

**Water Body
Site Investigation Report**

**SunE Bruining
Solar Energy Project**

FIT Contract Number: FIT-FH7CNFM

prepared for
Genivar and SunEdison



ECOLOGICAL SERVICES

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Date

May 20, 2012

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1. Introduction

1.1. Project Description

SunEdison, LLC (SunEdison) is proposing to develop a 10 megawatt (MW) solar photovoltaic project titled SunEdison Bruining Solar Energy Project. This project has received a 20-year Feed-in Tariff contract from the Ontario Power Authority (FIT Reference Number: FIT-FH7CNFM). The Project Location encompasses 53 hectares (ha) and is situated on Part of Lots 26, 27 and 28, Concession 2 located in Osnabruck (South Stormont) Township, Stormont County, Ontario. The Project Location is within Kemptville Ecodistrict 6E-12.

Additional information regarding the project, including the draft project description report, is available on the study website at www.sunedison.ca/Bruining.

1.2. Renewable Energy Approval Legislative 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), came into force on September 24, 2009 and identifies the Renewable Energy Approval (REA) requirements for renewable energy generation facilities in Ontario. The REA Regulation has since been amended by O. Reg. 521/10, which came in effect as of January 1, 2011.

As per the REA Regulation (Part II, Section 4), ground-mounted solar facilities with a nameplate capacity greater than (>) 12 kilowatts (kW) are classified as Class 3 solar facilities and require an REA. Part IV, subsection 29 (1) of the REA Regulation requires proponents of Class 3 solar projects to conduct a water assessment consisting of a *Water Body Records Review* (Genivar, 2012) and a *Water Body Site Investigation*.

Subsection 1 (1) of the REA Regulation defines a “water body” as a lake, permanent stream, intermittent stream or 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 or driven through
- c) rock chutes and spillways
- d) roadside ditches that do not contain a permanent or intermittent stream
- e) temporarily ponded areas that are normally farmed
- f) dugout ponds, or
- g) artificial bodies of water intended for the storage, treatment or recirculation of runoff from farm animal yards, manure storage facilities and sites and outdoor confinement areas.

Further, intermittent streams are defined as “a natural or artificial channel, other than a dam, that carries water intermittently and does not have established vegetation within the bed of the channel, except vegetation dominated by plant communities that require or prefer the continuous presence of water or continuously saturated soils for their survival” (O. Reg. 359/09).

Seepage areas are defined as “a site of emergence of groundwater where the water table is present at the ground surface, including a spring” (O. Reg. 359/09).

As amended by O. Reg. 521/10, subsection 31 (1) requires an investigation of the land and water within 120 metres of the Project Location, either by visiting the site or by alternative investigation of the site, in order to determine the following:

- a) whether the results of the analysis summarized in the Water Body Records Review Report (Genivar, 2012) 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 that were identified in the Water Body Records Review Report (Genivar, 2012) prepared under subsection 30 (2);
- c) the boundaries, located within 120 m of the Project Location, of any water body that was identified in the Water Body Records Review Report (Genivar, 2012) or the site investigation; and
- d) the distance from the Project Location to the boundaries determined under clause (c).

Subsection 31 (2) of the REA Regulation has specific requirements if designated lake trout lakes are present within 300 m of the Project Location. These requirements were not deemed applicable to the Project as no such lakes were found in the Water Body Records Review Report (Genivar, 2012).

As amended by O. Reg. 521/10, subsection 31 (4) of the REA Regulation requires the proponent to prepare a report setting out the following:

1. A summary of any corrections to the Water Body Records Review Report (Genivar, 2012) and the determinations made as a result of conducting the site investigation.
2. Information relating to each water body identified in the Water Body Records Review Report (Genivar, 2012) 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 31 (1) (c),
 - ii. the location and type of each water body identified in relation to the Project Location, and
 - iii. all distances mentioned in clause 31 (1) (d).
4. A summary of methods used to make observations for the purposes of the site investigation.
5. The name and qualifications of any person conducting the site investigation.
6. If an investigation was conducted by visiting the site:
 - i. the dates and times of the beginning and completion of the site investigation
 - ii. the duration of the site investigation
 - iii. the weather conditions during the site investigation

iv. field notes kept by the person conducting the site investigation.

