



# DESIGN AND OPERATIONS REPORT

## *Windsor Solar Project*

---

February 2015

*Table of Contents*

	<b>Page</b>
1. Introduction .....	1
2. The Proponent .....	5
3. Project Location .....	6
4. Site Plans .....	8
4.1 Transformers and Noise Receptors .....	8
4.2 Archaeological and Cultural Heritage Resources.....	9
4.3 Land Uses and Land Use Plans .....	9
4.4 Natural Heritage and Water Bodies.....	10
4.4.1 Natural Heritage Features .....	11
4.4.2 Water Bodies .....	11
5. Facility Design Plan .....	16
5.1 Existing Features .....	16
5.2 Electricity Generation Process .....	16
5.3 Solar Facility Components .....	16
5.3.1 Solar Modules and Mounting System.....	16
5.3.2 Medium Voltage Stations and Equipment.....	17
5.3.3 Electrical Collector System.....	17
5.3.4 Substation and Other Equipment .....	17
5.3.5 Access Roads.....	18
5.3.6 Fencing and Lighting .....	18
5.3.7 Control Building / Communication Tower .....	18
5.3.8 Operations and Maintenance Building .....	19
5.3.9 Water Crossings .....	19
5.3.10 Equipment Related to Stormwater Management .....	19
5.3.11 Water Supply .....	19
5.3.12 Sewage Disposal .....	19

5.3.13	Other Equipment .....	20
6.	Facility Operations Plan .....	21
6.1	Daily Operations, Staffing and Training .....	21
6.1.1	Stormwater Management .....	21
6.1.2	Sewage Management .....	21
6.1.3	Water Taking.....	21
6.2	Operations and Maintenance Activities .....	22
7.	Environmental Effects Mitigation and Monitoring Plan .....	24
8.	Emergency Response and Communications Plans .....	25
8.1	Emergency Response Plan .....	25
8.2	Emergency Communications Plan .....	25
8.3	Non-Emergency Communications Plan .....	26
8.3.1	Ongoing Stakeholder Engagement .....	26
8.3.2	Communications Methods, Records and Complaints Resolution Process .....	27
9.	Considerations for Projects Subject to Land Use Plans .....	28
10.	Conclusions .....	29

### ***List of Figures***

Figure 1:	General Location of the Windsor Solar Project in Ontario .....	7
Figure 2 –	Site Plan - Land Use.....	13
Figure 3 –	Site Plan – Conceptual Component Layout.....	14
Figure 4 –	Site Plan – Natural Heritage Features .....	15

### ***List of Tables***

Table 1:	Checklist for Requirements under O.Reg. 359/09 – Design and Operations Report.....	1
Table 2:	Operations and Maintenance .....	22

*List of Appendices*

- Appendix A: Environmental Effects Mitigation and Monitoring Plan
- Appendix B: Preliminary Layout, Components Drawings, Manufacturer and Technical Specifications
- Appendix C: Noise Receptor Coordinates
- Appendix D: Glare Analysis Report
- Appendix E: Preliminary Stormwater Management Report

## 1. INTRODUCTION

Windsor Solar LP proposes to develop a solar facility with a maximum name plate capacity of 50 megawatts alternating current (MWac), located on the Windsor International Airport property in the City of Windsor, Ontario (**Figure 1**). The Windsor International Airport is owned by the City of Windsor and operated by Your Quick Gateway (Windsor) Inc. (YQG). The renewable energy facility will be known as the Windsor Solar Project (the “Project”).

Windsor Solar LP has initiated the Project with the Independent Electricity System Operator (IESO).<sup>1</sup> The Project will require approval under Ontario Regulation 359/09 – Renewable Energy Approval (REA) under Part V.0.1 of the *Ontario Environmental Protection Act*.

This *Design and Operations Report* (DOR) discusses the potential for environmental effects as they relate to permanent 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 (ERCs) 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
<b>Site Plan Requirements</b>	
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,	N/A
v. any areas where waste, biomass, source separated organics and farm material are stored, handled, processed or disposed of,	N/A

---

<sup>1</sup> The IESO and Ontario Power Authority were merged as of January 1, 2015.

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 4, <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
<b><i>Conceptual Plan Requirements related to Design</i></b>	
If the facility includes a transformer substation, the works, facilities and equipment for secondary spill containment.	Appendix A
<b><i>Conceptual Plan Requirements related to Operations</i></b>	
If the facility includes a transformer substation,	
i. a description of the processes in place to prevent spills,	Section 6.1, <i>Daily Operations, Staffing and Training</i>
ii. a description of the processes to prevent, eliminate or ameliorate any adverse effects in the event of a spill, and	Section 7, <i>Environmental Effects Mitigation and Monitoring Plan</i>
iii. a description of the processes to restore the natural environment in the event of a spill.	Section 8, <i>Emergency Response and Communications Plan</i> Appendix A

