



ACCESS & TRAFFIC OPERATION EFFECTS ASSESSMENT St. Clair Sombra Solar Farm

Prepared by: Golder Associates

Date: May, 2010



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APPENDIX A-DRAFT

Site Reconnaissance Photos-St. Clair Sombra Solar Farm



Hwy 40 and Bentpath: facing North



Hwy 40 and Bentpath: facing South



Hwy 40 and Bentpath: facing East



Hwy 40 and Bentpath: facing West



Hwy 40 and Bentpath: facing North, West side



Hwy 40 and Bentpath: facing South, West side



APPENDIX A-DRAFT

Site Reconnaissance Photos-St. Clair Sombra Solar Farm



Hwy 40 and Bentpath: facing East, North side



Hwy 40 and Bentpath: facing East, South side



Hwy 40 and Bentpath: facing West, North side



Hwy 40 and Bentpath: facing West, South side



Hwy 40 and Bentpath: facing West + 100m, North side



Bentpath and Baseline: facing North



APPENDIX A-DRAFT

Site Reconnaissance Photos-St. Clair Sombra Solar Farm



Bentpath and Baseline: facing South



Bentpath and Baseline: facing East



Bentpath and Baseline: facing West



Bentpath and Baseline: facing North, East side



Bentpath and Baseline: facing North, West side



Bentpath and Baseline: facing South, East side



APPENDIX A-DRAFT

Site Reconnaissance Photos-St. Clair Sombra Solar Farm



Bentpath and Baseline: facing South, West side



Bentpath and Baseline: facing East, North side



Bentpath and Baseline: facing East, South side



Bentpath and Baseline: facing West, North side



Construction Entrance #1: facing North



Construction Entrance #1: facing South



APPENDIX A-DRAFT

Site Reconnaissance Photos-St. Clair Sombra Solar Farm



Construction Entrance #1: facing East (entrance)



Construction Entrance #1: facing North, East side



Construction Entrance #1: facing North, West side



Construction Entrance #1: facing South, West side



Baseline and Smith: facing North



Baseline and Smith: facing South



APPENDIX A-DRAFT

Site Reconnaissance Photos-St. Clair Sombra Solar Farm



Baseline and Smith: facing East



Baseline and Smith: facing West



Baseline and Smith: facing North, East side



Baseline and Smith: facing South, East side



Baseline and Smith: facing South, West side



Baseline and Smith: facing East, North side



APPENDIX A-DRAFT

Site Reconnaissance Photos-St. Clair Sombra Solar Farm



Baseline and Smith: facing East, South side



Baseline and Smith: facing West, South side



Construction Entrance #2: facing North



Construction Entrance #2: facing South



Construction Entrance #2: facing East



Construction Entrance #2: facing North, East side



APPENDIX A-DRAFT

Site Reconnaissance Photos-St. Clair Sombra Solar Farm



Construction Entrance #2: facing North, West side



Construction Entrance #2: facing South, East side



Smith and Hwy 40: facing North



Smith and Hwy 40: facing South



Smith and Hwy 40: facing East



Smith and Hwy 40: facing West



APPENDIX A-DRAFT

Site Reconnaissance Photos-St. Clair Sombra Solar Farm



Smith and Hwy 40: facing North, East side



Smith and Hwy 40: facing North, West side



Smith and Hwy 40: facing South, East side



Smith and Hwy 40: facing South, West side



Smith and Hwy 40: facing East, North side



Smith and Hwy 40: facing West, North side



APPENDIX A-DRAFT

Site Reconnaissance Photos-St. Clair Sombra Solar Farm



Smith and Hwy 40: facing West, South side



Smith and Hwy 40: facing South, East side (detail)



Smith and Hwy 40: facing South, east side (detail)

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DATE May 6, 2010**PROJECT No.** 10-1118-0006**TO** Eric Hyatt
First Solar, Inc.**CC** Aurelia Lebegin**FROM** Darcy Cowan**EMAIL** dcowan@golder.com**FIRST SOLAR ACCESS & TRAFFIC OPERATION EFFECTS ASSESSMENT – ST CLAIR SOMBRA SOLAR FARM****Introduction**

