

**Natural Heritage Assessment
Evaluation of Significance
Report**

**SunEdison Bruining
Solar Energy Project**

FIT Contract Number: FIT-FH7CNFM

prepared for

Genivar and SunEdison



ECOLOGICAL SERVICES

Report Author Signature

Dale Kuster

Date

June 13, 2012

Table of Contents

Contents

List of Appendices	ii
1 Introduction.....	1
1.1 Project Description.....	1
1.2 Renewable Energy Approval Legislative Requirements	1
1.3 Natural Heritage Assessment Evaluation of Significance Report.....	1
2 Evaluation of candidate significant natural features	2
2.1 Significant Woodlands.....	2
2.2 Significant Wetlands.....	4
2.3 Candidate Significant Wildlife Habitat.....	7
2.3.1 Raptor Wintering Area.....	7
2.3.2 Amphibian Breeding Habitat (Woodland).....	9
2.3.3 Shrub/Early Successional Bird Breeding Habitat	12
3 Summary of Evaluation	16
4 Next Steps	17
5 Names and Qualifications of Persons Conducting the Evaluation of Significance	18
6 List of References	21

List of Tables and Figures

Table 2.1 Woodland evaluation of significance criteria for lower tier municipalities with woodland cover ranging from 31-60%	2
Table 2.2 Woodland evaluation of significance criteria results for Bruining woodland features.....	4
Figure 2.0. Recently cleaned drainage channel through lower Ingleside Swamp PSW north of Project Location (photo taken February 2012).....	5
Figure 2.1. Ingleside Swamp PSW and UCMBS PSW within 120 m setback areas of Project Location ...	6

Figure 2.2 Wintering raptor area found on and within 120 m of Project Location (*includes community types FOCM4-1 and FODM7 and thicket (THMM2). Survey transects and direction indicated by dashed line 8

Figure 2.3. Candidate amphibian breeding habitat (woodland and wetland) on and within 120 m of the Project Location 10

Table 2.1 Amphibian survey results from evening of April 12, 2012. 12

Figure 2.4. Candidate shrub/early successional bird breeding habitat occurring on and within 120 m of the Project Location. 14

List of Appendices

Appendix 1. Wildlife species observed at Bruining..... 22

Appendix 2. Breeding bird survey counts..... 23

Appendix 2. Breeding bird survey counts (cont`d...). 24

Appendix 3. Winter raptor survey (includes incidental bird species observations)..... 25

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 Location¹ 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*, made under the *Environmental Protection Act* identifies the Renewable Energy Approval (REA) requirements for renewable energy projects in Ontario. Ground-mounted solar facilities with a nameplate capacity greater than 10 kilowatts (kW) are classified as Class 3 solar facilities and require a REA in accordance with Section 4 of O. Reg. 359/09. Subsection 24 (1) of O. Reg. 359/09 requires proponents of Class 3 solar projects to undertake a natural heritage assessment consisting of a records review report, site investigation report and an evaluation of significance report for each natural feature identified during the natural heritage records review and site investigation. Natural features are defined in subsection 1 (1) of O. Reg. 359/09 to be all or part of:

- a) an earth science or life science area of natural and scientific interest (ANSI)
- b) a coastal wetland
- c) a northern wetland
- d) a southern wetland
- e) a valleyland
- f) a wildlife habitat
- g) a woodland.

The *Natural Heritage Assessment Records Review Report (NHARR)* (Genivar 2011) and *Natural Heritage Assessment Site Investigation Report (SI)* (Ecological Services, 2012) identified two provincially significant wetlands within 120m of the project location, candidate significant wildlife habitat on and within 120 m of the project location, and generalized candidate significant wildlife habitat within 120m of the project location.

1.3 Natural Heritage Assessment Evaluation of Significance Report

Section 27 of the REA Regulation requires proponents of Class 3 solar projects to prepare a *Natural Heritage Assessment Evaluation of Significance Report (EOS)* for natural features identified in the *NHARR (Genivar 2012)* and *SI* (Ecological Services, 2012) to determine whether the natural feature is provincially significant or significant. The EOS summarizes the evaluation criteria used to make the significance determination, and the name and qualifications of any person who applied to evaluation criteria or procedures.

This report has been prepared to meet these requirements. Maps showing the boundaries of significant natural features identified in this report have also been prepared. As mentioned in Section 1.2, there are

two provincially significant wetlands and candidate significant wildlife habitat on and within 120 m of the Project Location. Generalized candidate significant wildlife habitat has also been identified within 120m of the project location. An evaluation to determine the significance of these features is required.

2 Evaluation of candidate significant natural features

2.1 Significant Woodlands

Methods

Four woodlands (*W1, W2, W3 and W4*) identified during site investigation were evaluated for significance using criteria established in the Natural Heritage Assessment Guide (OMNR, 2011). These woodlands occur within the lower-tier municipality of Osnabruck (South Stormont) Township, Stormont County, Ontario and within Kemptville Ecodistrict 6E-12 which has approx. 37% woodland cover (Henson and Brodribb, 2005). One of the following criteria listed in Table 2.1 must be met for the woodland to be considered significant.

Table 2.1 Woodland evaluation of significance criteria for lower tier municipalities with woodland cover ranging from 31-60%.

Evaluation Criteria	Standards of Significance
Woodland Size Criteria	
Woodland Cover	<ul style="list-style-type: none"> - If woodlands account 31-60 % of the total land use, woodlands 50ha in size or greater are significant. - The largest woodland in the planning area (or sub-unit) should be considered significant.
Ecological Functions Criteria	
Woodland Interior	<ul style="list-style-type: none"> - Woodlands with 8ha interior habitat when woodland cover is 31-60% should be significant. - Interior habitat can be initially identified by any forested habitat no closer than 100m from any woodland edge.
Proximity to Other Woodlands	<ul style="list-style-type: none"> - Woodlands that may provide ecological benefit to other nearby (within 30m) significant natural features or fish habitat may be considered significant, providing they meet the area threshold according to the woodland cover for the lower-tier or single-tier municipality. <p>The area threshold for significance is 10ha</p>
Linkages	<ul style="list-style-type: none"> - Woodlands that provide linkage functions between other significant features within a specified distance (e.g., 120m) may be considered significant. <p>The area threshold for significance is 10ha</p>

<p>Water Protection</p>	<ul style="list-style-type: none"> - Woodlands may be significant if they are within a sensitive watershed, or in close proximity to other hydrological features, including sensitive headwaters, fish habitat, and groundwater discharge. <p>The area threshold for significance is 4ha</p>
<p>Woodland Diversity</p>	<ul style="list-style-type: none"> - A naturally occurring composition of native forest species that have shown significant decline south and east of the Canadian Shield may be significant. - If high native diversity throughout forested features is noted, a woodland may be significant. <p>The area threshold for significance is 10ha</p>
<p>Uncommon Characteristics Criteria</p>	
<p>Woodland Characteristics</p>	<ul style="list-style-type: none"> - A woodland may be significant if it contains a unique species composition. - A vegetation community with a provincial S-Rank of S1, S2, or S3 may be considered significant. - Woodlands containing habitat for a rare, uncommon, or restricted woodland plant species may be considered significant. - Native woodlands showing characteristics of old woodlands or those with large tree stems may be considered significant. <p>The area threshold for significance is 4ha</p>

Results

Table 2.2 Woodland evaluation of significance criteria results for Bruining woodland features.