7. If an alternative investigation of the site was conducted:

- i. the dates of the generation of the data used in the site investigation
- ii. an explanation of why the person who conducted the alternative investigation determined that it was not reasonable to conduct the site investigation by visiting the site.

This *Water Body Site Investigation Report* has been prepared to meet these requirements. A physical examination of the site was completed, and therefore, clause (3) (7) does not apply.

2. Summary of Records Review Results

Table 2.1 provides a summary of the determinations made in the *Water Body Records Review Report* (Genivar, 2012) with respect to water body features in and within a specified distance from the Project Location.

Table 2.1 Summary of Records Review Determinations

Determination to be Made	Yes/No	Description
Is the Project Location in a water body?	No	No water bodies occur within the Project Location.
Is the Project Location 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	No lakes occur within 120 m of the Project Location.
Is the Project Location within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity?	No	No lake trout lakes were identified in the vicinity of the Project Location.
Is the Project Location within 120 m of the average annual high water mark of a permanent or intermittent stream?	Yes	A permanent stream was identified within 120 m of the Project Location. Intermittent streams may also occur on and within 120 m of the Project Location
Is the Project Location within 120 m of a seepage area?	No	No seepage areas were identified on or within 120 m of the Project Location during the Records Review.

As outlined in Table 2.1, the *Water Body Records Review Report* (Genivar, 2012) identified a permanent stream occurring within 120 m of the Project Location. This water body feature is discussed in the following sections. Any corrections required to the *Water Body Records Review Report* (Genivar, 2012), particularly with respect to Table 2.1, is discussed in Section 5.

3. Site Investigation Details and Methodology

3.1. Site Investigation Details

Two separate site investigations were conducted on the Project Location and surrounding area, in accordance with subsection 31 (3), clauses (5) and (6) of the REA Regulation. These site investigations were undertaken to:

- verify information obtained in the *Water Body Records Review Report* (Genivar, 2012)
- document existing conditions, including the type of water body, plant and animal composition and the ecosystem of the land and water investigated
- identify any corrections required to the *Water Body Records Review Report* (Genivar, 2012) and determinations made as a result of conducting the site investigation.

3.1.1. Site Investigation Timing and Weather Conditions

- **Site Investigation 1** – An initial site investigation was completed on June 27, 2011 from 05:20 to 10:12 hours for a total duration of approx. 4.5 hours. The weather conditions during the site investigation were light fog and a temperature of approximately 19°C. Wind strength was estimated as light. This investigation included GPS referenced mapping of wetland and water features requiring further investigation.
- **Site Investigation 2** – A second site investigation was completed on October 5, 2011 from 09:00 to 12:20 hours for a total duration of 3 hours. The weather conditions during the site investigation were clear with a temperature of approximately 12°C. The wind strength was estimated as light. Water feature and habitat characteristics were identified.
- **Site Investigation 3** – A third site investigation was completed on May 11, 2012 from 09:10 to 12:15 hours for a total duration of 3 hours. The weather condition during the site investigation was clear with a temperature of approximately 20°C. The wind strength was estimated as light to moderate. GPS referenced photo records were taken of all water features on and within 120 m of the Project Location.

3.1.2. Qualifications of Investigators

The site investigations were completed by Dale Kristensen and Chris Grooms. Dale is a terrestrial ecologist with Ecological Services since 1988 and Chris Grooms has been with Ecological Services since 2008. Ecological Services specializes in the provision of services relating to ecological management and research and has been in operation in eastern Ontario since 1985. Their core personnel combine education and experience to give a strong focus on land use planning and management as they relate to natural resources. Their combined experience includes species recovery, environmental impact assessments, management plans, wetland evaluations, and municipal land use planning. He has research experience in forest fragmentation and avian ecology. Dale is a member of the COSEWIC Species Recovery Teams for Deerberry (*Vaccinium stamineum*) and Cerulean Warbler (*Dendroica caerulea*), and is a Certified Butternut Health Assessor for the Province of Ontario. Chris Grooms was former president of the Kingston Field Naturalists and is currently working as a research technician at Queen's University in the Paleolimology lab under Dr. John Smol .