Golder Associates (Golder) was retained by First Solar, Inc. (First Solar), formerly OptiSolar Farms Canada Inc., to provide an assessment regarding access feasibility to the First Solar sites located in St Clair, Ontario. Construction of the alternative energy generating facility is scheduled for 2011 and will consist of arrays of solar panels for electricity generation. Construction and maintenance activities will result in additional traffic in the area as discussed below. This memorandum presents findings of the St. Clair Sombra Solar Farm facility's traffic operational effects both during construction and operation, as well as the feasibility to provide adequate access to the site, and the design criteria appropriate for traffic access to the site. A similar assessment for the St. Clair Moore Solar Farm site, located 20km further north of the St. Clair Sombra Solar Farm site, is provided under a separate cover. This preliminary assessment is based on limited information concerning the site, including construction and operating parameters. The data presented below was collected from First Solar and relevant municipal representatives, and do not include interpretation or modelling.

1.0 SITE LOCATION AND CONTEXT

A site visit was conducted by Golder staff on Monday, December 1, 2008 to collect background information and examine existing road conditions in the vicinity. A photo log of the roadways in the area of the site is contained in **Appendix A**. Golder staff met with representatives from the Township of St. Clair Municipality on Tuesday, December 9, 2008 to discuss concerns that could arise from the development proposal. Relevant and recent Average Annual Daily Traffic (AADT) volumes were not available at the time of study for the municipal roadways.

The site is located approximately 130 km northeast (by road) of the Ambassador Bridge International Border Crossing (Windsor, ON / Detroit, MI) and 50 km south of the Blue Water Bridge International Border Crossing (Sarnia, ON / Port Huron, MI). In addition, the site is approximately 250 km south-west of the Greater Toronto Area (GTA). As illustrated in **Figure 1**, the irregularly shaped, 350-acre site of St. Clair Sombra Solar Farm is located just east of the Michigan River, and south-east of the town of Sombra.

As illustrated on **Figure 2**, St. Clair Sombra Solar Farm is bounded by Baseline Road to the west, which runs in a north-south direction, and Bentpath Line (County Road 2) to the north, which runs in an east-west direction. The site is traversed by Smith Line in an east-west direction approximately 1.4 km south of the Baseline Road and Bentpath Line intersection. The closest roadway to the south is Holt Line and to the east is Highway 40.



The site is located in Lambton County. All roads fall under the jurisdiction of the Township of St. Clair Municipality (see **Figure 1**) except Bentpath Line, which falls under county jurisdiction, and Highway 40, which falls under the jurisdiction of the Ministry of Transportation of Ontario (MTO). Posted speed limits and other related roadway data can be found in **Table 1**. The topography of the site and its environs is generally flat. All roads except Highway 40 have a rural cross section, with two traffic lanes and gravel shoulders.

Highway 40 is a two-lane provincial highway with gravel shoulders and is located to the east of the site. Southbound on Highway 40 there is a designated lane turning west onto Bentpath Line. This route could be used as the main route to the site. It currently has an average annual daily traffic (AADT) volume of approximately 10,700 vehicles per day (veh/day). This highway has a posted speed limit of 80 km/hr.

Bentpath Line, west of Highway 40, is a two-lane, county roadway with gravel shoulders. The posted speed limit on Bentpath Line is 90 km/hr. There are stop signs on Bentpath Line east and west of Highway 40. AADT as recorded in 2005 along Bentpath Line 0.3 km east of the St. Clair Parkway is 900 veh/day. Baseline Road, between Bentpath Line to the north and Holt Line to the south, is a municipal, gravel roadway with gravel shoulders and no posted speed limits. There are stop signs on Baseline Road to the north and south of Bentpath Line, Smith Line and Holt Line.

St. Clair Sombra Solar Farm is located in a designated agricultural area.

2.0 SITE DEVELOPMENT PROPOSAL

First Solar plans to initiate construction in 2010 after approvals are obtained and finish construction in 2011. Ultimately, the site will consist of a total generating capacity of 20 MW. It is anticipated that major deliveries will occur over a seven-month period, from April 15 to November 15, using 16.15 m (53 ft.) transports for solar modules and 13.7 m (45 ft.) flatbeds for pre-cast concrete mounting pads. Additional trucks associated with deliveries of construction materials and support are anticipated. A maximum workforce of approximately 80 full-time construction staff will be utilized during times of peak activity. For the purpose of this analysis, it is assumed that the material delivery trucks will be carrying panels, inverters and construction materials (cement, gravel and sand). **Table 2** presents a summary of the projected truck and other vehicular traffic anticipated during the peak July to October period of construction activity. There are no specific weight requirements and the trucks will be subject to normal load restrictions. Employee traffic (light vehicles) of up to 160 two-way vehicle trips per day during heightened construction activity is anticipated. Post-construction, employee traffic will be significantly reduced, consisting primarily of maintenance traffic.