<i>ID</i>	ELC Designation	Size (50 ha)	Interior (8 ha)	Proximity (10ha)	Linkages (10ha)	Water Protection (4ha)	Diversity (10ha)	Uncommon Characteristics (4ha)
W2 <i>(1.1ha)</i>	FOCM4-1 Fresh – Moist White Cedar	No	No	No	No	No	No	No
W3 <i>(6.4ha)</i>	FODM7 Fresh – Moist Lowland Deciduous	No	No	No	No	No	No	No
W4 <i>(2.2 ha)</i>	FODM7 Fresh – Moist Lowland Deciduous	No	No	No	No	No	No	No
W6 <i>(2.4 ha)</i>	FODM7 Fresh- Moist Lowland Deciduous	No	<i>No</i>	No	No	No	No	No

Conclusion: There are no significant woodlands located within the Project Location or within 120m of the project location. Therefore these features will not be carried forward to the Environmental Impact Study Report.

2.2 Significant Wetlands

Ingleside Swamp PSW

The site investigation determined that portions of the Ingleside Swamp Provincially Significant Wetland (totalling 10.2 ha) extend to within 15 m of the Project Location (Figures 2.0 and 2.1). Thicket swamp vegetation of speckled alder, red-osier dogwood and willow (*Salix petiolaris*, *S. bebbiana*, *S. discolor*) grades into green ash - white elm lowland forest, woodland and moist thicket communities remaining within the Project Location. Improved drainage of this local wetland has been undertaken by the landowner recently via cleaning of an existing drainage channel that flows west-east into a small creek

east of the Project Location (Figure 2.1). Knowledge of this activity was conveyed to OMNR Kemptville staff by Sun Edison.

Evaluation –The Ingleside Swamp PSW does not require an evaluation of significance because MNR has already determined this feature to be Provincially Significant Wetland. Therefore the status of this wetland has been adopted. This feature will be carried forward to the Environmental Impact Study Report to address potential negative environmental impacts.



Figure 2.0. Recently cleaned drainage channel through lower Ingleside Swamp PSW north of Project Location (photo taken February 2012).

Upper Canada Migratory Bird Sanctuary (UCMBS) PSW

The Site Investigation determined that a small (0.7 ha) portion of the UCMBS Provincially Significant Wetland is 100 m to the southeast of the Project Location, across County Rd 2, near a planned site access road. This portion of wetland consists of emergent cattail marsh with some tall shrub (willow) and reed canary grass components.

Evaluation – The Upper Canada Migratory Bird Sanctuary PSW does not require an evaluation of significance because MNR has already determined this feature to be Provincially Significant Wetland. Therefore the status of this wetland has been adopted. This feature will be carried forward to the Environmental Impact Study Report to address potential negative environmental impacts.

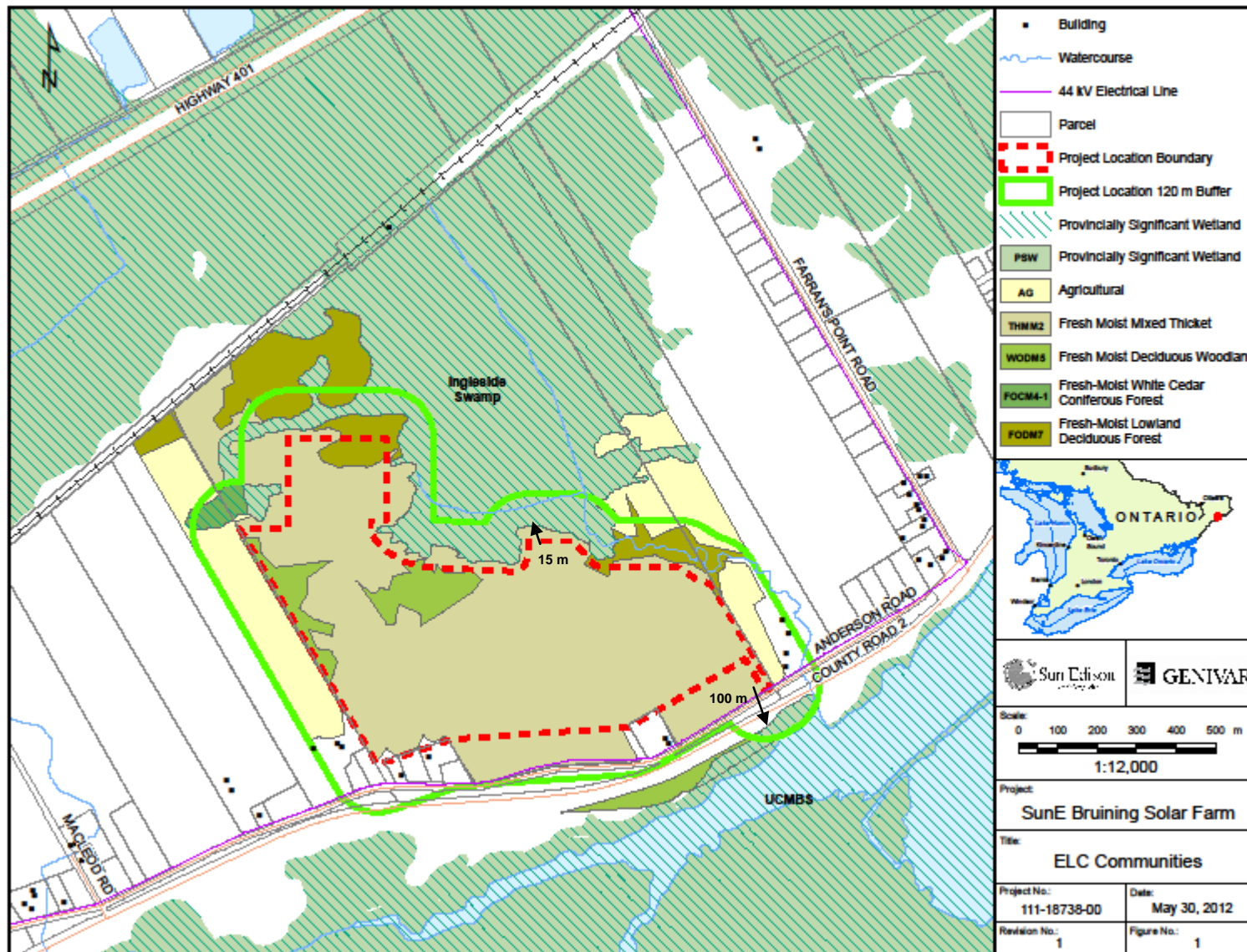


Figure 2.1. Ingleside Swamp PSW and UCMBS PSW within 120 m setback areas of Project Location.

