

Water Body
Site Investigation Report

SunE Westbrook
Solar Energy Project

FIT Contract Number: FIT-FDNXGQE

prepared for
SunEdison

DRAFT



ECOLOGICAL SERVICES

Report Author Signature

Dale Kruse

Date

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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 SunE Westbrook Solar Energy Project. This project has received a 20-year Feed-in Tariff contract from the Ontario Power Authority (FIT Reference Number: FIT0FDNXGQE). The Project Location¹ is a 40 hectare (ha) parcel situated on Pt Lots 4 and 5, Concession 5 WD, within the City of Kingston (single tier municipality) County of Frontenac and within Madoc Ecodistrict 6E-9 (Figure 1.1). The longitude and latitude are 44.300458 and 76.632893.

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

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, 2011) 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,

¹ “Project Location means, 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 proposed to engage in the project” (O. Reg. 359/09, s. 1 (1)).

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, 2011) 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, 2011) 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, 2011) 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, 2011).

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, 2011) 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, 2011) 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

The following table (Table 2.1) provides a summary of the determinations made in the *Water Body Records Review Report* (Genivar, 2011) 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 were identified on or 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	No lakes were identified on or 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 single intermittent watercourse was identified 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, 2011) identified a single intermittent stream occurring on and 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, 2011), 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, 2011)
- 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, 2011) and determinations made as a result of conducting the site investigation.

3.1.1. Timing and Weather Conditions During the Site Investigations

- **Site Investigation 1** – The first site investigation was completed on April 6, 2011 from 07:45 to 10:30 hours for a total duration of approx. 3 hours. The weather conditions during the site investigation were overcast and a temperature of approximately -3°C. Wind strength was estimated as light to moderate.
- **Site Investigation 2** – The second site investigation was completed on June 1, 2011 from 09:10 to 12:15 hours for a total duration of 3 hours. The weather conditions during the site investigation were clear with a temperature of approximately 25°C. The wind strength was estimated as light.

3.1.2. Qualifications of Investigator

The site investigations were completed by Dale Kristensen, MSc. a terrestrial ecologist for Ecological Services since 1988. 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. Dale's 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.

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, 2011).

Following the desktop exercise, those features identified in the *Water Body Records Review Report* (Genivar, 2011) 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.