3.2. Site Investigation Methodology

Prior to conducting the site investigations, background information and available hydrological mapping was reviewed to determine water body features on and within 120 m of the Project Location. Satellite imagery

produced by Google Earth Pro was also accessed to identify potential water body features not captured by the information sources reviewed in the *Water Body Records Review Report* (Genivar, 2012).

Following the desktop exercise, those features identified in the *Water Body Records Review Report* (Genivar, 2012) or through an interpretation of satellite imagery were ground-truthed during the site investigations. This involved walking the entire Project Location to document existing environmental conditions and to verify the presence of water body features on and within the 120 m setback. A field book was used to keep records of all observations made during the site investigations and photographs were taken to show the existing conditions on the Project Location. A copy of the field notes are provided in Appendix A.

The location of any water body observed during the site investigations was recorded using a Garmin GPS-12 handheld Global Positioning System (GPS) device. Waypoint accuracy during the site investigation was ± 5 m. The handheld GPS device was also used to demarcate the annual high water mark for each water body. Biophysical characteristics of topography and vegetation communities were used as the primary indicators of annual flooding. The type of water body (i.e., lake, permanent or intermittent stream, seepage area), and the associated plant and animal communities were investigated and documented. This included information such as the rate of water flow, direction of flow, physical characteristics of the water, in-stream habitat types (e.g., channel morphology, substrate, water depth), riparian habitat conditions (e.g., bank height, bank vegetation and substrate, presence of overhanging vegetation or undercut banks) and evidence of wildlife use. Features such as temporarily ponded areas, channel-like features and dug-out ponds were also investigated to assess if they meet the definition of a water body according to subsection 1 (1) of the REA Regulation.