Required Documentation	Location in Report
If the facility will collect, transmit, treat, store, handle, process or dispose of groundwater, sewage, biomass or source separated organics or discharge contaminants to air during its operation.	N/A - except for sewage related to washrooms in the operation and maintenance building Section 5.3.12, <i>Sewage Disposal</i> and Section 6.1.2, <i>Sewage Management</i>
<b><i>Environmental Effects Monitoring Plan Requirements</i></b>	
Performance objectives in respect of negative environmental effects.	Section 7, <i>Environmental Effects Mitigation and Monitoring Plan</i>  Appendix A
Mitigation measures to assist in achieving the performance objectives mentioned in subparagraph i.	
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.	
<b><i>Response Plan Requirements</i></b>	
Measures to provide information regarding the activities occurring at the Project Location, including emergencies.	Section 8, <i>Emergency Response and Communications Plan</i>
Means by which persons responsible for engaging in the Project may be contacted.	Section 8.3, <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 8.3.2, <i>Non-Emergency Communications Plan</i>
<b><i>General</i></b>	
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 4, <i>Site Plans</i>
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 4, <i>Site Plans</i>

<b>Required Documentation</b>	<b>Location in Report</b>
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 4, <i>Site Plans</i>
(b) under clause 23 (3) (b), if applicable.	Section 4, <i>Site Plans</i>

**2. THE PROPONENT**

Windsor Solar LP is coordinating and managing the approvals process for the Project. Windsor Solar LP is located at 2050 Derry Road West 2<sup>nd</sup> Floor, Mississauga, ON, L5N 0B9 (1-866-236-5040). Dillon Consulting Limited (Dillon) has been retained by Windsor Solar LP to prepare the REA application for the Project. The contact at Dillon is:

<b>Full Name of Company:</b>	<u>Dillon Consulting Limited</u>
<b>Prime Contact:</b>	<u>Michael Enright, Project Manager</u>
<b>Address:</b>	<u>1155 North Service Road West, Unit 14, Oakville, Ontario, L6M 3E3</u>
<b>Telephone:</b>	<u>(905) 901-2912 ext. 3401</u>
<b>Fax:</b>	<u>(905) 901-2918</u>
<b>Email:</b>	<u><a href="mailto:menright@dillon.ca">menright@dillon.ca</a></u>

### **3. PROJECT LOCATION**

The proposed Class 3 Solar Facility is to be located within the YQG, Windsor International Airport property, in the City of Windsor. The overall optioned lands available for development consist of approximately 175 hectares (432 acres) and the proposed Project Location is generally bounded by Rhodes Drive to the north, Division Road to the south, Lauzon Parkway to the east, and Walker Road to the west. Of the optioned lands, approximately 128.3 hectares (317 acres) will be occupied by components to make up the Project. The geographic coordinates of the centroid of the proposed Project Location are as follows:

- Latitude: 42° 16' 43.07" N
- Longitude: 82° 56' 9.56" 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”. Facility components making up the Project Location are discussed in **Section 5** of this report and their locations have been mapped in the site plans provided in **Section 4**.



**WINDSOR 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\149152 - Samsung Windsor\mxd\PDR



PROJECT: 149152  
STATUS: DRAFT  
DATE: 9/22/2014

## **4. SITE PLANS**

The following site plans (**Figures 2 - 4**) detail the location of facility components, natural features, noise receptors, land uses, setbacks and other features in accordance with Table 1 of Ontario Regulation 359/09.

**Figure 2** identifies the Project Location boundary and lands within 1,000 m. It provides the larger context for the 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 4.1**). **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 (two hangars and transportation landscape) are also provided.

**Figure 3** provides the location of all proposed facility components. In addition, the preliminary components include: PV panels (and associated racking and supports), MV Stations, substation, communication tower, operations and maintenance building, access roads, and the permanent fences and gated entrances. The preliminary facility layout and detailed information on facility components is provided in **Section 5** and **Appendix B**. **Appendix C** provides the UTM coordinates for the noise sensitive receptors within 1,000 m of the Project Location. Two temporary construction laydown areas (with parking for construction vehicles as well as trailers and temporary offices) are provided in **Figure 3** for context. **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 4.1**).

**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*.

### **4.1 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.

The chosen locations of the MV stations and the main high voltage substation transformer were based, in part, on the location of noise receptors. **Appendix C** provides a list of all assessed noise receptors, their UTM coordinates and distance to the transformers. Noise impacts associated with the dominant noise sources at the YQG, Windsor International Airport were also assessed. 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 vacant lot receptor from the Project Location boundary is at a distance of 354 m, and the closest noise receptor is 399 m. Both are located to the south of the Project Location boundary.

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. Without mitigation measures, the results of the *Noise Study Report* indicate that the Project complies with the applicable MOECC environmental noise guidelines. For more information refer to the *Noise Study Report*.

#### **4.2 Archaeological and Cultural Heritage Resources**

The Stage 1 and Stage 2 Archaeological Assessments, prepared by Stantec Consulting Ltd., identified 23 sites within the Project Location with archaeological finds that are of value or interest. Eighteen of the sites were recommended for Stage 3 assessment prior to any development of the property. Based on the findings of the Stage 1 and 2 Archaeological Assessments, the Project layout was modified to avoid some areas subject to Stage 3 assessment. Overall, 11 sites underwent Stage 3 assessment and 3 of the 11 sites were subject to a Stage 4 assessment. The comment (clearance) letters from MTCS on all of the sites for Stage 3 Assessments and Stage 4 Preliminary Assessments have been received. The locations of the archaeological finds have not been shown on the site plans, in accordance with Chapter 6, Section 2.3 of the Technical Guide to Renewable Energy Approvals (2013), which states that the precise location is sensitive, and therefore the general location should be indicated. Identification of the general location for the archaeological resources for the Project was also found to facilitate ease of identification of the locations, and therefore has not been included in the site plans to protect the resources.