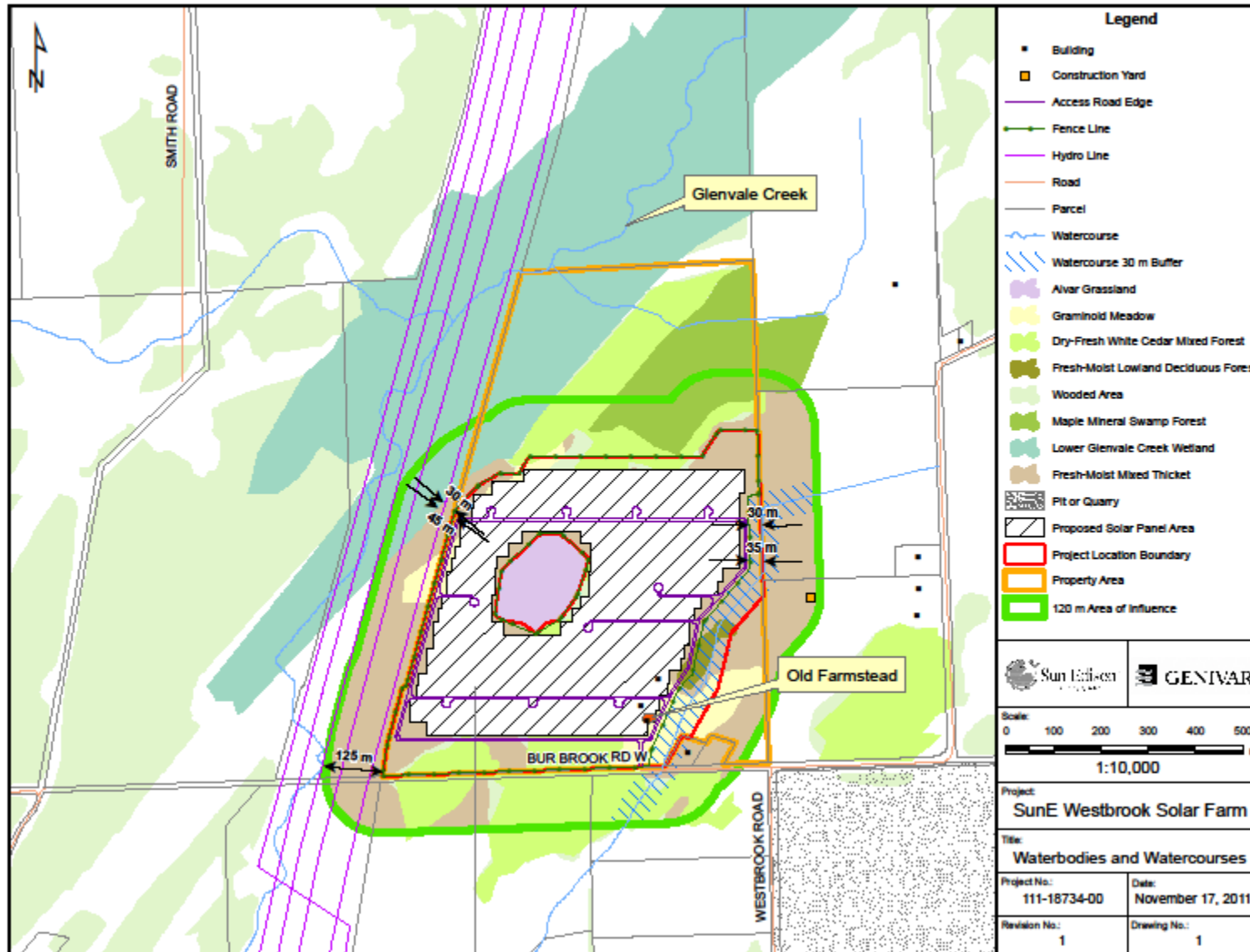
4.1. Site Description

The Project is located approx. 150 m east of Glenvale Creek, which is part of the Collin's Creek watershed. The Collin's Creek watershed covers 163 km² and lies within a flat to rolling region composed primarily of woodland, wetland and agricultural lands with a combination of suburban and rural residential development. Collins Creek flows 34 km southwest from its headwaters to empty into Lake Ontario via Collin's Bay.

The Project Location is situated north of Bur Brook Road and west of Westbrook Road in a rural area dominated by early-mid successional mixed woodlands and cultural thicket on abandoned agricultural lands. Local residential development is sparse, and the nearest settlement is Collin's Bay approx. 5 km to the south. An aggregate quarry occurs 200 m southeast of the Project Location.

The Project Location is flat with a slight decrease in elevation from the north to the southwest. Surface run-off is conveyed south via a seasonally intermittent watercourse that runs east and south of the Project Location or west via diffuse surficial drainage into Glenvale Creek approx. 150 m to the west. A large riparian wetland complex associated with Glenvale Creek lies to the west of the Project Location. This wetland consists mainly of marsh along with smaller open water, treed swamp and shrub swamp components. A second wetland feature (9 ha treed maple swamp) occurs north of the Project Location and is hydrologically connected to Glenvale Creek via a small seasonal creek. As discussed in the Natural Heritage Assessment Environmental Impact Study or *EIS* (Ecological Services, 2011b), the Project is not considered to have any impact on the features or functions associated with this wetland complex.

Figure 4.1 Project Location and water body features



4.2. Water Body Features

4.2.1. Permanent Streams

A permanent stream is considered a water body, and 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, 2011) did not identify any permanent streams on or within 120 m of the Project Location. This was confirmed during a site investigation completed on June 18, 2010. Most of the site is represented by upland thicket and young woodland (Figure 4.2).

4.2.2. Intermittent Streams

An intermittent stream is considered a water body, and 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, 2011) identified a single intermittent stream on and within 120 m of the Project Location to the southeast. This feature was confirmed and characterized during site investigations completed on April 6 and June 1, 2011 (Figures 4.3 and 4.4).

The stream is approximately 3 km in length and flows from a lowland forest to the northeast of the Project Location southwest to Glenvale Creek approximately 1.5 km to the south. Within 120 m of the Project Location, the creek channel is approximately 1-2 m in width and 20-30 cm deep at centre. Most of the creek is represented as a grass swale with no aquatic vegetation. There are sedges and rushes along portions of the creek, where soils are moist year-round. Flow was observed within the channel in mid spring, but was absent by June. The creek does not support fish or fish habitat; however, several amphibians (frogs) were noted within 30 m of the feature on April 6, 2011.

4.2.3. Lakes

The *Water Body Records Review Report* (Genivar, 2011) 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, 2011) did not identify any seepage areas on or within 120 m of the Project Location. This was confirmed during a site investigation completed on June 1, 2011 and April 1, 2011, where no evidence of seepage areas on or within 120 m of the Project Location was found.

4.3. Other Water Features

Other water features that were observed during the site investigation, but 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 on June 1, 2011 identified small (<0.2 ha) vernal pools within a 9 ha swamp forest north of the Project Location (Figure 4.5). In the *EIS* report, it was determined that this wetland would not be impacted or encroached upon by the development (Ecological Services, 2011b).