2.3 Candidate Significant Wildlife Habitat

The Site Investigation identified several candidate significant wildlife habitat features associated with the Project Location and 120 m setback area. These include:

- ***Raptor Wintering Area Habitat - on and within 120 m of Project Location***
- ***Amphibian Breeding Habitat (woodland) - on and within 120 m of Project Location***
- ***Shrub/early Successional Bird Breeding Habitat - on and within 120 m of Project Location***

2.3.1 Raptor Wintering Area

There are >20 ha of contiguous habitat potentially supportive of wintering raptors that includes both woodland (FOD and FOM) and thicket (THMM2, *formerly designated as CUT*) communities both on and within 120 m of the Project Location

Evaluation Criteria

Raptor wintering area habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats. Raptor wintering sites need to be > 20 ha with a combination of forest and upland. Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands are preferred. Studies must confirm the use of these habitats by:

- One or more Short-eared Owls or;
- At least 10 individuals and two listed spp. (Rough-legged Hawk, Red-tailed Hawk, Northern Harrier, American Kestrel, Snowy Owl)
- A site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds.

Survey Methods

Winter raptor surveying consisted of walking east-west transects across the length of the Project Location and looking for flying or perched raptors with binoculars (see Figure 2.2). Transects were spaced approx. 250 m apart to reduce potential for repeat observation of the same individual. Open areas along Anderson Road and adjacent farm fields were also surveyed. Raptor sightings, nests and calls were recorded and GPS referenced as encountered. Weather conditions and timing (mid-day) were chosen to optimize viewing potential.

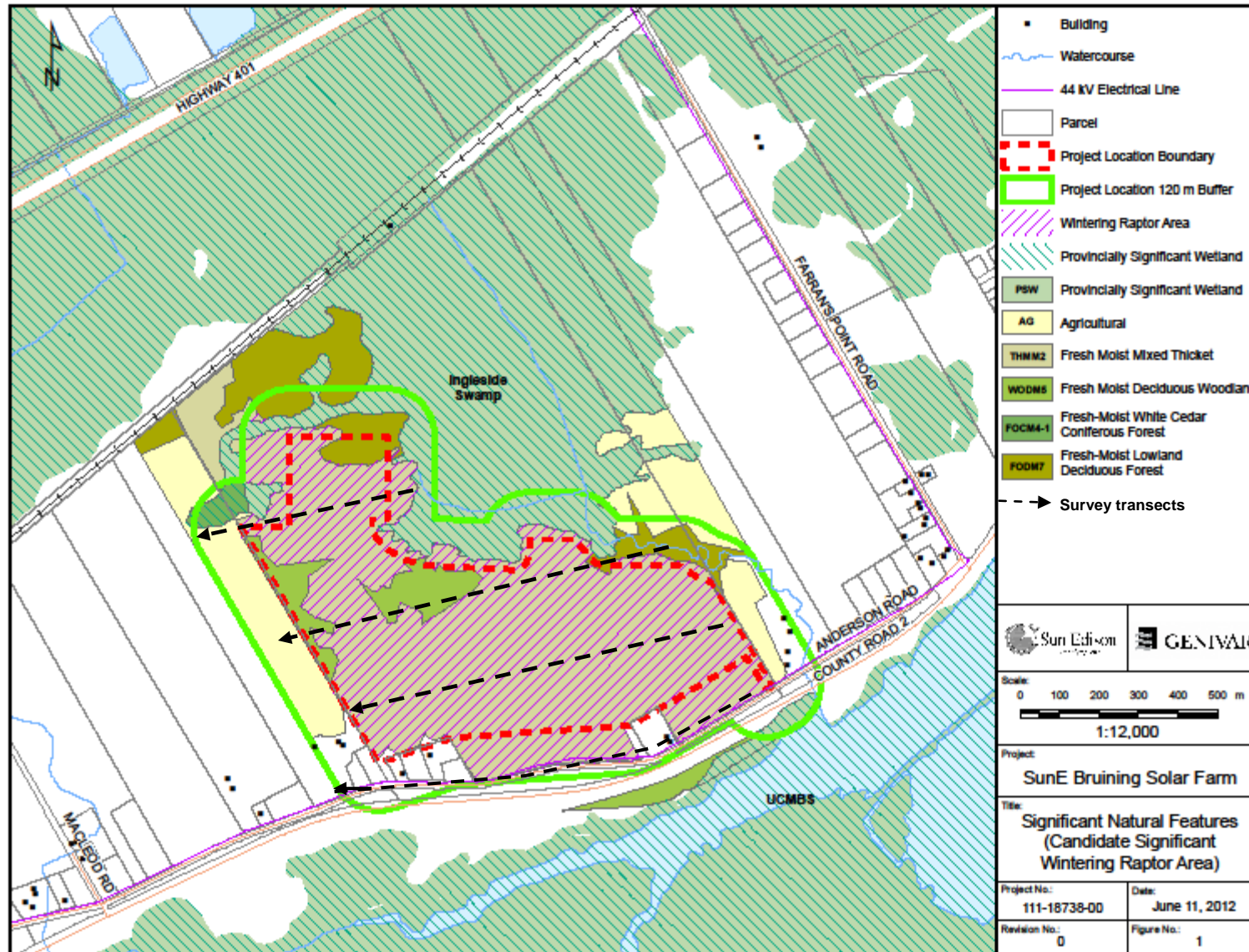


Figure 2.2 Wintering raptor area found on and within 120 m of Project Location (*includes community types FOCM4-1 and FODM7 and thicket (THMM2)).

Survey Dates

Date	Time	Weather Condition	Surveyor
January 22, 2012	12:00-14:30	Overcast, light west wind, -3°C	Chris Grooms
February 4, 2012	12:00-14:00	Clear, no wind, -4°C	Chris Grooms

Survey Results

No raptors were encountered during winter raptor surveys in January and February, 2012 (Appendix 3). Most of the lands within 120 m of the Project Location consist of recently logged young woodlands that lack mature mixed or coniferous woodlands that would provide suitable roosting sites for most raptor species. The site does not support high numbers of small mammals as the open successional lands have been recently created through logging of lowland deciduous forest.

Evaluation – The lands on and within 120 m of the Project Location are not considered significant wildlife habitat for wintering raptors and will not be carried forward to the Environmental Impact Study Report.

2.3.2 Amphibian Breeding Habitat (Woodland)

Remnant woodland, wetland thicket and wooded drainage swales with the potential to support woodland amphibian breeding occur both on and within 120 m of the Project Location adjacent to the Ingleside Swamp PSW (Figure 2.3). This site has experienced considerable disturbance via recent logging and channelization of drainage routes, and remaining woodlands are young and small. There is no interior habitat present although there is some localized flooding along portions of drainage swales that lead south from the Ingleside PSW.