A Cultural Heritage Assessment was undertaken to identify resources of interest or value and evaluate their cultural significance. The assessment included background research, consultation with agencies, review of historical and archival documents, and field surveys. The assessment identified two potential built heritage resources (two aircraft hangars) and one heritage transportation landscape (the airport grounds) within the defined Heritage Assessment Area, but outside of the Project Location. These features are identified in **Figure 2**. All three were evaluated and found to satisfy the criteria for cultural heritage value or interest. The resources were evaluated in consideration of Project activities and location. It was found that the resources are at a sufficient distance from the Project Location. Therefore, impacts are not anticipated to any of the resources as a result of the Project and, as such, no mitigation measures will be required.

#### **4.3 Land Uses and Land Use Plans**

The proposed solar facility will be located within the boundary of the YQG, Windsor International Airport, which is located within the Sandwich South Planning District. The Planning District covers 2,530 hectares and was annexed into the City of Windsor in 2003 and

incorporated into the City Official Plan in 2007. The Project Location is designated “Airport” and “Future Employment Area” in the Official Plan and is adjacent to an “Open Space” designation in the southeast corner of the airport lands.

In 2010, the YQG, Windsor International Airport Master Plan was also completed, which is the overall planning document that guides the development of the Airport and assists the City of Windsor and the private sector in making land use decisions on surrounding lands. In the general vicinity of the Airport, land use is governed by Transport Canada TP1247E (Land Use in the Vicinity of Airports) and recent modifications by NAV CANADA. Specifically, the registered zoning in place by Transport Canada is entitled *Windsor Airport Zoning Regulations*.

The majority of the Project Location is currently rented out and farmed with cash crops and/or consists of mowed fields. **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*) and the Official Plan. Significant setbacks from the surrounding road network and adjacent property lines are being applied and the majority of the surrounding uses are employment uses and agricultural. 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.

The solar PV panels to be installed have the potential of creating glare and reflectivity issues for YQG activities. Solar PV panels are designed with anti-reflective coatings and surface texture, which reduces reflectivity and glare. There are currently no federally, provincially or municipally mandated requirements or guidelines regarding how to conduct the analysis of reflection/glare of sunlight from solar projects. In the absence of any Canadian guidelines, the United States Federal Aviation Agency (FAA) interim policy – *FAA Review of Solar Energy System Projects on Federally Obligated Airports* was referenced to undertake a *Glare Analysis* on potential impacts to airport operations.

The *Glare Analysis* concluded that based on the geometric configuration of the panels relative to the sunlight path and the inherently low reflectivity of the PV panels, the proposed Project will not result in *hazardous glare* conditions, in comparison to the FAA interim standard. Additional details can be found in the *Glare Analysis Report (Appendix D)*.

The proposed Project is also in the process of being reviewed by NAV CANADA under its Land Use Program process and the Project is also being screened by YQG under its Facility Alterations Permit (FAP) process. When complete, YQG will submit the FAP to Civil Aviation Services Ontario (CASO) through the Transport Canada website for final approval.

#### **4.4 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 natural environment information that was collected, the Project Location was refined to avoid impacts to significant and/or sensitive natural heritage features and water bodies. The layout of the Project has been developed to minimize its footprint and avoid all significant natural features.

#### **4.4.1 Natural Heritage Features**

The Project Location is within 120 m of the Windsor Airport Swamps provincially significant wetland, the Airport Woodlands (Environmentally Significant Area #39), significant Climbing Prairie Rose habitat, and significant Giant Ironweed habitat. The layout of the Project as shown on **Figure 4** will allow for the persistence of all four of these significant features after this Project is constructed and operational. Completing an *Environmental Impact Study (EIS)* in accordance with procedures established by the MNR, Subsection (1) of Section 38 (*Ontario Regulation 359/09*) may permit project components to be constructed or installed within 50 m of a significant or provincially significant natural feature if deemed appropriate by the MNR. The EIS identifies any mitigation methods for negative environmental effects that may occur. For detailed information on natural heritage features at the Project Location, refer to the *Natural Heritage Assessment* documents.

