



Connecticut Department of
 Energy & Environmental Protection
 Bureau of Natural Resources
 Wildlife Division

CPPU USE ONLY	
App #:	_____
Doc #:	_____
Check #:	No fee required
Program:	Natural Diversity Database Endangered Species
Hardcopy	_____ Electronic _____

Request for Natural Diversity Data Base (NDDDB) State Listed Species Review

Please complete this form in accordance with the [instructions](#) (DEEP-INST-007) to ensure proper handling of your request.

There are no fees associated with NDDB Reviews.

Part I: Preliminary Screening & Request Type

<p>Before submitting this request, you must review the most current Natural Diversity Data Base "State and Federal Listed Species and Significant Natural Communities Maps" found on the DEEP website. These maps are updated twice a year, usually in June and December.</p> <p>Does your site, including all affected areas, fall in an NDDDB Area according to the map instructions: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Enter the date of the map reviewed for pre-screening: <u>June 2019</u></p>	
This form is being submitted for a :	
<input checked="" type="checkbox"/> <i>New NDDDB request</i> <input type="checkbox"/> <i>Renewal/Extension of a NDDDB Request, without modifications and within two years of issued NDDDB determination (no attachments required)</i>	<input type="checkbox"/> <i>New Safe Harbor Determination (optional) must be associated with an application for a GP for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities</i> <input type="checkbox"/> <i>Renewal/Extension of an existing Safe Harbor Determination</i> <input type="checkbox"/> <i>With modifications</i> <input type="checkbox"/> <i>Without modifications (no attachments required)</i>
<small>[CPPU Use Only - NDDDB-Listed Species Determination # 1736]</small>	<small>[CPPU Use Only - NDDDB-Safe Harbor Determination # 1736]</small>
Enter NDDDB Determination Number for Renewal/Extension:	Enter Safe Harbor Determination Number for Renewal/Extension:

Part II: Requester Information

*If the requester is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, the name shall be stated **exactly** as it is registered with the Secretary of State. Please note, for those entities registered with the Secretary of State, the registered name will be the name used by DEEP. This information can be accessed at the Secretary of the State's database CONCORD. (www.concord-sots.ct.gov/CONCORD/index.jsp)*

If the requester is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).

If there are any changes or corrections to your company/facility or individual mailing or billing address or contact information, please complete and submit the [Request to Change company/Individual Information](#) to the address indicated on the form.

1. Requester*

Company Name: **VHB**

Contact Name: **Jeffrey Shamas**

Address: **100 Great Meadow Road**

City/Town: **Wethersfield**

State: **CT**

Zip Code: **06109**

Business Phone: **860-807-4388**

ext.

E-mail: **jshamas@vhb.com

**By providing this email address you are agreeing to receive official correspondence from the department, at this electronic address, concerning this request. Please remember to check your security settings to be sure you can receive emails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes

a) Requester can best be described as:

Individual Federal Agency State agency Municipality Tribal

business entity (if a business entity complete i through iii):

i) Check type corporation limited liability company limited partnership

limited liability partnership statutory trust Other:

ii) Provide Secretary of the State Business ID #: 0236756 This information can be accessed at the

Secretary of the State's database (CONCORD). (www.concord-sots.ct.gov/CONCORD/index.jsp)

iii) Check here if your business is **NOT** registered with the Secretary of State's office.

b) Acting as (Affiliation), pick one:

Property owner Consultant Engineer Facility owner Applicant

Biologist Pesticide Applicator Other representative:

2. List Primary Contact to receive Natural Diversity Data Base correspondence and inquiries, if different from requester.

Company Name:

Contact Person:

Title:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.

**E-mail:

Part IV: Project Information (continued)

3. Give a detailed description of the activity which is the subject of this request and describe the methods and equipment that will be used. Include a description of steps that will be taken to minimize impacts to any known listed species.

The Project owner, GRE Gacrux LLC is submitting this NDDB Review Request for the proposed installation of an 15.3 megawatt AC photovoltaic electric generating facility. The total site is approximately 150 acres, however, the limit of work will occupy approximately 75 acres.

The proposed activities for this project include: clear cutting, grading, top soil removal and replacement, construction of a new gravel access roads, installation of photovoltaic arrays and equipment pads, and the installation of a chain-link security fence along the facility's perimeter. Soils will be stabilized with grass planting and stormwater will be controlled with structural BMP designed by engineers. This project has an approved Power Purchase Agreement through CTDEEP Public Utilities Regulatory Authority (PURA). Temporary construction measures will follow 2002 Connecticut Guidelines for Soil Erosion and Sediment Control to minimize secondary impacts.

This Project was filed as Petition No. 1347 to the Connecticut Siting Council (CSC) on June 20, 2018. A request for State Listed Species Review was not submitted when the Petition was prepared because the NDDB mapping did not indicate there were any records for the site. The Petition includes a Wetland and Biological Assessment which reported an observation of eastern ribbon snake (*Thamnophis sauritus*) and a special animal survey form was submitted to the NDDB. The CT DEEP submitted comments to the CSC on August 20, 2018 which cited the lack of targeted wildlife and plant surveys, specifically bird and bat surveys. The Petition No. 1347 was denied without prejudice for declaratory ruling on October 26, 2018 by the CSC.

A Petition for Reconsideration was filed by GRE Gacrux LLC on November 6, 2018. CTDEEP again provided comments dated December 4, 2018 and requested that the CSC uphold the decision to deny the petition. The CT DEEP requested that a comprehensive wildlife survey be conducted for submission with subsequent filings. The CSC issued a second decision to deny Petition No. 1347 without prejudice on December 11, 2018 and requested, among other items, that wildlife surveys requested by the CT DEEP be conducted.

The June 2019 NDDB map for New London County depicts an NDDB polygon along Oil Mill Brook in the northwestern part of the Project parcel.

A comprehensive wildlife study (enclosed herewith) was performed for the flora and fauna listed in the NDDB Preliminary Assessment No. 201905764 and a report prepared (enclosed herewith).

4. If this is a renewal or extension of an existing Safe Harbor request *with* modifications, explain what about the project has changed.

N/A

5. Provide a contact for questions about the project details if different from Part II primary contact.

Name:

Phone:

E-mail:

Part V: Request Requirements and Associated Application Types

Check *one* box from either Group 1, Group 2 *or* Group 3, indicating the appropriate category for this request.

<p>Group 1. If you check one of these boxes, complete Parts I – VII of this form and submit the required attachments A and B.</p> <p><input type="checkbox"/> Preliminary screening was negative but an NDDB review is still requested</p> <p><input type="checkbox"/> Request regards a municipally regulated or unregulated activity (no state permit/certificate needed)</p> <p><input type="checkbox"/> Request regards a preliminary site assessment or project feasibility study</p> <p><input type="checkbox"/> Request relates to land acquisition or protection</p> <p><input type="checkbox"/> Request is associated with a <i>renewal</i> of an existing permit or authorization, with no modifications</p>
<p>Group 2. If you check one of these boxes, complete Parts I – VII of this form and submit required attachments A, B, and C.</p> <p><input checked="" type="checkbox"/> Request is associated with a <i>new</i> state or federal permit or authorization application or registration</p> <p><input type="checkbox"/> Request is associated with modification of an existing permit or other authorization</p> <p><input type="checkbox"/> Request is associated with a permit enforcement action</p> <p><input type="checkbox"/> Request regards site management or planning, requiring detailed species recommendations</p> <p><input type="checkbox"/> Request regards a state funded project, state agency activity, or CEPA request</p>
<p><input type="checkbox"/> Group 3. If you are requesting a Safe Harbor Determination, complete Parts I-VII and submit required attachments A, B, and D. Safe Harbor determinations can only be requested if you are applying for a GP for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities</p>
<p>If you are filing this request as part of a state or federal permit application(s) enter the application information below.</p> <p>Permitting Agency and Application Name(s): Connecticut Siting Council</p> <p>Related State DEEP Permit Number(s), if applicable: _____</p> <p>State DEEP Enforcement Action Number, if applicable: _____</p> <p>State DEEP Permit Analyst(s)/Engineer(s), if known: _____</p>
<p>Is this request related to a previously submitted NDDB request? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes, provide the previous NDDB Determination Number(s), if known: Preliminary Assessment No. 201905764</p>

Part VI: Supporting Documents

Check each attachment submitted as verification that *all* applicable attachments have been supplied with this request form. Label each attachment as indicated in this part (e.g., Attachment A, etc.) and be sure to include the requester's name, site name and the date. **Please note that Attachments A and B are required for all new requests and Safe Harbor renewals/extensions with modifications.** Renewals/Extensions with no modifications do not need to submit any attachments. Attachments C and D are supplied at the end of this form.

<input checked="" type="checkbox"/> Attachment A:	Overview Map: an 8 1/2" X 11" print/copy of the relevant portion of a USGS Topographic Quadrangle Map clearly indicating the exact location of the site.
<input checked="" type="checkbox"/> Attachment B:	Detailed Site Map: fine scaled map showing site boundary and area of work details on aerial imagery with relevant landmarks labeled. (Site and work boundaries in GIS [ESRI ArcView shapefile, in NAD83, State Plane, feet] format can be substituted for detailed maps, see instruction document)
<input checked="" type="checkbox"/> Attachment C:	Supplemental Information, Group 2 requirement (attached, DEEP-APP-007C) <input checked="" type="checkbox"/> Section i: Supplemental Site Information and supporting documents <input checked="" type="checkbox"/> Section ii: Supplemental Project Information and supporting documents
<input type="checkbox"/> Attachment D:	Safe Harbor Report Requirements, Group 3 (attached, DEEP-APP-007D)

Part VII: Requester Certification

The requester *and* the individual(s) responsible for actually preparing the request must sign this part. A request will be considered incomplete unless all required signatures are provided.

<p>"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief."</p>	
Signature of Requester (a typed name will substitute for a handwritten signature)	Date
Name of Requester (print or type)	Title (if applicable)
Signature of Preparer (if different than above)	Date
Name of Preparer (print or type)	Title (if applicable)

Note: Please submit the completed Request Form and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
 DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
 79 ELM STREET
 HARTFORD, CT 06106-5127

Or email request to: deep.nddbrequest@ct.gov

Attachment C: Supplemental Information, Group 2 requirement

Section i: Supplemental Site Information

1. Existing Conditions

Describe all natural and man-made features including wetlands, watercourses, fish and wildlife habitat, floodplains and any existing structures potentially affected by the subject activity. Such features should be depicted and labeled on the site plan that must be submitted. Photographs of current site conditions may be helpful to reviewers.

Wetlands and vernal pools were previously surveyed and delineated by Davison Environmental and documented in their June 6, 2018 Wetland and Biological Assessment Report. This report provides an evaluation of potential wildlife within the site. Based on this report and a desktop review the property is assumed to include the following habitat types: Core forest consisting of oak forest, pine forest, northern hardwoods, rocky dry slopes and summits, and red maple swamp; early successional habitat in the public utility corridor; cold-water streams; and small cryptic vernal pools.

- Site Photographs (optional) attached
- Site Plan/sketch of existing conditions attached

2. Biological Surveys

Has a biologist visited the site and conducted a biological survey to determine the presence of any endangered, threatened or special concern species Yes No

If yes, complete the following questions and submit any reports of biological surveys, documentation of the biologist's qualifications, and any NDDB survey forms.

Biologist(s) name: Davison Environmental - Wetland and Biological Assessment Report, June 6, 2018

VHB - 2019 Rare Species Survey Summary

Habitat and/or species targeted by survey: Davison: General site, anticipated wildlife, wetlands & vernal pools. A record of eastern ribbon snake was submitted to the NDDB.

VHB: Species listed on NDDB Preliminary Assessment No. 201905764

Dates when surveys were conducted: Davison: Dec 2017-May 2018

VHB: August 2019-October 2019

- Reports of biological surveys attached
- Documentation of biologist's qualifications attached
- [NDDB Survey forms](#) for any listed species observations attached

Section ii: Supplemental Project Information

1. Provide a schedule for all phases of the project including the year, the month and/or season that the proposed activity will be initiated and the duration of the activity.

Prior to any construction of clearing activity the limits of work will be surveyed in the field and trees to be felled and those to be preserved will be marked along the survey limits. Perimeter sediment controls will be installed before grubbing and temporary structural sediment controls will be installed within the work site.

Project construction will likely take 6-8 months and is expected to begin Spring 2020. Construction will include the installation of the solar panels, access road(s), and structural stormwater best management practices (BMPs).

Following the construction phase, the site will be maintained by mowing and vegetation maintenance outside

of the array to avoid shading panels and will incorporate any CT DEEP-required seasonal restrictions. The anticipated project lifespan is 35 years and after that point the Project Area will be restored in accordance with a Decommissioning Plan.

2. Describe and quantify the proposed changes to existing conditions and describe any on-site or off-site impacts. In addition, provide an annotated site plan detailing the areas of impact and proposed changes to existing conditions.

The parcel is approximately 150 acres with 75 acres to be developed for the proposed project. This will convert approximately 50% of the parcel from forested covering to an open/grass cover type with solar panels. Wetlands on the Site will be an assigned nominal 100-foot buffer. Except for existing crossing, no project disturbance will occur in wetlands, watercourse or within 100 feet of these features.

Annotated Site Plan attached

Attachment D: Safe Harbor Report Requirements

Submit a report, as Attachment D, that synthesizes and analyzes the information listed below. Those providing synthesis and analysis need appropriate qualifications and experience. A request for a safe harbor determination shall include:

- 1. Habitat Description and Map(s), including GIS mapping overlays, of a scale appropriate for the site, identifying:**
 - wetlands, including wetland cover types;
 - plant community types;
 - topography;
 - soils;
 - bedrock geology;
 - floodplains, if any;
 - land use history; and
 - water quality classifications/criteria.
- 2. Photographs** - The report should include photographs of the site taken from the ground and also all reasonably available aerial or satellite photographs and an analysis of such photographs.
- 3. Inspection** - A visual inspection(s) of the site should be conducted, preferably when the ground is visible, and described in the report. This inspection can be helpful in confirming or further evaluating the items noted above.
- 4. Biological Surveys** - The report should include all biological surveys of the site where construction activity will take place that are reasonably available to a registrant. A registrant shall notify the Department's Wildlife Division of biological studies of the site where construction activity will take place that a registrant is aware of but are not reasonably available to the registrant.
- 5. Based on items #1 through 4 above, the report shall include a Natural Resources Inventory of the site of the construction activity.** This inventory should also include a review of reasonably available scientific literature and any recommendations for minimizing adverse impacts from the proposed construction activity on listed species or their associated habitat.
- 6. In addition, to the extent the following is available at the time a safe harbor determination is requested, a request for a safe harbor determination shall include and assess:**
 - Information on Site Disturbance Estimates/Site Alteration information
 - Vehicular Use
 - Construction Activity Phasing Schedules, if any; and
 - Alteration of Drainage Patterns



Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

July 5, 2019

Mr. Jeffery Shamas
VHB, Inc.
100 Great Meadows Road
Wethersfield, CT 06109
jshamas@vhb.com

Project: Preliminary Assessment for the Installation of Photovoltaic Electric Generating Facility for GRE Gacurux LLC, 117 Old Mill Road in Waterford, Connecticut
NDDDB Preliminary Assessment No.: 201905764

Dear Jeffery Shamas,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map provided for the Preliminary Assessment for the Installation of Photovoltaic Electric Generating Facility for GRE Gacurux LLC, 117 Old Mill Road in Waterford, Connecticut. According to our records there are known extant populations of State Listed Species known that occur within or close to the boundaries of this property. The species known from this area include:

Plants

Isotria medeoloides (Small whorled pogonia)

Status: Federal Threatened and State Endangered

Habitat: Mesic woods, often near vernal streams in dry mixed or deciduous woods, frequently under beech trees

Blooms: Mid-May through Mid-June

Aristida longespica var. *geniculate* (Neddlegrass)

Status: State Special Concern

Habitat: Dry or moist sandy and gravelly soils

Blooms: August through October

Polygala nuttallii (Nuttall's milkwort)

Status: State Threatened

Habitat: Dry, open sandy soils and rocky crevices

Blooms: July through September

Animals

Terrapene carolina carolina (Eastern box turtle)

Clemmys guttata (Spotted turtle)

Thamnophis sauritus (Eastern ribbon snake)

Opheodrys vernalis (smooth green snake)

Caprimulgus vociferus (Whip-poor-will)

Best times to survey for whip-poor-will are when moon is at least half illuminated and above the horizon, and not obscured by clouds. You will want minimal wind for your survey. In our experience, detection rates increase also after midnight, before sunrise. With a 6 minute survey point, that is 3 min of silent listening followed by callback, followed by 3 minutes of silent listening, you will have 60% probability of detecting the bird, given it is present, within 400m of your survey point. You will need to conduct multiple points in your project area on multiple nights to be sure that it is not there at all.

Please be advised that this is a preliminary review and not a final determination. A more detailed review will be necessary to move forward with any subsequent environmental permit applications submitted to DEEP for the

proposed project. This preliminary assessment letter cannot be used or submitted with your permit applications at DEEP. This letter is valid for one year.

To prevent impacts to State-listed species, field surveys of the site should be performed by a qualified biologist when these target species are identifiable. A report summarizing the results of such surveys should include:

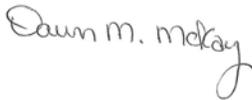
1. Survey date(s) and duration
2. Site descriptions and photographs
3. List of component vascular plant species and animal species within the survey area (including scientific binomials)
4. Data regarding population numbers and/or area occupied by State-listed species
5. Detailed maps of the area surveyed including the survey route and locations of State-listed species.
6. Statement/résumé indicating the biologist's qualifications to work with the taxon. A CT DEEP Scientific Collectors Permit may be required to survey for wildlife species and you should ask if your qualified biologist has one to work with taxon at this site.

The site surveys report should be sent to our CT DEEP-NDDDB Program (deep.nddbrequest@ct.gov) for further review by our program biologists along with an updated request for another NDDDB review. If you do not intend to do site surveys to determine the presence or absence of state-listed species, please let us know how you will protect the state-listed species from being impacted by this project with protection or conservation plans for the species.

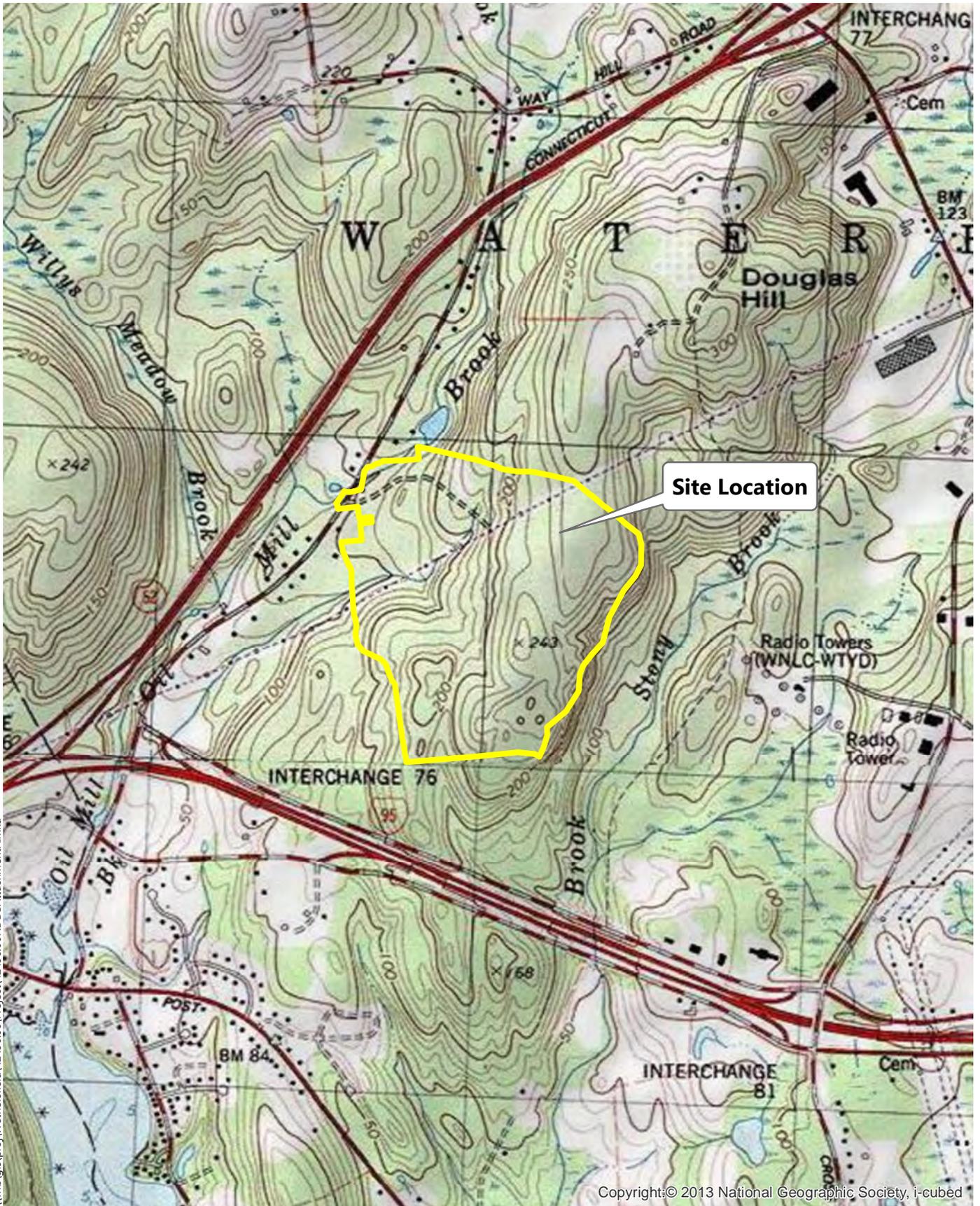
Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. The result of this review does not preclude the possibility that listed species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits.