Evaluation Criteria

Amphibian breeding habitat (woodland) requires the presence of a wetland, lake, or pond within or adjacent (within 120m) to a woodland (no minimum size). Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat. Studies should confirm;

- Presence of breeding population of 1 or more of the listed species (Eastern Newt, Blue-spotted Salamander, Spotted Salamander, Gray Treefrog, Spring Peeper, Western Chorus Frog, Wood Frog) with at least 20 individuals (adults, juveniles, eggs/larval masses).
- An observational study to determine breeding/larval stages will be required during the spring (Apr-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland.
- The habitat is the woodland (ELC polygons) and wetland (ELC polygons) combined. A travel corridor connecting the woodland and wetland polygons is to be included within the habitat.

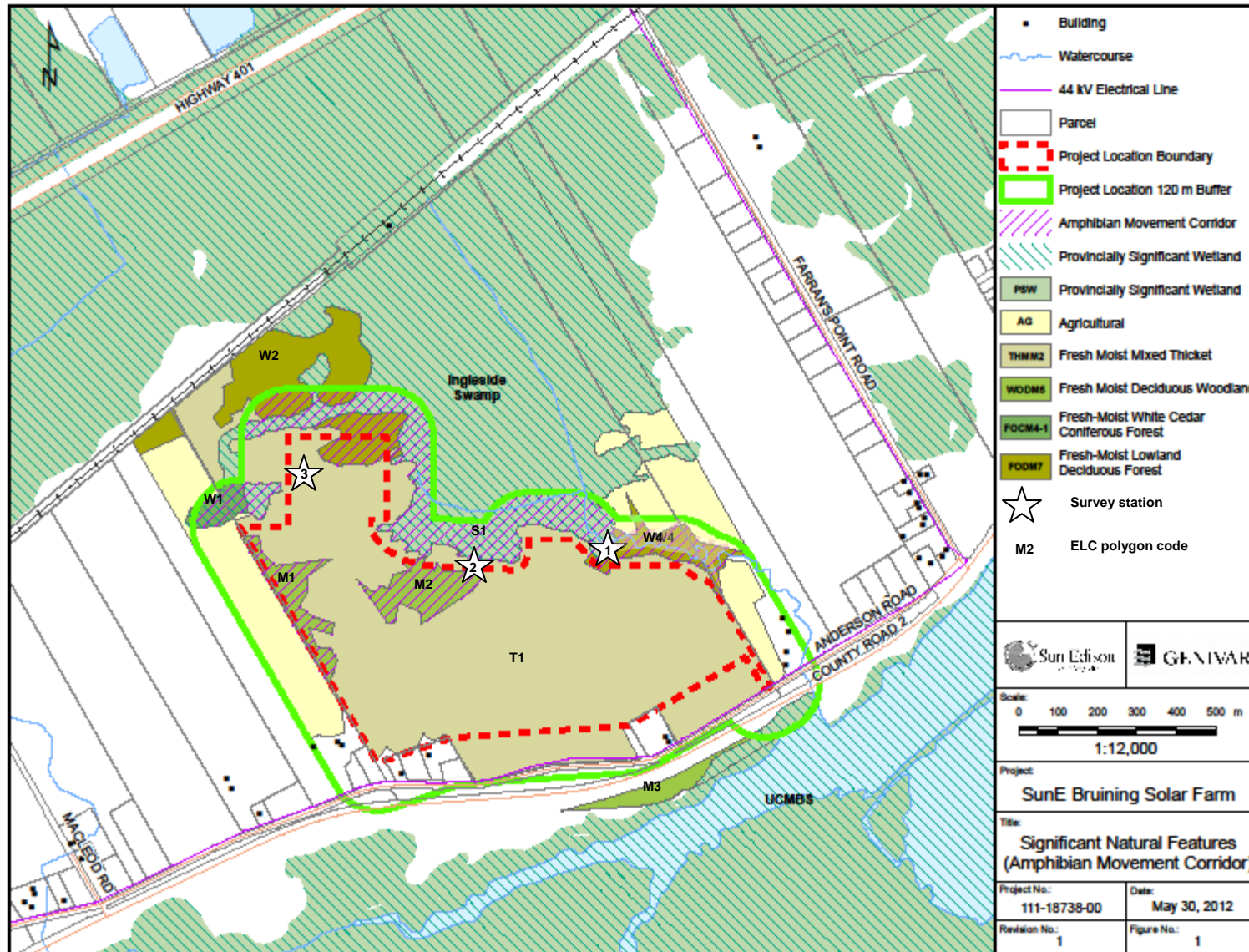


Figure 2.3. Candidate amphibian breeding habitat (woodland) on and within 120 m of the Project Location.

Survey Methods

In June 2011, amphibians were recorded if encountered (observed or heard) while conducting the first breeding bird survey from stations located across the Project Location and while travelling between stations. In 2012, focussed amphibian surveys were also conducted. These consisted of establishing survey stations within habitat polygons most likely to support breeding amphibians (e.g., wetland edge, lowland forest), and conducting surveys during the optimal breeding period for those species. The first survey took place in early spring (March) at mid-day in order to identify the presence of species that initiate breeding during this period (chorus frog, spring peeper). Remaining species were surveyed in mid-April in the evening as per standard marsh monitoring protocols. Due to the limited area of potential habitat, only 3 survey stations could be used as spacing had to be far enough apart to prevent duplicate counts (see Figure 2.3).

Surveying was for 3 minutes at each station as per standard marsh monitoring protocol. For the evening surveys, counts began one half-hour after sunset. Unlike marsh bird surveys, the amphibian survey protocol is entirely passive (i.e. call responses are not elicited through the use of a call broadcast tape/CD). Surveys recorded whether calls were heard outside the 100 meter radius or within this radius. Call level codes are assigned to all calling frog and toad species: Code 1: individual calls do not overlap and calling individuals can be discretely counted; Code 2: calls of individuals sometimes overlap, but numbers of individuals can still be estimated; Code 3: overlap among calls seems continuous (full chorus), and a count estimate is impossible.

No open water habitat was present so surveys for egg masses were not conducted.

Salamander surveying involved turning over logs, rocks and other debris that may provide hiding spots *if present* within woodland habitats.

Survey Dates

Date	Time	Weather Condition	Surveyor
June 27, 2011	05:20 -10:12	Light fog, sun/cloud, 19°C,	Chris Grooms
March 24, 2012	11:40-12:40	Overcast, light breeze, 5°C	Chris Grooms
April 12,2012	20:00 – 21:00	Clear, no breeze, 10°C	Chris Grooms

Survey Results

No salamanders or their habitat were encountered as remnant woodlands are young, disturbed by logging and devoid of downed woody debris, snags or logs that would provide shelter.