#### **4.4.2 Water Bodies**

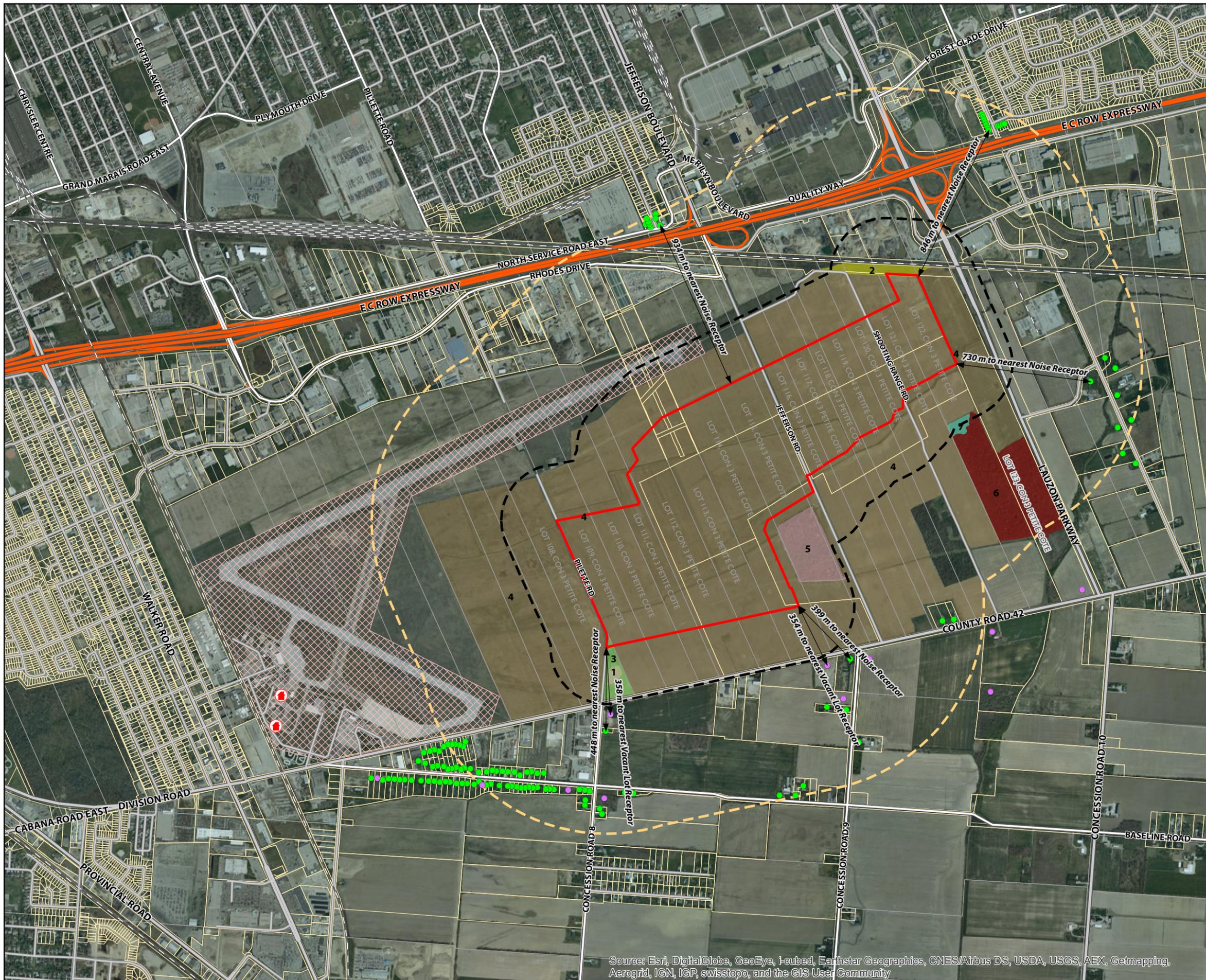
Three water courses, meeting the definition of a water body under Ontario Regulation 359/09, occur within the Project Location and/or the surrounding 120 m (**Figure 4**). They are as follows:

- The Lappan Drain is a channelized permanent stream that originates approximately 610 m west of the Project Location, enters the Project Location, flows generally eastward, exits the Project Location at its eastern boundary, and empties into the McGill Drain within the 120 m setback area.
- The McGill drain is a channelized stream that originates within the Project Location near its southwest boundary, flows generally eastward, exits the Project Location at its southeast boundary, forms a confluence with the Lappan Drain, continues eastward and flows into the Little River approximately 655 m east of the Project Location. From its origin to its confluence with the Lappan Drain, the McGill Drain is an intermittent stream. Downstream of the confluence, the McGill Drain is a permanent stream.
- The Rusette Drain is a channelized permanent stream that originates northwest of the Project Location, flows generally eastward, enters the 120 m setback area at its northeast boundary, turns northward, exits the 120 m setback area, continues northward and empties into the Little River.

Based on the water body information collected during 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 photovoltaic panels or devices and no transformer stations 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*.



## WINDSOR SOLAR PROJECT

**FIGURE 2  
SITE PLAN AND LAND USE**

- Built Heritage Resource
  - Cultural Heritage Landscape
  - Noise Receptor
  - Vacant Lot Noise Receptor
  - Project Location Boundary
  - Railway
  - Project Location 300 m Setback
  - Project Location 1000 m Setback
  - Parcel Boundary
  - Lots/Concessions
- Ecological Land Classification**
- 1. MEF: Forb Meadow
  - 2. MEMM4: Fresh-Moist Mixed Meadow
  - 3. MG: Manicured Grass
  - 4. OAGM1: Annual Row Crop
  - 5. SWDM3-3: Swamp Maple Mineral Deciduous Swamp
  - 6. SWDM4-2: White Elm Mineral Deciduous Swamp
  - 7. THDM5: Fresh-Moist Deciduous Thicket

The Project Location is within an area designated "Airport" and "Future Employment Area" by the City of Windsor Official Plan. Land uses adjacent to the project location are primarily agricultural and employment.

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.