Please contact me if you have further questions at (860) 424-3592, or dawn.mckay@ct.gov . Thank you for consulting the Natural Diversity Data Base.

Sincerely,



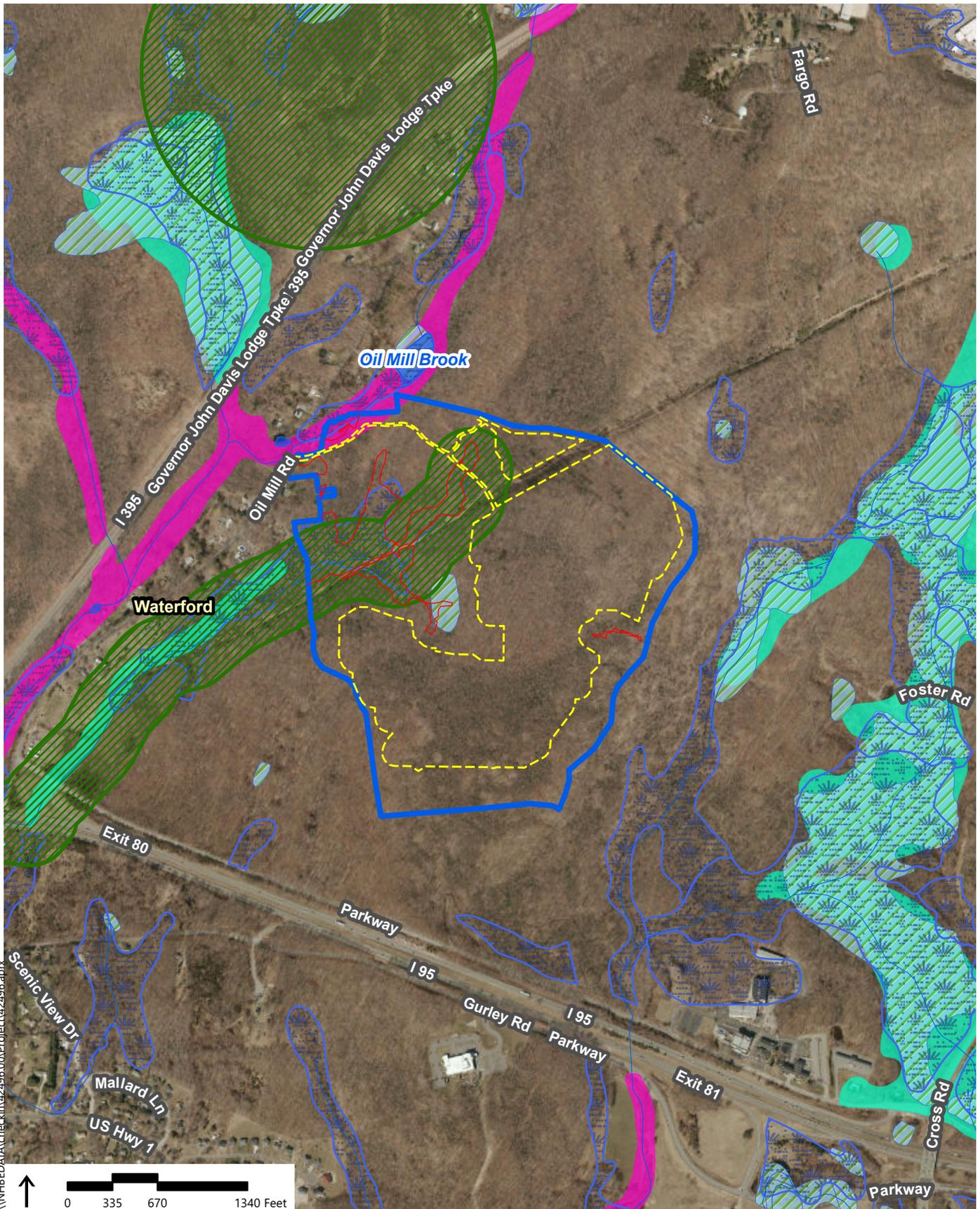
Dawn M. McKay
Environmental Analyst 3



\\vhb\gis\proj\Wethersfield\42496\001\Project\42496\00NDB\AttachmentA.mxd

Overview Map

**117 Oil Mill Road
Waterford, Connecticut**



\\NHBE\DATA\checkin\42496.00\Project\42496.aprx



- | | | |
|-------------------------------------|-------------------------------------|---------------------|
| Property Line | Hydrography | 100 Year Flood Zone |
| Limit of Disturbance | Field Delineated Wetlands | 500 Year Flood Zone |
| NNDDB Areas (CTDEEP, 06/2019) | Wetlands (CTDEEP, 2005) | Floodway in Zone AE |
| Critical Habitat (CTDEEP, 12/2009)* | National Wetland Inventory Wetlands | Other Flood Areas |
| Town Line | Open Water | |

Detailed Site Map

**117 Oil Mill Road
Waterford, Connecticut**



Biodiversity Studies • Wetland Delineation & Assessment • Habitat Management • GIS Mapping • Permitting

Wetland and Biological Assessment Proposed Photovoltaic Installation

117 Oil Mill Road
Waterford, Connecticut

*Submitted To:
BL Companies*

*Prepared By:
Eric Davison
Davison Environmental*

June 6, 2018

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1	FIGURE 1 – Topographic Location Map
	FIGURE 2 – Aerial Map
	Figure 3 – Wetlands, Vernal Pools and Rare Species
2	Wetland Delineation Report
3	Site Photographs

1.0 INTRODUCTION

A proposed photovoltaic installation (i.e., solar field) is proposed on a 152.23 acres property located at 117 Oil Mill Road in Waterford (“property” or “site”). Please refer to Figure 1 - *Location Map* and Figure 2 - *Aerial Map* in Appendix 1.

Davison Environmental, LLC biologists, soil scientists and wetland scientists conducted site visits from December 2017 through May 2018 in order to delineate the wetlands and watercourses, evaluate the characteristics of the wetlands and watercourses and wildlife habitats, and survey for vernal pools.

2.0 EXISTING ENVIRONMENT

2.1 *General Site Characteristics*

The site lies within the coastal ecoregion, approximately 4,000 feet northeast of the Niantic River, a tidal waterway. The site lies within two watersheds with the east-southeast portions of the site draining east into Stony Brook, and the northern portions of the site draining into Mill Brook. A small segment of Mill Brook flows through the northern portions of the property.

The site is largely forested, apart from a segment of Eversource utility right-of-way running roughly east-west across the northern portion of the site. Topography is rolling to rugged, with areas of large bedrock outcroppings and shallow-to-bedrock soils.

2.2 *Wetlands and Watercourses*

The wetlands were delineated in December of 2017 by Registered Soil Scientists Eric Davison and James Cowen. This work was conducted according to the requirements of the CT Inland Wetlands and Watercourses Act (P.A. 155). Wetlands are defined as areas of poorly drained, very poorly drained, floodplain, and alluvial soils, as delineated by a soil scientist. Watercourses are defined as bogs, swamps, or marshes, as well as lakes, ponds, rivers, streams, etc., whether natural or man-made, permanent or intermittent.

The wetland delineation work is described in Appendix 2 – *Wetland Delineation Report*, which includes a description of the soil types present on the site.

Wetland Descriptions

Two wetlands occur on the site, denoted as Wetland 1 and Wetland 2. Wetlands are illustrated on Figure 3 – *Wetlands, Vernal Pools and Rare Species* and their characteristics are summarized in Table 1.

Wetland 1 includes Oil Mill Brook, as well as those wetlands that drain to Oil Mill Brook. Wetland 1 is the larger of the two wetlands, occupying much of the northwest corner of the site. The wetland occurs in several “fingers” that extend from west to east into the hillside. At two locations, the woods road and utility right-of-way, there are existing culvert and fill crossings that bifurcate the wetland.

Wetland 2 is a single narrow wetland finger that extends onto the site from the east. Wetland 2 lies on a very steep rocky/bouldery slope. The wetland drains to the east into a broad wetland valley that borders on Stony Brook.

From a hydrologic perspective, both wetlands are classified as *hillside groundwater slope wetlands*. Hillside groundwater slope wetlands are wetlands that develop on hillsides, where groundwater discharges to the surface as springs and seeps. Throughout the upland-wetland interface visible groundwater discharge zones (i.e., seeps) are present. A key feature of these wetlands, from a water quality perspective, are the pronounced bedrock and boulder outcroppings where cold well-oxygenated groundwater discharges from fractured bedrock and glacial till.

Table 1: Wetland descriptions

Wetland	Type	Cover Type	Hydrology
1	Hillside groundwater slope; including and tributary to Oil Mill Brook	Forested (predom.), scrub-shrub within utility ROW	Seasonally saturated & perennial stream
2	Hillside groundwater slope; tributary to Stony Brook	Forested	Seasonally saturated

Wetland vegetation is similar in both wetlands, with variability occurring within wetland microhabitats. The tree layer consists of red maple (*Acer rubrum*), yellow birch (*Betula allegheniensis*), green ash (*Fraxinus pensylvanica*) and American elm (*Ulmus americana*).

The shrub layer includes mountain laurel (*Kalmia latifolia*), winterberry (*Ilex verticillata*) and pepperbush (*Clethra alnifolia*) along with the invasive non-native Japanese barberry (*Berberis thunbergii*) and multiflora rose (*Rosa multiflora*).

The herb layer includes skunk cabbage (*Symplocarpus foetidus*), false hellebore (*Veratrum viride*), sphagnum moss, cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), clearweed (*Pilea pumila*), sensitive fern (*Onoclea sensibilis*) and the invasive non-native Japanese stiltgrass (*Microstegium vimineum*).

Wetland Functions and Values

The functions and values are summarized in Table 2. The *Highway Methodology* recognizes the following 13 separate wetland functions and values: groundwater recharge/discharge, floodwater storage, fish and shellfish habitat, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, sediment/shoreline stabilization, wetland wildlife habitat, recreational value, educational/scientific value, uniqueness, visual/aesthetic quality and threatened and endangered species habitat.

The degree to which a wetland provides each of these functions is determined by one or more of the following factors: landscape position, substrate, hydrology, vegetation, history of disturbance, and size. Each wetland may provide one or more of the listed functions at significant levels. The determining factors that affect the level of function provided by a wetland can often be broken into two categories. The effectiveness of a wetland to provide a specified function is generally dependent on factors within the wetland whereas the opportunity to provide a function is often influenced by the wetland's position in the landscape as well as adjacent land uses. For example, a depressed wetland with a restricted outlet may be considered highly effective in trapping sediment due to the long residence time of runoff water passing through the system. If this wetland is located in gently sloping woodland, however, there is no significant source of sediment in the runoff therefore the wetland is considered to have a small opportunity of providing this function.

Table 2: Summary of Wetland Functions and Values

Wetland Functions and Values	Groundwater Recharge/Discharge	Sediment/Shoreline Stabilization	Floodflow Alteration	Fish & Shellfish Habitat	Sediment/Toxicant/Pathogen Retention	Nutrient Removal/Attenuation	Production Export	Wildlife Habitat	Recreation	Educational/Scientific Value	Uniqueness/Heritage	Visual Quality/Aesthetics	Listed Species Habitat
1	P	P	P	P	S	S	S	S	S	S	P	P	Y
2	P	U	P	S	S	S	S	S	S	S	P	P	N
<u>Suitability</u> P = principal function S = secondary function U = function unlikely to be provided at a significant level N = none present based on lack of current CT DEEP NDDDB records and lack of observations during site surveys													

2.3 Upland Habitats

Two upland habitat types are present, old field (managed utility ROW) and mixed hardwood forest. Old field habitat occurs solely within the Eversource ROW, and totals approximately five acres. The remainder of the site (147 acres) consists of mixed hardwood forest.

During the spring of 2018, the site was logged. Most of the larger trees (ca. over 15 inches d.b.h.) were removed, leaving the tree canopy open in many areas. This is a temporal disturbance, and over time, the tree density will recover. In the interim, a subtle shift in breeding bird species can be expected, favoring species which prefer larger forest openings, such as the Baltimore oriole and great-crested flycatcher.

Mixed hardwood forest habitat is comprised largely of black oak (*Quercus velutina*), red oak (*Quercus rubra*), black birch (*Betula lenta*), white oak (*Quercus alba*), hickories (*Carya*), ash (*Fraxinus spp.*), sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), sassafras (*Sassafras albidum*) and tulip tree (*Liriodendron tulipifera*). The shrub layer is dominated by mountain laurel (*Kalmia latifolia*), and also includes witchhazel (*Hamamelis virginiana*).

Old field habitat is comprised primarily of dense mountain laurel, with dense vines of greenbriar (*Smilax rotundifolia*), grape (*Vitis sp.*), the invasive Asiatic bittersweet (*Celastrus orbiculatus*), sweet fern (*Comptonia peregrina*), as well as tree saplings of some of the above-noted species.

3.0 WILDLIFE

The wildlife discussion focuses on species considered to be of high conservation priority in Connecticut as designated in the 2015 Connecticut Wildlife Action Plan (WAP) and those that have State listing status. The WAP was created to establish a framework for proactively conserving Connecticut's fish and wildlife, including their habitats. The WAP identifies species of "Greatest Conservation Need" (GCN) and prioritizes those species into three categories in descending order of significance from "most important" to "very important" and finally "important".

For many species, this wildlife assessment is habitat-based, with no detailed surveys conducted. Targeted field surveys included vernal pool and wetland-dependent species conducted from mid-April through mid-May. This work focused primarily on vernal pool identification but included cover and visual searching, and dip-netting throughout site wetlands. Bird species observed during that work were also recorded as discussed in Section 3.3.

This assessment does not address all biota that inhabit the site (e.g., bats, insects). Rather, the goal of the study was to focus on those species most likely to be adversely impacted from a

change in land use. These include amphibians and reptiles which have low mobility and dispersal capabilities, as well as breeding birds of conservation concern within the State.

3.1 Herpetofauna and Vernal Pools

Reptiles and amphibian species observed during field surveys are listed in Table 3.

Table 3: Amphibians and reptiles observed

Common Name	Scientific Name	CT WAP Status	State-listed Status
Spotted Salamander	<i>Ambystoma maculatum</i>	I	NL
Four-toed Salamander	<i>Hemidactylium scutatum</i>	NL	NL
Redback Salamander	<i>Plethodon cinereus</i>	NL	NL
American Toad	<i>Anaxyrus americanus</i>	NL	NL
Spring Peeper	<i>Pseudacris crucifer</i>	NL	NL
Green Frog	<i>Lithobates clamitans</i>	NL	NL
Wood Frog	<i>Lithobates sylvaticus</i>	I	NL
Two-lined Salamander	<i>Eurycea bislineata</i>	NL	NL
Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	VI	SC
Garter Snake	<i>Thamnophis sirtalis</i>	NL	NL
CT Wildlife Action Plan (CT WAP) Status: I = important; VI = very important; MI = most important; NL = not listed State-listed Status: E = endangered; T = threatened; SC = species of special concern; NL = not listed			

One state-listed species, the eastern ribbon snake (*Thamnophis sauritus*), was observed within Wetland 1 along the utility ROW (see Figure 3). The ribbon snake inhabits a variety of shallow water aquatic habitats, favoring open grassy or shrubby areas bordering on streams and wooded swamps (Klemens, 1993).

A vernal pool survey of the Site was conducted. Calhoun and Klemens (2002) provides the following operational definition of vernal pools:

Vernal pools are seasonal bodies of water that attain maximum depths in the spring or fall, and lack permanent surface water connections with other wetlands or water bodies. Pools fill with snowmelt or runoff in the spring, although some may be fed primarily by groundwater sources. The duration of surface flooding, known as hydroperiod, varies depending upon the pool and the year; vernal pool hydroperiods range along a continuum from less than 30 days to more than one year. Pools are generally small in size (<2 acres), with the extent of vegetation varying widely. They lack established fish populations, usually as a result of periodic drying, and support communities dominated by animals adapted to living in temporary, fishless pools. In the region, they provide essential breeding habitat for one or more wildlife species including

Ambystomid salamanders (Ambystoma spp., called “mole salamanders” because they live in burrows), wood frogs (Rana sylvatica), and fairy shrimp (Eubranchipus spp.).

Vernal pool physical characteristics can vary widely while still providing habitat for indicator species. “Classic” vernal pools are natural depressions in a wooded upland with no hydrologic connection to other wetland systems. Manmade depressions such as quarry holes, old farm ponds and borrow pits can also provide similar habitat. Often, vernal pools are depressions or impoundments within larger wetland systems. These vernal pool habitats are commonly referred to as “cryptic” vernal pools.

Several species of amphibians depend on vernal pools for reproduction and development. These species are referred to as indicator vernal pool species and their presence in a wetland during the breeding season helps to identify that area as a vernal pool.

While wetlands are extensive, due to the site’s landscape position on a broad slope these wetlands consist largely of headwater wetlands/drainageways. The sloping topography limits prolonged standing water capable of supporting vernal pools.

Breeding by two vernal pool indicator species, the wood frog (*Lithobates sylvaticus*) and the spotted salamander (*Ambystoma maculatum*), was noted at three locations, referred to as Vernal Pools 1 through 3, as illustrated on Figure 3 and summarized in Table 4.

Table 4: Amphibians and reptiles observed

Common Name	Scientific Name	Observations		
		Pool 1	Pool 2	Pool 3
Spotted Salamander	<i>Ambystoma maculatum</i>	4 egg masses	14	17 egg masses
Wood Frog	<i>Lithobates sylvaticus</i>	Larvae	1 wood frog mass; larvae	Not present

All three pools are cryptic in nature. While forest is abundant onsite and within the surrounding landscape, the limiting factor for vernal pool amphibians is the lack of seasonally flooded wetlands. As a result, the three identified breeding pools are quite small, and the hydrology shallow and somewhat marginal with respect to the length of the hydroperiod. All three pools are small in extent, and average ponding depths are shallow (i.e., less than 8 inches), and the depth of ponding is limited, due largely to topography.

Pool 2 was nearly completely dry, with only a roughly 6’ x 6’ area of standing water remaining. Based on these observations, this pool may not be productive in drier years. While pools 1 and 2 occur in natural depressions within larger wetland systems, Pool 3 is located on the upslope

side of an existing woods road crossing, and likely was created by the installation of this road. While in some cases this can create a “decoy” breeding situation, in this case the upslope groundwater discharge appears to provide adequate water supply for successful larval development.

3.2 *Natural Diversity Database Review (NDDB)*

The Connecticut Department of Energy and Environmental Protection’s Natural Diversity Database (NDDB) program mapping was reviewed. The most recent mapping dated December 2017, shows no existing NDDB records overlapping the site.

3.3 *Breeding Bird Inventory*

While no targeted breeding season bird surveys were conducted, all species observed from late April through mid-May were recorded as noted in Table 5. Many of these species can reasonably be expected to breed on the site due to the presence of suitable habitat. For the remainder of species noted in Table 5, they are considered potential breeders, developed utilizing a habitat-based catalog of known breeding birds in Connecticut. The primary source utilized was *The Atlas of Breeding Birds of Connecticut*¹ which is the result of a five-year study (1982-1986) of all bird species known to breed in the State. This study is the most comprehensive review to date of Connecticut’s breeding birds. Additional resources utilized include DeGraaf and Yamasaki (2001). An initial inventory of potential breeding birds was generated solely based on the presence of suitable habitat. That list was then refined by considering such factors as bio-geographical distribution, the presence or absence of critical habitat features and minimum patch size requirements

The site lies within an approximately 750 acre block of contiguous forest stretching between I-395, I-95, Route 85 and Cross Road. Within that forest block, there is only a minor intrusion of non-forested habitat within the roughly 100-foot wide utility ROW that traverses the site. The principal species expected to breed on the site are forest-dwelling birds, including those species requiring forest “interior”, generally defined regionally as forest that lies a minimum of 300ft from non-forested areas. These include a number of neotropical migratory songbirds of high-conservation priority, both in Connecticut as well as regionally. Examples include the wood thrush (*Hylocichla mustelina*) and scarlet tanager (*Piranga olivacea*).

¹ Bevier, L. R. (Ed.). Atlas of Breeding Birds of Connecticut. 1994. Bulletin 113. State Geological and Natural History Survey of Connecticut. 461 p.