No amphibians were encountered during the initial survey in June 2011. In 2012, during the early spring survey in March, a single spring peeper was heard calling from a drainage swale within open woodland (Figure 2.3 ELC polygon code M2). For April 2012 (see Table 2.1) spring peepers were encountered at Survey Station #2 in sufficient numbers to meet or surpass the REA criteria for significance (20

individuals), although gray treefrogs likely occur in comparable numbers given their similar habitat preference (gray treefrogs typically begin calling after mid-April). Survey Station #2 is located near ELC habitat polygon M2. This woodland is a 2.6 ha patch of fresh-moist deciduous woodland through which a seasonal drainage swale occurs that flows southward from the Ingleside Swamp PSW. Accordingly, this feature provides breeding habitat for woodland frogs and likely provides for localized movement between woodland and wetland areas. None of the other survey stations had species numbers approaching significance.

Evaluation – Woodland amphibian breeding habitat represented by ELC polygon codes M2 and SI located on and within 120 m of the Project Location is considered significant wildlife habitat for amphibian breeding (woodland). This feature will be carried forward to the Natural Heritage Assessment Environmental Impact Study Report.

Station	Species	Station location		Comment
1		44 59' 17.7"N, 75 01'06.1"W		
		<100m	>100m	
	Spring peeper	0	Code 3	Peepers to west
2		44 59' 17.0"N, 75 01'17.2"W		
		<100m	>100m	
	Spring peeper	Code 3	Code 1	Concentrations of peepers 20m to south of station and cedar grove.
3		44 59' 21.6"N, 75 01' 30.8W		
		<100m	>100m	
	Spring peeper	0	Code 3	Still hear peepers from station 2. Code 3 peepers also >>100 to west off site.

Table 2.1 Amphibian survey results from evening of April 12, 2012.

2.3.3 Shrub/Early Successional Bird Breeding Habitat

Due to recent logging activity, former woodlands across the Project Location have been thinned or removed which has allowed thicket and herbaceous species to dominate the site. Presently, a contiguous 60 ha of fresh-moist mixed thicket community (ELC polygon code T1) occurs on and within 120 m of the Project Location (see Figure 2.4). This community includes young ash, birch and elm and shrubs such as European buckthorn, red osier and gray dogwood. The ground cover is dense and includes grasses, sedges, herbaceous perennials (e.g., goldenrod), and thorny shrubs such as black raspberry.

Evaluation Criteria

Shrub/early successional bird breeding habitat is found within large field areas succeeding to shrub and thicket habitats >10ha in size. Shrub land or early successional fields must not be class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years). Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of species.

Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. Field studies should confirm:

- Presence of nesting or breeding of 1 of the indicator species (Brown Thrasher, Clay-coloured Sparrow), and at least 2 of the common species (Field Sparrow, Black-billed Cuckoo, Eastern Towhee, Willow Flycatcher)
- A field with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat.
- The area of the SWH is the contiguous ELC ecosite field/thicket area.

Survey Methods

Ten point count stations were established across the Project Location and adjacent subject property at a minimum of 200 m apart to reduce the incidence of duplicate observations (see Figure 2.4). Surveys followed standardized methods as described in the Ontario Breeding Bird Atlas Guide for Participants (Cadman and Kopysh 2001) for field and open land habitats and the Canadian Wildlife Service Forest Bird Monitoring Program for woodlands. Accordingly, for open habitat stations, surveys lasted 5 minutes, while for forest habitats surveys lasted 10 minutes. Birds were identified to species by song or call or by direct visual identification (binocular). The number of individuals occurring within 100 m of the survey station was distinguished from those occurring beyond 100 m. Surveying began under optimal weather conditions at or around dawn and continued until mid-morning. Surveys were conducted within the peak breeding season (May-June) for most bird species expected to be using the habitats found in and within 120 m of the Project location.

Survey Dates

Date	Time	Weather Condition	Surveyor
June 27, 2011	05:20 -10:12	Light fog, sun/cloud, 19°C,	Chris Grooms
June 2012	2 surveys pending		Chris Grooms