3.0 SITE ACCESS

As indicated on **Figure 2**, the primary construction access for the St. Clair Sombra Solar Farm is located on Bentpath Line and is approximately 700m east of Baseline Road. Two entrances were previously considered on Baseline Road. These previous entrances were located approximately 700 m south of Bentpath Line and 700 m north of Smith Line. The secondary construction entrance is located approximately 200 m south of Smith Line.

The selected entrance is intended to be the site access and would be used for all commercial traffic, material delivery, employees and visitors. **Table 1** presents a summary of the advantages and disadvantages of each of the three (3) locations that were considered for entrance locations.

4.0 ANALYSIS

There are three major directions of approach to the site: one from Windsor, another from Port Huron and a third from the Greater Toronto Area (GTA). Commercial traffic coming from Windsor is assumed to travel eastbound on Highway 401, then north-eastbound along King's Highway 2 (County 2), and then north-westbound along Highway 40. Commercial traffic travelling from Port Huron is assumed to travel eastbound along Highway 402 and then southbound along Highway 40. Commercial traffic travelling from the GTA is assumed to travel south-westbound along Highway 401, then westbound along Highway 402 and then southbound along Highway 40.

The intersection of these highways has been designed to accommodate heavy truck movement and can accommodate the movement of trucks generated by the site during the peak construction period. Highway 40 is interrupted at Churchill Line and resumes southbound 5.5 km further west on Churchill Line. There is a height restriction at the Highway 402 overpass at Christina Street (County Road 7). All commercial traffic will be following the Highway Traffic Act. No restrictions are anticipated at this point. In the rare case where a detour is required due to height restrictions, trucks can use County Road 29 via County Road 16 and 33 to continue on Highway 402. Due to the close proximity between the Port Huron border crossing and the St. Clair sites, it would be preferable to have all truck deliveries from Port Huron rather than from Windsor or the GTA. Township of St. Clair municipal representatives indicated that conflicts between transport trucks and other traffic are only anticipated in the event that the St. Clair Parkway (west of the site) is used.

During the data collection process, Township of St. Clair municipal representatives indicated that the proposed primary site entrance to the St. Clair Sombra Solar Farm site on Baseline Road north of Smith Line would be better suited than the secondary entrance to accommodate employee / visitor use and commercial traffic access for construction support, as it is closer to Bentpath Line which is a county roadway. Access at this location has good visibility for both approaching and departing vehicles.

Separate turning lanes from southbound Highway 40 onto Bentpath Line already exist. Based on the assumed direction of approach and the projected traffic generation by the First Solar construction site, it is the opinion of the Township of St. Clair municipal representatives that the existing road system will require minor road and ditch widening to accommodate the projected traffic demand from a traffic capacity and operations perspective regardless of the location of the construction entrance. The volumes of traffic utilizing the primary entrance are projected to be relatively light and will consist of normal sized truckloads by WB-17 or lesser design vehicles. The provincial highway and county roads are designated truck routes and are designed accordingly. Township of St. Clair municipal representatives indicated that the condition of the existing roads would require inspection prior to and after construction with the developers and municipal staff. Also, preferred haul routes will need to be confirmed with municipal staff during the approvals stage. The overall objective would be to, at minimum, restore the roadways to their conditions prior construction.

Based on this preliminary analysis, we have concluded that the preferred access configuration for the St. Clair Sombra Solar Farm site is to have the primary construction entrance on Bentpath Line, approximately 700m east of Baseline Road. This entrance should be adequate to accommodate all commercial traffic, material delivery, employees and visitors.

5.0 ACCESS DESIGN REQUIREMENTS

The access should be designed to provide two five-metre wide traffic lanes (one lane inbound and one lane outbound). Corner radii should be designed to accommodate the movements of WB-17 design vehicles (with at least 15 m radii). Daylighting should be provided in accordance with County and/or Ministry of Transportation requirements. All driveways should adhere to Municipal standards for commercial access. Due to low opposing traffic volume on the boundary roads, tapers or auxiliary turning lanes will not be warranted at either access.