Several Archaeological resources were identified within the Project Location. Stage 3 and 4 Archaeological Assessments are being completed. Please refer to Section 4.2 of the Design and Operations Report.

The Project Location is not on or adjacent to areas subject to Land Use Plans.



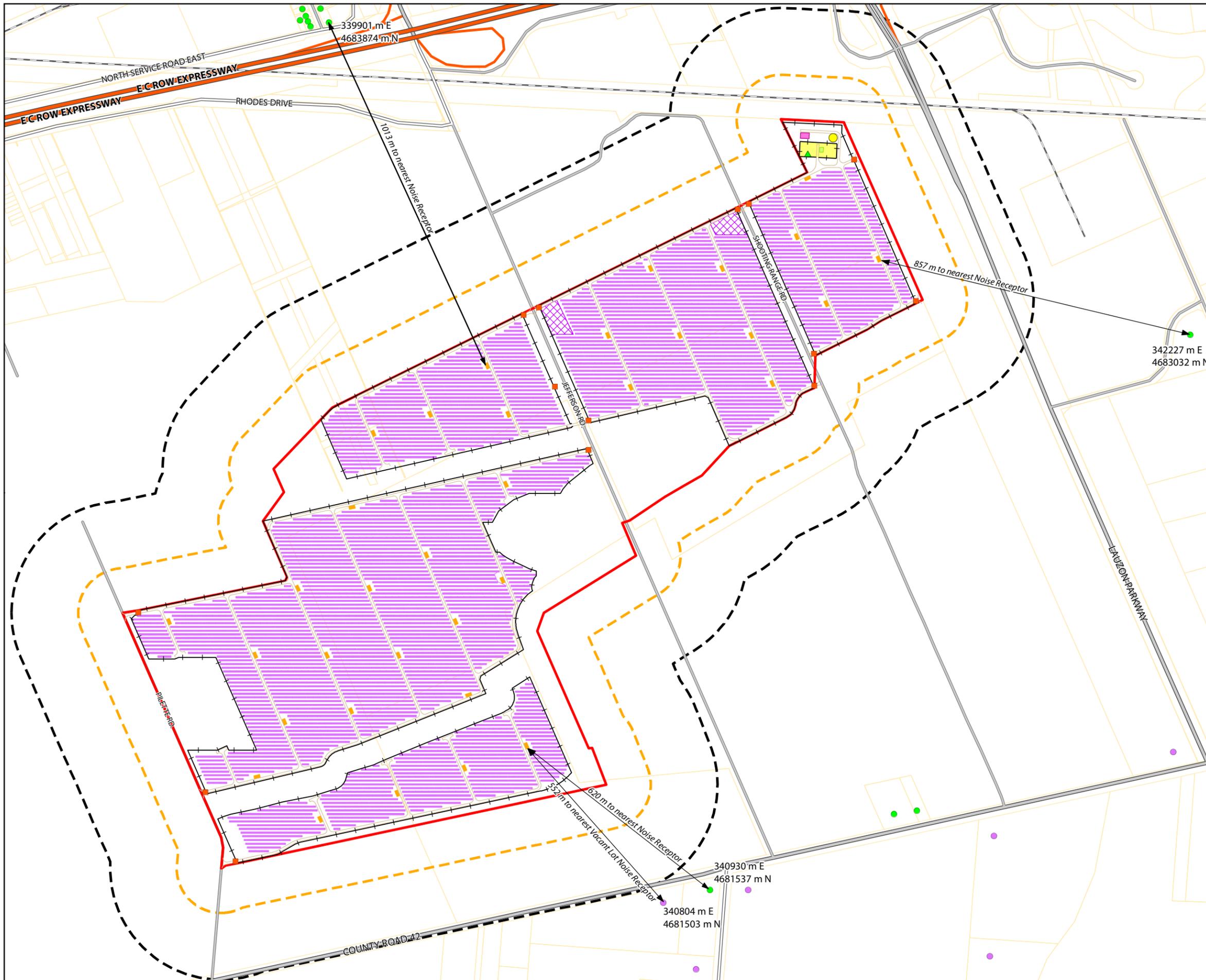
MAP DRAWING INFORMATION:  
DATA PROVIDED BY MNR, ERCA

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

FILE LOCATION: I:\GIS\149152 - Samsung Windsor\mxd\dot



PROJECT: 149152  
STATUS: DRAFT  
DATE: 10/14/2014



## WINDSOR SOLAR PROJECT

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

- Gate
- Noise Receptor
- Vacant Lot Noise Receptor
- Point of Common Coupling
- ▲ Communication Tower
- Solar Panel Row
- Access Road
- Fence
- Substation Transformer
- Substation Yard
- Operations & Maintenance Building
- MV Station
- Temporary Laydown Area
- Project Location Boundary
- Railway
- Project Location 120 m Setback
- Project Location 300 m Setback
- Parcel Boundary

Below-ground collection system will primarily follow Access Roads. Cabling will be installed through trenching, and directional drilling where required under Municipal Drains.