Table 5: Observed and Potential Breeding Birds

Common Name	Scientific Name	Observed (anticipated breeder)	Conservation Status
American Redstart	<i>Setophaga ruticilla</i>		
American Woodcock	<i>Scolopax minor</i>		MI
Barred Owl	<i>Strix varia</i>		
Baltimore Oriole	<i>Icterus galbula</i>	Observed	I
Black-and-white Warbler	<i>Mniotilta varia</i>		I
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	Observed	VI
Black-capped Chickadee	<i>Parus atricapillus</i>	Observed	
Blue Jay	<i>Cyanocitta cristata</i>		
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>		
Blue-winged Warbler	<i>Vermivora pinus</i>	Observed	MI
Broad-winged Hawk	<i>Buteo platypterus</i>		VI
Brown Creeper	<i>Certhia americana</i>		I
Brown-headed Cowbird	<i>Molothrus ater</i>		
Canada Warbler	<i>Wilsonia canadensis</i>		I
Carolina Wren	<i>Thryothorus ludovicianus</i>		
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>		VI
Common Yellowthroat	<i>Geothlypis trichas</i>		
Downy Woodpecker	<i>Picoides pubescens</i>		
Eastern Wood-Pewee	<i>Contopus virens</i>	Observed	I
Gray Catbird	<i>Dumetella carolinensis</i>	Observed	
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	Observed	
Great Horned Owl	<i>Bubo virginianus</i>		
Hairy Woodpecker	<i>Picoides villosus</i>		
Hermit Thrush	<i>Catharus guttatus</i>	Observed	I
Hooded Warbler	<i>Wilsonia citrina</i>		
Indigo Bunting	<i>Passerina cyanea</i>		VI
Louisiana Waterthrush	<i>Seiurus motacilla</i>		I
Northern Cardinal	<i>Cardinalis cardinalis</i>		
Ovenbird	<i>Seiurus aurocapillus</i>	Observed	I
Pileated Woodpecker	<i>Dryocopus pileatus</i>		
Prairie Warbler	<i>Dendroica discolor</i>		MI
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	Observed	
Red-eyed Vireo	<i>Vireo olivaceus</i>	Observed	
Red-shouldered Hawk	<i>Buteo lineatus</i>		
Red-tailed Hawk	<i>Buteo jamaicensis</i>		
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Observed	I
Rufous-sided Towhee	<i>Pipilo erythrophthalmus</i>	Observed	MI
Scarlet Tanager	<i>Piranga olivacea</i>	Observed	VI
Song Sparrow	<i>Melospiza Melodia</i>		
Tufted Titmouse	<i>Parus bicolor</i>	Observed	
White-breasted Nuthatch	<i>Sitta carolinensis</i>		
White-eyed Vireo	<i>Vireo griseus</i>		I

Table 5 continued.....			
Common Name	Scientific Name	Observed (anticipated breeder)	Conservation Status
Wild Turkey	<i>Meleagris gallopavo</i>		
Wood Thrush	<i>Hylocichla mustelina</i>	Observed	MI
Worm-eating Warbler	<i>Helmitheros vermivorus</i>		VI
Yellow Warbler	<i>Dendroica petechia</i>		
Yellow-throated Vireo	<i>Vireo flavifrons</i>	Observed	

3.4 Fisheries and Aquatic Resources

The site contains a segment of Oil Mill Brook, along with wetlands that drain directly to both Oil Mill Brook and Stony Brook. Both streams are tributary to the Niantic River, a tidal waterway draining to Long Island Sound.

While no fisheries surveys were conducted in the onsite sections of Mill Brook, fisheries data available from the CT DEEP fisheries program was queried. Available data shows the presence of wild brook trout (*Salvelinus fontinalis*) in the downstream sections of both Oil Mill Brook and Stony Brook. Brook trout are an indicator of high water quality, requiring cold well-oxygenated waters, with temperatures not exceeding the upper 60s Fahrenheit.

4.0 PROJECT IMPACTS

4.1 Impacts to Wetlands, Streams and Water Quality

No direct wetland impacts are proposed. The existing woods road will be improved but does not require alteration in a manner that will require additional fill or wetland disturbance. Therefore, the focus of impact mitigation measures relates to downstream water quality impacts that can occur when forest is converted to development without the implementation of appropriate best management practices. The following recommendations are aimed at minimizing secondary impacts to wetlands and watercourses.

1. The principal mitigation measures to insure no adverse impacts to downstream aquatic resources should be the implementation of a no disturbance buffer around wetlands and watercourses. Recognizing the sensitivity of these headwater wetlands, and the significance of downstream resources for wildlife and recreation, I would recommend a minimum 200-foot buffer around wetlands, with the first 100-feet being a no disturbance zone where existing forest remains intact. The second 100-feet should remain non-impervious (i.e., no solar panels) but can include stormwater management features and associated grading.

2. Management of stormwater should promote infiltration, as the runoff from solar array fields in general considered clean with respect to significant pollutant loads. This will help to insure there are no thermal impacts to downstream resources.
3. The stormwater management measures should be designed so that there is no increase in peak stormwater flows OR total volume discharging from the site.
4. Where possible, such as in low use areas of the array field, utilize seed mixes that are more beneficial for wildlife and water quality (i.e., require less mowing and reduced use of fertilizers and pesticides), such as:
 - a. “No mow” fescue blend (source: www.prairienursery.com); or
 - b. New England Conservation and Wildlife Mix (source: <http://newp.com/catalog/seed-mixes/#wildlife>).

4.2 *Impacts to Wildlife and Habitats*

The total limits of disturbance resulting from the project are approximately 90 acres. A portion of those disturbance limits will remain as native vegetation but will need to be cleared of trees to reduce shading of the arrays. These areas, if managed appropriately, can have significant wildlife benefits by providing early-successional edge habitat. To promote such habitat, these areas should be mowed/cleared no more than once per year. All clearing should occur between October 15th and March 1st, to prevent impacts to wildlife.

Breeding Bird Impact Assessment

Land development can impact breeding birds via direct habitat loss as well as degradation of habitats adjacent to development, resulting from what is commonly referred to as the “edge effect”. The edge effect refers to habitats which are degraded as a result of their adjacency to developed or non-forested habitats. This results from several factors, including habitat avoidance due to noise or visual disturbances, increased rates of predation or brood parasitism caused by improved habitat conditions for predators (e.g., raccoons), and nest parasites (i.e., brown-headed cowbirds. In the northeast region, the edge effect is generally considered to extend approximately 300 feet outward from a developed area. Within this zone, breeding productivity is often diminished and disturbances associated with the adjacent development can result in outright avoidance by nesting birds.

Using Geographic Information System (GIS) software to analyze the most recent aerial photography available (2016, source USDA), it was determined that the site is part of an approximately 750-acre forest block situated between I-395, I-95, Route 85 and Cross Road. Therefore, the site’s forests are part of a larger “core forest”. Forest areas designated as “core”

are those that exceed 250 acres and are configured in such a way that they include “interior” areas that are greater than 300 feet away from non-forested areas.

The total limits of tree clearing are 90 acres. The resulting habitat loss will render the site largely uninhabitable for forest-dwelling birds. Beyond the areas converted from forest to solar field, forest within approximately 300-feet of the proposed clearing limits will be diminished with respect to supporting forest-dwelling birds because of the impacts associated with the edge affect. Additionally, the overall 750-acre forest block will be fragmented, and the habitat value diminished. This is exacerbated by the fact that the site lies roughly within the center of the overall 750-acre forest block, which will have a particular affect on the portions of the forest block that lie to the west (west of the site towards I-95, north to Oil Mill Road) as this area will be fragmented into a small forest patch less than 100 acres.

Forest fragmentation remains the single largest threat to the suite of priority birds that occur within the IBA. Forest-interior birds have experienced population declines in small nature preserves throughout the northeastern United States and are considered to be extremely sensitive to human disturbance (Butcher et al. 1981; Bushman and Therres 1988; Askins et al. 1990; Friesen et al. 1995).

Most of the songbirds showing these declines share two characteristics: they are long-distance migrants that breed in the north temperate zone and spend the winter in the tropics, and they are specialized forest species that typically do not nest in non-wooded habitats (Askins 1995). The two primary causes of these declines are habitat fragmentation on the temperate breeding grounds and destruction of wintering habitat in the tropics (Robbins et al. 1989; Askins et al. 1990; Penhollow and Stauffer 2000). These species are “area sensitive” meaning they are less abundant in smaller woodlands than in large, unfragmented forests (Robbins et al. 1989; Wilcove and Robinson 1990; Askins 1994).

The reproductive success of area-sensitive species may be lower in fragmented forests because brood parasitism by Brown-headed Cowbirds (*Molothrus ater*) and nest predation are more prevalent near forest edges (Askins et al. 1990; Paton 1994; Rich et al. 1994).

Studies have shown that total forest cover, forest composition and forest fragmentation can affect the abundance and distribution of migratory, forest-nesting birds (Mortberg, 2001; Villard et al. 1999; Andren 1996). In the 2015 *Connecticut State of the Birds*, Connecticut College professor and noted ornithologist Robert Askins concluded that “in order to sustain a diversity of specialized forest birds, we need to protect some large areas of continuous or nearly continuous forest.”

Impacts to Eastern Ribbonsnake

The primary habitat for ribbonsnake includes the site's wetlands, although non-wetland habitats bordering wetlands (i.e., within a few hundred feet) also represent suitable habitat. The species was noted in Wetland 1, in early-successional wetlands within the utility ROW, which is likely the favored habitat for this species on the site.

The onsite portions of Wetland 2 represent sub-optimal habitat as they are deeply forested and consist of steep, bouldery groundwater discharge zones.

The proposed 200-foot wetland buffer, along with the fact that no disturbance is proposed within the utility ROW, is expected to be protective of the primary habitat for ribbonsnake.

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Appendix 1 – Figures

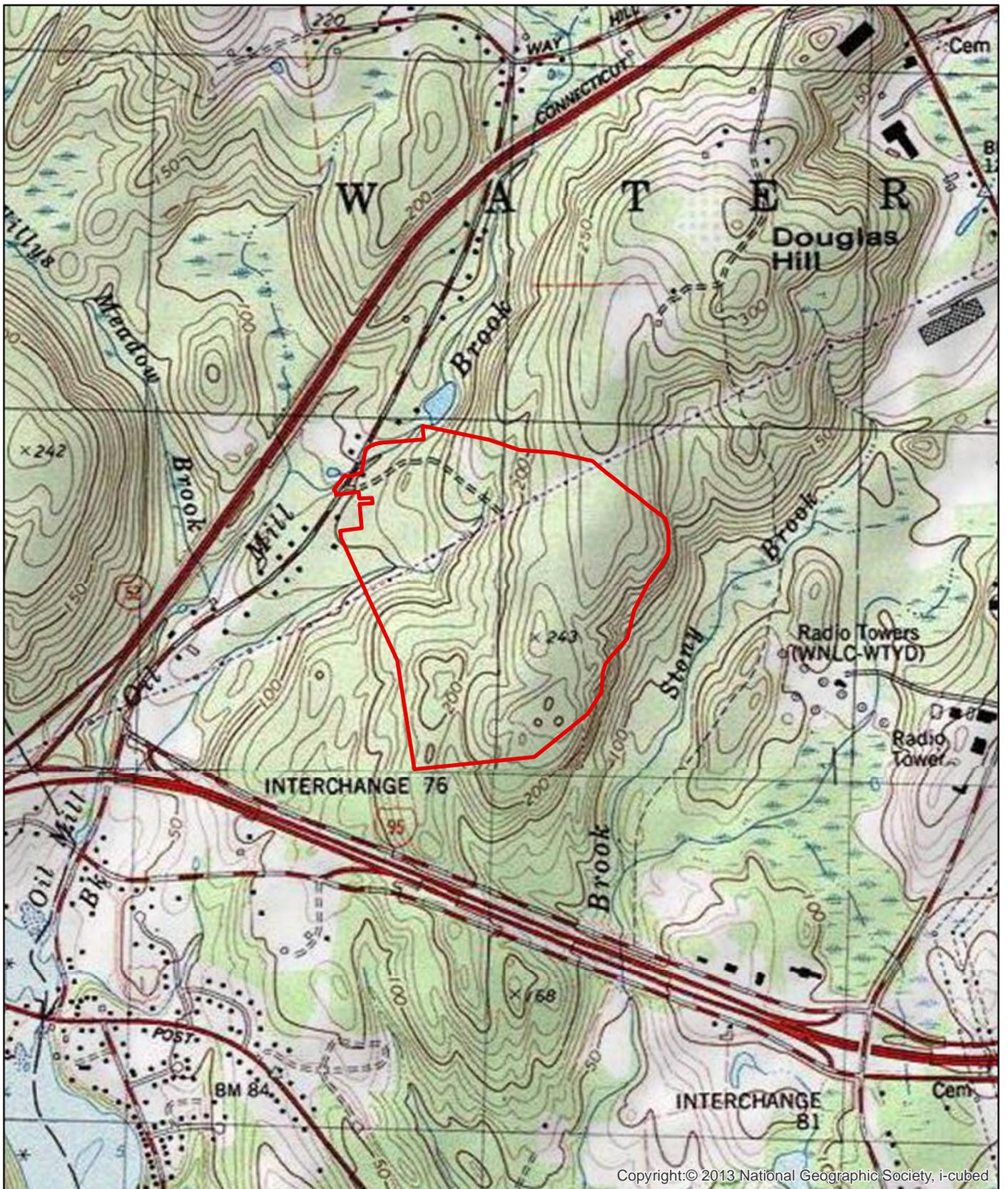


FIGURE 1:
Location Map
Oil Mill Road
Waterford, CT

 Property Boundary (approximate)

Topographic map (USGS) showing the approximate location of the parcel boundary as taken from the CT DEEP parcel dataset. This map is intended for general planning purposes only. It contains no authoritative data.



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FIGURE 2:
Aerial Map
Oil Mill Road
Waterford, CT

 Property Boundary (approximate)

CT Orthophotography (2016) showing the approximate location of the parcel and watercourse boundaries as taken from the CT DEEP Parcel and Hydrography datasets respectively. This map is intended for general planning purposes only. It contains no authoritative data.



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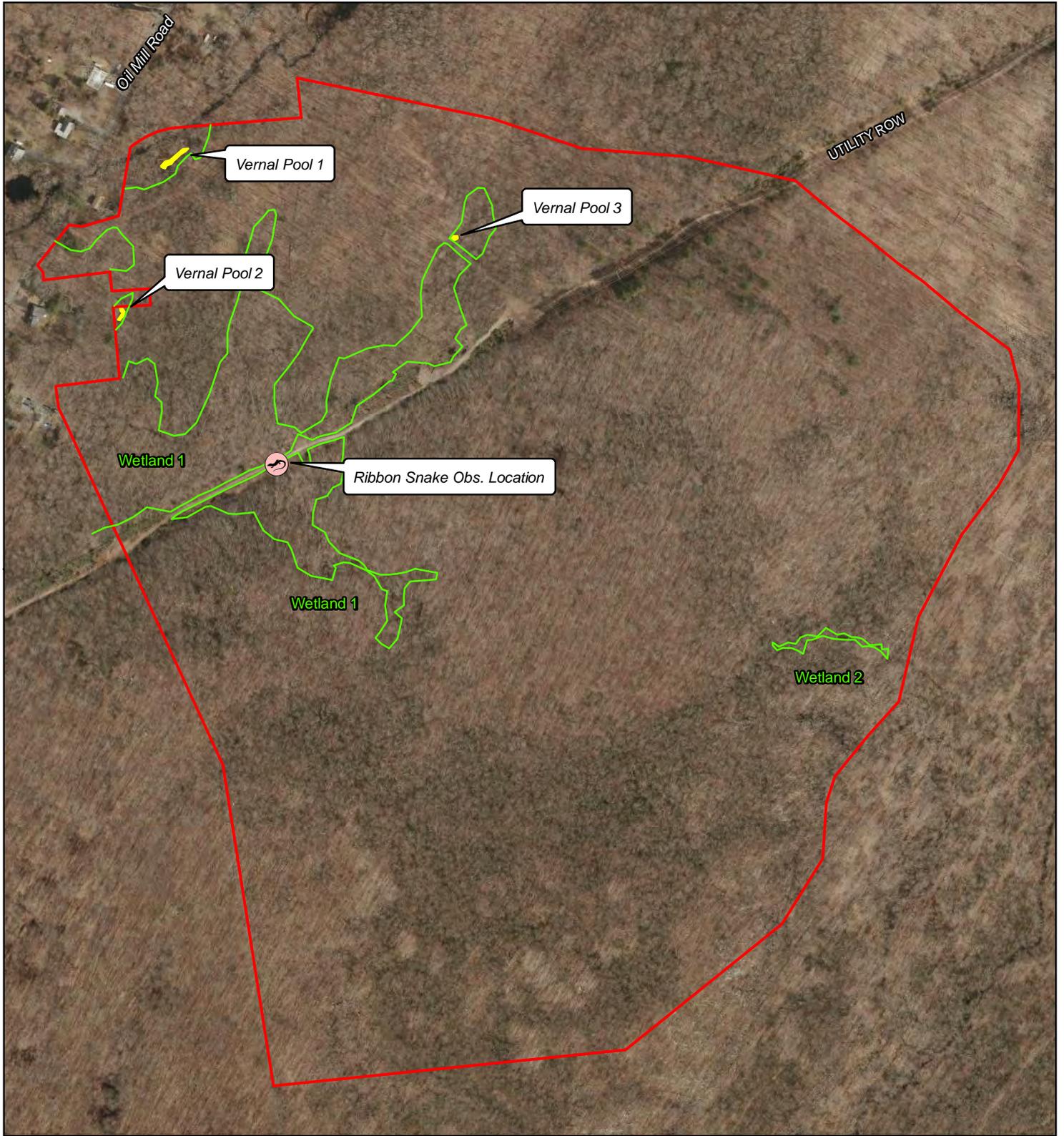


Figure 3:
Wetlands, Vernal Pools & Rare Species

Oil Mill Road
Waterford, CT

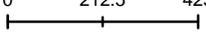
Legend

	Parcel Boundary		wetland boundary
	Vernal Pool		

Map Description
 The location and extent of features illustrated are approximate only. This map is intended for illustrative purposes only. It contains no authoritative data.

SCALE

0 212.5 425 Feet



N


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Appendix 2 – Wetland Delineation Report



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Biodiversity Studies • Wetland Delineation & Assessment • Habitat Management • GIS Mapping • Permitting • Forestry

WETLANDS / WATERCOURSES DELINEATION REPORT

Date of Work: 12/19 through 12/22, 2017

Client: Bill Fries

Project Location: Oil Mill Road, Waterford

BL Companies

IDENTIFICATION OF WETLANDS AND WATERCOURSES RESOURCES

Wetlands and watercourses present on property? Yes No

<u>Wetlands:</u>	<u>Watercourses:</u>	<u>Identification Method:</u>
Inland Wetlands <input checked="" type="checkbox"/>	Perennial Streams <input checked="" type="checkbox"/>	Auger and Spade <input checked="" type="checkbox"/>
Tidal Wetlands <input type="checkbox"/>	Intermittent Watercourses <input type="checkbox"/>	Backhoe Pits <input type="checkbox"/>

Numbering Sequences:

<u>1X-35X</u>	<u>184-196</u>
<u>1-102</u>	<u>197-210</u>
<u>103-109</u>	<u>110-124</u>
<u>125-183 (includes 157-1 through 157-25)</u>	

Wetland Plant Communities Present:

Forest
 Sapling/Shrub
 Wet Meadow
 Marsh
 Upland/Streamside

Definitions and methodology for identification of state regulated wetlands & watercourses

Wetlands and watercourses are regulated in the State of Connecticut General Statutes, Chapter 440, sections 22a-28 to 22a-45. The Statutes are divided into the Inland Wetlands and Watercourses Act (sections 22a-36 to 22a-45) and the Tidal Wetlands Act (sections 22a-28 to 22a-35). Inland Wetlands "means land, including submerged land, not regulated pursuant to sections 22a-28 to 22a-35, inclusive, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soils Survey, as may be amended from time to time, of the National Resources Conservation Service (NRCS) of the United States Department of Agriculture" section 22a-38(15). Watercourses "means rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private which are contained within, flow through or border upon this state or any portion thereof, not regulated pursuant to sections 22a-28 to 22a-35, inclusive. Intermittent watercourses shall be delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of recent alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation" section 22a-38(16). Tidal Wetlands are defined as "those areas which border on or lie beneath tidal waters, such as, but not limited to banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters, and whose surface is at or below an elevation of one foot above local extreme high water; and upon which may grow or be capable of growing some, but not necessarily all of the following" (includes plant list) section 22a-29(2).

WETLAND SOIL TYPES

Wetland soils on the site consist of the Ridgebury, Leicester and Whitman complex as well as Raypol soils. Ridgebury, Leicester and Whitman is an undifferentiated mapping unit consisting of two poorly drained (Ridgebury and Leicester) and one very poorly drained (Whitman) soil developed on glacial till in depressions and drainageways in uplands and valleys. Their use interpretations are very similar, and they typically are so intermingled on the landscape that separation is not practical. The Ridgebury and Leicester series have a seasonal high water table at or near the surface (0-6") from fall through spring. They differ in that the Leicester soil has a more friable compact layer or hardpan, while the Ridgebury soils have a dense to very dense compact layer. The Whitman soil has a high water table for much of the year and may frequently be ponded.

The Raypol series consists of very deep, poorly drained soils formed in loamy over sandy and gravelly glacial outwash. They are nearly level to gently sloping soils in shallow drainageways and low-lying positions on terraces and plains. The soils have a water table at or near the surface much of the year.

NON-WETLAND SOILS

The non-wetland soils were not examined in detail, except as was necessary to determine the wetland boundary. Non-wetland soils consist of the Agawam series, the Ninigret and Tisbury complex, the Charlton-Chatfield complex, the Canton and Charlton complex, the Paxton and Montauk complex and the Hollis-Chatfield-rock outcrop complex.

The Agawam series consists of very deep, well drained soils formed in a loamy mantle over sandy, water deposited materials. They are level to steep soils on outwash plains and high stream terraces. Most areas are on slopes that are less than 15 percent. Steeper slopes are on terrace escarpments and steep sides of gullies in dissected outwash plains.

The Ninigret series consists of very deep, moderately well drained soils formed in loamy over sandy and gravelly glacial outwash. They are nearly level to strongly sloping soils on glaciofluvial landforms, typically in slight depressions and broad drainageways. The soil has a seasonal high water table.