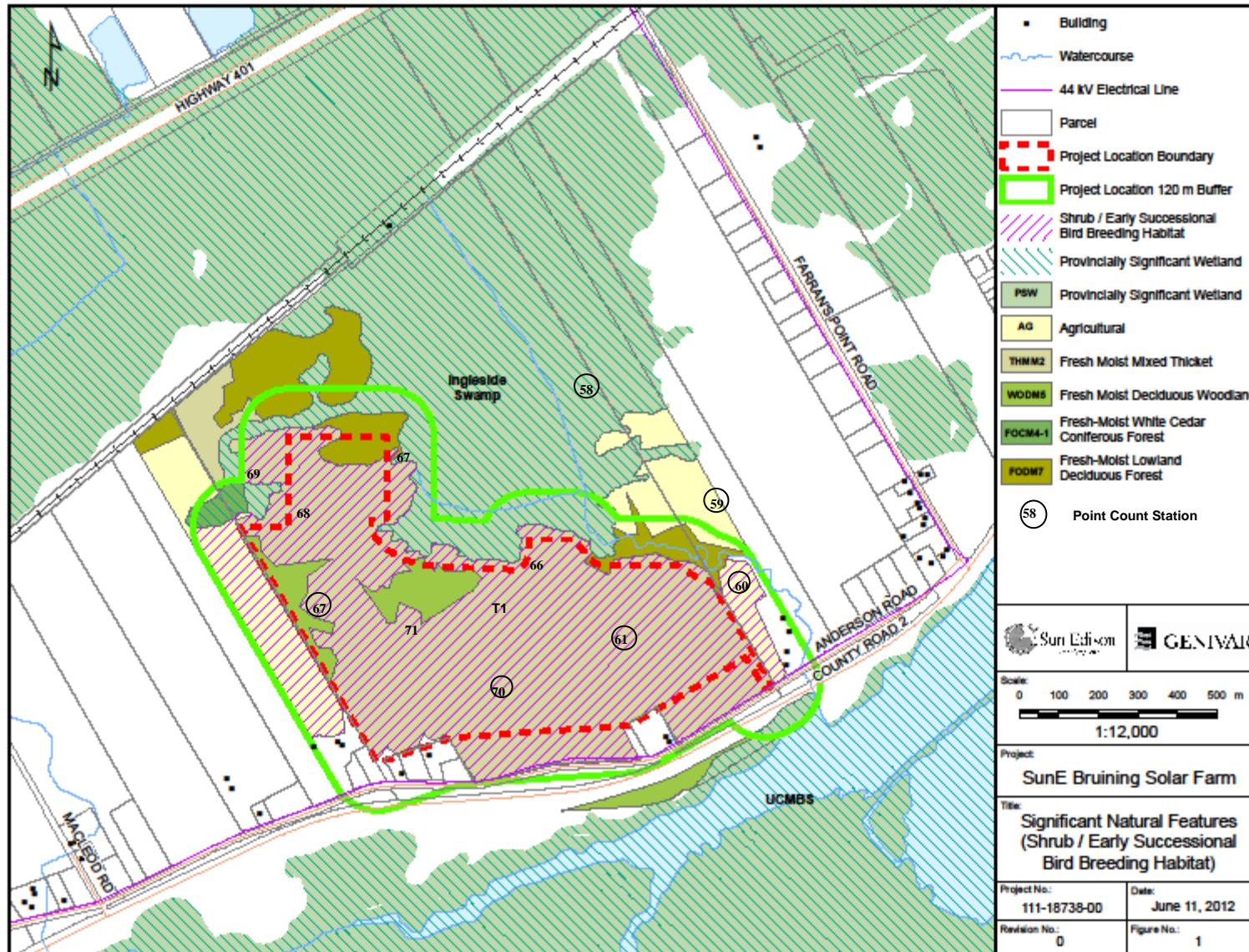


Figure 2.4. Shrub/early successional bird breeding habitat occurring on and within 120 m of the Project Location.

Survey Results

During the breeding bird survey in June of 2011, one common shrub/early successional habitat species was encountered - Willow Flycatcher (N=7). No shrub/early successional indicator species (e.g., Brown Thrasher, Clay-coloured Sparrow) or species of conservation concern (e.g., Golden-winged Warbler) were observed (Appendix 4).

Evaluation – *A greater diversity of shrubland species may not be supported by this habitat feature as it has been recently converted from young woodland and experiences continuing disturbance from logging activities. However, as two additional breeding bird surveys are to be completed in June 2012, the significance of the shrub/early successional bird breeding habitat cannot yet be determined. Accordingly, the identified habitat area on and within 120 m of the Project Location will be treated as significant and carried forward to the Environmental Impact Study Report as Significant Wildlife Habitat. SunEdison commits to undertake the additional surveys prior to construction.*

3 Summary of Evaluation

Based on the findings in this report, the following natural features have been evaluated as significant:

Significant Wetlands – A 5.3 ha portion of the Ingleside Swamp PSW is located within 120 m of the Project Location. A 0.7 ha portion of the Upper Canada Migratory Bird Sanctuary PSW is also located within 120m of the Project Location to the south across Hwy 2.

Significant Wildlife Habitat – Significant wildlife habitat is found on the Project Location.

- ***Amphibian breeding habitat (woodland)***: a 2.6 ha area of open woodland identified as W2 in combination with wetland S1 occurs on and within 120 m of the Project Location and has been identified as supporting spring peepers in sufficient numbers to meet habitat significance criteria.
- ***Shrub/early Successional Bird Breeding Habitat***: a contiguous 47 ha fresh-moist mixed thicket community (ELC polygon code T1) on and within 120 m of the Project Location was identified and will be treated as significant for shrub/early successional bird breeding.

These natural features will be carried forward to the Environmental Impact Study Report to assess the potential negative environmental effects on these features resulting from solar project development and operation.

4 Next Steps

A *Natural Heritage Assessment Environmental Impact Study Report* conducted according to the requirements of Subsection 38 (2) of O. Reg. 359/09 will be required in order to assess the potential effects, and recommend mitigation and monitoring requirements for the construction, operating and decommissioning of Project components within 120 m of identified significant natural features.

Date of Beginning and Completion of Evaluation

Start: June 27, 2011

Completion: June 13, 2012.

5 Names and Qualifications of Persons Conducting the Evaluation of Significance

The EOS assessment and report were completed by:

Dale Kristensen: Consultant, Ecological Services

3803 Sydenham Rd. Elginburg, Ontario K0H 1M0

Tel: (613) 376-6916; Fax: (613) 544-0072 E-mail: ecoserv@kos.net

Web Site: <http://ecologicalservices.webs.com/>

Ecological Services is a locally owned firm, specializing in the provision of services relating to ecological management and research. We have been in operation in eastern Ontario since 1985. Our core personnel combine education and experience to give us a strong focus on land use planning and management as they relate to natural resources. Our experience includes environmental impact assessments, management plans, wetland evaluations, and municipal land use planning. We have research experience in aquatic ecology, aquatic chemistry, forest fragmentation, avian ecology, and fisheries ecology.

We have worked with government at the federal, provincial, local and international levels. Other clients have included Crown corporations, planning and engineering firms, developers, and local groups. Our association with Queen's University provides us access to current research, and provides us with a pool of expert associates. A work prospectus is available at our website at <http://ecologicalservices.webs.com>.

Natural feature surveys of lands within 120 m of the Project location, and the subsequent preparation of the *SI* was done by Dale Kristensen. Chris Grooms conducted breeding bird, frog and marsh monitoring surveys. CV information for each is provided below:

CURRICULUM VITAE OF DALE KRISTENSEN

Environmental Consultant
Bedford Rd.
Sydenham, Ontario
KOH 2T0
(613) 376-6561 (613) 533-6151

Phytotron Manager/Adjunct Academic 5607
Department of Biology
Queen's University
Kingston, Ontario K7L 3N6
drk1@queensu.ca

Employment

1988 - present: Environmental Consultant with Ecological Services

- Specializing in floral and faunal resource inventories, wetland evaluations, environmental impact assessments, habitat analyses, and habitat restoration.

1996 - present. Phytotron Manager (Plant Research Facility). Dept. of Biology, Queen's University.

- Manager of a controlled environment facility for plant and other research

2008 – present: Curator Queen's University Fowler Herbarium

1987- 2009: Adjunct Academic. Department of Biology at Queen's University.

Development and instruction of various courses at Queen's University, including:

- | | |
|--|---|
| - Wildlife Issues in a Changing World (ENSC 320) | - Restoration Ecology (BIOL 522) |
| - Biology of Sex (BIOL 210) | - Field Botany (BIOL 320) |
| - Field ecology module at Lake Opinicon (BIOL 344) | - International graduate-level course on biodiversity |

Education

M.Sc., 1996 (Ecology) Queen's University. Kingston, Ontario.

B.Sc., 1981 (Wildlife Biology), University of Guelph. Guelph, Ontario.

Affiliations

Ecological Restoration Society, North American Wildflower Society, Land Conservancy for Kingston, Frontenac, Lennox & Addington, Kingston Field Naturalists, COSEWIC Species Recovery Team – Deerberry (*Vaccinium stamineum*) and Cerulean Warbler (*Dendroica caerulea*) habitat modelling.
Certified Butternut Health Assessor

CURRICULUM VITAE OF CHRIS GROOMS

Environmental Consultant
4388 Florida Rd.
Harrowsmith, Ontario K0H 1V0
(613) 386-7969
cgrooms@kingston.net

Department of Biology
Queen's University
Kingston, Ontario K7L 3N6
(613) 533-6151
groomsc@queensu.ca

Employment

2006 - present: Research Assistant. Paleocological Environmental Assessment and Research Laboratory, Queen's University.