4. Results of the Site Investigation

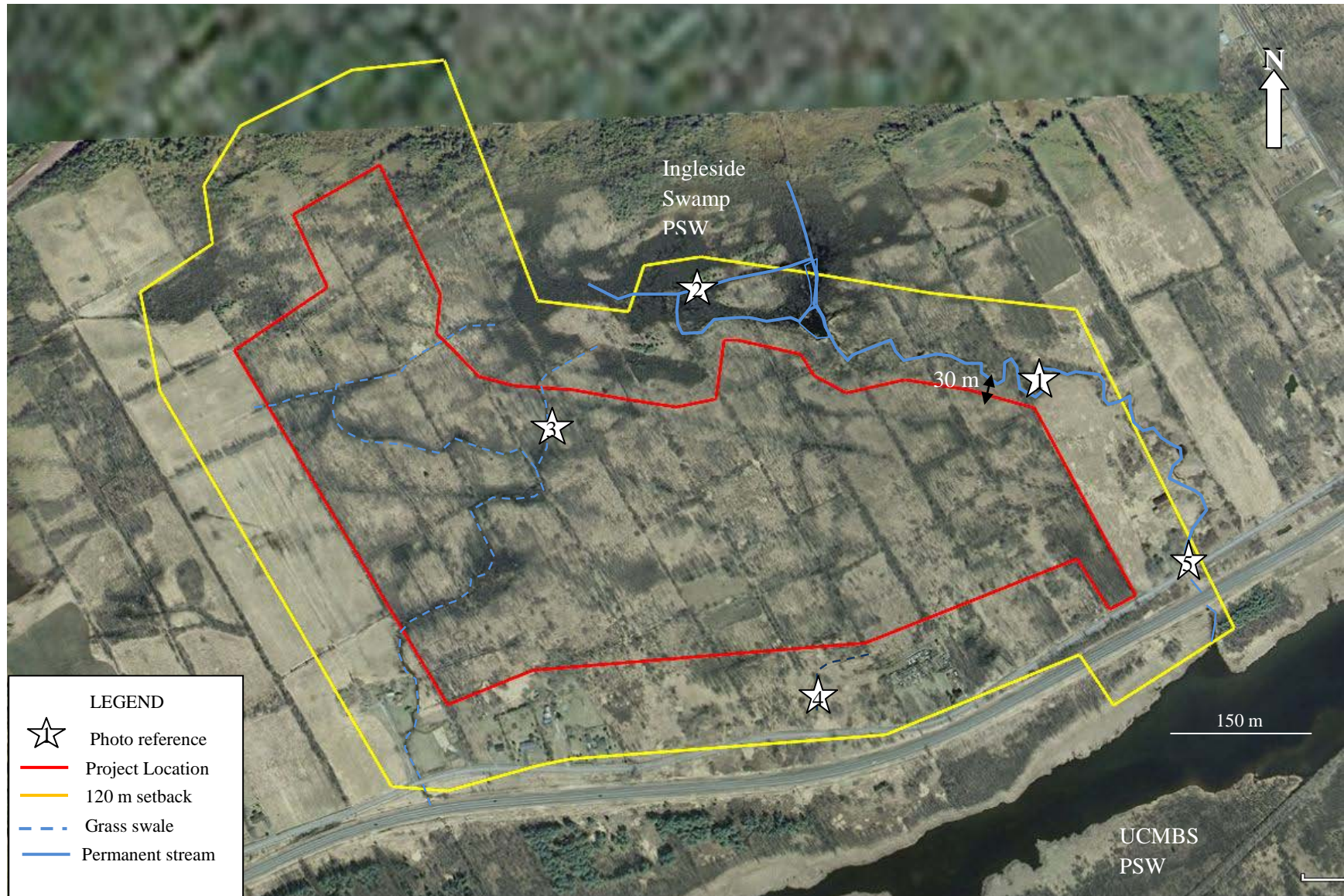
This section documents the results of the site investigations and discusses specific water body features observed on and within 120 m of the Project Location. Water body features that meet the definition of a water body according to the REA Regulation are shown on Figure 4.1. Other water features that were identified during the site investigations but don't meet the definition of a water body are also shown on Figure 4.1. The boundaries and distances of each water body feature (this excludes water features that do not meet the definition of a water body) confirmed during the site investigations are shown on Figure 4.1, including a 120 m setback from the Project Location, as per the requirements of subsection 31 (3) of the REA Regulation.

4.1. Site Description

The Project Location is situated north of Andersen Road/Highway 2, approx. 2 km west of the town of Ingleside in a rural area dominated by cropland and early-mid successional lowland forest and thicket. The Project is situated 120 m north of the St. Lawrence River within the St. Lawrence Lowlands Ecoregion. The site had been farmed prior to the 1960s, but was abandoned and allowed to succeed to deciduous woodland. However, as a result of recent logging activities by the landowner, the Project Location is now comprised mainly of dense shrubland with small remnants of former woodland. Two provincially significant wetlands occur within 120 m of the Project - to the north is Ingleside Swamp PSW and to the south is the UCMBS PSW. Agricultural lands and associated landowner dwellings occur to the east and west of the site (see Figure 4.1).

The Project Location is generally flat and occurs on poorly drained clay-loam soils. Surficial run-off across most of the site is conveyed south via a network of seasonally intermittent grass swales which also drain a small area of thicket swamp associated with the Ingleside Swamp PSW to the north. As small, seasonally intermittent features not dominated by aquatic or hydrophilic vegetation (Figure 4.2), they do not meet *O.Reg* 359/09 criteria for intermittent streams and will not be considered further in this report. Other portions of the Ingleside Swamp PSW to the north of the Project Location are drained via a series of excavated drainage channels that connect to a permanent creek that flows within the 120 m setback areas north and east of the Project Location eventually flowing south into a small embayment on the St. Lawrence River. These latter features meet *O.Reg* 359/09 criteria as a permanent stream (Figure 4.3).

Figure 4.1 Water features within 120 m of the Bruining Solar Project Location.



4.2. Water Features

4.2.1. Permanent Streams

A permanent stream is defined in subsection 1 (1) of the REA Regulation as a “*stream that continually flows in an average year*” (O. Reg. 359/09).