The Tisbury series consists of very deep, moderately well drained loamy soils. They are nearly level and gently sloping soils on outwash plains and terraces, typically in slight depressions

and broad drainageways. Slope ranges from 0 to 3 percent. Permeability is moderate in the surface layer and subsoil and rapid or very rapid in the substratum. Tisbury soils are nearly level and gently sloping soils on terraces and outwash plains. The soils formed in a silty eolian deposits over stratified sandy and gravelly outwash materials derived from a variety of acid rocks.

The Charlton series is a very deep, well drained loamy soil formed in friable till. They are nearly level to very steep soils on till plains and hills. Depth to bedrock and the seasonal high water table is commonly more than 6 feet.

The Chatfield series consists of moderately deep, well drained, and somewhat excessively drained soils formed in till. They are nearly level to very steep soils on glaciated plains, hills, and ridges. Slope ranges from 0 to 70 percent. Crystalline bedrock is at depths of 20 to 40 inches. The soils formed in a moderately thick mantle of glacial till overlying granite, gneiss, or schist bedrock. Rock outcrops are rare to common and are limited to the more resistant bedrock.

The Canton series consists of very deep, well drained soils formed in a loamy mantle underlain by sandy glacial till. They are on nearly level to very steep glaciated plains, hills, and ridges. Slope ranges from 0 to 35 percent. Permeability is moderately rapid in the solum and rapid in the substratum. The soils developed in a fine sandy loam mantle over acid sandy glacial till of Wisconsin age derived mainly from granite and gneiss and some fine-grained sandstone.

The Hollis series consists of shallow, well drained and somewhat excessively drained soils formed in a thin mantle of glacial till derived mainly from gneiss, schist, and granite. They are nearly level to very steep upland soils on bedrock controlled hills and ridges. Depth to hard bedrock ranges from 10 to 20 inches. Bedrock outcrops vary from few to many.

The Paxton series consists of well drained loamy soils formed in subglacial till. The soils are very deep to bedrock and moderately deep to a densic contact (known locally as hardpan). They are nearly level to steep soils on till plains, hills, and drumlins. The depth to the densic contact and material is commonly 20 to 40 inches but the range includes 18 to 40 inches. Depth to bedrock is commonly more than 6 feet. Rock fragments range from 5 to 35 percent by volume.

The Montauk series consists of very deep, well drained soils formed in glacial till derived primarily from granitic materials. These soils are on upland till plains and moraines. Slope ranges from 0 to 35 percent. The landscape in some areas has many closed depressions, some of which are filled by perennial ponds or wet spots. The soils formed in thick moderately coarse or medium textured glacial till mantles underlain by firm sandy till. Some areas have very stony or extremely stony surfaces. The potential for runoff is low to high. Permeability is moderate or moderately rapid in the solum and slow or moderately slow in the substratum.

NOTES:

A sketch map illustrating the delineated wetlands is attached (see Figure 1). This map is intended for illustrative purposes only.

Respectfully submitted,

A handwritten signature in cursive script that reads "Eric Davison".

Eric Davison
Certified Professional Wetland Scientist
Registered Soil Scientist

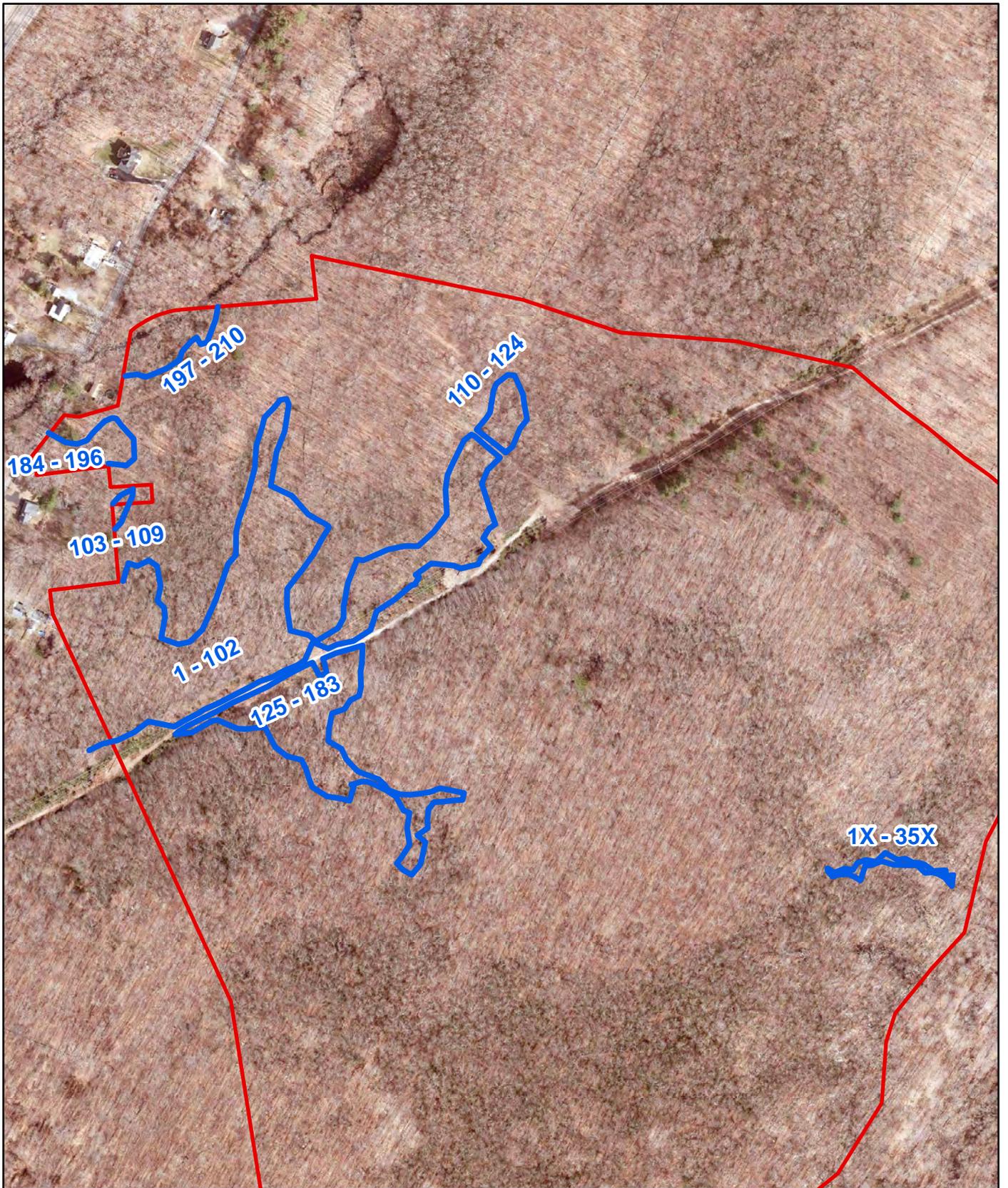
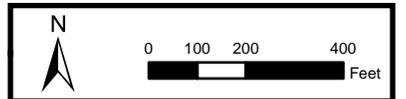


FIGURE 1
Aerial Map
Oil Mill Rd.
Waterford, CT

- Wetland Boundaries
- Parcel Boundary (Approx)

Orthophotography (2016) showing the approximate location of the parcel boundary as take from the CT parcel. Wetland locations as collected by Davison Environmental. This map is intended for general planning purposes only. It contains no authoritative data.



Davison Environmental, LLC
10 Maple Street
Chester, CT
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Appendix 3 – Site Photographs



Photo 1: Vernal Pool 1



Photo 2: Vernal Pool 2



Photo 3: Vernal Pool 3



Photo 4: Wetland 1



Photo 5: Wetland 1



Photo 6: Utility ROW



Photo 7: upland forest



Photo 8: upland forest



Photo 9: bedrock and boulder outcroppings occur throughout the site

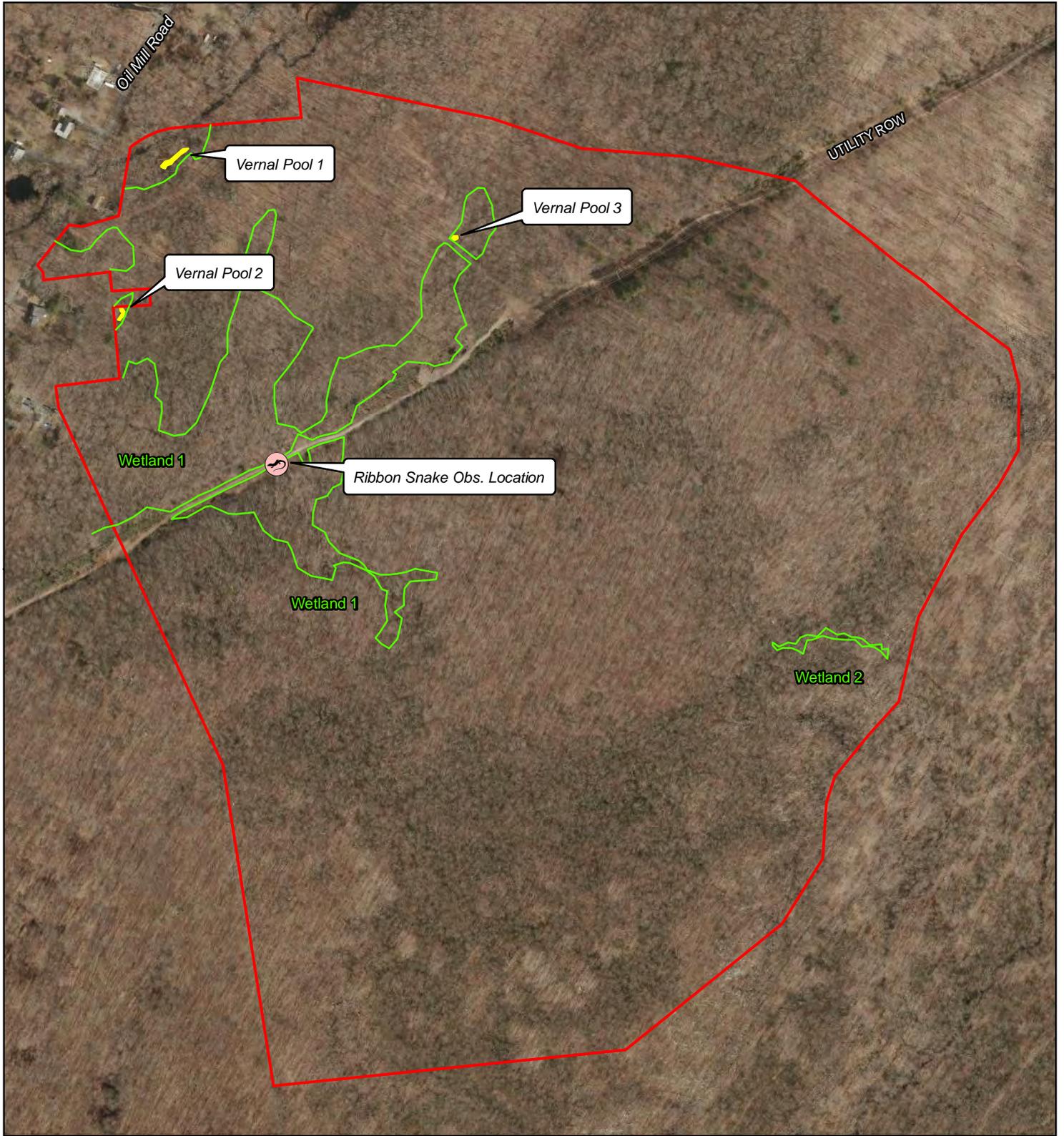


Figure 3:
Wetlands, Vernal Pools & Rare Species

Oil Mill Road
Waterford, CT

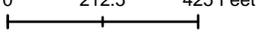
Legend

	Parcel Boundary		wetland boundary
	Vernal Pool		

Map Description
 The location and extent of features illustrated are approximate only. This map is intended for illustrative purposes only. It contains no authoritative data.

SCALE

0 212.5 425 Feet



N


Davison Environmental, LLC
 10 Maple Street
 Chester, CT 06412
 860-803-0938



DAVISON ENVIRONMENTAL



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

www.ct.gov/csc

VIA ELECTRONIC MAIL

August 24, 2018

TO: Parties and Intervenors

FROM: Melanie Bachman, Executive Director *NAB*

RE: **PETITION NO. 1347** – GRE GACRUX LLC petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed construction, maintenance and operation of a 16.78-megawatt AC solar photovoltaic electric generating facility located at 117 Oil Mill Road and associated electrical interconnection to Eversource Energy's existing substation at 325 Waterford Parkway North in Waterford, Connecticut.

Comments have been received from the Connecticut Department of Energy and Environmental Protection, dated August 20, 2018. A copy of the comments is attached for your review.

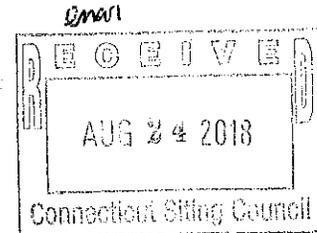
MB/RDM/lm

c: Council Members



August 20, 2018

Robert Stein, Chairman
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051



RE: 16.78 MW Solar Photovoltaic Electric Generation Facility
GRE GACRUX LLC
117 Oil Mill Rd, Waterford CT 06385
Petition No. 1347

Dear Chairman Stein:

The Department of Energy & Environmental Protection (DEEP) has reviewed the above referenced *Petition for Declaratory Ruling* for the installation and operation of a 16.78 megawatt AC ground-mounted solar photovoltaic electric generating facility and offers the following comments for your consideration.

GRE GACRUX LLC submitted this 16.78 MW project into the Small Scale Clean Energy Request for Proposals (RFP) issued by DEEP. Connecticut solicited and selected renewable energy projects pursuant to Section 1(b) of Connecticut Public Act 15-107, *An Act Concerning Affordable and Reliable Energy* (P.A. 15-107) and Sections 6 and 7 of Connecticut Public Act 13-303, *An Act Concerning Connecticut's Clean Energy Goals* (P.A. 13-303). Bringing grid-scale renewable energy projects on line is an important step forward towards a cheaper, cleaner, and more reliable energy future for the ratepayers of Connecticut. In the most recent legislative session, Connecticut committed to procuring 40% of its electricity from Class I renewable sources by 2030. Connecticut also committed to a mid-point reduction of carbon emissions of 45% below 2001 levels by 2035 on the way to attaining the state's longer term goal of an emissions reduction of 80% below 2001 levels by 2050. Grid scale renewable energy projects are essential to maintaining compliance with these statutory commitments. After reviewing all the projects submitted through the RFP process, DEEP selected the GRE GACRUX LLC project as one of the projects authorized to negotiate a long-term power purchase agreement with the utilities, Eversource Energy and The United Illuminating Company.

Site Visit

Field reviews of the site were conducted on June 29, 2018 and July 25, 2018. The parcel is an interior lot accessed by a dirt/gravel road off of Oil Mill Road. The zone for this area is rural residential, RU-120. The property consists of one parcel totaling 152.23 acres. Approximately

90 acres will be utilized for the project. At the time of the site visit a forest harvest was being conducted by the landowner. A plan for the harvest was submitted to the Town of Waterford by a Forester or Supervising Forest Harvester in January 2018 and accepted by the municipality. The Town of Waterford is monitoring the site for wetland impacts and wetland crossings.

The parcels contains wetlands, large bedrock outcrops and steep slopes. During the site visits, DEEP noted the steep topography, which ranges from approximately 100 feet to 250 feet. Discussions with the consultant for the proposed project during the site visit revealed that only cursory soils and geotechnical surveys were conducted, and further borings would be needed to determine constructability of the proposed stormwater detention basins.

Stormwater Management

Construction-related land disturbances of 0.5 acres or larger are regulated in Connecticut pursuant to the Connecticut Soil Erosion and Sediment Control Act under Sections 22a-325 to 22a-329, inclusive, of the Connecticut General Statutes (CGS). Construction-related land disturbances of one (1) acre or larger are also regulated under CGS Section 22a-430 and under Section 402(p) of the federal Clean Water Act and the National Pollutant Discharge Elimination System (NPDES) program. Construction projects involving five (5) or more acres of land disturbance require an individual NPDES discharge permit from DEEP, or may be eligible to register for coverage under DEEP's NPDES General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (general permit). DEEP has issued guidance for construction of solar farms for stormwater management dated September 8, 2017 (attached).

Approximately 90 acres of the site will be cleared for development, which involves clear cutting, grubbing, grading, top soil removal and replacement. Construction is anticipated to take 12 months beginning in spring 2019. The site is proposed to be constructed in 13 phases. The application states that hydroseeding will be done to stabilize each phase, however it does not state what methods will be used during winter, frozen ground conditions or during spring thaw. Given the compressed construction schedule, and that the site is proposed to be constructed in 13 phases, the timeframe does not allow for sufficient site stabilization in between each phase. DEEP has experienced adverse water quality impacts with three recent solar projects due to this type of aggressive construction schedule not allowing for adequate site stabilization and non-compliance with stormwater pollution control plans and other NPDES stormwater permit requirements, which resulted in the issuance of Cease and Desist Orders to those entities. DEEP strongly advises planning for a longer construction schedule to appropriately address each phase with stormwater controls and stabilization methods, and provide time for prompt implementation of corrective actions if needed. Also, since a forest harvest was being conducted by the landowner prior to development, should significant soil disturbance occur as a result of the harvest, DEEP may require site stabilization to be established prior to authorizing the commencement of any construction activities at the site. Such soil disturbances can reasonably be expected to increase soil erosion and sedimentation on and off the site prior to construction. As a component of the permitting process, DEEP may require the applicant to hire an independent third party to oversee and verify compliance with stormwater management requirements during construction.

Stormwater Discharge and Infiltration

In post-construction conditions, smooth surfaces are created through grading and vegetation that were not present in pre-construction conditions, in which there are rocks, depressions and a

variety of vegetation, roots and soils. Those types of pre-construction characteristics can trap, slow down and infiltrate runoff. On the contrary, in post-construction conditions, the smoothed surfaces can increase velocity on the sloped areas of this site. The petition should address potential measures to mimic pre-construction conditions in order to slow water down and allow for infiltration to control stormwater discharge peak flowrates and velocity and total stormwater volume. The petitioner needs to ensure the design factors smooth surfaces, compacted soils, soil types, slopes and bedrock into the calculations for pre-construction, during construction and post-construction design flows, velocities and volume. Also, a detailed geotechnical study of the site should be completed to verify constructability and size of the drainage basins and level spreaders indicated on the site plans.

In addition, removing topsoil from the site creates a loss in organic matter required for plant growth necessary for long term site stabilization. If the topsoil is not replaced or is mixed with subsoil, full vegetation may not occur in a year and could take a few years to stabilize. The applicant should address long term stabilization and site monitoring to fix bare patches by adding topsoil or re-seeding hard to grow areas.

Finally, a road network is proposed along the perimeter on rock outcrops, ledge and steep drop offs. Water runoff on this site will be changing from land overflow to point discharge. Detention basins are proposed along the perimeter to account for the runoff and allow sheet flow with the use of level spreaders. However, these level spreaders are on the property line. The site plans do not show the topography or location of the receiving waters for these level spreaders, and there are no notes indicating how these areas off site will be restored if erosion and sedimentation controls were to fail. Permission may be required from neighboring property owners to allow concentrated discharge onto their property.

Watershed

The petition lacks recognition of the current hydrologic connections of this proposed development site to the shared watersheds of Stony Brook and Oil Mill Brook, or to their individual water quality assessments. This watershed contains a high water quality stream system as supported by over ten years of water quality data from DEEP, the U.S. Geological Survey, the local Niantic River Watershed Committee, as well as stream macroinvertebrate data, and recent cold and cool water fisheries population and habitat evaluations. The Petition documents do not appear to sufficiently evaluate the proposed stormwater management systems for potential thermal and sediment impacts to downstream aquatic resources or describe any measures to mitigate any such potential adverse water quality impacts.

A DEEP approved watershed-based plan was developed for the full Niantic River watershed in 2006 (Niantic River Watershed Plan), followed by a Guided Summary in 2009. Oil Mill Brook and Stony Brook each are currently assessed as Fully Supporting for Aquatic Life use designation, and a pending 2018 assessment should be available in early fall 2018. Stony Brook and Oil Mill Brook are two of the three main freshwater tributaries that feed into the Niantic River estuary and are classified as Class A waters which have the potential to meet the criteria for drinking water as well as provide fish and wildlife habitat. Stony Brook and Oil Mill Brook are estimated to provide one third of the annual nitrogen load from surface fresh waters entering the nutrient-over enriched estuary. The Niantic River estuary is a DEEP priority coastal embayment for watershed restoration action planning by 2022. A tremendous amount of research, data collection and synthesis into nutrient loading and cycling within the Niantic River

watershed and the estuary connections with Long Island Sound is well documented and is currently supporting the development of that DEEP action plan.

The Niantic River does not currently meet water quality standards because of high levels of indicator bacteria and observed degradation of aquatic life. The *List of Impaired Waters* states that the water quality of the Niantic River is not supporting the aquatic life known to inhabit the estuary. The ecological changes are thought to be caused by excessive nutrients entering the river. Stormwater runoff transports pollutants off land into the many tributaries feeding the Niantic River. Polluted runoff is the greatest water quality management challenge for the Niantic River watershed and it is the most manageable of all potential sources of pollution to the river. One of the key findings in this study was the number of storm sewer outfalls directly discharging untreated water into the Niantic River. Though the location of this project is upstream of the River, it is adjacent to the Stony Brook and Oil Mill Brook tributaries. The site plans provided do not show the topography or location of the receiving waters in the various discharge points along the site. In addition, there is not an opportunity for infiltration in the plans. Stormwater management should be designed so there is not an increase in total volume of water or pollutants leaving the site. Erosion and sedimentation controls should be a priority at this location. Effectively managing nonpoint sources relies on land use management and efficiency of stormwater practices.

