Report

ORTECH Power
a division of ORTECH Consulting Inc

Design and Operations Report
Silvercreek Solar Park

Submission to:

Ministry of the Environment
Renewable Energy Approval Unit
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SUMMARY OF CHANGES – Construction Plan Report

The following changes have been made to this report to update it from the report released in August of 2012.

1. The proponent has opted to remove the provision for a tracking installation at the solar array due to requirements to meet domestic content provisions. As a result the layout of the solar array and the inverter locations has been altered slightly. The text has been revised to state that a fixed installation will be utilized, and maps of the array location have been updated to reflect the fixed tilt installation
2. As a result of consultations with the Township of Malahide minor changes to access roads on the Solar Array site were changed to allow for better emergency access in case of fire. This is reflected in the updated site layouts and diagrams.
3. As a result of stakeholder consultations the site map was updated to clarify the area between the Solar Array fence and the roadway will continue to be farmed as part of an agricultural operation.
4. The onsite laydown area has been removed due to archaeological considerations and all storage will occur offsite in a storage area such as a barn or multipurpose storage facility. The report has been updated to reflect this change
5. Section 2.2 Archaeological Resources was updated to reflect ongoing work on the Stage 3 & 4 archaeological assessment
6. Some minor typographical errors were corrected throughout the report as a result some page numbers and section headings have changed.
7. As a result of the layout change the Waterbodies report in Appendix 3 and the Noise Impact Assessment in Appendix 5 have been updated.
8. Section 2.3 has some minor updates to reflect the updates resulting from the layout change at the Solar Array site.

1. INTRODUCTION

1.1 Project Background and Location

Silvercreek Solar Park Inc. ("Silvercreek") is proposing to construct and operate a ground-mounted photovoltaic solar project ("the Project") in the Township of Malahide, Elgin County, Ontario, 9 km south of the town of Aylmer (Figure 1). The proposed project will have a total capacity of 10 megawatts (MW) generating approximately 18 gigawatt hours (GWh) of electricity annually. The 35.6 hectare (88 acre) project area is located on privately owned land, which has been in agricultural production for many years.

On July 1, 2012, amendments to Ontario Regulation 359/09 (O.Reg 359/09), the Renewable Energy Approvals Regulation, came into force. This amendment allowed for projects which were significantly advanced to continue under the previous regulation. Given that Proponent has completed a significant amount of progress towards completion of the REA, they have opted to continue under the January 2011 requirements.

1.2 Project Components

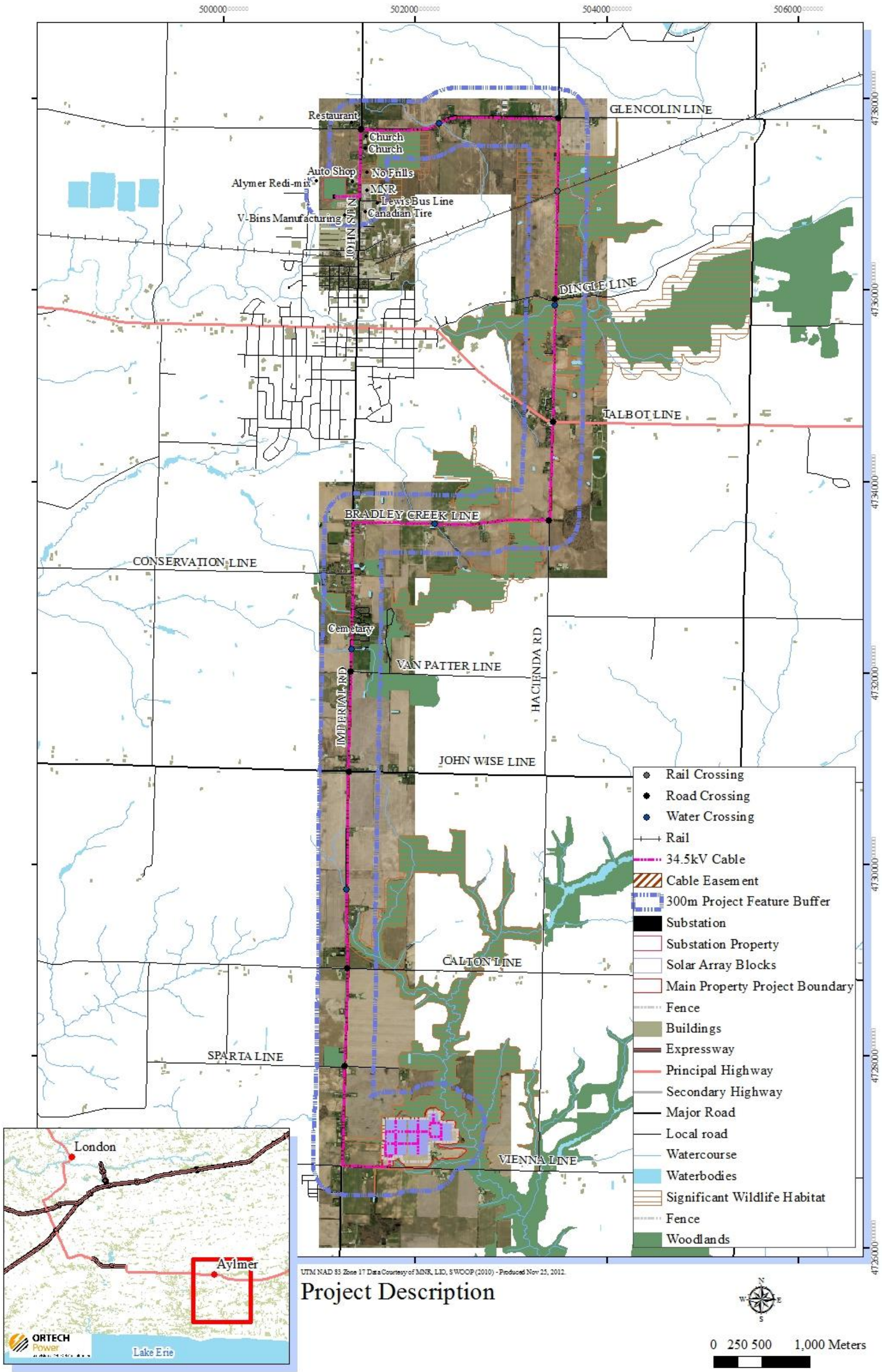
The Project involves construction, operation and decommissioning of a 10 MW ground-mounted photovoltaic solar park consisting of approximately 46,000 290 watt polycrystalline solar panels. Eight inverters and transformers will be required to convert direct current (DC) power generated by the panels to alternating current (AC) at a stepped up distribution line voltage of 34.5kV. The project will require an on-site electrical house (e-house), 15 km of underground 34.5 kV distribution line and an off-site substation to connect to the Hydro One 115 kV Transmission Station located north of the town of Aylmer.

The project area may require a temporary off site staging area for assembly of project components and storage of equipment, supplies, and materials during the construction period. In the event this is required storage and staging will occur in an existing barn located within reasonable proximity to the facility which is used for housing equipment, or in a multipurpose storage area located in the Town of Aylmer. Regardless of the option no construction or modification to these structures or areas will be required. The entire facility will be secured with a fence and a gate and locked; signs will be in place to warn the public of electrical danger.

The site layout is illustrated in Figure 1. A more detailed Site Plan can be found in Figures 2, 3 and 4.

The location of the substation and distribution line relative to natural features is shown in Figure 5.

Figure 1: Project Location



2. SITE PLAN

2.1 Project Components

Figure 2: Site Plan – Solar Array & Connection Route

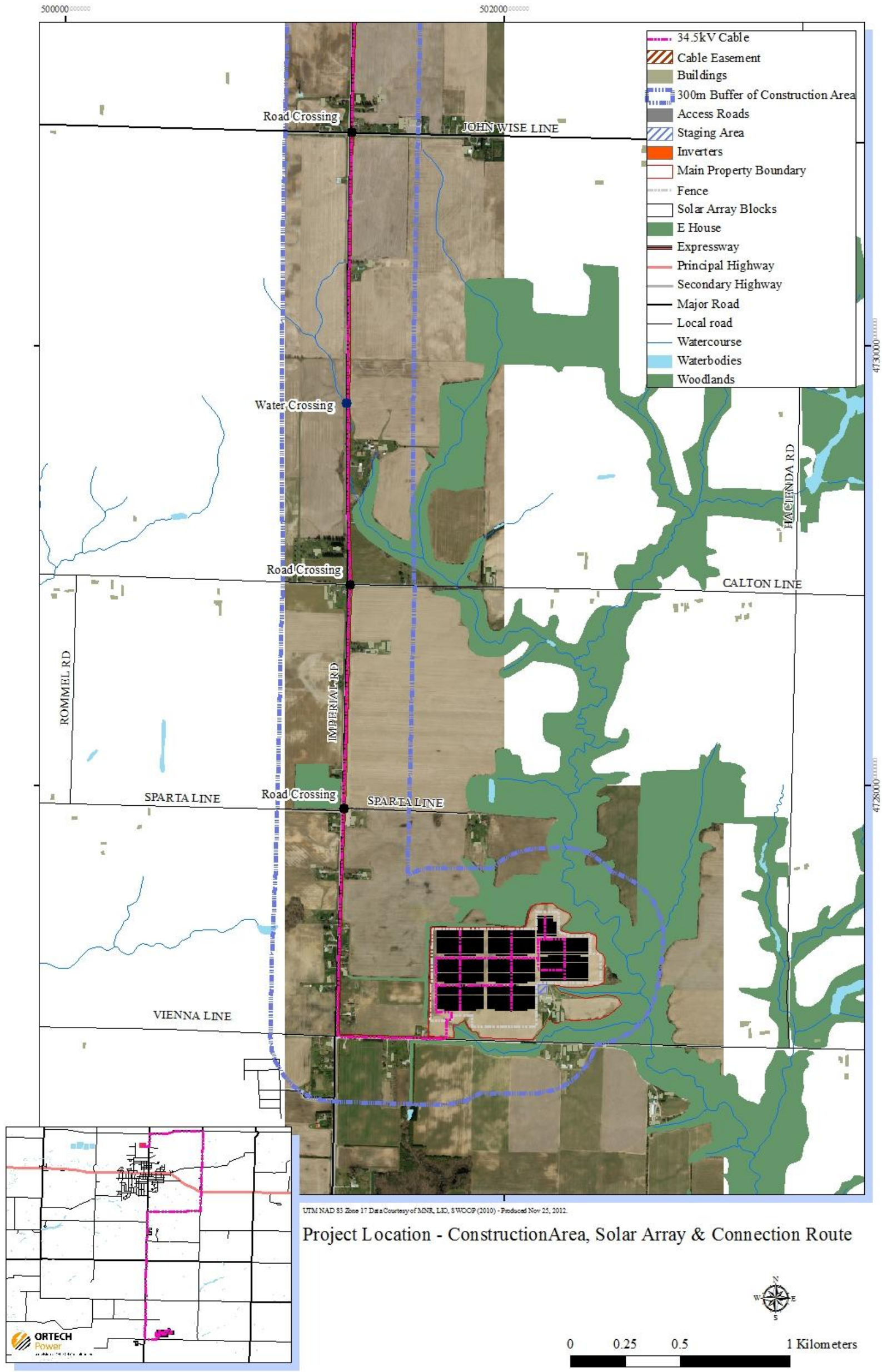


Figure 3: Site Plan –Connection Route - Continued

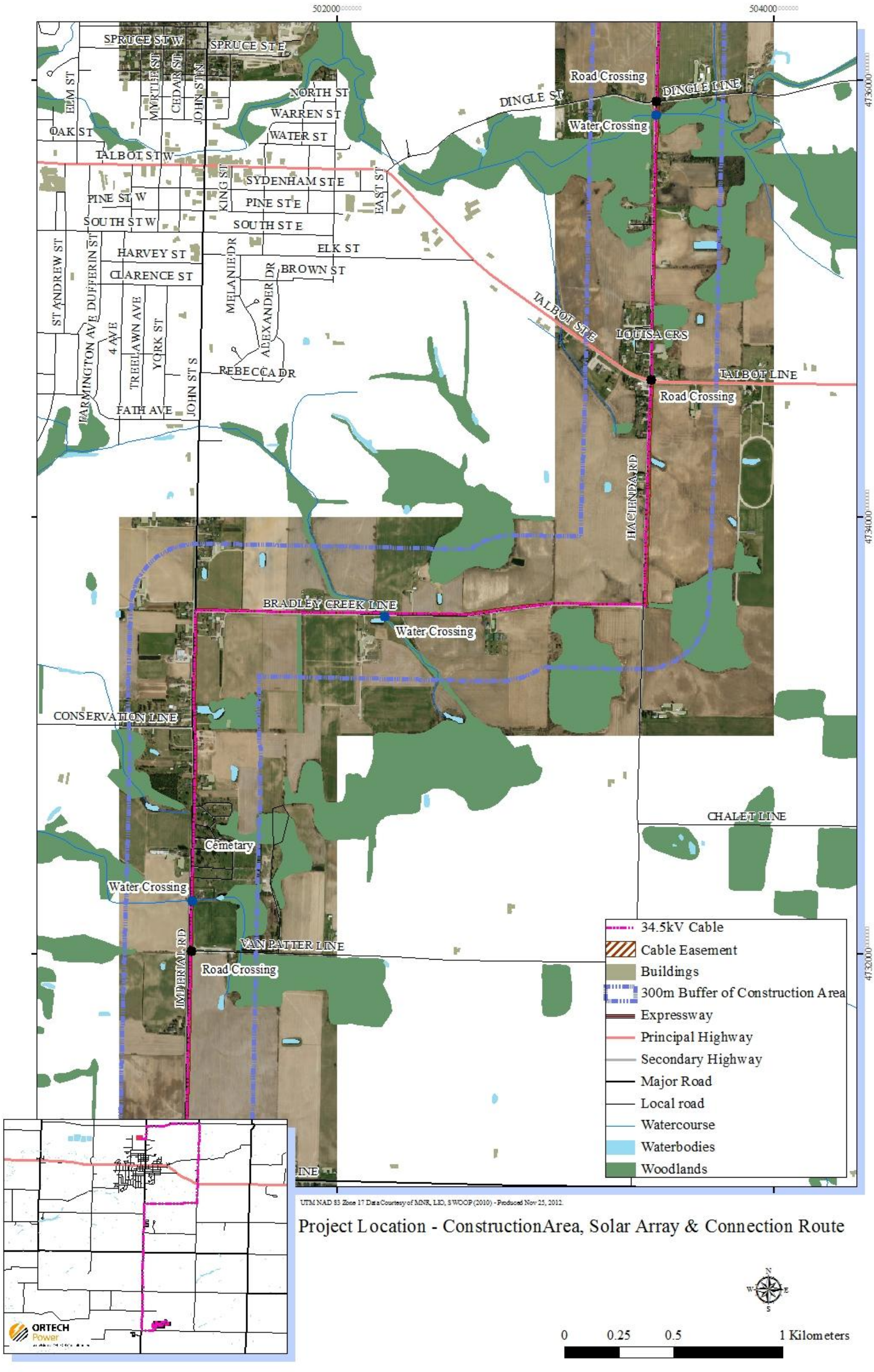
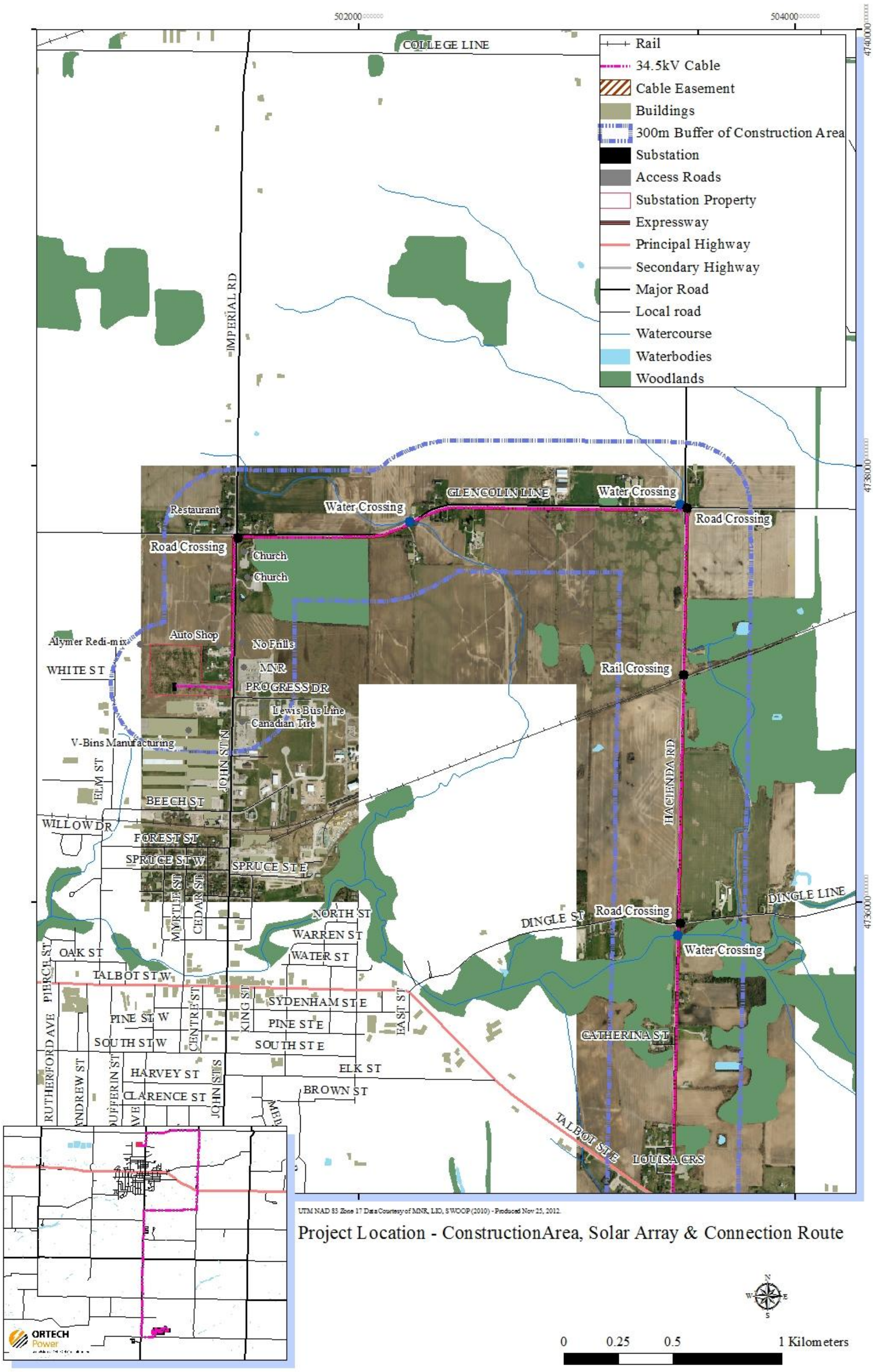


Figure 4: Site Plan – Connection Route & Substation



2.2 Cultural/Natural Features and Water Bodies

Heritage Resources
ORTECH completed a review and summary of heritage resources within 300m of the project in July of 2012. This review concluded that based upon consultations and review of cultural heritage information sources no protected properties, as listed in Section 19, Table 1 of the REA regulation were identified within 300 m of the project location, including the distribution line route.

Archaeological Resources
A stage one archaeological assessment and pedestrian survey was completed on November 26, 2009. This survey concluded that the field portion of the property has archaeological potential arising from the proximity to the Silver Creek watercourse, sandy soils of the region and the agricultural settlement history of the township. The survey concluded that proposed surface or subsurface impacts resulting from construction, utility installation, material storage and machine travel may affect unrecorded archaeological resources within the project area (Timmins, January 2010).

A Stage 2 assessment was required and completed in April of 2010. This survey found several locations considered to be of potential archaeological significance. Due to these findings a Stage 3 and 4 assessment was required. This process was completed in the summer of 2012 in accordance with the requirements of the Ministry of Culture. Further information on locations of Archaeological significance impacting the Project can be found through contacting the Ministry of Culture Tourism and Sport directly.

A Stage 1 & 2 assessment on the distribution line, and sub-station location was required and completed in December of 2011. This assessment found no items of archaeological significance and no further study is required.

Natural Heritage Resources
Information about potential impacts on natural heritage resources is crucial for the proposed development and project activities. In October of 2009, ORTECH retained on behalf of the proponent Natural Resource Solutions Inc. (NRSI) to prepare a natural heritage assessment of the project location. The goal of this assessment was to identify features which may influence the location of project components and to identify and address any potential impacts resulting from the proposed facility on natural heritage features.

The project area is mostly agricultural land, which is surrounded by wooded areas associated with the Silvercreek watershed at the northern and eastern boundaries of the project area, and hedgerows at the west and northwest boundaries of the project area. The adjacent Silvercreek valley is considered to be significant valleylands which may provide habitat for breeding birds. The substation property

is located on a white pine plantation, and is bordered by areas of agricultural and industrial operations.

The assessment evaluated potential impacts of the project on significant natural areas and came to a conclusion that the project can successfully mitigate or avoid any and all impacts. Further details can be found in the *Silvercreek Solar Park Natural Heritage Assessment* (2012).

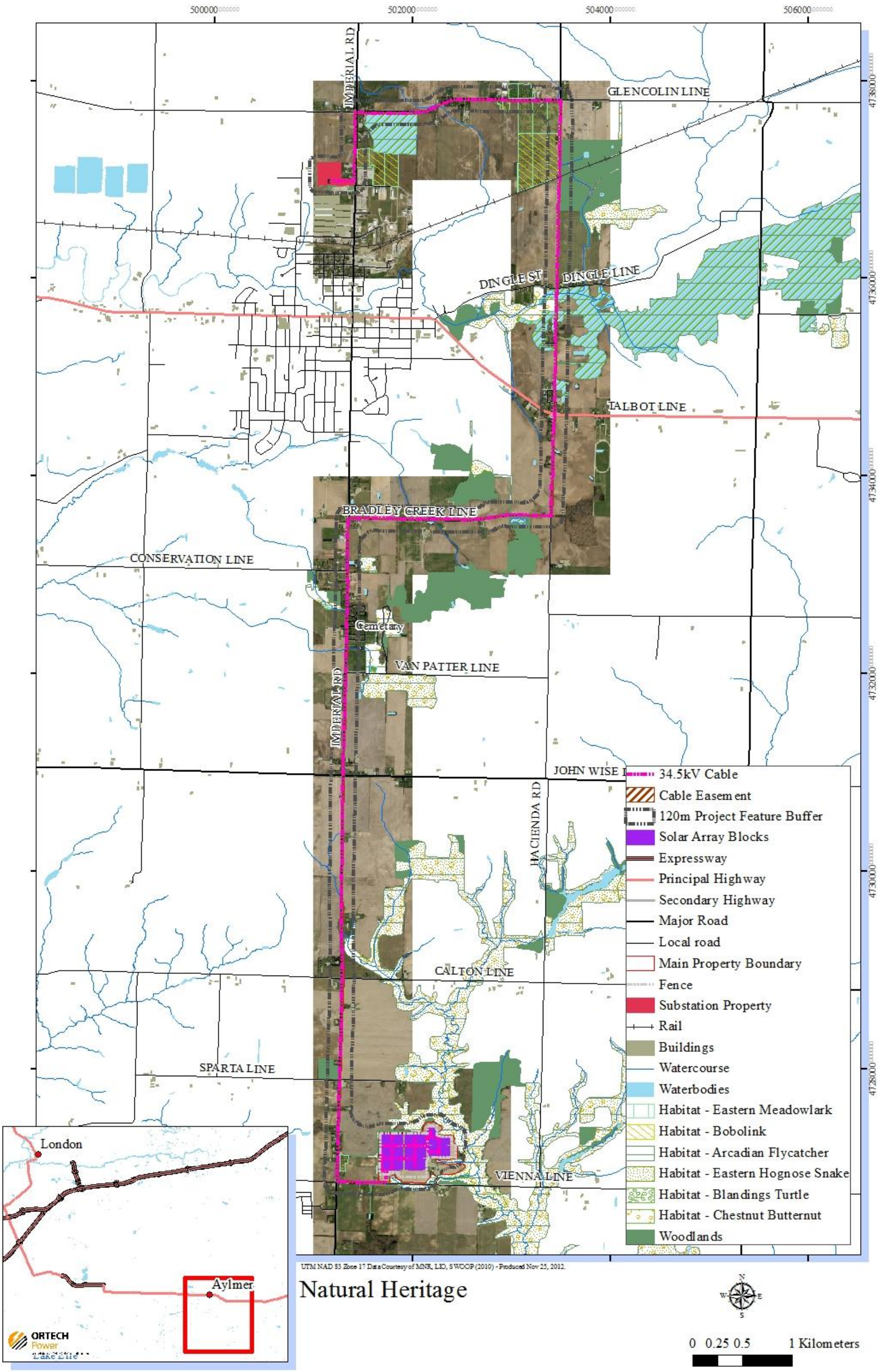
Water Bodies

A detailed assessment of the water bodies within and adjacent to the proposed Silvercreek Solar Park project was performed by Natural Resource Solution Inc. (NRSI) between 2010 and 2012. This assessment included a records review, site investigation and an environmental impact statement.

Through the completion of these studies, NRSI has confirmed the presence of 12 water bodies within the project area, of which 10 have been identified as intermittent/permanent water bodies and 2 have been identified as seepage areas. No lakes or Lake Trout lakes were identified within the Silvercreek Solar Park area.

All the potential impacts identified may occur as a result of construction activities and will be transient in nature. If recommended mitigation measures are employed as described in the Waterbodies Report (NRSI 2012), no significant impacts are anticipated on the identified water body features as a result of the development of the Silvercreek Solar Park Project.

Figure 5: Project Site – Waterbodies, Cultural & Natural Features



2.3 Noise Receptors

An acoustic assessment report (AAR) was undertaken by HGC Engineering in May 2012 (Updated November 2012) to ensure that the facility is in compliance with the most restrictive limits for all receptors based on the sound level limit in MOE noise guideline NPC-232. The solar park site is considered a Class 3 (rural) area under MOE noise assessment guidelines, with the most restrictive 'predictable worst case' sound level limit of 40 dbA (night time).

The lands surrounding the Silvercreek facility are generally zoned for agricultural use. Forty-five points of reception have been considered in this assessment in order to represent the existing residential dwellings and vacant lots, which permit noise sensitive use, within 1000 m of the proposed equipment at the solar facility, labeled as locations R01 through R45 in Figure 6. One house (marked as location O1) located in the property/parcel of the project, is owned by the proponent and has not been included in this assessment pursuant to Ontario Regulation 359/09 (HGC Engineering 2012).

During the operation of the solar facility, the main source of noise emissions will be the collection houses which include a secondary transformer and two inverters. The solar panels themselves are passive and do not produce sound and are therefore not considered to be sources of noise. Additionally, tracking panel motors will emit modest sound which is considered acoustically insignificant.

Sound level impacts from the project are predicted to be well within the provincial noise guideline values as shown in Table 1.

Substation

The substation, located on Imperial Road, is considered a Class 2 area under MOE noise assessment guideline NPC-233, with the most restrictive 'predictable worse case' sound level limit being 45 dbA (night time) due to the background sound in the vicinity of the site during a 2011 site visit being dominated by road traffic.

The lands surrounding the substation to the south and east are primarily industrial use, while the lands to the north are agricultural, with residential areas to the south. Two hundred and six points of reception have been considered in this assessment in order to represent the existing residential dwellings and vacant lots, which permit noise-sensitive use, within 1000,m of the proposed equipment at the substation facility, labeled as R001 through R206 in Figure 6.

During operation of the substation the main source of noise emission will be the transformer station. Sound level impacts from the substation are predicted to be well within the provincial noise guideline values as shown in Table 2. Key points of reception considered in the noise assessment for the substation site are shown

on Figure 7. During the operation of the substation, the main source of noise emissions will be from the transformer equipment required to step up the voltage from 34.5 kV to 115 kV.

It is not anticipated that the connection route will result in any operational noise and it has therefore not been included in the assessment.

Table 1: Noise Receptor Summary (Solar Array)

Table A3: Acoustic Assessment Summary Table

Point of Reception	Point of Reception Description	UTM Coordinates [m]		Sound Level at Point of Reception, LEQ [dBA]	Verified by Acoustic Audit	Performance Limit, LEQ [dBA]	Compliance with Performance Limit
		X	Y				
R01	Existing Dwelling	501641	4726886	38	No	40	Yes
R02	Vacant Lot	501636	4726793	36	No	40	Yes
R03	Existing Dwelling	501609	4726877	38	No	40	Yes
R04	Existing Dwelling	501544	4726739	34	No	40	Yes
R05	Existing Dwelling	501456	4726779	34	No	40	Yes
R06	Vacant Lot	501392	4726790	33	No	40	Yes
R07	Existing Dwelling	501283	4726798	32	No	40	Yes
R08	Existing Dwelling	501311	4726198	27	No	40	Yes
R09	Existing Dwelling	501194	4726494	28	No	40	Yes
R10	Existing Dwelling	501099	4726596	28	No	40	Yes
R11	Existing Dwelling	501187	4726719	30	No	40	Yes
R12	Existing Dwelling	501192	4726754	30	No	40	Yes
R13	Existing Dwelling	501194	4726786	30	No	40	Yes
R14	Existing Dwelling	501144	4726832	30	No	40	Yes
R15	Existing Dwelling	501290	4726948	33	No	40	Yes
R16	Existing Dwelling	501194	4727082	32	No	40	Yes
R17	Existing Dwelling	501277	4727150	33	No	40	Yes
R18	Existing Dwelling	501202	4727180	32	No	40	Yes
R19	Existing Dwelling	501276	4727228	33	No	40	Yes
R20	Existing Dwelling	501206	4727251	32	No	40	Yes
R21	Existing Dwelling	501280	4727260	33	No	40	Yes
R22	Existing Dwelling	501211	4727304	31	No	40	Yes
R23	Existing Dwelling	501278	4727340	32	No	40	Yes
R24	Existing Dwelling	501214	4727359	31	No	40	Yes
R25	Existing Dwelling	501211	4727398	31	No	40	Yes
R26	Vacant Lot	501205	4727491	31	No	40	Yes
R27	Vacant Lot	501300	4727486	32	No	40	Yes
R28	Existing Dwelling	501319	4727587	31	No	40	Yes
R29	Existing Dwelling	501176	4727591	30	No	40	Yes
R30	Existing Dwelling	501208	4727824	28	No	40	Yes
R31	Existing Dwelling	501226	4727857	28	No	40	Yes
R32	Existing Dwelling	501312	4727849	29	No	40	Yes
R33	Existing Dwelling	501230	4728012	27	No	40	Yes
R34	Vacant Lot	501758	4727835	32	No	40	Yes
R35	Existing Dwelling	501855	4727814	32	No	40	Yes
R36	Existing Dwelling	501901	4727838	32	No	40	Yes
R37	Existing Dwelling	502167	4727922	31	No	40	Yes
R38	Existing Dwelling	503138	4726842	26	No	40	Yes
R39	Vacant Lot	503052	4726779	27	No	40	Yes
R40	Vacant Lot	502841	4726863	30	No	40	Yes
R41	Existing Dwelling	502714	4726587	29	No	40	Yes
R42	Existing Dwelling	502441	4726859	35	No	40	Yes
R43	Existing Dwelling	502348	4726797	36	No	40	Yes
R44	Existing Dwelling	502236	4726787	37	No	40	Yes
R45	Vacant Lot	501800	4726110	28	No	40	Yes

Figure 6: Location of Points of Reception (Solar Array)

Note: 01 represents the participating landowner and therefore excluded from acoustical analysis.

Figure 7: Location of Points of Reception (Substation Site)

Table 2: Noise Receptor Summary (Substation Site)

Point of Reception	Point of Reception Description	UTM Coordinates [m]		Sound Level at Point of Reception, LEQ [dBA]	Verified by Acoustic Audit	Performance Limit, LEQ [dBA]	Compliance with Performance Limit
		X	Y				
R001	Residential Dwelling	500383	4737750	18	No	45	Yes
R002	Residential Dwelling	500435	4737662	19	No	45	Yes
R003	Residential Dwelling	500831	4737656	22	No	45	Yes
R004	Residential Dwelling	500901	4737648	23	No	45	Yes
R005	Residential Dwelling	500973	4737714	22	No	45	Yes
R006	Residential Dwelling	500984	4737654	23	No	45	Yes
R007	Residential Dwelling	501006	4737717	22	No	45	Yes
R008	Residential Dwelling	501035	4737654	23	No	45	Yes
R009	Residential Dwelling	501082	4737727	22	No	45	Yes
R010	Residential Dwelling	501220	4737729	22	No	45	Yes
R011	Residential Dwelling	501325	4737714	22	No	45	Yes
R012	Residential Dwelling	501401	4737979	19	No	45	Yes
R013	Residential Dwelling	501402	4737939	19	No	45	Yes
R014	Residential Dwelling	501398	4737861	20	No	45	Yes
R015	Residential Dwelling	501402	4737815	21	No	45	Yes
R016	Residential Dwelling	501400	4737793	21	No	45	Yes
R017	Residential Dwelling	501398	4737727	22	No	45	Yes
R018	Residential Dwelling	501405	4737704	22	No	45	Yes
R019	Residential Dwelling	501473	4737766	21	No	45	Yes
R020	Residential Dwelling	501482	4737721	22	No	45	Yes
R021	Residential Dwelling	501531	4737740	21	No	45	Yes
R022	Residential Dwelling	501572	4737747	21	No	45	Yes
R023	Institutional Facility	501505	4737593	23	No	45	Yes
R024	Institutional Facility	501522	4737488	24	No	45	Yes
R025	Residential Dwelling	501402	4737415	27	No	45	Yes
R026	Residential Dwelling	501386	4737098	33	No	45	Yes
R027	Residential Dwelling	501379	4737049	34	No	45	Yes
R028	Residential Dwelling	501387	4737026	33	No	45	Yes
R029	Residential Dwelling	501386	4736859	28	No	45	Yes
R030	Residential Dwelling	500956	4736401	20	No	45	Yes
R031	Residential Dwelling	501075	4736401	20	No	45	Yes
R032	Residential Dwelling	501115	4736397	20	No	45	Yes
R033	Residential Dwelling	501145	4736400	20	No	45	Yes
R034	Residential Dwelling	501161	4736397	20	No	45	Yes
R035	Residential Dwelling	501188	4736396	20	No	45	Yes
R036	Residential Dwelling	501222	4736387	20	No	45	Yes
R037 - R206	Residential Dwellings and Vacant Lots	Available upon request		<20	No	45	Yes

3. FACILITY DESIGN PLAN

3.1 Photovoltaic Modules

The solar panels used for the project will be delivered to the project site in cardboard boxes, transported by trucks. Each solar panel has a rated power of 290 watts. The panels consist of individual solar cells electrically connected. The solar panels, in turn, are connected to form larger units, termed arrays.

Photovoltaic cells are made of a semiconducting material, generally silicon. The sun-facing side of the solar cells is covered with glass or plastic (ethylene vinyl acetate) placed above the semiconducting layer, which is in turn covered with an antireflective coating to reduce reflection losses. The back side of the solar cells usually consists of a layer of aluminum. The Project will use fixed tilt panels mounted at a 30 degree angle. Steel support posts will be installed into the ground to a depth of 4 m. It is estimated that 12,540 posts will need to be installed.

The depth and height of the steel support posts will be adjusted as required to provide a level plane for the solar arrays. This approach to the design of the project will eliminate the need to alter the topography, and hence drainage patterns, of the property. Although the solar panels are impervious to precipitation, the land underneath will remain unaltered, as drainage rates and patterns from the site will remain relatively unchanged. On-site gravel access roads represent less than 1% of the overall project area and, with the exception of the entranceway, are located more than 30 m away from water bodies. An improvement in the quality and reduction in the maximum peak surface runoff from the site, which consists of rapidly draining soils, is predicted based upon a stormwater assessment conducted for the project.

Photovoltaic panels will generate an electric current that will travel through buried cables to inverter and transformer units.

Detailed equipment specifications are provided in Appendix 1.

Figure 8: Facility Design – Solar Array

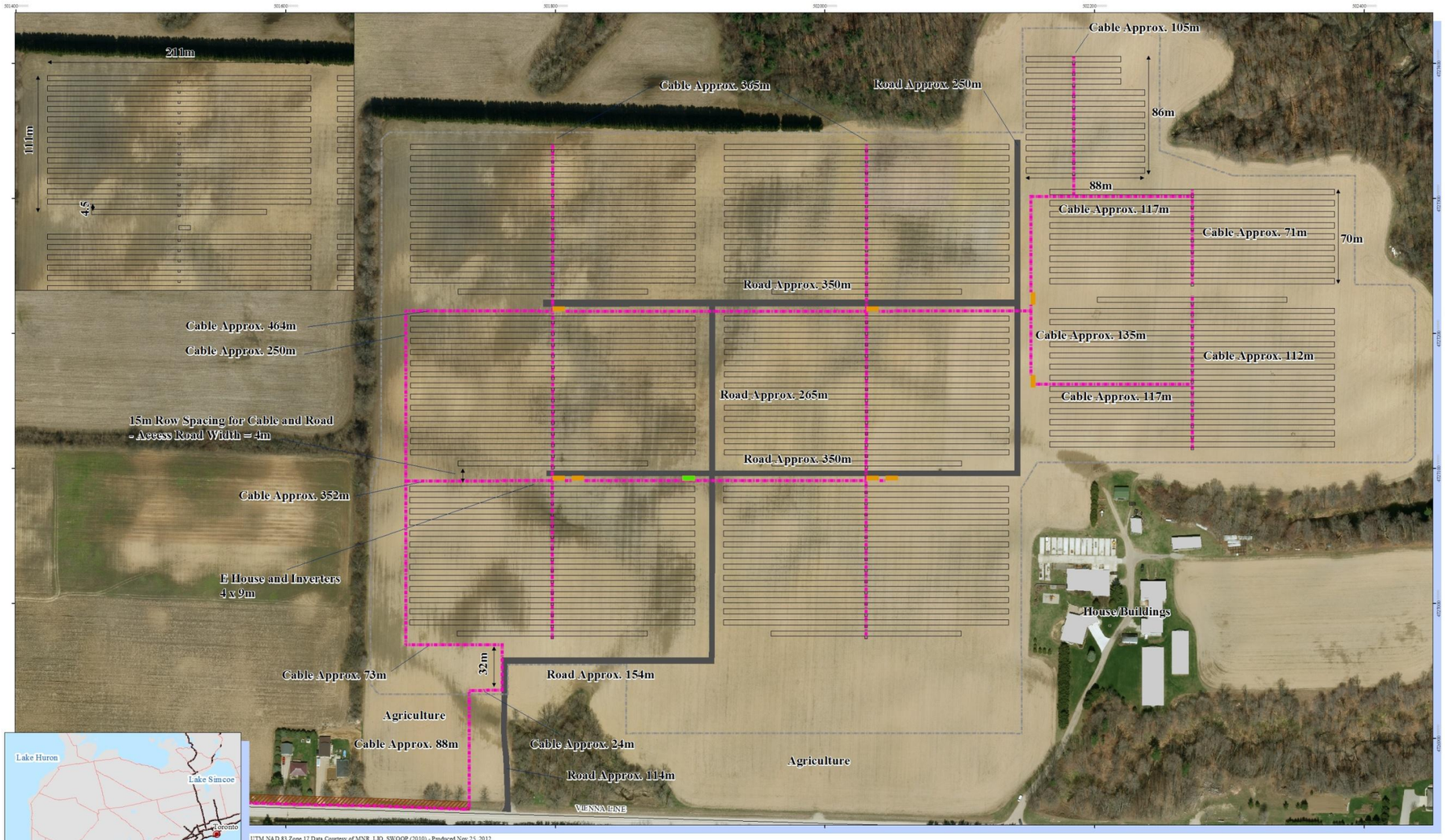


Figure 9 – Facility Design – Connection Route

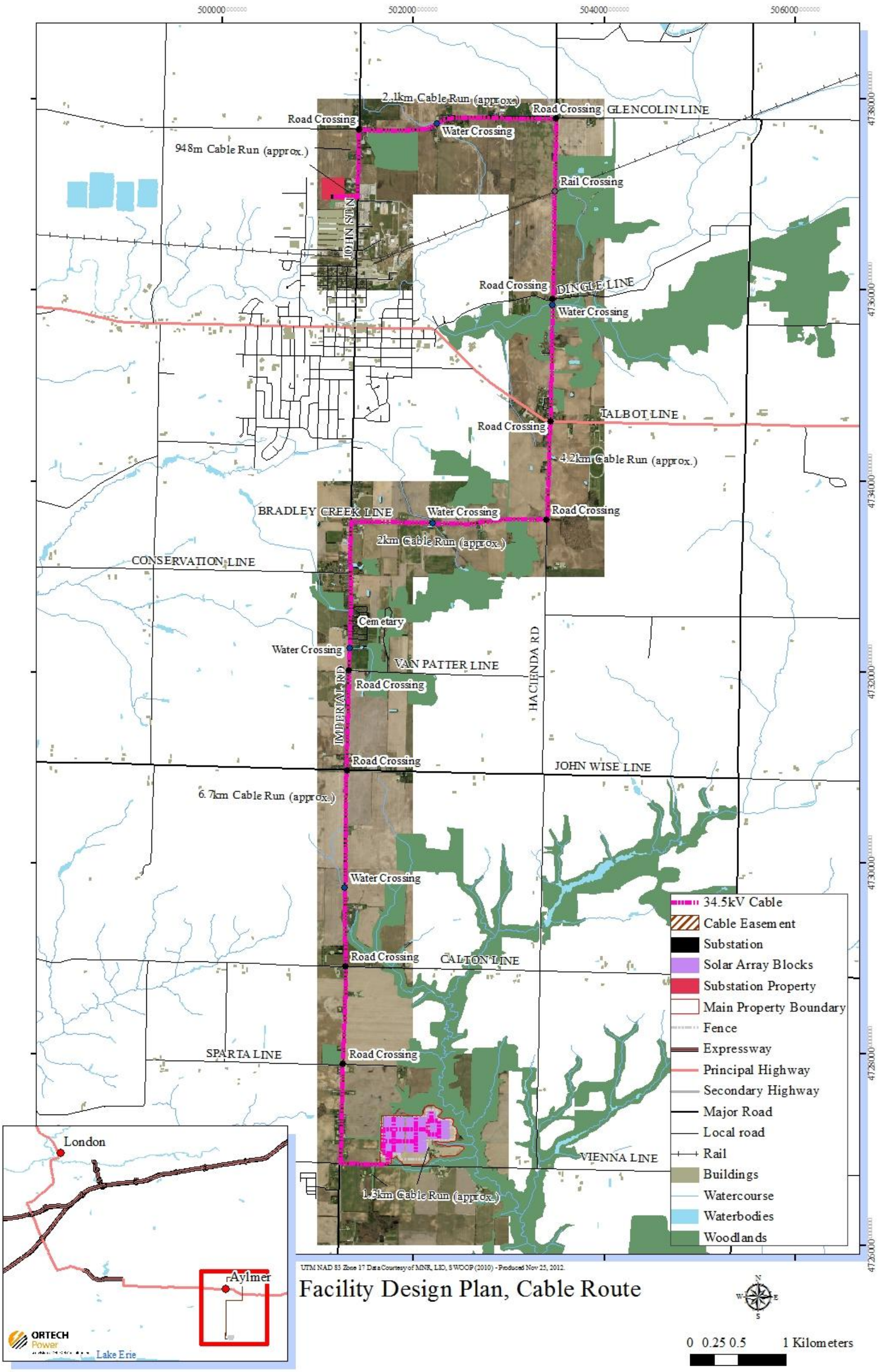
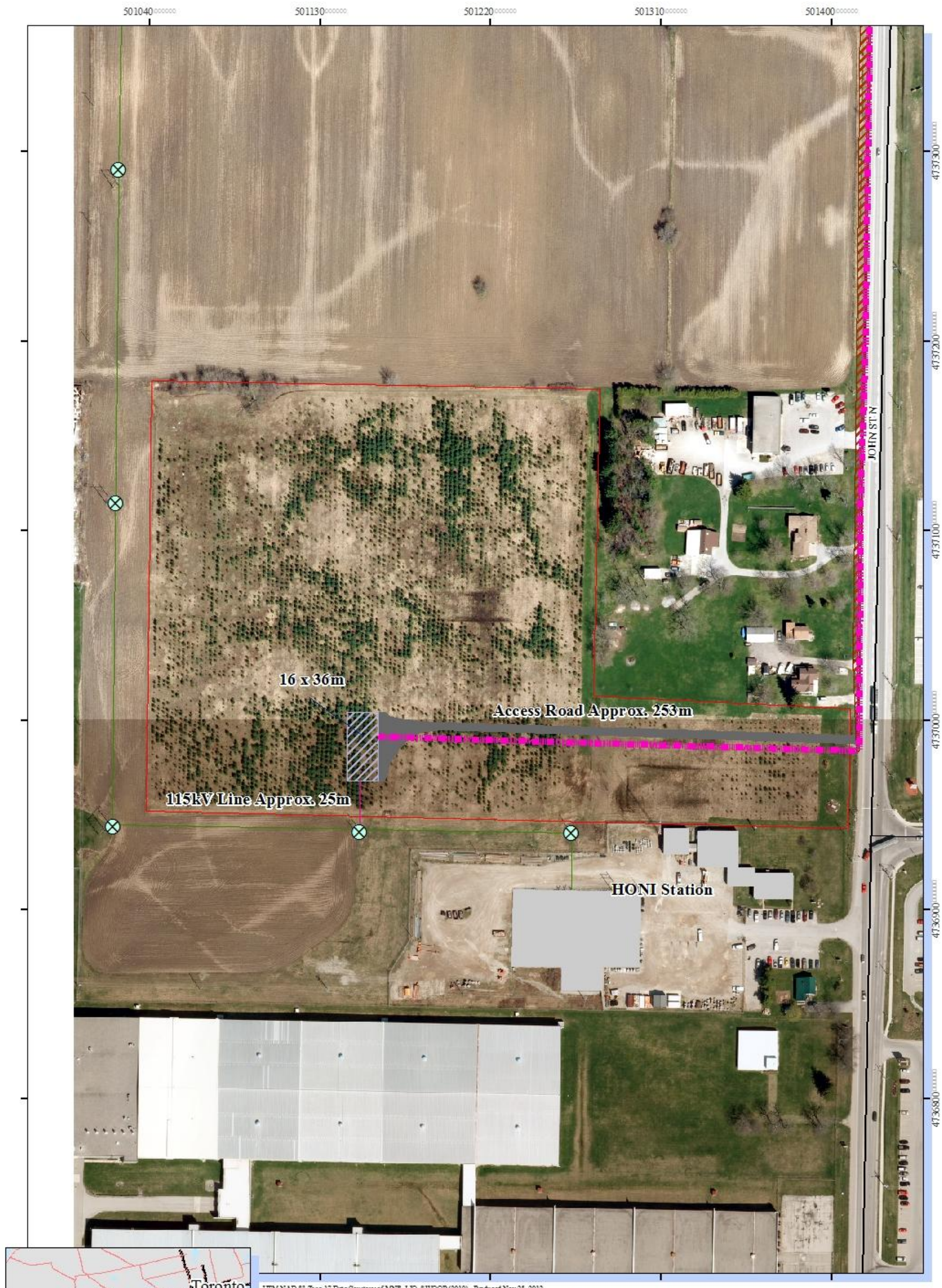


Figure 10: Facility Design - Substation



3.2 Electrical Collector System and Grid Connection

Eight inverter and transformer stations will be required for the project. The inverters will convert direct current (DC) voltage generated by the solar cells to alternating current (AC) voltage. The transformers will then increase the AC voltage up to 34.5 kV for underground power transmission. The project will require an electrical house (e-house) and a substation.

The power collected from the individual inverters/transformers will be routed to the e-house through the main underground 34.5 kV power bus. An underground 4.5 kV connection line will travel approximately 15 km from the Solar Array location to the Substation location along the roadside. The e-house will include switchgear, a power meter and Supervisory Control and Data Acquisition (SCADA) equipment to remotely monitor and control the facility. Figure 2 provides a site layout indicating the locations of these components.

3.3 Substation

The project will connect to the Hydro One WT1A Transmission line via a newly constructed substation and underground electrical distribution line. The substation will be constructed on lands adjacent to the Hydro One Transmission Station while the underground distribution line will run 15 km from the project site within municipal road easements. Figure 1 provides a layout of the distribution line routing, project site, substation, natural features and lands within 120 m of the proposed works.

3.4 Ancillary Components

In order to provide an independent supply of power for operations and to meet standby power requirements, the facility will be connected to the existing 3-phase 4.8 kV line located on Vienna Line. The connection point with this line will be located at the entrance of the facility.

The site will be accessed via an existing entrance located on the north side of Vienna Line; this entrance is gravel based. The existing roads are approximately 7 m in width and the entrance is approximately 10 m wide, no upgrades of the existing roads will be required. On-site access roads running through the project site will be required for construction and maintenance activities.

The entire facility will be secured with a fence and a gate and locked. Signs will be in place to warn the public of electrical danger.

4. FACILITY OPERATIONAL PLAN

The Facility operations plan will be confirmed by the proponent following detailed project design and equipment manufacturer agreements. The following represents a general plan for operational monitoring and maintenance which will be supplemented by specific operations as required by the equipment manufacturer.

4.1 Daily Operations and Monitoring Activities

The project will be monitored remotely 24 hours a day through the SCADA system, which will monitor voltage and the status of the tracking system.

As a minimum, one site visit will occur every week during which time solar panels, inverters and the substation will be visually inspected. An inspection log will be kept which will record dates and times of the inspection. Site inspections will be used in conjunction with the prescribed timing of routine maintenance activities to initiate repairs as needed.

4.2 Scheduled Maintenance

Scheduled maintenance activities include:

- washing of solar panels to remove dirt from the surface;
- manual control of vegetation; and
- inspection of the electrical collector system.

Solar panels may require annual or seasonal cleaning to remove accumulated dirt from the surface. Routine control of vegetation in and around the solar park will be carried out to prevent shading of the panels and to facilitate inspections of the equipment.

Inspection and lubrication of equipment will require the use of lubricants. Lubricants will not be stored on the project site. Excess lubricants will be removed from site upon completion of maintenance and disposed of in accordance with provincial requirements.

During inspection and maintenance activities on the electrical collector system, individual solar arrays can be isolated from the project through electrical disconnect switches located within the individual inverter/transformer house.

4.3 Unscheduled Maintenance

Comparatively, solar farms have lower maintenance requirements than other electrical generation technologies. However, there is the potential that some unscheduled maintenance activities may arise during the operating life cycle. These occurrences may consist of a failure of one or more components such as a solar panel module or inverter system. Isolation of a portion of the system may be required through the e-house to complete these unscheduled maintenance activities. These repairs will be carried out by service personnel, generally requiring the use of hand tools.

4.4 Site Supervision and Employee Training

All on-site staff will be fully trained on the maintenance and environmental aspects of the project. A health and safety policy will be drafted which complies with the Ontario Workplace Health and Safety Act. All contractors will report directly to the operations manager.

4.5 Waste Management and Water Takings

Consumables used on-site during the operation and maintenance of the project will consist primarily of oils, lubricants and cleaning rags. Minor quantities of these materials will be generated and the small quantity generation exemption provisions under Ontario Regulation 347 "General Waste Management" will be reviewed prior to operation to ensure conformance with provincial legislation.

No sewer facilities will be required for the project. No water takings will be required for the project.

5. ENVIRONMENTAL EFFECTS MONITORING PLAN

An Environmental Effects Monitoring Plan was prepared as a component of the Natural Heritage Study. This plan addresses aspects related to ecological features. Table 3 summarizes the monitoring proposed. A Waterbodies Assessment Report is provided in Appendix 3. A Natural Heritage Assessment completed in 2012 by NRSI and confirmed by the MNR concluded that no operational mitigation or monitoring will be required at this time

Table 3: Proposed Monitoring Plan

Criterion	Potential Effect Activity/Description	Performance Objective	Mitigation Measure	Monitoring Plan and Contingency Measures
Heritage and Archaeological Resources				
Archaeological	None Identified	**To maintain no impact**	Stage I, II III and IV level assessments conducted on project site and a Stage I and II level assessment conducted on substation site for all areas to be disturbed by project.	**None required**
Cultural Heritage	None Identified	**To maintain no impact**	No impacts identified	**None required**
Natural Heritage Resources				
Flora / Fauna	Risk of disrupting animal movement through the area caused by perimeter fence line at the project site.	Utilize project siting in order to protect habitat and movement corridors. Maintain a 10 m setback distance from wooded areas and areas designated as valleylands.	No mitigation required.	**None required**
	Disruption to habitat from removal of wooded area at substation location.	Minimize disruption to wooded areas through site layout.	No mitigation required. Overall area impacted is less than 0.7 ha.	**None required**
Water Bodies				
Surface Water Quality	Risk of surface water contamination on adjacent waterbodies (<120m) in the event of equipment leaks (fuel, oil, lubricants, hydraulic fluids) and malfunction.	Maintain a 30 m buffer between components and waterbodies. No spills.	Materials will not be stored at the site, reducing the potential for leaks. Re-fuelling of equipment will occur in designated locations away from waterbodies. A Spill Contingency Plan will be developed and all personnel will be trained in the proper spill clean-up procedures. Spill containment kits will be provided on-site.	Operation staff will be trained and instructed on spill reporting requirements.

	Surface water runoff from project site into adjacent waterbodies.	Maintain 30 m buffer from waterbodies. No alteration to site drainage.	No mitigation required.	**None required**
	Water quality impairment	No Impairment	Avoid or limit use of pesticides, implement BMPs. Address any impacts resulting from design or construction phases	Operation staff will be trained and instructed on spill reporting requirements.
Groundwater Quality	Risk of groundwater contamination in the event of equipment leaks (fuel, oil, lubricants, hydraulic fluids) and malfunction.	No spills.	All equipment will be properly maintained. Spills will be cleaned up immediately, operation staff will be trained in proper spill clean-up techniques.	Operation staff will be trained and instructed on spill reporting requirements.
Air Odour Dust				
Air and Noise	Noise impact of inverter/transformer and substation on nearby residences and public buildings.	Compliance with the Ministry of Environment Noise Guidelines.	In the event of a noise complaint Silvercreek will investigate and/or verify compliance with the applicable noise guidelines. Silvercreek will notify the MOE of complaints in a timely manner. Mitigation measures in the event of an actual noise exceedence may include equipment repairs / retrofit, or shut down of the non-conforming equipment.	Monitoring of the noise complaints during operation of the project. *Contingency measures* Investigate complaints and take appropriate actions to resolve any issues.
Land Use and Resources				
Land	Decline in agriculturally used land. Approximately 35.6 hectares will be occupied by the project and ancillary facilities.	Minimize impacts. Project is sited on Class III agricultural land.	No mitigation required.	**None required**

	Soil contamination due to accidental spills of oils, fuels or other fluids associated with the equipment malfunction.	No spills.	All equipment at the site will be properly maintained. A Spill Contingency Plan will be developed and spills will be cleaned up immediately. Operation personnel will be trained in proper spill clean-up techniques. Spill containment kits will be provided on-site.	Operation staff will be trained and instructed on spill reporting requirements.
	Bank erosion on adjacent valleylands from tile drainage.	Maintain current creek bank.	Repair drainage system as required. Install erosion control measures in consultation with Conservation Authority.	Annual inspection of drainage outfall.
Provincial and Local Infrastructure				
	Surface water runoff from project site into municipal drain.	No alteration to site grading. No impacts on the local community.	No mitigation required.	**None required**
Public Health and Safety				
Public Health and Safety	Stray voltage from collector lines to distribution station.	Conformance with Electrical Safety Codes	The project will comply with local grid standards and electrical safety requirements. Prior to commissioning testing for stray voltage will occur	Annual inspection of electrical equipment.
	Risk to the public due to access to electrical danger.	Conformance with Electrical Safety Codes	The project site and substation will be contained within a secure fence and gate. Electrical distribution lines will conform to electrical safety codes.	Annual inspection of fencing.