Figure 4.2 Typical upland shrub thicket communities within Westbrook Project Location.



Figure 4.3 Grass swale associated with seasonally intermittent stream location (June, 2011)



Figure 4.4. Seasonal drainage (April 6, 2011).



Figure 4.5. Vernal pool within maple swamp forest north of Project Location (June 1, 2011).

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, 2011), 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, 2011) and documented during the site investigations.

Table 5.1 Corrections required to the Unity Road 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, 2011) 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, 2011) 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, 2011) 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	There are no corrections required to the <i>Water Body Records Review Report</i> (Genivar, 2011) with respect to permanent or intermittent streams. The site investigation confirmed that there is a single seasonally intermittent watercourse 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, 2011) with respect to seepage areas. The site investigation confirmed that there are no seepage areas within 120 m of the Project Location.

As a seasonally intermittent watercourse 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, 2011a. SunE Westbrook Solar Energy Project Natural Heritage Assessment Site Investigation Report. SunEdison Canada.

Ecological Services, 2011b. SunE Westbrook 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. 2011. SunE Westbrook Solar Energy Project Water Body Records Review Report. SunEdison Canada.

Appendix 1. Site Investigation field notes

Location Burr Brook Rd Date Aug 14/11
 Project / Client Axio Power
 - prelim. site investigation

Weather: Overcast, light shower -3C
 → Rob Snodgrass & Dale Kristensen
 START TIME: 07:45. END 10:30

→ abandoned pastureland, now largely stripped & mixed conifer with remnant fields.
 → central drainage swales N→S. overgrown
 → lots of RO decayed, 10m of RR by gray decayed, 10m of RR and red cedar
 → medium mixed conifer forest to NW (P. B. Co)
 → cedar/jump alder near stream/native lines to west
 → most of area recently cleared with 23"-4" standing water pooled in low lying patches
 → lots of conifer & deer forest
 → no indication indicated near

Location Westbrook Rd Date June 1/11
 Project / Client Axio Power
 TIME: 09:10 - 12:15

Weather: 25°C light wind, CLEAR
 FARMHOUSE FIELD: Subsummed
 Pkg. Vicia cracca, Asp Chive, Milkweed
 Bromus, Timothy, Sedum, Shrewsbury
 with shallow open field.
 → Fr. Sp. Rubus, S. G.
 Lonic, Man. Maple, Red Cedar, Elm
 Rescue Dandelion, Woodchuck,
 (Photo 1 & 2)

① Creek bed - ~~dry~~, upland soils (Photo 3) within driveway.
 → Riparian corridor of 30-50 year
 Beech, Elm, Raspberry,
 - some muddy soils & pooling, no amphibians. Buckthorn
 → patches are dry but creek narrow creek (2m) showing
 southward to conifer forest R.O. Day
 → mixed pool within stream
 red ash (Photo) River lily,
 N. Star older trees Willow creek

Project / Client

surrounding land ^{seasonally} ~~inundated~~ to EAST
mainly Ag. Elm (<20 yr)
Gr. Dgw., Spiraea, C. gracillima,
Sol. can., C. flava, C. nemoralis,
Pop. can.

WEST of creek drier, Young Ag. Elm
woodlands, Hesperis, Spiraea.
Photo Silky Dgw.

G.C.F.C.
* shallow flooded pool within Ag.
grass, Phalaris, Ad. Dgw. ~ 20x30 m
* w/ 30 m of creek Bur. Oak,
Tg. Aspen

Photo → mature Ag lining creek
and mature mixed forest to
N, also shows area of regem
within loc. location. Salix pet.,
Red Maple

Approaching forest at NE corner
Mixed-Hdw / Conifer with deer
trees (100+) & younger regem (25)
Ob. Pn, S., Blue Beech,
Am Ag, Balsam, Cedar. Fresh/Moist

Project / Client

Understory rich, C. gracillima,
Nightshade, Virg. Creeper, C. rosea,
Sens. str, Ab, Lady Fern
Trillium, Mr., C. cornuta

Mr. &
Silver Maple stand, with several
pools Photo fern, C. intima

Probable amphib. habitat
Note: This is the main stand type
along N. edge. → some older
trees >90-100 yr. OVEN,

AMCR. Sol. Junco R&N
→ Edge of regem bordering wet
forest has exposed limestone
grayer, 1- patches. no snakes
encountered

* definite 1-1.5 m drop from edge
of regem into wet forest area
follows NE-SW edge of forest
toward open drier area

Photo: upland forest bordering
the Mr stand → Pn, S., Pop. with
co. Junco → Mr Ob