Wetlands

In the Wetland and Biological Assessment Report submitted by the applicant, the soil scientists indicate that the wetlands identified as 1 and 2 are hillside groundwater slope wetlands. These wetlands develop on hillsides where groundwater discharges to the surface as springs and seeps. The soil scientists noted that the seeps are visible in the upland/wetland interface, and that a key feature for water quality is the pronounced bedrock and boulder outcrops where cold, well-oxygenated groundwater discharges from fractures in bedrock. Before upland activities take place such as breaking up the rock outcrops for grading and leveling for construction, the effect on wetland hydrology must be addressed.

Wildlife

This site does not fall in an existing Natural Diversity Database area, but it is likely this location has never been surveyed. The location of the special concern species, the Eastern ribbon snake, and the biological assessment have been furnished to DEEP's Wildlife Division. The wildlife assessment was generally based on habitat with a focus on vernal pools and not on detailed surveys which may have identified state listed plants, presence/absence of bats or other animals, and state listed insects in the area. Breeding bird surveys were not conducted, though avian species were observed when the biologists were at the site. Given the lack of available information, it is recommended that a comprehensive wildlife survey be conducted at the site.

Core Forest

State of Connecticut Public Act 17-218, requires DEEP and the Siting Council to consider the impact of certain proposed energy-related projects on the environment, prime farmland or forest land, or agriculture, before allowing them to proceed. The Act's requirements for solar facilities do not apply to facilities that DEEP selected in solicitations issued before July 1, 2017. While this project is exempt from requiring a letter from DEEP that the project will not materially affect the land's status as core forest, impacts to core forest should be addressed in the petition. Core forest is defined as unfragmented forest land that is at least 300 feet from the boundary between forest land and non-forest land, as determined by the DEEP commissioner.

This proposed project site is 150 acres of undeveloped land. The interior area of this parcel would be defined as core forest using the 300 feet from a non-forested area. Land surrounding this parcel is currently undeveloped forestland zoned as General Industrial and Rural Residential 120. As previously noted in the Site Visit section above, at the time of the site visit, a forest harvest was being conducted by the landowner. A harvested area creates valuable habitat and does not diminish the value of the greater core forest. By creating such early succession habitat, many species of Greatest Conservation Need will benefit for more than fifteen years.

Errata:

1. Several site plan sheets are missing from the application's grading and site utilities sections (G4, SU 4,7,8,9,11,12).
2. The Landscape notes on page LL-17 of site plans follow typical seeding and planting plans that may not apply to a solar application. For example several of the notes refer to the planting and staking of evergreen and deciduous trees. The applicant should clarify if trees are scheduled to be re-planted on the site without potentially shading panels.
3. The Site Work, General Notes section (GN-1) states the agent from the Town of Waterford is responsible for marking the clearing limits. The Town of Waterford does not have jurisdiction over this project. The applicant and contractors are the responsible parties. While these notes could apply to a variety of construction projects, they should be revised to the specific construction for solar projects. There is no mention of the use of a tackifier or erosion control blankets with site stabilization methods, and note #32 on how the wetlands are marked in the field is incomplete.
4. Cover page, Volume 1, states Watertown instead of Waterford
5. Cover page for Appendix E is the Stormwater System Operation and Maintenance Plan, but the plan is labeled as Appendix F.
6. Appendix F states water quality volume and release rates have been omitted from this report due to lack of impervious surfaces. This requires further explanation due to the rock/ledge on site, existing gravel roads and proposed improved gravel roads, as well as creating smooth surfaces in post-construction, and accounting for soil compaction during construction.

Thank you for the opportunity to review this project. If there are any questions regarding these comments, please contact me at 860-424-3739 or Linda.Brunza@ct.gov if there are any questions.

Respectfully yours,

Linda Brunza

Linda Brunza
Environmental Analyst

Cc: Robert Klee, Commissioner

Stormwater Management at Solar Farm Construction Projects September 8, 2017

Solar farms are on-the-ground installations of arrays of photovoltaic cell panels, supporting structures and related equipment for the production of electricity. As with other types of construction projects, the construction of solar farms can involve land clearing, grading, excavation, trenching, dewatering and similar activities that create land disturbances which potentially result in soil erosion and sediment discharges polluting wetlands, streams and other surface waters. Construction-related land disturbances of 0.5 acres or larger are regulated in Connecticut pursuant to the Connecticut Soil Erosion and Sediment Control Act under Sections 22a-325 to 22a-329, inclusive, of the Connecticut General Statutes (“CGS”). Construction-related land disturbances of one (1) acre or larger are also regulated under CGS Section 22a-430 and under Section 402(p) of the federal Clean Water Act and the National Pollutant Discharge Elimination System (“NPDES”) program. Prior to the start of such regulated activities, authorization is required from local authorities and, for larger projects, the Connecticut Department of Energy and Environmental Protection (“Department”). Construction projects involving five (5) or more acres of land disturbance require an individual NPDES discharge permit from the Department, or may be eligible to register for coverage under the Department’s NPDES General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (general permit).

The Department has encountered repeated problems associated with solar farm construction projects covered under the general permit, from the registration process through construction activities. Although in no way an exhaustive list, the following are common problems associated with solar farm general permit registration applications and ways to address such problems:

- Applicants have been submitting registration applications that lack the requisite information or the requirements necessary for authorization under the general permit. The Department requires a complete and sufficient application when a registration application is filed, and may reject any registration application it deems to be incomplete or insufficient.
- Applicants are not adhering to the sixty (60) day/ninety (90) day time frame for Department review as required by Section 3(c) of the general permit. While the Department has on occasion shortened the review timeframe, Applicants are expected to allocate no less than the requisite time frame for the registration application review process and must plan accordingly.
- Registration applications for solar farm projects often fail to identify the project’s contractor and sub-contractors. Section 5(b)(1)(viii) of the general permit mandates that this information be included in the registration application.

- Applicants have been repackaging the Siting Council submittal, which is not acceptable. Section 3(c)(2)(D) of the general permit mandates that the application submittal include only materials required to support the Stormwater Pollution Control Plan (“SWPCP”). This information must be up-to-date and accurate. Any superfluous information delays the registration application review process.
- SWPCPs for solar farm projects are often lacking sufficient detail and information. An approvable SWPCP shall include, but not be limited to, the location of all erosion, sediment and stormwater control measures including detailed design cut sheets with supporting calculations, construction means and methods, project phasing (i.e., site planning, pre-construction, construction, and post-construction stabilization, etc.), construction sequencing and a construction schedule.
- The Applicant’s design professional must be well-versed in the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (“E&S Guidelines”), specifically the techniques found in Chapter 4, Large Construction Sites, the 2004 Connecticut Stormwater Quality Manual, as well as *current* best management practices (BMPs) recognized by the International Erosion Control Association (IECA), provided such BMPs are equal to or better than the E&S Guidelines.
- From the Department’s perspective, an approvable SWPCP will include methods for avoiding compaction of soils, disconnection and reduction of runoff associated with solar panel arrays, avoidance of concentration of stormwater, and other measures necessary to maintain or improve pre-construction hydrologic conditions.
- Applicants need to follow the SWPCP review checklist when preparing the SWPCP, giving specific attention to post-construction stormwater controls and the development of a detailed long-term maintenance plan to ensure that the SWPCP meets the terms and conditions of the general permit.

Subsequent to authorization for coverage under the general permit, the Registrant is responsible for ensuring compliance with all terms and conditions of the general permit and the approved SWPCP once construction has been initiated. However, for solar farm projects, Registrants often fail to comply with the terms and conditions of the general permit, including the approved SWPCP. In particular, Department staff have observed the following issues that a routine inspection protocol and proper oversight, as required under the general permit, would have prevented, including but not limited to:

- pre-construction site planning and management deficiencies (e.g., existing vegetation, scheduling, training, phasing/sequencing, tree protection, etc.)
- ineffective placement, maintenance, and/or repair of administrative/procedural, vegetative, and structural BMPs (e.g., erosion, sediment and stormwater runoff controls, good housekeeping, materials management, and training)
- lack of thorough inspections
- ineffective or untimely corrective action
- ineffective stabilization practices
- ineffective permanent post-construction controls (i.e., store, treat and direct stormwater quality and quantity to pre-construction levels)

Such issues at solar farm construction projects raise concerns, since such projects often create areas of land disruption larger than the generally accepted BMPs of five (5) acres anticipated under the general permit. As a result, any applicant seeking coverage under the general permit

for a solar farm construction project should take care to address the issues noted above. While by no means exclusive, some recommendations that should be incorporated into a SWPCP to address these issues include:

- Ensuring that only a Professional Engineer and/or Landscape Architect, as defined in Section 2 of the general permit, who meets the qualifications described in Section 5(b)(4)(A)(ii) and who has been approved in writing by the Commissioner, serve as the Commissioner's agent to inspect the site and also serve as the qualified inspector for the purposes of Section 5(b)(4) of the general permit ("authorized professional"). Such authorized professional must remain in good standing with the Connecticut Department of Consumer Protection and be technically and ethically qualified to inspect the site and be retained for the duration of the construction project until the Notice of Termination acceptable to the Commissioner has been filed as described below.
- Ensuring that the authorized professional prepare a proposed inspection checklist to assure the construction project is being conducted in compliance with the terms and conditions of the general permit, and the approved SWPCP is implemented in accordance with the general permit. The inspection checklist shall comply with Section 5(b)(4)(B)(iii) of the general permit, and include a space for the authorized professional's signature and professional stamp.
- Ensuring that the credentials for the authorized professional proposed by the Applicant and the proposed inspection checklist prepared by such authorized professional be submitted for the review and approval of the Commissioner and be included with the registration application for the general permit. No other professional may serve as the authorized professional without the prior submittal of relevant credentials and inspection checklist for the Commissioner's review and written approval.
- Ensuring that the authorized professional personally perform all pre-construction, construction, and post-construction site inspections; perform inspections at the end of any storm event whether or not such storm generates a discharge; and prepare and submit all inspection reports including the supporting inspection checklists in compliance with Sections 5(b)(4)(A) and 5(b)(4)(B) of the general permit.
- Ensuring that the authorized professional report any violations of the terms and conditions of the general permit or the SWPCP to the Commissioner's designee within two (2) hours of becoming aware of such violation, or at the start of the next business day of becoming aware of such violation outside normal business hours and shall, within five (5) days, prepare and submit a signed and stamped written report, which documents the cause of the violation, duration including dates and times, and corrective action taken or planned to prevent future occurrences.
- Ensuring that if circumstances necessitate a revision to the SWPCP, the authorized professional works with the Permittee's design professional to ensure compliance with the terms and conditions of the general permit, and any such change to the SWPCP shall be submitted for the review and written approval of the Commissioner.
- Ensure that the authorized professional reviews all stormwater monitoring reports to evaluate the effectiveness of the SWPCP and to document any adverse impacts that any stormwater controls on the construction site or discharges from the construction site may have on wetlands, streams, any other receiving waterbodies. Such evaluation shall be documented in the inspection reports and inspection checklists performed pursuant to Section 5(b)(4) of the general permit.

- Ensuring that, in the event the authorized professional identifies a violation of the terms and conditions of the general permit, the SWPCP, or otherwise identifies adverse impacts on wetlands, streams or any other receiving waterbodies, that construction activity shall immediately cease and the site stabilized until such violation or adverse impacts have been corrected.
- Ensuring that reporting and record-keeping of all inspection checklists and inspection reports comply with the requirements of Section 5(d) of the general permit, except that a copy shall also be submitted electronically to the Department within ten (10) days from the date such inspection was performed.
- Ensuring that all inspection checklists and inspection reports comply with the requirements for Certification of Documents in Section 5(i) of the general permit, including the requirement that such checklists and reports shall also be prepared, stamped and signed by the authorized professional.
- After completion of a construction project, ensuring that a Notice of Termination is filed in compliance with Section 6 of the general permit, including the requirement that such Notice of Termination be stamped and signed by the authorized professional certifying that such authorized professional has personally inspected and verified that the site has been stabilized following the first full growing season (i.e., April through October) in the year following completion of the construction project.
- Ensuring that any transfer of the registration comply with the requirements of Section 5(m) of the general permit.

These recommendations are by no means intended to be exclusive. To help address the issues noted above, the Commissioner will also be considering the posting of a performance bond or other security, in accordance with Section 22a-6(a)(7) of the Connecticut General Statutes, to assure the solar farm construction project maintains compliance with the terms and conditions of the general permit and the SWPCP.



Memorandum

To: Ms. Dawn M. McKay
CTDEEP
Natural Diversity Database Program
79 Elm Street
Hartford, CT 06106-5127

Date: October 2, 2019

Project #: 42496.00

From: Jeffrey Shamas, PWS, CE, CSS

Re: 2019 Rare Species Survey Summary
16.78 MW-AC Solar Project (GRE Gacurux LLC)
117 Oil Mill Road, Waterford, Connecticut

GRE Gacurux, LLC is proposing development of an approximately 78-acre, 15.8-megawatt AC photovoltaic electric generating facility in Waterford, CT (the Project). The Project has been sited on an approximately 150-acre property with frontage on Oil Mill Road, northeast of the I-395/I-95 interchange (the Site; see Figure 1).

The CTDEEP and Connecticut Siting Council have requested that wildlife surveys for several state-listed be conducted throughout the Site as part of the pre-construction environmental due-diligence and permitting for the Project. A July 5, 2019 letter from the CT DEEP Natural Diversity Data Base (NDDDB) indicated that field surveys should be conducted for eight state-listed species from three taxonomic groups. Table 1 lists the state-listed species that were requested for evaluation on the Site.

Table 1 State-listed Species Targeted for Survey

Taxonomic Group	Scientific Name	Common Name	Connecticut Status
Vascular Plant	<i>Aristida longespica var. geniculata</i>	Needlegrass	Special Concern
Vascular Plant	<i>Isotria medeoloides</i>	Small Whorled Pogonia	Endangered (US Threatened)
Vascular Plant	<i>Polygala nuttallii</i>	Nuttall's Milkwort	Threatened
Reptile	<i>Clemmys gutatta</i>	Spotted Turtle	Special concern
Reptile	<i>Opheodrys vernalis</i>	Smooth Green Snake	Special concern
Reptile	<i>Terrapene carolina carolina</i>	Eastern Box Turtle	Special concern
Reptile	<i>Thamnophis sauritus</i>	Eastern Ribbon Snake*	Special concern
Bird	<i>Caprimulgus vociferus</i>	Whip-poor-will	Special concern

According to the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool, federally-listed species that may occur of the Project Site, and/or may be affected by the project include Small Whorled Pogonia (*Isotria medeoloides*) and Northern Long-eared Bat (*Myotis septentrionalis*; see Attachment 1 USFWS Consultation Response Letter dated September 17, 2019).

100 Great Meadow Road
Suite 200
Wethersfield, CT 06109-2377
P 860.807.4300

On behalf of GRE Gacrux, LLC, VHB's environmental scientists surveyed the Site for state and federally-listed plants and state-listed birds during May, June, August, and October 2019. Northern Long-eared Bat surveys were not conducted because NDDDB did not identify this species as potentially occurring on the site.

A summary of site conditions and the survey methodologies and findings of VHB's investigations are presented below.

Site Description

Much of the Site was recently logged and contains a network of access roads and skidder roads. Unlogged areas include successional forest, mature hardwood forest, and freshwater wetlands. An electrical transmission corridor bisects the Site in a southwest to northeast alignment. Several stone walls were observed on the Site or along the boundaries of the site. Rolling to moderately-steep topography generally slopes up to a ridge located along the southeastern Site boundary. Rocks and boulders are abundant throughout the Site and rock outcrops and ledges exist along the southeastern ridge. Five general vegetation cover types exist throughout the Site: recently logged uplands, upland forest, wetlands, electrical transmission right-of-way, and disturbed access roads.

Land use surrounding the Site is largely undeveloped forest in all cardinal directions, except for sparse residential development along Oil Mill Road to the northwest (see Figure 2). Portions of the forest located to the southeast of the Site have been recently logged. Oil Mill Brook skirts the northeast corner of the Site and Stony Brook is located approximately 500 feet to the east of the Site.

Recently Logged Uplands

Recently logged uplands are the dominant vegetation cover type on the Site. Much of the canopy has been removed and only scattered copses and solitary trees exist within the deforested area (see Photos 1-4). Recently logged upland areas that do not contain abundant woody debris (fallen trees, logs, branches, slash, and wood chips) currently exhibit growth by disturbance-tolerant species. Dominant vegetation within the recently logged uplands includes American burnweed (*Erechtites hieraciifolius* var. *hieraciifolius*), hay-scented fern (*Dennstaedtia punctilobula*), bladder-pod lobelia (*Lobelia inflata*), Swan's sedge (*Carex swanii*), Pennsylvania sedge (*Carex pennsylvanica*), rushes (*Juncus secundus* and *J. tenuis*), great plains flatsedge (*Cyperus lupulinus*), blackberries (*Rubus* spp.), and mountain laurel (*Kalmia latifolia*).

Upland Forest

A stand of sub-mature upland forest exists in the northeastern Site. This area contains young trees having low diameters at breast height (see Photo 5). The understory contains sparse shrub and ground cover. Dominant species include black birch (*Betula lenta*), red maple (*Acer rubrum*), black cherry (*Prunus serotina*), hay-scented fern, and roundleaf greenbrier (*Smilax rotundifolia*), and Canada-mayflower (*Maianthemum canadense*).

Areas of mature forest, with canopies comprised of black birch, oaks (*Quercus* spp.), American beech (*Fagus grandifolia*), shagbark hickory, and hop-hornbeam (*Ostrya virginiana*) exist in the southeastern portions of the Site. In general, the forest understory is comprised of dense heath cover [mountain laurel (*Kalmia latifolia*), black huckleberry (*Gaylussacia baccata*), lowbush blueberry (*Vaccinium angustifolium*) (see Photos 6 and 7). The rocky outcrops, ledges, and slopes along the southeastern ridge, however, contain a diverse understory with several rich woods species such

as woodland agrimony (*Agrimonia rostellata*), wood violet (*Viola palmata*), perfoliate bellwort (*Uvularia perfoliata*), northern maidenhair fern (*Adiantum pedatum*), black-seeded spear grass (*Piptochaetium avenaceum*), Bosc's rosette-panicgrass (*Dichantherium boscii*), hairy wood brome (*Bromus pubescens*), nodding fescue (*Festuca subverticillata*), and southern long-awned wood grass (*Brachyletrum erectum*; see Photo 8).

Wetlands

A large wetland complex exists in the northern portion of the Site. The northern wetlands are associated with or drain towards Oil Mill Brook via rocky seeps and intermittent drainages. A small, hillside seep that drains to the east toward Stony Brook exists along the eastern property boundary. Wetland areas are primarily forested, except those that occur within the transmission line right-of-way. Wetland understory composition is somewhat variable containing areas of sparse shrub and herbaceous vegetation, to shrubby thickets, and areas of dense graminoid growth (see Photos 9-12).

Dominant wetland vegetation includes red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), coastal sweet-pepperbush (*Clethra alnifolia*), northern spicebush (*Lindera benzoin*), common winterberry (*Ilex verticillata*), cinnamon fern (*Osmundastrum cinnamomeum*), spinulose wood fern (*Dryopteris carthusiana*), skunk-cabbage (*Symplocarpus foetidus*), sedges (*Carex* spp.), sweet wood-reed (*Cinna arundinacea*). Wetlands located within the electrical transmission right-of-way also contain hydrophytes such as speckled alder (*Alnus incana*), climbing hempvine (*Mikania scandens*), broad-leaved cat-tail (*Typha latifolia*), and common reed (*Phragmites australis*).

Electrical Transmission Right-of-way

The electrical transmission right-of-way lacks tree canopy species and contains shrubby thickets interspersed with meadow-like habitat (see Photos 13-15). An access road extends along the right-of-way length. Vegetation is comprised of a mix of native and non-native weedy species. Dominant shrub and vines include mountain laurel, multiflora rose (*Rosa multiflora*), common blackberry, American hazelnut (*Corylus americana*), roundleaf greenbrier, and Asiatic bittersweet (*Celastrus orbiculatus*). The more open meadow areas contain little bluestem (*Schizachyrium scoparium*), poverty grass (*Danthonia spicata*), goldenrods (*Euthamia* spp. and *Solidago* spp.), and several members of the pea family including garden bird's-foot-trefoil (*Lotus corniculatus*), round-headed and hairy bush-clovers (*Lespedeza capitata* and *L. hirta*), clovers (*Trifolium* spp.), and round-leaved trailing tick-trefoil (*Desmodium rotundifolium*). Other weedy species associated with the right-of-way access road are listed below.

Disturbed Access Roads

The site contains a network of access roads and skid roads. Most of the access roads are topped with stone, gravel or wood chips while the skid roads have vehicle tracks through the native soils (see Photos 16-18). Vegetation within and along the various roads are limited to weedy, disturbance-tolerant species such as Japanese stiltgrass (*Microstegium vimineum*), Oriental lady's-thumb smartweed (*Persicaria longisetata*), hairy crabgrass (*Digitaria sanguinalis*), Japanese-clover (*Kummerowia striata*), flat-stemmed blue grass (*Poa compressa*), common wormwood (*Artemisia vulgaris*), Chinese foxtail (*Setaria faberi*), tufted lovegrass (*Eragrostis pectinacea*), slender bentgrass (*Paspalum setaceum* var. *setaceum*), tufted hair-sedge (*Bulbostylis capillaris*), and threeawn/needlegrass (*Aristida* sp.). Hydrophytes such as common woolsedge (*Scirpus cyperinus*), mosquito bulrush (*Scirpus hattorianus*), brownish beaksedge (*Rhynchospora capitellata*), dwarf St. john's-wort (*Hypericum mutilum*), and lesser St. John's-wort (*Hypericum canadense*) were also observed within rutted skid roads.