6. COMMUNICATIONS AND EMERGENCY RESPONSE PLAN

During the Project's construction and operational activities it will be vital to inform the public, Aboriginal communities, the MOE, Elgin County and the Township of Malahide regarding activities occurring at the Project site (including emergencies), as well as provide means by which stakeholders can contact Silvercreek and/or the appropriate contractor. The following outlines the actions to be taken during the operation of the Project to facilitate communication, and means by which correspondence received will be recorded and addressed.

A Construction Emergency Response and Communications Plan will be developed by the construction contractor and/or Silvercreek and will include protocols for the proper handling of material spills and associated procedures to be undertaken in the event of a spill.

6.1 Emergency Response Plan

Silvercreek and/or the Contractor will finalize a detailed Emergency Response Plan for Construction, Operations and Decommissioning phases of the Project in collaboration with local Emergency Services Departments and the Township of Malahide.

The Emergency Response Plan will include a plan for the proper handling of material spills and associated procedures to be undertaken during a spill event. The plan will also specify containment and clean-up materials and their storage locations. The plan will include general procedures for personnel training. As appropriate, the plan may cover response actions to fire preparedness, evacuation procedures and medical emergencies. Developing this plan with local emergency services personnel will allow Silvercreek to determine the extent of emergency response resources and response actions of those involved.

The plan will include key contact information for emergency service providers, a description of the chain of communications and how information will be disseminated between Silvercreek and/or the Contractor and the relevant responders. The plan will also indicate how Silvercreek and/or the Contractor will contact (via phone or in-person) project stakeholders who may be directly impacted by an emergency so that the appropriate actions can be taken to protect stakeholders' health and safety.

6.2 Non-Emergency Communications Plan

Silvercreek and/or the Contractor will continue contact with Project stakeholders (public, ministries, Aboriginal communities, the municipality) during the operation of the Project, including providing Project updates on the Project website (www.silvercreeksolar.com). As a long-term presence in the area, Silvercreek will continue to develop contacts and to develop local relationships and channels of communication, which could provide local benefit. The location of the underground cable route and drawings will be registered with Ontario One Call for location requests. These same details will be kept on file with the Municipality and the County. The plant manager will be available via a posted contact number for any requests pertaining to the location of the connection line.

6.3 Public Communications Plan

Since the beginning of Project consultation, Silvercreek has made a Project email address available for stakeholders to use in order to provide input. This email is published on all notices and within draft reports. It is also posted on the Silvercreek website in the "Contact Us" section. Silvercreek has provided a toll-free number as a means of reaching Silvercreek representatives. Silvercreek works towards providing a response to public communications within 1-2 weeks, however this is partly dependent on the volume being received during that period. Stakeholder communication will continue during the Project's construction and operation activities. All messages will be recorded in a Communications Response Document.

Should there be a post-construction concern expressed, Silvercreek and/or the Contractor will endeavor to respond to messages within 48 hours. All reasonable efforts will be made to take appropriate action as a result of concerns as soon as practicable. Actions taken to remediate the cause of the issue and the proposed actions to be taken to prevent reoccurrences in the future will also be recorded. If appropriate, the MOE Spills Action Centre will be contacted to notify them of the issue. Correspondence will be shared with other stakeholders, such as the MOE, as required and/or as deemed appropriate.

Ongoing communication will allow Silvercreek and the Operations and Maintenance Contractor to receive and respond to community issues on an ongoing basis.

7. ACKNOWLEDGEMENTS AND REFERENCES

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&
Leah Deveaux, BES
Environmental Assessment Specialist

With assistance from:

Natural Resource Solutions Inc.
Timmins Martel Heritage Consultants

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APPENDIX 1

EQUIPMENT SPECIFICATIONS
(15 pages)

www.jinkosolar.com

JKM300P-72

POLY CRYSTALLINE MODULE
280-300 Watt

Jinko Solar introduces a brand-new line of high performance modules in wide application.

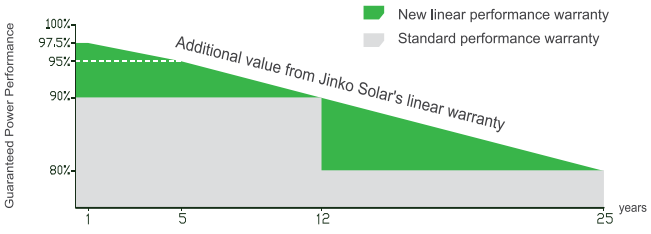
KEY FEATURES

- High module conversion efficiency (up to 15.46%), through superior manufacturing technology
- Perfect module self-cleaning capability, reduce power loss caused by dust (soiling effect)
- Excellent performance in low-light irradiance environment
- Extreme environment durability, low power degradation under high temperature
- Entire module certified to withstand high wind loads (2400 Pascal) and snow loads (5400 Pascal)

QUALITY&SAFETY

- Positive power tolerance of -0/+3% *
- 10 year warranty on material & workmanship *
- Industry leading power output warranty (12 years/90%, 25 years/80%)
- Premium linear performance warranty *

Premium Performance Warranty



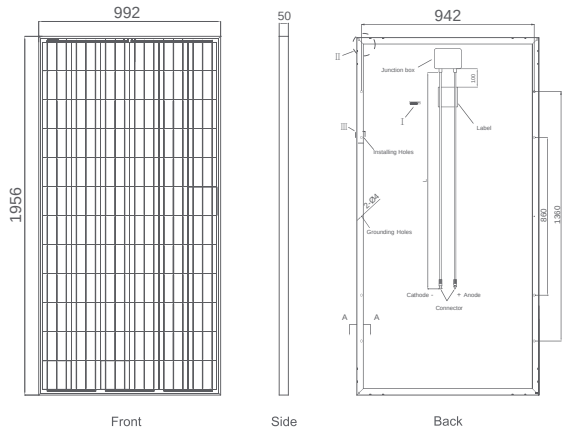
* Based on customer requirements and contract terms

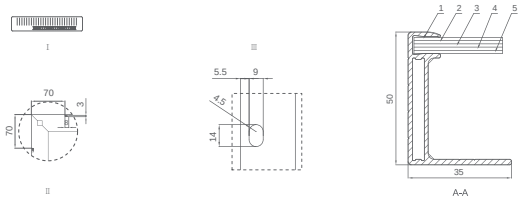
ISO9001:2008、ISO14001:2004、OHSAS18001 certified factory
IEC61215、IEC61730 certified products

APPLICATIONS

On-grid residential roof-tops | On-grid commercial/ industrial roof-tops | Solar power plants | Off-grid systems

Engineering Drawings



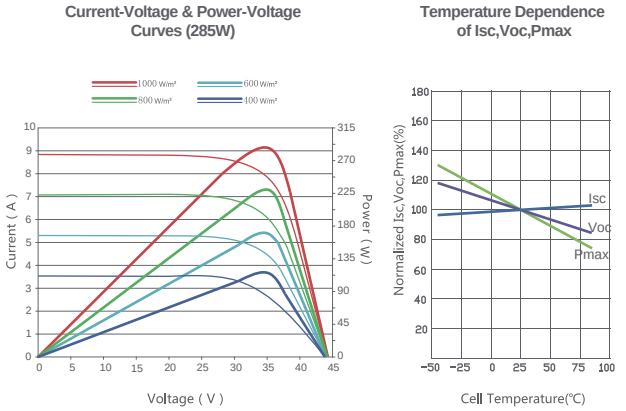


Packaging Configuration

(Two boxes =One pallet)

20 pcs/box, 40 pcs/pallet, 440 pcs/40'HQ Container

Electrical Performance & Temperature Dependence



Mechanical Characteristics

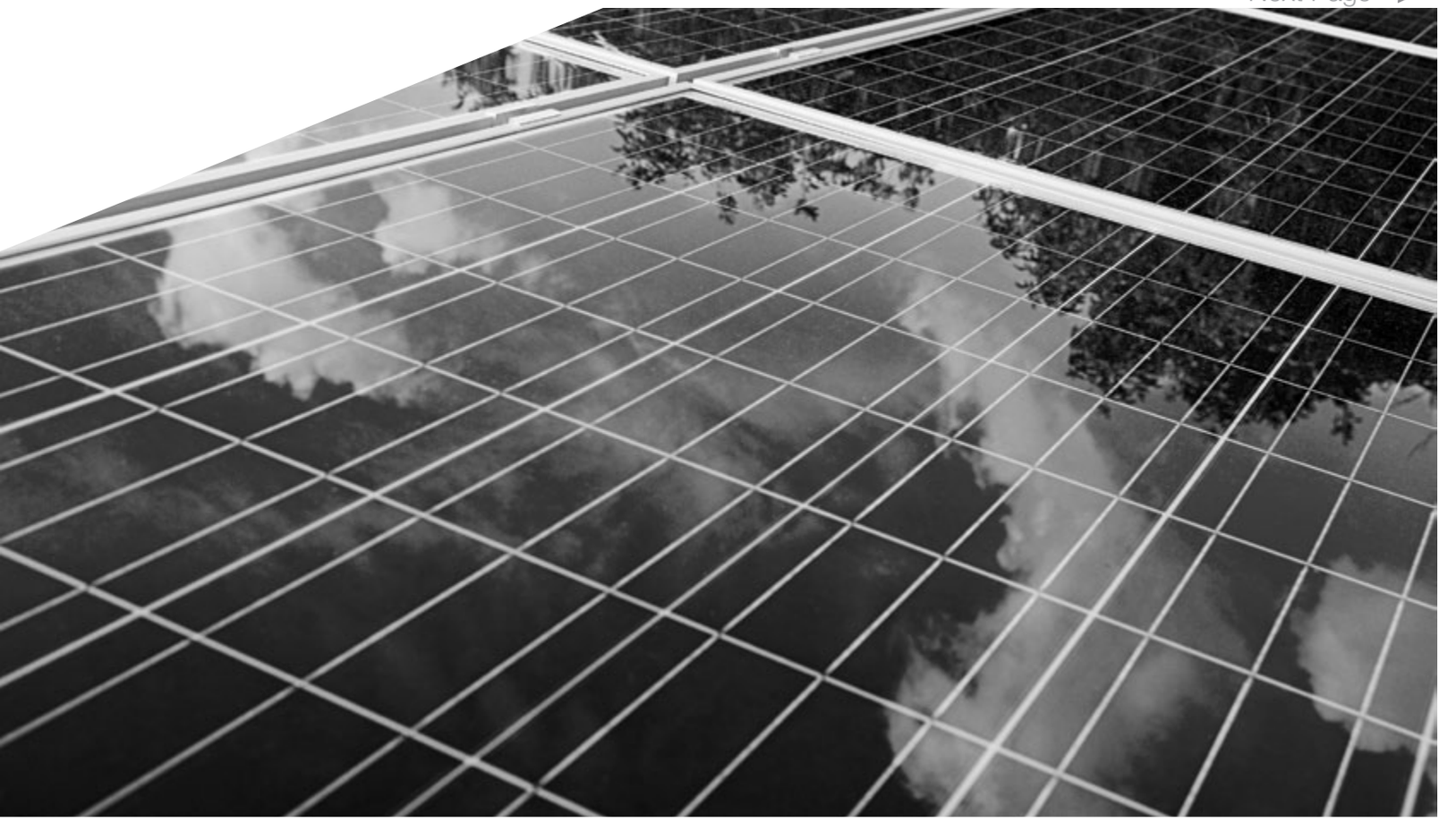
Cell Type	Poly-crystalline 156×156mm (6 inch)
No.of cells	72 (6×12)
Dimensions	1956×992×50mm (77.01×39.06×1.97 inch)
Weight	27.0 kg (59.5 lbs.)
Front Glass	4.0mm, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP65 Rated
Output Cables	TÜV 1×4.0mm²/ UL 12AWG , Length:900mm

SPECIFICATIONS

Module Type	JKM280P	JKM285P	JKM290P	JKM295P	JKM300P
Maximum Power at STC(Pmax)	280Wp	285Wp	290Wp	295Wp	300Wp
Maximum Power Voltage (Vmp)	35.5V	36V	36.4V	36.8V	37.2V
Maximum Power Current (Imp)	7.89A	7.92A	7.97A	8.02A	8.07A
Open-circuit Voltage (Voc)	44.5V	44.7V	44.9V	45.2V	45.4V
Short-circuit Current (Isc)	8.81A	8.85A	8.89A	8.95A	8.98A
Module Efficiency(%)	14.43%	14.69%	14.95%	15.20%	15.46%
Operating Temperature(℃)	-40℃~+85℃				
Maximum system voltage	600V (UL) /1000V (IEC) DC				
Maximum series fuse rating	15A				
Power tolerance	±3% / -0~+3% (Based on customer requirements and contract terms)				
Temperature coefficients of Pmax	-0.45%/℃				
Temperature coefficients of Voc	-0.27%/℃				
Temperature coefficients of Isc	0.05%/℃				
Nominal operating cell temperature (NOCT)	45±2℃				

STC: Irradiance 1000W/m² Module Temperature 25°C AM=1.5

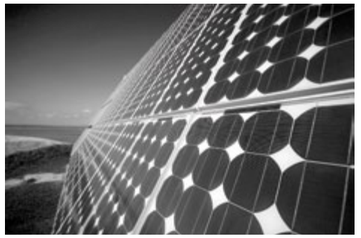
* Power measurement tolerance: ± 3%

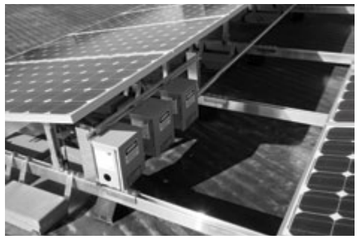


Innovative, Reliable and Cost–Effective.

Solar Solutions

COOPER





ONE COOPER

Decreasing our dependence on foreign oil and heightened environmental concerns continue to drive solar energy market growth. However, total life cycle cost-per-watt and levelized cost of electricity (LCOE) remain the critical factors in justifying any project. Seeking a partner like Cooper Industries, with experience and innovative solutions, is key to driving down any solar system's overall installation and ongoing maintenance costs .

CLICK TO PLAY

A BEST–IN–CLASS PARTNER FOR THE SOLAR INDUSTRY

- MOST COMPLETE PORTFOLIO OF BALANCE OF SYSTEM (BOS) SOLUTIONS
- GLOBAL MANUFACTURING FOOTPRINT WITH 39% OF ALL PRODUCTS SOLD OUTSIDE THE U.S.
- END–TO–END, STRUCTURAL ENGINEERED SOLUTIONS

COOPER B-Line
Wire and Cable Management

COOPER Bussmann
Circuit Protection and Electrical Safety

COOPER Crouse-Hinds
Harsh and Hazardous Electrical Solutions

COOPER Lighting
Total Lighting Solutions

COOPER Power Systems
Medium Voltage Power Solutions

COOPER Safety
Protection of People and Property

COOPER Wiring Devices
Industrial Wiring Solutions

Innovative, Reliable and Cost–Effective. **Solar Solutions.**

BEST–IN–CLASS SERVICE & SOLUTIONS

Solar is part of our DNA. From our dedicated solar team to our innovative engineering solutions, you'll gain value from forward–thinking approaches designed to answer the specific needs of the solar market. Not only are Cooper products engineered to provide the safest solutions, they are designed to allow you to minimize your total cost of ownership. We provide everything from components and assemblies to complete BOS solutions, giving the specifier design flexibility and investors/owners the best value.

Global Reach

Benefit from more than 175 years of experience and global reach. We have experience with large solar projects in North America, Europe and Asia and have components and assemblies available that help you get the job done.

Labor Savings

Cooper Industries' product development efforts are consistently geared toward developing solutions that offer an innovative way to approach a problem or solution. Many times that innovation is directed at savings its customer money. Look to Cooper Industries for product solutions that can offer the user significant, valuable savings in time, labor or money compared to similar solutions.

Ease of Installation

Cooper understands that construction costs are driven both by the flexibility of the solutions provided as well as minimization of parts in the field. Pre–assembly and part integration are core requirements of all solar balance of system designs. An example is a new combiner mounting bracket which reduced individual parts from eighteen to ONE!

Thousands of Configurations

Cooper offers a wide breadth of combiner box configurations to support customers' varying needs for string capacity as well as circuit management requirements such as monitoring, surge protection and integrated disconnect.

Best–in–Class Services

In the solar market, experience and innovation are the keys to creating successful partnerships. Cooper has the technical expertise to assist solar developers, EPCs, electrical contractors, and integrators in designing state–of–the–art solar systems.

Environmentally Friendly

Cooper is dedicated to environmentally friendly manufacturing and applications. We insist on a high content of recycled materials in all our products whenever possible. Some examples of this commitment are our non–penetrating Dura–Blok product which is made with 100% recycled tires as well as our Envirotemp FR3 fluid which is soy oil based, high fire point, bio–degradable, and non–toxic.

EC&M Magazine's 2011 Product of the Year Winner

Cooper ARISTA™ Solar Rooftop Mounting System won the *EC&M* Magazine's 2011 Product of the Year for the Fasteners, Hangers and Accessories category. This highly flexible solar rooftop mounting system offers a high degree of labor savings for a reduced cost per watt and lower total installation costs. Highly adaptable, the system supports virtually any solar PV panel type or size and can be landscape or portrait mounted.

Consulting–Specifying Engineer Magazine's 2010 Product of the Year Gold Medal

The Cooper Solar Combiner Box was awarded the Gold Medal in the Electrical Distribution category. With a variety of fusible configurations up to 1000V DC with 50kA IR, Cooper Combiner Boxes provide the ultimate in protection for sensitive photovoltaic systems. Customers are able to protect and connect 2 to 24 photovoltaic strings or arrays with complete flexibility in enclosure types and fusing options. Whether standard, compact or integrated disconnect, all configurations are ETL Listed to UL 1741 and include IP20 finger–safe CH Series modular fuse holders.

Innovative, Reliable and Cost–Effective. **Solar Solutions.**

COOPER

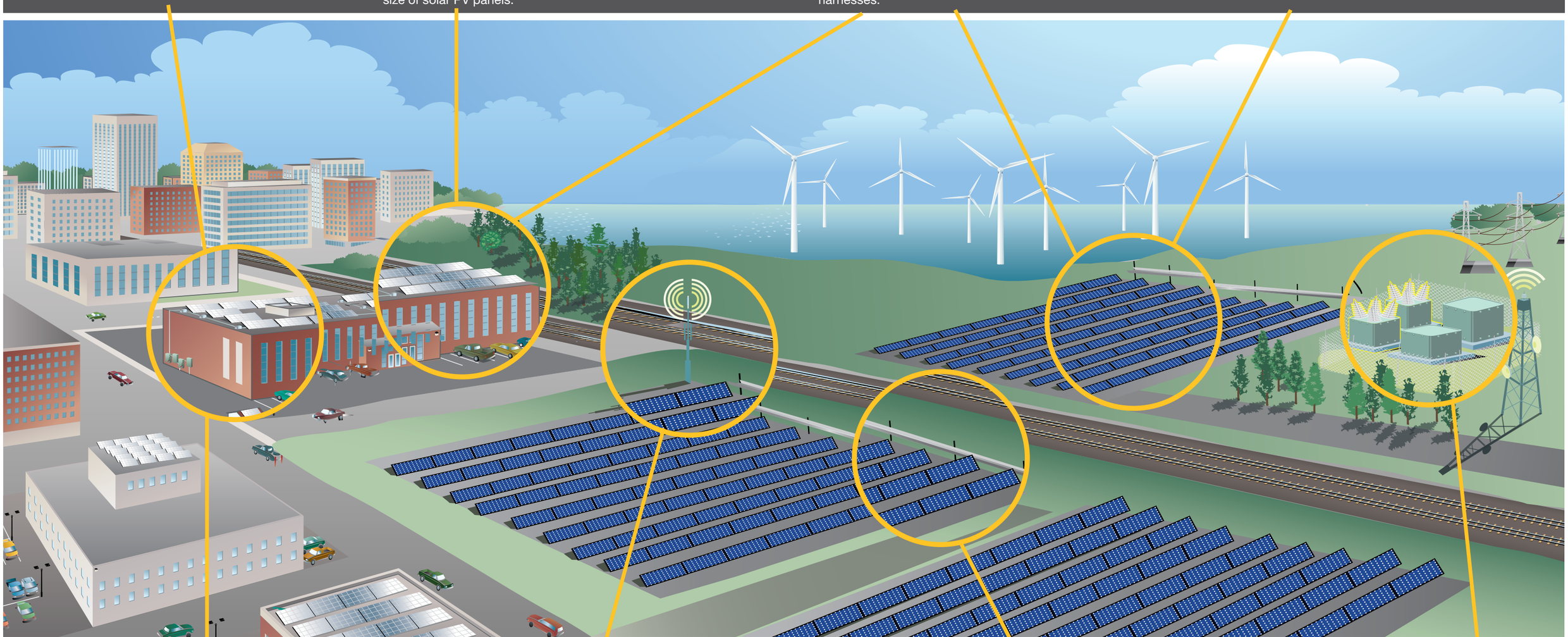
COMPREHENSIVE PRODUCT SOLUTIONS FOR GLOBAL SOLAR APPLICATIONS

Circuit Management
The AC/DC disconnects are designed to provide an extra measure of protection with flexibility of application. Built–in safety features provide a safer product with reliable protection for your solar equipment.

Rooftop Mounting
The monolithic solar mounting system is designed to deliver labor savings and a lower total cost investment with pre–assembled components. The system easily adapts to both portrait and landscape mounting and accommodates virtually any type and size of solar PV panels.

Cable Harness Assemblies
Solar assemblies provide the backbone for the entire Photovoltaic system. Thoughtfully considered designs optimize power output and reduce failures and warranty claims. Core products include jumpers, whips, parallel circuit and homerun harnesses.

Cable Management
The Type 3R wireway is the industry's first quick–connecting solution that is UL listed and CSA certified. The enclosed system protects wire and cable in extreme outdoor conditions.



Combiner & Recombiner
The combiner box offering allows for overcurrent and overvoltage safeguard solutions in–a–box. Solar circuit protection is made simple with a complete combiner box offering that allows for reduced installation and material costs by combining your solar array circuits.

Wireless
Solar wireless products provide secure and reliable communication from combiner boxes to remote networks. Information communicated can include: temperature, voltage, relay controls, and live video delivering critical solar panel performance data and ensuring consistent reliability.

Ground Mount
The ground mount system can be installed without the use of mechanical assistance and is designed to reduce pier depth. The system is compatible with multiple pier types and each panel support is preassembled to project specific panel specifications.

Grid–Tie & Automation Solutions
A complete portfolio of medium voltage equipment facilitates grid–tie solar generation. They include Envirotemp FR3 fluid–filled transformers, switchgear, and cable connector systems specifically designed for Photovoltaic applications.

Innovative, Reliable and Cost–Effective. **Solar Solutions.**

BROADEST PORTFOLIO OF SOLAR INDUSTRIES PRODUCTS & SOLUTIONS

Optimize your solar solutions through the reliability and expertise of Cooper Industries. As your single source for solar products, Cooper quickly provides safe, simple and complete solutions to take full advantage of converting sunlight into usable energy. Cooper can provide the entire BOS solar package—from point–of–generation to the utility—saving you time in sourcing and qualifying vendors. We have the broadest renewable energy product offering to protect your investment and are the preferred choice for renewable energy applications. With unmatched application expertise, global resources and award–winning products, we can help you technically as well as consistently deliver high–quality components whenever and wherever needed.

Mounting Solutions

Cooper offers a comprehensive set of solutions for mounting solar panels in ground and rooftop applications. Ideally, mounting systems become the foundation for the optimal system deployment and effective wire management.

- Mounting Solutions: Ground and Rooftop
- Wire and Cable Management
- Electrical Enclosures
- Meter Mounting Devices

Electrical Protection

Cooper provides safe, simple and complete circuit protection solutions so you can take full advantage of converting sunlight into usable energy. A single source for the entire AC and DC circuit protection and disconnecting package.

- Solar Fuses
- Surge Protection
- AC and DC Safety Switches
- Power Distribution Blocks
- Compact Circuit Protectors

Circuit Management

Cooper manufacturers circuit management solutions to combine and connect the conductors from several arrays and/or solar panels into one main bus or feed. Cooper also offers a variety of solutions that range from enclosures to complete systems.

- Combiner Boxes
- Recombiner Boxes
- Solar Pass Through Boxes
- Solar Cable Assemblies
- Non–metallic Cord Grips

Grid–Tie Solutions

Cooper provides the products and services to connect large, utility–grade photovoltaic energy systems to the grid. Transformers filled with our FR3 dielectric fluid are custom designed to minimize total life–cycle cost with optimal operation in demanding conditions.

- Transformers
- Molded Rubber Cable Connectors
- Capacitors
- Automation Communication Systems
- Switchgear















ENVIROTEMP FR3 DIELECTRIC FLUID—THE BETTER ALTERNATIVE

Today's customers are demanding more from their dielectric fluid. More and more customers are switching from mineral oil to Envirotemp FR3 fluid, the revolutionary transformer fluid that helps achieve higher levels of public and workforce safety, performance and reliability, while keeping costs and liability down. More than 300,000 new and retrofilled transformers are in use today.

FR3 fluid extends the life of the transformer. Accelerated aging studies have shown a life extension of 4–8x that of a mineral oil system. This feature is especially important for very cyclical load demands inherent with solar power generation.

This extended life expectation helps assure performance through the extended warranty periods demanded for many solar projects.

Produced from domestically grown soybeans, FR3 fluid is the optimal sustainable dielectric coolant for transformer usage. Through thorough evaluations, FR3 fluid has proven to be high fire points, non–toxic, readily biodegradable, and essentially carbon neutral.

Enhanced Fire Safety
Superior Environmental Profile
Enhanced Transformer Insulation Life
Enhanced Transformer Performance

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COOPER

Turnkey

- Modular power solution allows for rapid field deployment
- Conversion, distribution and control functions included
- Customizable service options

Innovative

- Based on award-winning SMA Sunny Central technology
- Leading grid management functions available

Secure

- Renowned SMA manufacturing standards ensure long term operation
- Diverse service options address project-specific needs

Flexible

- Available as an open platform, with a canopy shade or as a full steel enclosure
- Can be installed on a concrete slab, piers or vault

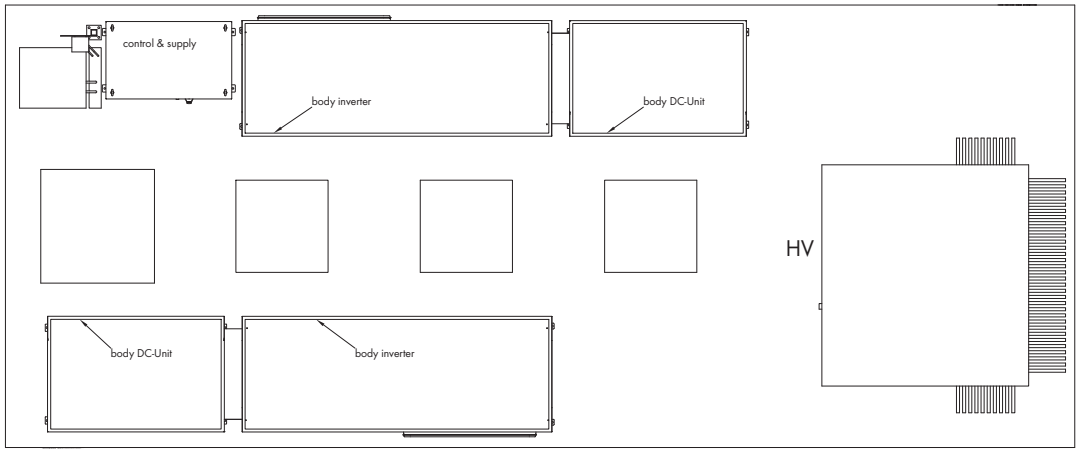
MV POWER PLATFORM 1.0 / 1.25 / 1.4 / 1.5 / 1.6 MW

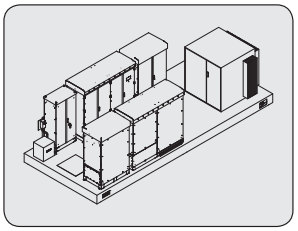
Modular utility-scale power solution

The SMA MV Power Platform—available as an open, shaded or enclosed structure—provides the most cost-effective way to modularly install large-scale PV power converters. These 1.0–1.6 megawatt medium-voltage turnkey power solutions include two Sunny Central inverters; a medium-voltage transformer; optional DC or AC/DC disconnect cabinets; and a control and supply panel for power distribution to local loads and (optionally) field tracker motors. They also feature easy integration with installer SCADA equipment; a modular, steel base with all component interconnection cabling; and a convenient plug-and-play installation scheme. Designed for Seismic Zone D applications, all configurations can be deployed for temperatures down to -40 °C. Each configuration can also be installed on a concrete slab, vault or piers for maximum flexibility.

Technical data	SAMPLE CONFIGURATIONS			
	MVPP 1.0 MW		MVPP 1.5 MW	MVPP 1.6 MW
	600 V DC	1000 V DC	1000 V DC	1000 V DC
Input (DC)				
Max. DC power	1013 kW	1120 kW	1796 kW	1796 kW
MPP voltage range (@77°F/122°F at 60Hz)	330 V ... 600 V / 330 V ... 600 V a)	449 V ... 820 V / 436 V ... 820 V a)	609 V ... 820 V / 554 V ... 820 V a)	641 V ... 820 V / 583 V ... 820 V a)
Rated input voltage	380 V	480 V	595 V	620 V
Max. DC voltage	600 V	1000V / 1100 V b)	1000V / 1100 V b)	1000V / 1100 V b)
Max. DC input current	3200 A	2500 A	2800 A	2800 A
Number of independent MPP inputs	2	2	2	2
Number of fused DC inputs	18	18 / 64 (Optiprotect)	18 / 64 (Optiprotect)	18 / 64 (Optiprotect)
Output (AC)				
Nominal AC power	1000 kVA @113 °F	1000 kVA @122 °F	1500 kVA @122 °F	1600 kVA @122 °F
Maximum AC power	1000 kVA @113 °F	1100 kVA @77 °F	1650 kVA @77 °F	1760 kVA @77 °F
Nominal AC voltage options	12.47 kV; 13.8 kV; 20.6 kV; 24.9 kV; 27.6 kV; 34.5 kV	12.47 kV; 13.8 kV; 20.6 kV; 24.9 kV; 27.6 kV; 34.5 kV	12.47 kV; 13.8 kV; 20.6 kV; 24.9 kV; 27.6 kV; 34.5 kV	12.47 kV; 13.8 kV; 20.6 kV; 24.9 kV; 27.6 kV; 34.5 kV
Total Harmonic Distortion of grid current	< 3 % @ nominal power	< 3 % @ nominal power	< 3 % @ nominal power	< 3 % @ nominal power
Grid frequency	60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
Power factor (adjustable)	0.90_{lead} - 0.90_{lag}	0.90_{lead} - 0.90_{lag}	0.90_{lead} - 0.90_{lag}	0.90_{lead} - 0.90_{lag}
Transformer vector group	Dy1y1	Dy1y1	Dy1y1	Dy1y1
Transformer no load taps	±2.5 % & ±5.0 %	±2.5 % & ±5.0 %	±2.5 % & ±5.0 %	-5.0 %; -2.5 %; +3.5 %; +7.0 %; +10.5 %; +14.0 % c)
Transformer cooling type	KNAN	KNAN	KNAN	KNAN
Power consumption				
Internal consumption in operation (inverter + MV-transformer)	< 3400 VA + < 12 kVA	< 3000 VA + < 12 kVA	< 3000 VA + < 19.2 kVA	< 3000 VA + < 19.2 kVA
Standby consumption (inverter + MV-transformer)	< 220 VA + < 1500 VA	< 200 VA + < 1500VA	< 200 VA + < 2200 VA	< 200 VA + < 2200 VA
Supply via internal PV power /external power supply / green power	○ / ○ / ●	○ / ○ / ●	○ / ○ / ●	○ / ○ / ●
External auxiliary supply voltage	208 V; 480 V; 600 V	208 V; 480 V; 600 V	208 V; 480 V; 600 V	208 V; 480 V; 600 V
Efficiency				
Max. efficiency / European efficiency / CEC efficiency inverter	98.60% / 97.90% / 98.00%	98.60% / 98.40% / 98.50%	98.60% / 98.40% / 98.50%	98.60% / 98.40% / 98.50%
Max. efficiency / European efficiency / CEC efficiency transformer	TBD / TBD / TBD	TBD / TBD / TBD	TBD / TBD / TBD	TBD / TBD / TBD

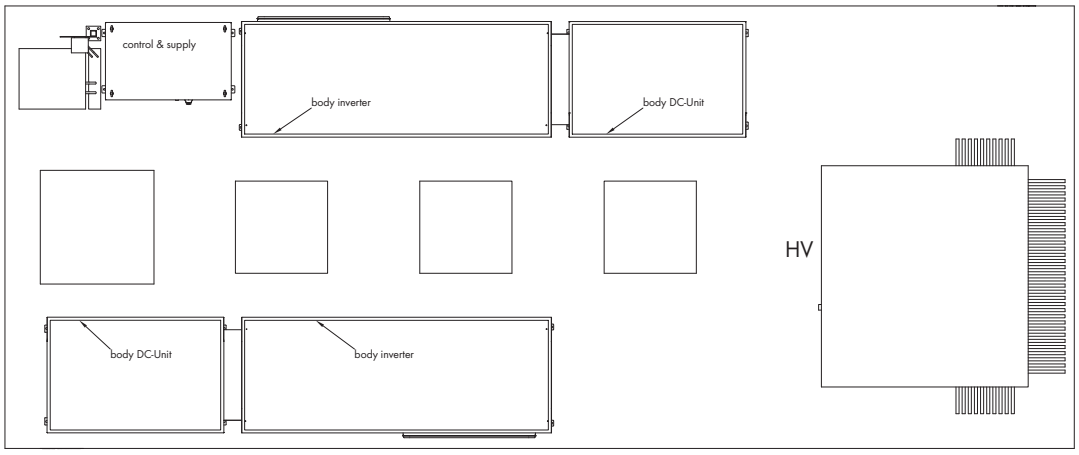
OPEN CONFIGURATION

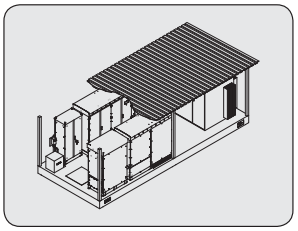




Technical data	SAMPLE CONFIGURATIONS			
	MVPP 1.0 MW		MVPP 1.5 MW	MVPP 1.6 MW
	600 V DC	1000 V DC	1000 V DC	1000 V DC
Protection rating and ambient conditions				
Protection rating	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R
Operation temperature range @ nominal power	-13 °F ... +113 °F	-4°F ... +122°F	-4°F ... +122°F	-4°F ... +122°F
Storage temperature standard / low temperature option	-13°F ... +140°F / -40°F ... +140°F	-4°F ... +140°F / -40°F ... +140°F	-4°F ... +140°F / -40°F ... +140°F	-4°F ... +140°F / -40°F ... +140°F
Relative humidity	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Snow load (psf)	>40	>40	>40	>40
Wind load (mph)	>110	>110	>110	>110
Fresh air consumption (CFM)	3531.6	3531.6	3531.6	3531.6
Max. altitude above sea level (m)	2000	2000	2000	2000
Design lifetime (years)	>20	>20	>20	>20
Compliance and certificates				
Seismic rating according UBC sec. 1632 and IBC sec. 1613[d]	Site class D, Ss =2.0g, S1=1.0g	Site class D, Ss =2.0g, S1=1.0g	Site class D, Ss =2.0g, S1=1.0g	Site class D, Ss =2.0g, S1=1.0g
NEC 2011 / OSHA 1910	● / ●	● / ●	● / ●	● / ●
PE certificate on mechanical, electrical, seismic for California / other state	● / ○	● / ○	● / ○	● / ○
Features				
Disconnect Unit	○	○	○	○
AC circuit breakers located in inverter / Disconnect Unit	● / ○	● / ○	● / ○	● / ○
Project specific power supply for tracker motors etc.	○	○	○	○
Auxiliary power fusible disconnect switch / overvoltage protection	● / ○	● / ○	● / ○	● / ○
Customer SCADA system compartment [e]	34" x 30" x 12", Supply: 120V/60Hz/max 250W	34" x 30" x 12", Supply: 120V/60Hz/max 250W	34" x 30" x 12", Supply: 120V/60Hz/max 250W	34" x 30" x 12", Supply: 120V/60Hz/max 250W
On platform	2x 120V/ max. 250W each	2x 120V/ max. 250W each	2x 120V/ max. 250W each	2x 120V/ max. 250W each
Transformer alarm contacts: Thermo / Pressure / Fluid level	● / ○ / ○	● / ○ / ○	● / ○ / ○	● / ○ / ○
Transformer oil containment	○	○	○	○
Delivery FCA/on site	● / ○	● / ○	● / ○	● / ○

CANOPY CONFIGURATION

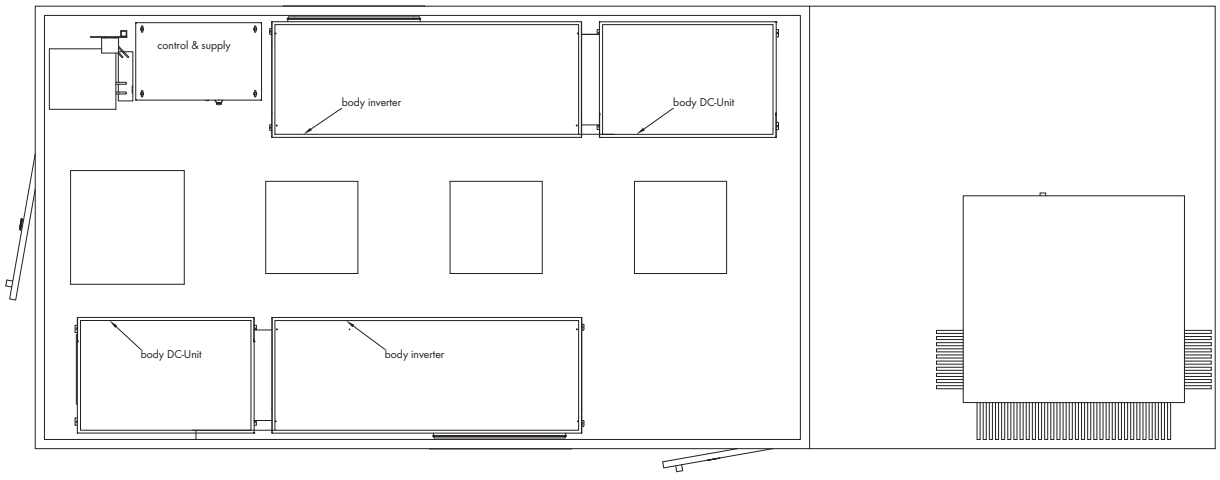


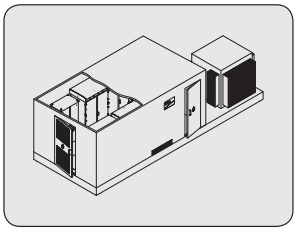


Technical data	SAMPLE CONFIGURATIONS			
	MVPP 1.0 MW		MVPP 1.5 MW	MVPP 1.6 MW
	600 V DC	1000 V DC	1000 V DC	1000 V DC
Platform design				
Open including Disconnect Units				
Width / Height / Depth	29′ / 8′9″ / 12′	29′ / 8′9″ / 12′	29′ / 8′9″ / 12′	29′ / 8′9″ / 12′
Weight (lb)	<39,000	<39,000	<39,000	<39,000
Open excluding Disconnect Units				
Width / Height / Depth	24′ / 8′9″ / 12′	24′ / 8′9″ / 12′	24′ / 8′9″ / 12′	24′ / 8′9″ / 12′
Weight (lb)	<34,000	<34,000	<34,000	<34,000
Canopy including Disconnect Units				
Width / Height / Depth (roof)	31′ / 10′6″ / 14′	31′ / 10′6″ / 14′	31′ / 10′6″ / 14′	31′ / 10′6″ / 14′
Weight (lb)	<42,000	<42,000	<42,000	<42,000
Canopy excluding Disconnect Units				
Width / Height / Depth (roof)	26′ / 10′6″ / 14′	26′ / 10′6″ / 14′	26′ / 10′6″ / 14′	26′ / 10′6″ / 14′
Weight (lb)	<37,000	<37,000	<37,000	<37,000
Enclosure including Disconnect Units				
Width / Height / Depth	32′ / 10′6″ / 12′	32′ / 10′6″ / 12′	32′ / 10′6″ / 12′	32′ / 10′6″ / 12′
Weight (lb)	<48,000	<48,000	<48,000	<48,000
Enclosure excluding Disconnect Units				
Width / Height / Depth	27′ / 10′6″ / 12′	27′ / 10′6″ / 12′	27′ / 10′6″ / 12′	27′ / 10′6″ / 12′
Weight (lb)	<43,000	<43,000	<43,000	<43,000
● Standard features ○ Optional features – Not available				
Type designation	MV-1000HE-US	MV-1000CP-10	MV-1500CP-10	MV-1600CP-10

a) @ 1.05 U_{ACnom} and cos φ = 1
b) Standard: 1000 V DC, optional 1100 V DC with a start-up < 1000 V DC
c) Reduction from 1600 kVA to 1400 kVA in 40 kVA steps possible to balance module degradation
d) Pier height 3 ft max., mounting via wedge anchors included in delivery
e) Suitable to -13 °F ... +140 °F, has to include buffer module

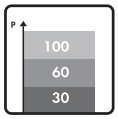
ENCLOSED CONFIGURATION





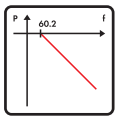
SMART GRID MANAGEMENT INCLUDED

SMA inverters in the MV Power Platform can fulfill the following grid management specifications with:



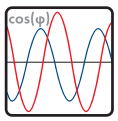
Power limitation peak shaving / grid safety management

In order to avoid short-term grid overload, the grid operator presets a nominal active power value which the inverter will implement within 60 seconds. The nominal value is transmitted to the inverters via a ripple control receiver in combination with the SMA Power Reducer Box. Typical limit values are 100, 60, 30, or 0 percent of the nominal power.



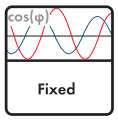
Frequency-dependent control of active power

Starting at a defined grid frequency, the inverter will automatically reduce the fed-in active power along a preset characteristic curve, which stabilizes grid frequency.



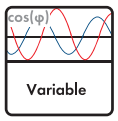
Grid support through reactive power

In order to keep the grid voltage constant, SMA inverters supply leading or lagging reactive power to the grid. For this, there are three options:



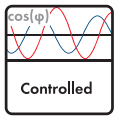
a) Fixed presetting of the reactive power by the grid operator

The grid operator presets a fixed reactive power value or a fixed phase shift between $\cos(\varphi)_{leading} = 0.9$ and $\cos(\varphi)_{lagging} = 0.9$.



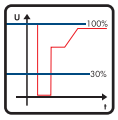
b) Dynamic presetting of the reactive power by the grid operator

The grid operator presets a dynamic phase shift - any value between $\cos(\varphi)_{leading} = 0.9$ and $\cos(\varphi)c_{lagging} = 0.9$. It is transmitted either through a communication unit or via a standardized current signal (I=4...20 mA) in accordance with IEC.



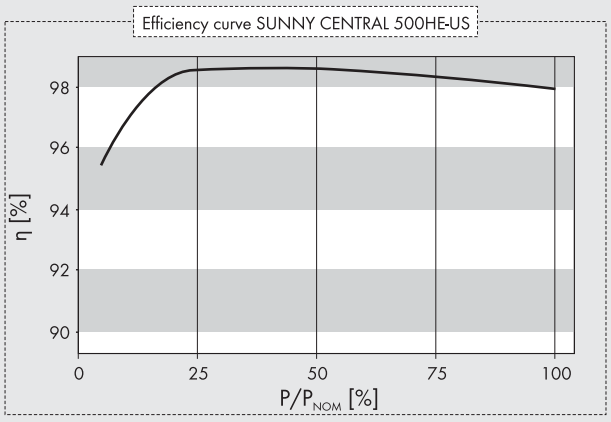
c) Control of the reactive power through a characteristic curve

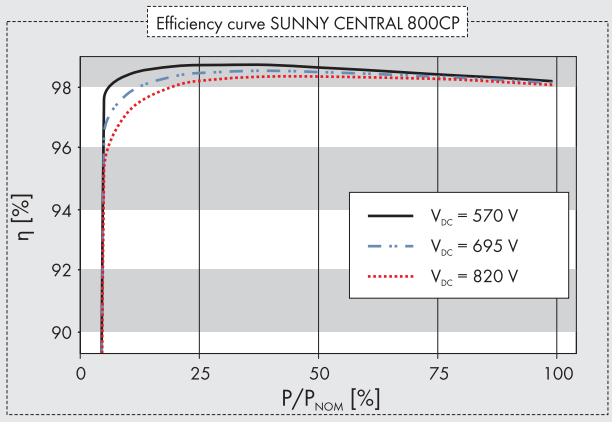
Either the reactive power or the phase shift is controlled by a pre-defined characteristic curve - depending on the fed-in active power or grid voltage.



LVRT (Low Voltage Ride-Through) 1000V ONLY

Until now, PV systems have had to disconnect from the grid immediately even during short grid voltage losses. Using the monitored dynamic grid support, SMA inverters can feed in immediately after short-term voltage losses—as long as the nominal voltage exceeds fixed values.





SERVICE FOR POWER PLANT SOLUTIONS

With a PV plant's expected service life exceeding 20 years, careful consideration must be given to not just the technologies used but also the reliability and durability of a system's components. Likewise, a comprehensive plan must be in place for the maintenance and operation of the plant. SMA Service for PV power plants addresses these needs and ensures optimum inverter availability—providing integrators, investors and utilities with the greatest security possible.

SMA also understands that every PV power plant is different and requirements vary. That's why we developed a modular service approach specifically designed for large power plants. This allows our customers to define individual service packages that best meet their needs. Approaching 100 service locations worldwide, SMA Service guarantees outstanding local customer support through a variety of customizable packages.

Maintenance
To optimize system performance, SMA performs controls, cleaning and parts replacement at regular intervals. This preventative maintenance is important for long term operation.

Spare parts warranty
Whether electronic or mechanical, we guarantee the availability of all components over the duration of the complete system life cycle. Our customers can be confident that even as technologies evolve, SMA's support will be constant. This guarantee also provides additional cost security for the operational life of the inverter solution.

Diagnostics and repair
Beginning with remote service, which often eliminates on-site assistance, to First Level, (diagnostics and small repairs), or Second Level Support, (comprehensive repairs), SMA offers the proper service plan for our customers' needs. Customers can optionally administer First Level Support themselves. With local staff to assist, SMA Service quickly provides the appropriate response to any situation.

Inverter availability
SMA inverters lead the industry. Our customers know our world-class manufacturing and high-quality components result in a superior solution. To fully protect investment security, SMA offers two inverter uptime guarantees: 98 or 99 percent. With these guarantees, we will reimburse the customer for the difference between the actual and agreed-upon inverter uptime. With warranty periods up to 25 years in length, SMA can also guarantee our solution's performance for the life of the PV plant.

Need more information?
Call SMA Power Plant Solutions at +1 888 476 2872 to hear more.

Toll Free +1 888 4 SMA USA
www.SMA-America.com

SMA America, LLC

APPENDIX 2

SUMMARY OF HERITAGE RESOURCES
(40 pages)

ORTECH Environmental
a division of ORTECH Consulting Inc.

www.ortech.ca Mississauga • Sarnia • Windsor

804 Southdown Road
Mississauga, ON
Canada L5J 2Y4

Tel 905-822-4120
877-774-6560
Fax 905-855-0406

MEMORANDUM

TO: Dave Moerman, Silvercreek Solar

FROM: ORTECH Environmental

DATE: July 19, 2012

RE: Written Summary in Support of a Cultural Heritage Self-Assessment for the Silvercreek Solar Project

---

The Silvercreek Solar Project is subject to Ontario Regulation 359/09 under the Environmental Protection Act (the Regulation), and requires a Renewable Energy Approval (REA), as a Class 3 Solar Facility. The project was awarded a Feed-in Tariff (FIT) contract in July 2011. Construction activities are planned to begin in the third quarter of 2013. All required permits and authorizations will be obtained prior to commencing construction

The Regulation ensures projects consider and avoid or mitigate impacts to the environment including the cultural environment. For the purpose of this summary the cultural environment includes: archaeological resources, built heritage resources and cultural heritage landscapes. The Ontario Ministry of Tourism and Culture (MTC) allows applicants to undertake a self-assessment if there is reason to believe that there is low likelihood for archaeological and heritage resources to be present at the project location. If the applicant can demonstrate through their answers to the screening questions that there is low potential for resources to be present, further assessment is not required. (MTC, 2012). As of July 1, 2012, applicants choosing to self-assess are required to complete ministry checklists for heritage and archaeology that will assist them in determining the potential for heritage and archaeological resources to be present at the project location.

Based upon consultations and review of cultural heritage information sources no protected properties, as listed in Section 19, Table 1 of the REA regulation were identified within 300 m of the project location, including the distribution line route. The cultural heritage self-assessment checklist is provided in Attachment 2 with additional supporting information supporting this conclusion in Attachments 3, 4 and 5.

Archaeological and other cultural resources associated with the project are addressed within the Stage I and Stage II archaeological assessment reports prepared by Timmins, Martel Heritage Consultants. Both Stage I and Stage II reports have been reviewed and accepted by MTC. A copy of the review and acceptance letter is provided in Attachment 6 in lieu of completing the archaeological checklist provided in the self-assessment guide.

The Cultural Heritage Self-Assessment is comprised of the following attachments:

- Attachment 1 Project Information and Location
- Attachment 2 REA Checklist: Consideration of Potential for Heritage Resources
- Attachment 3 Additional Supporting Information Response to Questions 1, 2, 3, 4, and 5
- Attachment 4 Additional Supporting Information Response to Question 6
- Attachment 5 Additional Supporting Information Response to Questions 7, 8, 9, and 10
- Attachment 6 Ministry of Culture Review and Acceptance of Stage I and II Archaeological Assessment

Regards,

Scott Manser.

Scott Manser
Senior Project Manager
Compliance & Permitting

ATTACHMENT 1

Project Information and Location
(5 pages)

Project Information and Location

Silvercreek Solar Park Inc. (Silvercreek) is proposing the installation of a 10 MW ground mounted solar photovoltaic (PV) facility in Elgin County within the Township of Malahide. This project is a Class 3 Solar Facility under the Renewable Energy Approval (REA) requirements. The project was awarded a Feed-in Tariff (FIT) contract in July 2011 as a result of the Bruce to Milton Transmission Line Expansion.

The current design requires up to 46,000 polycrystalline solar photovoltaic panels with a rated power output of 290 W each to be mounted on horizontal beam single-axis trackers. The project will require installation of a new 34.5kV distribution line to be installed primarily below ground to a new 115kV substation adjacent to the existing Aylmer Transmission Station.

The project site is depicted in Figure 1, the operating footprint of the site including photovoltaic panels, inverters, transformers and ancillary facilities will occupy 35.6 hectares (88 acres).

Description of the Energy Source

The solar panels used for the project will be delivered to the project site in cardboard boxes, transported by trucks. Each solar panel has a rated power of 290 watts. The panels consist of individual solar cells electrically connected. The solar panels, in turn, are connected to form larger units termed arrays. The single axis tracking system for each array will be controlled separately by a small 1.5 horsepower electrical motor.

Photovoltaic cells are made of a semiconducting material, generally silicon. The sun-facing side of the solar cells is covered with glass or plastic (ethylene vinyl acetate) placed above the semiconducting layer, which is in turn covered with an antireflective coating to reduce reflection losses. The back side of the solar cells usually consists of a layer of aluminum.

The project will use a single-axis tracking system rotating the photovoltaic panels simultaneously about a horizontal north-south axis to achieve the maximum efficiency of the photovoltaic conversion. The trackers are programmed to move the panels towards the sun from east to west between sunrise and sunset. Compared to fixed mount systems, the single-axis tracking system increases annual output by approximately 25% - 30%. The trackers will require inspection and lubrication on an annual basis. The tracking system may require replacement of a controller approximately every 5 years. Steel support posts for the trackers will be installed into the ground to a depth of 4 m. It is estimated that 12,540 posts will need to be installed.

The depth and height of the steel support posts will be adjusted as required to provide a level plane for the solar arrays. This approach to the design of the project will eliminate the need to alter the topography, and hence drainage patterns, of the property. Although the solar panels are impervious to precipitation, the land underneath will remain unaltered, as drainage rates and patterns from the site will remain relatively unchanged. On-site gravel access roads represent less than 1% of the overall project area and, with the exception of the entranceway, are located more than 30 m away from water bodies. Surface runoff from the site, which consists of rapidly draining soils, is considered to remain unaltered by this development.

Photovoltaic panels will generate an electric current that will travel through buried cables to inverter and transformer units. Eight inverters and transformers stations will be required for the project. The inverters will convert direct current (DC) voltage generated by the solar cells to alternating current (AC) voltage. The transformers will then increase the AC voltage up to 34.5 kV for underground power transmission. The project will require an electrical house (e-house) and a substation. The power collected from the individual inverter/transformer will be routed to the e-house through the main underground 34.5 kV power bus. The e-house will include a switchgear, a power meter and SCADA equipment to remotely monitor and control the facility.

The project will connect to the Hydro One WT1A Transmission Station line via a newly constructed substation and underground electrical distribution line. The substation will be constructed on lands adjacent to the Hydro One Transmission Station while the underground distribution line will run 15 km from the project site within municipal road easements. Figure 2 provides a layout of the distribution line routing, project site, substation, natural features and lands within 300 m of the proposed works.