Table 1: Summary of Access Locations

Site	Access Location	Jurisdiction	Posted Speed (km/h)	Advantages	Disadvantages
St Clair Sombra (Primary Entrance)	Bentpath Line	Lambton, County	None	<ul style="list-style-type: none">• Designated turning lanes onto Bentpath Line from Hwy 40• Bentpath Line is in reasonable condition• Good visibility• No Gravel Roads	<ul style="list-style-type: none">• Bentpath Line is the main access route from Hwy 40 to the town of Sombra (900 veh/day)

Site	Access Location	Jurisdiction	Posted Speed (km/h)	Advantages	Disadvantages
St. Clair Sombra Solar Farm	Baseline Road (east)	Lambton County, Township of St. Clair	None	<ul style="list-style-type: none"> • Designated turning lanes onto Bentpath Line from Hwy 40 • Bentpath Line is in reasonable condition • Good visibility • No Gravel Roads 	<ul style="list-style-type: none"> • Bentpath Line is the main access route from Hwy 40 to the town of Sombra (900 veh/day)
St. Clair Sombra Solar Farm	Baseline Road (east)	Lambton County, Township of St. Clair	None	<ul style="list-style-type: none"> • Good visibility 	<ul style="list-style-type: none"> • If access from Smith Line: gravel road • If access from Bentpath Line: further distance and additional stop at Smith Line

Table 2: Site Traffic Generation (20MW)

Anticipated MW to be Constructed		20
Construction Period April 15 - November 15 (months)		7
Construction Period (working days)		153
Total Inbound Commercial Traffic during Construction Period ¹		5,210
Peak Inbound Commercial Traffic Volume Per Day ²		58
Peak Two-Way Total Commercial Traffic Volume Per Day		116
Construction Employees		80
Employee Vehicle Trips Per Day		160
Visitor Trips Per Day (5% of Employee Trips Per Day)		8
Peak Two-Way Total Auto Volume Per Day		168
Peak Two-Way Total Vehicle Volume Per Day		284
Peak Hourly Traffic Generation During Peak Construction (July – October)		
Auto	Inbound	80
	Outbound (5% of Peak Inbound)	4
Commercial Traffic ³	Inbound	8
	Outbound	8
Total	Inbound	88
	Outbound	12
Total Peak Hourly Traffic Generation (veh/hr)		100

Notes:

1. Total inbound commercial traffic volume over a 7-month construction period for 20 MW includes 1618 trucks for module delivery, 1796 trucks for rack delivery and 1796 trucks for BOS (inverters, transformers, cable).
2. Peak commercial traffic generation as per **Table 3**.
3. Hourly commercial traffic volumes are based on an 8-hour working day.

Table 3: Estimated Commercial Traffic Generation

Start	End	Week Days	Modules/ day	Racks/ day	BOS/ day	Trucks/ day	Total	Cumulative Total
15-Apr	15-May	23	6	6	6	18	414	414
16-May	15-Jun	21	8	8	8	24	504	918
16-Jun	15-Jul	22	10	16	16	42	924	1842
16-Jul	15-Aug	22	18	20	20	58	1276	3118
16-Aug	15-Sep	22	14	16	16	46	1012	4130
16-Sep	15-Oct	22	10	10	10	30	660	4790
16-Oct	15-Nov	21	8	6	6	20	420	5210

Closure

This report is provided for the information and use of First Solar only and is specific to the St. Clair Sombra Solar Farm site. Third party reliance on the information is at the sole risk of the third party.

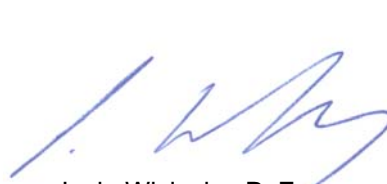
We trust that you find this analysis satisfactory. Please contact the undersigned at 905-567-4444 should further comment or clarification be required. This report replaces all other draft or versions provided by Golder Associates Ltd.