Vascular Plant Survey Methodology

VHB Senior Ecologist, Brett Trowbridge, conducted visual, walking, surveys for Needlegrass (*Aristida longespica* var. *geniculata*), Small Whorled Pogonia, and Nuttall's Milkwort (*Polygala nuttallii*) throughout the Project Site on August 1, 2, 14, 15, 19, and October 1, 2019. Pertinent field notes, including a list of observed vascular plant species were recorded during surveys and representative photographs taken. In general, rocky outcrops, logging haul roads, cart paths, and the electrical transmission line access roads were specifically targeted for Needlegrass and Nuttall's Milkwort. Formerly forested areas and upland woods, including the margins of wetland areas, were targeted for Small Whorled Pogonia.

Vascular Plant Survey Findings

State or federally-listed vascular plants were not detected on the Project Site during six 2019 survey days. Over 300 taxa were observed and the list of observed vascular plant species is presented within Attachment 4.

Aristida dichotoma, a non-regulated congener and common species that often grows with Needlegrass, was somewhat common within the electrical transmission line access roads (see Photo 19).

Indian Cucumber (*Medeola virginiana*), which has a similar gestalt to Small Whorled Pogonia, was observed in a few areas throughout the site, primarily within wooded areas adjacent to streams and wetlands. Orchid observations on the Site included the little club-spur bog-orchid (*Platanthera clavellata*) and a purple fringed bog-orchid (*P. grandiflora* or *P. psycodes*), both observed within forested wetlands.

Blood milkwort (*Polygala sanguinea*), a congener of Nuttall's Milkwort with larger sepals and wider racemes, was observed within sandy disturbed soil of the electrical transmission right-of-way (see Photo 20).

Invasive plants observed on the Site include tree-of-heaven (*Ailanthus altissima*), Japanese barberry (*Berberis thunbergii*), Asiatic bittersweet, autumn-olive (*Elaeagnus umbellata*), burning-bush (*Euonymus alatus*), Japanese honeysuckle (*Lonicera japonica*), Japanese stiltgrass, Oriental lady's-thumb smartweed, common reed, flat-stemmed blue grass, multiflora rose, and common sheep sorrel (*Rumex acetosella*).

Reptile Survey Methodology

Dedicated surveys or trapping for Spotted Turtle, Smooth Green Snake, Eastern Box Turtle, and Eastern Ribbon Snake were not conducted. However, during botanical survey transects throughout the Site Mr. Trowbridge conducted a habitat evaluation for each target species and maintained awareness that rare herpetological observations were possible. Approximately, 42 survey hours were conducted during the five survey days (August 1, 2, 14, 15, 19, and October 1, 2019). Surveys were conducted between 8:00 AM and 7 PM during sunny or cloudy conditions.

Reptile Survey Findings

State-listed reptiles were not observed during the 2019 surveys. Observed herptiles included green frogs and wood frogs, including recently metamorphosed yearlings (see Photo 21). These observations were primarily made within or near wetland areas.

The Site lacks suitable primary habitat for Spotted Turtles (*Clemmys gutatta*). Although pockets of water may exist during spring high-water conditions, the wetlands on the Site generally drain to the northwest and do not appear to flood to suitable depths or contain emergent hummocks to support overwintering by Spotted Turtles. The onsite wetland features offer suitable migration habitat for this species and the pockets of water that have been demonstrated by others to provide suitable vernal pool breeding habitat, could provide spring foraging opportunities for Spotted Turtles.

The Site's mosaic of cleared areas, sunny thickets, copses, wetlands, and forest provides a diversity of microhabitats for potential use by Eastern Box Turtles (*Terrapene carolina carolina*), including basking, migration, and feeding on berries, mushrooms, and invertebrates. Upland forest or recently cleared uplands provide suitable overwintering opportunities for this species. The open access roads and areas with piles of wood chips provide suitable nesting habitat for both Spotted and Eastern Box Turtles (see Photo 22).

The Site's shallow wetlands and open areas offer suitable foraging, migration, and basking habitat for Smooth Green (*Opheodrys vernalis*) and Ribbon Snakes (*Thamnophis sauritus*). Open upland areas of Site offer suitable nesting and birthing habitat for both species, respectively. Overwintering habitat also exists within rock crevices and upland burrows.

Bird Survey Methodologies

General breeding bird surveys and dedicated aural surveys (call-response) for Whip-poor-will (*Caprimulgus vociferous*) were conducted on the Site. To ensure that seasonal windows for species identification were not missed, the general breeding bird surveys were conducted on May 21, 2019 and June 14, 2019, prior to receiving a response from the CTDEEP NDDB. When the July 5, 2019 NDDB response letter was received, VHB shifted survey efforts to focus specifically on Whip-poor-wills.

Breeding Bird Survey Methodology

An inventory of potential breeding birds was developed based on information from survey point counts and field observations, the Atlas of Breeding Birds of Connecticut (Bevier ed. 1994), New England Wildlife (DeGraaf and Yamasaki 2001), and NDDB data. Survey point counts for breeding birds were conducted by VHB biologists, Jeffrey Peterson and Chelsea Glinka on May 21, 2019 and June 14, 2019.

Eastern Whip-poor-will Surveys

Two nighttime call-response surveys for the eastern Whip-poor-will (*Caprimulgus vociferous*) were conducted by VHB biologists, Jeffrey Peterson and Maggie Murphy during clear conditions on June 24, 2019 and July 16-17, 2019. The surveys were conducted by listening at various locations throughout the Site. Survey locations, which are also presented within Figure 3, were accessed via walking. At each location, the biologists engaged in three minutes of silent listening, followed by six minutes of alternating between playing a whip-poor-will call recording and silent listening.

The June survey was conducted between the hours of 1:18 AM and 4:18 AM with a waning gibbous moon phase (59.4 percent illumination). Temperatures were in the high-70's with high humidity and call-response sampling occurred at five locations.

The July survey was conducted on July 16 into July 17, 2019 between the hours of 9:00 PM to 2:00 AM under a full moon. The temperatures were in the mid-70's with high humidity. Call-response sampling occurred at nine locations.

Bird Survey Findings

A list of potential and observed breeding bird species is provided in Attachment 5.

Whip-poor-wills were not detected during VHB's surveys, however, the woodlands on and near the Site provide suitable nesting habitat and the clearings on the Site offer suitable foraging and mating habitat.

Conclusions

The 98-acre Site contains various habitats suitable for several state-listed species. However, during several days and nighttime surveys, VHB's biologist did not detect the NDDB-targeted plant and animal species (see Table 2).

Table 2 State-listed Species Survey Summary

Scientific Name	Common Name	Suitable Habitat Present	Detected During 2019
<i>Aristida longespica var. geniculata</i>	Needlegrass	Yes	No
<i>Isotria medeoloides</i>	Small Whorled Pogonia	Yes	No
<i>Polygala nuttallii</i>	Nuttall's Milkwort	Yes	No
<i>Clemmys gutatta</i>	Spotted Turtle	Secondary habitat only	No
<i>Opheodrys vernalis</i>	Smooth Green Snake	Yes	No
<i>Terrapene carolina carolina</i>	Eastern Box Turtle	Yes	No
<i>Thamnophis sauritus</i>	Eastern Ribbon Snake*	Yes	No
<i>Caprimulgus vociferus</i>	Whip-poor-will	Yes	No

References:

- Bevier, L. R. (Ed.). Atlas of Breeding Birds of Connecticut. 1994. Bulletin 113. State Geological and Natural History Survey of Connecticut. 461 p.
- DeGraaf, R.M. and Yamasaki, M. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH.
- Fusco, Paul. July/August 2013. Invisible bird of the forest: The eastern whip-poor-will. Connecticut Wildlife. Connecticut Department of Energy and Environmental Protection: Bureau of Natural Resources Wildlife Division. Accessed June 11, 2019.
- Klemens, M. W. 1993. Amphibians and reptiles of Connecticut and adjacent regions. State Geological and Natural History Survey of Connecticut, Bulletin No. 112, Connecticut Department of Environmental Protection, Hartford, CT.
- Moon phases and lunar calendar for Waterford, CT. The Old Farmer's Almanac. <https://www.almanac.com/astronomy/moon/calendar/zipcode/06385/2019-06#>. Accessed June 11, 2019.
- U.S. Fish and Wildlife Service. Official Species Consultation. Information for Planning and Consultation. <https://ecos.fws.gov/ipac/>. Accessed September 17, 2019.
- Veit, R.R. and Peterson, W.R. 1993. Birds of Massachusetts. Natural History of New England Survey.

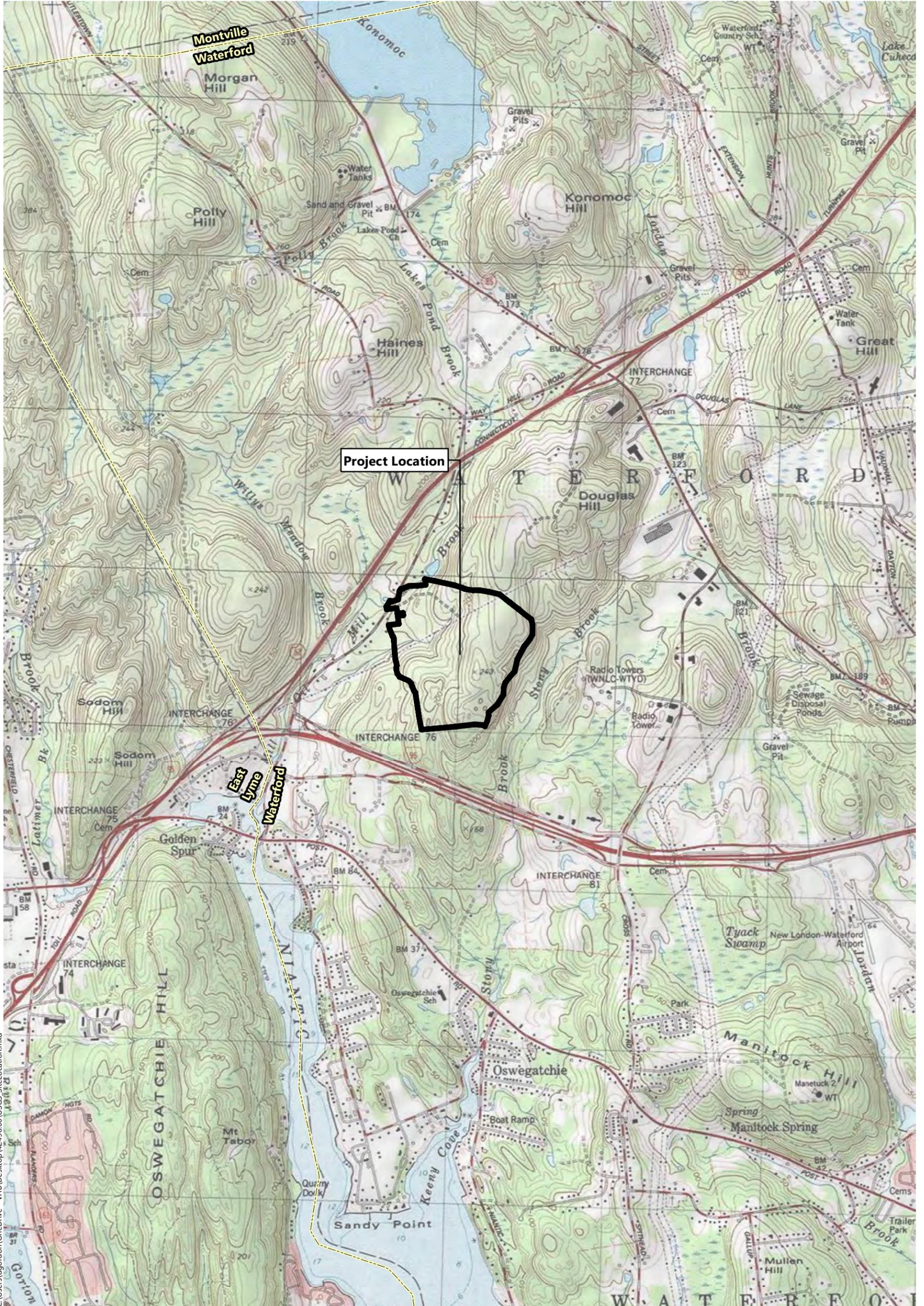
Figures

- Figure 1 USGS Locus Map
- Figure 2 Aerial Overview Map
- Figure 3 Bird Survey Locations

Attachments:

- Attachment 1 USFWS Consultation Response Letter (September 17, 2019)
- Attachment 2 Representative Site Photographs
- Attachment 3 Biologist Qualifications
- Jeffrey C. Peterson, Senior Soil and Wetland Scientist
Brett Trowbridge, Senior Ecologist
- Attachment 4 Observed Vascular Plant List
- Attachment 5 Observed and Potential Bird Species

Figure 1 USGS Locus Map



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42496.00 - Oil Mill Rd

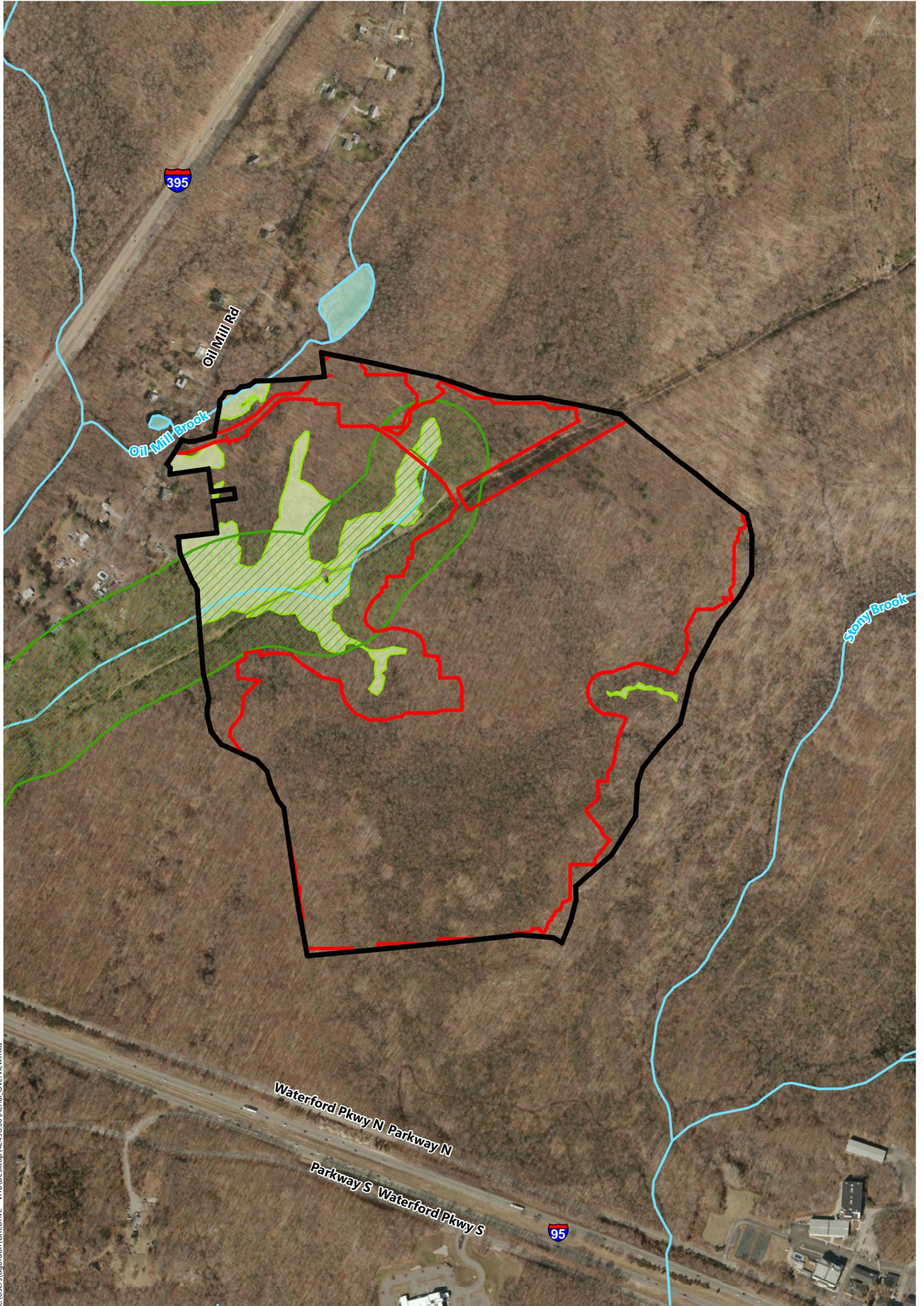
Waterford, Connecticut

- Property Boundary
- Town Boundary

USGS Locus Map

Source: VHB, CTDEEP, ESRI

Figure 2 Aerial Overview Map



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42496.00 - Oil Mill Rd

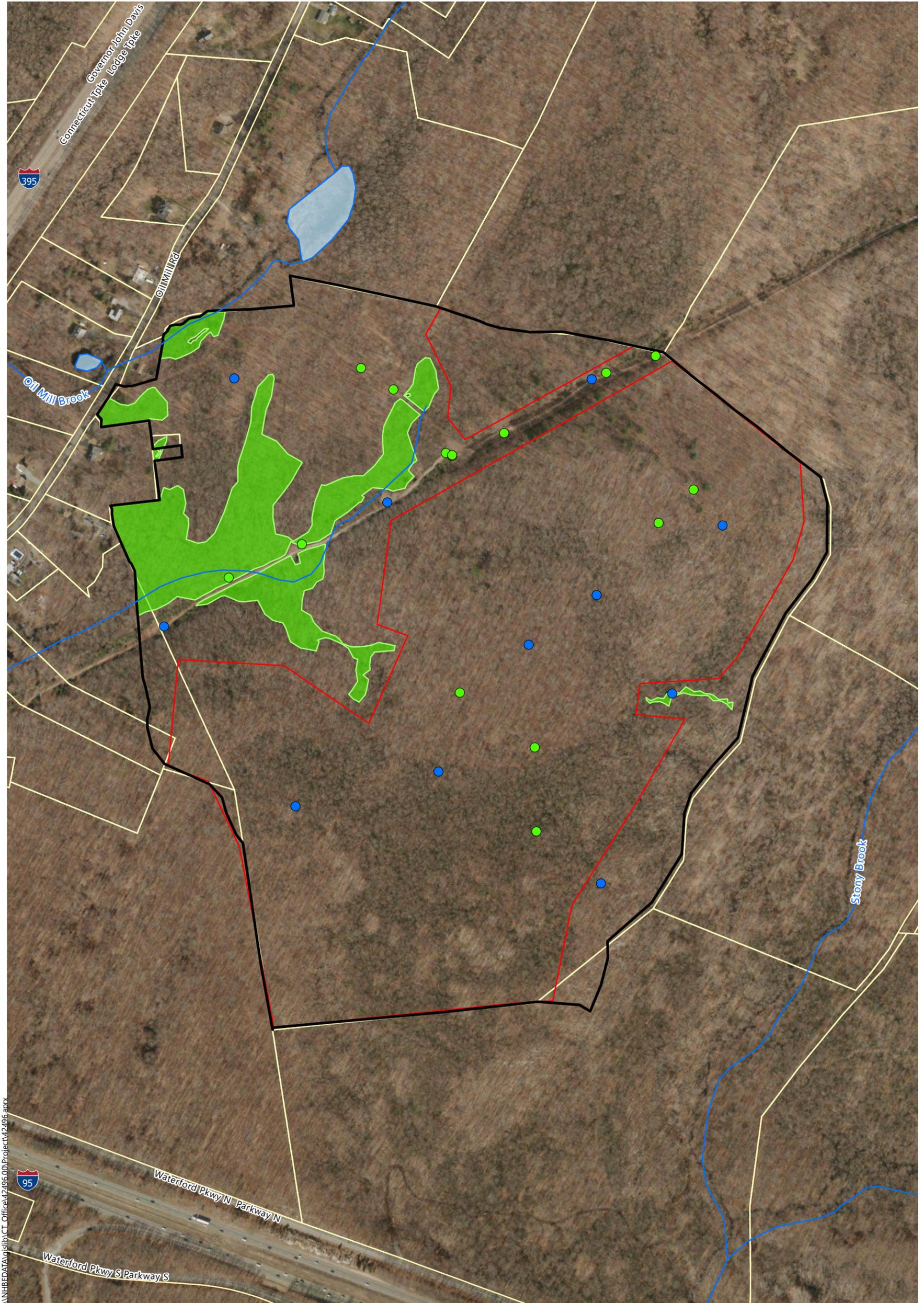
Waterford, Connecticut

- Property Boundary
- Limit Of Work
- Stream/River
- Delineated Wetland Edge
- Water Body
- Wetland Resource Area
- NDDB Habitat (December 2018)

Aerial Overview

Source: VHB, CTDEEP, ESRI

Figure 3 Bird Survey Locations



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Waterford Solar

Waterford, Connecticut

Bird Survey Figure

- Parcel Boundary
- Limit of Work
- Delineated Wetland Edge
- Wetland Resource Area
- Adjacent Parcels
- Whip-poor-will Survey Point
- Breeding Bird Survey Point
- Stream/River
- Waterbody

Source: VHB, CTDEEP, ArcGIS Online

Attachment 1

USFWS Consultation Response Letter



United States Department of the Interior



FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
<http://www.fws.gov/newengland>