Figure 1: Project Site Layout

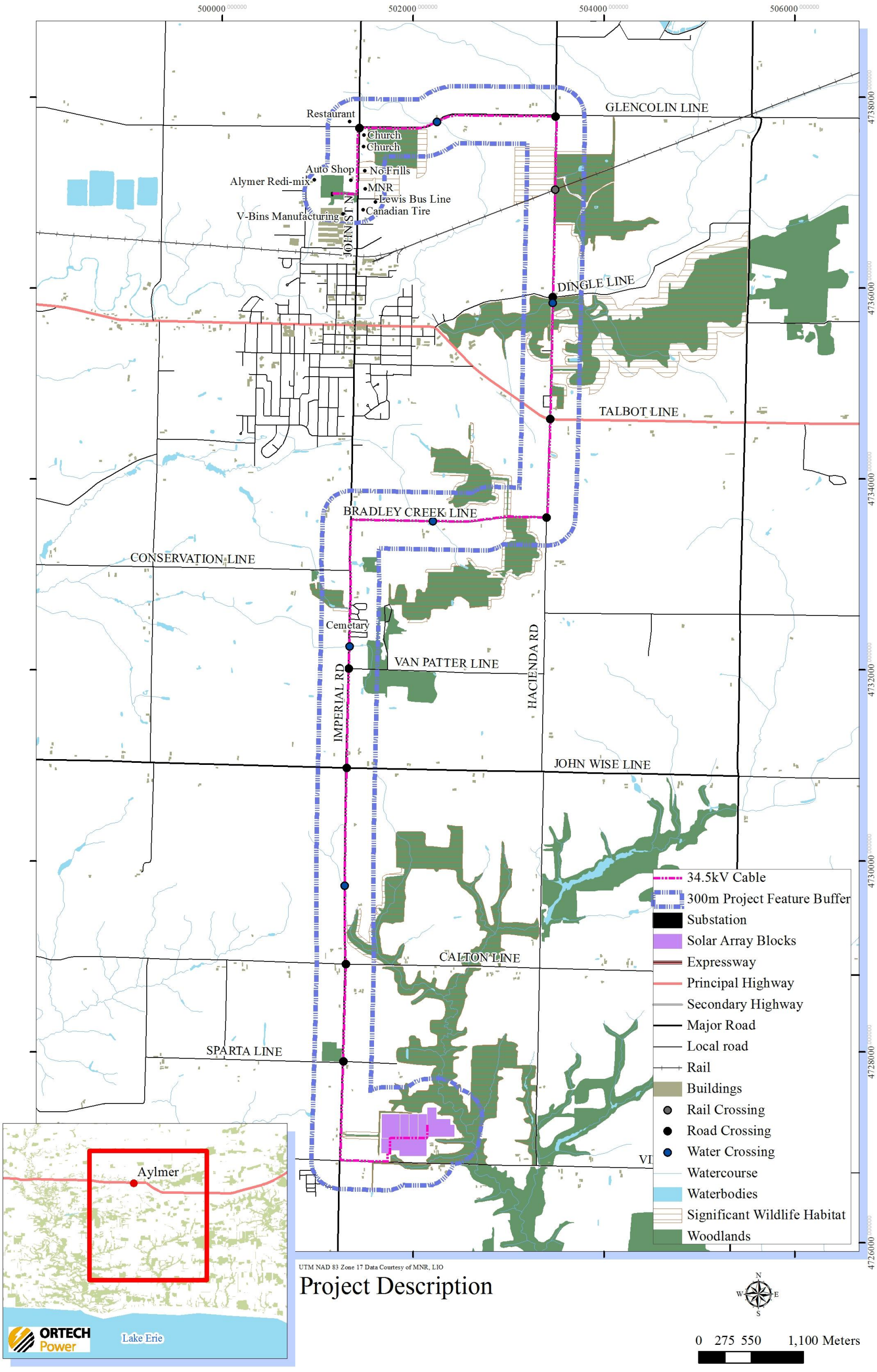


Figure 2: Location of Project, Solar Array and Connection Route

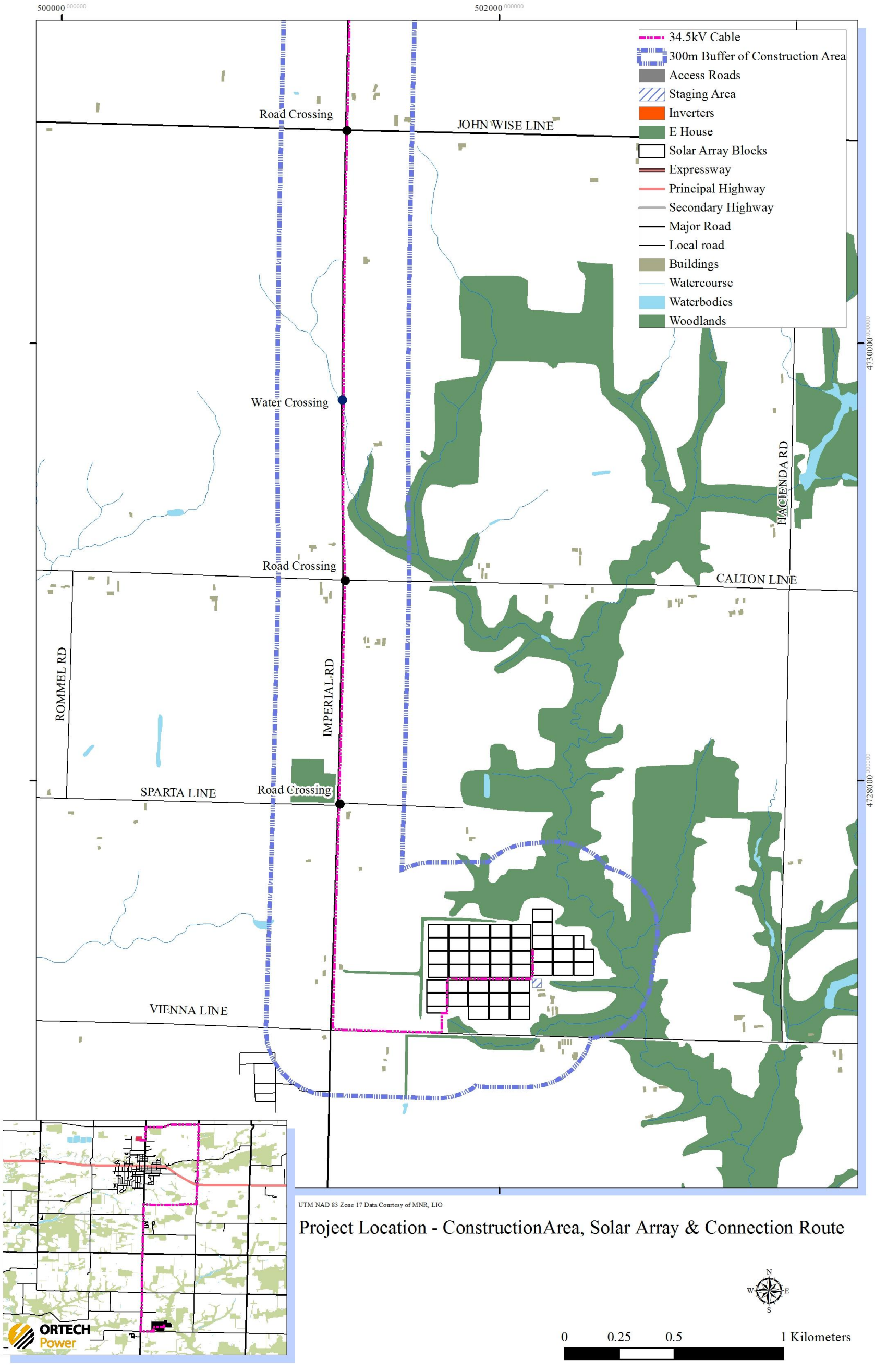
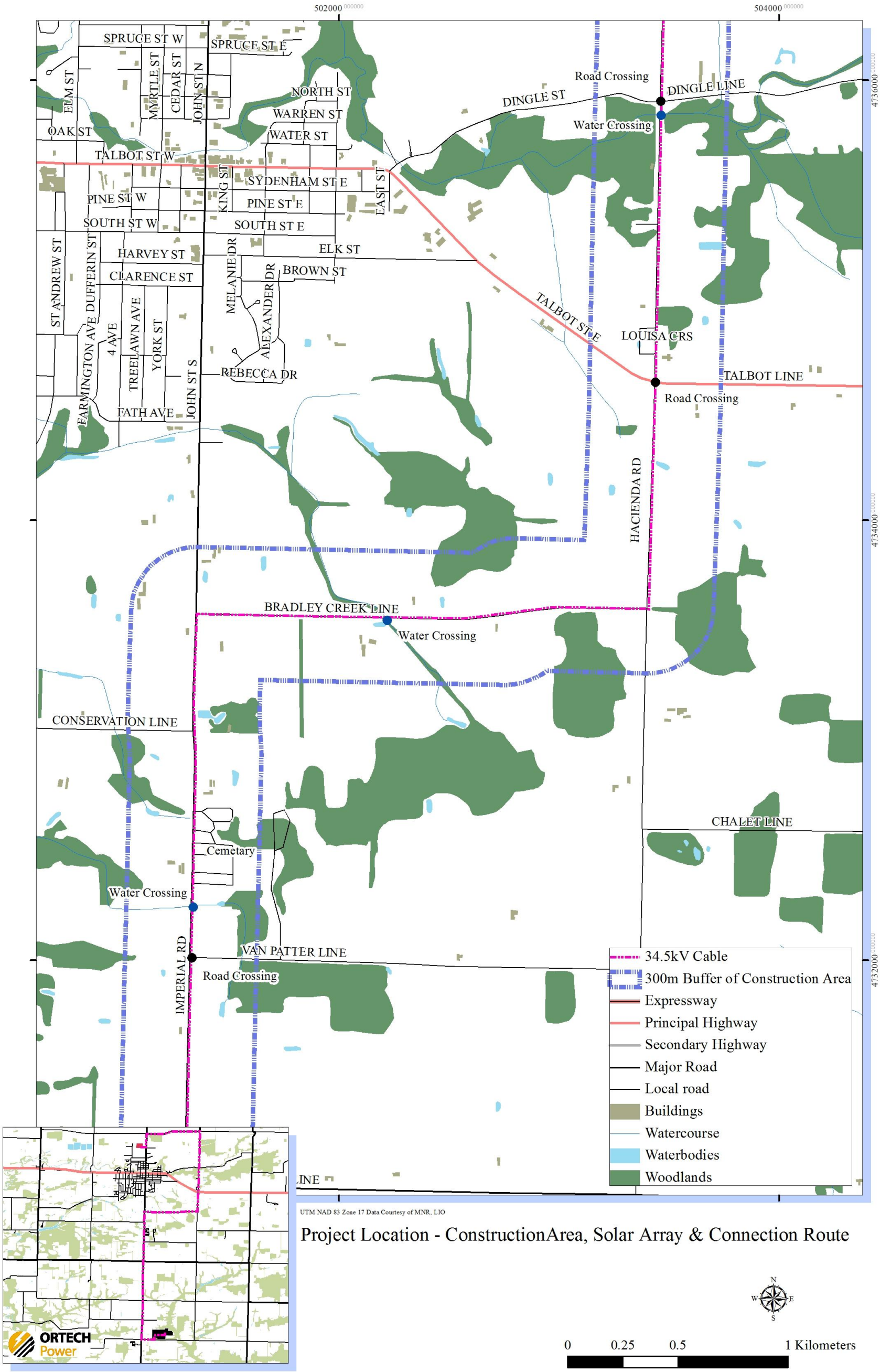


Figure 3: Location of Project, Connection Route



ATTACHMENT 2

REA Checklist: Consideration of Potential for Heritage Resources (1 page)

Ontario

Ministry of Tourism, Culture and Sport

Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

REA Checklist: Consideration of Potential for Heritage Resources

Applies to: Applicants for a renewable energy approval (REA) under the *Environmental Protection Act* who opt to consider the potential for heritage resources under subsection 23(2) of O. Reg. 359/09.

Screening Question		
Is the project location situated on a parcel of land that:	**Yes**	**No**
1. Abuts any protected property as described in Column 1 of the Table in section 19?*	☐	☑
2. Is included on the Ministry of Tourism, Culture and Sport's list of provincial heritage properties?	☐	☑
3. Is listed on a register or inventory of heritage properties maintained by the municipality?	☐	☑
4. Is the subject of a municipality, provincial or federal plaque?	☐	☑
5. Is on or abutting a National Historic Site?	☐	☑
6. Is on or abutting a known burial site and/or cemetery?	☑	☐
7. Contains structures over forty years old? (Residential structures, farm buildings and outbuildings, industrial, commercial, institutional buildings and/or engineering works, etc.)	☐	☑
Is there Aboriginal or local knowledge or accessible documentation suggesting that the project location is situated on a parcel of land that:	**Yes**	**No**
8. Contains or is part of a cultural heritage landscape? (Aboriginal trail, park, relationship to a Canadian Heritage River, designed garden, historic road or rail corridor, etc.)	☐	☑
9. Is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?	☐	☑
10. Has special association with a community, person or historical event? (Aboriginal sacred site, traditional-use areas, battlefield, birthplace of an individual of importance to the community, etc.)	☐	☑

If **YES** to one or more of the above questions, there is potential for heritage resources at the project location.

If **uncertain** about the answer to one or more of the above questions, a heritage assessment is advised as additional research is required to determine whether there is potential for heritage resources in the project location.

if **NO** to all of the above questions, there is low potential for heritage resources at the project location. A summary of the information supporting the consideration of potential for heritage resources must be included in the design and operations report.

*If the project is located on a protected property, written authorization must be obtained from the appropriate body and submitted to MOE as part of complete REA application under section 19 of O. Reg. 359/09.

ATTACHMENT 3

Additional Supporting Information
Response to Questions 1, 2, 3, 4 and 5
(16 pages)

Additional Supporting Information in Support of Self-Assessment:

Response to Questions 1, 2, 3, 4 and 5

No protected properties abut the project area. Consultation with the Ontario Heritage Trust, the Municipality of Malahide and a search of the Ontario Ministry of Culture, Ontario Heritage Properties and Elgin County Heritage Database is provided below. No subject properties abut the project area, including the distribution line.

An initial review of the main project area, located on Vienna Line, Malahide Township was provided to the Ministry of Culture and Tourism on August 20, 2010. The Ministry provided a response confirming that no protected properties were impacted. This opinion is limited to the main project location. Copies of communications and literature searches are provided below.

Correspondence with Ontario Heritage Trust regarding Protected Properties

ONTARIO HERITAGE TRUST
An agency of the Government of Ontario

10 Adelaide Street East
Toronto, Ontario M5C 1J3

Telephone: 416-325-5000
Fax : 416-325-5071
www.heritagetrust.on.ca

VIA MAIL AND EMAIL

June 5, 2012

ORTECH Environmental
804 Southdown Road
Mississauga, Ontario, Canada L5J 2Y4

Attention: Scott Manser, Sr. Environmental Engineer

Dear Mr. Manser:

Re: Silvercreek Solar Park – 49588 Vienna Line, Aylmer – Lots 12, 13 and 14, Concession 3, Twp. of Malahide, Elgin County

We are in receipt of your inquiry dated June 1, 2012 pursuant section 19 of O. Reg. 359/09 and the attached Notice of a Change to a Proposal to Engage in a Renewable Energy Project Public Meetings for the above-noted to be located within the study area shown on the Notice.

As the Province's lead heritage agency, the Ontario Heritage Trust is mandated to preserve, protect and promote the conservation of the Province's rich natural and cultural heritage. In carrying out the above mandate, the Trust protects many significant cultural heritage and natural heritage sites across Ontario through ownership and conservation easements. The Trust also promotes appropriate measures to protect heritage resources which may be affected by large-scale undertakings.

We have reviewed the study area site map you provided and advise that the Trust does not protect any property through a conservation easement on lands that are within or are abutting the study area.

We encourage you to contact the Ministry of Tourism, Culture and Sport, if you have not already done so, to confirm if there are any other cultural heritage interests which may be affected by this project. Should you have any questions, please contact me at 416 325-5019.

Yours truly,

Sean Fraser
Manager, Acquisitions and Conservation Services

Copy to: Chris Schiller, Manager, Culture Services Unit, Ontario Ministry of Tourism, Culture and Sport

Correspondence with the Municipality of Malahide regarding Protected Properties

Scott Manser

From: Michelle Casavecchia <MCasavecchia@malahide.ca>
Sent: January-16-12 5:02 PM
To: Scott Manser
Subject: RE: Silvercreek Solar Park Heritage Properties Along Distribution Line Route

Please be advised that there are no such Heritage properties within the 300 m area that you have identified.

Sincerely,

Michelle M. Casavecchia, D.P.A., C.M.O., CMM III
Chief Administrative Officer/Clerk
Township of Malahide
87 John Street South
Aylmer, ON N5H 2C3
Phone: 519-773-5344, ext. 225
Fax: 519-773-5334
mcasavecchia@malahide.ca
www.malahide.ca

Township of Malahide is now on FACEBOOK
Now you can connect with us on FaceBook for the latest information on upcoming municipal events, news and information, community events and more!
Check us out on Facebook - and don't forget to click the "Like" button to stay connected to current Malahide information.

From: Scott Manser [mailto:smanser@ortech.ca]
Sent: January 13, 2012 1:45 PM
To: Michelle Casavecchia
Subject: Silvercreek Solar Park Heritage Properties Along Distribution Line Route

Michelle;

Back in 2010 ORTECH did an inquire about Heritage / Protected Properties adjacent to the proposed Silvercreek Solar Park (none identified). As you are (hopefully) aware the route for the distribution line has changed since the start of the project. I have searched the Ontario Heritage Database (which has not been updated since 2005) and no properties within 300 m were identified.

Can you check the municipal records and see if there are any properties (see the table below) within 300 m along the distribution line. The attached map shows the distribution line with a 120 m boundary around this. I am aware that the distribution line will pass by the Alymer Cemetery on Imperial Road.

Item	Column 1	Column 2	Column 3
	Description of property.	Person or body whose authorization is required.	Type of authorization required to be submitted.

(continued…)

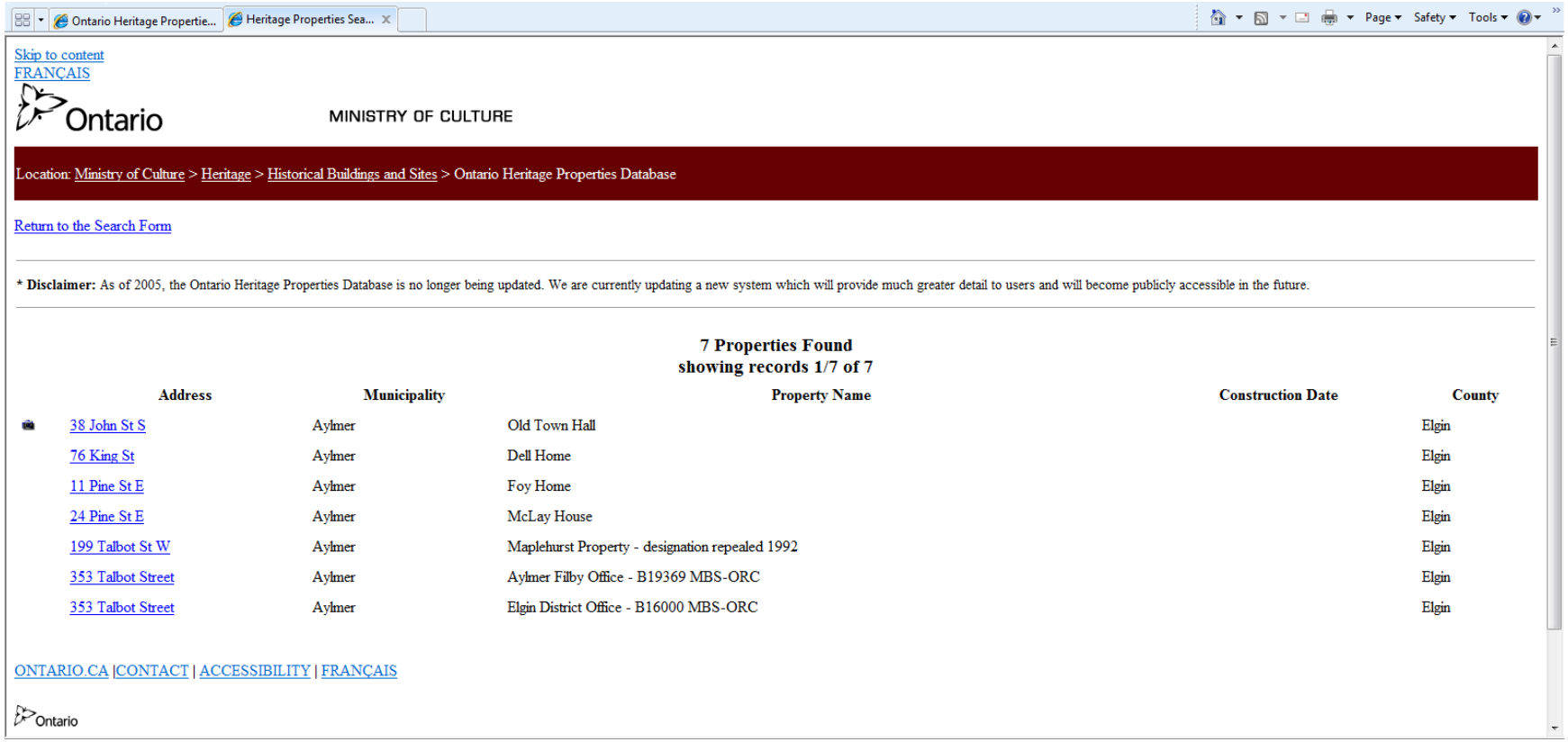
1.	A property that is the subject of an agreement, covenant or easement entered into under clause 10 (1) (b) of the *Ontario Heritage Act*.	Ontario Heritage Trust.	Authorization to undertake any activities related to the renewable energy project that require the approval of the Ontario Heritage Trust pursuant to the easement or covenant.
2.	A property in respect of which a notice of intention to designate the property to be of cultural heritage value or interest has been given in accordance with section 29 of the *Ontario Heritage Act*.	Municipality that gave the notice.	If, as part of the renewable energy project, the alteration of the property or the demolition or removal of a building or structure on the property is proposed, consent to alter the property or demolish or remove the building or structure.
3.	A property designated by a municipal by-law made under section 29 of the *Ontario Heritage Act* as a property of cultural heritage value or interest.	Municipality that made the by-law.	If, as part of the renewable energy project, the alteration of the property or the demolition or removal of a building or structure on the property is proposed, consent to alter the property or demolish or remove the building or structure.
4.	A property designated by order of the Minister of Culture made under section 34.5 of the *Ontario Heritage Act* as a property of cultural heritage value or interest of provincial significance.	Minister of Culture.	If, as part of the renewable energy project, the alteration of the property or the demolition or removal of a building or structure on the property is proposed, consent to alter the property or demolish or remove the building or structure.
5.	A property in respect of which a notice of intention to designate the property as property of cultural heritage value or interest of provincial significance has been given in accordance with section 34.6 of the *Ontario Heritage Act*.	Minister of Culture.	If, as part of the renewable energy project, the alteration of the property or the demolition or removal of a building or structure on the property is proposed, consent to alter the property or demolish or remove the building or structure.
6.	A property that is the subject of an easement or a covenant entered into under section 37 of the *Ontario Heritage Act*.	Municipality that entered into the easement or covenant.	Authorization to undertake any activities related to the renewable energy project that require the approval of the municipality that entered into the easement or covenant.
7.	A property that is part of an area designated by a municipal by-law made under section 41 of the *Ontario Heritage Act* as a heritage conservation district.	Municipality that made the by-law.	If, as part of the renewable energy project, the alteration of the property or the erection, demolition or removal of a building or structure on the property is proposed, a permit to alter the property or to erect, demolish or remove a building or structure on the property.
8.	A property designated as a historic site under Regulation 880 of the Revised Regulations of Ontario, 1990 (Historic Sites) made under the *Ontario Heritage Act*.	Minister of Culture.	If, as part of the renewable energy project, the excavation or alteration of the property of historical significance is proposed, a permit to excavate or alter the property.

O. Reg. 359/09, s. 19, Table.

Regards;

Scott Manser, P.Eng
Senior Environmental Engineer
ORTECH Environmental
Tel: 519-966-8798
Fax: 519-966-8014

Search of Protected Properties: Ministry of Tourism, Culture and Sport's Database



Skip to content
FRANÇAIS

Ontario MINISTRY OF CULTURE

Location: Ministry of Culture > Heritage > Historical Buildings and Sites > Ontario Heritage Properties Database

Return to the Search Form

* **Disclaimer:** As of 2005, the Ontario Heritage Properties Database is no longer being updated. We are currently updating a new system which will provide much greater detail to users and will become publicly accessible in the future.

7 Properties Found
showing records 1/7 of 7

Address	Municipality	Property Name	Construction Date	County
38 John St S	Aylmer	Old Town Hall		Elgin
76 King St	Aylmer	Dell Home		Elgin
11 Pine St E	Aylmer	Foy Home		Elgin
24 Pine St E	Aylmer	McLay House		Elgin
199 Talbot St W	Aylmer	Maplehurst Property - designation repealed 1992		Elgin
353 Talbot Street	Aylmer	Aylmer Filby Office - B19369 MBS-ORC		Elgin
353 Talbot Street	Aylmer	Elgin District Office - B16000 MBS-ORC		Elgin

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Ontario

(Note: No provincial sites registered within the Municipality of Malahide)

Initial communication with the Ministry of Tourism, Culture and Sport regarding the potential for heritage impacts (Note: does not cover distribution line route)

From: Dolson, Judy (MCI) [mailto:Judy.Dolson@ontario.ca]
Sent: Wed 01/09/2010 2:31 PM
To: Nadiya Bogush
Cc: Potter, George (MCI); Dam, Laura-Lee (MCI)
Subject: FW: heritage assessment report

Hello Nadiya,

Below are Jo-Ann Hutchison's comments as requested.

If you have any further questions, don't hesitate to call.

Thanks.

Judy Dolson

From: Hutchison, Jo-Ann (MCI)
Sent: September 1, 2010 1:58 PM
To: Dolson, Judy (MCI)
Cc: Dam, Laura-Lee (MCI); Potter, George (MCI)
Subject: RE: heritage assessment report

Here's my response:

No specific comments at this time.

Please be advised that the Ministry of Culture must also provide technical comments to the impact of the proposal to heritage resources. For review/comment on heritage resources pertaining to land use matters, Provincial Policy Statement, the Ontario Heritage Act, etc, please contact:

James Hamilton
Manager (A), Culture Services Unit
Programs and Services Branch
Ontario Ministry of Culture
4th Floor, 400 University Avenue
Toronto, ON M7A 2R9

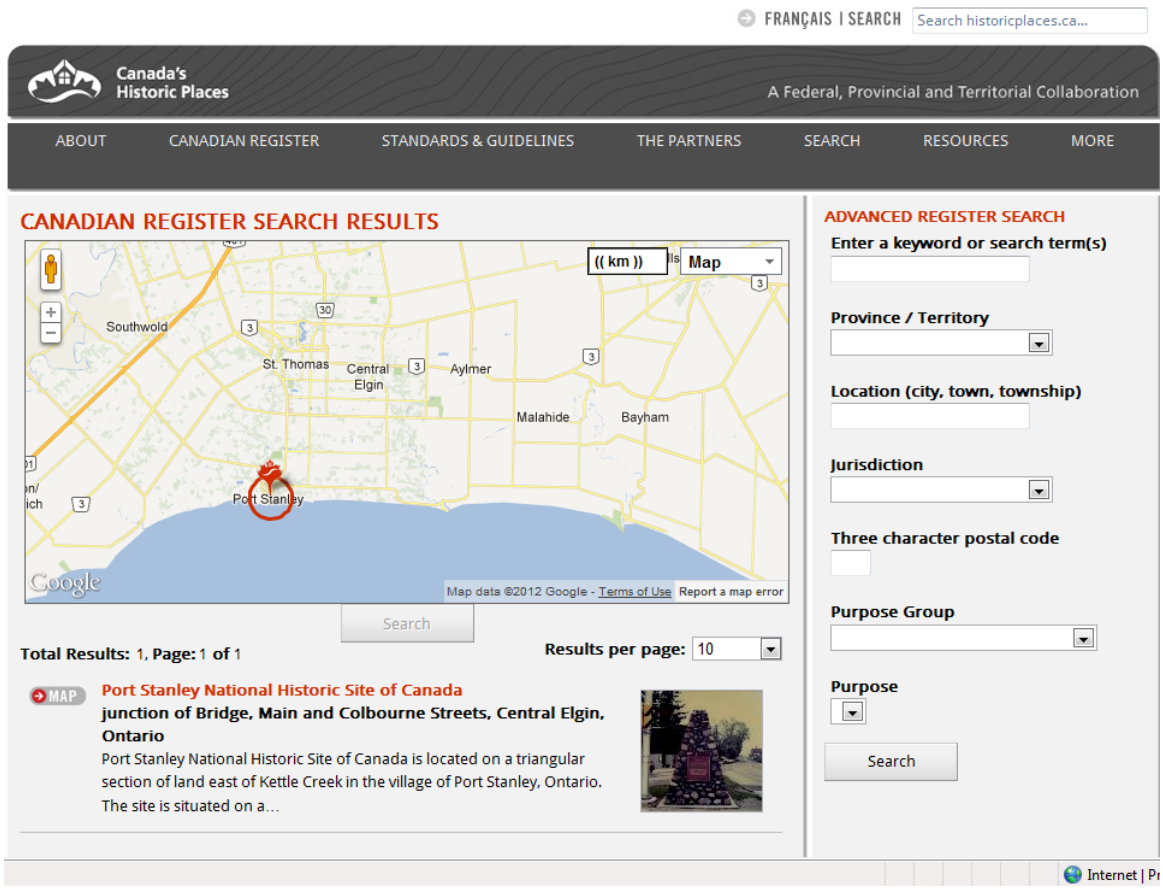
From: Nadiya Bogush [mailto:NBogush@ortech.ca]
Sent: August 23, 2010 11:06 AM
To: Dolson, Judy (MCI)
Cc: Scott Manser
Subject: RE: heritage assessment report

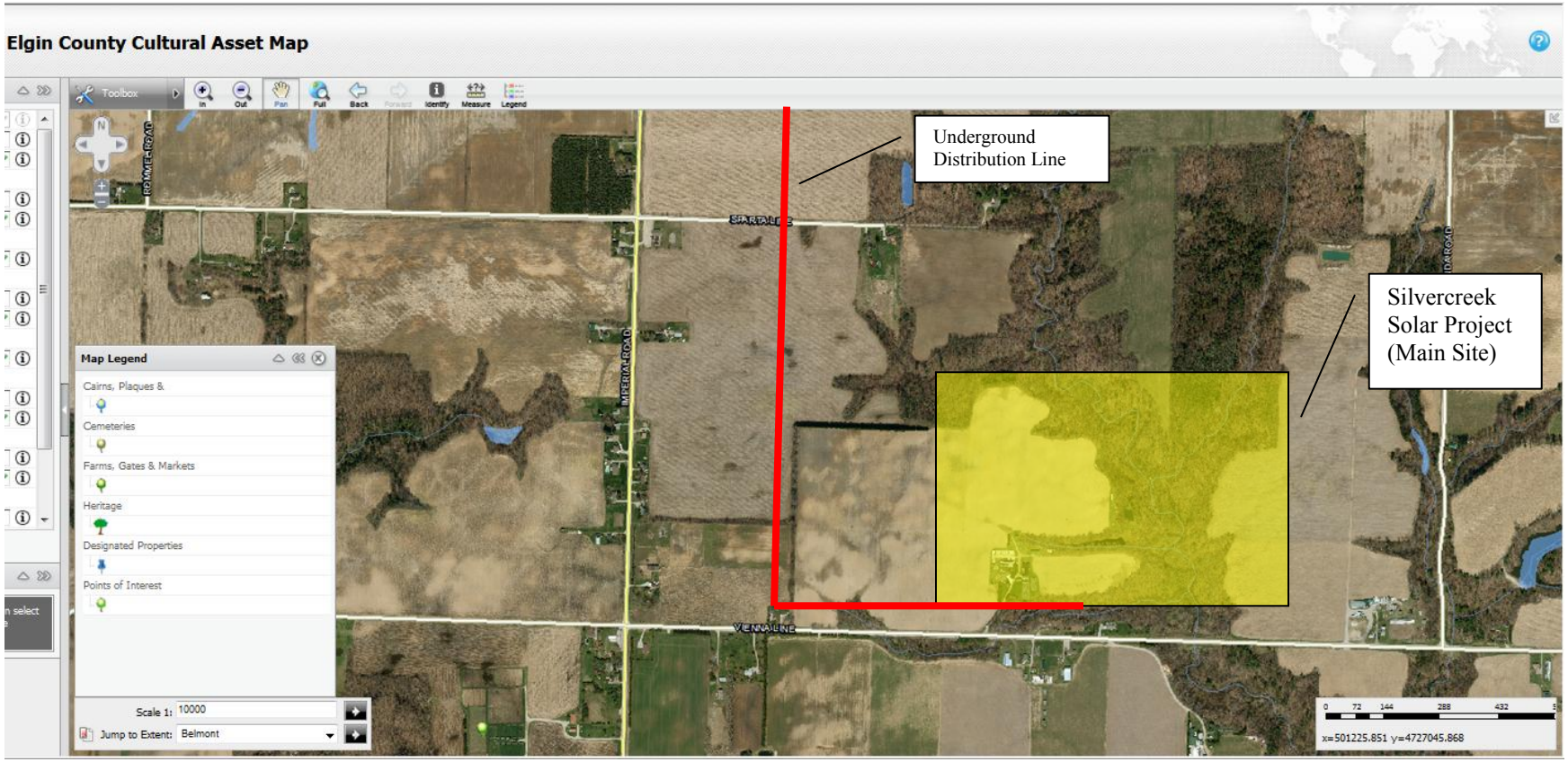
Good morning Judy,

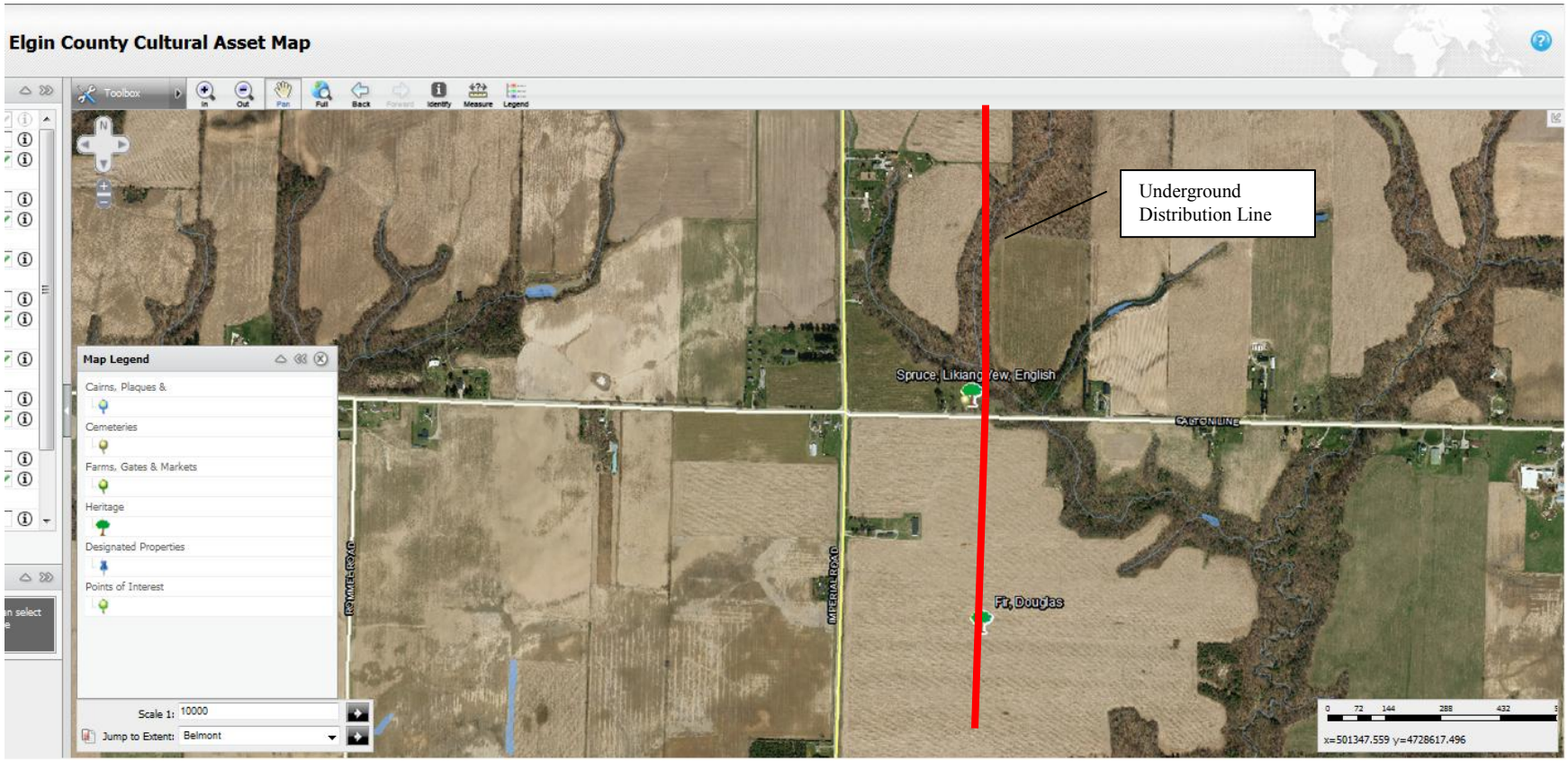
Please find attached an electronic copy of the report, let me know if you would prefer a hard copy. This project has very sensitive timelines and we would like to receive comments by September 13, 2010.

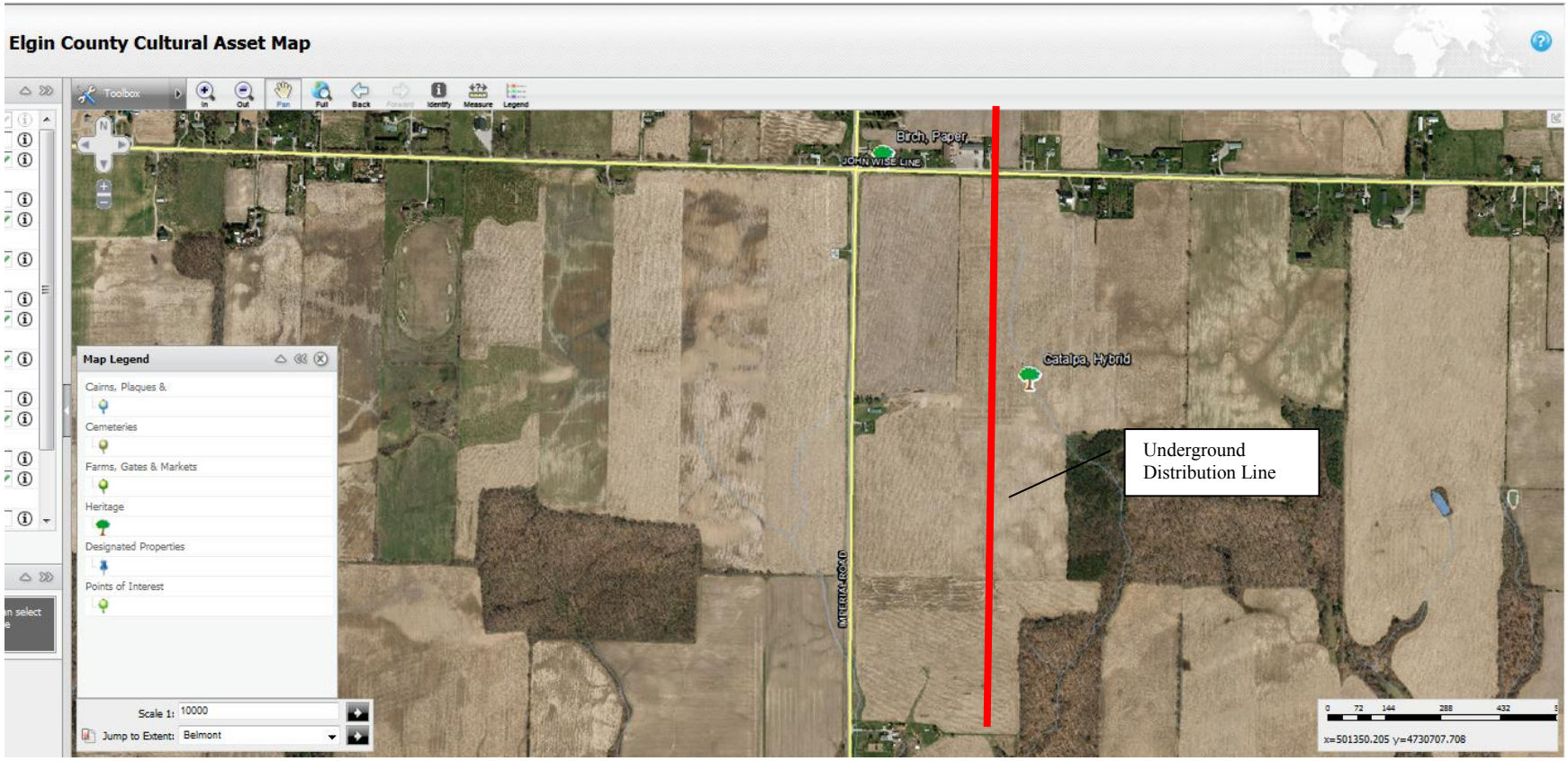
Information Search: National Heritage / Historic Sites

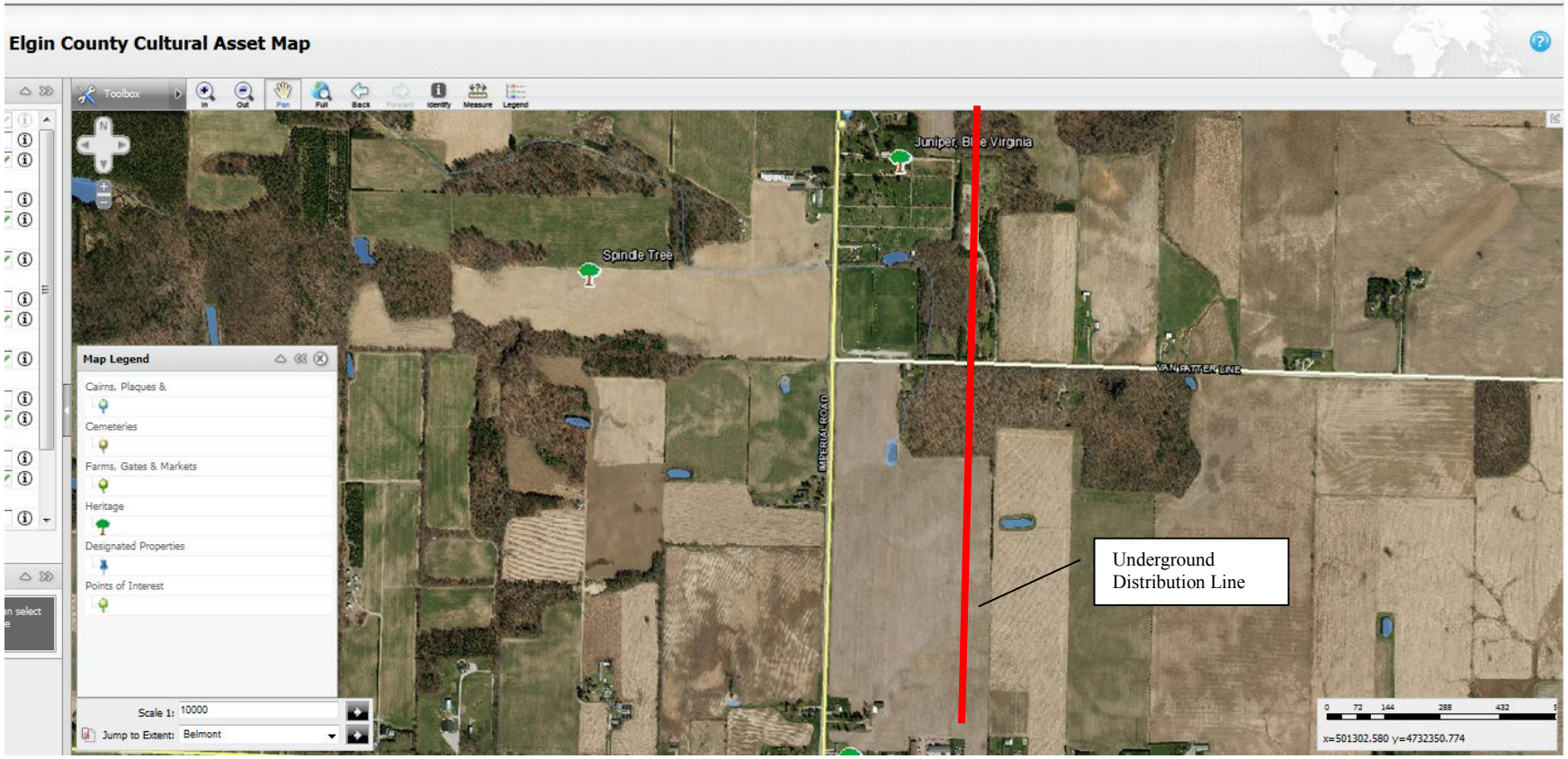
The closest location identified under the Canada's Historic Places website is the Port Stanley National Historical Site, located approximately 45 kilometers to the south west of the project.

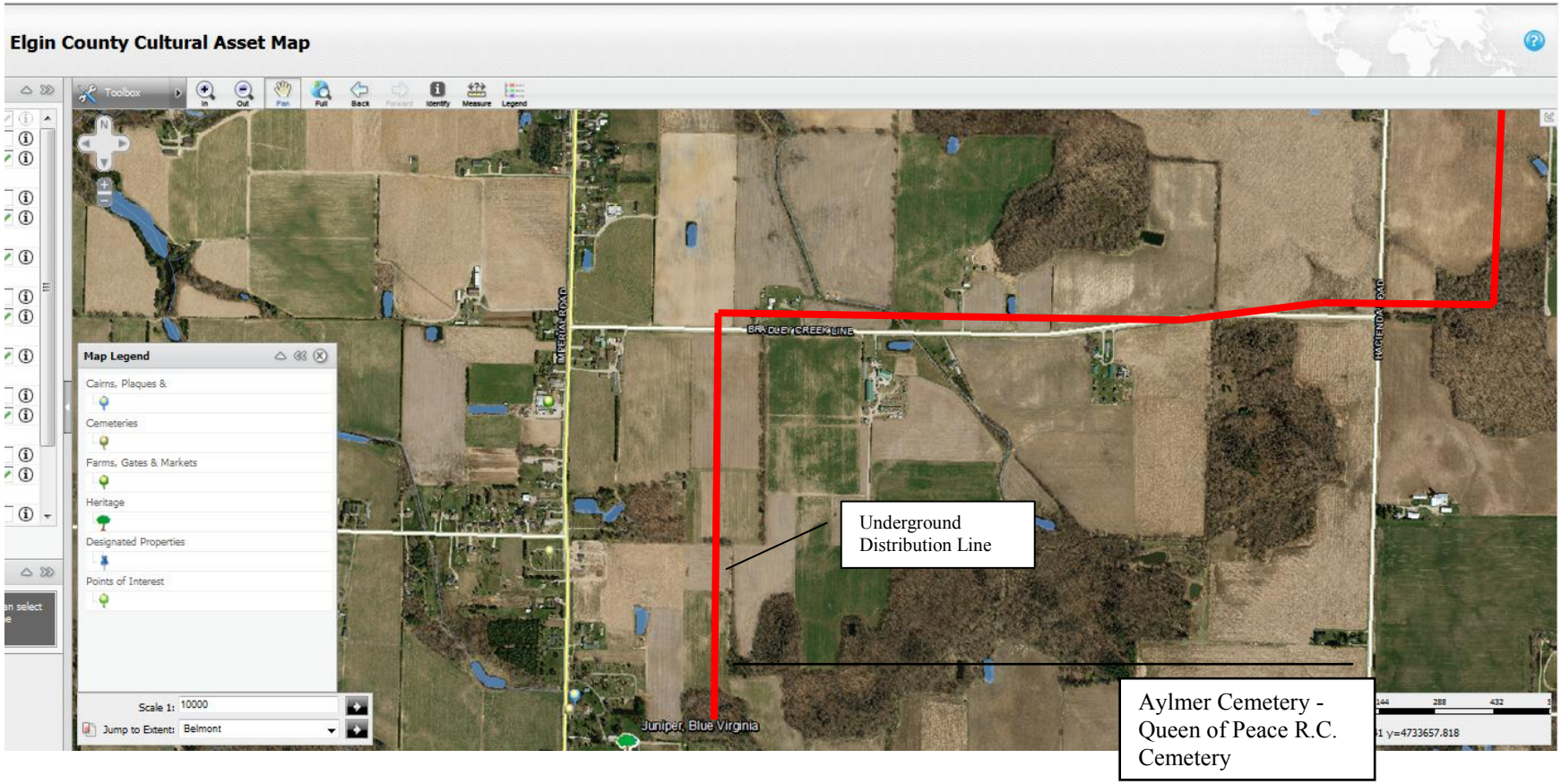


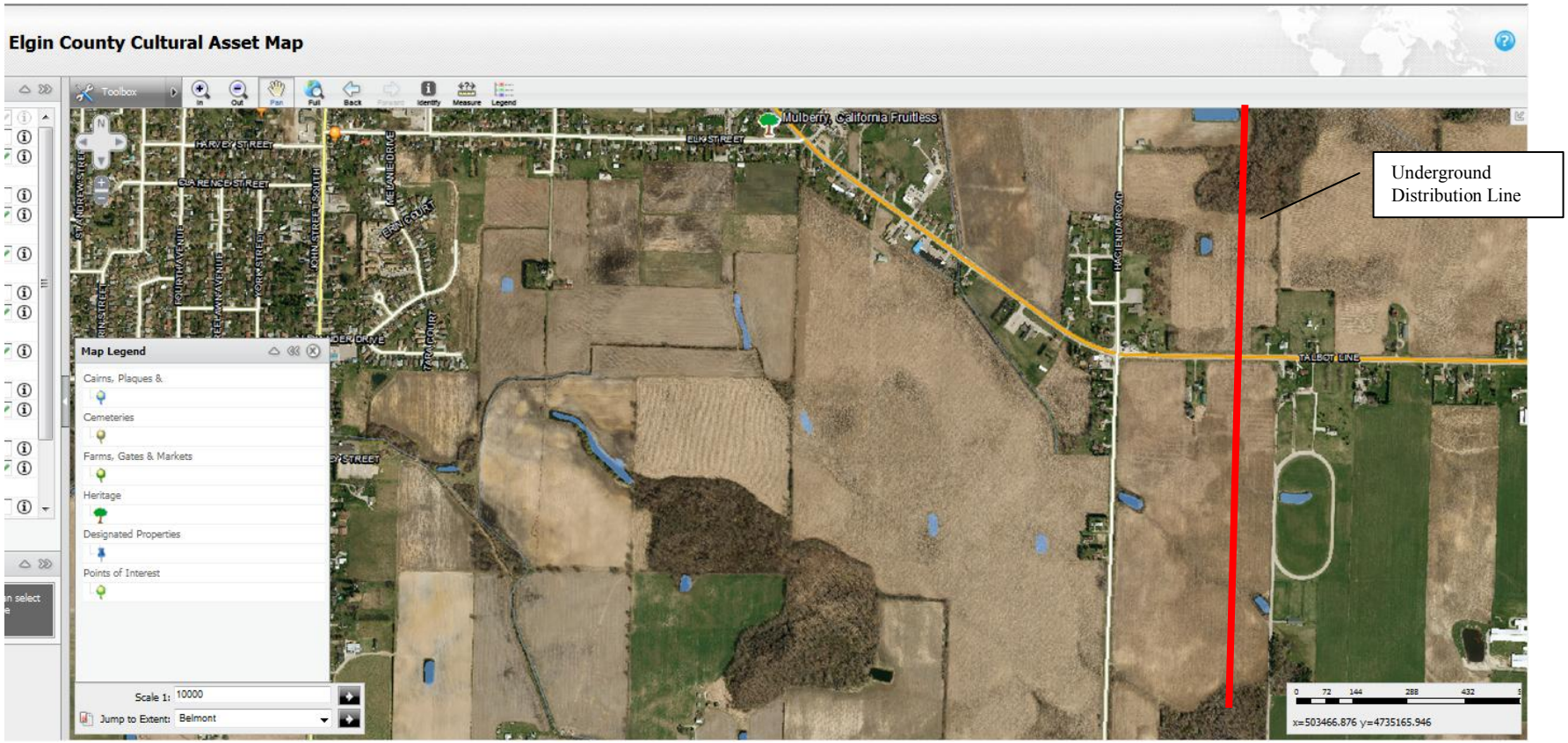

Elgin County Cultural Asset Map
Underground Distribution Line
Silvercreek Solar Project (Main Site)
Map Legend
Cairns, Plaques &
Cemeteries
Farms, Gates & Markets
Heritage
Designated Properties
Points of Interest
Scale 1: 10000
Jump to Extent: Belmont
IMPERIAL ROAD
VIENNA LINE
x=501225.851 y=4727045.868

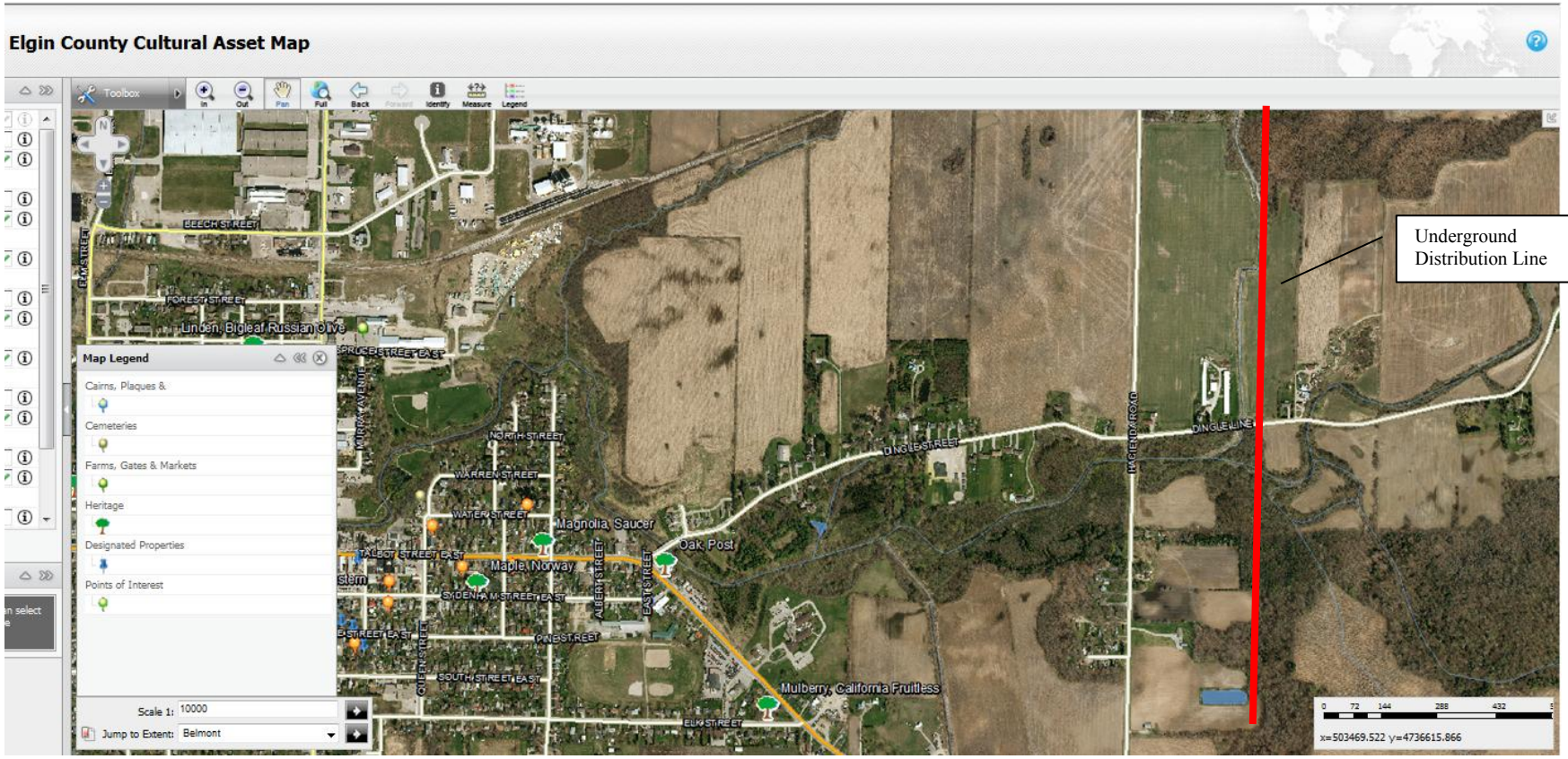

Elgin County Cultural Asset Map
Underground Distribution Line
Map Legend
Cairns, Plaques &
Cemeteries
Farms, Gates & Markets
Heritage
Designated Properties
Points of Interest
Scale 1: 10000
Jump to Extent: Belmont
Spruce, Likiang
English
Fr, Douglas
x=501347.559 y=4728617.496