The *Water Body Records Review Report* (Genivar, 2012) identified a permanent stream within 120 m of the Project Location (closest approach is 30 m). Characteristic stream features were recorded and photographed during site investigations in 2011 and 2012 (Figure 4.2). The stream originates approx. 1.5 km north of the Project Location within the Ingleside Swamp PSW and flows east and south across Anderson Rd and Highway 2 to a small embayment on the St. Lawrence River. The stream is associated with artificial drainage channels within the Ingleside Swamp PSW that were constructed as part of a wetland project managed by Ducks Unlimited. It is also connected to farm drains that have been recently cleaned and deepened by the landowner (Figure 4.3). Stream characteristics include:

Width (top of bank): 1 - 1.75 m

Depth at centre: 10 -20 cm

Flow: 0.25 m per sec in upper sections, reduced flow in lower sections

Substrate: Silt and clay, some organics at upper reach

Vegetation: No instream submergents or emergents, some riparian sedge, rush and willow communities

Other Instream Features: none noted, no pooling within 120 m of Project Location

Fish Habitat Potential: Some potential in lower reaches, but impediments to movement present

Erosion Potential: low to moderate (banks exposed as a result of recent drain clearing)



Figure 4.2 Permanent stream north and east of Project Location (Photo Ref 1)

Figure 4.3 Cleaned and excavated drain north of Project Location. (February 2012 - Photo Ref 2)



Figure 4.4 Permanent stream lower reach at Anderson Rd south east of Project Location. (Photo Ref 5)



4.2.2. Intermittent Streams

An intermittent stream is defined in Subsection 1 (1) of the REA Regulation as “a natural or artificial channel, other than a dam, that carries water intermittently and does not have established vegetation within the bed of the channel, except vegetation dominated by plant communities that require or prefer the continuous presence of water or continuously saturated soil for their survival” (O. Reg. 359/09).

The *Water Body Records Review Report* (Genivar, 2012) identified potential intermittent streams on and within 120 m of the Project Location. However, during the site investigations no additional drainage features occurring within the Project Location meet the criteria for consideration as intermittent streams.

4.2.3. Lakes

The *Water Body Records Review Report* (Genivar, 2012) did not identify any lakes on or within 120 m of the Project Location. This was confirmed during the site investigation.

4.2.4. Seepage Areas

Seepage areas are defined as “a site of emergence of ground water where the water table is present at the ground surface, including a spring” (O. Reg. 359/09). The information sources reviewed in the *Water Body Records Review Report* (Genivar, 2012) did not identify any seepage areas on or within 120 m of the Project Location. This was confirmed during the site investigations.

4.3. Other Water Features

Other water features that do not meet the definition of a water body as outlined in the REA Regulation were considered in this report for the Project Location and 120 m adjacent lands. Site investigations included observations of a network of grass swale drainage features (Figures 4.4 and 4.5) flowing across the Project Location south to a collector ditch along Anderson Road.

Figure 4.4 Grass swale drainage feature (Photo Ref 3).



Figure 4.4. Drainage swale at Anderson Rd (Photo Ref 4).



5. Conclusions

Subsection 31 (1) of the REA Regulation requires that the *Water Body Site Investigation Report* include a summary of any corrections to the *Water Body Records Review Report* (Genivar, 2012), as well as the determinations made as a result of conducting the site investigations. The following table (Table 5.1) identifies the corrections required (if any) and determinations made for the water body features identified in the *Water Body Records Review Report* (Genivar, 2012) and documented during the site investigations.