- fieldwork and lab management

2003- 2005: Coordinator, Eastern Region. Ontario Nature – Federation of Ontario Naturalists.

- liaison with member groups and other conservation organizations to promote conservation, land stewardship and nature education

1992- 2003. Habitat Stewardship and Ornithological Experience. Contracts with the Canadian Wildlife Service, Ontario Ministry of Natural Resources (MNR), Wildlife Preservation Trust Canada, and Bird Studies Canada.

- endangered loggerhead shrike recovery - population surveys, landowner contact; monitored nests, oversaw colour banding, mapped habitat, selected future reintroduction sites; supervised first experimental reintroduction of captive-bred shrikes to the wild.

Ontario Power Generation: inventory of the fauna of the Lennox Generation Station property.

Nature Conservancy Canada: inventory of breeding birds and amphibians at Burnley Carmel Nature Reserve near Rice Lake, Ontario.

Acres & Associated Environmental Limited: bird usage inventory of proposed wind farm sites on Wolfe Island, Ontario, and a bird inventory for a proposed wind site on Amherst Island, Ontario.

Lower Trent Region Conservation Authority: documented nesting sites of Red-Shouldered Hawks in five townships in eastern Ontario for the MNR over three years.

Education

B.Sc., 1998 (Biology), Queen's University. Kingston, Ontario.

Affiliations

Former President, Kingston Field Naturalists

6 List of References

- Ecological Services. 2012. SunEdison Bruining, Natural Heritage Assessment. Site Investigation. SunEdison and Genivar.
- Gleason, Henry A. and Arthur Cronquist. 1991. Manual of the Vascular Plants of Northeastern United States and Adjacent Canada, Second Edition. D. Van Nostrand, N.Y
- Genivar. 2012. Bruining Natural Heritage Assessment Natural Heritage Records Review Report. SunEdison.
- Henson, B.L. and K.E. Brodribb 2005. *Great Lakes Conservation Blueprint for Terrestrial Biodiversity, Volume 2: Ecodistrict Summaries*. Nature Conservancy of Canada.
- Huizer, R. and T. Lehman. 2005. Southern OWES re-evaluation of Ingleside Swamp. OMNR Kemptville.
- Lee, H., W. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. Ecological Land Classification for Southern Ontario. Natural Heritage Information Centre, OMNR Peterborough.
- NAVTEQ 2010. Satellite imagery. Available at www.bing.com/maps
- Ontario Ministry of Natural Resources. 2012. DRAFT Significant Wildlife Habitat EcoRegion 6E Criterion Schedule.
- Ontario Ministry of Natural Resources. 2009. Approval and Permitting Requirements Document for Renewable Energy Projects
- Ontario Ministry of Natural Resources. 2011. Natural Heritage Assessment Guide for Renewable Energy Projects.
- Szuba, K., and B. Naylor (1998). Forest raptors and their nests in Central Ontario. OMNR Southcentral Sciences Section Field Guide FG-03

Appendix 1. Wildlife species observed at Bruining.

Species	name	Common Name	Rank	Family
<i>Agelaius</i>	<i>phoeniceus</i>	Red-winged Blackbird	S5B	ICTERIDAE
<i>Bombycilla</i>	<i>cedrorum</i>	Cedar Waxwing	S5B	BOMBYCILLIDAE
<i>Bonasa</i>	<i>umbellus</i>	Ruffed Grouse	S5B	PHASIANIDAE
<i>Cardinalis</i>	<i>cardinalis</i>	Northern Cardinal	S5B	CARDINALIDAE
<i>Catharus</i>	<i>fuscescens</i>	Veery	S5B	TURDIDAE
<i>Charadrius</i>	<i>vociferus</i>	Killdeer	S5B	CHARADRIIDAE
<i>Coccyzus</i>	<i>erythrophthalmus</i>	Black-billed Cuckoo	S4B	CUCULIDAE
<i>Colaptes</i>	<i>auratus</i>	Northern Flicker	S5B	PICIDAE
<i>Corvus</i>	<i>brachyrhynchos</i>	American Crow	S5B	CORVIDAE
<i>Cyanocitta</i>	<i>cristata</i>	Blue Jay	S5B	CORVIDAE
<i>Dendroica</i>	<i>petechia</i>	Yellow Warbler	S5B	PARULIDAE
<i>Dumetella</i>	<i>carolinensis</i>	Gray Catbird	S5B	MIMIDAE
<i>Empidonax</i>	<i>traillii</i>	Willow Flycatcher	S5B	TYRANNIDAE
<i>Geothlypis</i>	<i>trichas</i>	Common Yellowthroat	S5B	PARULIDAE
<i>Icterus</i>	<i>galbula</i>	Baltimore Oriole	S5B	ICTERIDAE
<i>Larus</i>	<i>delawarensis</i>	Ring-billed Gull	S5B	LARIDAE
<i>Meleagris</i>	<i>gallopavo</i>	Wild Turkey	S4B	PHASIANIDAE
<i>Melospiza</i>	<i>georgiana</i>	Swamp Sparrow	S5B	EMBERIZIDAE
<i>Melospiza</i>	<i>melodia</i>	Song Sparrow	S5B	EMBERIZIDAE
<i>Molothrus</i>	<i>ater</i>	Brown-headed Cowbird	S5B	ICTERIDAE
<i>Myiarchus</i>	<i>crinitus</i>	Great Crested Flycatcher	S5B	TYRANNIDAE
<i>Passerculus</i>	<i>sandwichensis</i>	Savannah Sparrow	S5B	EMBERIZIDAE
<i>Pheucticus</i>	<i>ludovicianus</i>	Rose-breasted Grosbeak	S5B	FRINGILLIDAE
<i>Picoides</i>	<i>pubescens</i>	Downy Woodpecker	S5B	PICIDAE
<i>Poecile</i>	<i>atricapillus</i>	Black-capped Chickadee	S5B	PARIDAE
<i>Quiscalus</i>	<i>quiscula</i>	Common Grackle	S5B	ICTERIDAE
<i>Sitta</i>	<i>carolinensis</i>	White-breasted Nuthatch	S5B	SITIDAE
<i>Sphyrapicus</i>	<i>varius</i>	Yellow-bellied Sapsucker	S5B	PICIDAE
<i>Spinus</i>	<i>tristis</i>	American Goldfinch	S5B	FRINGILLIDAE
<i>Spizella</i>	<i>passerina</i>	Chipping Sparrow	S5B	EMBERIZIDAE
<i>Sturnus</i>	<i>vulgaris</i>	European Starling	SNA	STURNIDAE
<i>Troglodytes</i>	<i>aedon</i>	House Wren	S5B	TROGLODYTIDAE
<i>Turdus</i>	<i>migratorius</i>	American Robin	S5B	TURDIDAE
<i>Tyrannus</i>	<i>tyrannus</i>	Eastern Kingbird	S5B	TYRANNIDAE
<i>Vireo</i>	<i>gilvus</i>	Warbling Vireo	S5B	VIREONIDAE
<i>Vireo</i>	<i>olivaceus</i>	Red-eyed Vireo	S5B	VIREONIDAE
<i>Zenaida</i>	<i>macroura</i>	Mourning Dove	S5B	COLUMBIDAE
<i>Zonotrichia</i>	<i>albicollis</i>	White-throated Sparrow	S5B	EMBERIZIDAE
<i>Canis</i>	<i>latrans</i>	Coyote	S5	CANIDAE
<i>Microtus</i>	<i>pennsylvanicus</i>	Meadow Vole	S5	MURIDAE
<i>Odocoileus</i>	<i>virginianus</i>	White-tailed Deer	S5	CERVIDAE
<i>Peromyscus</i>	<i>maniculatus</i>	Deer Mouse	S5	MURIDAE
<i>Sylvilagus</i>	<i>floridanus</i>	Eastern Cottontail	S5	LEPORIDAE
<i>Sciurus</i>	<i>carolinensis</i>	Gray Squirrel	S5	SCIURIDAE
<i>Tamias</i>	<i>striatus</i>	Eastern Chipmunk	S5	SCIURIDAE
<i>Vulpes</i>	<i>vulpes</i>	Red Fox	S5	CANIDAE

