded in an electronic file and/or log book and will include the following:

- time and date of communication;
- type of inquiry/comment/complaint;
- name and contact information of the person(s);
- response and date of response; and,
- any follow-up issues.

A record will be kept for all complaints, including: the history of the complaint resolution process that was followed and all actions taken to remediate the cause of the complaint. Where appropriate, steps will be taken to prevent reoccurrence of similar complaints in the future and this information will also be recorded.

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10. CONSIDERATIONS FOR PROJECTS SUBJECT TO LAND USE PLANS

The Project is not located in areas subject to Land Use Plans. Specifically, the Project does not lie within the Niagara Escarpment, Lake Simcoe Watershed, Oak Ridges Moraine or the Greenbelt.

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11. CONCLUSIONS

This *Design and Operations Report* has been completed to fulfill regulatory requirements as mandated by the provincial government for the development of the Project. This report is consistent with the provisions of Ontario Regulation 359/09 for a Class 3 Solar Facility and has been prepared in accordance with MOECC guidance documents. Given the nature of solar power generation, few (if any) negative environmental effects are anticipated during the operations phase. Potential negative effects to the environment from operational and maintenance activities are outlined in the EEMMP and have been minimized or avoided through careful facility layout planning, the application of appropriate mitigation measures, and adherence to all regulatory requirements. An ERCP will ensure that the facility, stakeholders and first responders are prepared in the unlikely event of an emergency. Based on the results of the *Noise Study Report* the Project will meet or exceed all MOECC requirements without the use of mitigation measures during operations.

The generation of power from solar energy will displace 50 MWac of electricity that otherwise may have been generated by fossil fuel or non-renewable power plants. As a result, the energy generated will not contribute to climate change or emissions-related health impacts. There will also be a direct benefit to the local economy in terms of the number of construction jobs that will be created, and there will also be an economic spin-off to the local service sector (i.e. hotels, restaurants, etc.). The Project supports the goals of the Province's *Green Energy and Green Economy Act, 2009* and *Long-Term Energy Plan (LTEP), 2013*.

The overall conclusion of this *Design and Operations Report* is that this Project can be operated without any significant adverse residual effects to the environment.