1:10,000  
0 50 100 200 300 m



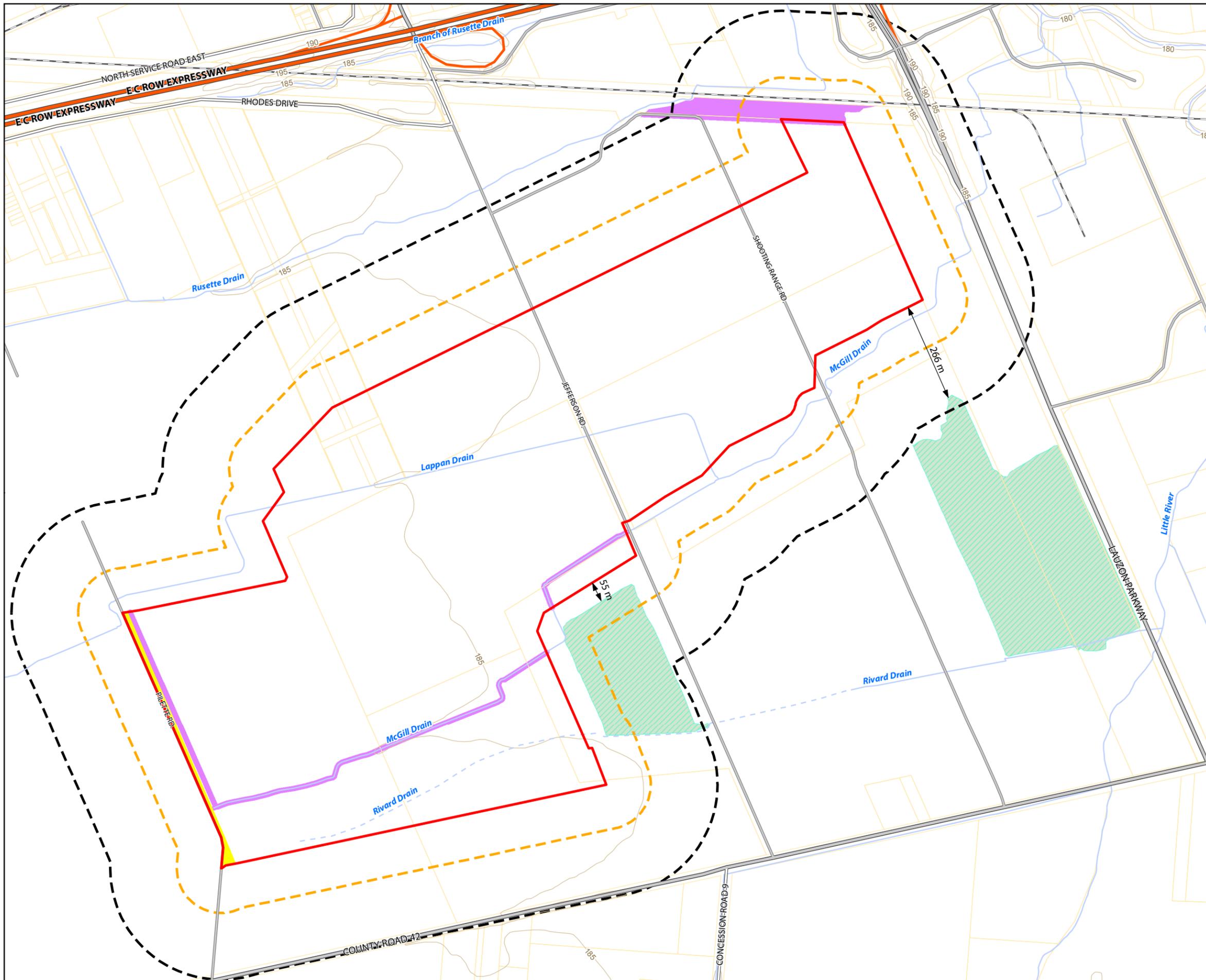
MAP DRAWING INFORMATION:  
DATA PROVIDED BY MNR

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

FILE LOCATION: I:\GIS\149152 - Samsung Windsor\mxd\doA



PROJECT: 149152  
STATUS: DRAFT  
DATE: 11/13/2014



## WINDSOR SOLAR PROJECT

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

- Project Location Boundary
- Railway
- Permanent / Intermittent Stream
- Ephemeral Drain
- 5 m Elevation Contour
- Project Location 120 m Setback
- Project Location 300 m Setback
- Parcel Boundary
- Significant Climbing Prairie Rose Habitat
- Significant Giant Ironweed Habitat
- Provincially Significant Wetland
- Woodland (Airport Woodlands- Environmentally Significant Area No. 39)

An Environmental Impact Study has been submitted to the Ministry of Natural Resources for natural features deemed significant. A Water Bodies Report has been prepared.

The portion of Rivard Drain within the project location is proposed to be abandoned under the Municipal Drainage Act and relocated up to the project location boundary.



MAP DRAWING INFORMATION:  
DATA PROVIDED BY MNR

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

FILE LOCATION: I:\GIS\149152 - Samsung Windsor\mxd\doA



PROJECT: 149152  
STATUS: DRAFT  
DATE: 9/25/2014

## **5. 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. The Project will require some stormwater management, as described in **Section 6.1.1**.

### **5.1 Existing Features**

The Project will not require the use of any existing features (e.g., buildings), as there are none within the Project Location. However, the facility will be connected to the IESO controlled grid to the immediate north of the Project Location and the facility will be accessed from Division Road via Pillette Road and Jefferson Boulevard. Both Pillette Road and Jefferson Boulevard are existing roads which were formerly open as municipal roads, but have been privatized and gated as part of the YQG infrastructure.