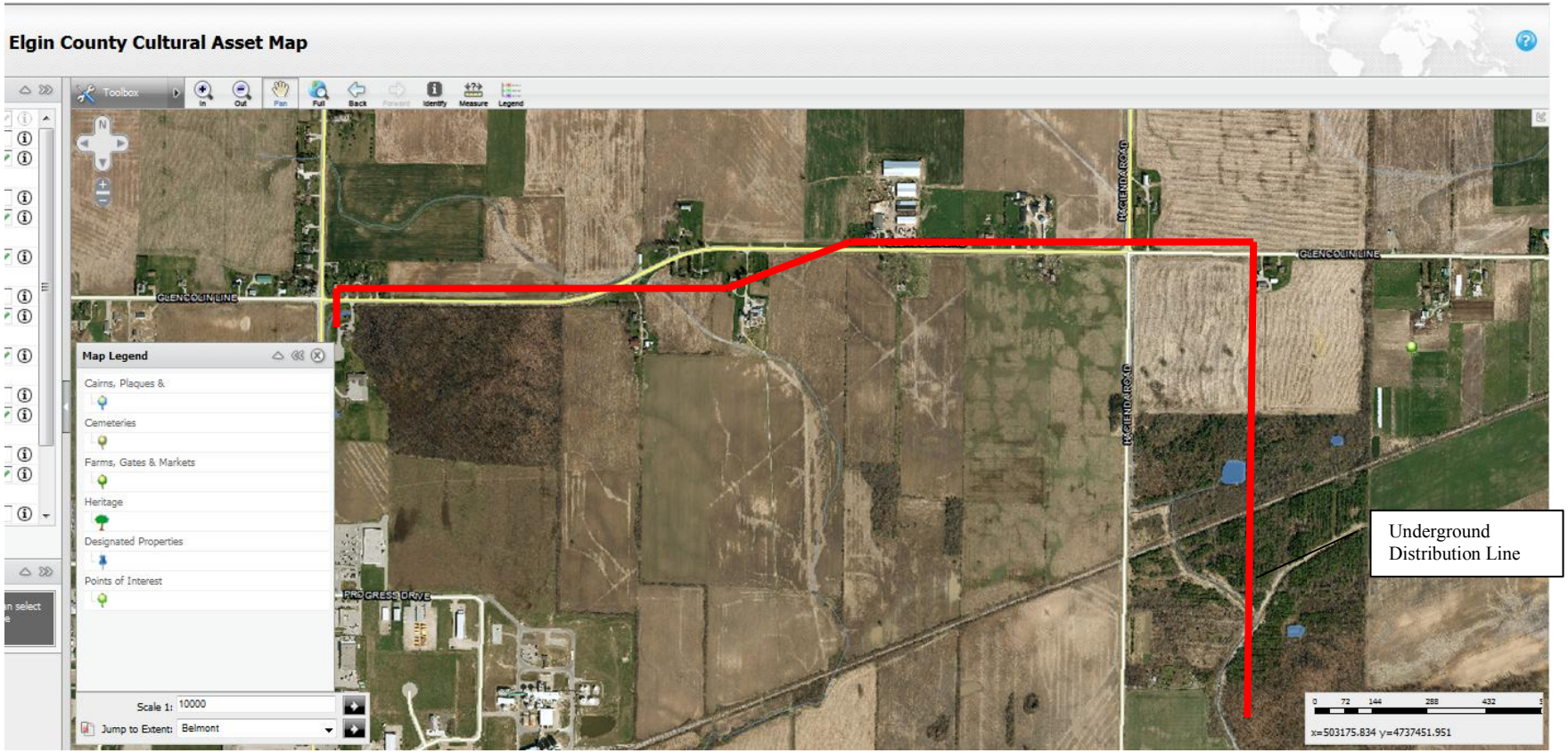

Elgin County Cultural Asset Map
Toolbox
In
Out
Pan
Full
Back
Forward
Identify
Measure
Legend
Birch, Paper
JOHN WISE LINE
Catalpa, Hybrid
Underground
Distribution Line
MIDDLE ROAD
Map Legend
Cairns, Plaques &
Cemeteries
Farms, Gates & Markets
Heritage
Designated Properties
Points of Interest
Scale 1: 10000
Jump to Extent: Belmont
0 72 144 288 432
x=501350.205 y=4730707.708

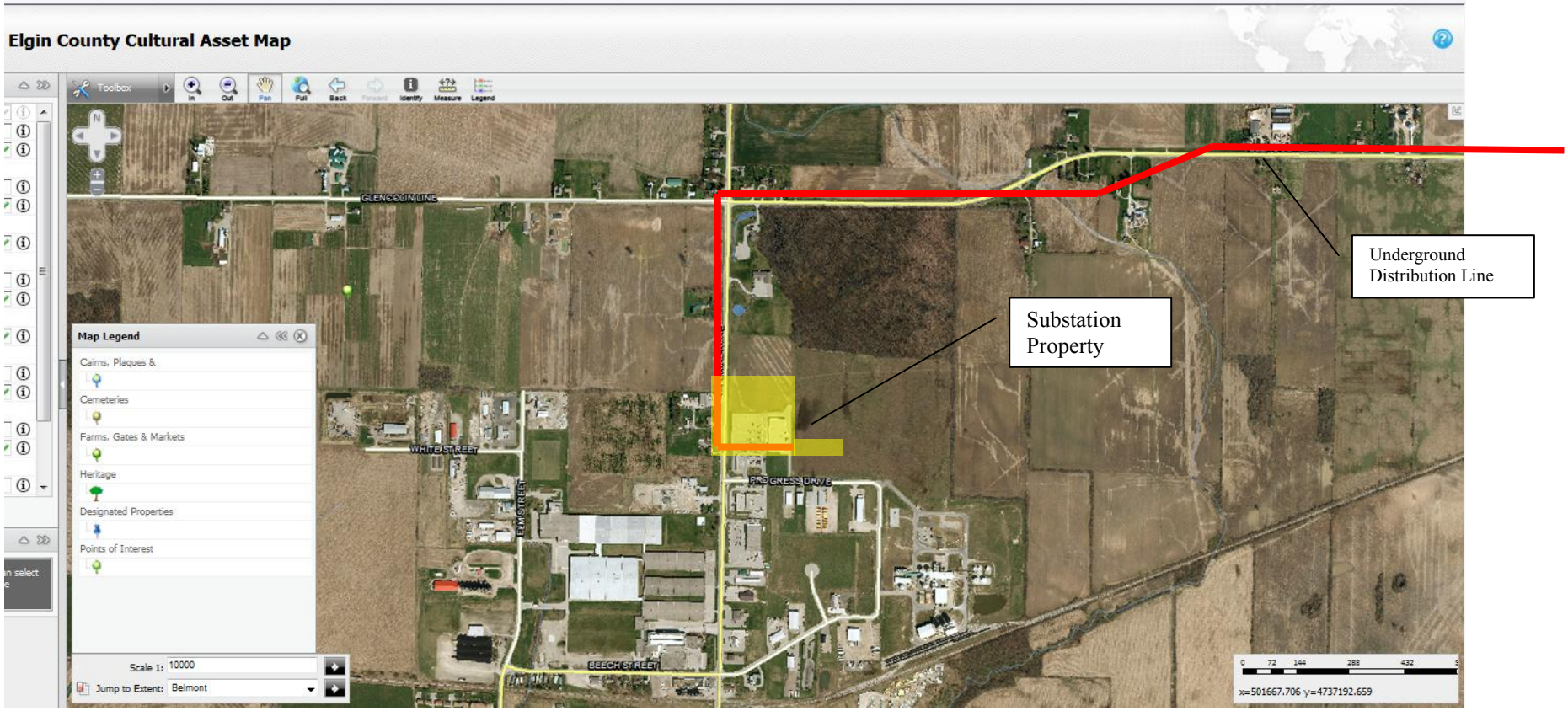

Elgin County Cultural Asset Map
Toolbox
Spindle Tree
Map Legend
Cairns, Plaques &
Cemeteries
Farms, Gates & Markets
Heritage
Designated Properties
Points of Interest
Scale 1: 10000
Jump to Extent: Belmont
Underground
Distribution Line
x=501302.580 y=4732350.774


Elgin County Cultural Asset Map
Toolbox
Map Legend
Cairns, Plaques &
Cemeteries
Farms, Gates & Markets
Heritage
Designated Properties
Points of Interest
Scale 1: 10000
Jump to Extent: Belmont
Juniper, Blue Virginia
Underground Distribution Line
Aylmer Cemetery - Queen of Peace R.C. Cemetery


Elgin County Cultural Asset Map
Toolbox
Map Legend
Cairns, Plaques &
Cemeteries
Farms, Gates & Markets
Heritage
Designated Properties
Points of Interest
Scale 1: 10000
Jump to Extent: Belmont
Mulberry, California Fruitless
ELK STREET
HARVEY STREET
CLARENCE STREET
MELANIE DRIVE
HACIENDA ROAD
TALBOT LINE
Underground Distribution Line
x=503466.876 y=4735165.946


Elgin County Cultural Asset Map
Underground Distribution Line
Map Legend
Cairns, Plaques &
Cemeteries
Farms, Gates & Markets
Heritage
Designated Properties
Points of Interest
Scale 1: 10000
Jump to Extent: Belmont
Linden, Bigleaf Russian Olive
Magnolia, Saucer
Oak, Post
Maple, Norway
Mulberry, California Fruitless
BEECH STREET
FOREST STREET
SPRUCE STREET EAST
NORTH STREET
WARREN STREET
WATER STREET
TALBOT STREET EAST
SYDENHAM STREET EAST
PINE STREET
SOUTH STREET EAST
ELM STREET
DINGLE STREET
DINGLE LINE
HACIENDA ROAD
MURRAY AVENUE
ALLEN STREET
EAST STREET
QUEEN STREET
x=503469.522 y=4736615.866


Elgin County Cultural Asset Map
Toolbox
Map Legend
Cairns, Plaques &
Cemeteries
Farms, Gates & Markets
Heritage
Designated Properties
Points of Interest
Scale 1: 10000
Jump to Extent: Belmont
GLENCOLIN LINE
MCGLENDA ROAD
PROGRESS DRIVE
Underground Distribution Line
x=503175.834 y=4737451.951


Elgin County Cultural Asset Map
Toolbox
Map Legend
Cairns, Plaques &
Cemeteries
Farms, Gates & Markets
Heritage
Designated Properties
Points of Interest
Scale 1: 10000
Jump to Extent: Belmont
GLENCOLIN LINE
WHITE STREET
BEECH ST REET
PROGRESS DRIVE
x=501667.706 y=4737192.659
Underground Distribution Line
Substation Property

ATTACHMENT 4

Additional Supporting Information
Response to Question 6
(2 pages)

Additional Supporting Information Response to Question 6

Based upon a search of registered cemeteries and a site inspection conducted during the Stage 1 Archaeology Assessment two (2) registered sites (#00551 Aylmer Cemetery and #00557 Queen of Peach R.C. Cemetery) were identified along the route of the distribution line. Both sites are located adjacent to one another and along the east side of Imperial Road, north of Van Patter Line.

Cemeteries are not specifically listed under Section 19, Table 1 of the REA Regulation as protected properties. The MTC in developing the "REA Checklist: Consideration of Potential for Heritage Resources" has included cemeteries in the self-assessment process as these sites are often listed as protected properties. As discussed in Attachment 3 these cemetery sites are not prescribed protected properties under the Ontario Heritage Act.

The following discussion is provided as an added measure to demonstrate that consideration of these properties has been incorporated into the design and construction of the distribution line. Impacts to these properties, following the methods described within the Construction Plan Report, are not anticipated.

The route of the distribution line, as shown in Figure 2, will run within the municipal road allowance along the following path commencing at the project site travelling to the substation:

- north side of Vienna Line;
- east side of Imperial Road;
- south side of Glencolin Line;
- east side of Hacienda Road, and
- north side of Tobacco Line, and
- west side of Imperial Road.

Along the east side of Imperial Road, within the municipal road allowance the area has experienced significant disturbances in recent history as evidence by an existing underground telephone cable (see Image 16) and road grading. The proposed underground distribution line would run between the existing road and the existing underground telephone cable. The potential for additional impacts in the area is considered limited as construction techniques used for the installation of the existing telephone cable would be similar for the distribution line. Additional discussion regarding construction effects, mitigation and monitoring are provided in the Construction Plan Report.

The Stage 1 Archaeological Assessment, approved by the Ministry of Culture on January 5, 2012, concluded that this area of the municipal road allowance has limited archaeological potential.

Image 16: Location of transmission line on the east side of Imperial Road, adjacent to cemetery, looking north (note ditching, fill slopes, telephone cable)

Image Source: Stage 1 & 2 Archaeological Assessment Silvercreek Solar Park Substation and Transmission Line Geographic Township of Malahide Elgin County, Ontario FIT Reference #FIT-FEA8Z1X

ATTACHMENT 5

Additional Supporting Information
Response to Questions 7, 8, 9 and 10
(1 page)

Additional Information in Response to Question 7

There are no residential structures, farm buildings, industrial, commercial or institutional buildings, engineering works, monuments or landmark features at the main project location or substation property. Project location is defined by O.Reg 359/09 as "when used in relation to a renewable energy project, 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 and any air space in which a person is engaging in or proposes to engage in the project".

A 15 km underground distribution line will travel from the main project site to the substation property entirely within the municipal right of way. Construction and operation of the distribution line is therefore a permitted use of the existing municipal zoning. The construction of the distribution line will not require upgrades or alterations to built structures or engineering works. A series of aerial maps indicating the presence of cultural features from Elgin County, Cultural Asset Interactive Mapping of the distribution line route is provided in Attachment 4 for additional information.

Additional Information in Response to Question 8, 9 and 10

Consultation with the Municipality of Malahide, Ontario Heritage Trust, and First Nation Communities supports the conclustion that the project site is not located on a parcel of land of cultural significance. Copies of Archaloggical assessments have been provided to the MTC and First Nation Communities.

ATTACHMENT 6

Response from the Ministry of Tourism, Culture and Sport
Regarding Archaeological Assessments
(4 pages)

Ministry of Tourism and Culture

Culture Programs Unit
Programs and Services Branch
401 Bay Street, Suite 1700
Toronto, ON M7A 0A7
Telephone: (416)-314-7691
Facsimile: (416)-314-7175
Email : Ian.Hember@ontario.ca

Ministère du Tourisme et de la Culture

Unité des programmes culturels
Direction des programmes et des services
401 Rue Bay, Suite 1700
Toronto, ON M7A 0A7
Téléphone: (416)-314-7691
Télécopieur: 416- 314-7175
Email : Ian.Hember@ontario.ca

Ontario

January 31, 2011

Scott Manser
Ortech Power
804 Southdown Road
Mississauga, ON
L5J 2Y4
smanser@ortech.ca

RE: Silver Creek Solar Farm. Geographic Township of Malahide, Elgin County, Ontario. FITFEA8Z1X. MTC RIMS number 34EA004. MTC PIF Number P083-016-2010

Dear Proponent:

This letter constitutes the Ministry of Tourism and Culture's written comments as required by s. 22(3)(a) of O. Reg. 359/09 under the *Environmental Protection Act* regarding archaeological assessments undertaken for the above project.

Based on the information contained in the report(s) you have submitted for this project, the Ministry believes the archaeological assessment complies with the *Ontario Heritage Act's* licensing requirements, including the licence terms and conditions and the Ministry's 1993 Archaeological Assessment Technical Guidelines. Please note that the Ministry makes no representation or warranty as to the completeness, accuracy or quality of the Report(s).*

The report(s) recommends the following:

1) *Fifteen locations of archaeological interest were recorded within the subject property.*
2) *Based on the Ministry of Tourism and Culture's guidelines, Locations 1, 2, 4-8, 10, and 12 are considered to be of limited archaeological significance and are not recommended for further investigation.*
3) *Based on the Ministry of Tourism and Culture's guidelines, Locations 3, 9, 11, and 13-15 are considered to be of potential archaeological significance and are recommended for Stage 3 archaeological assessment. The Stage 3 fieldwork should consist of the mapping of all surface artifacts using a total station or transit during conditions of good surface visibility. This should be followed by the hand excavation of one-metre units across the site areas.*

   Since typical archaeological assessment methods cannot always detect deeply buried archaeological deposits, if these are found at any point during construction, the Ministry of Tourism and Culture should be notified immediately at (519) 675-6898. Upon the discovery of human remains during construction, the proponent should immediately contact a representative of Timmins Martelle Heritage Consultants, the Ministry of Tourism and Culture, as well as the Registrar of Cemeteries, Michael D'Mello, in the Cemeteries Regulation Unit of the Ministry of Small Business and Consumer Services (416) 326-8404.

The Ministry is satisfied with these recommendations.

This letter does not waive any requirements which you may have under the Ontario *Heritage Act*. A separate letter addressing archaeological licensing obligations under the Act will be sent to the archaeologist who completed the assessment and will be copied to you.

This letter does not constitute approval of the renewable energy project. Approvals of the project may be required under other statutes and regulations. It is your responsibility to obtain any necessary approvals or licences.

Please feel free to contact me if you have questions or require additional information.

Sincerely,

Archaeology Review Officer

cc. Arthur Figura, Timmins Martelle Heritage Consultants

Ministry of Tourism,
Culture and Sport

Culture Programs Unit
Programs and Services Branch
Culture Division
401 Bay Street, Suite 1700
Toronto, ON, M7A 0A7
Telephone: 416-314-2120
Facsimile: 416-314-7175
Email: Andrea.Williams@ontario.ca

Ministère du Tourisme,
de la Culture et du Sport

Unité des programmes culturels
Direction des programmes et des services
Division de culture
401, rue Bay, Bureau 1700
Toronto, ON, M7A 0A7
Téléphone: 416-314-2120
Télécopieur: 416-314-7175
Email: Andrea.Williams@ontario.ca

January 5, 2012

Mr. Arthur Figura
Timmins Martelle Heritage Consultants
@ The Museum of Ontario Archaeology
1600 Attawandaron Road
London Ontario N6G 3M6

RE: Review and Acceptance into the Provincial Register of Reports: Archaeological Assessment Report Entitled, *"Stage 1 & 2 Archaeological Assessment Silvercreek Solar Park Substation and Transmission Line Geographic Township of Malahide Elgin County, Ontario,"* Report Dated December, 2011, Report Received December 21, 2011, FIT # FEA8Z1X, MCL Project Information Form Number P083-152-2011, MCL RIMS Number HD00671

Dear Mr. Figura:

This office has reviewed the above-mentioned report, which has been submitted to this Ministry as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, R.S.O. 1990, c 0.18. This review is to ensure that the licensed professional consultant archaeologist has met the terms and conditions of their archaeological licence, that archaeological sites have been identified and documented according to the 2011 Standards and Guidelines for Consultant Archaeologists set by the Ministry and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario.*

As the result of our review, this Ministry accepts the above titled report into the Provincial register of archaeological reports. No archaeological sites were documented. It is recommended that there are no further concerns for alterations to archaeological sites for the

area that has undergone archaeological assessment. This Ministry concurs with this recommendation.

Given the above, this Ministry is satisfied that concerns for archaeological sites have been met for the area of this development project as depicted by Figure 10 of the above titled report and as depicted by the areas of the Proposed Silvercreek Substation Property and the 27.6 kV Line on the development project map titled Silvercreek Solar – Aylmer, prepared by N. Collard, ORTECH Power, August 5th, 2011 and as depicted by the areas of the Proposed Silvercreek Substation Property and the 34.5 kV Line on the development project map titled Silvercreek Solar – Option A, prepared by N. Collard, ORTECH Power, October 24th, 2011.

This letter does not constitute the Ministry's written comments for the purposes of O. Reg 359/09.

I trust this information is of assistance. Should you require any further information regarding this matter, please feel free to contact me.

Sincerely,

Andrea K. Williams

Andrea Williams
A/ Archaeology Review Officer

cc. Archaeological Licensing Office
Leah Deveaux, ORTECH Power

APPENDIX 3

WATERBODIES ASSESSMENT REPORT AND EIS
(162 pages)

SILVERCREEK SOLAR PARK
Water Body Assessment: Records Review

Prepared for:
ORTECH Environmental
804 Southdown Rd.
Mississauga, ON
L5J 2Y4

Project No. 0983A Date: November 2012

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

SILVERCREEK SOLAR PARK
Water Body Assessment: Records Review

Project Team:

Staff	Role
Andrew Ryckman	Project Manager/Terrestrial and Wetland Biologist
Christy Humphrey	Terrestrial and Wetland Biologist
Steve Burgin	Aquatic Biologist
Erica Frey	GIS Analyst
Katie Roth	GIS Analyst

Report submitted on November 29, 2012

Andrew G. Ryckman

225 Labrador Drive, Waterloo, Ontario, N2K 4M8 **Tel:** (519) 725-2227 **Fax:** (519) 725-257 **Web:** www.nrsi.on.ca **Email:** info@nrsi.on.ca

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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in October 2009 by ORTECH Environmental, on behalf of Silvercreek Solar Park Inc., to conduct a water body resource assessment in accordance with the Renewable Energy Approval (REA) regulation (O.Reg. 359/09). This assessment includes a records review, site investigation, and impact assessment of any water bodies at a proposed 10MW solar power generating facility in Elgin County and Malahide Township, ON. The analysis of the water body features is one issue being considered, other factors such as natural heritage, land ownership, social impacts, and cultural impacts are also being assessed in other reports.

The Silvercreek Solar Park proposed by Silvercreek Solar Park Inc. is located south of the Town of Aylmer, ON (the substation property is located north of the Town of Aylmer). The property proposed for the solar array is dominated by agricultural land and represents approximately 59 hectares (ha). Within this property, the project area is estimated to be 35.9ha. Boundaries to this property are Imperial road to the west, Vienna Line to the south, and the Catfish Creek wooded corridor to the north and east. This solar energy generating facility is proposed to be 10MW in size, consisting of a total of 40 photovoltaic solar panel arrays, as well as supporting infrastructure and development activities. This includes access roads, inverters/transformers and electrical cabling, perimeter fencing and temporary storage areas; on the northern location, a 115kVtransmission line and transformer substation. In addition to the solar panel arrays, the associated infrastructure designs, including the placement of access roads, cabling, and transformer stations, have also been reviewed for potential impacts on natural features.

In accordance with the Renewable Energy Approval (REA) Regulation, NRSI has conducted a thorough records review of available background resources to identify any water bodies (lakes, seepages, intermittent/permanent watercourses) within 120m, or Lake Trout (*Salvelinus namaycush*) lakes within 300m, of the project location. The records review assessment includes a detailed review of all available background information from a variety of sources, including the Ontario Ministry of Natural

Resources (OMNR), the municipality, existing biological studies, and other available online and/or published resources.

As identified in the REA Regulation, the proposed layout of these features is collectively referred to as the 'project location'. This includes areas within 120m of the solar array layout as well as any areas that may be used as temporary lay-down areas, crane pads, access roads, connector, distribution and transmission lines (Figure 1). For the purposes of this report, NRSI will refer to the areas within 120m of the project location as the 'project area'. NRSI biologists have reviewed the proposed development layout and have identified a study area which includes an area up to 1 km from this project area boundary to document the presence of existing water bodies.

The Silvercreek Solar Park is located approximately 3.5km north of Lake Erie, south of the Town of Aylmer in Elgin County. The landscape consists primarily of annual row crop agricultural lands, with occasional watercourses, wetlands, and woodlands within 120m of the project location. Silver Creek and its associated valley are prominent features in the landscape as well. The proposed location of the solar panels is within active agricultural lands, consisting of row crop rotations. Silver Creek and its wooded valleyland are found immediately adjacent to the project location. The transmission line is proposed to run within the road right-of-way, travelling north to connect to the substation located on the northern edge of the Town of Aylmer. The transmission line will include a combination of both above ground and below ground cabling, and will run adjacent to a variety of habitat types, including agricultural fields, woodlands, and some wetlands. Throughout this report, water body locations are described where these features overlap with the project area. In some instances, specific point locations (Figure 1) have been identified and described.

As part of this project, NRSI has considered all aspects relating to provincially Threatened and Endangered species. However, since these species are addressed as part of the *Endangered Species Act* (2007), they have not been discussed within any of these Water Body reports. These species will be addressed in full detail, including a habitat description and results of field assessments, potential impacts, and recommended mitigation measures, as part of a separate *Approval and Permitting*

Requirements Document (APRD) to be submitted to the MNR under separate cover, where necessary.

Figure 1

Silvercreek Solar Park

Project Area and Natural Features

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

November 22, 2012
Project: 0983A
NAD83 - UTM Zone 17
Scale 1:30,000 (11 x 17")

N

498000 499000 500000 501000 502000 503000 504000 505000

4738000 4737000 4736000 4735000 4734000 4733000 4732000 4731000 4730000 4729000 4728000 4727000

IMPERIAL RD
GLENCOLIN LINE
ROGERS RD
WHITE ST
ELM ST
Argyle Drain
Gracey Drain
DINGLE LINE
DINGLE ST
TALBOT LINE
TALBOT ST W
TALBOT ST E
Catfish Creek
Aylmer
BROOK LINE
CATT LINE
ROGERS RD
Trib B
TOBACCO LINE
Trib C
CONSERVATION LINE
Bradley Creek
SPRINGWATER FOREST
Trib A
CHALET LINE
VAN PATTER LINE
JOHN WISE LINE
ROGERS RD
Trib G
IMPERIAL RD
Trib F
HACIENDA RD
SPRINGFIELD RD
CALTON LINE
Silver Creek
CALTON LINE
ROMMEL RD
SPARTA LINE
Trib E
Trib D
Trib C
Trib B
Trib A
VIENNA LINE
IMPERIAL RD
CATFISH CREEK TILL

Meters
0 500 1,000

Legend

- Project Area (120m Buffer)
- Solar Layout
- Substation
- Staging Area
- Access Road
- Inverter
- Building
- Underground Cabling
- Substation Connection Line
- Fence
- Primary Road
- Local Road
- Provincially Significant Wetland
- Other Wetland
- Wooded Area
- ANSI, Earth Science
- ANSI, Life Science
- Waterbody
- Permanent Watercourse
- Intermittent Watercourse

Path: X:\0983_SilvercreekSolarProject\NRSI_0983_WB_Fig1_ProjectAreaNatFeat_30K_2012_11_22_KSR.mxd

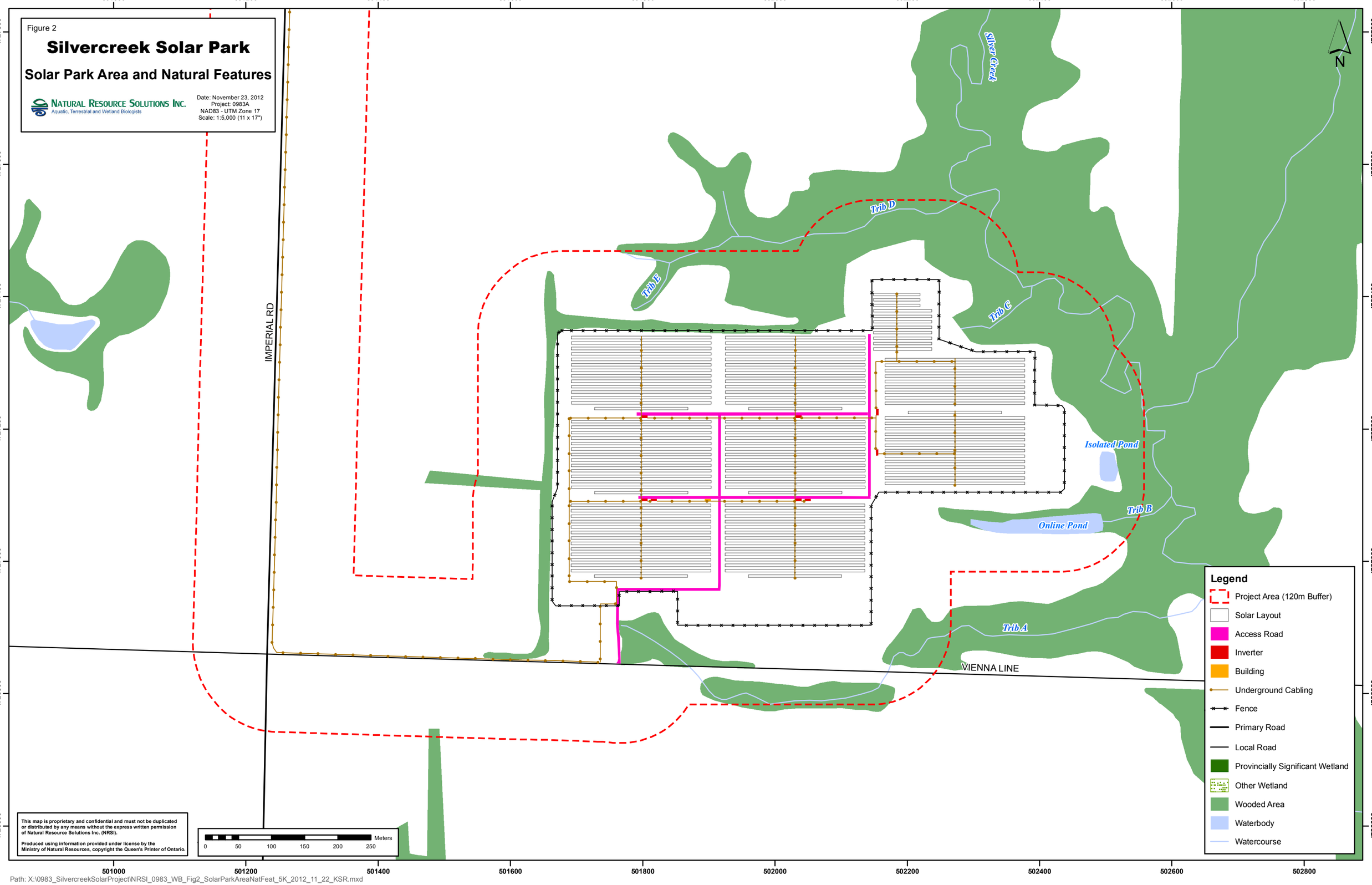
Figure 2

Silvercreek Solar Park

Solar Park Area and Natural Features

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

Date: November 23, 2012
Project: 0983A
NAD83 - UTM Zone 17
Scale: 1:5,000 (11 x 17")



Path: X:\0983_SilvercreekSolarProject\NRSI_0983_WB_Fig2_SolarParkAreaNatFeat_5K_2012_11_22_KSR.mxd

2.0 REA Requirements

Ontario Regulation (O. Reg.) 359/09 – *Renewable Energy Approvals* Under *Part V.0.1 of the Act*, (herein referred to as the REA Regulation) made under the *Environmental Protection Act* (*EPA*) identifies the requirements for the development of renewable energy projects in Ontario. In accordance with the REA Regulation, the Silver Creek Solar Park, classified as a Class 3 solar facility, is required to complete a REA.

Section 29 of the REA Regulation requires proponents of Class 3 solar facility to undertake a water assessment which involves a records review in order to identify whether the project location is:

1. in a water body;
2. within 120 meters of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity;
3. within 300 meters of the average annual high water mark of a lake trout lake that is at or above development capacity;
4. within 120 meters of the average annual high water mark of a permanent or intermittent stream; or
5. within 120 meters of a seepage area.

Section 1.1 of the REA Regulations defines a "water body" as a lake, a permanent stream, an intermittent stream and a seepage area but does not include,

a) grassed waterways;
b) temporary channels for surface drainage, such as furrows or shallow channels that can be tilled and driven through;
c) rock chutes and spillways;
d) roadside ditches that do not contain a permanent or intermittent stream;
e) temporary ponded areas that are normally farmed;
f) dugout ponds; and
g) artificial bodies of water intended for storage, treatment or recirculation of runoff from animal yards, manure storage facilities and sites and outdoor confinement areas.

Subsection 2 of Section 30 of the REA Regulation requires the proponent to prepare a report "*setting out a summary of the records searched and the results of the analysis*" (O. Reg. 359/09). This Water Body Records Review Report has been prepared for the Silver Creek Solar Park to meet these requirements.

3.0 Records Review Sources

In accordance with the REA Regulation, NRSI biologists consulted several information sources and agencies for the purposes of assessing water bodies within 120m (and 300m) of the project location. The results of this consultation process have been documented throughout the following report, and have been summarized in Table 1 below.

Table 1. Summary of Records Consulted for the Silvercreek Solar Park Project

Information Source	Consultation Date(s)	Type of Records Obtained
Township of Malahide Official Plan (2003)	February 23, 2012	Natural Heritage Features
Ontario Ministry of Natural Resources, Aylmer District (Riddell *pers. comm.*)	November 18, 2009 February 17, 2012	Known and predicted fish distribution data Waterbody thermal regime
Catfish Creek Conservation Authority (Difazio *pers. comm*.)	October 9, 2009 February 14, 2012	Catfish Creek Fish Habitat Management Report including: Watershed delineation Sub-watershed description Physiology Hydrology Fish community and habitat descriptions Drain classification Fish distribution data
Ministry of Natural Resources, NHIC and Biodiversity Explorer	November 18, 2011 February 23, 2012	Species of Conservation Concern Occurrence Records
Department of Fisheries and Oceans (DFO 2011)	February 22, 2012	Red-line Mapping for Aquatic Species at Risk (Potential for Occurrence)
Ministry of Northern Development and Mines, Ontario Geological Survey	February 22, 2012	Landscape drainage (Physiography of Southern Ontario)

All water body features initially located within the project area were identified using OMNR watercourse base mapping and digital air photos. These features are shown in Figures 1 and 2.

4.0 Records Review Findings

For the purposes of the records review reporting, NRSI has examined available background information to identify any lakes, intermittent or permanent watercourses, and seepage areas within 120m of the project location as well as Lake Trout Lakes within 300m of the project location. Information obtained relating to identified water bodies is provided in Sections 4.1 through to 4.5.

4.1 Lakes

4.1.1 Lake Trout Lakes

Following a review of the *Inland Ontario Lakes Designated for Lake Trout Management* produced by the OMNR it has been determined that no Lake Trout lakes exist within or near the Silvercreek Solar Park. Further to this, no Lake Trout lakes were identified within the Aylmer District OMNR (OMNR 2006).

4.1.2 Other Lakes

NRSI biologists have used available mapping (OMNR base mapping, digital air photo and topographic) to identify the presence of any lake features within the Silvercreek Solar Park project area. From this review, no lakes were identified within the project area. The nearest lake outside of the project area was identified to be Lake Erie, located approximately 3.5km south of Vienna Line.

4.2 Permanent or Intermittent Watercourses

NRSI biologists have used available mapping (OMNR watercourse mapping and digital air photo) to identify the presence of intermittent/permanent watercourse features within the Silvercreek Solar Park project area. Findings of this review indicated a number of 'water bodies' (permanent or intermittent watercourses) are located within the project area. These watercourses have been divided and discussed based on their respective subwatersheds which include the Silver Creek, Bradley Creek, and Upper Main Catfish Creek drainage areas.

All watercourse features within the project area are within the jurisdictional area of the Catfish Creek Conservation Authority (CCCA). Many of these features have been identified as headwater tributaries, and based on air photo interpretation and drainage

classification, are highly influenced by historic and present agricultural activities (i.e. channelization).

All watercourse features are also situated within the Norfolk sand plain physiographic region (Chapman & Putnum 1985). The region is predominantly a sand plain with substrates dominated by sand and silt, however, till moraine and clay plain also exist throughout the region. As a result, drainage throughout the region is quite variable. Within the project area the Norfolk sand plain extends from the Lake Erie shoreline north to the town of Aylmer. This is dissected by the Tilsonburg Moraine, a till moraine which extends horizontally, south of Aylmer. North of Aylmer the physiography is quite variable transitioning between clay plain, till plain, and till moraine (CCCA 2007).

Upon completion of this report, limited secondary source information regarding the identified watercourses was made available. Information made available by local OMNR included several fish community records and thermal designations for the associated watercourses. This information is provided in Appendix I.

More information, specific to each of the subwatersheds, is provided in the following sections.

4.2.1 Silver Creek Subwatershed

Silver Creek originates from a series of natural and tile drained headwater tributaries located in the Tillsonburg Moraine, which largely occurs to the east of the project area. This system flows south through predominantly agricultural lands and numerous online irrigation ponds, eventually flowing into Lake Erie approximately 3.5km south of the project area. The main channel as well as 7 tributaries to Silver Creek are located within the project area. The main channel and 5 of these tributaries exist to the east, north and south of the proposed solar layout while 2 tributaries appear to cross underground cabling at Imperial Line, north of Calton Line. Underground cabling is proposed to be directionally drilled underneath watercourses, and as a result the project is not considered to be located within these features. These five tributaries have been identified as Tributary A, B, C, D, and E for the purposes of this report as they are unnamed (Figures 1 and 2). The majority of Silver Creek's 41km^2 drainage occurs in the

Norfolk Sand Plain, resulting in high rates of groundwater recharge and low runoff due to the sandy soil (CCCA 2007).

The documented fish community within the main stem of the Silver Creek includes a variety of species which is indicative of a diverse fish community, as evidenced by the species varied life history requirements and trophic status. Silver Creek is considered a coolwater system (19 - 25°C) and is known to support a fish community comprised of a variety of coolwater and tolerant warmwater species (Difazio 2012 *pers. comm.*). It is also known to support a variety of migratory salmonid species including rainbow trout (steelhead) (*Oncorhynchus mykiss*) and several species of salmon including coho salmon (*Oncorhynchus kisutch*), chinook salmon (*Oncorhynchus tshawytscha*), and pink salmon (*Oncorhynchus gorbuscha*)(Riddell 1012, *pers. comm.*). In the absence of fisheries information for the associated tributaries to Silver Creek, fisheries management status should be deferred to that of the main channel. In the case of the Silver Creek subwatershed, tributaries will be considered coolwater fisheries for the purpose of this report. Refer to Appendix I for a full species list.

The channel exhibits good habitat structure relative to other creeks in the CCCA jurisdiction and a fairly high habitat complexity that is characterized by typical riffle-pool sequences. Throughout the watershed, Silver Creek and its associated tributaries provide important direct and indirect fish habitat. Substrates are predominantly fine resulting in vulnerable and erodible banks. The benthos community exhibits a moderately high taxonomic richness and is represented mainly by pollution tolerant species (CCCA 2007). Water quality within the main branch of Silver Creek was inferred based on the Hilsenhoff biotic index. This index provides a measure of organic and nutrient pollution within a system based on the pollution tolerances of the benthic taxa present (Hilsenhoff 1987). Results of this index show that within the main branch of Silver Creek water quality is fairly poor indicating that substantial organic pollution is likely (CCCA 2007).

4.2.2 Bradley Creek Subwatershed

Bradley Creek originates from a series of headwater tributaries located along the northern edge of the Tillsonburg Moraine that are classified as Type C drains

(permanent water body with forage fish), Type F drains (ephemeral with no fish), and tile drains (CCCA 2007; DFO 2010). The system flows in a westerly direction through agricultural lands in the headwater, then through the Town of Aylmer, where it receives supplemental flows from stormwater ponds, and then through a series of online ponds and dams in the lower reaches (CCCA 2007). Similar to Silver Creek, much of the Bradley Creek system flows through the Norfolk Sand Plain, where high rates of groundwater recharge and low runoff occur. The lower reaches of the system enter into the Ekfrid Clay Plain where Bradley Creek eventually flows into the Lower Main Catfish Creek. Three headwater tributaries of Bradley Creek are located within the project area. Two of these tributaries cross proposed underground cabling at Imperial Road, south of Conservation Line, and the third crosses at Tobacco Line. Underground cabling will be directionally drilled underneath any watercourse crossings, and as a result the underground cabling in these locations is not considered to be within these features. These water bodies have been identified as Tributary A, B & C for the purposes of this report as they are unnamed (Figure 1).

The Bradley Creek watershed has been characterized as a coolwater system with water temperatures ranging from 19 - 25°C (Difazio 2012, *pers. comm.*). The documented fish community within the system includes a variety of species which is indicative of a diverse fish community. It is known to support at least 25 different fish species that include moderately tolerant warmwater sportfish, coolwater sportfish, and a variety of baitfish species (Riddell 2012, *pers. comm.*). It provides year round habitat for species including northern pike (*Esox lucius*), smallmouth bass (*Micropterus dolemieu*), largemouth bass (*Micropterus salmoides*), common carp (*Cyprinus carpio*), and green sunfish (*Lepomis cyanellus*), and offers seasonal habitat for migratory rainbow trout (steelhead) throughout the lower reaches. Historically this tributary was well known for its brook trout (*Salvelinus fontinalis*) fishery (CCCA 2007). Refer to Appendix I for a full species list.

The channel exhibits fairly good habitat structure relative to other creeks in the CCCA jurisdiction and a relatively low habitat complexity that is characterized mainly by pools and glides throughout the headwaters. The aquatic habitat existing throughout Bradley Creek is similar to that of Silver Creek. Substrates are predominantly fine resulting in

vulnerable and erodible banks. The benthos community exhibits a high taxonomic richness relative to other systems within the CCCA and is represented mainly by moderately pollution-sensitive and tolerant species (CCCA 2007). . Results of this index show that in the lower reaches of Bradley Creek water quality is poor indicating that very substantial organic pollution is likely within the system (CCCA 2007).

4.2.3 Upper Main Catfish Creek Subwatershed

The Upper Main Catfish Creek originates as a series of tile drained headwater tributaries that flow south from till plain. These headwaters flow over the Ekfrid Clay Plain and into the main branch where they change direction and flow southwest through the Norfolk Sand Plain. This system flows predominately through agricultural lands and then through the Town of Aylmer where it receives supplemental flows from stormwater and sewage treatment ponds (CCCA 2007). The main branch and two additional headwater waterbodies of the Upper Catfish Creek are located within the project area, northeast of Aylmer. The main branch crosses proposed underground cabling at Hacienda Road, south of Dingle Street. As underground cabling is proposed to be directionally drilled underneath of any watercourses, the project is not considered to be located within this feature. The first tributary has been identified as Gracey Drain, which runs parallel to Hacienda Road and crosses Glencolin Line. Gracey Drain flows into the Upper Main Catfish Creek south of Aylmer. The second tributary is located west of Gracey Drain and has been identified as Argyle Drain. This drain crosses Glencolin Line and flows into the Upper Main Catfish Creek north of Aylmer (Figure 1).

The Upper Catfish Creek watershed has been characterized as a warm water system with water temperatures exceeding 25°C (Difazio 2012, *pers. comm.*). Within the main branch of this system the fish community is characterized by a moderately tolerant warmwater sportfish and baitfish community. It is known to provide year round habitat for species that may include northern pike, largemouth bass, brook stickleback (*Culaea inconstans*), yellow bullhead (*Ameiurus natalis*), white crappie (*Pomoxis annularis*), black crappie (*Pomoxis nigromaculatus*), green sunfish (*Lepomis cyanellus*), and northern hog sucker (*Hypentelium nigricans*) as well as a variety of cyprinids. It also provides seasonal spawning and rearing habitat for several Lake Erie species including

rainbow trout (steelhead), silver redhorse (*Moxostoma anisurum*), and golden redhorse (*Moxostoma erythrurum*)(CCCA 2007). Refer to Appendix I for a full species list.

The main channel and associated tributaries exhibit good habitat structure and cover relative to other creeks in the CCCA jurisdiction and a relatively low habitat complexity that is characterized almost exclusively by pools and glides with occasional slow riffles. Silver Creek and its associated tributaries provide important direct and indirect fish habitat. Substrates are predominantly fine resulting in highly vulnerable and erodible banks. The benthos community exhibits a low taxonomic richness throughout the upper reaches of the system and a high richness throughout the lower reaches near where it flows into the Lower Main Catfish Creek. Species present were predominantly tolerant taxa (CCCA 2007) indicating fair to poor water quality and a high likelihood of organic pollution within the system (CCCA 2007).

4.3 Seepage Areas

Three main types of aquifers have been identified within the Catfish Creek Watershed: shallow unconfined overburden aquifers, which are associated with the Norfolk Sand Plain, deeper overburden aquifers, and bedrock aquifers. The lower sections of Catfish Creek as well as some of the smaller watercourses, including Silver Creek, draining into Lake Erie are considered to be potentially high discharge areas (CCCA 2007).

No site-specific information on seepage areas was available through the OMNR or associated databases.

4.4 Species of Conservation Concern

Species of conservation concern include all species that have been designated as a species of Special Concern according to the provincial Species At Risk in Ontario (SARO) and/or the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC), have been given a provincial S-Rank of S1-S3, or have been designated by COSEWIC as Threatened or Endangered but have not been designated as either Endangered or Threatened within Ontario. Species at Risk (provincially Threatened or Endangered) will be addressed separately in an *Approval and Permitting Requirements Document* to address the *Endangered Species Act* (2007).

Records review findings have identified no fish, mussels, or benthic invertebrate species of conservation concern within or near the Silvercreek Solar Park project area.

5.0 Summary of Records Review

In accordance with the REA Regulation, NRSI has completed a comprehensive records review for the proposed Silvercreek Solar Park project location and surrounding 300m. This records review included correspondence with provincial agency staff, and a review of available online and published resources. The results of this records review have been summarized in Table 3 below.

Table 2. Summary of Silvercreek Solar Park Records Review

Criteria	Yes/No	Description	Associated Water Body Features
i. In a water body	No	A total of 8 water bodies (watercourses) from 3 subwatersheds are shown to be crossing underground cabling, however this cabling will be directionally drilled underneath any watercourses and as a result are not considered to be within the water bodies.	<u>Silver Creek Subwatershed</u> • Silver Creek Tributaries F & G <u>Bradley Creek Subwatershed</u> • Bradley Creek Tributaries A, B & C <u>Upper Main Catfish Creek Subwatershed</u> • Upper Main Catfish Creek (main channel) • Gracey Drain • Argyle Drain The records review has identified 8 water bodies, including 2 within the Silver Creek subwatershed, 3 within the Bradley Creek Watershed, and 3 within the Upper Main Catfish Creek subwatershed to be overlapping the project location, more specifically crossing proposed underground cabling along existing roads. Underground cabling will be directionally drilled underneath any watercourses and as a result the project is not considered to be located within any water bodies. All of these water bodies represent expected permanent or intermittent watercourses.
ii. Within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity	No	The project location is not within 120m of the average annual high water mark of a lake.	None.
iii. Within 300 m of the average annual high water mark of a Lake Trout lake that is at or above development capacity	No	The project location is not within 300m of the average annual high water mark of a Lake Trout lake that is at or above development capacity.	None.
iv. Within 120 m of the average annual high	Yes	A total of 14 water bodies from 3	<u>Silver Creek Subwatershed</u> • Silver Creek (main tributary)

Criteria	Yes/No	Description	Associated Water Body Features
water mark of a permanent or intermittent watercourse		subwatersheds are located within 120m of the project location.	• Silver Creek Tributaries A, B, C, D, E, F, G <u>Bradley Creek Subwatershed</u> • Bradley Creek Tributaries A, B & C <u>Upper Main Catfish Creek Subwatershed</u> • Upper Main Catfish Creek (main channel) • Gracey Drain • Argyle Drain The records review has identified 14 water bodies, including 8 within the Silver Creek subwatershed, 3 within the Bradley Creek subwatershed and 3 within the Upper Main Catfish Creek subwatershed to be within 120m of the project location. All of these water bodies represent expected permanent or intermittent watercourses.
iv. Within 120 m of a seepage area	No	Seepage areas have not been identified within the project area.	None.

6.0 References

Publications

Catfish Creek Conservation Authority (CCCA). 2007. Catfish Creek Fish Habitat Management Report. 63p.

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Hilsenhoff W.L. 1987. An Improved Biotic Index of Organic Stream Pollution. The Great Lakes Entomologist. Volume 20: Number 1, 31p.

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Difazio, T. 2012. Resource Planning Coordinator, Catfish Creek Conservation Authority. Email dated February 14, 2012.

Riddell, H. 2009. Renewable Energy Intern, Ministry of Natural Resources (Aylmer District). Email dated November 18, 2009.

Riddell, H. 2012. A/ Planning Ecologist, Renewable Energy, Ministry of Natural Resources (Aylmer District). Email dated February 17, 2012.

Appendix I
OMNR Fisheries Information

Fish Species That May Occur In the Vicinity of the Silvercreek Solar Park

Common Name	Scientific Name	Most Recent Observation	S-Rank
Black Bullhead[1]	*Ameiurus melas*	7/15/1974	S4
Black Crappie[1]	*Pomoxis nigromaculatus*	-	S4
Blacknose Dace[2]	*Rhinichthys obtusus*	8/7/1974	S5
Blackside Darter[2]	*Percina maculata*	7/24/1973	S4
Bluegill[1]	*Lepomis macrochirus*	-	S5
Bluntnose Minnow[1,2]	*Pimephales notatus*	7/15/1974	S5
Brassy Minnow[1]	*Hybognathus hankinsoni*	-	S5
Brook Stickleback[1]	*Culaea inconstans*	7/15/1974	S5
Central Mudminnow[2]	*Umbra limi*	10/7/1974	S5
Common Carp[1,2]	*Cyprinus carpio*	7/24/1974	SNA
Common Shiner[1,2]	*Luxilus cornutus*	9/7/1974	S5
Creek Chub[1]	*Semotilus atromaculatus*	7/15/1974	S5
Creek Chub[1,2]	*Semotilus atromaculatus*	8/7/1974	S5
Fathead Minnow[1]	*Pimephales promelas*	7/15/1974	S5
Golden Shiner[1]	*Notemigonus crysoleucas*	7/15/1974	S5
Hornyhead Chub[1,2]	*Nocomis biguttatus*	9/7/1974	S4
Johnny Darter[1,2]	*Etheostoma nigrum*	7/15/1974	S5
Largemouth Bass[1,2]	*Micropterus salmoides*	8/7/1974	S5
Northern Pike2	*Esox lucius*	7/24/1973	S5
Pumpkinseed[1,2]	*Lepomis gibbosus*	7/15/1974	S5
River Chub[1]	*Nocomis micropogon*	-	S4
Rock Bass[2]	*Ambloplites rupestris*	7/24/1973	S5
Smallmouth Bass[2]	*Micropterus dolomieu*	7/24/1973	S5
Spotfin shiner[2]	*Cyprinella spiloptera*	7/24/1973	S4
Stonecat[2]	*Noturus flavus*	7/24/1973	S4
White sucker[1,2]	*Catostomus commersonii*	7/15/1974	S5

1: Riddell 2009, *pers. comm.*; NHIC 2009
2: Riddell 2012, *pers. comm.*

Provincial Rank (S-Rank)
- SNA: Not Applicable to Conservation Activities
- S4: Apparently Secure
- S5: Secure

SILVERCREEK SOLAR PARK
Water Body Assessment: Site Investigation

Prepared for:
ORTECH Environmental
804 Southdown Rd.
Mississauga, ON
L5J 2Y4

Project No. 1087

Date: November 2012

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

SILVERCREEK SOLAR PARK
Water Body Assessment: Site Investigation

Project Team:

Staff	Role
Andrew Ryckman	Project Manager/Terrestrial and Wetland Biologist
Andrew Scheidel	Aquatic Biologist
Phil Anderson	Aquatic Biologist
Steve Burgin	Aquatic Biologist
Brian Watson	Aquatic Biologist
Erica Frey	GIS Analyst
Katie Roth	GIS Analyst

Report submitted on November 29, 2012

Andrew G. Ryckman

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1.0 Project Description

Natural Resource Solutions Inc. (NRSI) was retained in October 2009 by ORTECH Environmental, on behalf of Silvercreek Solar Park Inc., to conduct a water body resource assessment in accordance with the Renewable Energy Approval (REA) regulation (O.Reg.359/09). This assessment includes a records review, site investigation, and impact assessment of any water bodies at a proposed 10MW solar power generating facility in Elgin County and Malahide Township, ON. The analysis of the water body features is one issue being considered, other factors such as natural heritage, land ownership, social impacts, and cultural impacts are also being assessed in other reports.

The Silvercreek Solar Park proposed by Silvercreek Solar Park Inc. is located south of the Town of Aylmer, ON (the substation property is located north of the Town of Aylmer). The property proposed for the solar array is dominated by agricultural land and represents approximately 59 hectares (ha). Within this property, the project area is estimated to be 35.9ha. Boundaries to this property are Imperial road to the west, Vienna Line to the south, and the Catfish Creek wooded corridor to the north and east. This solar energy generating facility is proposed to be 10MW in size, consisting of a total of 40 photovoltaic solar panel arrays, as well as supporting infrastructure and development activities. This includes access roads, inverters/transformers and electrical cabling, perimeter fencing, and temporary storage areas; on the northern property, a 115kVtransmission line and transformer substation. In addition to the solar panel arrays, the associated infrastructure designs, including the placement of access roads, cabling, and transformer stations, have also been reviewed for potential impacts on natural features.

In accordance with the Renewable Energy Approval (REA) Regulation, NRSI has conducted a thorough records review of available background resources to identify any water bodies (lakes, seepages, intermittent/permanent watercourses) within 120m, or Lake Trout (*Salvelinus namaycush*) lakes within 300m, of the project location. The records review assessment includes a detailed review of all available background information from a variety of sources, including the Ontario Ministry of Natural

Resources (OMNR), municipal files, existing biological studies, and other available online and/or published resources.

As identified in the REA Regulation, all proposed infrastructure associated with the solar facility development is collectively referred to as the 'project location'. This includes areas within 120m of the solar array layout as well as any areas that may be used as temporary lay-down areas, crane pads, access roads, connector, distribution and transmission lines (Figure 1). For the purposes of this report, NRSI will refer to the areas within 120m of the project location as the 'project area'. NRSI biologists have reviewed the proposed development layout and have identified a study area which includes an area up to 1 km from this project area boundary to document the presence of existing water bodies.

Throughout this report, water body locations are described where these features overlap with the project area. In some instances, specific point locations (WB) have been identified and described where they overlap with project components.

The Silvercreek Solar Park is located approximately 3.5km north of Lake Erie, south of the Town of Aylmer in Elgin County. The landscape consists primarily of annual row crop agricultural lands, with occasional watercourses, wetlands, and woodlands within 120m of the project location. Silver Creek and its associated valley are prominent features in the landscape as well. The proposed location of the solar panels is within active agricultural lands, consisting of row crop rotations. Silver Creek and its wooded valleyland are found immediately adjacent to the project location. The transmission line is proposed to run within the road right-of-way, travelling north to connect to the substation located on the northern edge of the Town of Aylmer. The transmission line will include underground cabling, and will run adjacent to a variety of habitat types, including agricultural fields, woodlands, and some wetlands. Throughout this report, water body locations are described where these features overlap with the project area. In some instances, specific point locations (Figures 1 and 2) have been identified and described.

In accordance with the Renewable Energy Approval (REA) Regulation, NRSI has conducted site investigations to identify and characterize water bodies (lakes, seepages, intermittent/permanent watercourses) within 120m of the project location and Lake Trout (*Salvelinus namaycush*) lakes within 300m of the project. Site investigations were conducted to confirm the presence/absence of water bodies identified during the records review (NRSI 2012), pinpoint any corrections to features identified during the records review, and document new water bodies not previously identified. Field investigations also focused on the characterization of the identified features.

As part of this project, NRSI has considered all aspects relating to provincially Threatened and Endangered species. However, since these species are addressed as part of the *Endangered Species Act* (2007), they have not been discussed within any of these Water Body reports. These species will be addressed in full detail, including a habitat description and results of field assessments, potential impacts, and recommended mitigation measures, as part of a separate *Approval and Permitting Requirements Document (APRD)* to be submitted to the MNR under separate cover, where necessary.