In Reply Refer To:
Consultation Code: 05E1NE00-2019-SLI-2902
Event Code: 05E1NE00-2019-E-07594
Project Name: Proposed Waterford Solar

September 17, 2019

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office

70 Commercial Street, Suite 300

Concord, NH 03301-5094

(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2019-SLI-2902

Event Code: 05E1NE00-2019-E-07594

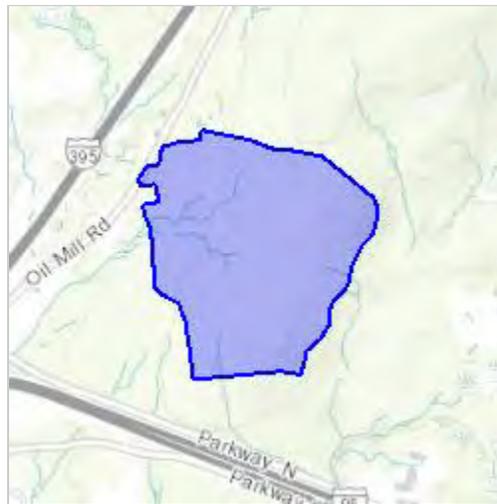
Project Name: Proposed Waterford Solar

Project Type: ** OTHER **

Project Description: Proposed development site for solar farm by Green Skies Renewable Energy.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/41.37937745707926N72.1773439474141W>



Counties: New London, CT

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Flowering Plants

NAME	STATUS
Small Whorled Pogonia <i>Isotria medeoloides</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1890	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

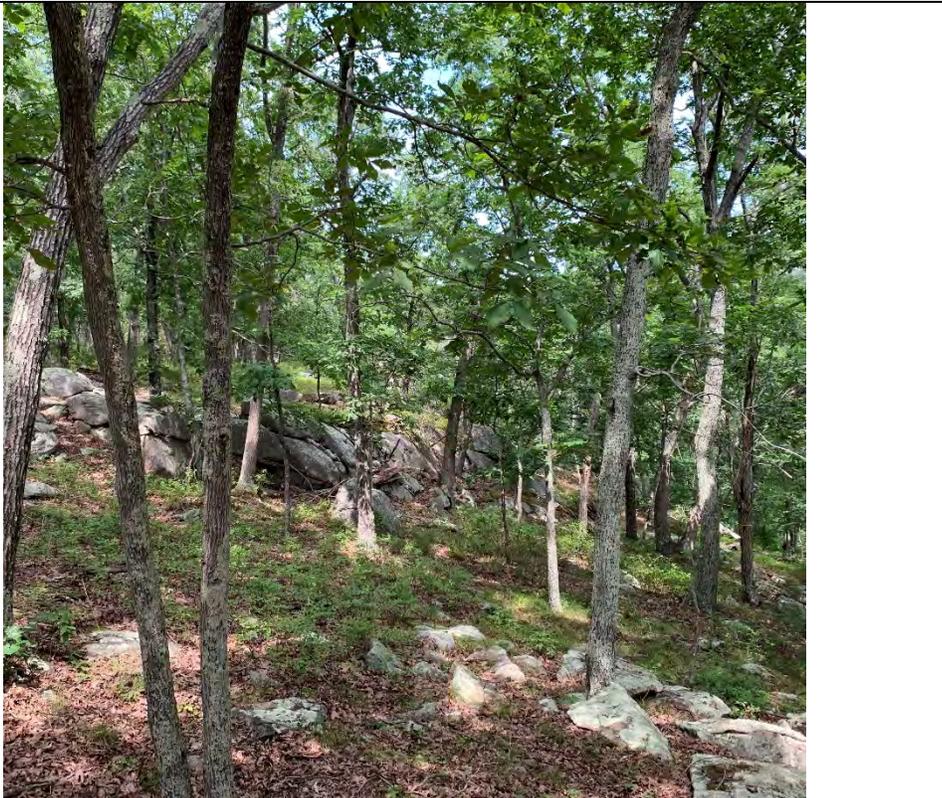
Attachment 2

Representative Site Photographs

Photo 1	Description:
	<p>Northwesterly view of recently cleared forest within the western portion of the Site with generally open canopy interspersed with copses and solitary trees.</p> <p>August 1, 2019</p>
Photo 2	Description:
	<p>Southwesterly view of recently cleared forest within the central portion of the Site with sparse tree cover and growth by disturbance-tolerant species within the open landscape.</p> <p>August 15, 2019</p>

Photo 3	Description:
	<p>Northwesterly view of recently cleared forest near the central portion of the Site. The electrical transmission right-of-way is visible in the background.</p> <p>August 2, 2019</p>
Photo 4	Description:
	<p>Northeasterly view of an uncut copse with a sedge-dominated understory along the northern property line, west of the right-of-way.</p> <p>August 1, 2019</p>

Photo 5	Description:
	<p>Northwesterly view of the stand of sub-mature forest located along the northern property boundary, east of the right-of-way. Trees within this forested area are somewhat closely spaced and have low dbhs.</p> <p>August 2, 2019</p>
Photo 6	Description:
	<p>Southerly view of the southwestern portion of the Site with a mature forest area containing an understory dominated by short and tall heath species.</p> <p>August 2, 2019</p>

Photo 7		<p>Description:</p> <p>Northeasterly view of the rocky, wooded slope near the southeastern property boundary.</p> <p>August 2, 2019</p>
Photo 8		<p>Description:</p> <p>Southerly view of an uncut copse along a rocky ridge located within the eastern portion of the proposed solar array. The eastern slopes of the ridge contain vascular plants associated with rich woodlands.</p> <p>August 15, 2019</p>

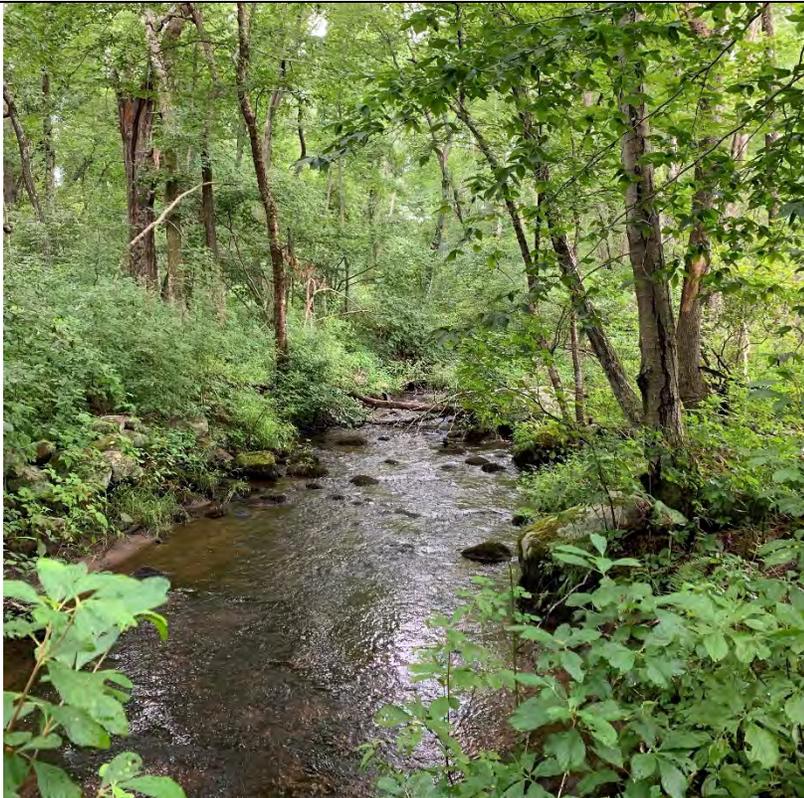
<p>Photo 9</p> 	<p>Description:</p> <p>Northeasterly view of Oil Mill Brook located along the northwestern corner of the property.</p> <p>August 14, 2019</p>
<p>Photo 10</p> 	<p>Description:</p> <p>Northerly view of the large wetland system in the northern portion of the Site with mucky soil and sparse shrub cover.</p> <p>August 2, 2019</p>

Photo 11	Description:
	<p>Southwesterly view of a more open portion of the large wetland system in the northern portion of the Site. This area contains variable microtopography with sparsely vegetated pockets between rocks and buttressed tree roots.</p> <p>August 2, 2019</p>

Photo 12	Description:
	<p>Southwesterly view of the shrubby, thicketed wetlands on both sides of the electrical transmission right-of-way access road.</p> <p>August 1, 2019</p>

<p>Photo 13</p> 	<p>Description:</p> <p>Northeasterly view of the northeastern portion of the right-of-way containing shrubby thickets interspersed with meadow-like habitat.</p> <p>August 1, 2019</p>
<p>Photo 14</p> 	<p>Description:</p> <p>Southwesterly view of the northeastern portion of the right-of-way containing shrubby thickets interspersed with meadow-like habitat.</p> <p>August 1, 2019</p>

<p>Photo 15</p>  <p>A photograph showing a grassy, slightly elevated area with various green plants and shrubs. A utility pole is visible on the left side, and power lines stretch across the sky. The background is filled with dense trees under a clear blue sky.</p>	<p>Description:</p> <p>Northeasterly view of the right-of-way with a mix of native and non-native shrubs and herbs.</p> <p>August 1, 2019</p>
<p>Photo 16</p>  <p>A photograph of a gravel access road winding through a wooded area. The road is covered with patches of green grass and weeds. The surrounding forest is dense with tall trees and lush undergrowth.</p>	<p>Description:</p> <p>Easterly view of the gravel access road at the Site entrance with abundant coverage by Japanese stiltgrass and Oriental lady's-thumb smartweed.</p> <p>August 1, 2019</p>

Photo 17	Description:
	<p>Northerly view of a haul road within the central portion of the Site.</p> <p>August 1, 2019</p>
Photo 18	Description:
	<p>Northeasterly view of the access road within the central portion of the right-of-way, top-dressed with riprap and containing various weeds.</p> <p>August 19, 2019</p>

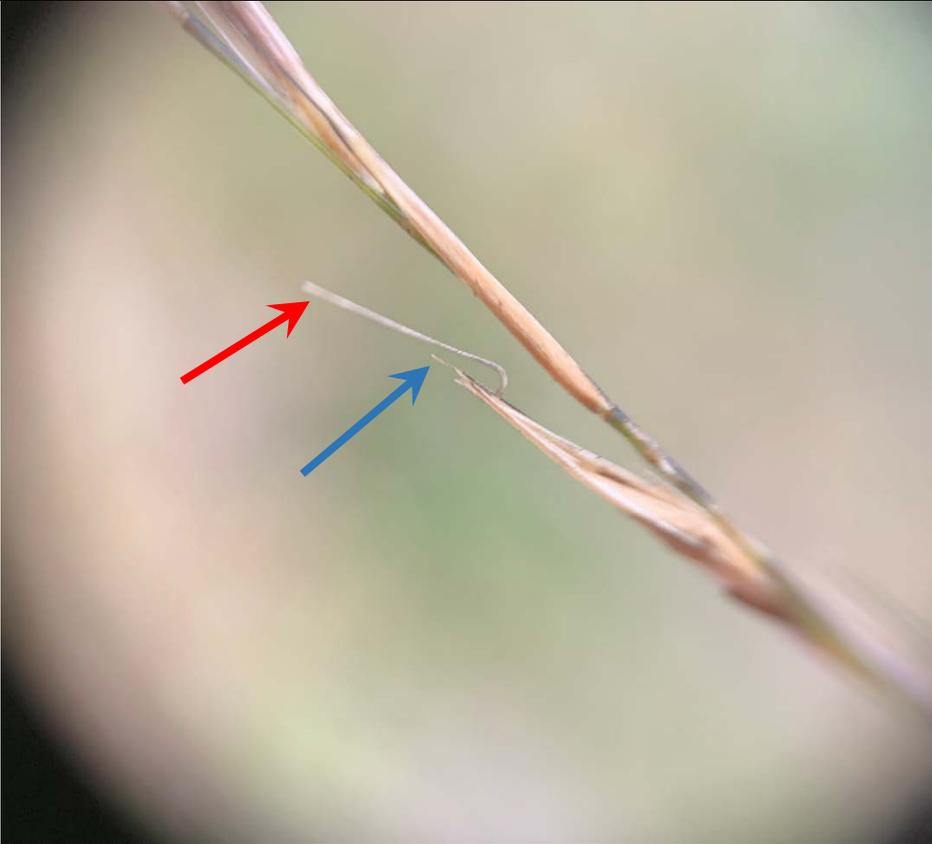
<p>Photo 19</p> 	<p>Description:</p> <p>14x magnification of a floret of <i>Aristida dichotoma</i>, with a long central lemma awn (red arrow), and diminutive lateral lemma awns (blue arrow). This species, observed within the access roads of the electrical transmission right-of-way, is a common associate of the state-listed Needlegrass.</p> <p>October 1, 2019</p>
<p>Photo 20</p> 	<p>Description:</p> <p>Blood milkwort, a congener of Nuttall's Milkwort with larger sepals and wider racemes, observed within the electrical transmission right-of-way.</p> <p>August 1, 2019</p>

Photo 21	Description:
	<p>Yearly wood frog captured within the wetlands in the northern portion of the Site.</p> <p>August 2, 2019</p>

Photo 22	Description:
	<p>Large, open staging area with dense wood chip cover that could provide suitable nesting habitat for turtles.</p> <p>August 1, 2019</p>

Attachment 3

Biologist Qualifications

Jeffrey C. Peterson, CPSS, PWS, CPESC, ENV SP

Senior Soil and Wetland Scientist



Education

Graduate Coursework, Soil Science, University of Massachusetts, 2003

Graduate Coursework, Soil Science, University of Connecticut, 1996

BS, Biology, Ecology, University of Connecticut, 1977

Registrations/Certifications

Certified Professional Soil Scientist (Soil Science), 2001

Certified Professional in Erosion and Sediment Control (Erosion and Sediment Control Planning), 2003

Professional Wetland Scientist (Wetland Science), 2015

Licensed Soil Evaluator (Soil Evaluation) RI, 2001

Certified Wetland Delineator (Federal Wetland Delineation) USACE Baltimore Dist., 1993

Envision™ Sustainability Professional, 2013

Jeff is a Soil Scientist and Plant Ecologist with VHB specializing in hydric soil identification, plant taxonomy, and delineation and evaluation of wetland resources. As a senior member of the Environmental Staff, his responsibilities include permit preparation and expert witness testimony for complex energy and transportation projects. He has expertise in wetland delineation, identification of and conservation planning for rare plant and animal taxa, wetland functional value assessment and impact analysis, and site selection, design and monitoring study development for compensatory wetland creation, enhancement, and restoration projects.

41 years of professional experience

Tobacco Valley Solar Project, Simsbury, CT

Jeff led the preparation of the natural resource documentation supporting the Petition for a Declaratory Ruling from the Connecticut Siting Council (CSC) for a proposed 26.4 MW for a solar photovoltaic development. Jeff delineated the wetland resources on the 300 acre Project property. He also coordinated with the CTDEEP Natural Diversity Data Base (NDDDB) staff to conduct breeding bird surveys, and rare flora and fauna surveys. He drafted the conservation measures plan to protect state-listed species within the project area that were approved by the NDDDB Program. Jeff provided expert testimony on anticipated project effects to water quality and wildlife before the CSC in public hearings for the project which was approved in a unanimous vote by the CSC. He also prepared high intensity and site specific soil surveys of the agricultural soils in the project area to inventory prime farmland prior to project implementation. He also wrote the resource conservation sections of the Development and Management Plans required for the Project.

Groton New London Airport Rare Species Surveys, Wetland Mitigation Monitoring Report, and Invasive Species Report, Groton, CT

Under an on-call environmental services contract with the Connecticut Airport Authority (CAA), Jeff led a small team conducting field surveys for two state-listed rare plants present on the airfield and reported on the populations trends by reviewing previous reports. He also completed an annual wetland mitigation monitoring report required by the U.S. Army Corps of Engineers and the Connecticut Department of Energy (CTDEEP) for a tidal wetland creation and enhancement project along the Poquonnock River on airport property. Additionally, he completed an invasive species field investigation and management report for the CAA. Jeff led these efforts and coordinated with CAA and airfield staff to maximize the efficiency of field efforts.

T.F. Green Airport, Runway Safety Improvements Wetland Mitigation, Warwick, RI

After successfully completing the Environmental Impact Statement (EIS) marked by the issuance of a Record of Decision by the FAA, VHB was retained by the Rhode Island Airport Corporation (RIAC) to develop the wetland mitigation program to offset impacts associated with safety improvements to the Runway 16- 34 safety areas. Jeff coordinated with the Rhode Island Department of Environmental Management's (RIDEM) Freshwater



Wetlands, Water Quality, and Rhode Island Pollution Discharge Elimination Programs along with the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency to expedite approvals. Jeff authored the sections of the Application to Alter Wetlands dealing with the wetland mitigation and coordinated the approval of the Individual USACE Permit for this critical project. The program consists of five sites, primarily on airport property, that offset the functions lost due to the filling of 2.63 acres of wetland. The program restored and created three acres of floodplain wetland at the Runway 34 end, stabilized a severely eroding stream channel, enhanced 700 linear feet of a channelized stream to a natural meandering pattern, and restored 1.5 acres of floodplain wetland system north of Warwick Pond. This work included the replacement of an undersized culvert that created a severe localized flooding problem and restricted anadromous fish and wildlife passage. VHB was retained by the RIAC to provide technical assistance during construction of the mitigation sites and the preparation of progress reports for the regulatory agencies. The completed mitigation program is now being monitored by Jeff and other VHB staff.

National Grid, Rhode Island Reliability Project, North Smithfield to Warwick, RI

VHB was retained by National Grid to provide environmental services for proposed improvements to a 24-mile transmission line corridor through northern Rhode Island. Jeff completed vernal pool and rare, threatened, and endangered (RTE) species surveys along the 24-mile long project corridor that passes through six Rhode Island municipalities. Data collected were used to complete the Rhode Island Department of Environmental Management (RIDEM) Application to Alter a Freshwater Wetland and U.S. Army Corps of Engineers (USACE) Category II Programmatic General Permit applications. He responded to requests by the RIDEM for field locations of RTE taxa in the northern portion of the project and negotiated with RIDEM staff to establish protocols for work in the vicinity of RTE stations included in the project permit approval documents issued by RIDEM.

Calais LNG, Wildlife Habitat Assessment, Calais, ME

Retained as part of a multi-company team collecting data for an Environmental Impact Study for a proposed liquefied natural gas (LNG) receiving terminal and gas transmission pipeline. VHB was given the task of documenting the existing conditions for wildlife and plant community resources. Jeff conducted habitat assessments along portions of the 21-mile alignment, focusing on the vegetation in ombrotrophic bogs. He also assisted in the collection of breeding bird survey data used in the preparation of federal applications.

Northeast Utilities Transmission Line Environmental Assessment, Central Connecticut

As part of the regional New England East-West Solution project, VHB was retained to perform environmental and constructability assessments for adding a new transmission line within an existing 35-mile transmission corridor through central Connecticut. Mr. Peterson identified and assessed vernal pool habitat within the right-of-way (ROW) and produced a report classifying the sixty vernal pools encountered. He worked with other VHB wetland scientists collecting data to prepare data forms documenting the limits of wetlands and coordinated the data collection effort for the wetland functional analysis. He assisted in the preparation of documentation for the project petition to the Connecticut Siting Council. He also coordinated with the staff of Connecticut's Natural

Biodiversity Data Base (NDDDB) to inventory and report on populations of rare plant and wildlife species in the ROW. Element occurrence forms were completed to document the rare taxa encountered in the field. These forms were forwarded to the client and subsequently to the NDDDB to update records. He also conducted field surveys of 10 alternative route segments for the project, which involved identifying and mapping potential constraints such as rare threatened and endangered species, cold water fisheries, wetlands, public water supply aquifers, and erosion hazards.

Professional Boards and Committees:

Board of Directors, Southern New England Chapter of the Soil and Water Conservation Society since 2017

Member, New England Hydric Soils Technical Committee since 1999

Past Vice-President Society of Soil Scientists of Southern New England

Affiliations/Memberships

Soil Science Society of America

Society of Soil Scientists of Southern New England

Soil and Water Conservation Society

Society of Wetland Scientists

Massachusetts Association of Wetland Scientists

Recent Contributions and Presentations

Technical Review Committee for the *Rhode Island Soil Erosion and Sediment Control Handbook (2016)*.

Review Editor: *New England Hydric Soils Technical Committee. 2018 Version 4, Field Indicators for Identifying Hydric Soils in New England*. New England Interstate Water Pollution Control Commission, Lowell, MA.

Peterson, J. and L. Vanderveer. 2015. Use of avian surveys to successfully permit the widening of powerline corridors by assessing potential effects and benefits to wildlife. In *Proceedings of the 11th International Symposium on Environmental Concerns in Right-of-Way Management*. pp 399 to 405.

Peterson and Lizewski. 2015 T.F. Green Airport Runway 34 Safety Improvement Project Wetland Mitigation Program. Presented at the Society for Wetland Scientists Annual Conference in Providence, RI.

Peterson and Brousseau. 2019. Monitoring Wetland Hydrology and Floodplain Storage Function of Compensatory Wetlands at T.F. Green Airport. Poster Presentation at the Society of Wetland Scientist's Annual Conference. Baltimore, MD.