### **5.2 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 cables and connected to the main high voltage substation transformer. At the substation, the voltage will be stepped up to 115 kV and connected to the IESO transmission grid.

### **5.3 Solar Facility Components**

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

#### **5.3.1 Solar Modules and Mounting System**

Approximately 197,000 to 208, 000 solar panels of between 290-305 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 approximately 10 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 28-36 degrees, subject to refined modeling to achieve optimal energy yields. It is estimated that approximately 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. It is anticipated that the piles will be either screwed into the ground using helical piers. The exact type of method and number of piles will be determined based on the *Geotechnical Investigation* and at the time of final design.

### **5.3.2 Medium Voltage Stations and Equipment**

MV Stations house multiple components, including inverters, and an MV transformer. The AC voltage created by the inverters will be “stepped-up” to 34.5 kV through the multiple MV stations. A total of up to 34 MV Stations will be required for the Project and 31 of them will include two 800 kW inverters and one MV transformer with a capacity rating of 1,600 kilovolt-amperes (KVA), while 3 of the MV Stations will only contain one 800 kW inverter. 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 may be SMA Sunny Central 800 CP-CA, or similar, and the MV Transformer used may be a 1,600 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 selection of inverter and MV transformer suppliers is made, respectively. The foundations for the skid-mounted MV Stations are recommended to be concrete caissons, as determined through a Preliminary Foundations Investigation following geotechnical study of the Project Location.

### **5.3.3 Electrical Collector System**

The AC electrical energy output from the MV Stations will be collected via underground cables and connected to the main high voltage (HV) substation transformer. The location of the cables will generally follow the access road network as shown on **Figure 2** and will be directionally drilled under any existing drains, where necessary.

### **5.3.4 Substation and Other Equipment**

The collector system voltage will be stepped up to the IESO’s 115 kV transmission grid voltage at one main HV substation transformer to be located at the very northeast corner of the Project Location immediately adjacent to the HONI corridor, which contains an existing 115 kV transmission line. Specifically, the Project will be transmission connected to the IESO controlled grid and the Point of Common Coupling (PCC) will be north of the substation and just south of the HONI corridor within the Project Location boundary.

HONI will be responsible for the necessary equipment within its corridor. The HV substation transformer will be sized appropriately for a 50 MWac solar facility. 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. DSTATCOM (as well as capacitors and reactors) will be required for HV transformer VAR compensation which will be used to regulate the IESO transmission grid voltage to an established set point. The size will ultimately be confirmed by the IESO.

The substation 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.

### ***5.3.5 Access Roads***

The main entrances to the facility will be located off Division Road via Pillette Road and Jefferson Boulevard. Pillette Road and Jefferson Boulevard are existing roads that were formerly open public municipal roads. However, since they became part of the YQG, Windsor International Airport lands they have been closed to public access with controlled gated entries. Other existing internal access roads will also be utilized. In addition permanent gravel access roads will be constructed to facilitate maintenance requirements during operations. The roads will be granular and 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.

### ***5.3.6 Fencing and Lighting***

For the safety of the public and to prevent vandalism, chain link fencing of standard height will be installed around project components. The fencing will be installed after further consultation with YQG and in accordance with ESA specifications. Typically, the ESA requires a 1.8 m high fence with three strands of barbed wire on top. Gates will be installed where the fence intersects access roads.

For security and maintenance purposes, lighting may be installed near the entrances of the facility and task-specific lights will be provided as necessary and will be installed where they are deemed appropriate based on YQG safety requirements.

### ***5.3.7 Control Building / Communication Tower***

A control building and microwave (communication) tower will also be installed to provide transfer of facility operation data to HONI during operations. These components will be located within the substation yard at the northeast corner of the Project Location, as shown on **Figure 3**.

### ***5.3.8 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, washroom, lunch room, warehouse and parking area. The location for the operations and maintenance building will be in the northeast corner of the Project Location near the substation yard. Based on the results of a geotechnical assessment, it is recommended that the building be supported by conventional cast-in-place concrete spread and strip foundation.

### ***5.3.9 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 above-ground 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*.

### ***5.3.10 Equipment Related to Stormwater Management***

Once operational, the solar facility is not anticipated to have any significant negative impacts to existing stormwater runoff or off-site drainage patterns. The detailed stormwater management plan (to be developed at final design) will identify any requirement 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 *Stormwater Management Report* in **Appendix E** and in the *Construction Plan Report*.

### ***5.3.11 Water Supply***

If feasible, water for use in toilets and sinks would 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 would be provided for drinking purposes.

### ***5.3.12 Sewage Disposal***

The operation and maintenance building would contain a washroom and kitchen facilities. If feasible, sewage from the washroom and kitchen facilities would be directed to the municipal system. If not feasible, sewage would be directed to a holding septic holding tank, designed in accordance with the Ontario Building Code and City building standards. A level gauge would 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 would be provided to prevent overfilling.