Table 5.1 Corrections to the Bruining Solar Energy Project Water Body Records Review Report

Determination to be Made	Yes/No	Corrections Required?
Is the Project Location in a water body?	No	There are no corrections required to the <i>Water Body Records Review Report</i> (Genivar, 2012) with respect to water bodies. The site investigation confirmed that there are no water bodies within 120 m of the Project Location.
Is the Project Location 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	There are no corrections required to the <i>Water Body Records Review Report</i> (Genivar, 2012) with respect to lakes. The site investigation confirmed that there are no lakes within 120 m of the Project Location.
Is the Project Location within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity?	No	There are no corrections required to the <i>Water Body Records Review Report</i> (Genivar, 2012) with respect to lake trout lakes. The presence/absence of lake trout lakes is the responsibility of the MNR and is not required for the site investigation.
Is the Project Location within 120 m of the average annual high water mark of a permanent or intermittent stream?	Yes	A permanent stream was confirmed as occurring within 120 m of the Project Location. The site investigation did not identify seasonally intermittent watercourses on and within 120 m of the Project Location.
Is the Project Location within 120 m of a seepage area?	No	There are no corrections required to the <i>Water Body Records Review Report</i> (Genivar, 2012) with respect to seepage areas. The site investigation confirmed that there are no seepage areas within 120 m of the Project Location.

As a permanent stream was identified on and within 120 m of the Westbrook Project Location a *Water Body Environmental Impact Study Report* is required to address potential negative environmental effects.

6. References

- Ecological Services, 2012a. SunE Bruining Solar Energy Project Natural Heritage Assessment Site Investigation Report. SunEdison Canada.
- Ecological Services, 2011b. SunE Bruining Solar Energy Project Natural Heritage Assessment Environmental Impact Study Report. SunEdison Canada.
- Government of Ontario. 2009. Ontario Regulation 359/09 made under the Environmental Protection Act, Renewable Energy Approvals under Part V.0.1 of the Act. September 8, 2009 version. Printed in *The Ontario Gazette*: October 10, 2009. Available on-line at: http://www.elaws.gov.on.ca/html/source/regs/english/2009/elaws_src_regs_r09359_e.htm. Accessed September 15, 2010.
- Government of Ontario. 2010. Ontario Regulation 521/10 made under the Environmental Protection Act, Renewable Energy Approvals under Part V.0.1 of the Act. December 15, 2010 version. Printed in *The Ontario Gazette*: January 8, 2011. Available on-line at: http://www.elaws.gov.on.ca/html/source/regs/english/2010/elaws_src_regs_r10521_e.htm. Accessed January, 2011.
- Genivar. 2012. SunE Bruining Solar Energy Project Water Body Records Review Report. SunEdison Canada.

Appendix 1. Site Investigation field notes and additional photo records

Location _____ Date _____
Project / Client _____

Location KRUVING SIDE Date OCT 2
Project / Client SUNFORSUN

04:00:10:20 clear. DC light w. wind

FROM ANDERSON RD
→ patchy wetland & scrub field.
→ 25-40 yr. Ag / Ems Ab, Am.
→ active cutting under way, log trails
→ ~30-40% cover some grasses
→ g. dogwood, buckthorn, Ro. Dogw.
- AMR, BLJA. Shrub at RWAS (30)
WFCe) CSWa AMPs. NOFI RWa (4)
→ soils deep brown, dry. abundant
Sedges & grasses throughout

* tree cover > 50 yr. removed by
landowner in previous years.

→ low lying patch of Salix pet. &
Tupelo ang. → no standing water.
PO Dogw. Juncus & Scirpus.
Represents south edge of extensive
Sedge/willow wetlands.

* Encountered seasonal grass sward
at edge of wetland including sedge
& no water. → ends in small grove
of Ab (20 yr.)

some poorly drained patches of Abch
south of wetland but mostly
fresh-mid upland communities.
- some ~~seasonal~~ seasonal sponges, OL
Mud acc.
→ Farm field to west: Southern ^{no}
→ Tall ingrowth fern → not spon. marsh.
→ wild grass throughout
→ spruce at road & cedar patches small Phal
→ sedge leading back 30 m onto prop. but
not drained channel (no curved at road)
- only drained channel near farm
marked with sign → some water just
nearby narrow swale (2 m x 0.5 m)
Summary: mostly successional
wetland features.
- NO obvious water features.
- some local poor drained areas
of Ab/Ag
→ disturbance → cutting at east
edge timber.
→ old field patches throughout but
small & interspersed with young
regions

Cleared drain north of Project Location



Stream overflow and clearing northeast of Project Location



Grass swale and ATV tracks within Project Location