Figure 1

Silvercreek Solar Park

Project Area and Natural Features

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

November 22, 2012
Project: 0983A
NAD83 - UTM Zone 17
Scale 1:30,000 (11 x 17")

N

498000 499000 500000 501000 502000 503000 504000 505000

4738000 4737000 4736000 4735000 4734000 4733000 4732000 4731000 4730000 4729000 4728000 4727000

IMPERIAL RD
GLENCOLIN LINE
ROGERS RD
WHITE ST
ELM ST
Argyle Drain
Gracey Drain
DINGLE LINE
DINGLE ST
TALBOT LINE
TALBOT ST W
TALBOT ST E
Catfish Creek
Aylmer
BROOK LINE
CATT LINE
ROGERS RD
Trib B
TOBACCO LINE
Trib C
CONSERVATION LINE
Bradley Creek
SPRINGWATER FOREST
Trib A
CHALET LINE
VAN PATTER LINE
JOHN WISE LINE
ROGERS RD
Trib G
IMPERIAL RD
Trib F
HACIENDA RD
SPRINGFIELD RD
CALTON LINE
Silver Creek
CALTON LINE
ROMMEL RD
SPARTA LINE
Trib E
Trib D
Trib C
Trib B
Trib A
VIENNA LINE
IMPERIAL RD
CATFISH CREEK TILL

Meters
0 500 1,000

Legend

- Project Area (120m Buffer)
- Solar Layout
- Substation
- Staging Area
- Access Road
- Inverter
- Building
- Underground Cabling
- Substation Connection Line
- Fence
- Primary Road
- Local Road
- Provincially Significant Wetland
- Other Wetland
- Wooded Area
- ANSI, Earth Science
- ANSI, Life Science
- Waterbody
- Permanent Watercourse
- Intermittent Watercourse

Path: X:\0983_SilvercreekSolarProject\NRSI_0983_WB_Fig1_ProjectAreaNatFeat_30K_2012_11_22_KSR.mxd

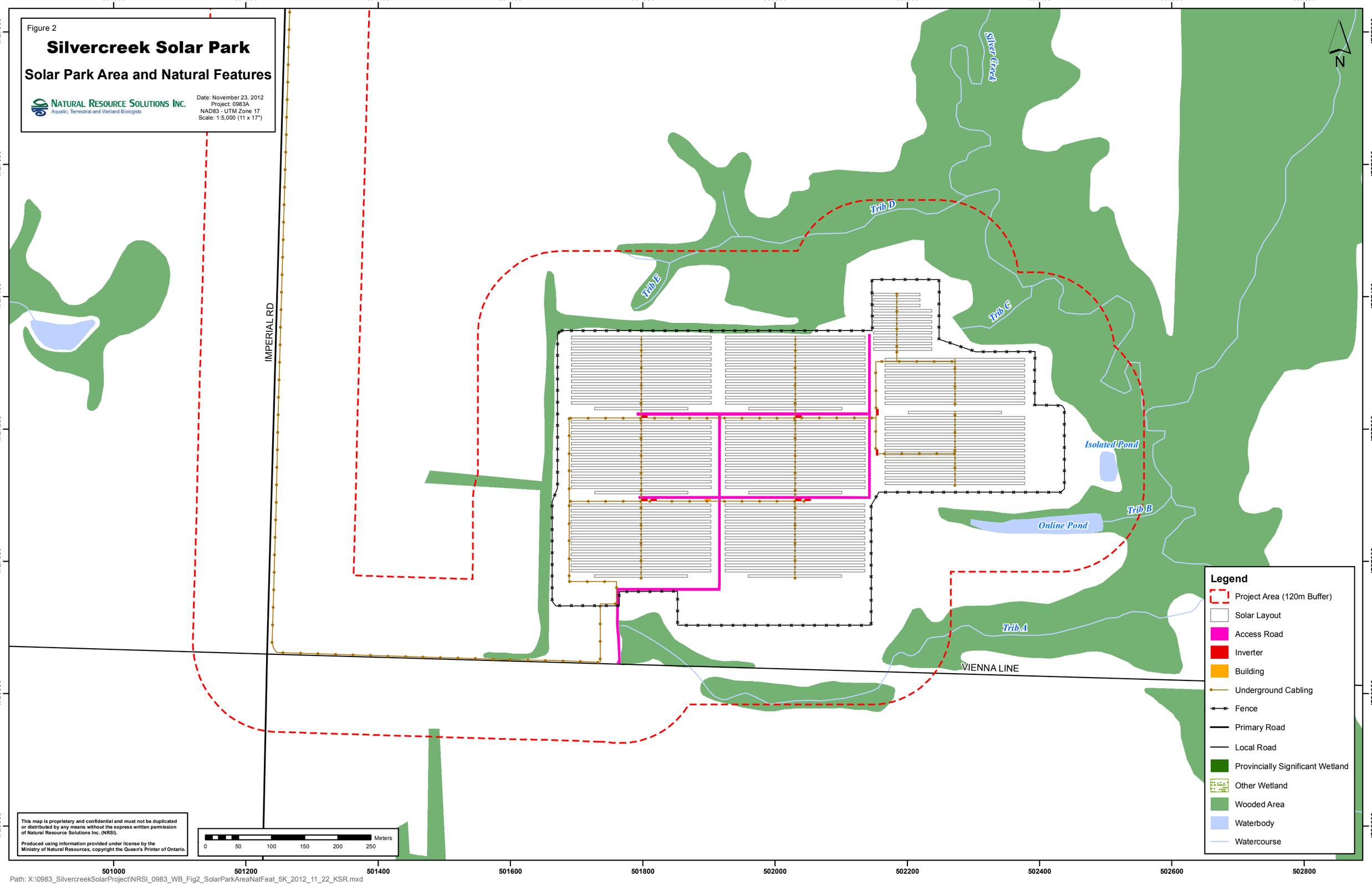
Figure 2

Silvercreek Solar Park

Solar Park Area and Natural Features

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

Date: November 23, 2012
Project: 0983A
NAD83 - UTM Zone 17
Scale: 1:5,000 (11 x 17")



Path: X:\0983_SilvercreekSolarProject\NRSI_0983_WB_Fig2_SolarParkAreaNatFeat_5K_2012_11_22_KSR.mxd

2.0 REA Requirements

Ontario Regulation (O. Reg.) 359/09 – *Renewable Energy Approvals* Under *Part V.0.1 of the Act*, (herein referred to as the REA Regulation) made under the *Environmental Protection Act* (*EPA*) identifies the requirements for the development of renewable energy projects in Ontario. In accordance with the REA Regulation, the Silvercreek Solar Park, classified as a Class 3 solar facility, is required to complete a REA.

Section 31 (1) subject to subsection (2) of the REA Regulation requires proponents of Class 3 solar facility to undertake a water site investigation for the purpose of determining:

(a) whether the results of the analysis summarized in the report prepared under subsection 30(2) are correct or require correction, and identifying any required corrections;
(b) whether any additional water bodies exist, other than those identified in the records review;
(c) the boundaries, located within 120m of the project location, of any water body that was identified in the records review or the site investigation; and
(d) the distance from the project location to the boundaries determined under clause (c).

The REA Regulation has specific requirements if designated lake trout lakes are present within 300m of the project site. These requirements were not deemed applicable to the project as no such lakes were found during the Water Body Records Review Report (NRSI 2012).

Subsection (3) of Section 31 of the REA Regulations requires the proponent to prepare a site investigations report setting out the following:

1. A summary of any corrections to the report prepared under subsection 30 (2) and the determinations made as a result of conducting the site investigation under subsection (1).
2. Information relating to each water body identified in the records review and in the site investigation, including the type of water body, plant and animal composition and the ecosystem of the land and water investigated.

3. A map showing,
    i. The boundaries mentioned in clause (1) (c) or (2) (c) and (d),
    ii. The location and type of each water body identified in relation to the project location, and
    iii. The distances mentioned in clause (1) (d) or (2) (e).
4. The dates and times of the beginning and completion of the site investigation.
5. The duration of the site investigation.
6. The weather conditions during the site investigation.
7. A summary of methods used to make observations for the purpose of the site investigation.
8. The name and qualifications of any person conducting the site investigation.
9. Field notes kept by the person conducting the site investigation.

3.0 Staff Roles

The requirements of the REA Regulation indicate that the name and qualifications of all staff participating in the site investigation should be included. As a result, the qualifications and roles of all staff participating in the site investigations at the Silvercreek Solar Park have been outlined in the following sections.

Andrew G. Ryckman, B.Sc.

Andrew is a Terrestrial and Wetland Biologist with 8 years of environmental experience. He routinely manages the natural heritage aspects of renewable energy projects, with specific expertise relating to bats and herpetofauna. Andrew is certified in Ecological Land Classification (2010), and has successfully completed a Bat Conservation International (BCI) Acoustic Monitoring Workshop (2008).

Andrew's role in the Project was to act as the Project manager, overseeing all aspects of the Natural Heritage Assessment and water body assessments, including all associated field work and reporting. Andrew assisted with the preparation of all appropriate reports, and worked with other staff to evaluate the significance of several of the natural features within the project area. He also acted as the main contact point for agency staff.

Andrew Schiedel, B.A.

Andrew Schiedel has 10 years of experience as an aquatic biologist dedicated to assessments of aquatic biota and their habitats. He specializes in aquatic habitat assessments, fish community studies, freshwater mussel surveys, and benthic invertebrate biomonitoring programs. Andrew has extensive field experience on a wide variety of projects. He has been involved in numerous planning projects in Ontario, including subwatershed studies, secondary plans, provincial and municipal Environmental Assessments and Environmental Impact Studies. Andrew also has experience dealing with permit requirements for projects, including negotiation of fish habitat permits under the federal *Fisheries Act*. Andrew is trained in the methods of the Ontario Stream Assessment Protocol, and is a certified participant of the Ontario Benthos Biomonitoring Network.

Andrew conducted site specific field investigations of several of the water body features around the project location for the initial project layout. He was also responsible for the preparation of a draft version of this water bodies assessment.

Phil Anderson, F.W.T.

Phil is an aquatic biologist with 11 years of diverse experience in providing technical expertise in developing, reviewing, implementing and monitoring inventory processes. Phil specializes in fish habitat surveys and mapping, fish community assessment, aquatic habitat rehabilitation and environmental monitoring for construction. Phil has extensive experience with environmental monitoring during construction of wind farms, culvert extensions, dewatering exercises, waterway crossings and municipal infrastructure projects (water/sewer). He has been involved with assessing conditions from pre-construction to post-construction and has provided regular written analysis to DFO to satisfy their requirements and Authorizations.

Phil conducted site specific field investigations of several of the water body features around the project location.

Steve Burgin, F.W.T, B.Sc.

Steve graduated from Trent University with a B.Sc. in Biology (Hounors) following three years at Fleming College (F.W.Technology Diploma) and currently works as an Aquatic Biologist. Previous contract positions have provided him with more than 4 years of practical work experience in the environmental field. His areas of expertise include fish habitat surveys, habitat mapping, and fish community assessments, but he also has experience with benthic invertebrate surveys and is adept with fish species identification.

Steve was responsible for the preparation of all of the water body assessment reports.

Brian Watson, F.W.T, B.Sc.

Brian is an Aquatic Biologist with more than one year of work experience in the environmental field. His areas of expertise are fish and fish habitat surveys, environmental monitoring, and benthic invertebrate surveys. Brian has completed the

fish identification course through the Royal Ontario Museum (2011) and obtained his Ontario Benthos Biomonitoring Network Certificate (2010).

Brian conducted site specific field investigations of several of the water body features around the project location.

Erica Frey, B.A., GIS-AS

Erica graduated from the University of Waterloo with a B.E.S. in Urban Planning and diploma in GIS. She has experience in areas such as mapping natural features, site selection analysis, and web GIS. Erica provides mapping support for a variety of projects at NRSI including renewable energy projects.

Erica's role in the project was as GIS technician. She reviewed and collected all available background mapping resources to produce project mapping.

4.0 Summary of Records Review

In accordance with the REA Regulation, NRSI has completed a comprehensive records review for the proposed Silvercreek Solar Park project area (NRSI 2012). The results of this records review have been summarized in Table 1 below. For more detail the reader is referred to the complete report (NRSI 2012).

Table 1. Summary of Records Review of the Silvercreek Solar Park

Criteria	Associated Water Body Features
i. In a water body	The records review has identified 8 water bodies, including 2 within the Silver Creek subwatershed, 3 within the Bradley Creek Watershed, and 3 within the Upper Main Catfish Creek subwatershed to be overlapping the project location, more specifically crossing proposed underground cabling along existing roads. Underground cabling will be directionally drilled underneath any watercourses and as a result the project is not considered to be located within any water bodies. All of these water bodies represent potential permanent or intermittent watercourses.
ii. Within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity	None.
iii. Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity	None.
iv. Within 120 m of the average annual high water mark of a permanent or intermittent stream	The records review has identified 14 water bodies, including 8 within the Silver Creek subwatershed, 3 within the Bradley Creek subwatershed and 3 within the Upper Main Catfish Creek subwatershed to be within 120m of the project location. All of these water bodies represent expected permanent or intermittent watercourses.
iv. Within 120 m of a seepage area	None.

5.0 Site Investigation Methodology

In accordance with the REA Regulation, comprehensive site investigations were carried out within the Silvercreek Solar Park project area. These site investigations focused on confirming presence/absence and extent of water bodies identified during the records review, identifying any corrections to water body mapping required including the identification of any previously unidentified features, and to characterize identified water bodies. Results of these site investigations will be used to identify proximity of water bodies to project components and identify requirements for mitigation and impact assessment.

A summary of site investigation methodology is found in following sections.

5.1 Survey Dates

In accordance with the REA Regulation, NRSI recorded dates, times, duration, and weather conditions during each site investigation. This information has been summarized in Table 2 below. Detailed descriptions of staff roles and qualifications can be found in Section 3.0 of this report, and original field site investigation data forms in Appendix I.

Table 2. Site Investigation Survey Dates

Staff Name(s)	Date (2011)	Time (hrs)	Duration (hrs)	Weather Conditions		
				Air Temp. (°C)	Beaufort Wind	Cloud Cover (%)
Andrew Schiedel	Oct. 15, 2009	1040 – 1350	3	5 - 6	n/a	100
Brian Watson	Sept. 16, 2011	1345 – 1640	3	14.5 - 19.5	1 - 3	80 - 90
Brian Watson	Sept. 22, 2011	1050 – 1515	4.5	18 - 22	2 - 3	10 - 80
Phil Anderson	Oct. 4, 2011	1042 – 1620	5.5	15 - 17	2 - 3	5 - 10
Brian Watson	Nov. 8, 2011	1115 – 1245	1.5	12	1 - 2	10 - 20

5.2 Lakes and Lake Trout Lakes

Available natural features mapping (MNR, NRVIS, digital ortho, and topographic) was used to identify any lakes within 120m of the project area in the Records Review Report. The presence of lake trout lakes within 300m was screened through review of *Inland Ontario Lakes Designated for Lake Trout Management* (OMNR 2006) which indicated the absence of Lake Trout lakes within the project area.

As no lakes or Lake Trout lakes were identified during the records review, no targeted site investigations were undertaken to characterize this feature type. General presence/absence surveys to confirm the absence of lakes was carried out.

5.3 Intermittent/Permanent Watercourses

Prior to field investigations, potential intermittent/permanent watercourses were identified through review of all available natural features mapping as part of the records review (NRSI 2012). Field investigations were focused on confirming presence of these features as well as any additional watercourse features that may not be shown on existing mapping.

Once a watercourse feature was identified during site investigations, it was further assessed to determine if it meets the definition of a “water body” within the REA Regulation. Under this definition, a water body includes intermittent/permanent watercourses only, and does not include grassed waterways, temporary channels for surface drainage, such as furrows or shallow channels that can be tilled and driven through, rock chutes and spillways, or roadside ditches (that do not contain a permanent or intermittent stream).

Once a watercourse was identified as an intermittent/permanent watercourse, specific water body data was gathered during the site investigations. This involved walking the entire extent of each feature identified within the project area, and in some cases beyond to confirm its point of origin. For each feature, NRSI biologists collected a wide range of field information, including (but not limited to) wetted width, water depth, substrate, vegetation and habitat present, and any groundwater indicators. At each location, photographs and specific UTM coordinates were also taken.

5.4 Seepage Areas

No seepage areas were identified through the records review however the potential for such features to exist within the project area was recognized (NRSI 2012). Site investigations were carried out to identify the presence of seepage areas within the project area. These investigations were conducted concurrently with other water body site investigations as well as during wetland site assessments completed for the Natural Heritage Assessment.

During site investigations, groundwater seepage areas were to be identified through a characterization of site-specific characteristics including direct observations of groundwater upwelling, the presence of groundwater indicator plant species (e.g. watercress (*Nasturtium officinale),* dense patches of jewelweed (*Impatiens capensis*), etc. or iron-staining of soils and substrates.

6.0 Site Investigation Results

NRSI biologists completed a comprehensive site investigation of the aquatic resources within the Silvercreek Solar Park project area. These surveys have been completed in accordance with the REA Regulation and the results have been summarized below.

6.1 Lakes

6.1.1 Lake Trout Lakes

Site investigations confirmed the absence of any Lake Trout Lakes within 300m of the project location.

6.1.2 Other Lakes

Site investigations confirmed the absence of any lakes within the project area.

6.2 Intermittent/Permanent Watercourses

NRSI biologists have confirmed a total of 10 permanent or intermittent watercourses within the project area. Of these, 3 will be crossed by proposed underground cabling. This cabling is proposed to be directionally drilled underneath all watercourses and as a result the project is not considered to be located within these features. The remaining 7 watercourses range in distance from the project location from 1 to 79m, without any direct overlap with project components. For the purposes of this report, these watercourses have been divided and discussed based on their respective subwatersheds which include the Silver Creek, Bradley Creek (a tributary of Lower Main Catfish Creek), and Upper Main Catfish Creek drainage areas. Where specific water body locations were assessed, a unique identifier (WB) has been attributed. These survey locations and watercourse features are shown on Figures 3 and 4. Several water body assessment locations exist that have not been discussed within the water body assessment reports. These have not been discussed due to the fact that their locations no longer exist within the Silvercreek Solar Park project area. These assessment locations include WB-11, WB-12, WB-13, and WB-14. The locations at which watercourses intercept the project location or exist within the project area have been included with the exception of four locations; WB-17, WB-18, WB-22, and WB-24. Two offline dugout ponds were observed, one each at WB-17 and WB-18 and were found to occur on residential lots. At both WB-22 and WB-24 no water bodies were observed as

these existed as ploughed-through ephemeral swales with no defined channel. All other watercourses and their respective subwatersheds are discussed in Sections 6.2.1, 6.2.2 and 6.2.3.

Site investigation field notes are provided in Appendix I. Water body site investigation photographs are provided in Appendix II.

Figure 3

Silvercreek Solar Park

Aquatic Features

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

Date: November 22, 2012
Project: 0983A
NAD83 - UTM Zone 17
Scale: 1:30,000 (11 x 17")

N

498000 499000 500000 501000 502000 503000 504000 505000

4738000 4737000 4736000 4735000 4734000 4733000 4732000 4731000 4730000 4729000 4728000 4727000

IMPERIAL RD
GLENCOLIN LINE
WB-25
WB-26
WB-18
WB-09
WHITE ST
ELM ST
ROGER
Argyle Drain
Gracey Drain
DINGLE LINE
DINGLE ST
WB-10
TALBOT LINE
TALBOT ST W
TALBOT ST E
Catfish Creek
Aylmer
BROOK LINE
WB-17
CATT LINE
ROGERS RD
TOBACCO LINE
WB-19
Trib B
Trib C
CONSERVATION LINE
Bradleys Creek
WB-21
CHALET LINE
SPRINGWATER FOREST
Trib A
WB-20
WB-14
WB-12
WB-13
VAN PATTER LINE
WB-22
JOHN WISE LINE
SPRINGFIELD RD
WB-23
Trib G
WB-15
Trib F
WB-16
HACIENDA RD
Silver Creek
CALTON LINE
ROMMEL RD
SPARTA LINE
Trib E
Trib D
WB-06
WB-24
WB-05
WB-07
WB-04
Trib B
WB-03
WB-01
WB-02
WB-11
WB-08
VIENNA LINE
CATFISH CREEK TILL

Meters
0 500 1,000

Legend

- Project Area (120m Buffer)
- Solar Layout
- Substation
- Access Road
- Inverter
- Building
- Underground Cabling
- Substation Connection Line
- Fence
- (WB) Water Body Survey Location
- Primary Road
- Local Road
- Provincially Significant Wetland
- Other Wetland
- Wooded Area
- ANSI, Earth Science
- ANSI, Life Science
- Permanent Watercourse
- Intermittent Watercourse
- Waterbody

Path: X:\0983_SilvercreekSolarProject\NRSI_0983_WB_Fig3_AquaticFeatures_30K_2012_11_22_KSR.mxd

Figure 4

Silvercreek Solar Park

Aquatic Features

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Date: November 23, 2012
Project: 0983A
NAD83 - UTM Zone 17
Scale: 1:5,000 (11 x 17")

N

501000 501200 501400 501600 501800 502000 502200 502400 502600 502800

4727800 4727600 4727400 4727200 4727000 4726800 4726600

IMPERIAL RD

VIENNA LINE

Silver Creek

Trib D

Trib E

Trib C

Isolated Pond

Trib B

Online Pond

Trib A

WB-01 WB-02 WB-03 WB-04 WB-05 WB-06 WB-07 WB-08 WB-11 WB-24

Legend

- Project Area (120m Buffer)
- Solar Layout
- Access Road
- Inverter
- Building
- (WB) Water Body Survey Location
- Underground Cabling
- Fence
- Primary Road
- Local Road
- Provincially Significant Wetland
- Other Wetland
- Wooded Area
- Waterbody
- Watercourse

Meters
0 50 100 150 200 250

Path: X:\0983_SilvercreekSolarProject\NRSI_0983_WB_Fig4_AquaticFeatures_5K_2012_11_21_KSR.mxd

6.2.1 Silver Creek Drainage Area

The records review has identified a total of 7 unnamed tributaries associated with Silver Creek, in addition to the main branch of Silver Creek, within the project area (NRSI 2012a). All of these features are designated as a coolwater with resident and migratory coolwater and tolerant warmwater species, and are shown on Figures 1 through 3.

NRSI biologists conducted site investigations on these 8 potential water bodies and have confirmed that 7 of these features have characteristics that justify consideration as water bodies, as defined by the REA Regulation. One of these features (Tributary F) is considered a water body at one location and a non-water body at another. The mix in designations to this tributary is due to the nature of headwater features and the resulting changes in permanency of flow and channel definition as the watercourse becomes a more developed feature within the watershed. One additional feature is not considered a water body. A general summary of these features along with measurements of distances to project components is provided in Table 3 below.

Table 3. Water Body Site Investigations Summary for Silvercreek Solar Park Project Area – Silver Creek Subwatershed

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Location Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Silver Creek	WB-01	intermittent/permanent water body, naturalized channel, fish observed	SP – 91 AR – >120 UL – >120 BO – 68 BU – >120	Yes	Yes
	WB-11				
Tributary A	WB-02	intermittent/permanent water body, channelized	SP – 72 AR – 4 UL – 32 BO – 28 BU – >120	Yes	Yes
	WB-08	Intermittent/permanent water body, channelized drain, groundwater seepage near origin and along banks			
Tributary B	WB-03	intermittent/permanent water body, channelized through eroded banks, outlet from dam and pond	SP – >120 AR – >120 UL – >120 BO – 76 BU – >120	Yes	Yes

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Location Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Tributary C	WB-04	Intermittent/permanent water body, meandering weakly defined channel, groundwater seepage at origin	SP – 44 AR – >120 UL – 45 BO – 31 BU – >120	Yes	Yes
Tributary D	WB-05	intermittent/permanent water body, weakly channelized through eroded banks	SP – 100 AR – >120 UL – >112 BO – 79 BU – >120	Yes	Yes
	WB-06				
Tributary E	WB-07	intermittent water body, weakly channelized originating from tile drain outlet	SP – 42 AR – >120 UL – 43 BO – 33 BU – >120	Yes	Yes
Tributary F	WB-15	ephemeral, swale through agricultural field and residential lot, no defined channel	SP – >120 AR – >120 UL – Crossing BO – >120 BU – >120	No	No
	WB-16	intermittent/permanent water body, channelized east of Imperial Road, ephemeral west of Imperial Road through agricultural field		Yes	Yes
Tributary G	WB-23	ephemeral, swale through agricultural field, no defined channel	SP – >120 AR – >120 UL – Crossing BO – >120 BU – >120	No	No

*Note: Measurements are taken from the closest distance to a water body from a given project component, and not necessarily from the specific location of the site investigation.

Legend
SP - Solar Panel
AR - Road Access
UL - Underground Line
BO - Construction Activity or Balance of Operation
BU - Building or Inverter

6.2.2 Bradley Creek Subwatershed

The records review identified a total of 3 unnamed tributaries of the Bradley Creek subwatershed within the project area (NRSI 2012a). All of these features are designated

as coolwater systems with resident and migratory coolwater and tolerant warmwater species (CCCA 2007).

NRSI biologists conducted site investigations on these 3 potential water bodies and have confirmed that 1 of these features has characteristics that justify consideration as a water body, as defined by the REA Regulation. A general summary of these features is provided in Table 4 below.

Table 4. Water Body Site Investigations Summary for Silvercreek Solar Park Project Area – Bradley Creek Subwatershed

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Location Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Tributary A	WB-20	ephemeral, swale through agricultural field, no defined channel	SP – >120 AR – >120 UL – Crossing BO – >120 BU – >120	No	No
Tributary B	WB-21	ephemeral, channelized swale through agricultural field	SP – >120 AR – >120 UL – Crossing BO – >120 BU – >120	No	No
Tributary C	WB-19	intermittent/permanent water body, channelized through agricultural fields	SP – >120 AR – >120 UL – Crossing BO – >120 BU – >120	Yes	Yes

*Note: Measurements are taken from the closest distance to a water body from a given project component, and not necessarily from the specific location of the site investigation.

Legend
SP - Solar Panel
AR - Road Access
UL - Underground Line
BO - Construction Activity or Balance of Operation
BU - Building or Inverter

6.2.3 Upper Main Catfish Creek Drainage Area

The records review has identified a total of 3 watercourses associated with the Upper Main Catfish Creek subwatershed within the project area (NRSI 2012a). These features are designated as warmwater with moderately tolerant warmwater sportfish and baitfish species as well as seasonal coolwater species (CCCA 2007).

NRSI biologists conducted site investigations on the identified water bodies features and have confirmed that 2 of these watercourses have characteristics that warrant consideration as water bodies. One of these features (Gracey Drain) is considered a water body at one location and a non-water body at another. The mix in designations to this tributary is due to the nature of headwater features and the resulting changes in permanency of flow and channel definition as the watercourse becomes a more developed feature within the watershed. A general summary of these features is provided in Table 5 below.

Table 5. Water Body Site Investigations Summary for Silvercreek Solar Park Project Area – Upper Main Catfish Creek Subwatershed

Water Body Feature Name	Water Body Location ID	Description of Water Body at Water Body Location	Distance to Project Location Component (m)	Water Body (Yes/No)	EIS Required (Yes/No)
Catfish Creek	WB-10	intermittent/permanent water body, aquatic vegetation, fish observed	SP – >120 AR – >120 UL – Crossing BO – >120 BU – >120	Yes	Yes
Gracey Drain	WB-09	intermittent/permanent water body, roadside ditch with flow	SP – >120 AR – >120 UL – 1 BO – >120 BU – >120	Yes	Yes
	WB-26	ephemeral, tile drained, no water body feature present		No	No
Argyle Drain	WB-25	ephemeral, tile drained, no water body feature present	SP – >120 AR – >120 UL – Crossing BO – >120 BU – >120	No	No

*Note: Measurements are taken from the closest distance to a water body from a given project component, and not necessarily from the specific location of the site investigation.

Legend
SP - Solar Panel
AR - Access Road
UL - Underground Line
BO - Construction Activity or Balance of Operation
BU - Building or Inverter

6.3 Seepage Areas

Two sites were identified as having areas of groundwater seepage within the project area during the site investigations. These areas of seepage occur within two tributaries of the Silver Creek subwatershed and include Tributary A and Tributary C. During

habitat characterization surveys on October 4, 2011, Tributary A was noted to originate from an area of groundwater seepage in the vicinity of assessment location WB-08 (Figure 3). Following an investigation of the tributary, additional areas of seepage were observed along the banks of Tributary A, and within the project area. Jewelweed (*Impatiens capensis*), as well as small amounts of iron staining and watercress (*Nasturtium officinale*), were observed along Tributary A (Figures 3 and 4). One other area of groundwater seepage was observed during surveys conducted on October 15, 2009. This was observed near the headwaters of Tributary C and was observed at assessment location WB-04.

7.0 Modifications to the Records Review

Results of the site investigation led to one main modification to the Records Review, the re-classification of intermittent/permanent watercourses or 'water bodies' to 'non-water body' features. These modifications are discussed further below.

The records review identified a total of 7 unnamed tributaries, in addition to the main channel, associated with the Silver Creek subwatershed that occur within the project area as potential water bodies (NRSI 2012a). Findings of the site investigations confirmed that of these 8 water courses, 7 have been confirmed to have at least some habitat that warrants water body classification and warrant further consideration as part of the Environmental Impact Study. These include the main branch of Silver Creek in addition to Tributaries A, B, C, D, E and F. The remaining feature has been confirmed as an agricultural swale with no defined channel and does not warrant consideration in the EIS in accordance with the REA Regulation. Areas of groundwater seepage were also observed at two locations within this watershed, near the origins of Tributary A and Tributary C.

The records review identified a total of 3 unnamed tributaries belonging to the Bradley Creek subwatershed that occur within the project area as potential water bodies (NRSI 2012a). Findings of the site investigations confirmed that of these 3 tributaries, 1 feature (Tributary C) should be considered a water body and warrants further consideration within the EIS.

The records review identified a total of 3 water bodies associated with the Upper Main Catfish Creek subwatershed within the project area as potential water bodies (NRSI 2012a). Findings of the site investigations confirmed that 2 of these features (the main branch of the Upper Catfish Creek and Gracey Drain) are considered to be water bodies and warrant further consideration within the EIS.

8.0 Summary of Site Investigation

In accordance with the REA Regulation, NRSI has completed water body site investigations for the proposed Silvercreek Solar Park project area. Site investigations were conducted to confirm the presence/absence of water bodies identified during the records review (NRSI 2012), pinpoint any corrections to features identified during the records review, and document new water bodies not previously identified. Field investigations also focused on the characterization of the identified features. The results of this records review have been summarized in Table 6 below.

Table 6. Summary of Water Body Site investigations for the Silvercreek Solar Park

Criteria	Associated Water Body Features
i. In a water body	Site investigations have identified 3 water bodies that are shown to overlap the project location where underground cabling will run within the road right-of-way. However, this cabling will be directionally drilled underneath any watercourses and as a result the project is not considered to be in the water bodies. These include 1 tributary within the Silver Creek subwatershed, 1 tributary within the Bradley Creek subwatershed, and 1 tributary within the Upper Main Catfish Creek subwatershed.
ii. Within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity	None.
iii. Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity	None.
iv. Within 120 m of the average annual high water mark of a permanent or intermittent stream	Site investigations have confirmed the presence of 10 water bodies within 120m of the project location, including 7 within the Silver Creek subwatershed, 1 within the Bradley Creek subwatershed, and 2 within the Upper Main Catfish Creek subwatershed. These include the above-mentioned crossing locations as well. Tributaries within the Silver Creek and Bradley Creek subwatersheds are characterized as coolwater systems while tributaries of the Upper Main Catfish Creek subwatershed are warmwater systems. All will require the completion of an Environmental Impact Study.
iv. Within 120 m of a seepage area	Site investigations confirmed the presence of 2 seepage areas within the project area surrounding

	the solar layout. These occur at the headwaters of Tributaries A and C within the Silver Creek subwatershed. These seepage areas will require the completion of an Environmental Impact Study.

9.0 References

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Appendix I
Site Investigation Field Notes

983 Silver Creek Solar Farm — 15 Oct 2019

Andrew Schiedel

Aquatic Habitat Assessment

See data forms for AH4-001
" -002
" -003
" -005

See airphoto map for AH4 locations

AH4-004 * WB-04 *

Trib. at NE corner of main field
Steep valley extending from main valley
Deciduous forest
Groundwater seepage at origin

Channel
- Several branches at origin
- 0.2 m wide at top
  - banks < 0.1m high
- up to 0.5 m wide near outlet
  - banks up to 0.5 m high
- clay & sand substrate
- natural, meandering
- moderate bank stability
- veg on banks - herbs & trees
  - density M
- Little instream habitat features
  - no pools etc
- Woody material present

983 Silver Creek Solar Farm 15-Oct. 2009

AHY-004 continued

Water temp = 7°C

Air temp = 5°C

Time = 1:05 pm

Wetted width near outlet = 0.4m

depths: 2, 2, 3 cm

Photo 19 - looking u.s. at lower end

" 20 - looking u.s. at upper end

AHY-006 *WB-06*

P26 - looking d/s

P27 - looking u.s.

Channel with flowing water

similar to AHY-005 but smaller

- flow from another branch

also feeds AHY-005

983 Silver Creek Solar Farm 15 Oct. 2009
Andrew Schiedel Aquatic Assessment

AHK-007 *WB-07*
Intermittent trib. to AHK-006
Not flowing
P28 - looking upstream from outlet/confluence of AHK-006
No defined channel
Tile drain source at upper limit trickling, but not enough to sustain surface flow.

WB-08
AHK-008 - Upper limit of AHK-002 trib.
- southwest part of property near Vienna Line
Originates at a tile drain outlet
23cm diameter plastic pipe
- defined channel all the way upstream to the tile drain
In deciduous woodlot
Small valley form compared to other AHKs
Meandering channel
Width = 0.5 to 1m (1.5m in a couple isolated spots)
Bank height = 0.1 to 0.3
- Vegetated banks w herbaceous plants

983 Silver Creek Silver Farm

15 Oct. 2009

ANY-008 - continued

Wetted Width (m)	Depths cm
0.3	2, 3, 1
0.8	2, 1, 5, 1, 1
0.7	4, 3, 1, 1
1.0	2, 3, 2, 2, 2

Limited instream habitat complexity
Some woody material ↳ no big woody
- good for invertebrates

Water temp = 13°C
Air " = 5°C
Time 2:35 pm

A second smaller tile outlet
~10m from the origin

Substrate: sand,

Photo 30 & 31 - d/s u/s from road
Photos 32 & 33 - u/s. & d/s at
upper end.
Photo 34 - muddy flat w skunk cabbage
" 35 - skunk cabbage

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Aquatic, Terrestrial and Wetland Biologists

HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983 Silver Creek Solar Farm
Field Staff: Andrew Schiedel
Station: AHY-001 * WB-01 * **Site Location:** See airphoto map
Waterbody: Silver Creek - Main branch on property **GPS Datum:** **Easting:**
Drainage System: Silver Creek **Zone:** **Northing:**
Location in System: Upstream of Vienna Rd **Municipality:**
Appr. Reach Length (m): **Lot & Concession:**
Survey Date: 15 Oct. 2009 **Weather Conditions:**
Time Started: 11:30 am **Wind:** Breezy **Cloud Cover (%):** 100
Time Finished: 12:05 pm **Precipitation:** none air = 5°C

ADJACENT LANDS

Valley	Slope: Gentle (< 5°)	Moderate (5 - 15°)	Steep (> 15°)		
	Extent of Natural Vegetation (m)	0-10	10 to 20	20 to 30	30+
	Vegetation Type: Deciduous forest				
Riparian Zone	Flood Plain - extent of frequent flood (m):	0-10	10 to 20	20 to 30	30+
	Vegetation Type: Deciduous forest				
	Vegetation Density (HML): H				
Canopy	Type: Trees	Quality and % shade: 50 to 75 %			
Land Use	Ag land outside of valley				
Other Notes	(groundwater, soils, pools, vegetation, etc.)				
	Sand & clay soils				

CHANNEL MORPHOLOGY

Channel Width (range (m)): 6 to 8	Gradient (H/M/L): L
Bank Height (range (m)): 3 to 4	Meander/Straight: Meandering
Bank Slope (degrees from surface of water): variable up to vertical	Bank Stability: Non-erosive
Bank Vegetation Type: herbs & trees	Bank Veg. Density (H/M/L): H to H

CHANNEL SUBSTRATE %

Clay: ✓	Gravel: ✓	Boulder: —	Muck: —
Silt: —	Pebble: —	Bedrock: —	Detritus: ✓ Leaves
Sand: ✓	Cobble: —	Marl: —	Other: —

INSTREAM HABITAT AND COVER

Pools: ✓	Undercut Banks: Some	Boulder/Rock: —
Riffles: —	Woody Debris: ✓	Cobble: —
Backwater: ✓	Vegetation: —	Other: Thick mats of leaves

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
algae		Rust-brown, non-filamentous -along margins

CODES:		
AHP Aquatic Habitat Point	SWI Surface Water Input	SCS Stream Cross Section
AHY Aquatic Habitat Area	GWI Groundwater Input	DOX Dissolved Oxygen Stn
TMP Temp Monitor Stn	CKC Creek Crossing	VSS Visual Survey Stn
FLW Flow Monitor Stn	WEL Well	WQS Water Quality Stn
	CUL Culvert	

FLOW CONDITIONS

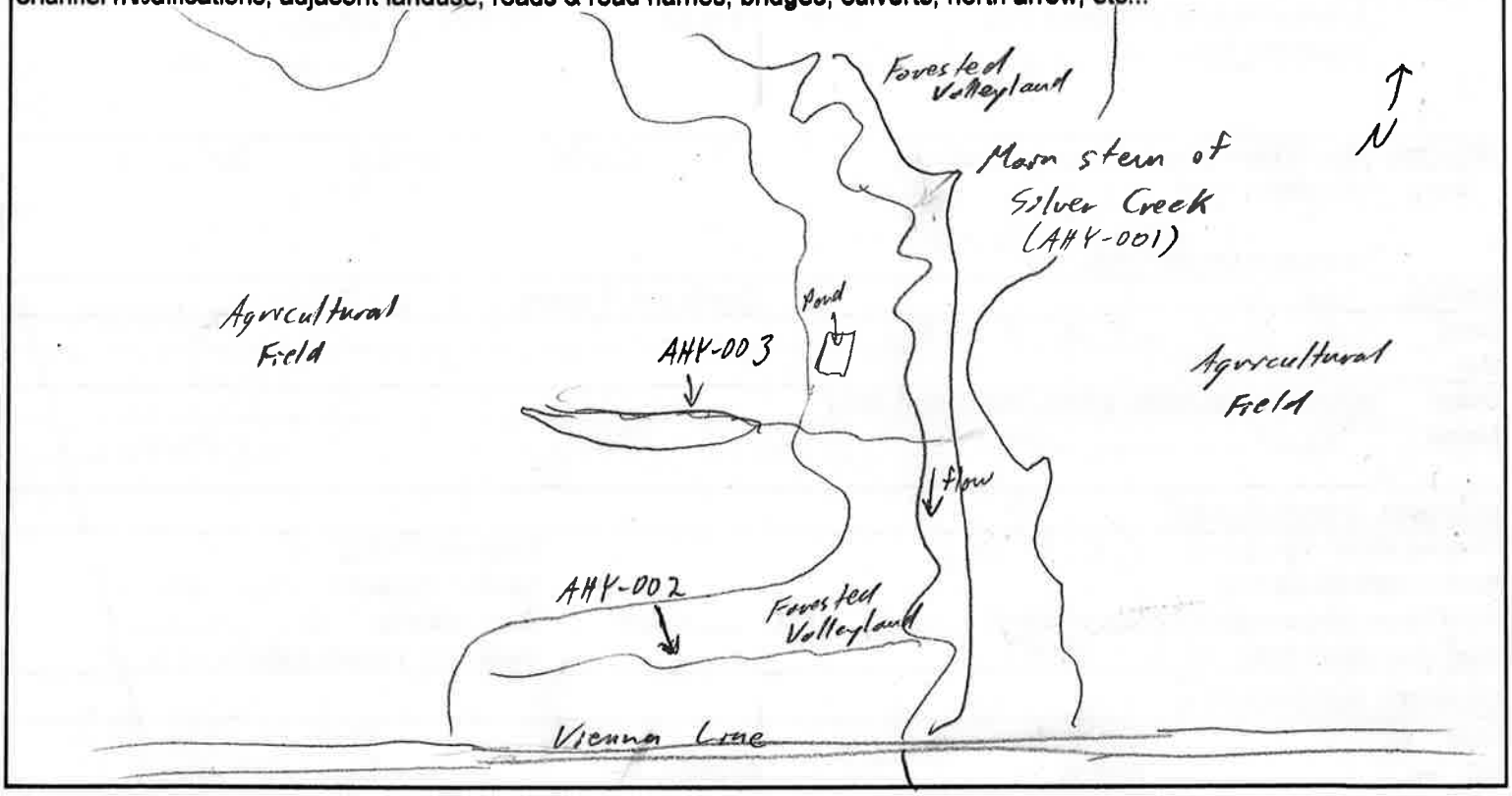
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1	5.5	10, 17, 26, 33, 31	Run/flat
2	4.5	16, 37, 43, 54, 34	Run/pool
3	4	12, 36, 63, 87, approx. 40	Pool
4	4	26, 37, 46, 42, 26	Pool below some small logs
5	4.5	8, 31, 19, 17, 11	~~Flat~~/cross over of thalweg

WATER QUALITY

Water Temp. (°C): 6	D.O. (ppm):	pH:	Visible Characteristics/Other Parameters:
Air Temp. (°C): 6	D.O. (%):	TDS (ppm):	
Time Taken: 11:35 am	Conductivity (µs/cm):		
Location Taken: Near Vienna Rd, - upstream of outlet of AHY-002			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description
8 & 9	DS & US near Vienna Rd.		
10	algae on bottom		
11	woody material creates nice habitat		
12	big bend with deep pool		

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

Substrate is mostly soft sand, with areas of hard clay, and ~~patches~~ areas of gravel

Lots of leaves - deep in some places.

Banks are very eroded - slumped in places

Lots of fish observed in a large pool (Photo 12) - likely cyprinids - up to approx. 15cm long

NATURAL RESOURCE SOLUTIONS INC.
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HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983 Silver Creek Solar Farm
Field Staff: Andrew Schiedel
Station: AHY-002 *WB-02* **Site Location:** See airphoto to map
Waterbody: Unnamed trib. to Silver Creek GPS Datum: Easting:
Drainage System: Silver Creek Zone: Northing:
Location in System: upstream of Vienna Line Municipality:
Appr. Reach Length (m): Lot & Concession:
Survey Date: 15 Oct. 2009 **Weather Conditions:**
Time Started: 10:40am Wind: Breezy Cloud Cover (%): 100
Time Finished: 11:20am Precipitation: none Air temp = 6°C

SUROUNDING LANDSCAPE

Topography:
Soils:
Vegetation:
Land Use:

ADJACENT LANDS

Valley Form	Slope: Steep	Deciduous forest
	Description: Gully extending west from main valley	
Riparian Zone	Flood Plain - extent of frequent flood zone: Channel incised	
	Vernal Pools:	
	Vegetation Type: Deciduous forest	
	Vegetation Density: high density	
	Soils: Sand	
	Groundwater discharge: Fed by tile drain	
Upland Habitat	Extent of Natural/Undisturbed Vegetation outside riparian zone/floodplain: 730m near outlet,	
	Vegetation Type: ~~Bedrock Forest~~ Ag field at top	
	Vegetation Density:	
Canopy Cover	Type: Deciduous forest	
	Quality and % shade: Good ~ 75%	

CHANNEL MORPHOLOGY

Channel Width (range (m)): 1.5 to 6 Gradient (H/M/L): M to H
Bank Height (range (m)): 0.2 to 3 Meander/Straight: Meander
Bank Slope (degrees from surface of water): — Generally very steep - up to vertical Bank Stability: Poor - lots of erosion
Bank Vegetation Type: Herbs & trees Bank Veg. Density (H/M/L): M

CHANNEL SUBSTRATE

Clay: ✓	Gravel: ✓	Boulder: —	Muck: —
Silt: —	Pebble: —	Bedrock: —	Detritus: —
Sand: ✓	Cobble: —	Marl: —	Other: —

INSTREAM HABITAT AND COVER

Pools: ✓ Lots	Undercut Banks: ✓	Boulder/Rock: no
Riffles: ✓ Small ones	Woody Debris: ✓ Abundant	Cobble: no
Backwater: ✓ Small areas	Vegetation: Some bank veg.	Other: —

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance

FLOW CONDITIONS

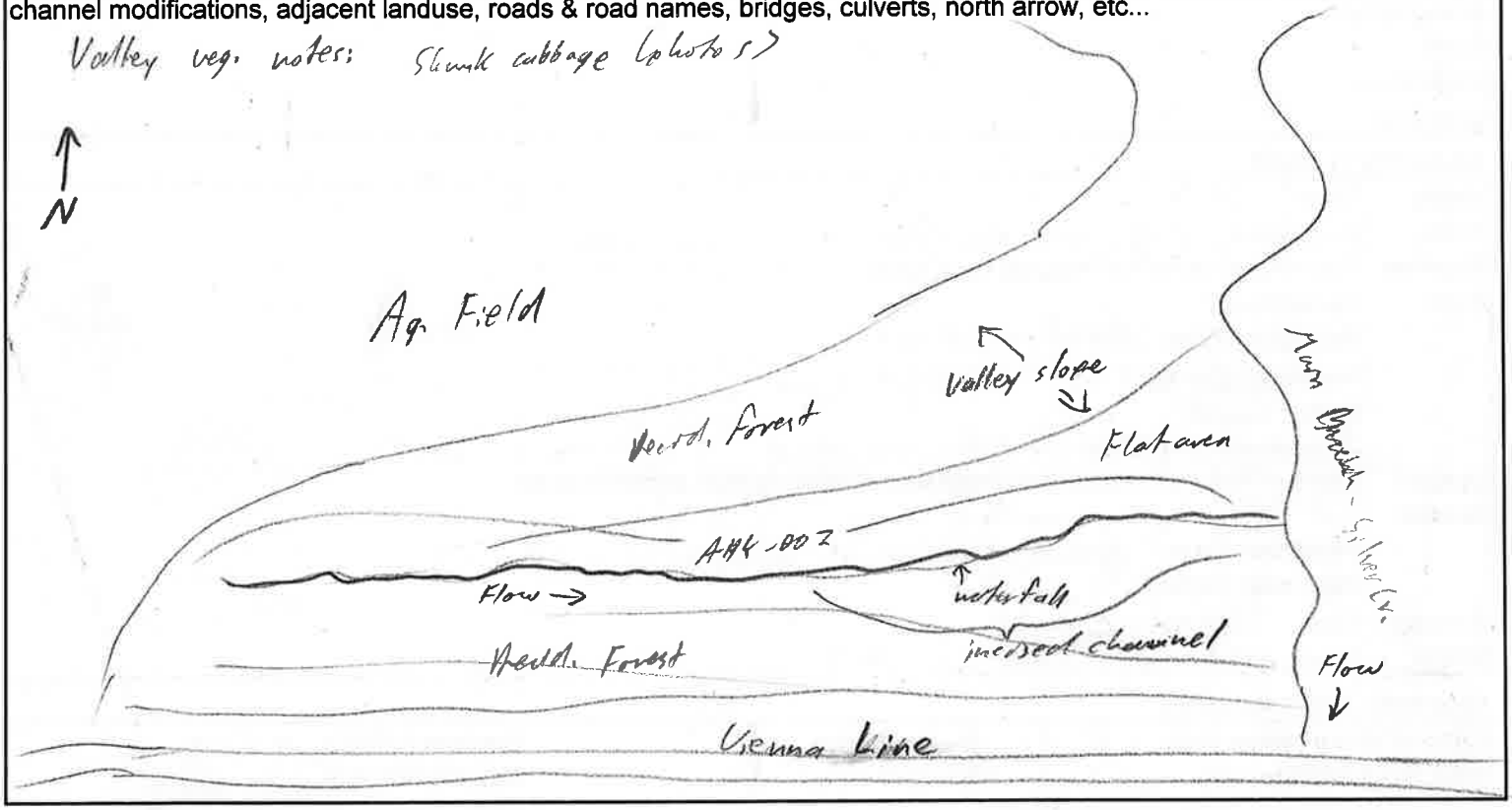
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1	0.8	4, 5, 6, 5, 2	Run
2	0.7	3, 2, 5, 6, 4	Riffle
3	1.0	20, 24, 18, 16, 18	Pool
4			
5			

WATER QUALITY

Water Temp. (°C): 6	D.O. (ppm):	pH:	Visible Characteristics/Other Parameters:
Air Temp. (°C): 6	D.O. (%):	TDS (ppm):	clear
Time Taken: 10:50am	Conductivity (µs/cm):		
Location Taken: near outlet	Location Taken:		

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description
1 & 2	downstream & upstream in main valley		
3	waterfall		
4	Woody material - logs		
5	Skunk cabbage		
6 & 7	downstream & upstream in upper section		

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, etc.:

Lower section is an incised channel with flat table-land within the valley.
Pools up to 0.3m deep.
Upper section - channel not incised, valley not as deep or wide

NATURAL RESOURCE SOLUTIONS INC.
Tel. (519) 725-2227 Fax (519) 725-2575 50 Westmount Road North, Unit 230 Waterloo, Ontario N2L 2R5

HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983 Silver Creek Solar Farm			
Field Staff: Andrew Schiedel			
Station: AHK-003 *WB-03*		**Site Location:** See aerophoto map	
Waterbody: Tributary - unnamed		GPS Datum:	Easting:
Drainage System: Silver Creek		Zone:	Northing:
Location in System: upstream at Vienna Rd.		Municipality:	
Appr. Reach Length (m):		Lot & Concession:	
Survey Date: 15 Oct. 2009	**Weather Conditions:**		
Time Started: 12:10 pm	Wind: Breezy	Cloud Cover (%): 100	
Time Finished: 13:40 pm	Precipitation: none	Air temp = 5°C	

SUROUNDING LANDSCAPE

Topography:	
Soils:	
Vegetation:	
Land Use:	

ADJACENT LANDS

Valley Form	Slope: Flat bench in main valley,
	Description:
Riparian Zone	Flood Plain - extent of frequent flood zone: Incised channel near outlet
	Vernal Pools:
	Vegetation Type: Decid. Forest
	Vegetation Density:
	Soils: Sand + clay
	Groundwater discharge: Tile drain source (according to land owner)
Upland Habitat	Extent of Natural/Undisturbed Vegetation outside riparian zone/floodplain:
	Vegetation Type: Ag field, farm buildings
	Vegetation Density:
Canopy Cover	Type: Decid. Forest
	Quality and % shade:

CHANNEL MORPHOLOGY

Channel Width (range (m)):	1 to 2	Gradient (H/M/L):	M to H
Bank Height (range (m)):	0.5 to 1	Meander/Straight:	Meander
Bank Slope (degrees from surface of water):	See photos	Bank Stability:	moderate
Bank Vegetation Type:	herbs + trees	Bank Veg. Density (H/M/L):	M

CHANNEL SUBSTRATE

Clay: ✓	Gravel: —	Boulder: —	Muck: —
Silt: —	Pebble: —	Bedrock: —	Detritus: —
Sand: ✓	Cobble: —	Marl: —	Other: —

INSTREAM HABITAT AND COVER

Pools: —	Undercut Banks: —	Boulder/Rock: —
Riffles: Small	Woody Debris: ✓	Cobble: —
Backwater: —	Vegetation: —	Other: —

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
—		

FLOW CONDITIONS

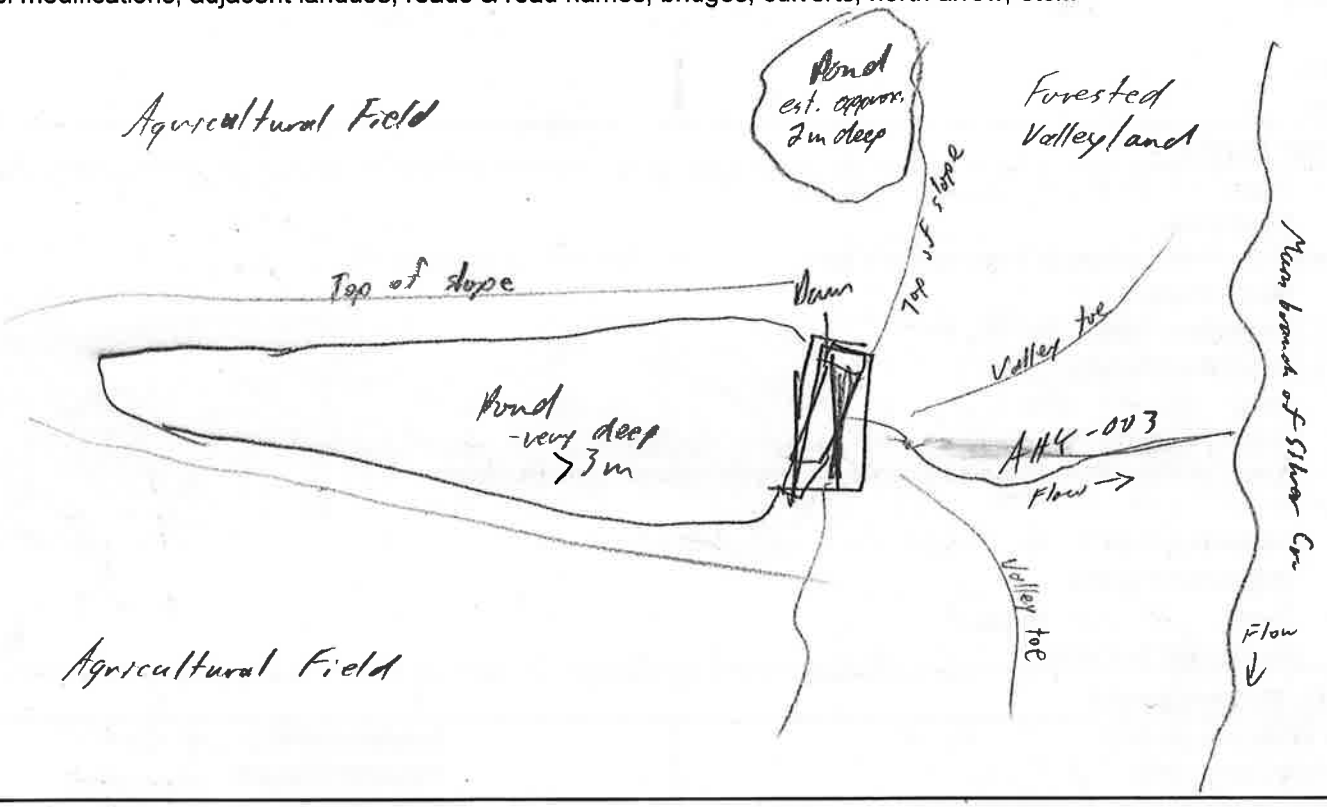
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1	0.7	4, 5, 6, 3, 1	Flat
2	0.8	5, 3, 0, 2, 3	Bend w mud-channel bar
3	0.3	2, 4, 7	Riffle
4			
5			

WATER QUALITY

Water Temp. (°C): 8	D.O. (ppm):	pH:	Visible Characteristics/Other Parameters: Clear
Air Temp. (°C): 5	D.O. (%):	TDS (ppm):	
Time Taken: 12:15 pm	Conductivity (µs/cm):		
Location Taken:	Location Taken:		

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description
13+14	downstream + upstream near outlet		
15	looking downstream / east from dam		
16	looking upstream at pond from dam		
17	dam - looking south		
18	Other pond to the north - looking north		

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, etc.:

Smaller + less flow than AHY-002
Scared up a wild turkey near outlet
Channel is below a dam approx. 6 to 8m high, made to create a pond.
- outlet culvert at base is a 0.8m diam. CSP

NATURAL RESOURCE SOLUTIONS INC.
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HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983 Silver Creek Solar Farm			
Field Staff: Andrew Schiestel			
Station: AHH-005 *WB-05*		**Site Location:** See airphoto to map	
Waterbody: Trib. - unnamed - across north part of property		GPS Datum:	Easting:
Drainage System: Silver Creek		Zone:	Northing:
Location in System: upstream of Vienna Rd.		Municipality:	
Appr. Reach Length (m):		Lot & Concession:	
Survey Date: 15 Oct. 2009	**Weather Conditions:**		
Time Started: 1:20 pm	Wind:	Cloud Cover (%):	
Time Finished: 1:50 pm	Precipitation:		

SUROUNDING LANDSCAPE

Topography:	
Soils:	
Vegetation:	
Land Use:	

ADJACENT LANDS

Valley Form	Slope: Steep - sided valley - not as steep or deep as AHH-002 or AHE-001	
	Description:	
Riparian Zone	Flood Plain - extent of frequent flood zone: Deep channel in flat valley bottom	
	Vernal Pools:	
	Vegetation Type: Deciduous forest	
	Vegetation Density:	
	Soils: Sand + clay	
	Groundwater discharge:	
Upland Habitat	Extent of Natural/Undisturbed Vegetation outside riparian zone/floodplain: to top of valley	
	Vegetation Type: Ag. field	
	Vegetation Density:	
Canopy Cover	Type: Decid. forest	
	Quality and % shade: 75 to 100% shade	

CHANNEL MORPHOLOGY

Channel Width (range (m)): 1 to 3		Gradient (H/M/L): M	
Bank Height (range (m)): 0.2 to 1		Meander/Straight: meander	
Bank Slope (degrees from surface of water): up to vertical		Bank Stability: poor - erosional	
Bank Vegetation Type: Herbs + trees		Bank Veg. Density (H/M/L): M	

CHANNEL SUBSTRATE

Clay: ✓	Gravel: ✓	Boulder: —	Muck: —
Silt: —	Pebble: —	Bedrock: —	Detritus: ✓ leaves
Sand: ✓	Cobble: —	Marl: —	Other: —

INSTREAM HABITAT AND COVER

Pools: ✓	Undercut Banks: —	Boulder/Rock: —
Riffles: —	Woody Debris: ✓	Cobble: —
Backwater: —	Vegetation: —	Other: Detritus

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance

FLOW CONDITIONS

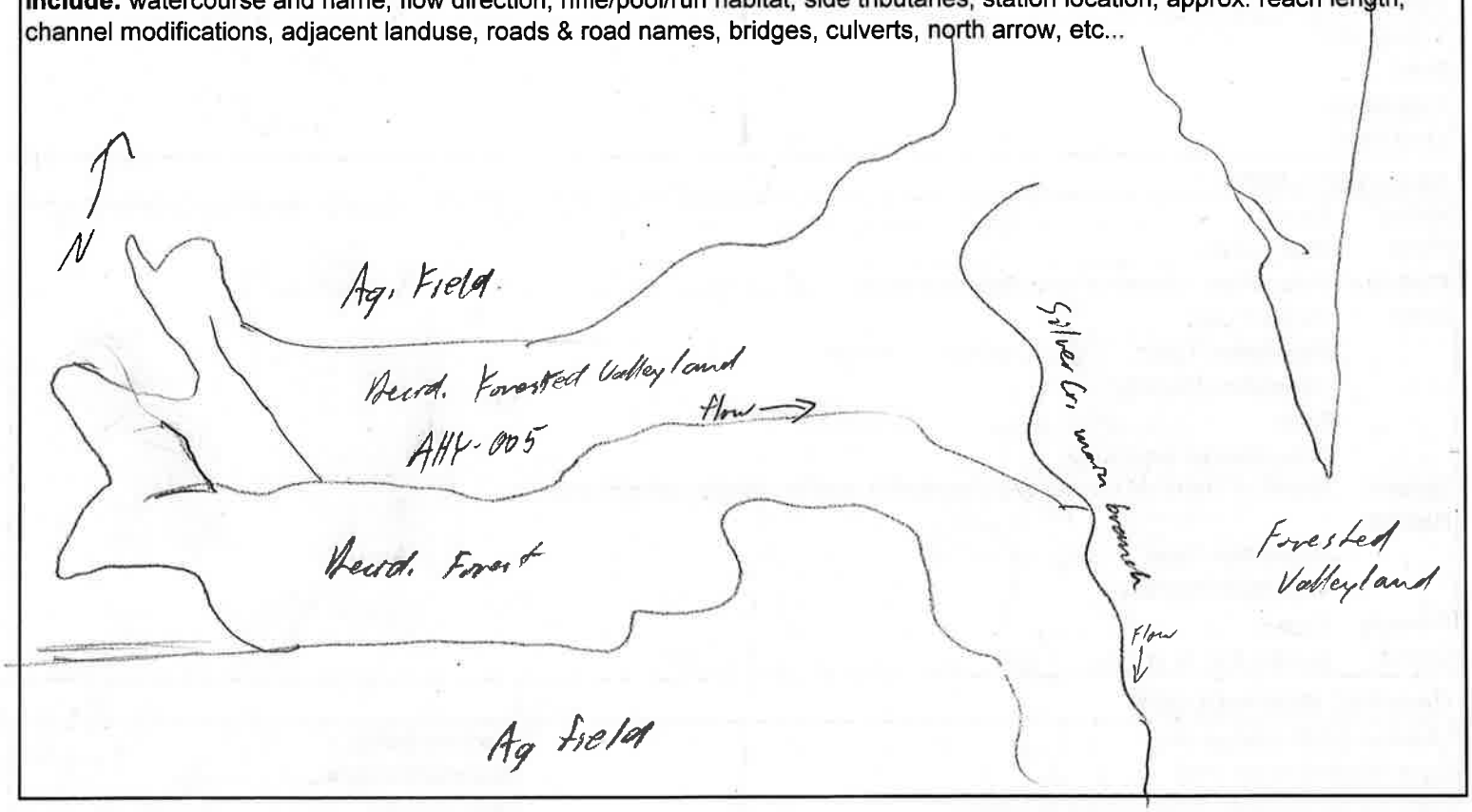
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1	1.0	4, 6, 3, 3, 2	Flat / Run
2	0.6	3, 5, 6, 5, 2	Outside bend - small baseflow channel
3	1.9	11, 14, 17, 16, 10	Pool below 0.2 m high clay ledge
4	0.7	2, 4, 4, 3, 1	Typical
5	1.8	5, 5, 4, 2, 2	Wide spot - barely a pool

WATER QUALITY

Water Temp. (°C):	5	D.O. (ppm):	pH:	Visible Characteristics/Other Parameters: Clear
Air Temp. (°C):	5	D.O. (%):	TDS (ppm):	
Time Taken:	1:30 pm	Conductivity (µs/cm):		
Location Taken:		Location Taken:		

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description
21+22	downstream + u.s. - at lower end		
23	Common plants on valley floors		
24+25	looking upstream + downstream - at upper end		

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, etc.:

Smaller version of the main branch of Silver Creek (AHY-001)

983A Silver Creek Solar Farm Sept. 16, 2011
Aquatic Habitat Survey Brian W.
1200hr Nathan M.
16°C, Ø precip, wind 2-3, 40% c.c.