Appendix 2. Breeding bird survey counts.

Date: June 27, 2011

Time: 05:20- 10:12

Weather: Light fog, sun/cloud, 19-22C

Genus	Species	Common Name	Station 58		Station 59		Station 60		Station 61		Station 66	
			<100m	>100m	<100m	<100m	<100m	>100m	<100m	>100m	<100m	<100m
<i>Charadrius</i>	<i>vociferus</i>	Killdeer							1			
<i>Zenaida</i>	<i>macroura</i>	Mourning Dove								1		
<i>Colaptes</i>	<i>auratus</i>	Northern Flicker			1							
<i>Empidonax</i>	<i>traillii</i>	Willow Flycatcher	1						1			
<i>Tyrannus</i>	<i>tyrannus</i>	Eastern Kingbird									1	
<i>Vireo</i>	<i>olivaceus</i>	Red-eyed Vireo					1					
<i>Corvus</i>	<i>brachyrhynchos</i>	American Crow								1		1
<i>Catharus</i>	<i>fuscescens</i>	Veery		1								1
<i>Turdus</i>	<i>migratorius</i>	American Robin		3			2	1	1	3	1	3
<i>Bombycilla</i>	<i>cedrorum</i>	Cedar Waxwing	2								3	
<i>Dendroica</i>	<i>petechia</i>	Yellow Warbler							1			
<i>Geothlypis</i>	<i>trichas</i>	Common Yellowthroat	3	2		3			3	2	2	3
<i>Spizella</i>	<i>passerina</i>	Chipping Sparrow								1		
<i>Melospiza</i>	<i>melodia</i>	Song Sparrow	3		8	5	5		3	4	5	1
<i>Melospiza</i>	<i>georgiana</i>	Swamp Sparrow	1									
<i>Agelaius</i>	<i>phoeniceus</i>	Red-winged Blackbird	1	4		1		1				

Appendix 2. Breeding bird survey counts (cont`d...)

Genus	Species	Common Name	Station 67		Station 68		Station 69		Station 70		Station 71	
			<100m	>100m	<100m	>100m	<100m	>100m	<100m	>100m	<100m	>100m
<i>Sphyrapicus</i>	<i>varius</i>	Yellow-bellied Sapsucker			1			1				
<i>Empidonax</i>	<i>traillii</i>	Willow Flycatcher									2	
<i>Myiarchus</i>	<i>crinitus</i>	Great Crested Flycatcher		1				1				
<i>Vireo</i>	<i>gilvus</i>	Warbling Vireo							1			
<i>Vireo</i>	<i>olivaceus</i>	Red-eyed Vireo									1	
<i>Cyanocitta</i>	<i>cristata</i>	Blue Jay		1		2						
<i>Corvus</i>	<i>brachyrhynchus</i>	American Crow								2	1	2
<i>Poecile</i>	<i>atricapillus</i>	Black-capped Chickadee									3	
<i>Catharus</i>	<i>fuscescens</i>	Veery		1								
<i>Turdus</i>	<i>migratorius</i>	American Robin		1		1		1			1	
<i>Dumetella</i>	<i>carolinensis</i>	Gray Catbird							1		2	
<i>Sturnus</i>	<i>vulgaris</i>	European Starling							2		1	
<i>Bombycilla</i>	<i>cedrorum</i>	Cedar Waxwing			2				2		1	
<i>Dendroica</i>	<i>petechia</i>	Yellow Warbler									1	1
<i>Geothlypis</i>	<i>trichas</i>	Common Yellowthroat	2	1	2	1	1	1	1		1	
<i>Spizella</i>	<i>passerina</i>	Chipping Sparrow	1	1								
<i>Melospiza</i>	<i>melodia</i>	Song Sparrow	4		5		1	2	2	3	1	
<i>Zonotrichia</i>	<i>albicollis</i>	White-throated Sparrow						1				
<i>Cardinalis</i>	<i>cardinalis</i>	Northern Cardinal							1			
<i>Pheucticus</i>	<i>ludovicianus</i>	Rose-breasted Grosbeak						1				
<i>Agelaius</i>	<i>phoeniceus</i>	Red-winged Blackbird							3	1		
<i>Quiscalus</i>	<i>quiscula</i>	Common Grackle									3	
<i>Icterus</i>	<i>galbula</i>	Baltimore Oriole										
<i>Spinus</i>	<i>tristis</i>	American Goldfinch								2	2	

Appendix 3. Winter raptor survey (includes incidental bird species observations)

Date: February 4, 2012

Time: 12:00- 14:00

Weather: Clear, no wind, -4°C

Species name			Site name	Date
Ruffed Grouse	Bonasa	umbellus	Bruining	02/04/2012
Wild Turkey	Meleagris	gallopavo	Bruining	01/22/12
Wild Turkey	Meleagris	gallopavo	Bruining	02/04/2012
Downy Woodpecker	Picoides	pubescens	Bruining	02/04/2012
Blue Jay	Cyanocitta	cristata	Bruining	02/04/2012
American Crow	Corvus	brachyrhynchos	Bruining	02/04/2012
Black-capped Chickadee	Poecile	atricapillus	Bruining	01/22/12
Black-capped Chickadee	Poecile	atricapillus	Bruining	02/04/2012
American Robin	Turdus	migratorius	Bruining	01/22/12
American Robin	Turdus	migratorius	Bruining	02/04/2012
European Starling	Sturnus	vulgaris	Bruining	01/22/12
European Starling	Sturnus	vulgaris	Bruining	02/04/2012