Limit of Use

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Darcy Cowan
Associate



Irwin Wislesky, P. Eng
Principal

AL/DC/dh/DCIW/dh/DC

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Attachments: Figure 1: Regional Map

Figure 2: St. Clair Solar Sombra Solar Farm Location

Appendix A: Site Reconnaissance Photos – St. Clair Sombra Solar Farm

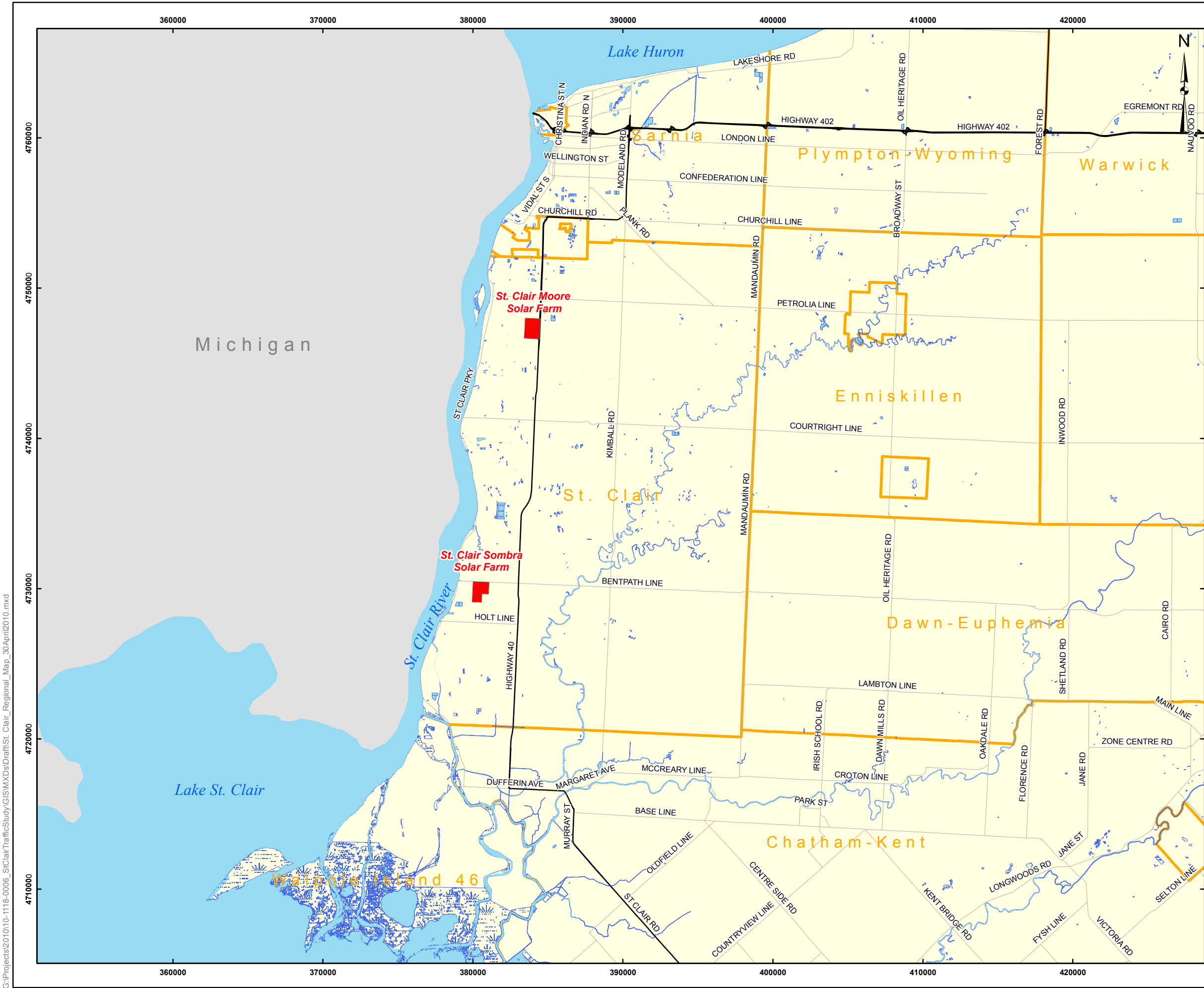


APPENDIX A

Site Reconnaissance Photos - St. Clair Sombra Solar Farm



FIGURES

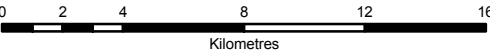



LEGEND

- Site Location
- Highway
- Local Road
- Waterbody
- Wetland
- Municipal Boundary