983ADRAINW001, ~~0501821~~ 0502246 *WB-25*
Argyle Drain ~~4737686~~ 4737737
No water, No defined channel
Photos # 0727 - facing N
0728 - facing E
0729 - facing SE
0730 - facing SW
Located on Glencolin Line

983ADRAINW002 0503506 *WB-26*
Gracey Drain 4737716
Photos # 0731 - facing N
0732 - facing S
Located on the ~~east~~ side of Hacienda Rd
South off Glencolin Line
No water, No defined channel
0733 - facing N, 230m N of
railway crossing.

983ASWALE001
Agricultural Swale
No water
Photo # 0741 facing S/E

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Aquatic, Terrestrial and Wetland Biologists

HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983A Silver Creek Solar Farm
Field Staff: Brian Watson, Nathan Miller
Station: AHY009 / Gracey Drain * WB-09* **Site Location:** See air photo
Waterbody: Unnamed Tributary - 983ADRAW003 GPS Datum: NAD 83 Easting: 0503501
Drainage System: Catfish Creek Zone: 17T Northing: 4737147
Location in System: d/s (east side) of Hacienda Rd Municipality: Elgin County
Appr. Reach Length (m): Lot & Concession:
Survey Date: Sept 16, 2011 **Weather Conditions:**
Time Started: 1345 Wind: 3 Cloud Cover (%): 80
Time Finished: 1420 Precipitation: Ø

ADJACENT LANDS

Valley
Slope: Gentle (< 5°) Moderate (5 - 15°) (Steep) (> 15°)
Extent of Natural Vegetation (m) 0-10 10 to 20 20 to 30 (30+)
Vegetation Type: Mixed forest to the N, over grown medow to the S
Topography: Flat

Riparian Zone
Flood Plain - extent of frequent flood (m): (0-10) 10 to 20 20 to 30 30+
Vegetation Type: Speckled Alder, Red Osier Dogwood, Canada Goldenrod, Blk willow Lots of grasses, Manitoba Maple, Green Ash
Vegetation Density (HML): H

Canopy Type: Shrubs, herbs Quality and % shade: Good 70%

Land Use Natural

Other Notes (groundwater, soils, pools, vegetation, etc.)

CHANNEL MORPHOLOGY

Channel Width (range (m)): 0.5 - 2 Gradient (H/M/L): L
Bank Height (range (m)): 3 - 3.5 Meander/Straight: Meander
Bank Slope (degrees from surface of water): 45 Bank Stability: Good
Bank Vegetation Type: Same as riparian zone above Bank Veg. Density (H/M/L): H

CHANNEL SUBSTRATE %

Clay:	Gravel:	Boulder:	Muck: 60
Silt: 15	Pebble:	Bedrock:	Detritus: 5
Sand:	Cobble: 30 (rip rap)	Marl:	Other:

INSTREAM HABITAT AND COVER

Pools: ✓	Undercut Banks:	Boulder/Rock:
Riffles:	Woody Debris:	Cobble: ✓
Backwater:	Vegetation: ✓	Other:

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
N/A		

CODES:		
AHP Aquatic Habitat Point	SWI Surface Water Input	SCS Stream Cross Section
AHY Aquatic Habitat Area	GWI Groundwater Input	DOX Dissolved Oxygen Stn
TMP Temp Monitor Stn	CKC Creek Crossing	VSS Visual Survey Stn
FLW Flow Monitor Stn	WEL Well	WQS Water Quality Stn
	CUL Culvert	

FLOW CONDITIONS

Cross-Section	Wetted Width (m)	~~5 Depths, equally spaced (cm)~~	Discharge/Pool/Riffle/Run/Notes
1	0.35, 2.3 (pool)	Bankfull width (m)	
2	Wetted depth (m)	2	
3	0.16, 0.35 (pool)	Bankfull depth (cm)	
4		0.5	
5			

WATER QUALITY

Water Temp. (°C): 16	D.O. (ppm): —	pH: 6.52	Visible Characteristics/Other Parameters:
Air Temp. (°C): 19.5	D.O. (%): —	TDS (ppm): —	
Time Taken: 14:05	Conductivity (µs/cm): 2173		
Location Taken: d/s of culverts on Hacienda Rd.			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...

Refer to air photos

PHOTOS TAKEN

Photo #	Description	Direction	Photo #	Description
#0734	Downstream	Southeast		
#0735	Channel			
#0736	upstream 1	Northwest		
#0737	upstream 2	Northwest		

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

Strong odour when walking in water - methane smell

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983A Silver Creek Solar Farm
Field Staff: Brian Watson, Nathan Miller
Station: AHY010 *WB-10*
Site Location: See air photo
Waterbody: Unnamed Tributary
GPS Datum: NAD 83 Easting: 0503443
Drainage System: Catfish Creek
Zone: 17 T Northing: 4735839
Location in System: @ Hacienda Rd bridge
Municipality: Elgin County
Appr. Reach Length (m):
Lot & Concession:
Survey Date: Sept 16, 2011
Weather Conditions:
Time Started: 1445
Wind: 2
Cloud Cover (%): 90
Time Finished: 1510
Precipitation: Ø

ADJACENT LANDS

Valley
Slope: Gentle (< 5°) Moderate (5 - 15°) (Steep) (> 15°)
Extent of Natural Vegetation (m) 0-10 (10 to 20) N 20 to 30 (30+) S Plantation
Vegetation Type: N - Ag. Soy S - Plantation White Pine, Blk Walnut
Valley vegetation Type: Deciduous forest - Weeping Willows, Manitoba Maples
Topography: Flat

Riparian Zone
Flood Plain - extent of frequent flood (m): 0-10 (10 to 20) 20 to 30 30+
Vegetation Type: herbs, shrubs, grasses, trees: Willows, jewelweed, Manatoba Maple
Vegetation Density (HML): M - H

Canopy
Type: Trees
Quality and % shade: Good 60%

Land Use
~~Natural~~ Agriculture to the north, Forest to the south

Other Notes
(groundwater, soils, pools, vegetation, etc.)

CHANNEL MORPHOLOGY

Channel Width (range (m)): 8 - 10
Gradient (H/M/L): L
Bank Height (range (m)): 1 - 3
Meander/Straight: Meander
Bank Slope (degrees from surface of water): 30
Bank Stability: Good
Bank Vegetation Type: Grasses, herbs, Jewlweed, willows, shrubs
Bank Veg. Density (H/M/L): H

CHANNEL SUBSTRATE %

Clay:	Gravel: —	Boulder: —	Muck:
Silt: 15	Pebble: —	Bedrock: —	Detritus: 10 (leaves)
Sand: 70	Cobble: 5	Marl: —	Other:

INSTREAM HABITAT AND COVER

Pools:	Undercut Banks:	Boulder/Rock:
Riffles:	Woody Debris: ✓	Cobble: ✓ some
Backwater:	Vegetation:	Other: leaves

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
N/A		

CODES:		
AHP Aquatic Habitat Point	SWI Surface Water Input	SCS Stream Cross Section
AHY Aquatic Habitat Area	GWI Groundwater Input	DOX Dissolved Oxygen Stn
TMP Temp Monitor Stn	CKC Creek Crossing	VSS Visual Survey Stn
FLW Flow Monitor Stn	WEL Well	WQS Water Quality Stn
	CUL Culvert	

FLOW CONDITIONS

Cross-Section	Wetted Width (m)	~~5 Depths, equally spaced (cm)~~	Discharge/Pool/Riffle/Run/Notes
1	8.4	Bankful Width (m)	
2		10.6	
3	Wetted Depth (m)	Bankful depth (m)	
4	0.25	0.95	
5			

WATER QUALITY

Water Temp. (°C):	~~15.0~~ 14.7	D.O. (ppm):	—	pH: 8.46	Visible Characteristics/Other Parameters:
Air Temp. (°C):	14.5	D.O. (%):	—	TDS (ppm): —	Clear
Time Taken:	14:40	Conductivity (µs/cm):	701		
Location Taken:	@ bridge crossing				

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...

Refer to air photo

PHOTOS TAKEN

Photo #	Description	Direction	Photo #	Description
0738	u/s	east		
0739	d/s	West		
0740	channel	east		

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

1 unknown fish sp. observed

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983A Silver Creek Solar Farm			
Field Staff: Brian Watson			
Station: AHY015 *WB-11*		**Site Location:**	
Waterbody: Silver Creek		GPS Datum: NAD 83	Easting: 0508662
Drainage System:		Zone: 17T	Northing: 4726827
Location in System: immediately u/s of Vienna Rd.		Municipality: Elgin County	
Appr. Reach Length (m):		Lot & Concession:	
Survey Date: Sept 22, 2011	**Weather Conditions:**		
Time Started: 1450	Wind: 3	Cloud Cover (%): 80	
Time Finished: 1515	Precipitation: Ø		

ADJACENT LANDS

Valley	Slope:	Gentle (< 5°)	(Moderate) (5 - 15°)	(Steep) (> 15°)		
	Extent of Natural Vegetation (m)	0-10	10 to 20	20 to 30	(30+)	
	Vegetation Type: Deciduous Forest: Blk Walnut, Speckled Alder, Poplar, Sugar Maple Red oak, Basswood					
Riparian Zone	Flood Plain - extent of frequent flood (m):	0-10	10 to 20	20 to 30	(30+)	
	Vegetation Type: herbs, trees: jewelweed, Garlic Mustard, Canada Golden rod, Aster sp. Wild raspberry					
	Vegetation Density (H/M/L): H					
Canopy	Type: Forest	Quality and % shade: 30%				
Land Use	Natural					
Other Notes	**(groundwater, soils, pools, vegetation, etc.)**					

CHANNEL MORPHOLOGY

Channel Width (range (m)): 4-6	Gradient (H/M/L): L
Bank Height (range (m)): 2-4	Meander/Straight: Meander
Bank Slope (degrees from surface of water): 50	Bank Stability: Good
Bank Vegetation Type: herbs, shurbs, trees	Bank Veg. Density (H/M/L): H

CHANNEL SUBSTRATE %

Clay:	Gravel:	Boulder:	Muck:
Silt: 70	Pebble:	Bedrock:	Detritus: 10
Sand: 20	Cobble:	Marl:	Other:

INSTREAM HABITAT AND COVER

Pools: ✓	Undercut Banks:	Boulder/Rock: ✓
Riffles:	Woody Debris: ✓	Cobble:
Backwater:	Vegetation:	Other:

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
N/A		

CODES:	SWI Surface Water Input	SCS Stream Cross Section
AHP Aquatic Habitat Point	GWI Groundwater Input	DOX Dissolved Oxygen Stn
AHY Aquatic Habitat Area	CKC Creek Crossing	VSS Visual Survey Stn
TMP Temp Monitor Stn	WEL Well	WQS Water Quality Stn
FLW Flow Monitor Stn	CUL Culvert	

FLOW CONDITIONS

Cross-Section	Wetted Width (m)	~~5 Depths, equally spaced (cm)~~	~~Discharge/Pool/Riffle/Run/Notes~~
1	3	Bankful width (m)	~0.3 m/s
2		6	
3	Wetted depth	Bankful depth	–
4	~ 1m	~ 1.5m	
5			

WATER QUALITY

Water Temp. (°C): 16	D.O. (ppm): –	pH: –	Visible Characteristics/Other Parameters:
Air Temp. (°C): 18	D.O. (%): –	TDS (ppm): –	
Time Taken: 1500	Conductivity (µs/cm): –		
Location Taken: u/s of culvert			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...

Refer to air photos

PHOTOS TAKEN

Photo #	Description	Direction	Photo #	Description
0788	d/s view	S		
0789	u/s view	N		
0790	Channel			

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

983A

PPA - 10% cloud Cover
- light Breeze.
15°C Air Temp. (9:55am)

17T 0503024 4731958

- Van Patter Rd - from HiAcierd - West
no watercourse along rd side ditch.
- ditch is just a vegetated swale with no defined channel or water
- only convey water in rain or snow melt
- ag field on both N & S side - Corn to S Beaton.
- 2 woodlots along S side.

17T 0502330 4731976

immediately West of AHY-016 is a low grassy area. N of VanPatter Rd - no defined channel but low area may convey flow in storm & snow melt - (~~extreme headwater~~) Veg swale.

GPS of small pond S side of Rd + AHY-016
17T. 0502217 +WB-13*
4731960
See AHY-017 Field form for details

WB-22

AHP-001 - W of Imperial Rd - Dry vegetated swale - no defined channel - no water
- only conveys flow in storm or snow melt.
- along 2 ag fields on both side - No Aqua Habitat.

983A · Silver Cr Solar park. pg 2 of 3

Oct 4, 2011

- AHP-002 - swale - plowed through ag field (corn)
  - no defined channel. - No Aquatic Habitat - only conveys flow in snow melt

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AHP-003 - Dry vegetated swale. * WB-24*.
- Ephemeral.
- No defined Channel.
- Manicured lawn - Then Natural woodlot D/S
- No Aquatic habitat.
- ag field To North - Residents & Lawn To S.
- may seasonally have flow within bnd and valley (based on Mapping)

PPA - CH.

Site Visit.

10% Cloud Cover

- light Breeze.

15°C Air temp.

- Vienna Ln

D/s (N) of Vienna Ln tributary flows through steep valley with mature trees.

- ~~wetted~~ ~~width~~

- Wetted widths range from 0.15 to 0.25m

- lots of woody debris present.

- evidence of ground water seepage from banks of steep valley +

- very soft moist soils

- some iron staining + watercress present.

- -ground water inputs observed between Vienna Ln + 250m D/s (north)

deer tracks + turkey tracks observed in mud ~~at~~ along the creek.

983A 1 of 2

Photo Ref list. Oct 4, 2011

DSCF
110-0712 - low veg swale west of AHY-016
110-0713 - AHY-016 -
110-0714 - AHY-017 - pond - Tile drain - E view.
110-0715 - AHY-017 - pond.
110-0716 - AHY-017 - Pond outlet.
110-0717 - AHY-016 - S of Van Pattern Rd - ups view.
110-0718 - AHY-016 - N of VanPattern Rd - Dls view.
110-0719 - AHY-016 - Substrate at crossing
110-0720 - AHY-016 - Crossing Looking ups.
110-0721 - AHY-018 - ups view South)
110-0722 - AHY-018 - Dls view. (N)
110-0723 - AHP-001 - Dry swale w of Imperial Rd.
110-0724 AHP-001 - Dry swale w of Imperial Rd.
110-0725 AHY-019 - Dls view - Imperial Rd
110-0726 AHY-019 - ups view - Imperial Rd.
110-0727 AHY-019 - Dls Tomeadow + woodlot
110-0728 AHY-019 - Manicured lawn (imperial Rd)
110-0729 AHY-020 ups - Culvert
110-0730 AHY-020 ups along Rd ditch (N)
DSCF 0731 AHY-020 ups along Rd ditch + swale in ag
0732 AHY-020 - Dls imperial Rd
0733 - AHY-020 - Dls imperial Rd in valley
0734 - AHY-020 - culvert Dls imperial Rd

Oct 4, 2011

983A - Silver Cr Solar

pg 2 of 2

110-0735 - AHP-003 - D/S To wood lot (W of Imperial)
110-0736 - Black Caterpiller
110-0737 - " "
110-0738 - " "
110-0739 - " "
110-0740 - Some Cricket grass hoper thing
110-0741 - erased
110-0742 - Cricket grass hoper Thing.
110-0743 - " " " "
110-0744 - AHY-021 Concrete at Culvert
110-0745 - AHY-021 Pond E of Hacienda
110-0746 - AHY-021 " " "
110-0747 - AHY-021 " " "
110-0748 - AHY-022 pond.
OSCF 0749 - " "
0750 - " "

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983A Silver Cr Solar park.
Field Staff: PpA
Station: AHY - 016 * WB-12 * **Site Location:** VanPatter Rd.
Waterbody: Bradley Creek GPS Datum: NAD 83 Easting: 0502212
Drainage System: Zone: 17T Northing: 4731986
Location in System: head water. Municipality: Aylmer
Appr. Reach Length (m): 50m (From Rd Lot & Concession:
Survey Date: Oct 4, 2011 **Weather Conditions:**
Time Started: 11:06 am Wind: 2 Light Breeze Cloud Cover (%): 10%
Time Finished: 11:10 am Precipitation: 0

ADJACENT LANDS

Valley	Slope: (Gentle (< 5°))	Moderate (5 - 15°)	Steep (> 15°)		
	Extent of Natural Vegetation (m) D/s - (0-10)	10 to 20	20 to 30	(30+) - u/s (s of VanPatten)	
	Vegetation Type: u/s - wood lot. D/s - grass (manicured) & ag field				
Riparian Zone	Flood Plain - extent of frequent flood (m):	(0-10)	10 to 20	20 to 30	(30+)
	Vegetation Type: u/s woodlot D/s grass (manicured) - ag field				
	Vegetation Density (H/M/L):				
Canopy	Type: Trees u/s - grasses D/s	Quality and % shade: 90%			
Land Use	Natural woodlot u/s - ag field D/s & Residential (one house west side)				
Other Notes	**(groundwater, soils, pools, vegetation, etc.)** extreme headwater w pond u/s - creek originates from pond.				

CHANNEL MORPHOLOGY

Channel Width (range (m)): 0.25m To 1.0m.		Gradient (H/M/L): L	
Bank Height (range (m)): 0.25 - 0.50		Meander/Straight: slight meander.	
Bank Slope (degrees from surface of water): 110° - 120°		Bank Stability: stable	
Bank Vegetation Type: grasses isolated shrubs D/s - Trees & Shrubs u/s		Bank Veg. Density (H/M/L): H	

CHANNEL SUBSTRATE %

Clay:	Gravel: 10	Boulder:	Muck:
Silt: 30	Pebble: 25	Bedrock:	Detritus: 10
Sand: 10	Cobble: 5	Marl: 10	Other:

INSTREAM HABITAT AND COVER

Pools: Small & isolated	Undercut Banks: isolated	Boulder/Rock: NO
Riffles: yes (small)	Woody Debris: yes (isolated)	Cobble: isolated
Backwater: NO	Vegetation: NO	Other:

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
—		

CODES:		
AHP Aquatic Habitat Point	SWI Surface Water Input	SCS Stream Cross Section
AHY Aquatic Habitat Area	GWI Groundwater Input	DOX Dissolved Oxygen Stn
TMP Temp Monitor Stn	CKC Creek Crossing	VSS Visual Survey Stn
FLW Flow Monitor Stn	WEL Well	WQS Water Quality Stn
	CUL Culvert	

FLOW CONDITIONS

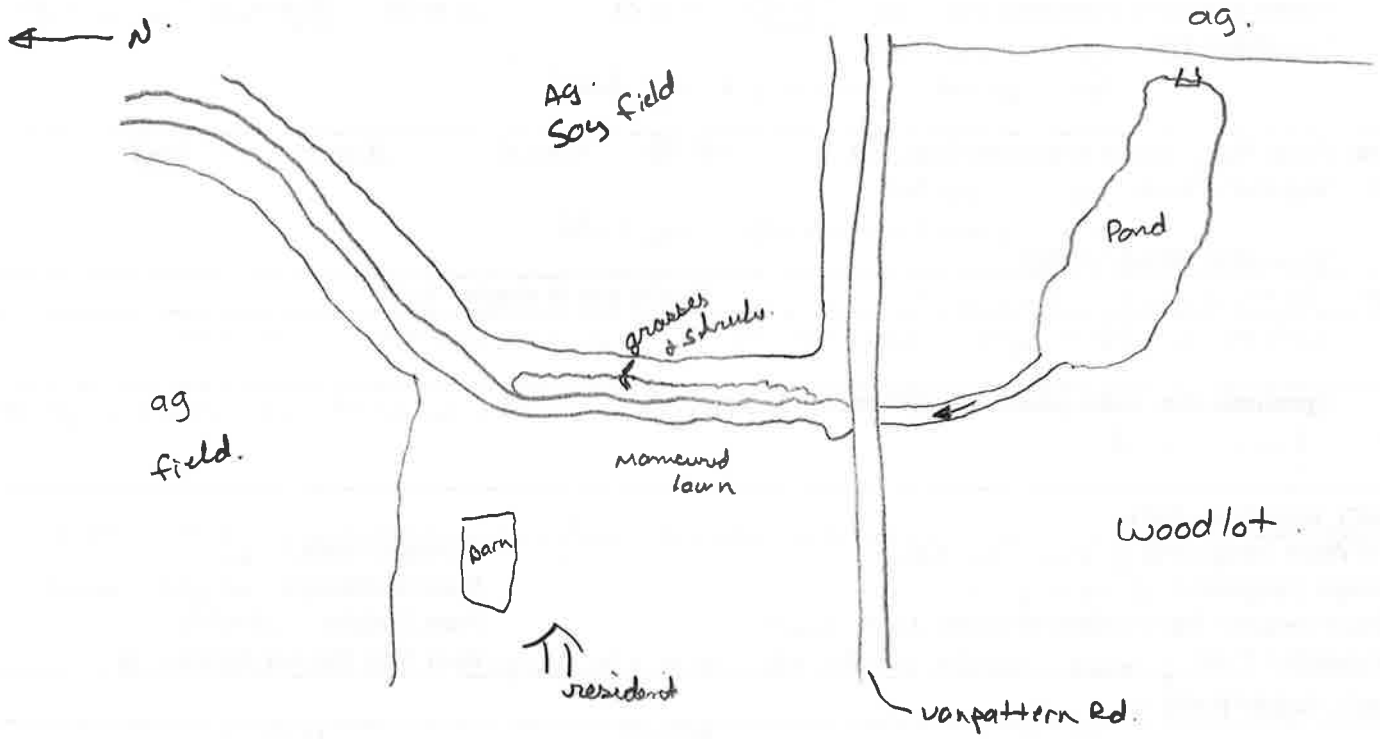
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1	—		
2			
3			
4			
5			

WATER QUALITY

Water Temp. (°C):	14°C	D.O. (ppm): —	pH: —	Visible Characteristics/Other Parameters:
Air Temp. (°C):	15°C	D.O. (%): —	TDS (ppm): -	
Time Taken:	11:00 am	Conductivity (µs/cm): —		
Location Taken:	D/s of crossing			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description
see ref list.			

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

- small fish observed in pond - not creek
- wood frog.

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983A - Silver Cr Solar Park
Field Staff: PPA
Station: AH4-017. ~~WB-13~~ **Site Location:** Van Patter Rd.
Waterbody: small ~~pond~~ Pond. - Bradley Creek GPS Datum: NAD83 Easting: 0502217
Drainage System: Zone: 17T Northing: 4731960
Location in System: - S side of - Van Patters Rd Municipality: Aylmer
Appr. Reach Length (m): 45m x 25m. Lot & Concession: Van Patter Rd
Survey Date: Oct 4, 2011 **Weather Conditions:**
Time Started: 10:42 am Wind: 2 Light Breeze Cloud Cover (%): 10
Time Finished: 10:56 am Precipitation: 0

ADJACENT LANDS

Valley	Slope:	(Gentle (< 5°)	Moderate (5 - 15°)	Steep (> 15°)		
	Extent of Natural Vegetation (m)	0-10	10 to 20	20 to 30	(30+)	Extreme E side (10m) To ag field.
	Vegetation Type: Mature forest (see veg mapping details Christy)					
Riparian Zone	Flood Plain - extent of frequent flood (m):	0-10	(10 to 20)	20 to 30	30+	
	Vegetation Type: Trees & shrubs. (see veg mapping Christy).					
	Vegetation Density (HML): H					
Canopy	Type: Trees.			Quality and % shade: 25-30%.		
Land Use	Natural 95% (ag field 10%) on east side					
Other Notes	**(groundwater, soils, pools, vegetation, etc.)**					

CHANNEL MORPHOLOGY

Channel Width (range (m)): Pond 45x 25m.	Gradient (H/M/L): L
Bank Height (range (m)): 1-5m.	Meander/Straight: —
Bank Slope (degrees from surface of water): 110% TO 130°.	Bank Stability: stable
Bank Vegetation Type: Trees & shrubs.	Bank Veg. Density (H/M/L): H.

CHANNEL SUBSTRATE %

Clay:	Gravel:	Boulder:	Muck: 5%.
Silt: 50%.	Pebble:	Bedrock:	Detritus: 20%
Sand:	Cobble: 5%.	Marl: 30%	Other:

INSTREAM HABITAT AND COVER

Pools: Pond.	Undercut Banks: NO	Boulder/Rock: NO
Riffles: — NO	Woody Debris: Yes.	Cobble: isolated
Backwater: Pond.	Vegetation: none visible.	Other:

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
—		

CODES:		
AHP Aquatic Habitat Point	SWI Surface Water Input	SCS Stream Cross Section
AHY Aquatic Habitat Area	GWI Groundwater Input	DOX Dissolved Oxygen Stn
TMP Temp Monitor Stn	CKC Creek Crossing	VSS Visual Survey Stn
FLW Flow Monitor Stn	WEL Well	WQS Water Quality Stn
	CUL Culvert	

FLOW CONDITIONS

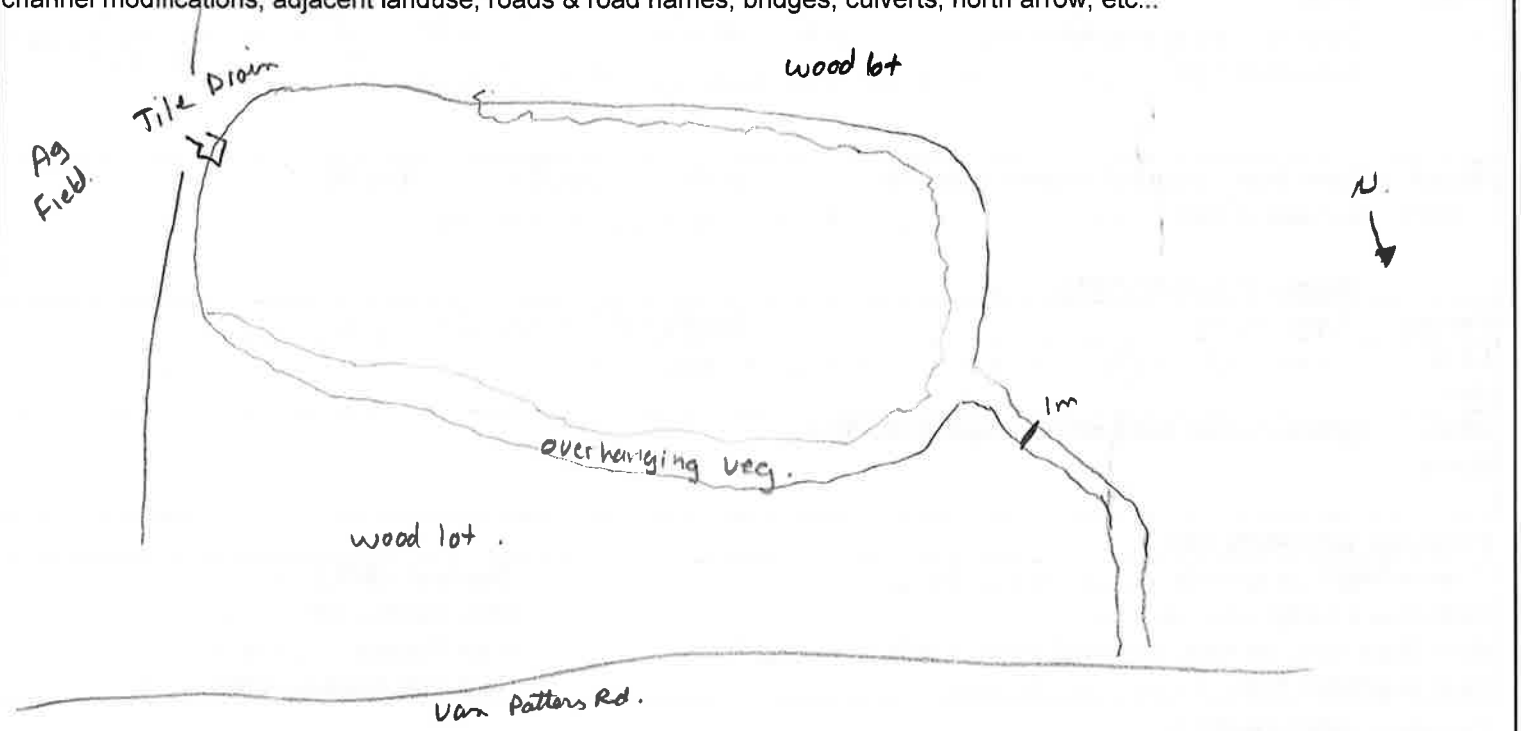
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1	N A.		
2			
3			
4			
5			

WATER QUALITY

Water Temp. (°C): 14°C	D.O. (ppm): —	pH: —	Visible Characteristics/Other Parameters:
Air Temp. (°C): 15°C	D.O. (%): —	TDS (ppm): —	
Time Taken: 10:48	Conductivity (µs/cm): —		
Location Taken: Pond - Shade			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description
See ref list.			

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

small fish observed (looks like YOY) could not ID.

Pond outlets at west side & flows N across Van Patten Rd.

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

HABITAT CHARACTERIZATION

PROJECT (Number & Name):

Field Staff:

Station: AH4-018 - * WB-14 * **Site Location:** Vanpatten Rd

Waterbody: No defined Channel - Extreme Flood water **GPS Datum:** NAD 83 **Easting:** 0501556

Drainage System: to Bradley Creek Watershed **Zone:** 17T **Northing:** 4732008

Location in System: **Municipality:**

Appr. Reach Length (m): ~ 50m (From Rd) **Lot & Concession:**

Survey Date: Oct 4, 2011 **Weather Conditions:**

Time Started: 11:14am **Wind:** 2 **Cloud Cover (%):** 10%

Time Finished: 11:22am **Precipitation:** 0

ADJACENT LANDS

Valley	Slope: (Gentle) (< 5°)	Moderate (5 - 15°)	Steep (> 15°)		
	Extent of Natural Vegetation (m)	(0-10)	10 to 20	20 to 30	(30+) - D/S woodlot.
	Vegetation Type:	U/S - Woods Residents.			
	see veg mapping - Christy.				
	grasses - Trees. Jewelweed shrubs. - willows.				
Riparian Zone	Flood Plain - extent of frequent flood (m):	0-10	10 to 20	20 to 30	(30+)
	Vegetation Type: Jewelweed, trees shrubs				
	Vegetation Density (HML): H				
Canopy	Type: Trees.	Quality and % shade: 90%.			
Land Use	Natural woodlot - N side + SE side.				
	- Residential S W side				
Other Notes	**(groundwater, soils, pools, vegetation, etc.)**				
	Manicured Grass S side				

CHANNEL MORPHOLOGY

Channel Width (range (m)):	— No defined channel.	Gradient (H/M/L):	L
Bank Height (range (m)):	—	Meander/Straight:	—
Bank Slope (degrees from surface of water):	—	Bank Stability:	—
Bank Vegetation Type:	—	Bank Veg. Density (H/M/L):	H.

CHANNEL SUBSTRATE % — grass.

Clay: —	Gravel: —	Boulder: —	Muck: —
Silt: —	Pebble: —	Bedrock: —	Detritus: —
Sand: —	Cobble: —	Marl: —	Other: grass & terrestrial veg 100%.

INSTREAM HABITAT AND COVER

Pools: —	Undercut Banks: —	Boulder/Rock: —
Riffles: —	Woody Debris: —	Cobble: —
Backwater: —	Vegetation: —	Other: —

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
—		

CODES:		
AHP Aquatic Habitat Point	SWI Surface Water Input	SCS Stream Cross Section
AHY Aquatic Habitat Area	GWI Groundwater Input	DOX Dissolved Oxygen Stn
TMP Temp Monitor Stn	CKC Creek Crossing	VSS Visual Survey Stn
FLW Flow Monitor Stn	WEL Well	WQS Water Quality Stn
	CUL Culvert	

FLOW CONDITIONS

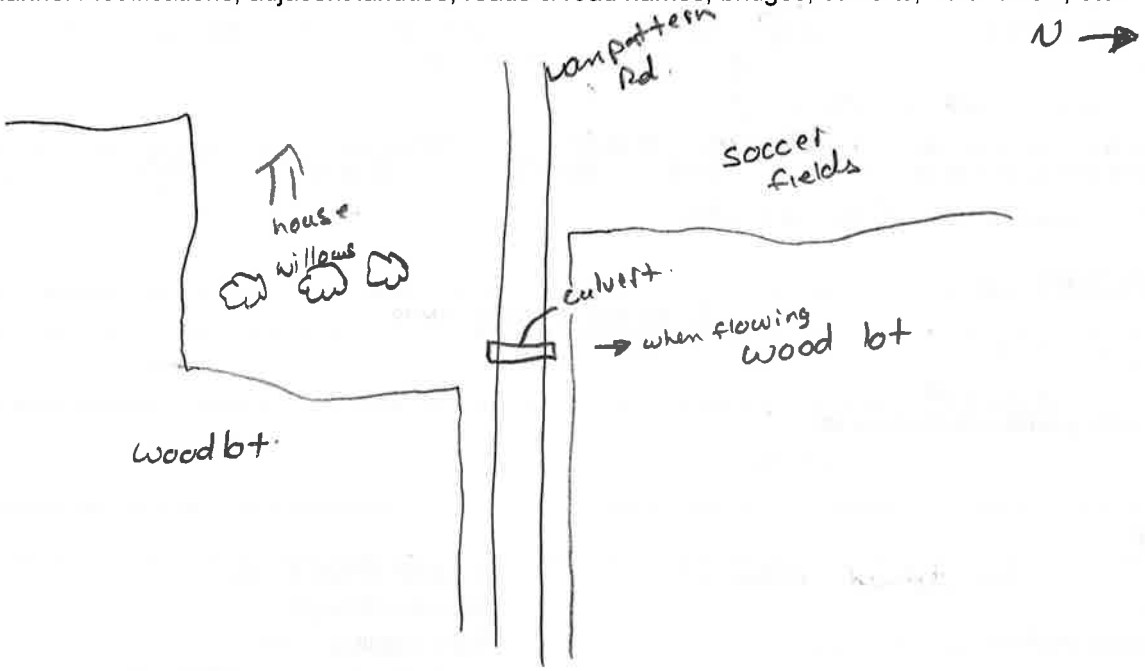
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1			
2			
3			
4			
5			

WATER QUALITY

Water Temp. (°C): no water	D.O. (ppm): –	pH: –	Visible Characteristics/Other Parameters: only conveys flow in storm or snow melt.
Air Temp. (°C): 15°c	D.O. (%): –	TDS (ppm): –	
Time Taken: 11:18	Conductivity (µs/cm): –		
Location Taken: –			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description
see ref list.			

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

- no flow in creek.
- no defined channel.

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HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983A - Silver Cr Solar Park.
Field Staff: PPA
Station: AHY-019 * WB-15* (* look on map when back at office) **Site Location:** Imperial Rd
Waterbody: Silver Creek GPS Datum: NAD83 Easting: 0501281
Drainage System: Lake Erie Zone: 17T Northing: 4729727
Location in System: Extreme head water Municipality: Aylmer
Appr. Reach Length (m): 50m - (From Rd.) Lot & Concession:
Survey Date: Oct 4, 2011 **Weather Conditions:**
Time Started: 12:00 Wind: 2 Light Breeze Cloud Cover (%): 10%
Time Finished: 12:20 Precipitation: 0

ADJACENT LANDS

Valley	Slope:	(Gentle) (< 5°)	(Moderate (5 - 15°))	Steep (> 15°)	
	Extent of Natural Vegetation (m)	(0-10)	10 to 20	20 to 30	30+
	Vegetation Type: ag field -				
Riparian Zone	Flood Plain - extent of frequent flood (m):	(0-10)	10 to 20	20 to 30	30+
	Vegetation Type: ag field W side of Imperial Manicured lawn E side of Imperial.				
	Vegetation Density (HML): L				
Canopy	Type: grass + ag	Quality and % shade: 20%			
Land Use	ag field + manicured lawn.				
Other Notes	**(groundwater, soils, pools, vegetation, etc.)** Dry - Ephemeral swale - plowed through + Manicured lawn - No Defined Channel				

CHANNEL MORPHOLOGY

Channel Width (range (m)): No defined Channel.	Gradient (H/M/L): L
Bank Height (range (m)): —	Meander/Straight: —
Bank Slope (degrees from surface of water): —	Bank Stability: —
Bank Vegetation Type: Corn/plowed Through + Manicured lawn	Bank Veg. Density (H/M/L): L

CHANNEL SUBSTRATE %

Clay: —	Gravel: —	Boulder: —	Muck: —
Silt: —	Pebble: —	Bedrock: —	Detritus: —
Sand: —	Cobble: —	Marl: —	Other: Lawn + ag field.

INSTREAM HABITAT AND COVER

Pools: —	Undercut Banks: —	Boulder/Rock: —
Riffles: —	Woody Debris: —	Cobble: —
Backwater: —	Vegetation: —	Other: Dry C

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
—		

CODES:	SWI Surface Water Input	SCS Stream Cross Section
AHP Aquatic Habitat Point	GWI Groundwater Input	DOX Dissolved Oxygen Stn
AHY Aquatic Habitat Area	CKC Creek Crossing	VSS Visual Survey Stn
TMP Temp Monitor Stn	WEL Well	WQS Water Quality Stn
FLW Flow Monitor Stn	CUL Culvert	

FLOW CONDITIONS

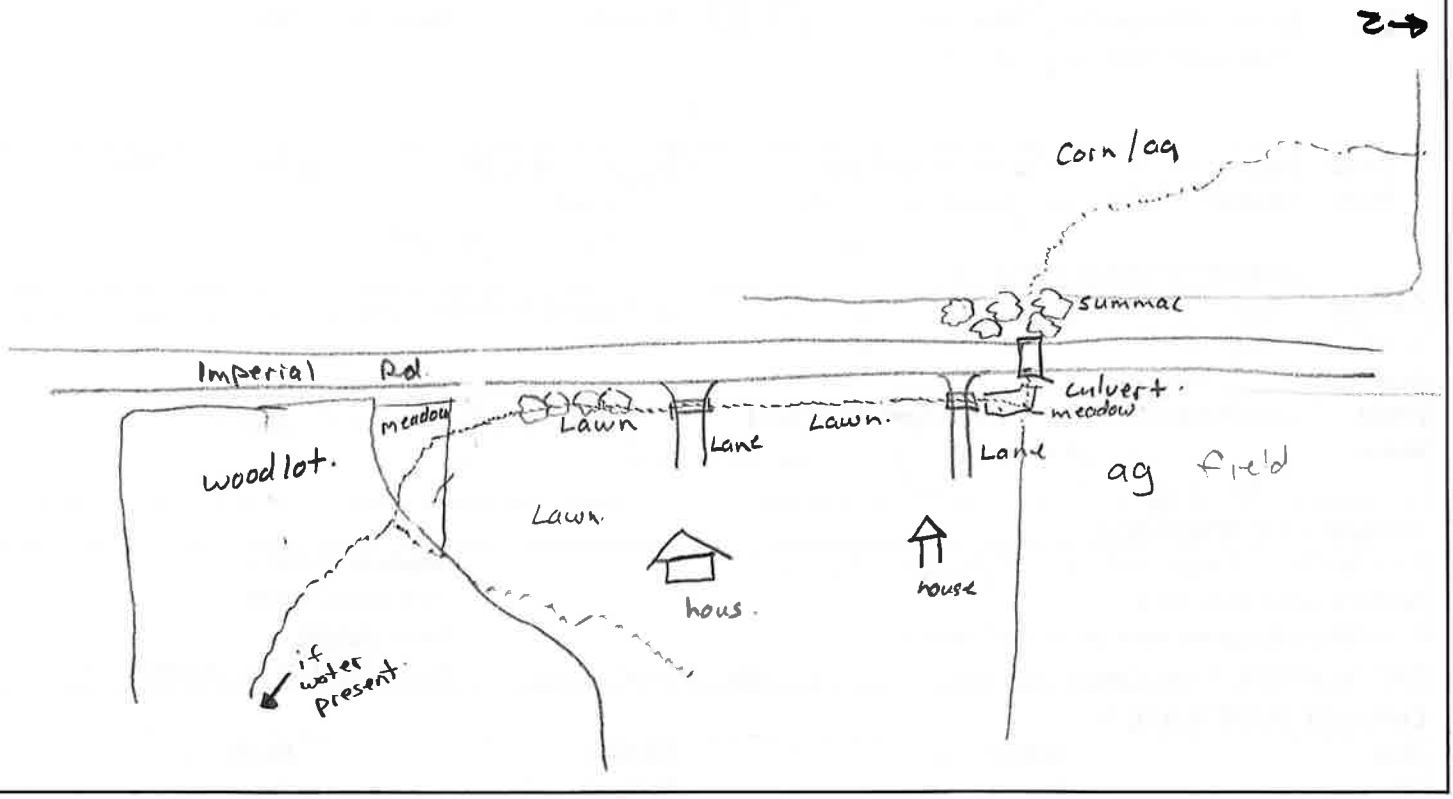
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1			
2			
3			
4			
5			

WATER QUALITY

Water Temp. (°C): — Dry	D.O. (ppm): —	pH: —	Visible Characteristics/Other Parameters: Ephemeral.
Air Temp. (°C): 17°C	D.O. (%): —	TDS (ppm): —	
Time Taken: 12:13	Conductivity (µs/cm): —		
Location Taken: —			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description
see ref list.			

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

no defined channel, no Aquatic hab.

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HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983A Silvercreek Solar			
Field Staff: PPA			
Station: AHY-020 * WB-116*		**Site Location:** Imperial Rd	
Waterbody: Trib To -		GPS Datum: NAD 83	Easting: 0501285
Drainage System: Silver Cr.		Zone: 17T	Northing: 4729242
Location in System: Headwater - Imperial Dr.		Municipality: Aylmer	
Appr. Reach Length (m): 50m (From Rd).		Lot & Concession:	
Survey Date: Oct 4, 2011	**Weather Conditions:**		
Time Started: 11:26	Wind: 3 Breezy	Cloud Cover (%): 5%	
Time Finished:	Precipitation: 0		

ADJACENT LANDS

Valley	Slope: (D/S) Gentle (< 5°)	Moderate (5 - 15°)	Steep (> 15°)		
	Extent of Natural Vegetation (m)	0-10	10 to 20	20 to 30	30+
	Vegetation Type: Trees (see veg mapping - Christy).				
Riparian Zone	Flood Plain - extent of frequent flood (m):	0-10	10 to 20	20 to 30	30+
	Vegetation Type: Trees - see veg mapping. (D/S) ag field up/s				
	Vegetation Density (HML): M				
Canopy	Type: Trees D/S - ag up/s.	Quality and % shade: 90% D/S	0% up/s.		
Land Use	Natural - D/S ag field - up/s.				
Other Notes	**(groundwater, soils, pools, vegetation, etc.)** -				

CHANNEL MORPHOLOGY

Channel Width (range (m)): 0.10m - 0.50m	Gradient (H/M/L): L
Bank Height (range (m)): 0-25m	Meander/Straight: meander
Bank Slope (degrees from surface of water): 115°	Bank Stability: Moderately
Bank Vegetation Type: Trees (ground cover none)	Bank Veg. Density (H/M/L): L

CHANNEL SUBSTRATE %

Clay:	Gravel: 20	Boulder:	Muck:
Silt: 30%	Pebble: 25% (more near Rd)	Bedrock:	Detritus: 10%
Sand: 5%	Cobble: 10%	Marl:	Other:

INSTREAM HABITAT AND COVER

Pools: very small & isolated	Undercut Banks: no	Boulder/Rock: no
Riffles: yes	Woody Debris: yes	Cobble: no
Backwater: yes	Vegetation: no	Other:

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
—		

CODES:	SWI Surface Water Input	SCS Stream Cross Section
AHP Aquatic Habitat Point	GWI Groundwater Input	DOX Dissolved Oxygen Stn
AHY Aquatic Habitat Area	CKC Creek Crossing	VSS Visual Survey Stn
TMP Temp Monitor Stn	WEL Well	WQS Water Quality Stn
FLW Flow Monitor Stn	CUL Culvert	

FLOW CONDITIONS

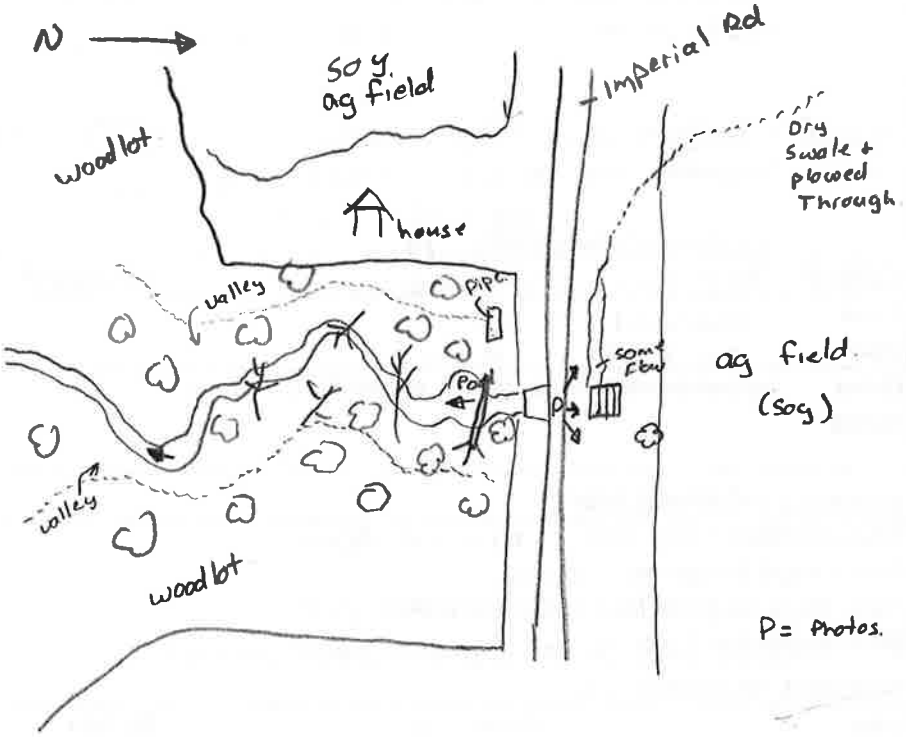
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1	No access - Rd side only + not a good representation		
2			
3			
4			
5			

WATER QUALITY

Water Temp. (°C): 13.5°C.	D.O. (ppm): —	pH: —	Visible Characteristics/Other Parameters:
Air Temp. (°C): 17°C	D.O. (%): —	TDS (ppm): —	
Time Taken: 12:40	Conductivity (µs/cm):		
Location Taken: shade d/s of culvert			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description
see ref list for Photos.			

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

- No fish observed
- minimal flow - depth 0.05 - 0.15m.
- Turbid water
- may originate from Tile Drain u/s of Imperial Rd
- lots of woody debris & fallen trees in valleys.

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HABITAT CHARACTERIZATION

PROJECT (Number & Name): 9834 Silver Cr Solar Park.
Field Staff: PPA
Station: AH1-021 * WB-17 * **Site Location:** E of Hacienda Rd - Sof Talbot
Waterbody: un named pond. GPS Datum: NAD 83 Easting: 0503427.
Drainage System: Catfish Creek Zone: 17T Northing: 4738254.
Location in System: Municipality: Aylmer
Appr. Reach Length (m): 45m x 20m Lot & Concession:
Survey Date: Oct 4, 2011 **Weather Conditions:**
Time Started: 1520 Wind: 2 light Breeze Cloud Cover (%): 5%
Time Finished: Precipitation: 0.

ADJACENT LANDS

Valley	Slope: (Gentle) (< 5°)	Moderate (5 - 15°)	Steep (> 15°)		
	Extent of Natural Vegetation (m)	(0-10)	10 to 20	20 to 30	30+
	Vegetation Type: walnut, maple, Trees & shrubs.				
Riparian Zone	Flood Plain - extent of frequent flood (m):	(0-10)	10 to 20	20 to 30	30+
	Vegetation Type: Trees & shrubs.				
	Vegetation Density (HML): M				
Canopy	Type:	Quality and % shade:			
Land Use	agricultural.				
Other Notes	**(groundwater, soils, pools, vegetation, etc.)**				
	appears to have culvert under Rd (Hacienda To W side) Direction of flow is ~~under~~ not known - no water W side of Hacienda.				

CHANNEL MORPHOLOGY

Channel Width (range (m)): pond is 45m x 20m.	Gradient (H/M/L): L - Pond.
Bank Height (range (m)): 0.25m - 0.50m.	Meander/Straight: —
Bank Slope (degrees from surface of water): 130°	Bank Stability: Stable
Bank Vegetation Type: grasses & Trees.	Bank Veg. Density (H/M/L): M.