### ***5.3.13 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.
- discharge of contaminants to air.

## **6. FACILITY OPERATIONS PLAN**

### **6.1 Daily Operations, Staffing and Training**

The Project will operate year round and generate electricity during daylight hours only. The 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. Operating reports for the Project will be produced on an annual basis which will track the frequency of maintenance or any other incidents. 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.

#### **6.1.1 Stormwater Management**

Given the topography and location of the Project, it is not anticipated that significant ongoing stormwater management activities will be required during operation of the solar facility. Windsor Solar LP commits to maintaining the existing off-site drainage patterns and conditions off-site and to further mitigating any impacts to the existing site drainage that the proposed solar facility will cause. Any requirement for permanent stormwater management control structures will be determined during development of a detailed stormwater management report during the detailed design phase of the Project.

#### **6.1.2 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 City building standards and daily flows would be very minimal. No significant impacts on groundwater or surface water are predicted.

#### **6.1.3 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.

## 6.2 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. Security and minor maintenance are the only regular activities anticipated on-site, although, there could be some permanent on-site employees working out of the operations and maintenance building.

Table 2: Operations and Maintenance

Activity	Description
Monitoring and meter calibrations	The 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 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 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 entrance of the 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. Regular 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.
Periodic landscape	Short native vegetation may be planted once construction activities are complete and through further discussion with YQG. It will be necessary to maintain the land in

maintenance	such a way that vegetation does not shade or in other ways impact the solar panels, but must also consider any operational concerns for YQG. Regular scheduled maintenance will also occur to manage weed growth. 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 regular scheduled inspections and testing.
Traffic	No major deliveries are anticipated for maintenance. Minimal vehicle traffic is associated with regular maintenance.
Drainage and erosion control	Stormwater runoff at the Project Location will be managed as per a stormwater management plan to be developed by the appropriate contractor prior to detailed design. This will be done with consideration to maintaining pre-construction drainage patterns and any recommendations or limitations outlined in the <i>Natural Heritage Assessment</i> or <i>Water Reports</i> . Any implemented measures will be inspected during routine maintenance reviews.
Waste	The operation of the solar facility does not produce waste of any kind. All debris as a result of maintenance or cleaning will be removed from the site immediately by the contractor. The only exception is sewage disposal from the washrooms and kitchen facilities, which will either be directed to the municipal system or to a septic tank designed to building code requirements.

## **7. 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.
- 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.

## **8. EMERGENCY RESPONSE AND COMMUNICATIONS PLANS**

Emergency events associated with a solar facility are unlikely. The proponent will develop Emergency Response and Communication Plans (ERCPs) that cover the entire life of the Project including construction, operation and decommissioning phases. The ERCPs 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 8.3**.

### **8.1 Emergency Response Plan**

The YQG, Windsor International Airport addresses emergency response within their Airport Master Plan<sup>2</sup>. The airport provides emergency response services, including some response staff and emergency response equipment. Emergency response support is provided by the City of Windsor.

The City of Windsor has also developed an Emergency Response Plan<sup>3</sup>. The plan provides details regarding the “definition of an emergency”; roles and responsibilities of members of the community responsible for controlling emergency situations; notification procedures; emergency response procedures, and a communications plan. The plan was approved by Council on December 5, 2011.

Prior to construction, Windsor Solar LP will establish an Emergency Response Plan (ERP) for the Project. In preparing this Plan, Windsor Solar LP will discuss potential emergency scenarios that could arise during construction, operation, maintenance and decommissioning of the Project with related parties such as YQG, City of Windsor, 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.

### **8.2 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 Windsor Solar LP and relevant responders under emergency scenarios applicable to the Project. Emergency issues that could potentially occur include fire, personal injury and spill incidents. A log book including key contacts and their information (names, emergency phone numbers) will be posted in the

---

<sup>2</sup> YQG, Windsor International Airport Master Plan, 2010. Prepared in Dec. 2010 by LPS Aviation Inc. & Dillon Consulting. (Accessed from <http://www.yqg.ca/wp-content/uploads/2013/01/Windsor-International-Airport-Master-Plan.pdf>)

<sup>3</sup> By-Law #98-2005 as amended. City of Windsor Emergency Response Plan, approved by Council Dec. 5, 2011. (Accessed at <http://www.windsorfire.com/wp-content/uploads/2013/08/Windsor-ERP1.pdf>)

construction trailers (during construction) and the operations and maintenance building as well as at the City Clerk's office and Windsor Solar LP offices for easy access during an emergency.

In the event of an emergency, relevant responders will be immediately contacted by phone based on the outlined chain of communication. If required during a major emergency, Windsor 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. The Emergency Communications Plan will be developed in coordination with the YQG, Fire Department, and the City and will be made available on the Project website and provided to the MNRF and MOECC.

### **8.3 Non-Emergency Communications Plan**

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

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

Members of the public can contact Windsor 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.

### ***8.3.2 Communications Methods, Records and Complaints Resolution Process***

Correspondence received by Windsor 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. 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.
- 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. Where relevant, the Ministry's Spills Action Centre will be notified of the complaint at 1-800-268-6060.

**9. 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.

## **10. 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 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 a noise study, the Project will meet or exceed all MOECC requirements without the use of mitigation measures.

The generation of power from solar energy will displace approximately 50 MWac of electricity that otherwise may have been generated by fossil fuel burning 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, but 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 natural or social environments.