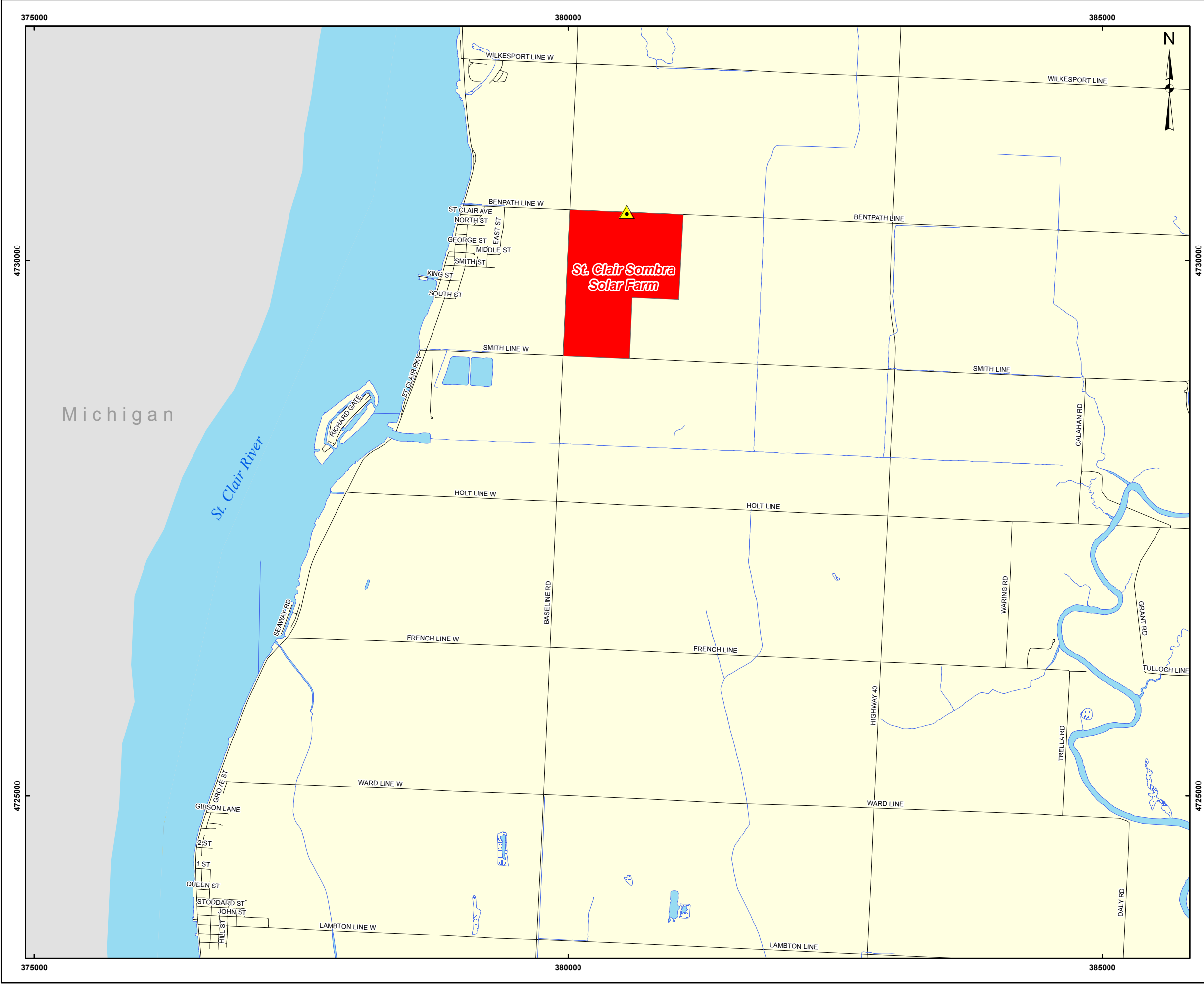
REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17



PROJECT	FIRST SOLAR TRAFFIC STUDIES			
TITLE	REGIONAL MAP			
 Mississauga, Ontario	PROJECT No. 10-1118-0006		SCALE: 1:250,000	REV. 0.0
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	GIS	CGE	30 Apr. 2010	
	CHECK	AL	30 Apr. 2010	
	REVIEW	DC	30 Apr. 2010	

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LEGEND

- Proposed Primary Construction Entrance
- Site Location
- Roads
- Watercourse
- Waterbody
- Wetland

REFERENCE

Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4
Produced by Golder Associates Ltd under licence from
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Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

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ST. CLAIR SOMBRA SOLAR FARM																							
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