CHANNEL SUBSTRATE %

Clay:	Gravel:	Boulder:	Muck: 20%.
Silt: 30%	Pebble:	Bedrock:	Detritus: 20%.
Sand: 15%	Cobble:	Marl: 15	Other:

INSTREAM HABITAT AND COVER

Pools: Pond	Undercut Banks: NO	Boulder/Rock: —
Riffles: NO	Woody Debris: yes	Cobble: —
Backwater: Pond	Vegetation: None observed	Other: —

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
—		

CODES:		
AHP Aquatic Habitat Point	SWI Surface Water Input	SCS Stream Cross Section
AHY Aquatic Habitat Area	GWI Groundwater Input	DOX Dissolved Oxygen Stn
TMP Temp Monitor Stn	CKC Creek Crossing	VSS Visual Survey Stn
FLW Flow Monitor Stn	WEL Well	WQS Water Quality Stn
	CUL Culvert	

FLOW CONDITIONS

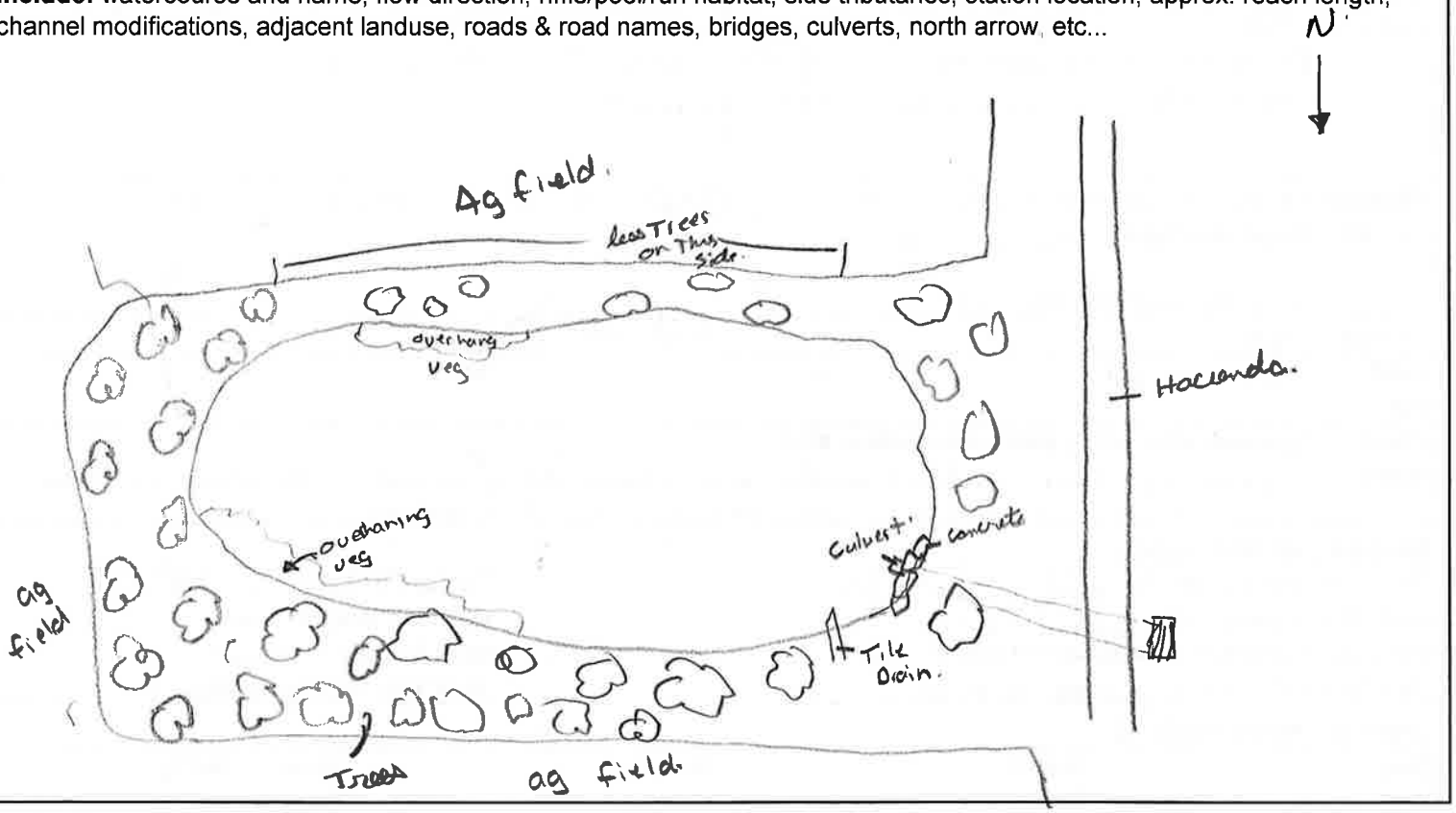
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1	—		
2			
3			
4			
5			

WATER QUALITY

Water Temp. (°C):	13°C.	D.O. (ppm): —	pH: —	Visible Characteristics/Other Parameters:
Air Temp. (°C):	17°C	D.O. (%): —	TDS (ppm): —	water is turbid
Time Taken:	1530	Conductivity (µs/cm): —		
Location Taken:	Shade.			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description
see ref list			

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

- No Fish observed.
- water turbid -
- I believe it drains the water from the fields W of Acienda Rd

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HABITAT CHARACTERIZATION

PROJECT (Number & Name):

Field Staff:

Station: AHY-022 * WB-18* **Site Location:** County 73, Imperial.

Waterbody: pond - GPS Datum: NAD83 Easting:

Drainage System: Catfish Creek Zone: 17T Northing:

Location in System: Sab church + Kingdom hall. Municipality:

Appr. Reach Length (m): 10m + 10m Lot & Concession:

Survey Date: Oct 4, 2011 **Weather Conditions:**

Time Started: 1620 Wind: Cloud Cover (%):

Time Finished: Precipitation:

ADJACENT LANDS

Valley	Slope:	(Gentle) (< 5°)	Moderate (5 - 15°)	Steep (> 15°)	
	Extent of Natural Vegetation (m)	(0-10)	10 to 20	20 to 30	30+
	Vegetation Type:	grass - lawn	Isolated Trees.		
Riparian Zone	Flood Plain - extent of frequent flood (m):	(0-10)	10 to 20	20 to 30	30+
	Vegetation Type:	grass	Isolated Trees		
	Vegetation Density (HML):	L			
Canopy	Type: Trees		Quality and % shade: 10%		
Land Use	Manicured Lawn				
Other Notes	(groundwater, soils, pools, vegetation, etc.)				

CHANNEL MORPHOLOGY

Channel Width (range (m)):	pond	Gradient (H/M/L):	L Pond
Bank Height (range (m)):	0.05m	Meander/Straight:	—
Bank Slope (degrees from surface of water):	—	Bank Stability:	Stable
Bank Vegetation Type:	grass	Bank Veg. Density (H/M/L):	L

CHANNEL SUBSTRATE % ?

Clay:	?	Gravel:	yes	Boulder:		Muck:	
Silt:	~~yes~~	Pebble:	yes	Bedrock:		Detritus:	
Sand:		Cobble:		Marl:		Other:	

INSTREAM HABITAT AND COVER

Pools:	Pond	Undercut Banks:	NO	Boulder/Rock:	—
Riffles:	NC	Woody Debris:	NO	Cobble:	—
Backwater:	Pond	Vegetation:	NC	Other:	—

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance

CODES:		
AHP Aquatic Habitat Point	SWI Surface Water Input	SCS Stream Cross Section
AHY Aquatic Habitat Area	GWI Groundwater Input	DOX Dissolved Oxygen Stn
TMP Temp Monitor Stn	CKC Creek Crossing	VSS Visual Survey Stn
FLW Flow Monitor Stn	WEL Well	WQS Water Quality Stn
	CUL Culvert	

FLOW CONDITIONS

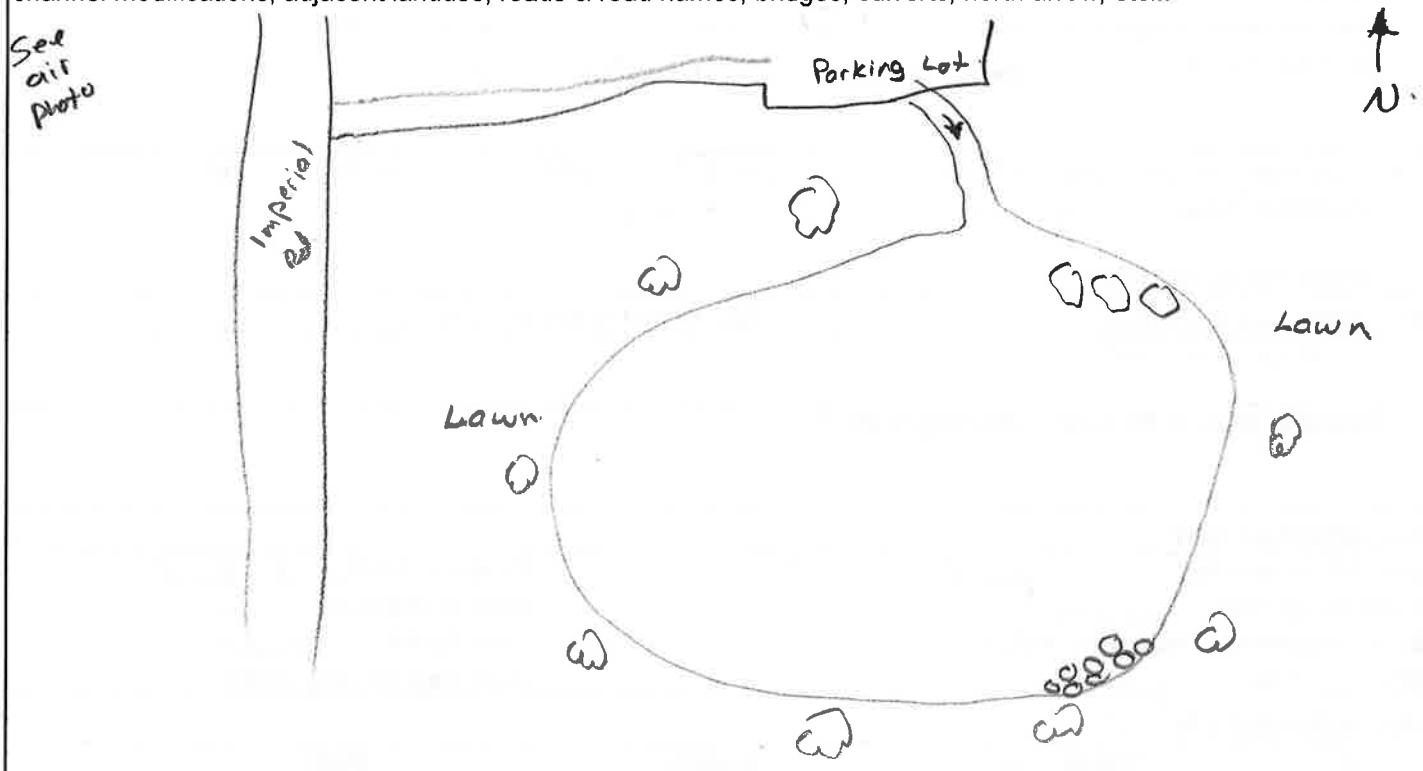
Cross-Section	Wetted Width (m)	5 Depths, equally spaced (cm)	Discharge/Pool/Riffle/Run/Notes
1			
2			
3			
4			
5			

WATER QUALITY

Water Temp. (°C):	No access	D.O. (ppm): —	pH: —	Visible Characteristics/Other Parameters:
Air Temp. (°C):	17°C.	D.O. (%): —	TDS (ppm): —	
Time Taken:		Conductivity (µs/cm): —		
Location Taken:				

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...



PHOTOS TAKEN

Photo #	Description	Photo #	Description

GENERAL COMMENTS

Fish observed, unususal conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

Silver Creek Solar Farm

AHY-023 (previously 050)
- intermittent / permanent
- channelized through agi-fields.

AHY-024 (previously 051)
- Ephemeral

AHY-025 (previously 052)
- Ephemeral but would like to see pic's to confirm.
- Channelized

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HABITAT CHARACTERIZATION

PROJECT (Number & Name):	988A Silver Creek Solar Farm		
Field Staff:	Brian W., Andrew D.		
Station:	AHY-023 previously 050 *WB-19*	**Site Location:**	
Waterbody:	~~Unnamed Tributary/Drain~~ Bradleys Creek	GPS Datum: NAD83	Easting: 502212
Drainage System:	Catfish Creek	Zone: 17T	Northing: 4733547
Location in System:	U/S of Tabacco Line	Municipality:	
Appr. Reach Length (m):	N/A	Lot & Concession:	
Survey Date:	Nov. 8, 2011	**Weather Conditions:**	
Time Started:	1115	Wind: 2	Cloud Cover (%): 10
Time Finished:	1130	Precipitation: Ø	

ADJACENT LANDS

Valley	Slope:	Gentle (< 5°)	Moderate (5 - 15°)	(Steep) (> 15°)		
	Extent of Natural Vegetation (m)	(0-10)	10 to 20	20 to 30	30+	
	Vegetation Type: Grasses, herbs, shrubs - Reed Canary Grass, Curled Dock, Smooth Brome, Common Milkweed, Canada Goldenrod, Red Osier Dogwood, Blk Walnut					
Riparian Zone	Flood Plain - extent of frequent flood (m):	(0-10)	10 to 20	20 to 30	30+	
	Vegetation Type: Grasses, hebs, Shrubs: Reed Canary grass is dominate, Red Osier					
	Vegetation Density (HML):					
Canopy	Type: Shrubs & Grasses	Quality and % shade: 20, poor				
Land Use	Agriculture					
Other Notes	**(groundwater, soils, pools, vegetation, etc.)**					

CHANNEL MORPHOLOGY

Channel Width (range (m)):	2 - 10	Gradient (H/M/L):	L
Bank Height (range (m)):	1.5 - 2	(Meander)/Straight:	
Bank Slope (degrees from surface of water):	45	Bank Stability:	Good
Bank Vegetation Type:	Grasses, herbs, shrubs	Bank Veg. Density (H/M/L):	H

CHANNEL SUBSTRATE %

Clay: 20	Gravel: 20	Boulder:	Muck:
Silt:	Pebble: 20	Bedrock:	Detritus: 20
Sand:	Cobble: 20	Marl:	Other:

INSTREAM HABITAT AND COVER

Pools: ✓	Undercut Banks:	Boulder/Rock:
Riffles:	Woody Debris: ✓	Cobble: ✓
Backwater:	Vegetation: ✓	Other:

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
T - grasses		

CODES:	SWI Surface Water Input	SCS Stream Cross Section
AHP Aquatic Habitat Point	GWI Groundwater Input	DOX Dissolved Oxygen Stn
AHY Aquatic Habitat Area	CKC Creek Crossing	VSS Visual Survey Stn
TMP Temp Monitor Stn	WEL Well	WQS Water Quality Stn
FLW Flow Monitor Stn	CUL Culvert	

FLOW CONDITIONS

Cross-Section	Wetted Width (m)	~~5 Depths, equally spaced (cm)~~	Discharge/Pool/Riffle/Run/Notes
1	1.2	Wetted depth	
2		3.4	
3	Bankful width	Bankful depth	
4	3.3	3.75	
5			

WATER QUALITY

Water Temp. (°C): 11	D.O. (ppm):	pH:	Visible Characteristics/Other Parameters:
Air Temp. (°C): 12	D.O. (%):	TDS (ppm):	
Time Taken: 1130	Conductivity (µs/cm):		
Location Taken: Tabasco Rd.			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...

Refer to air photo.

PHOTOS TAKEN

Photo #	Description	Photo #	Description
0973	U/S view	South	
0974	Channel		
0975	d/S view	North.	

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

Closed culvert

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HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983A Silver Creek Solar Farm
Field Staff: Brian W., Andrew D.
Station: AHY-024 previously 051 *WB-20*
Waterbody: Unnamed Tributary / Drain
Drainage System: Bradleys Creek → Catfish Creek
Location in System: U/S of Imperial Rd.
Appr. Reach Length (m): N/A
Survey Date: Nov 8, 2011
Time Started: 1210
Time Finished: 1230

Site Location:
GPS Datum: NAD 83 Easting: 0501337
Zone: 17 T Northing: 4732247
Municipality:
Lot & Concession:

Weather Conditions:
Wind: 2 Cloud Cover (%): 10
Precipitation: Ø

ADJACENT LANDS

Valley
Slope: Gentle (< 5°) Moderate (5 - 15°) (Steep) (> 15°)
Extent of Natural Vegetation (m) (0-10) 10 to 20 20 to 30 30+
Vegetation Type: Grasses, herbs

Riparian Zone
Flood Plain - extent of frequent flood (m): (0-10) 10 to 20 20 to 30 30+
Vegetation Type: Grasses, herbs
Reed Canary, Canada Goldenrod
Vegetation Density (HML): H

Canopy Type: Grasses, herbs Quality and % shade: 40, moderate

Land Use Residential

Other Notes (groundwater, soils, pools, vegetation, etc.)

CHANNEL MORPHOLOGY

Channel Width (range (m)): 1.5 - 6
Bank Height (range (m)): 1 - 2
Bank Slope (degrees from surface of water): 30
Bank Vegetation Type: Grasses, herbs

Gradient (H/M/L): L
Meander/(Straight)
Bank Stability: Good
Bank Veg. Density (H/M/L): H

CHANNEL SUBSTRATE %

Clay: 50	Gravel:	Boulder:	Muck:
Silt: 10	Pebble:	Bedrock:	Detritus:
Sand: 40	Cobble:	Marl:	Other:

INSTREAM HABITAT AND COVER

Pools:	Undercut Banks:	Boulder/Rock:
Riffles:	Woody Debris:	Cobble:
Backwater:	Vegetation: ✓	Other:

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
T- Grasses		

CODES:		
AHP Aquatic Habitat Point	SWI Surface Water Input	SCS Stream Cross Section
AHY Aquatic Habitat Area	GWI Groundwater Input	DOX Dissolved Oxygen Stn
TMP Temp Monitor Stn	CKC Creek Crossing	VSS Visual Survey Stn
FLW Flow Monitor Stn	WEL Well	WQS Water Quality Stn
	CUL Culvert	

FLOW CONDITIONS

Cross-Section	Wetted Width (m)	~~5 Depths, equally spaced (cm)~~	Discharge/Pool/Riffle/Run/Notes
1	1.0	Bankful Width	
2		3	
3	Wetted Depth	Bankful Depth	
4	0.12	0.35	
5			

WATER QUALITY

Water Temp. (°C): 11	D.O. (ppm):	pH:	Visible Characteristics/Other Parameters:
Air Temp. (°C): 12	D.O. (%):	TDS (ppm):	
Time Taken: 1225	Conductivity (µs/cm):		
Location Taken: u/s Imperial Rd			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...

Refer to air photo

PHOTOS TAKEN

Photo #	Description	Photo #	Description
0976	u/s view (u/s of imperial rd)	East	
0977	d/s view (u/s of imperial rd)	West	
0978	Channel		
0979	d/s view (d/s of imperial rd)	West	

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

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HABITAT CHARACTERIZATION

PROJECT (Number & Name): 983A Silver Creek Solar Farm
Field Staff: Brian W., Andrew D.
Station: AHY-025 previously 052 *WB-21K
Waterbody: Unnamed Tributary / Drain
Drainage System: Bradleys Creek → Catfish Creek.
Location in System: d/s of Imperial Rd.
Appr. Reach Length (m):
Survey Date: Nov 8, 2011
Time Started: 1240
Time Finished: 1245

Site Location:
GPS Datum: NAD 83 Easting: 0501331
Zone: 17T Northing: 4732648
Municipality:
Lot & Concession:

Weather Conditions:
Wind: 1 Cloud Cover (%): 20
Precipitation: 0

ADJACENT LANDS

Valley	Slope:	Gentle (< 5°)	Moderate (5 - 15°)	Steep (> 15°)	
	Extent of Natural Vegetation (m)	0-10	10 to 20	20 to 30	30+
	Vegetation Type: herbs, deciduous forest (Ash & poplar)				
Riparian Zone	Flood Plain - extent of frequent flood (m):	0-10	10 to 20	20 to 30	30+
	Vegetation Type: herbs, grasses, cattails, Bittersweet nightshade.				
	Vegetation Density (HML): H				
Canopy	Type: Deciduous forest	Quality and % shade: 10, poor			
Land Use					
Other Notes	(groundwater, soils, pools, vegetation, etc.)				

CHANNEL MORPHOLOGY

Channel Width (range (m)): 2-3	Gradient (H/M/L): L
Bank Height (range (m)): 0.5-1.5	Meander/Straight:
Bank Slope (degrees from surface of water): 60	Bank Stability: Good
Bank Vegetation Type: Cattails, herbs (Canada Goldenrod)	Bank Veg. Density (H/M/L): H

CHANNEL SUBSTRATE %

Clay:	Gravel:	Boulder:	Muck: 20
Silt: 30	Pebble:	Bedrock:	Detritus: 50
Sand:	Cobble:	Marl:	Other:

INSTREAM HABITAT AND COVER

Pools:	Undercut Banks:	Boulder/Rock:
Riffles:	Woody Debris:	Cobble:
Backwater:	Vegetation: ✓	Other: Detritus

INSTREAM VEGETATION

Type (submerg./emerg./floating)	Family/Genus/species	Description/Abundance
Cattails		Abundant near road.

CODES:		
AHP Aquatic Habitat Point	SWI Surface Water Input	SCS Stream Cross Section
AHY Aquatic Habitat Area	GWI Groundwater Input	DOX Dissolved Oxygen Stn
TMP Temp Monitor Stn	CKC Creek Crossing	VSS Visual Survey Stn
FLW Flow Monitor Stn	WEL Well	WQS Water Quality Stn
	CUL Culvert	

FLOW CONDITIONS

Cross-Section	Wetted Width (m)	~~5 Depths, equally spaced (cm)~~	Discharge/Pool/Riffle/Run/Notes
1	1.8	Bankful width	
2		2.5	
3	Wetted depth	Bankful depth	
4	0.28	0.70	
5			

WATER QUALITY

Water Temp. (°C): 11	D.O. (ppm):	pH:	Visible Characteristics/Other Parameters:
Air Temp. (°C): 12	D.O. (%):	~~TDS (ppm):~~	
Time Taken: ~~##~~ 1245	~~Conductivity (µs/cm):~~		
Location Taken: d/s of Imperial Rd.			

SITE DRAWING

Include: watercourse and name, flow direction, riffle/pool/run habitat, side tributaries, station location, approx. reach length, channel modifications, adjacent landuse, roads & road names, bridges, culverts, north arrow, etc...

Refer to air photo

PHOTOS TAKEN

Direction.

Photo #	Description	~~Photo #~~	~~Description~~
0980	d/s view	West	
0981	Channel		
0982	U/s view	East	

GENERAL COMMENTS

Fish observed, unusual conditions, differences from previous site visit, landowner comments, topography, general land use and vegetation, etc.:

Appendix II
Site Investigation Photographs

Photograph 1 – Upstream view of Tributary A (Silver Creek subwatershed) at assessment location WB-02 (October 15, 2009)

Photograph 2 – Downstream view of Tributary A (Silver Creek subwatershed) at assessment location WB-02 (October 15, 2009)

Photograph 3 – Upstream view of Tributary A (Silver Creek subwatershed) at assessment location WB-08 (October 15, 2009)

Photograph 4 – Downstream view of Tributary A (Silver Creek subwatershed) at assessment location WB-08 (October 15, 2009)

Photograph 5 – Upstream view of Silver Creek at assessment location WB-01 (October 15, 2009)

Photograph 6 – Downstream view of Silver Creek downstream of assessment location WB-01 (October 15, 2009)

Photograph 7 – Upstream view of Tributary B (Silver Creek subwatershed) at assessment location WB-03 (October 15, 2009)

Photograph 8 – Downstream view of Tributary B (Silver Creek subwatershed) at assessment location WB-03 (October 15, 2009)

Photograph 9 – Upstream view of Tributary C (Silver Creek subwatershed) at assessment location WB-04 (October 15, 2009)

Photograph 10 – Upstream view of Tributary D (Silver Creek subwatershed) at assessment location WB-05 (October 15, 2009)

Photograph 11 – Downstream view of Tributary D (Silver Creek subwatershed) at assessment location WB-05 (October 15, 2009)

Photograph 12 – Upstreeam view of Tributary D (Silver Creek subwatershed) at assessment location WB-06 (October 15, 2009)

Photograph 13 – Upstream view of Tributary D (Silver Creek subwatershed) at assessment location WB-06 (October 15, 2009)

Photograph 14 – Upstream view of Tributary E (Silver Creek subwatershed) at assessment location WB-07 (October 15, 2009)

Photograph 15 – Upstream view of Tributary D (Silver Creek subwatershed) at assessment location WB-08 (October 15, 2009)

Photograph 16 – Downstream view of Tributary D (Silver Creek subwatershed) at assessment location WB-08 (October 15, 2009)

Photograph 17 – Upstream view of Gracey Drain (Catfish Creek subwatershed) at assessment location WB-09 (September 16, 2011)

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Photograph 19 – Upstream view of Catfish Creek at assessment location WB-10 (September 16, 2011)

Photograph 20 – Downstream view of Catfish Creek at assessment location WB-10 (September 16, 2011)

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Photograph 22 – Downstream view of Tributary F (Silver Creek subwatershed) at assessment location WB-15 (October 4, 2011)

Photograph 23 – Upstream view of Tributary F (Silver Creek subwatershed) at assessment location WB-16 (October 4, 2011)

Photograph 24 – Downstream view of Tributary F (Silver Creek subwatershed) at assessment location WB-16 (October 4, 2011)

Photograph 25 – Dugout pond at assessment location WB-17 (October 4, 2011)

Photograph 26 – Dugout pond at assessment location WB-18 (October 4, 2011)

Photograph 27 – Upstream view of Tributary C (Bradley Creek subwatershed) at assessment location WB-19 (November 8, 2011)

Photograph 28 – Downstream view of Tributary C (Bradley Creek subwatershed) at assessment location WB-19 (November 8, 2011)

Photograph 29 – Upstream view of Tributary A (Bradley Creek subwatershed) at assessment location WB-20 (November 8, 2011)

Photograph 30 – Downstream view of Tributary A (Bradley Creek subwatershed) at assessment location WB-20 (November 8, 2011)

Photograph 31 – Upstream view of Tributary B (Silver Creek subwatershed) at assessment location WB-21 (November 8, 2011)

Photograph 32 – Downstream view of Tributary B (Silver Creek subwatershed) at assessment location WB-21 (November 8, 2011)

Photograph 33 – Upstream view of Argyle Drain facing north from Glencolin Line (Catfish Creek subwatershed) at assessment location WB-25 (November 8, 2011)

Photograph 34 – Southwest view of Argyle Drain along south side of Glencolin Line (Catfish Creek subwatershed) at assessment location WB-25 (September 16, 2011)

Photograph 35 – Upstream view of Gracey Drain facing north along the east side of Hacienda Road (Catfish Creek subwatershed) at assessment location WB-26 (November 8, 2011)

Photograph 36 – Downstream view of Gracey Drain Drain facing south along the east side of Hacienda Road (Catfish Creek subwatershed) at assessment location WB-26 (September 16, 2011)

SILVERCREEK SOLAR PARK
Water Body Environmental Impact Study

Prepared for:
ORTECH Environmental
804 Southdown Rd.
Mississauga, ON
L5J 2Y4

Project No. 0983A

Date: November 2012

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

SILVERCREEK SOLAR PARK
Water Body Environmental Impact Study

Project Team:

Staff	Role
Andrew Ryckman	Project Manager/Biologist
Christy Humphrey	Terrestrial and Wetland Biologist
Steve Burgin	Aquatic Biologist
Erica Frey	GIS Technician

Report submitted on November 29, 2012

Andrew G. Ryckman

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1.0 Project Description

Natural Resource Solutions Inc. (NRSI) was retained in October 2009 by ORTECH Environmental, on behalf of Silvercreek Solar Park Inc., to conduct a water body resource assessment in accordance with the Renewable Energy Approval (REA) regulation (O.Reg 359/09). This assessment includes a records review, site investigation, and impact assessment of any water bodies at a proposed 10MW solar power generating facility in Elgin County and Malahide Township, ON. The analysis of the water body features is one issue being considered, other factors such as natural heritage, land ownership, social impacts, and cultural impacts are also being assessed in other reports.

The Silvercreek Solar Park proposed by Silvercreek Solar Park Inc. is located south of the Town of Aylmer, ON (the substation property is located north of the town of Aylmer). The property proposed for the solar array is dominated by agricultural land and represents approximately 59 hectares (ha). Within this property, the project area is estimated to be 35.9ha. Boundaries to this property are Imperial road to the west, Vienna Line to the south, and the Catfish Creek wooded corridor to the north and east. This solar energy generating facility is proposed to be 10MW in size, consisting of a total of 40 photovoltaic solar panel arrays, as well as supporting infrastructure and development activities. This includes access roads, inverters/transformers and electrical cabling, perimeter fencing and temporary storage areas; on the northern location, a 115kVtransmission line and transformer substation. In addition to the solar panel arrays, the associated infrastructure designs, including the placement of access roads, cabling, and transformer stations, have also been reviewed for potential impacts on natural features. The project location and proposed solar panel layout can be found in Figures 1 and 2.

As identified in the REA Regulation, the proposed layout of these features is collectively referred to as the ‘project location’. This includes solar panels as well as any areas that may be used as temporary lay-down areas, crane pads, access roads, connectors, distribution and electrical collector cabling. For the purposes of this report, NRSI will refer to the areas within 120m of the project location as the ‘project area’. Water body ‘sites’ are defined as locations within an identified water body feature where the project

location overlaps (i.e. crosses or comes within 120m). Areas surrounding the project location that are expected to be temporarily disturbed during the construction phase are described as 'disturbance areas'.

In accordance with the Renewable Energy Approval (REA) Regulation, NRSI has conducted a records review and site investigations to identify and characterize water bodies within the (lakes, seepages, intermittent/permanent water bodies) within 120m, or Lake Trout (*Salvelinus namaycush*) lakes within 300m, of the project location. Site investigations were conducted within the project area to confirm the presence/absence of water bodies identified within the records review, as well as to document new water bodies not previously identified. Field investigations also focused on the characterization of these features. Findings of these assessments are provided in the Silvercreek Solar Park Records Review Report (NRSI 2012a) and the Site Investigation Report (2012b). Based on review of these findings and the proposed Silvercreek Solar Park layout and design plans, NRSI has conducted an impact assessment to identify any potential impacts to water bodies located within the project area. Findings of this assessment are provided within this report.

As part of this project, NRSI has considered all aspects relating to provincially Threatened and Endangered species. However, since these species are addressed as part of the *Endangered Species Act* (2007), they have not been discussed within any of these Water Body reports. These species will be addressed in full detail, including a habitat description and results of field assessments, potential impacts, and recommended mitigation measures, as part of a separate *Approval and Permitting Requirements Document (APRD)* to be submitted to the Ontario Ministry of Natural Resources (OMNR) under separate cover, where necessary.

Figure 1

Silvercreek Solar Park

Project Area and Natural Features

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

November 22, 2012
Project: 0983A
NAD83 - UTM Zone 17
Scale 1:30,000 (11 x 17")

N

498000 499000 500000 501000 502000 503000 504000 505000

4738000 4737000 4736000 4735000 4734000 4733000 4732000 4731000 4730000 4729000 4728000 4727000

IMPERIAL RD
GLENCOLIN LINE
ROGERS RD
WHITE ST
ELM ST
Argyle Drain
Gracey Drain
DINGLE LINE
DINGLE ST
TALBOT LINE
TALBOT ST W
TALBOT ST E
Catfish Creek
Aylmer
BROOK LINE
CATT LINE
ROGERS RD
Trib B
TOBACCO LINE
Trib C
CONSERVATION LINE
Bradley Creek
SPRINGWATER FOREST
Trib A
CHALET LINE
VAN PATTER LINE
JOHN WISE LINE
ROGERS RD
Trib G
IMPERIAL RD
Trib F
HACIENDA RD
SPRINGFIELD RD
CALTON LINE
Silver Creek
CALTON LINE
ROMMEL RD
SPARTA LINE
Trib E
Trib D
Trib C
Trib B
Trib A
VIENNA LINE
IMPERIAL RD
CATFISH CREEK TILL

Meters
0 500 1,000

Legend

- Project Area (120m Buffer)
- Solar Layout
- Substation
- Staging Area
- Access Road
- Inverter
- Building
- Underground Cabling
- Substation Connection Line
- Fence
- Primary Road
- Local Road
- Provincially Significant Wetland
- Other Wetland
- Wooded Area
- ANSI, Earth Science
- ANSI, Life Science
- Waterbody
- Permanent Watercourse
- Intermittent Watercourse

Path: X:\0983_SilvercreekSolarProject\NRSI_0983_WB_Fig1_ProjectAreaNatFeat_30K_2012_11_22_KSR.mxd

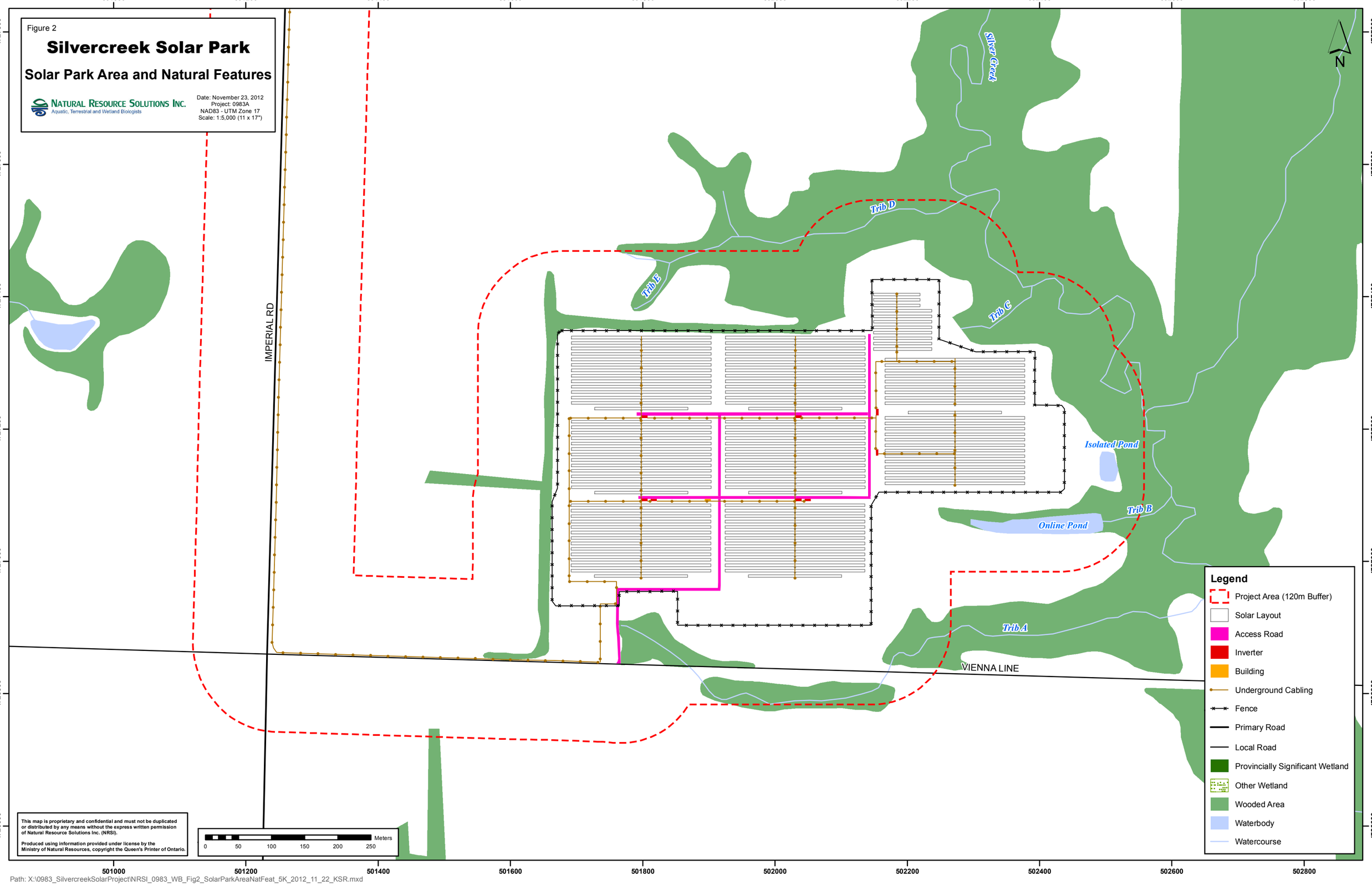
Figure 2

Silvercreek Solar Park

Solar Park Area and Natural Features

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

Date: November 23, 2012
Project: 0983A
NAD83 - UTM Zone 17
Scale: 1:5,000 (11 x 17")



Path: X:\0983_SilvercreekSolarProject\NRSI_0983_WB_Fig2_SolarParkAreaNatFeat_5K_2012_11_22_KSR.mxd

2.0 REA Regulations

Ontario Regulation (O. Reg.) 359/09 – *Renewable Energy Approvals Under Part V.0.1 of the Act*, (herein referred to as the REA Regulation) made under the *Environmental Protection Act* (*EPA*) identifies the requirements for the development of renewable energy projects in Ontario. In accordance with the REA Regulation, the Silvercreek Solar Park, classified as a Class 3 solar facility, is required to complete a REA.

Section 40 of the REA Regulation states that "no person shall construct, install or expand a renewable energy generation facility as part of a renewable energy project at a project location that is in any of the following locations":

1. within 120 meters of the average annual high water mark of a lake, other than a Lake Trout (*Salvelinus namaycush*) lake that is at or above development capacity;
2. within 300 meters of the average annual high water mark of a Lake Trout lake that is at or above development capacity;
3. within 120 meters of the average annual high water mark of a permanent or intermittent stream; or
4. within 120 meters of a seepage area.

This however does not apply if the applicant submits a report that:

1. identifies and assesses any negative environmental effects of the project on a water body referred to in paragraphs 1 to 4 (above) and on land within 30 meters of the water body;
2. identifies mitigation measures in respect of any negative environmental effects mentioned in clause (i);
3. describes how the environmental effects monitoring plan addresses any negative environmental effects mentioned in clause (i); and describes how the construction plan report prepared in accordance with Table 1 of the REA addresses any negative environmental effects mentioned in clause (i).

3.0 Summary of Records Review

In accordance with the REA Regulation, NRSI has completed a records review for the proposed Silvercreek Solar Park project location and surrounding 120m (NRSI 2012a). This records review included correspondence with regional and provincial agency staff, and a review of several available online and published resources. The results of this records review have been summarized in Table 1 below. For more detail, please refer to the Silvercreek Solar Park Water Body Assessment Records Review Report (NRSI 2012a).

Table 1. Summary of the Water Bodies Records Review of the Silvercreek Solar Park Project Area

Criteria	Yes/No	Description	Associated Water Body Features
i. In a water body	No	A total of 8 water bodies (watercourses) from 3 subwatersheds are shown to be crossing underground cabling, however this cabling will be directionally drilled underneath any watercourses and as a result are not considered to be within the water bodies.	<u>Silver Creek Subwatershed</u> • Silver Creek Tributaries F & G <u>Bradley Creek Subwatershed</u> • Bradley Creek Tributaries A, B & C <u>Upper Main Catfish Creek Subwatershed</u> • Upper Main Catfish Creek (main channel) • Gracey Drain • Argyle Drain The records review has identified 8 water bodies, including 2 within the Silver Creek subwatershed, 3 within the Bradley Creek Watershed, and 3 within the Upper Main Catfish Creek subwatershed to be overlapping the project location, more specifically crossing proposed underground cabling along existing roads. Underground cabling will be directionally drilled underneath any watercourses and as a result the project is not considered to be located within any water bodies. All of these water bodies represent expected permanent or intermittent watercourses.
ii. Within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or	No	The project location is not within 120m of the average annual high water mark of a lake.	None.

Criteria	Yes/No	Description	Associated Water Body Features
above development capacity			
iii. Within 300 m of the average annual high water mark of a Lake Trout lake that is at or above development capacity	No	The project location is not within 300m of the average annual high water mark of a Lake Trout lake that is at or above development capacity.	None.
iv. Within 120 m of the average annual high water mark of a permanent or intermittent watercourse	Yes	A total of 14 water bodies from 3 subwatersheds are located within 120m of the project location.	<u>Silver Creek Subwatershed</u> • Silver Creek (main tributary) • Silver Creek Tributaries A, B, C, D, E, F, G <u>Bradley Creek Subwatershed</u> • Bradley Creek Tributaries A, B & C <u>Upper Main Catfish Creek Subwatershed</u> • Upper Main Catfish Creek (main channel) • Gracey Drain • Argyle Drain The records review has identified 14 water bodies, including 8 within the Silver Creek subwatershed, 3 within the Bradley Creek subwatershed and 3 within the Upper Main Catfish Creek subwatershed to be within 120m of the project location. All of these water bodies represent expected permanent or intermittent watercourses.
iv. Within 120 m of a seepage area	No	Seepage areas have not been identified within the project area.	None.

4.0 Summary of Site Investigation

Comprehensive site investigations for the Silvercreek Solar Park project were undertaken by NRSI biologists on October 15, 2009, September 16, 2011, September 22, 2011, October 4, 2011, and November 8, 2011 (NRSI 2012b). These site investigations included site-specific habitat assessments of water bodies throughout the project area. In areas where site access was not available or project components were located considerable distances from aquatic resources, site investigations were conducted from nearby roadside locations.

Of the 14 potential water body features identified within the study as part of the Records Review, a total of 10 of these features were confirmed as water body features based on site investigation findings. Two seepage areas that had not been identified as part of the Records Review were observed within the study area during site investigation. No lakes or Lake Trout lakes were identified within 120m of the Silvercreek Solar Park project location. A summary of the site investigations findings is provided in Table 2 below.

Table 2. Summary of Water Body Site Investigations within the Silvercreek Solar Park Project Area

Criteria	Associated Water Body Features
i. In a water body	Site investigations have identified 3 water bodies that are shown to overlap the project location where underground cabling will run within the road right-of-way. However, this cabling will be directionally drilled underneath any watercourses and as a result the project is not considered to be in the water bodies. These include 1 tributary within the Silver Creek subwatershed, 1 tributary within the Bradley Creek subwatershed, and 1 tributary within the Upper Main Catfish Creek subwatershed.
ii. Within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity	None.
iii. Within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity	None.
iv. Within 120 m of the average annual high water mark of a	Site investigations have confirmed the presence of 10 water bodies within the project area, including 7

permanent or intermittent stream	within the Silver Creek subwatershed, 1 within the Bradley Creek subwatershed, and 2 within the Upper Main Catfish Creek subwatershed. These include the above-mentioned crossing locations as well. Tributaries within the Silver Creek and Bradley Creek subwatersheds are characterized as coolwater systems while tributaries of the Upper Main Catfish Creek subwatershed are warmwater systems. All will require the completion of an Environmental Impact Study.
iv. Within 120 m of a seepage area	Site investigations confirmed the presence of 2 seepage areas within the project area surrounding the solar layout. These occur at the headwaters of Tributaries A and C within the Silver Creek subwatershed. These seepage areas will require the completion of an Environmental Impact Study.

The results of this site investigation will be used, in conjunction with the records review, to identify potential impacts associated with the proposed development activities associated with the Silvercreek Solar Park.

5.0 Description of Proposed Undertaking

The following sections provide information pertaining to the design, construction, operation, and decommissioning activities associated with the proposed undertaking for the Silvercreek Solar Park project.

5.1 Design

The proposed design layout includes the installation of a series of ground mounted photovoltaic (PV) solar panels, as well as associated supporting infrastructure. This will include below ground electrical collector cabling and communication cabling, access roads, inverter/transformer stations, a transmission line, and associated buildings (i.e. substation and electrical house).

The proposed solar facility will consist of a total of 44 solar panel blocks forming 1 array for a total installed capacity of up to 10MW. Panels will be electrically connected both in parallel and series.

The electricity generated by the panels will be transmitted via underground cables to one of eight combined inverter/transformer stations located alongside one of the main access roads. The inverter/transformer stations will convert DC to alternating current (AC) and the units will step-up the line voltage to 34.5 kV. The inverter/transformer stations will connect to an e-house containing electrical switch gears and metering devices prior to exiting the project site. Electricity generated by the Silvercreek Solar Park project will be collected via 34.5 kV underground cabling within the project site and distributed by a new 34.5 kV distribution line, which will run 15 km underground, from the site location to a new substation built adjacent to the Aylmer TS. An additional 115kV cable will run less than 500m from the substation to an adjacent Hydro One system (ORTECH Environmental 2012). The path of the distribution line can be seen in Figure 2.

An existing entranceway located on Vienna Line will be used to access the site from the south. This access point consists of a gravel pad approximately 10m in width and is sufficient for the project requirements. No modifications or alterations to this access point will be required. Other access roads will be constructed with a gravel base to allow access to the electrical systems located alongside the roadway. Use of a geotextile may

be required to prevent gravel from mixing with the topsoil layer. Fencing will be installed to prevent vandalism and public access. A gravel road will be constructed utilizing an existing access in order to access the substation. This access road will require clearing of white pine trees and substrate. Materials will include 200 m^3 of gravel and 700 m^2 of geotextile.

Installation of the underground cable will be completed using open trenching and plowing when suitable conditions are present. Horizontal directional drilling (described below) will be required when crossing obstructions such as permanent water bodies, and where possible roads and railways. Trenches will be approximately 0.9m deep, and the trenches will be filled immediately after cables have been laid. Project design details are provided in the Design and Operations Plan Report (ORTECH Environmental 2012).

5.2 Construction

The construction phase of the project will involve:

- Solar panel assembly and installation;
- installation of electrical collector and communication cabling (below);
- installation of connection line;
- construction of substation
- creation of new access roads;
- installation of associate facilities (substation and transformers/inverters) and,
- installation of temporary construction components (i.e. laydown areas, storage areas etc.)

Based on current layouts, vegetation clearing, tree removal grubbing, and grading will occur throughout the project area to accommodate the access roads, solar panels, crane pads, lay-down areas, and associated buildings. A detailed impact assessment associated with vegetation removal, to terrestrial and wetland features within the project area, is provided in the Natural Heritage Assessment Environmental Impact Study Report (NRSI 2012c).

A total of 44 solar panel blocks forming 1 array will be installed as part of the Silvercreek Solar Park. An existing entranceway located on Vienna Line will be used to access the solar park site from the south. This access point consists of a gravel pad approximately 10m in width and is sufficient for the project requirements. No modifications or alterations to this access point will be required. Other access roads will be constructed

with a gravel base to allow access to the electrical systems located alongside the roadway. Use of a geotextile may be required to prevent gravel from mixing with the topsoil layer. Fencing will be installed to prevent vandalism and public access.

Access to the substation will be gained through an existing access supported by the construction of a new gravel road. This access road will require clearing of white pine trees and substrate. Materials will include 200 m^3 of gravel and 700 m^2 of geotextile.

Installation of the underground cable will be completed using open trenching and plowing when suitable conditions are present. Horizontal directional drilling (described below) will be required when crossing obstructions such as permanent water bodies, roads, and railways. Trenches will be approximately 0.9m deep, and the trenches are filled immediately after cables have been laid. No work is planned to be conducted in a water body as drilling will occur below the stream bed.

One new building (substation) will be constructed as part of the Silvercreek Solar Park development. The location of the new substation is within a white pine plantation. In order to facilitate the installation of the substation, removal and disposal of 0.36 hectares of immature (less than 15 years old) white pine, stumps and substrate will be required. Wood waste will be sent off site for compost or landscape mulch. Excess substrate will be graded into the adjacent topography. The substation will require the construction of concrete foundations, block walls and installation of electrical equipment.

Detailed construction methods are provided in the Construction Plan Report (ORTECH Environmental 2012).

5.3 Operation

The operational phase of the Silvercreek Solar Park will include the operation and maintenance of 44 solar panel blocks, which will form 1 array. Regular maintenance will occur at all of the solar panels at the Silvercreek Solar Park. In addition to regularly scheduled maintenance (1-2 times annually), occasional unscheduled maintenance activities may be required.

5.4 Decommissioning

Project components are expected to be in service for the duration of the operational phase. Following the operation, a decision would be made to extend the life of the facility or to decommission. Decommissioning would entail the dismantling and removal of project infrastructure associated with the Silvercreek Solar Park and restoring the land to a use similar to pre-construction activities.

Forty-four solar panel blocks forming one array will be removed as part of the project decommissioning. . Following the removal of solar panels, the land is expected to return to land use present prior to solar panel installation. In all cases this will be agricultural activities. The visible foundation pedestal will be removed entirely; sufficient base material will be removed to permit tilling of the soil and planting of crops according to the property owner's standard practice.

During the construction phase, underground cabling was installed through two different methods; open cut trench and horizontal directional drilling. Underground cabling installed via open cut trench will not be removed to reduce disturbance. Underground cabling installed via horizontal direction drilling will be removed in a similar manner to the installation, pulled out from the entry/exit pits that are on either side of the natural feature, which they cross. Entry/exit pits will be restored to their pre-construction conditions as soon as possible.

One substation building will be associated with the Silvercreek Solar Park. The surface area will be re-graded and returned to its previous use as a plantation planted with trees native to this region unless requested otherwise by the property owner.

6.0 Impact Assessment

6.1 Approach to Impact Assessment

For the purposes of this report, the analysis of potential impacts has been divided into two categories. First, general impacts on water bodies related to each project phase including construction, design, and operation and decommissioning. Second, specific impacts to each water body identified within the project area that considers the site specific features and functions of the water body as well as the proposed works. These impacts are grouped by water body feature type, as identified by O. Reg. 359/09, s. 30 and include intermittent or permanent water bodies as well as seepage areas.

This approach allows for general impacts to water body features as it relates to project construction, design, operation and decommissioning to be identified up front, avoiding redundancy in subsequent text.

All identified impacts are discussed in this section assuming no mitigations are applied, therefore, are described as a "worst case scenario" for impacts to water bodies. Recommendations to mitigate identified impacts as well as monitoring of effectiveness of these measures are discussed in Section 7.0.

6.2 General Project Phase Impacts

If not mitigated appropriately, impacts to water bodies have the potential to be considerable due to the nature of development and construction activities. These impacts have potential to affect surface water quality, fish, fish habitat, benthic organisms, and stream hydrology and range in degree from temporary disturbance to permanent loss or impairment.

Impacts associated with each project phase including design, construction, operation, and decommissioning are discussed below in Sections 6.2.1., through 6.2.4, respectively. Specific impacts associated with each water body within the project area are discussed in Section 6.3. A summary of general project phase impacts are present in Table 8 in Section 8.0.

6.2.1 Design

Impacts associated with solar energy project design are related to the actual project layout as well as the engineering design of certain project components.

Project layout will dictate what water bodies will be directly impacted based on project component orientation as well as the level of risk a water body has potential to be impacted based on proximity of a project component to a water body feature . It is inferred that the greater distance a water body is away from a project component, the less potential for impacts to the feature, although, topography (slope to the water body), the permeability of soils, and the density of vegetation and/or ground litter (i.e. dead grass, leaves, twigs, and logs) are also all factors in the level of risk of impacts to water bodies. NRSI worked closely with the proponent throughout the REA reporting process to identify water bodies and avoid direct impacts wherever possible.

With respect to project components occurring within a water body, the REA Regulation sets clear guidelines as to where solar farm development is acceptable. In the case of Class 3 solar facilities like the proposed Silvercreek Solar Park project, the development of solar panels and transformer stations is prohibited within 30m from all water bodies. All other ancillary project components including transmission lines and access roads can occur at any distance from, including within, a water body if it is demonstrated that it will result in no negative environmental effects, through the completion of an impact study.

Within the proposed Silvercreek project area, electrical collector cabling will traverse intermittent/permanent water bodies via underground directional drilling, and therefore the crossing of these water bodies by the collector cabling is not considered to occur within these features.

A common impact to all water bodies is the alteration of local drainage patterns. This impact is directly related to project layout, stormwater management design, and grading plans. Alteration of drainage patterns has the potential to affect all water bodies occurring within the associated drainage catchment area(s) and is not exclusive to the project area.

Alteration of drainage patterns occurs through a variety of project related activities including the re-grading of land, removal of surrounding forested vegetation, increase in impervious surfaces with the installation of substations (i.e. concrete and asphalt) as well as the implementation of stormwater management measures (i.e. installation of roadside ditches) if required.

Alteration of drainage patterns can cause a variety of impacts to water bodies. This includes changes to watercourse flow (increase or decrease), changes to thermal characteristics of a water body, more specifically, warming of a feature through increased surface water run-off contributions, decreased groundwater base flow, increases and decreases in water levels of seepage areas and lakes. Decreased infiltration to key areas (areas of recharge) due to newly impervious cover interrupts the natural water cycle causing a decrease in infiltration and soil attenuation of precipitation. Additionally, an increase in impervious cover facilitates increased runoff down a steep slope (i.e. a valley feature), could increase potential for erosion and downstream sedimentation.

Specific impacts as a result of alteration of drainage patterns will need to be addressed at the detailed design, permitting and approval phase. As the proposed project location layout considers proximity to water bodies by limiting interference with these features, in addition to utilizing existing access roads where possible, it is anticipated that alterations to drainage patterns will be minimal.

Intermittent/Permanent Water Bodies

Design related impacts to water bodies are associated with the specific location of the proposed crossing at a feature as well as the proposed crossing structure, as in the case with road crossings. Locations of electrical collector cabling and access roads, if not selected appropriately, have potential to impact key habitat features (i.e. such as refuge pools, spawning beds etc.). No access roads are proposed to cross any water body features; however, underground cabling has been identified as crossing water bodies at 3 specific locations. These have been discussed in more detail in Section 6.3.

Any loss in the productive capacity of fish habitat as a result of changes to the physical structure, substrate, type and quantity of cover, vegetation, and flow volume and dynamics are considered harmful alteration, disruption or destruction (HADD) to fish habitat and are prohibited under the federal *Fisheries Act (1986)*.

6.2.2 Construction

Potential for impacts to water bodies during this project phase is generally associated with the length of the construction window (i.e., days, weeks, months); however, un-mitigated impacts have the potential to cause lasting effects beyond the construction window, or permanent impacts that will be evident during the operational phase of the project. In addition, as mentioned in the design-related impacts section, project layout will dictate the level of impact that a water body has potential to be exposed to during construction based on proximity of a project component to a water body feature (i.e. 100m away versus 25m away). It is inferred that the greater distance a water body is away from a project component, the less potential for impacts to the feature. The slope to the water body, the permeability of soils, and the density of vegetation and/or ground litter are also factors in the level of impact risk present. The method of construction selected will also dictate the type of impacts that are possible as well as the degree of impact, as is the case with the installation and connection of electrical collector cabling. An open-trench method (as proposed for this project) has the potential for increased risk of impacts at water crossing locations. Currently, open trench construction as well as horizontal direction drilling is proposed to occur during the installation of underground cabling.

Potential construction related impacts to water bodies have been identified and grouped by the following discussions:

- erosion and sedimentation;
- contaminant spills;
- soil compaction;
- construction debris; and
- drilling.

6.2.2.1 Erosion and Sedimentation

Disturbance of the project site as a result of vegetation clearing and grubbing, topsoil and subsoil stripping, grading, use of heavy machinery, and soil stockpiling all have the

potential to increase erosion in areas directly at or adjacent to water bodies, resulting in movement of sediment-laden runoff into receiving water bodies. Precipitation and thaw events, where runoff is in contact with these exposed areas, have increased potential for erosion and sedimentation.

Soil compaction also has potential to occur as a result of heavy machinery and the stockpiling of heavy materials (i.e. soils) in the project area. Soil compaction can greatly reduce the permeability of soils and affect their ability to retain water during rain/snow melt events. This will result in an increase in surface water run-off which will ultimately increase the erosion potential and the amount of sediment being transported into adjacent water bodies.

The removal of buffer vegetation near water bodies associated with development activities will compromise the stability of lands adjacent to streams, again increasing erosion and sedimentation potential around water bodies.

The effects of sedimentation on aquatic life has been well documented (i.e. Newcombe and MacDonald 1991; Ward 1992; Waters 1995; Osterling *et al.* 2010). Sedimentation can negatively alter the aquatic habitat in any water body, and destabilize the existing erosion and sediment transport regimes of water bodies. It has the ability to reduce water clarity, absorb energy from sunlight, and increase turbidity. These effects can reduce the feeding success of sight-feeding fish and invertebrate species, reduce the reproductive success of aquatic species through the loss of nesting habitat and the smothering of eggs, inhibit plant photosynthesis, warm the water in a system, impair respiratory functions, lower tolerance to disease and toxicants and increase physiological stress. Under prolonged conditions where water quality remains at levels unacceptable for aquatic life, death of aquatic organisms may result.

6.2.2.2 Contaminant Spills

Contaminant spills are a concern due to the proximity of construction vehicles and machinery to water bodies. Accidental spills during equipment re-fueling are one of the more frequent spills of concern.

A contaminant spill will result in the degradation of water quality within a water body. Changes in water quality may impose significant behavioral and physiological stress on fish species, resulting in impaired spawning, feeding or routine activities. Under conditions where water quality remains at levels unacceptable for aquatic life, death of aquatic organisms may result. In some case, depending on contaminant physical and chemical properties a spill has potential to result in immediate death of aquatic organisms.

The degree of impact on the water quality and aquatic organisms is dependent on the quantity, chemical composition, and toxicity of the substance spilled, as well as, the spill response time, ability to contain the spill, and dilution capabilities of the receiving water body (flow volume and rate). Water bodies also have the potential to convey hazardous materials for long distances and affect large areas of habitat. The degree to which this impact occurs is directly related to flow within the watercourse. Intuitively, deleterious substances will travel a much greater distance in a water body that experiences relatively high flow rates compared to one with standing water. At the same time, higher flows tend to dilute the contaminant resulting in lower contaminant concentrations.

Ultimately, a release of contaminant or 'spill' into a water body is considered a release of a 'deleterious substance' and is prohibited under the *Fisheries Act*, the *Environmental Protection Act* and *Ontario Water Resources Act*.

6.2.2.3 Soil Compaction

Heavy equipment and machinery frequently traveling over soils during construction has potential to result in soil compaction. The risk for soil compaction is greater during wet periods when soils are saturated. Soil compaction decreases soil permeability and interferes with surface and subsurface drainage, resulting in an increase in the ratio of runoff to infiltration. If soils are compacted to where runoff approaches 100%, they may act as an impervious surface. Percent impervious cover in a respective watershed leads to water quality/quantity/habitat degradation, if it exceeds a certain threshold (Stanfield and Kilgour 2006). Compacted soil may also restrict the re-colonization of vegetation, and thus contribute to increased potential for erosion and sedimentation as discussed in Section 6.2.2.1.

6.2.2.4 Construction Debris

Stockpiling of construction related materials in or near a water body has potential to enter a water body if not properly contained. This also includes vegetative debris (i.e. shrubs, tree root wads etc.) left from clearing and grubbing activities. Debris entering a water body has potential to result in the destruction or disturbance of fish habitat, disrupt flow patterns increasing risk for flooding or erosion and sedimentation, as well as impair water quality. The degree of impact on the water body is dependent on the type of material as well as amount entering the watercourse. .

6.2.2.5 Drilling

Directional drilling is currently proposed to be used at 3 water body crossing locations. Use of this technology will result in minimal impacts to water bodies in comparison to open trench construction. However, there are still risks associated with the potential for drilling mud to escape into the environment. This is typically as a result of spill, tunnel collapse or rupture of mud to the surface, which is otherwise commonly known as a 'frac-out'. A frac-out is caused when excessive drilling pressure results in drilling mud propagating toward the surface (DFO 2007). Directional drilling may also result in increased risk of erosion and sedimentation from equipment if located near a water body. In addition, the potential for impairment of water quality from debris or drilling mud (bentonite and water slurry) entering a watercourse is present. Operational guidelines for high-pressure directional drilling have been developed by the Department of Fisheries and Oceans (DFO).

6.2.3 Operation

During the operation phase of the project, it is anticipated that impacts to water bodies will be limited to the occasional traffic along access roads within the project area as well as ongoing maintenance activities. This includes a risk of contaminant spills, and erosion and sedimentation from maintenance activities. All result in the degradation of surface water quality within receiving water bodies. Contaminant spills are discussed above in Section 6.2.2.2. Erosion and sedimentation is also discussed above in Section 6.2.2.1.

6.2.4 Decommissioning

The decommissioning phase impacts are essentially the same as the construction-phase impacts, albeit to a lesser extent due of the lack of removal of buried cabling. As these impacts are redundant with the construction-phase impacts, they will not be reiterated here. See Section 6.2.2.

6.3 Site Specific Water Body Impacts

In accordance with the Renewable Energy Approval (REA), the proposed Silvercreek Solar Park project area has been assessed for the presence of water bodies by NRSI biologists through the completion of a records review and site investigation. Identified water bodies located within 120m of the project location were further evaluated for potential impacts as it relates to the proposed undertaking. General project phase impacts are discussed in Section 6.2., site specific impacts to identified water bodies are discussed below.

For the purposes of this report, the analysis of potential impacts has been divided by water body type, as defined by the REA regulation. This includes permanent/intermittent water bodies and seepage areas (crossings and within 0 to 120m).

A total of 12 water body features were identified within the project area. Ten of these have been identified intermittent/permanent water bodies while two have been identified as areas of groundwater seepage. There are a total of 11 individual sites where these water bodies are present within 120m of the Silvercreek project location. The locations of each water body assessment are shown on Figure 3 and 4.

Figure 3

Silvercreek Solar Park

Aquatic Features

Natural Resource Solutions Inc.
Aquatic, Terrestrial and Wetland Biologists

Date: November 22, 2012
Project: 0983A
NAD83 - UTM Zone 17
Scale: 1:30,000 (11 x 17")

N

498000 499000 500000 501000 502000 503000 504000 505000

4738000 4737000 4736000 4735000 4734000 4733000 4732000 4731000 4730000 4729000 4728000 4727000

IMPERIAL RD
GLENCOLIN LINE
WB-25
WB-26
WB-18
WB-09
WHITE ST
ELM ST
ROGER
Argyle Drain
Gracey Drain
DINGLE LINE
DINGLE ST
WB-10
TALBOT LINE
TALBOT ST W
TALBOT ST E
Catfish Creek
Aylmer
BROOK LINE
WB-17
CATT LINE
ROGERS RD
TOBACCO LINE
WB-19
Trib B
Trib C
CONSERVATION LINE
Bradleys Creek
WB-21
CHALET LINE
SPRINGWATER FOREST
Trib A
WB-20
WB-14
WB-12
WB-13
VAN PATTER LINE
WB-22
JOHN WISE LINE
SPRINGFIELD RD
WB-23
Trib G
WB-15
Trib F
WB-16
HACIENDA RD
Silver Creek
CALTON LINE
ROMMEL RD
SPARTA LINE
Trib E
Trib D
WB-06
WB-24
WB-05
WB-07
WB-04
Trib B
WB-03
WB-01
WB-02
WB-11
WB-08
VIENNA LINE
CATFISH CREEK TILL

Meters
0 500 1,000

Legend

- Project Area (120m Buffer)
- Solar Layout
- Substation
- Access Road
- Inverter
- Building
- Underground Cabling
- Substation Connection Line
- Fence
- (WB) Water Body Survey Location
- Primary Road
- Local Road
- Provincially Significant Wetland
- Other Wetland
- Wooded Area
- ANSI, Earth Science
- ANSI, Life Science
- Permanent Watercourse
- Intermittent Watercourse
- Waterbody

Path: X:\0983_SilvercreekSolarProject\NRSI_0983_WB_Fig3_AquaticFeatures_30K_2012_11_22_KSR.mxd

Figure 4

Silvercreek Solar Park

Aquatic Features

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Date: November 23, 2012
Project: 0983A
NAD83 - UTM Zone 17
Scale: 1:5,000 (11 x 17")

N

501000 501200 501400 501600 501800 502000 502200 502400 502600 502800

4727800 4727600 4727400 4727200 4727000 4726800 4726600

IMPERIAL RD

VIENNA LINE

Silver Creek

Trib D

Trib E

Trib C

Isolated Pond

Trib B

Online Pond

Trib A

WB-01 WB-02 WB-03 WB-04 WB-05 WB-06 WB-07 WB-08 WB-11 WB-24

Legend

- Project Area (120m Buffer)
- Solar Layout
- Access Road
- Inverter
- Building
- (WB) Water Body Survey Location
- Underground Cabling
- Fence
- Primary Road
- Local Road
- Provincially Significant Wetland
- Other Wetland
- Wooded Area
- Waterbody
- Watercourse

Meters
0 50 100 150 200 250

Path: X:\0983_SilvercreekSolarProject\NRSI_0983_WB_Fig4_AquaticFeatures_5K_2012_11_21_KSR.mxd

The following section outlines potential site specific impacts on water bodies associated with the proposed Silvercreek Solar Park.

6.3.1 Intermittent/Permanent Water bodies

A total of 10 intermittent/permanent water bodies have been identified within the Silvercreek Solar Park project area. These water bodies provide direct or in-direct habitat for fish and other aquatic organisms and must be given consideration in order to protect them from immediate or prolonged degradation.

Within the identified 10 water bodies, a total of 3 locations have been identified where watercourse features will be crossed by a project component. These three underground cabling crossing locations will occur at WB-10, WB-20, and WB-23. Directional drilling is proposed at these locations, and as a result the project component and construction works are not considered to be located within these water bodies. Crossing locations are summarized in Table 3.

6.3.2 Seepage Area

Two seepage areas have been identified within the Silvercreek Solar Park project area. These areas provide and contribute to baseflow conditions within intermittent and permanent water bodies.

The identified locations of groundwater seepage were observed at the headwaters and within the banks of Tributary A, and at the headwaters of Tributary C within the Silver Creek subwatershed. These areas were observed at assessment locations WB-08 and WB-04, respectively (Figures 3 and 4).

Table 3. Summary of Intermittent/Permanent Watercourse Crossing Locations, Site Specific Considerations & Potential Impacts

Subwatershed	Water Body Feature Name	Water Body Location ID	Crossing Infrastructure	Site Specific Considerations	Potential Impacts
Silver Creek	Tributary F	WB-20	• Underground Cabling • Construction Area	Low sensitivity fish habitat, tolerant baitfish species present, directional drilling proposed with no in-water work	Outlined in Section 6.2.
Bradley Creek	Tributary C	WB-23	• Underground Cabling • Construction Area	Low sensitivity fish habitat, tolerant baitfish species present, directional drilling proposed with no in-water work	Outlined in Section 6.2.
Catfish Creek	Catfish Creek	WB-10	• Underground Cabling • Construction Area	Medium sensitivity fish habitat, top predators and tolerant baitfish species present, directional drilling proposed with no in-water work	Outlined in Section 6.2.

Note: Fish habitat sensitivity was derived from the DFO *Practitioners Guide to the Risk Management Framework* and considers habitat factors such as species sensitivity, species dependence on habitat, rarity, and habitat resiliency. The assessment should be considered preliminary for the purposes of assessing impact as further assessment would be required for final sensitivity determination.

A total of 7 watercourse features are found within 1 to 120m of the project location.

These locations are summarized in Table 4.

Table 4. Summary of Potential Impacts and Site Specific Considerations for Intermittent/Permanent Watercourse and Seepage Area Locations from 0 to 120m of the Silvercreek Project Location (but not crossing)

Subwatershed	Water Body Feature Name	Water Body Location ID	Associated Infrastructure and Distance (m)	Site Specific Conditions	Potential Impacts
Silver Creek	Silver Creek	WB-01	SP - 91 AR - >120 UL - >120 BO - 68 BU - >120	Low to medium sensitivity fish habitat, generally tolerant baitfish species present with some top predatory species, no in-water work proposed, increased risk of impacts based on proximity to water body (closer = greater risk)	Outlined in Section 6.2.
		WB-11			
	Tributary A	WB-02	SP - 72 AR - 4 UL - 32 BO - 28 BU - >120		
		WB-08			

Subwatershed	Water Body Feature Name	Water Body Location ID	Associated Infrastructure and Distance (m)	Site Specific Conditions	Potential Impacts
	Tributary B	WB-03	SP - >120 AR - >120 UL - >120 BO - 76 BU - >120		
	Tributary C	WB-04	SP - 44 AR - >120 UL - 45 BO - 31 BU - >120		
	Tributary D	WB-05 WB-06	SP - 100 AR - >120 UL - 112 BO - 79 BU - >120		
	Tributary E	WB-07	SP – 42 AR - >120 UL - 43 BO - 33 BU - >120		
Upper Main Catfish Creek	Gracey Drain	WB-09	SP - >120 AR - >120 UL - 1 BO - >120 BU - >120	Low sensitivity fish habitat, generally tolerant baitfish species present, no in-water work proposed, increased risk of impacts based on proximity to water body (closer = greater risk)	Outlined in Section 6.2.

Note: fish habitat sensitivity was derived from the DFO *Practitioners Guide to the Risk Management Framework* and considers habitat factors such as species sensitivity, species dependence on habitat, rarity, and habitat resiliency. The assessment should be considered preliminary for the purposes of assessing impact as further assessment would be required for final sensitivity determination.

Legend

SP - Solar Panel
AR - Road Access
UL - Underground Line
BO – Construction activity or Balance of Operation
BU – Building or Inverter

7.0 Recommendations

Based on the analysis of potential negative impacts, mitigation measures provided in the following sections are designed to reduce potential impacts to water bodies and their ecological functions. It is anticipated that the implementation of mitigation measures will be achieved through the conditions of approval on the REA application.

7.1 General Project Phase Mitigation

7.1.1 Design Related Mitigation

Mitigation through design is the first line of defense for avoiding or minimizing impacts to water bodies.

Existing surface water drainage patterns and functions should be maintained through proper stormwater management design considerations. Newly impervious surfaces (i.e. substation buildings etc.) should consider the use of permeable materials, where possible, as to reduce impacts associated with the increase in newly impermeable surfaces.

7.1.2 Construction Related Mitigation

Mitigation measures are recommended to minimize risk associated with potential impacts to water bodies during construction. These mitigation measures are described in the following sections. Site-specific mitigation measures will be identified during detailed design phase.

7.1.2.1 Timing of Works

In general, construction activities near water (within 30m of a water body) is recommended to occur during the low flow period from mid-June to the end of September in order to avoid or minimize impacts, where possible. Within the Silvercreek Solar Park, construction activity will occur less than 30m from a watercourse at Gracey Drain (WB-09/WB-26), and Tributary F to Silver Creek (WB-15/WB-16), where underground cabling is proposed to be laid adjacent to watercourses running alongside the road, as well as Tributary A to Silver Creek where the access road will run within a few meters. If construction must occur outside of the timing window, the proposed

erosion and sediment control measures, outlined below, are expected to protect these features from adverse impacts.

Clearing, grubbing, and grading activities should be timed to avoid seasonally wet periods (i.e. spring), wherever possible. Construction involving heavy machinery or driving on unprepared surfaces should avoid high volume rain events (20mm in 24 hours) and significant snow melts/thaws, resuming once soils have stabilized as to not increase risk of erosion, soil compaction, or the potential for sediment release into nearby water bodies. A Flood Response Plan should be developed by the construction contractor in order to deal with on-site flooding as to mitigate any possible effects to the aquatic environment. This plan should outline contingency measures to be implemented in the event of excess water on-site that could result in erosion or sedimentation. Implementation of effective erosion and sediment control measures prior to construction will minimize the potential for issues related to excessive flows on-site.

7.1.2.2 Erosion & Sediment Control Plan

To minimize the potential for construction related sediment release into nearby water bodies. Erosion and sediment control measures should be developed utilizing the *Erosion and Sediment Control Guideline for Urban Construction*, December 2006 (ESC 2006), prepared by the Greater Golden Horseshoe Area Conservation Authorities (GGHACA) as guidance.

The goal of the ESC plan is to preserve and protect the water body locations that have potential to be affected by the construction. On all sites, multiple layers of protection are to be employed prior to the commencement of construction along with a regulated process for monitoring and maintenance to ensure that the measures are functioning within approved limits. ESC condition reports will be prepared as part of the monitoring and maintenance plan. Where ESC measures are found to be in an unacceptable condition they are to be repaired or replaced immediately. Increased ESC measures (i.e. silt fencing) should be implemented in all situations where a water body or drainage feature (i.e. ephemeral watercourse, swale, ditch etc.) are located within 120m of any construction activity unless otherwise agreed upon with appropriate agency staff. In addition, re-vegetation should occur as soon as possible after soil has been disturbed in order to minimize erosion and sedimentation. If insufficient time is available in the

growing season to establish vegetative cover, an overwintering treatment such as erosion control blankets, fiber matting, rock reinforcement/armoring or equivalent will be applied to contain the site over the winter period. Where rock will be utilized, large, clean, angular rocks should be used. Planting of vegetative cover should then follow in the next growing season. Maintenance and inspection of the vegetative cover will continue until such time as the disturbed areas are sufficiently stabilized through vegetative growth to prevent overland runoff of suspended materials.

7.1.2.3 Re-vegetation

Due to the nature of directional drilling at water courses and the proximity of the Silvercreek Solar Park to valleylands and some water bodies, some re-vegetation activities will be required. Planting after construction should be implemented to stabilize watercourse channel banks and encourage rapid re-vegetation of disturbed soils to prevent collapse, erosion and sedimentation. Seeding should be completed on all disturbed soils as soon as weather permits, following reconstruction of the slope. Seeds should also be protected with a layer of erosion control matting to assist in stabilizing the slope and propagating seed. Re-vegetated areas will also act to buffer potential materials (i.e. sediment) that may flow from adjacent lands and valleys into water bodies. These areas can substantially reduce erosion of stream banks which, in turn, will minimize sedimentation, support fish habitat, and protect the many sensitive ecological functions that occur in water bodies (River Keepers 1998).

If insufficient time is available in the growing season to establish vegetative cover, an overwintering treatment such as erosion control blankets, fiber matting, rock reinforcement/armoring or equivalent will be applied to contain the site over the winter period. Where rock will be utilized, large, clean, angular rocks should be used. Planting of vegetative cover should then follow in the next growing season. Maintenance and inspection of the vegetative cover will continue until such time as the disturbed areas are sufficiently stabilized through vegetative growth to prevent overland runoff of suspended materials.

7.1.2.4 Construction Equipment

To minimize impacts from construction equipment (i.e. cranes, back hoes etc.), machinery should be operated in a manner that minimizes disturbance to the banks and

bed of the watercourse. Silt fencing should be implemented in order to clearly delineate the limits of the construction area to avoid accidental impacts to adjacent water bodies. Equipment should always stay outside the watercourse and bank area. Machinery should arrive on site in clean condition and is to be checked and maintained free of fluid leaks. Machinery must be refueled, washed and serviced a minimum of 30m away from all water bodies and other drainage features as to prevent any deleterious substances from entering a watercourse. Fuel and other construction related materials should be stored securely away from any drainage features. Construction staging areas should also be located away from any water body (i.e. 30m away). It is recommended that spill kits be kept on site at all times and on-site workers should be trained in the use of this kit.

A spill is defined in the Ontario EPA as a discharge "into the natural environment, from or out of a structure, vehicle or other container, that is abnormal in quality or quantity in light of all the circumstances of the discharge" (MOE 1990). Such spills will be identified as major spills, which must be reported to the MOE's provincial spill response center immediately.

To minimize the potential for soil compaction, construction equipment will be restricted to designated controlled vehicle access routes.

7.1.2.5 Construction Debris

Any debris produced as a result of construction activities should be stabilized while on site to prevent it from entering any nearby water bodies. This could include covering stockpiles with biodegradable mats or tarps as well as hanging netting or tarps underneath the water body crossing structure (if applicable). Staging and stockpiling areas should also be located greater than 30m from any water body to limit the potential for construction debris to enter the water bodies. Any waste generated from the site should be removed and disposed of appropriately off site according to municipal standards.

7.1.2.6 Directional Drilling

The greatest potential impact associated with directional drilling is 'frac-out', where drilling mud escapes upwards into a water body. The primary mitigation measure in

preventing a frac-out is to have geotechnical studies completed at proposed drilling locations as to ensure drilling is a feasible option and will not likely result in a frac-out based on geological conditions. An emergency frac-out response plan should be developed and implemented in the event a frac-out occurs. This plan will include steps to contain, monitor and clean-up in response to the event. The DFO Operational Statement for Directional Drilling should be referenced in the development of the response plan (DFO 2007). The plan to address frac-out is found within the Construction Plan Report (ORTECH Environmental 2012).

To minimize risk of drilling related debris or mud entering a watercourse as well as preventing erosion and sedimentation from equipment, drilling entry/exit shafts should be located at least 30m away from any water body.

The Spill Response Plan should also include details associated with drilling operations and be implemented in the event of a spill.

7.1.3 Operational Related Mitigation

As risk of impacts during the operational phase are limited to the potential for water quality impairment from contaminant spills, and erosion and sedimentation from maintenance activities, therefore recommended mitigation measure are focused on water quality and erosion and sedimentation.

Recommendations to mitigate for contaminant spills are discussed in Section 7.1.2.4.

The use of herbicides for the removal of vegetation should be avoided. If application is required, it should be limited and adhere to BMP's for herbicide application, and use herbicides approved for use adjacent to water bodies or within riparian buffer areas.

Recommendations to mitigate for erosion and sedimentation are discussed in Section 7.1.2.2.

7.1.4 Decommissioning Related Mitigation

Recommendations associated with decommissioning activities will generally follow the same guidelines as included above construction related mitigation recommendations

noted in Section 7.1.2. A mitigation and rehabilitation strategy will be prepared to counteract any and all negative environmental impacts caused by decommissioning activities.

7.2 Monitoring

An adaptive management approach to the protection of water body protection requires regular site inspections and monitoring by a designated on-site Environmental Manager(s) (EM). Understanding the condition of the natural ecosystem throughout all phases of the project will form the basis upon which to consider altering construction methods, environmental protection measures, and monitoring programs. Ultimately, any determination related to the application of mitigation and contingency measures will be informed by ongoing analyses of monitoring data, and rely on the experience and judgment of the on-site EM in consultation with the OMNR, MOE and DFO as regulatory agencies.

Pre-construction monitoring is recommended where baseline conditions must be determined (i.e. water quality, water levels etc.). Active construction monitoring will be required at all locations where drainage features and water bodies are present. Active construction monitoring will be required at all locations of construction as well as water bodies located in close proximity. Post-construction monitoring may also be required to certify that proper restoration, stabilization, and overall quality of runoff is returned to pre-construction conditions as well as to satisfy regulatory permitting and/or authorizations. Detailed monitoring plans will be developed within the detailed design phase and will incorporate other monitoring required by regulatory permitting and authorizations i.e.) Letter of Advice (LOA), Fisheries Act Authorization, Permit to Take Water (PTTW) etc. They will also incorporate specific detail of developed plans (i.e. ESC Plan, Flood Response Plan etc.)

General recommended monitoring activities are summarized in Table 5.

Table 5. Summary of General Monitoring Recommendations

Recommended Monitoring	Timing of Monitoring	Estimated Frequency of Monitoring
Monitor on-site conditions (i.e. erosion and sediment control measures, spills, flooding	• Construction phase	• Weekly during active construction periods • Prior to, during and after forecasted rain events (>20mm in 24 hours) or significant snowmelt events • Daily during extended rain or snowmelt periods • Monthly during inactive construction periods • As detailed in the ESC Plan, SRP, and Flood Response Plan
Monitor meteorological conditions from Environment Canada	• Construction phase	• Daily review of weather forecasts
Document changes to existing aquatic habitat	• Pre-construction (to document existing conditions) • Construction Phase	• Once pre-construction • Daily during work within 30m • Weekly for work occurring within 31-120m of a water body
Monitor aquatic habitat at drilling locations	• Construction phase	• Continuous monitoring of aquatic habitat conditions when drilling underneath a water body

8.0 Impact Assessment Summary

A summary of general project phase water body potential impacts, recommended mitigations and resulting impacts are presented in Table 6. With appropriate application of recommended mitigation measures outlined in this report, it is anticipated there will be no resulting significant impacts.

Table 6. Summary of General Project Phase Potential Impacts, Recommended Mitigation Measures and Resulting Significance of Impact

Potential Impact	Recommended Mitigation Measure(s)	Resulting Impact Significance[1]
Design Phase		
Alteration of Local Drainage Patterns	• Design to maintain existing surface water drainage patterns and functions (including project layout, grading, storm water management facilities and structure designs) • Utilize existing roads and road crossing structures where possible • Newly impervious surfaces should consider use of permeable materials	Not Significant
Fish Habitat Alteration/ Loss	• Consideration of design layout to minimize number of crossings • Consider layout distances to water body features and sensitivity of those features • Implement trenchless (i.e. directional drilling) technology at crossings where possible • Any loss to the productive capacity of a watercourse must be compensated for under the *Fisheries Act*	Not Significant
Construction Phase		
Erosion and Sedimentation	• Implement trenchless (i.e. drilling) technology at crossings • Minimize potential for soil compaction (see Soil Compaction) • Controlled vehicle and machinery access routes, keep away from water bodies • Avoid clearing, grubbing and grading activities during seasonally wet periods (i.e. spring) • Avoid work if during high volume rain events (>20mm in 24hrs) or snow melts are observed, resuming once soils have stabilized • Stabilize exposed soils as soon as possible after construction disturbance (i.e. plantings, rock etc.), if insufficient time is available in the growing season to establish vegetative cover, an overwintering treatment such as erosion control blankets, fiber matting etc. should be applied to contain the site over the winter period • Minimize disturbance by keeping construction equipment outside and away from water bodies • Where construction activity and supporting infrastructure (ie. underground cabling) exist less than 30m from a water body, work is recommended to occur during the low flow period of the year from late June through to the end of September, wherever possible, and appropriate sediment and control measures should be implemented. • If work within 30m of a water body cannot be completed during the recommended time period, work should be temporarily halted during major rain or surface runoff events to avoid the increased potential for sedimentation. • Implement Stormwater Management Plan	Not Significant
Water Quality Impairment	• Keep machinery clean and refuel a minimum of 30m away from any water body • Fuel and other construction related chemical stored securely away from water bodies • Any discharges to a water body must meet MOE Policy 2 standards (at or better water quality that than of the	Not Significant

[1] Considers if recommended mitigation measures are applied

Potential Impact	Recommended Mitigation Measure(s)	Resulting Impact Significance[1]
	receiving water body) • Adequately treat any discharge water prior to discharge as to meet MOE policy 2 standards (i.e. filer bags) • Implement Stormwater Management Plan	
Water Level Alteration	• Implement Water Level Response Plan, trigger criteria to be determined in consultation with OMNR • Maintain temporary by-pass channel (when required) during in-water work as to maintain flow and prevent back flooding and overtopping of water containment structure	Not Significant
Soil Compaction	• Controlled vehicle access routes • Staging areas should be located a minimum of 30m from any water body	Not Significant
Debris entering a water body	• Construction debris should be stabilized (i.e. tarps) away from water bodies • Refuse and other material should be appropriately disposed of off-site • Staging areas should be located away from water bodies (i.e. 30m) • Drilling shafts should be located away from water bodies (i.e. 30m)	Not Significant
Drilling Frac-out	• Conduct appropriate geotechnical studies as to ensure directional drilling is appropriate at that location and will not result in a 'frac-out' • Develop emergency response plan in the unlikely event of a 'frac-out' when drilling below a water body, this plan will deal with issues associated with water level alteration, water quality and erosion & sedimentation	Not Significant
Operational Phase		
Water Quality Impairment	• Avoid or limit use of pesticides, implement BMP's • Address any impacts resulting from design or construction phases	Not Significant
Decommissioning		
See construction related impacts and recommended mitigation		

9.0 Summary and Conclusions

A detailed assessment of the water bodies within and adjacent to the proposed Silvercreek Solar Park project has occurred through the use of a detailed Records Review (NRSI 2012a) and Site Investigation (NRSI 2012b) conducted by Natural Resource Solutions Inc. biologists.

Through the completion of these studies, NRSI has confirmed the presence of 12 water bodies within the project area, of which 10 have been identified as intermittent/permanent water bodies and 2 have been identified as a seepage areas. No lakes or Lake Trout lakes were identified within the Silvercreek Solar Park area.

If recommended mitigation measures are employed as described in this report, no significant impacts are anticipated on the identified water body features as a result of the development of the Silvercreek Solar Park Project.

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APPENDIX 4

STORMWATER MANAGEMENT REPORT
(22 Pages)

SILVERCREEK SOLAR PARK

TOWNSHIP OF MALAHIDE

STORMWATER MANAGEMENT REPORT

CYRIL J. DEMEYERE LIMITED
Consulting Engineers
261 Broadway, P.O. Box 460
Tillsonburg, Ontario
N4G 4H8

CJDL
Consulting Engineers

1227
29 June 2012

TABLE OF CONTENTS

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29 June 2012

SILVERCREEK SOLAR PARK

TOWNSHIP OF MALAHIDE

STORMWATER MANAGEMENT REPORT

1.0 Project Description

Silvercreek Solar Park Inc. is proposing to develop a 35.6 ha (88 ac) solar farm on lands identified as Part of Lots 12,13 and 14 Concession III (Vienna Line), Township of Malahide, Elgin County. The Class 3 Solar Facility, under the Renewable Energy Approval (REA) requirements, is anticipated to produce 10 MW of electricity through the installation of 44,250 ground mounted solar panels located through out the proposed site. Electricity will be sold under a Feed-in Tariff (FIT) contract.

The purpose of this Stormwater Management Report is to discuss the potential impact the proposed Silvercreek Solar Park will have on the surrounding watershed and to provide recommendations if it is determined there potentially may be adverse effects.

2.0 Existing Site Conditions

2.1 Topography

The proposed solar park will occupy 35.6 ha (88 ac) of a 56.7ha (140 ac) parcel of land owned by the proponent. The current land use of the remaining land not occupied by the solar park will remain. This consists mainly of forested land, a small remaining workable section of farmland and a residence with various outbuildings.

The Silvercreek Solar Park - Site Plan, prepared by ORTECH Power (Appendix 'A'), shows that Silver Creek forms the east boundary of the proposed solar park site, with branches adjacent to the southern and northeastern site limits as well. The ravine leading down to the watercourse is lined with mature trees and assorted vegetative groundcovers. The properties to the west and northwest of the site are row crop agricultural fields, and the south boundary of the site is Vienna Line.

The proposed solar park drain is located in the Catfish Creek Watershed, which outlets into Lake Erie at Port Bruce. Source water protection is important as Lake Erie is the primary water supply of drinking water for many urban and rural areas within this watershed. The proposed solar park is not located in flood plain.

The current land use of the subject lands is cultivated, row crop agriculture. Preconstruction pictures from a June 8, 2012 site visit by CJDL have been included in Appendix 'C.'

2.2 Soil Conditions

DBH Soil Services Inc. drilled a total of 22 soil inspection sites to a minimum depth of 1 m throughout the subject lands, as part of their soil inventory. Sampling concluded the presence of three (3) different soil types in the subject lands (refer to Appendix 'A').

Plainfield Sand soil is rapidly drained internally and externally and has low water holding capacity. This soil was generally found towards the east third of the property. Walsingham Sand soil, which is imperfectly drained and rapidly permeable, was typical for the westerly 2/3 of the subject lands. Waterin Sand soil, which is poorly drained and rapidly permeable was found in a few isolated areas interspersed with the Walsingham Sand.

Please refer to 'Soil Survey and Canada Land Inventory Classification for Part of Lots 12, 13 and 14, Concession III, Township of Malahide, Elgin County' (November, 2009) by DBH Soil Services Inc. for specific details relating to existing soil conditions in the subject lands.

2.3 Site Drainage

DBH Soil Services Inc.'s report stated that natural drainage of the subject lands is aided by the presence of random field tile. Two (2) hickenbottoms are located in low areas toward the east side of the property, where water has traditionally ponded during sever storm events. The field tiles outlet to nearby ravine branches which flow to Silver Creek. Township of Malahide 'Artificial Drainage Systems' (April, 1996) inventory map confirmed there are no municipal drains in the area that the subject lands are tributary to.

Contour mapping at 0.5 m intervals provided by ORTECH Power (refer to Appendix 'A') indicates that there are ±1.5m elevation variations throughout the limits of the portion of the site to be utilized for solar panels. This gently sloping terrain generally causes any surface water that is not infiltrated into the ground or captured by the surface inlets to field tile drains to "sheet flow" overland to the nearest ravine. No evidence of concentrated water flow causing surface or bank erosion was noted during a recent site visit.

3.0 Stormwater Management

3.1 Site Alterations

The 44,520 polycrystalline solar photovolatic panels will be installed at the 35.6 ha (88 ac) Silver Creek Solar Park in rows grouped in separate clusters throughout the field. Support for the panels will be embedded into the soil via a vibratory pile drive, without the need for a concrete pad or any other impervious surface. Although the panel surface itself is impervious, the installation of the panels will have a minimal affect on the effective impervious area of the site. Water hitting the panels will simply drip off and disburse under and around the panel or surrounding panels and then infiltrate into the soil. See photo of typical installation and proposed single axis tracker in Appendix 'A'.

The site plan identifies the location of ten (10) inverter stations and one (1) e-house, to be installed on concrete pier foundations. Although the ground surface area beneath remains permeable, these structures will be considered impermeable for modeling purposes. The size of these structures will be assumed as 20 m^2 each.

The site plan also shows a proposed gravel access road to be constructed from Vienna Line north into the site, with branches running east and west. This road will be built prior to solar panel installation and will remain during operation of the facility. The site plan shows a total of ±1,100 m of gravel driveway, assumed to be 3.5 m wide.

The staging area is identified on the site plan as an approximate 75 m by 25 m fenced enclosure, required for the assembly of project components and storage of supplies during the construction period. This area has been identified as temporary, but has been considered when completing the hydrologic modeling for this report. The staging area is assumed to be gravel.

It is assumed that existing drainage pattern for the proposed site will be maintained, including contours and tile drainage system. ORTECH Environmental's Draft Project Description report states a vegetative cover will be seeded on areas of bare soil once the solar panels have been installed. The vegetative cover is assumed to be a pasture grass mixture.

3.2 Hydrologic Modeling Methodology & Results

All site alterations previously discussed will be considered when completing hydrologic modeling comparing pre and post development site conditions. The Rational Method will be used to analyze how the development of the Silvercreek Solar Park will effect the peak discharge from the proposed site;

$$Q = 0.00278\ c\ i\ A$$

where,
Q = peak discharge (m^3/s)
i = rainfall intensity (mm/hr)
c = runoff coefficient (unitless)
A = drainage area (ha)

Rainfall intensity will be calculated for 2, 5, 10, 25, 50 and 100 year storms, using factors for MOE District East of London, ON. Tme of concentration (t_c), the time it takes for water to propagate from the furthest point in the watershed to the outlet, will be calculated using the Airport Formula. This method is preferred for watersheds where the runoff coefficient is less than 0.40;

$$t_c = (3.26\ (1.1 - c)\ L^{0.5})/\ S_w^{0.33}$$

where,
t_c = time of concentration (min)
L = watershed length (m)
c = runoff coefficient (unitless)
S_w = watershed slope (%)

As previously mentioned, the watershed length and slope will remain unchanged from pre to post development conditions since no grading changes are taking place. The length of the overland flow path will be assumed as 450 m, which is approximately the greatest distance from a branch of Silver Creek to a boundary of the proposed site. DBH Soil Services Inc's Soils/Canada Land Inventory (CLI) map shows the approximate overland slope in each soil type boundary identified on the map. Based on this information, a slope of 2.0% appears to be representative of the site.

The following is a summary of the pre and post development runoff coefficients, as used in both the Airport Formula and the Rational Method.

Table 1: Pre and Post Development Runoff Coefficients Summary

Surface	Runoff Coefficient (c)	Pre-Development Area (ha)	Post Development Area (ha)
CULTIVATED (0 to 5% Slopes Open Sand Loam)	0.22	35.6 (100%)	0.0 (0%)
PASTURE (0 to 5% Slopes Open Sand Loam)	0.10 + 50% =0.15*	0.0 (0%)	35.01 (98.3%)
GRAVEL (Access Roads & Staging Area)	0.50	0.0 (0%)	0.57 (1.6%)
STRUCTURES (Inverter Stations, House)	0.95	0.0 (0%)	0.02 (0.1%)
Effective Runoff Coefficient		0.22	0.16

* The run-off coefficient for pasture has been increased by 50% to account for the affect of the solar panels concentrating the rainfall pattern.

Rainfall intensity is calculated using design factors for MOE district 'East of London.' Rainfall intensity, along with calculated runoff coefficients are used in the Rational Method to estimate peak flow. The following table compares pre and post development peak overland flows at different rainfall intensities.

Table 2: Peak Flow Modeling Results for Pre and Post Development Design Storms

Condition	Peak Flow (m^3/s)					
	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
Pre-Development	0.584	0.785	0.914	1.185	1.434	1.626
Post-Development	0.406	0.544	0.634	0.823	0.995	1.128

Refer to Appendix 'C' for a sample calculation of the procedure outlined above.

3.3 Hydrologic Modeling Discussion

As summarized in Section 3.2 'Hydrologic Modeling Methodology & Results' above, it is found that post development peak flow will be 31% less than that of pre-development farm land. Seeding a vegetative cover over the soil once the solar panels are installed was the greatest factor in decreasing the post development peak flow. The vegetative cover increases infiltration into the sandy soil, as well as decreasing the time of concentration by slowing overland flow velocities when compared with cultivated row crop agriculture.

Increased surface water infiltration translates into increased ground water recharge. Water from the site will slowly percolate into Silver Creek, therefore helping to replenish the existing base flow.

The post development site areas occupied by surfaces with higher runoff coefficients than pre development (gravel driveways, staging area, inverter stations and e-house) had a very small effect on peak flow values due to the small fraction of overall area they occupied.

4.0 Stormwater Quality Control

4.1 Erosion Control

The most effective erosion control for this site is seeding the area between and beneath the solar panels with a vegetative pasture type cover. The vegetative cover will increase infiltration and slow overland water sheet flow velocities, while increasing soil stability when compared with the traditional cultivated row crop use for the subject lands. Once growth of the vegetative cover has been established, sediment transport to adjacent ravines during storm events will be virtually eliminated, thereby improving water quality in the surrounding watershed.

4.2 Site Maintenance

In order for the vegetative cover to maintain maximum effectiveness, plant health must be maintained. This includes primarily occasional mowing, as required. Periodic visual inspections of the vegetative cover should be conducted to determine if maintenance operations are necessary. If areas of vegetative cover become thin or die off, they should be reseeded immediately to mitigate any potential erosion.

When necessary, there will be light vehicular traffic in between the rows of solar panels in less traveled areas which do not have a gravel driveway. If vegetation in a grassed driveway is damaged due to higher than anticipated traffic, it is recommended to construct a gravel driveway in the area to eliminate the potential for sediment transport.

4.3 Construction Period Erosion Control

The construction process should not generate any increase in particle transport than what exists with the pre development cultivated row crop agricultural use of the site. However, if areas of erosion are noticed during construction, a straw bale check dam or a silt fence should be installed to eliminate sediment transport.

4.4 Foreign Containment Control

ORTECH Environmental's Draft Project Description for Silvercreek Solar Park notes that , during construction and/or maintenance periods, there may be an increased risk for diesel fuel and lubricating oil spills. The report states a Spill Contingency Plan will be in place and exercised if necessary to deal with any accidental releases.

4.5 Agricultural Pollutants

With the conversion of the proposed site from agricultural land to a solar park, the need for herbicides and pesticides has been eliminated. This will remove any potential risk of these chemicals from polluting the surrounding watershed.

5.0 Conclusions and Recommendations

The Catfish Creek Watershed Characterization Report (January, 2008) was produced in part by the Catfish Creek Conservation Authority to help protect water quality and quantity for drinking water system. The Silvercreek Solar Park Stormwater Management Report demonstrates that post development conditions of the solar farm improve upon many predevelopment site characteristics, when analyzing key topics identified by the Catfish Creek Conservation Authority.

The solar panels will be installed on the existing site without altering the overland water flow path. Any tile drains which currently exist in the field are also expected to be maintained.

Hydrologic modeling using the Rational Method has been completed, accounting for changes in site conditions from pre to post development. Modeling results showed post development peak flow is reduced 31% from that of pre development, largely because of the seeding of a vegetative cover on previously cultivated row crop soil.

The conversion of the proposed site from agricultural lands to a Solar Park will improve water quality entering the surrounding watershed. This is largely due to the seeding of a vegetative cover, which will greatly reduce sediment transport to neighbouring watersheds by providing soil stability. It will require periodic monitoring to ensure optimal plant health, and reseeding of areas may be necessary to maintain maximum effectiveness.

** ** **

All of which is respectfully submitted,

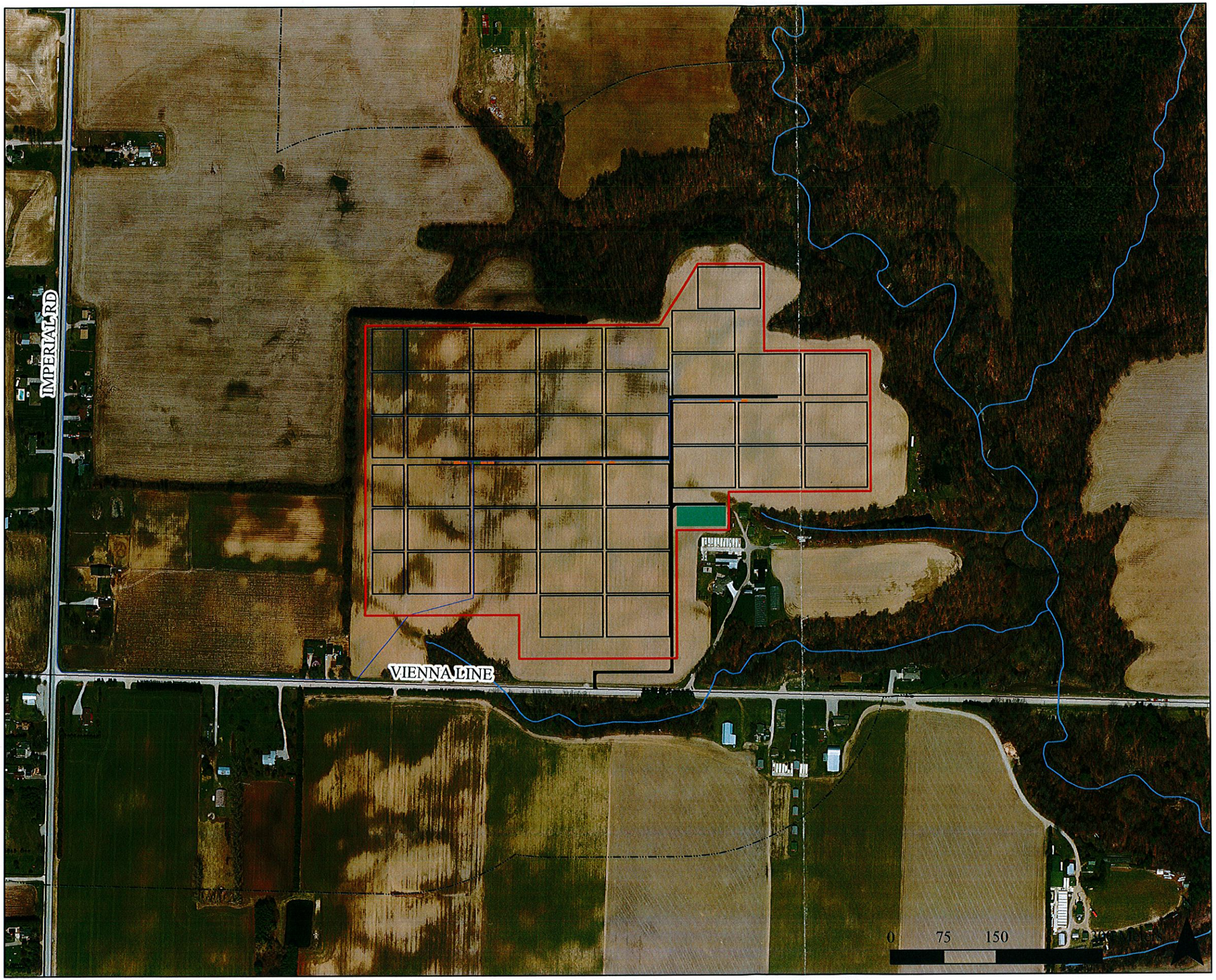
Deren Lyle, E.I.T.

fm Peter J. Penner, P. Eng.

APPENDIX 'A'

- Silvercreek Solar Park - Site Plan
  Courtesy of ORTECH Power (January 23, 2012)
- Silvercreek Solar Park - 0.5 m Contour Mapping
  Courtesy of ORTECH Power (May 23, 2012)
- Silvercreek Solar Park - Soils / Canada Land Inventory (CLI)
  Courtesy of DNH Soil Services Inc. (November 23, 2009)
- Email from Ortech with example installation and proposed tracking system - 31 May 2012

Silvercreek Solar Park - Site Plan



34.5 kV Cable

Solar Park Fence Line

Silvercreek Block Layout

300m Buffer of Project Components

Inverter Station

Access Road

E-House

Staging Area

Major Road

Local road

Watercourse

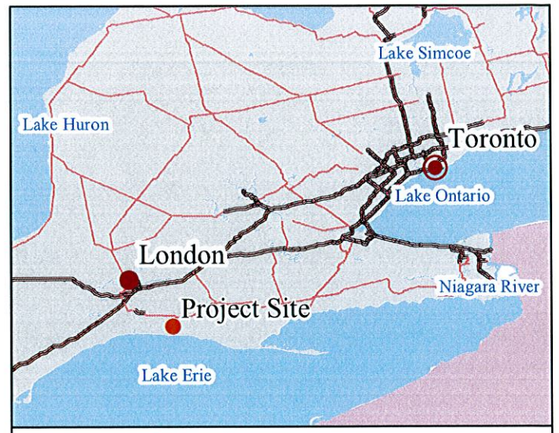
ORTECH Power

UTM NAD 83
Zone 17
Data Courtesy of MNR, LIO Ortho 2010

Prepared By:
N Collard
Date:
2012 Jan 23

501690 501780 501870 501960 502050 502140 502230 502320 502410

4727430 4727360 4727290 4727220 4727150 4727080 4727010 4726940 4726870 4726800



0.5m Contours

- 197.0 - 202.0
- 202.0 - 207.0
- 207.0 - 212.0
- 212.0 - 217.0
- 217.0 - 222.0

UTM NAD 83
Zone 17
Data Courtesy of MNR, LIO
Prepared By:
N Collard
Date:
2012 May, 23

ORTECH Power

0 37.5 75 150 Meters

N W E S

Legend

- Soil Inspection Site and Number
- Soil Polygon Boundary
- Subject Lands

Soil Series — Slope Code
PF/B
3F
CLI Class — CLI Subclass

Soil Series

PF - Plainfield Sand
WM - Walsingham Sand
WN - Waterin Sand

CLI Subclass

F - Low Fertility
W - Excessive Moisture

Slope Code

Aa 0.0 - 0.5 %
Bb 0.5 - 2.0 %
Cc 2.0 - 5.0 %
Dd 5.0 - 9.0 %
Ee 9.0 - 15.0 %
Ff 15.0 - 30.0 %
\ < 50 m slope length
\ > 50 m slope length

Figure 2

Soils / Canada Land Inventory (CLI)

DBH Soil Services Inc.

November23, 2009

File: 2010/05/Figure 2 -Soils/CLI

Peter Penner

From: Scott Manser [smanser@ortech.ca]
Sent: Thursday, May 31, 2012 1:49 PM
To: ppenner@cjdleng.com
Subject: Silvercreek Solar Information.
Attachments: STP270_24Vb_12_ltr.pdf; SunPower_t0tracker_en_lt_w_ra.pdf

Peter – below is a representative image of what the solar panels will look like when mounted on the tracking system. I have also attached the proposed solar panels for use (note they state 270W in the information, whereas in our reports we have used 275 W). 44,520 panels in total. I have also attached a brochure for the proposed tracking system.

Figure 8: Solar Panels (Arrays)

Regards;

Scott Manser, P.Eng
Senior Environmental Engineer
ORTECH Environmental
Tel: 519-966-8798
Fax: 519-966-8014
email: smanser@ortech.ca

SUNPOWER

TRACKER

SINGLE-AXIS DESIGN FOLLOWS THE PATH OF THE SUN

BENEFITS

Higher Energy Delivery
Delivers more energy per land area than competing systems

Patented Single-Axis Design
Fewer moving parts and motors means more reliability and lower operating and maintenance costs

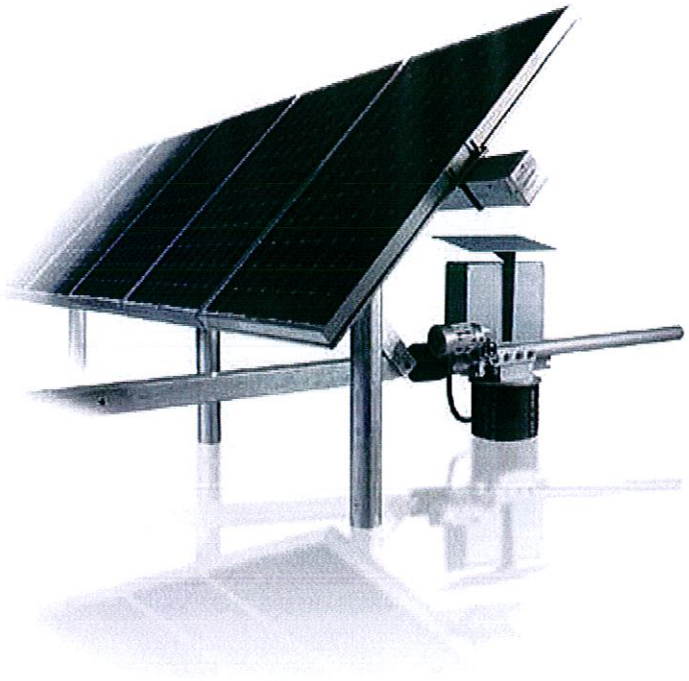
No Panel Shading
Sophisticated backtracking algorithms avoid panel shading while increasing energy production

Efficient Use of Land
Requires ½ the land area of conventional solar tracking systems

Fully Scalable
Scales easily from small to large multi-megawatt installations

Reliable and Robust Design
Galvanized, corrosion-resistant steel frame provides superior strength

Bavaria Solar Park - **10 MW** - Bavaria, Germany



The SunPower Tracker is today's most reliable and proven solar tracking technology. This revolutionary product's single-axis design enables solar panels to automatically track the sun's movement throughout the day. This increases sunlight capture by up to 25% over traditional fixed-tilt systems, while significantly reducing land use requirements.

SUNPOWER T-0 TRACKER

SUNPOWER

TRACKER

SINGLE-AXIS DESIGN FOLLOWS THE PATH OF THE SUN

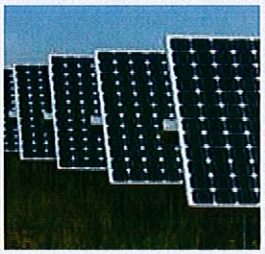
Specifications and Details

Attribute	Specification
Tracking Type	Single-Axis (with backtracking)
Tilt Angle	0 Degrees
kW per Drive Motor	Up to 250 kWp
Drive Type	Linear Actuator
Operation	Grid-Connected
Warranty	Full System Warranty with On-Site Service

SunPower Tracker vs. Conventional Solar Tracking Systems: A 1MW System Comparison

Unlike conventional solar tracking systems that require wide array spacing, SunPower Tracker minimizes shading and thereby enables tighter spacing, requiring half the land area of conventional systems.

At low sun angles, SunPower Tracker employs its exclusive backtracking feature to prevent shading and to optimize energy production. In conventional systems, backtracking is generally much less effective and yields inconsistent results.



Parameter	SunPower T-0 Tracker	Conventional Tracker
Motors per 1MW	4	200
Land Area Required per 1MW	1.8 to 2.4 Hectares	4 to 6 Hectares
Operating Wind Resistance	Up to 145 Km/h	Up to 80 Km/h
Energy Gain vs. Fixed Tilt Systems (kWh/kW)	Up to 25% More	Up to 35% More
Self Shading on Panels	None	Partial Shading
Solar Tracking Method	GPS Controller Tracking	Active Solar Sensing

SunPower Tracker technology is protected by US Patent 6,058,930.
International Patents 1169604 (France, Portugal , Spain and UK) and 60015950.7 (Germany).
Other US and/or international patents issued or pending may apply.

About SunPower

SunPower designs, manufactures and delivers high-performance solar electric technology worldwide. Our high-efficiency solar cells generate up to 50 percent more power than conventional solar cells. Our high-performance solar panels, roof tiles and trackers deliver significantly more energy than competing systems.

APPENDIX 'B'

- Design Chart 1.07: Runoff Coefficients
  Courtesy of MOE Drainage Management Manual Parts 3&4 (1997)
- Sample Calculation for Post Development 2 Year Storm

Design Chart 1.07: Runoff Coefficients

- Urban for 5 to 10-Year Storms

Land Use		Runoff Coefficient	
		Min.	Max.
Pavement	- asphalt or concrete	0.80	0.95
	- brick	0.70	0.85
Gravel roads and shoulders		0.40	0.60
Roofs		0.70	0.95
Business	- downtown	0.70	0.95
	- neighbourhood	0.50	0.70
	- light	0.50	0.80
	- heavy	0.60	0.90
Residential	- single family urban	0.30	0.50
	- multiple, detached	0.40	0.60
	- multiple, attached	0.60	0.75
	- suburban	0.25	0.40
Industrial	- light	0.50	0.80
	- heavy	0.60	0.90
Apartments		0.50	0.70
Parks, cemeteries		0.10	0.25
Playgrounds (unpaved)		0.20	0.35
Railroad yards		0.20	0.35
Unimproved areas		0.10	0.30
Lawns	- Sandy soil		
	- flat, to 2%	0.05	0.10
	- average, 2 to 7%	0.10	0.15
	- steep, over 7%	0.15	0.20
	- Clayey soil		
	- flat, to 2%	0.13	0.17
	- average, 2 to 7%	0.18	0.22
	- steep, over 7%	0.25	0.35

For flat or permeable surfaces, use the lower values. For steeper or more impervious surfaces, use the higher values. For return period of more than 10 years, increase above values as 25-year - add 10%, 50-year - add 20%, 100-year - add 25%.

The coefficients listed above are for unfrozen ground.

Design Chart 1.07: Runoff Coefficients (Continued)

- Rural

Land Use & Topography[3]	Soil Texture		
	Open Sand Loam	Loam or Silt Loam	Clay Loam or Clay
CULTIVATED			
Flat 0 - 5% Slopes	0.22	0.35	0.55
Rolling 5 - 10% Slopes	0.30	0.45	0.60
Hilly 10- 30% Slopes	0.40	0.65	0.70
PASTURE			
Flat 0 - 5% Slopes	0.10	0.28	0.40
Rolling 5 - 10% Slopes	0.15	0.35	0.45
Hilly 10- 30% Slopes	0.22	0.40	0.55
WOODLAND OR CUTOVER			
Flat 0 - 5% Slopes	0.08	0.25	0.35
Rolling 5 - 10% Slopes	0.12	0.30	0.42
Hilly 10- 30% Slopes	0.18	0.35	0.52
BARE ROCK	COVERAGE[3]		
	30%	50%	70%
Flat 0 - 5% Slopes	0.40	0.55	0.75
Rolling 5 - 10% Slopes	0.50	0.65	0.80
Hilly 10- 30% Slopes	0.55	0.70	0.85
LAKES AND WETLANDS	0.05		

[2] Terrain Slopes

[3] Interpolate for other values of % imperviousness

Sources: American Society of Civil Engineers - ASCE (1960)
U.S. Department of Agriculture (1972)

Calculate runoff coefficient (c) based on post development modifications to site imperviousness by taking a weighted average of runoff coefficients. See Table 1:Pre and Post Development Runoff Coefficients Summary (Section 3.2) for areas and coefficients.

c = ((35.01 ha * 0.1) + (0.57 ha * 0.50) + (0.02 ha * 0.95)) / 35.6 ha
= 0.11

Calculate time of concentration using the Airport Method. Use L = 450 m and S_w = 2% and MOE intensity factors in Table 3.

Table 3: MOE District East of London, ON. - Storm Intensity Factors

	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
a	568.522	785.255	918.044	1065.506	1205.613	1289.347
b	4.326	4.631	4.618	4.618	4.631	4.236
c	0.770	0.776	0.777	0.773	0.778	0.775

$t_c = (3.26 (1.1 - c) L^{0.5})/ S_w^{0.33}$
$= (3.26*(1.1-0.11)*(450^{0.5})) / (2\%^{0.33})$
= 54.5 min

Calculate peak 2 Year storm intensity (theocratically at calculated time of concentration).

$i = a / (t_c + b)^c$
$= 568.522 / (48.4 + 4.326)^{0.770}$
= 24.7 mm/hr

Use Rational Method to calculate peak discharge from the proposed site;

Q = 0.00278 c i A
= 0.00278 * 0.16 * 24.7 mm/hr * 35.6 ha
= 0.406 m^3/s

APPENDIX 'C'

- Figures 1-4 taken during 8 June 2012 site visit by CJDL

Figure 1: Looking northwest from Vienna Line.

Figure 2: Looking northeast from Vienna Line.

Figure 3: One (1) of two (2) existing hickenbottoms to capture surface flow.

Figure 4: Northern site limit looking east.

APPENDIX 5

NOISE ASSESSMENT REPORT
(86 pages)