Brett Trowbridge

Senior Ecologist



Education

BS, Biotechnology, Worcester Polytechnic Institute, 2002

Affiliations/ Memberships

New England Botanical Club (NEBC) Councillor (2019-present)

New England Botanical Club President (2017-2019)

NEBC Herbarium Volunteer

New England Plant Conservation Program (NEPCoP) Task Force Member

NEPCoP Plant Conservation Volunteer Corps Member

Botanical Club of Cape Cod and the Islands

Torrey Botanical Society

New York Flora Association

Timber Rattlesnake Recovery Group

Massachusetts Association of Conservation Commissioners

Association of Massachusetts Wetland Scientists

Conservation Commissioner Princeton, MA (2014-2017)

Brett is a Senior Ecologist in the Natural Sciences Group in VHB's Worcester, Massachusetts, office. He has a diverse background in environmental services, specializing in botanical inventories, wildlife surveys, habitat assessments, vernal pool ecology, wetland delineation, wetlands and wildlife permitting, mitigation, and construction monitoring. Brett has successfully contributed to numerous local, state, and federal environmental permit applications in the Northeast. He frequently integrates Global Positioning System (GPS) and Global Information System (GIS) technologies into his field work and permitting.

17 years of professional experience

The Ridge at Talcott Mountain, Simsbury, CT

Brett conducted vernal pool evaluations throughout wetlands on a 173-acre site and performed habitat assessments, and surveys for several CT state-listed herpetological (*Ambystoma jeffersonianum*, *Ambystoma laterale*, *Clemmys guttata*, *Heterodon platirhinos*, *Lithobates pipiens*, *Terrapene carolina*, and *Thamnophis sauritus*) and vascular plant species (*Carex davisii*, *Desmodium glabellum*, *Drymocallis arguta*, *Elymus wiegandii*, *Hydrophyllum virginianum*, and *Silene stellata*). He subsequently prepared a Habitat Assessment & Project Description for CT DEEP Review and submitted observation records for each observed rare species.

New England Power Company Transmission Line Reliability Project, Tewksbury, Pelham, Windham, Hudson, Londonderry, NH

For this interstate transmission reliability project, Brett performed due-diligence field work and negotiated approvals to work within state-listed species habitat areas with the NH Fish and Game and the NH Natural Heritage Bureau. His field work entailed pre-construction surveys and habitat evaluations for NH state-listed reptiles (black racer, spotted, wood, and Blanding's turtles) and pre-construction botanical surveys. He subsequently prepared state-listed snake, turtle, and plant protection plans to be implemented during construction. Brett provided environmental monitoring to ensure on-site compliance with permit conditions during ~12 months of construction, including capturing and translocating rare herpetiles away from work zones. He is currently monitoring project work areas to document restoration of rare plant habitat areas.

Substation Upgrades and Transmission Line Reconfiguration, Adams, MA

Brett assisted with permitting under MA Division of Fisheries and Wildlife, MA Department of Environmental Protection, and US Army Corps of Engineers regulations for this transmission reliability project, which included work within rare species habitat and involved temporary and permanent impacts to wetlands and rare species. He performed pre-construction, due-diligence botanical surveys, and prepared a rare plant protection plan and a comprehensive 2-acre wetland rehabilitation plan, which included tree and shrub plantings, mowing, and treatment of invasive plants. Brett provided construction monitoring during site work and wetland rehabilitation. He commenced long-term monitoring of the site during 2019 to document effectiveness of treatments and confirm that site conditions meet wetland rehabilitation goals.

Solar Development, Merrimack, NH

Brett conducted weekly surveys for eastern hognose snake and black racers prior to commencement of construction for a 12-acre, ground-mounted solar array involving tree removal and grading. His field work also included surveys for vascular plants: *Viola pedate*

Brett Trowbridge

and *Aristida longispica* var. *geniculata*. Brett documented snake and rare plant observations throughout the site and prepared report materials for NHF&G.

Granite Bridge Pipeline and Liquefied Natural Gas Facility, Manchester, Auburn, Candia, Raymond, Epping, Brentwood, Exeter, and Stratham, NH

Brett identified areas of suitable turtle nesting along the 27-mile project alignment to be surveyed for state-listed turtle nesting during and in advance of construction. Brett worked with NHF&G to establish an appropriate snake survey protocol and is currently conducting surveys within areas that have been identified as potential habitat for black racers.

Rumney Salt Marsh Restoration Monitoring, Saugus, MA

DEP Wetland Variance and USACE Section 404/Section 10 Permits for Logan Runway Safety Area projects require post-construction monitoring of a 4.2-acre salt marsh restoration area of Rumney Marsh. Brett implemented the post-construction monitoring protocol, including establishment of monitoring locations, installation of permanent markers, accretion sampling stations, and a tide staff gauge. Brett has conducted 2 years of vegetation, accretion, and hydrology monitoring, and prepared associated memoranda and annual reports. Brett will continue monitoring marsh reestablishment during 2019.

Eversource New Right-of-way, Hudson, Stowe, Marlborough, Sudbury, MA

For this ± 7.6-mile-long, new transmission line project, Brett conducted vernal pool evaluations and habitat assessments for MA state-listed whip-poor-will, wood turtle, eastern box turtle, and blue-spotted salamander. Brett prepared Massachusetts Endangered Species Act (MESA) Project Review Checklist for the project review by the MA Division of Fisheries and Wildlife (MA DFW).

Town Well Testing, Maynard, MA

Brett generated a Blanding's turtle protection plan for the Town of Maynard Department of Public Works for groundwater pump testing associated with a potential new Town public water supply well. After receiving approval from the MA DFW to serve as the qualified biologist for the project and obtaining a Scientific Collection Permit from the MA DFW, Brett conducted a turtle training session for project workers and conducted turtle surveys throughout the work area immediately prior to the daily construction.

Wellesley College Science Center Renovations, Wellesley, MA

For this three-year, multi-phase renovation and construction project, Brett performed a habitat assessment within the wetland buffer zone on the project site. After field inspection, Brett documented the site conditions and habitat features and made recommendations pertaining to wildlife within a letter to the Wellesley Natural Resources Commission (WNRC). Subsequently, Brett met the WNRC agent at the project site to discuss wildlife considerations for the project.

Eversource Line 312 Structure Replacement, Montague, MA

Brett generated an eastern box turtle protection plan and obtained a Scientific Collection Permit for handling this state-listed species during project construction. Brett also conducted surveys for *Celastrus scandens* for this transmission infrastructure project. Following construction, Brett provided a summary of protection plan activities and submitted rare species observation records to the MA DFW.

Worcester Airport CAT III ILS & Taxiway Improvements, Worcester, MA

The CAT-III ILS and Taxiway Project at the Worcester Airport resulted in the permanent loss of bordering vegetated wetlands and Massport designed and constructed a 7,320 square

Brett Trowbridge

foot compensatory wetland. Habitat for grasshopper sparrow was also altered during the project and a Conservation and Management Permit was issued by the MA DFW. During 2018, Brett conducted multiple vegetation monitoring events, preparing interim reports after each, and prepared an annual year end summary report. He will monitor the restored wetland again during fall 2019. During spring 2019, Brett generated a vascular plant species list of the airports grasslands and conducted follow-up monitoring for grasshopper sparrows, with positive findings for this species.

Attachment 4

Observed Vascular Plant List

	Scientific Name	Common Name	Status
1	<i>Abutilon theophrasti</i>	velvetleaf Indian-mallow	Non-native
2	<i>Acalypha virginica</i>	Virginia three-seeded-Mercury	Native
3	<i>Acer rubrum</i>	red maple	Native
4	<i>Acer saccharum</i>	sugar maple	Native
5	<i>Achillea millefolium</i>	common yarrow	Native
6	<i>Adiantum pedatum</i>	northern maidenhair fern	Native
7	<i>Agrimonia rostellata</i>	woodland agrimony	Native
8	<i>Agrostis capillaris</i>	colonial bentgrass	Non-native
9	<i>Agrostis perennans</i>	autumn bentgrass	Native
10	<i>Ailanthus altissima</i>	tree-of-heaven	Invasive
11	<i>Alnus incana</i>	speckled alder	Native
12	<i>Ambrosia artemisiifolia</i>	common ragweed	Native
13	<i>Amelanchier laevis</i>	smooth serviceberry	Native
14	<i>Anemone quinquefolia</i>	wood anemone	Native
15	<i>Anthoxanthum odoratum</i>	sweet vernalgrass	Non-native
16	<i>Apios americana</i>	common ground-nut	Native
17	<i>Apocynum cannabinum</i>	hemp dogbane	Native
18	<i>Aralia nudicaulis</i>	wild sarsaparilla	Native
19	<i>Arisaema triphyllum ssp. pusillum</i>	Jack-in-the-pulpit	Native
20	<i>Arisaema triphyllum ssp. triphyllum</i>	Jack-in-the-pulpit	Native
21	<i>Aristida dichotoma</i>	churchmouse threawn	Native
22	<i>Artemisia vulgaris</i>	common wormwood	Non-native
23	<i>Asclepias incarnata</i>	swamp milkweed	Native
24	<i>Asclepias tuberosa</i>	butterfly milkweed	Native
25	<i>Asplenium platyneuron</i>	ebony spleenwort	Native
26	<i>Athyrium angustum</i>	narrow lady fern	Native
27	<i>Baptisia tinctoria</i>	yellow wild indigo	Native
28	<i>Bartonia virginica</i>	Virginia screwstem	Native
29	<i>Berberis thunbergii</i>	Japanese barberry	Invasive
30	<i>Betula alleghaniensis</i>	yellow birch	Native
31	<i>Betula lenta</i>	black birch	Native
32	<i>Boehmeria cylindrica</i>	small-spiked false nettle	Native
33	<i>Brachyletrum aristosum</i>	northern long-awned wood grass	Native
34	<i>Brachyletrum erectum</i>	southern long-awned wood grass	Native
35	<i>Bromus pubescens</i>	hairy wood brome	Native
36	<i>Bulbostylis capillaris</i>	tufted hair-sedge	Native
37	<i>Carex atlantica var. capillacea</i>	prickly bog sedge	Native
38	<i>Carex lurida</i>	sallow sedge	Native
39	<i>Carex straminea</i>	eastern straw sedge	Native
40	<i>Carex tenera</i>	delicate quill sedge	Native
41	<i>Carex appalachica</i>	Appalachian sedge	Native
42	<i>Carex arctata</i>	drooping woodland sedge	Native
43	<i>Carex brunnescens</i>	brownish sedge	Native
44	<i>Carex cephaloidea</i>	thin-leaved sedge	Native
45	<i>Carex cephalophora</i>	oval-headed sedge	Native
46	<i>Carex debilis</i>	white-edged sedge	Native
47	<i>Carex digitalis</i>	slender woodland sedge	Native
48	<i>Carex gynandra</i>	nodding sedge	Native
49	<i>Carex intumescens</i>	greater bladder sedge	Native
50	<i>Carex laxiculmis</i>	spreading sedge	Native
51	<i>Carex laxiflora</i>	broad loose-flowered sedge	Native
52	<i>Carex leptalea</i>	bristly-stalk sedge	Native
53	<i>Carex lurida</i>	sallow sedge	Native
54	<i>Carex mesochorea</i>	midland sedge	Native
55	<i>Carex muehlenbergii</i>	Muhlenberg's sedge	Native
56	<i>Carex normalis</i>	greater straw sedge	Native
57	<i>Carex pennsylvanica</i>	Pennsylvania sedge	Native
58	<i>Carex projecta</i>	necklace sedge	Native

	Scientific Name	Common Name	Status
59	<i>Carex retroflexa</i>	reflexed sedge	Native
60	<i>Carex rosea</i>	rosy sedge	Native
61	<i>Carex scabrata</i>	eastern rough sedge	Native
62	<i>Carex scoparia</i>	pointed broom sedge	Native
63	<i>Carex sparganioides</i>	bur-reed sedge	Native
64	<i>Carex stipata</i>	awl-fruited sedge	Native
65	<i>Carex swanii</i>	Swan's sedge	Native
66	<i>Carex tribuloides</i>	blunt broom sedge	Native
67	<i>Carex vestita</i>	velvet sedge	Native
68	<i>Carex virescens</i>	ribbed sedge	Native
69	<i>Carpinus caroliniana</i>	American hornbeam	Native
70	<i>Carya ovata</i>	shagbark hickory	Native
71	<i>Carya cordiformis</i>	bitternut hickory	Native
72	<i>Castanea dentata</i>	American chestnut	Native
73	<i>Celastrus orbiculatus</i>	Asiatic bittersweet	Invasive
74	<i>Cerastium fontanum</i>	mouse-ear chickweed	Non-native
75	<i>Chamaecrista nictitans</i>	wild sensitive-pea	Native
76	<i>Chimaphila maculata</i>	pipsissewa	Native
77	<i>Chrysosplenium americanum</i>	golden-saxifrage	Native
78	<i>Cinna arundinacea</i>	sweet wood-reed	Native
79	<i>Circaea canadensis</i>	enchanter's-nightshade	Native
80	<i>Cirsium vulgare</i>	common thistle	Non-native
81	<i>Clematis virginiana</i>	Virginia virgin's-bower	Native
82	<i>Clethra alnifolia</i>	coastal sweet-pepperbush	Native
83	<i>Coleataenia longifolia ssp. rigidula</i>	long-leaved redtop-panicgrass	Native
84	<i>Comptonia peregrina</i>	sweet-fern	Native
85	<i>Corylus americana</i>	American hazelnut	Native
86	<i>Crocianthemum canadense</i>	Canada frostweed	Native
87	<i>Cyperus lupulinus</i>	great plains flatsedge	Native
88	<i>Cyperus strigosus</i>	straw-colored flatsedge	Native
89	<i>Dactylis glomerata</i>	orchard grass	Non-native
90	<i>Danthonia compressa</i>	flattened oatgrass	Native
91	<i>Danthonia spicata</i>	poverty grass	Native
92	<i>Dendrolycopodium hickeyi</i>	Hickey's tree-clubmoss	Native
93	<i>Dendrolycopodium obscurum</i>	princess pine	Native
94	<i>Dennstaedtia punctilobula</i>	eastern hay-scented fern	Native
95	<i>Desmodium rotundifolium</i>	round-leaved trailing tick-trefoil	Native
96	<i>Dianthus armeria</i>	Deptford pink	Non-native
97	<i>Dichantherium boreale</i>	northern rosette-panicgrass	Native
98	<i>Dichantherium boscii</i>	Bosc's rosette-panicgrass	Native
99	<i>Dichantherium clandestinum</i>	deer-tongue rosette-panicgrass	Native
100	<i>Dichantherium depauperatum</i>	starved rosette-panicgrass	Native
101	<i>Dichantherium sphaerocarpon</i>	round-fruited rosette-panicgrass	Native
102	<i>Digitaria sanguinalis</i>	hairy crabgrass	Non-native
103	<i>Diphasiastrum digitatum</i>	southern ground-cedar	Native
104	<i>Diphasiastrum tristachyum</i>	blue ground-cedar	Native
105	<i>Doellingeria umbellata</i>	tall white-aster	Native
106	<i>Dryopteris carthusiana</i>	spinulose wood fern	Native
107	<i>Dryopteris intermedia</i>	evergreen wood fern	Native
108	<i>Dryopteris marginalis</i>	marginal wood fern	Native
109	<i>Echinochloa sp.</i>	barnyard grass	Unknown
110	<i>Elaeagnus umbellata</i>	autumn-olive	Invasive
111	<i>Eleocharis obtusa</i>	blunt spikesedge	Native
112	<i>Eleusine indica</i>	goosegrass	Non-native
113	<i>Elymus sp.</i>	rye cultivar	Non-native
114	<i>Epilobium coloratum</i>	eastern willow-herb	Native
115	<i>Eragrostis pectinacea</i>	tufted lovegrass	Native
116	<i>Eragrostis spectabilis</i>	purple lovegrass	Native

	Scientific Name	Common Name	Status
117	<i>Erechtites hieraciifolius</i> var. <i>hieraciifolius</i>	American burnweed	Native
118	<i>Erigeron canadensis</i>	Canada fleabane	Native
119	<i>Euonymus alatus</i>	burning-bush	Invasive
120	<i>Eupatorium perfoliatum</i>	boneset thoroughwort	Native
121	<i>Eurybia divaricata</i>	white wood-aster	Native
122	<i>Euthamia caroliniana</i>	coastal plain grass-leaved-goldenrod	Native
123	<i>Euthamia graminifolia</i>	common grass-leaved-goldenrod	Native
124	<i>Eutrochium dubium</i>	coastal plain Joe-Pye weed	Native
125	<i>Eutrochium maculatum</i>	spotted Joe-Pye weed	Native
126	<i>Fagus grandifolia</i>	American beech	Native
127	<i>Fallopia convolvulus</i>	black bindweed	Non-native
128	<i>Festuca rubra</i>	red fescue	Non-native
129	<i>Festuca subverticillata</i>	nodding fescue	Native
130	<i>Fraxinus americana</i>	white ash	Native
131	<i>Galium circaeazans</i>	forest licorice bedstraw	Native
132	<i>Galium lanceolatum</i>	lance-leaved licorice bedstraw	Native
133	<i>Galium mollugo</i>	whorled bedstraw	Non-native
134	<i>Galium pilosum</i>	hairy bedstraw	Native
135	<i>Galium tinctorium</i>	stiff three-petaled bedstraw	Native
136	<i>Galium trifidum</i> ssp. <i>trifidum</i>	three-petaled bedstraw	Native
137	<i>Galium triflorum</i>	fragrant bedstraw	Native
138	<i>Gaylussacia baccata</i>	black huckleberry	Native
139	<i>Geranium maculatum</i>	spotted crane's-bill	Native
140	<i>Geum canadense</i>	white avens	Native
141	<i>Glyceria striata</i>	fowl manna grass	Native
142	<i>Hamamelis virginiana</i>	American witch-hazel	Native
143	<i>Hieracium pilosella</i>	mouse-ear hawkweed	Non-native
144	<i>Hieracium praealtum</i>	tall hawkweed	Non-native
145	<i>Hieracium scabrum</i>	rough hawkweed	Native
146	<i>Hieracium caespitosum</i>	yellow hawkweed	Non-native
147	<i>Hieracium paniculatum</i>	panicked hawkweed	Native
148	<i>Hydrocotyle americana</i>	American marsh-pennywort	Native
149	<i>Hylodesmum nudiflorum</i>	naked tick-trefoil	Native
150	<i>Hypericum gentianoides</i>	orange-grass St. John's-wort	Native
151	<i>Hypericum mutilum</i>	dwarf St. john's-wort	Native
152	<i>Hypericum canadense</i>	lesser St. John's-wort	Native
153	<i>Hypericum perforatum</i>	common St. John's-wort	Non-native
154	<i>Hypericum punctatum</i>	spotted St. John's-wort	Native
155	<i>Hypopitys lanuginosa</i>	hairy pine-sap	Native
156	<i>Hypochaeris radicata</i>	hairy cat's-ear	Non-native
157	<i>Hypoxis hirsuta</i>	common star-grass	Native
158	<i>Ilex opaca</i>	American holly	Native
159	<i>Ilex verticillata</i>	common winterberry	Native
160	<i>Impatiens capensis</i>	jewelweed	Native
161	<i>Juncus brevicaudatus</i>	short-tailed rush	Native
162	<i>Juncus canadensis</i>	Canada rush	Native
163	<i>Juncus effusus</i>	common soft rush	Native
164	<i>Juncus marginatus</i>	grass-leaved rush	Native
165	<i>Juncus pylaei</i>	Pylaei's soft rush	Native
166	<i>Juncus secundus</i>	lopsided rush	Native
167	<i>Juncus tenuis</i>	path rush	Native
168	<i>Juniperus virginiana</i>	eastern red cedar	Native
169	<i>Kalmia latifolia</i>	mountain laurel	Native
170	<i>Krigia virginica</i>	Virginia dwarf-dandelion	Native
171	<i>Kummerowia striata</i>	Japanese-clover	Non-native
172	<i>Lactuca canadensis</i>	tall lettuce	Native
173	<i>Lechea intermedia</i>	round-fruited pinweed	Native
174	<i>Lechea mucronata</i>	hairy pinweed	Native

	Scientific Name	Common Name	Status
175	<i>Lechea tenuifolia</i>	narrow-leaved pinweed	Native
176	<i>Leersia virginica</i>	white cut grass	Native
177	<i>Lepidium campestre</i>	field pepperweed	Non-native
178	<i>Lespedeza capitata</i>	round-headed bush-clover	Native
179	<i>Lespedeza hirta</i>	hairy bush-clover	Native
180	<i>Lespedeza procumbens</i>	trailing bush-clover	Native
181	<i>Lespedeza violacea</i>	wand bush-clover	Native
182	<i>Lindera benzoin</i>	northern spicebush	Native
183	<i>Linum virginianum</i>	woodland yellow flax	Native
184	<i>Liriodendron tulipifera</i>	tuliptree	Native
185	<i>Lobelia inflata</i>	bladder-pod lobelia	Native
186	<i>Lonicera japonica</i>	Japanese honeysuckle	Invasive
187	<i>Lotus corniculatus</i>	garden bird's-foot-trefoil	Non-native
188	<i>Ludwigia alternifolia</i>	square-pod water-primrose	Native
189	<i>Luzula multiflora</i>	common wood rush	Native
190	<i>Lycopodium clavatum</i>	common clubmoss	Native
191	<i>Lycopus virginicus</i>	Virginia water-horehound	Native
192	<i>Lyonia ligustrina</i>	maleberry	Native
193	<i>Lysimachia ciliata</i>	fringed yellow-loosestrife	Native
194	<i>Lysimachia borealis</i>	starflower	Native
195	<i>Lysimachia hybrida</i>	lowland yellow-loosestrife	Native
196	<i>Lysimachia quadriflora</i>	four-floured yellow-loosestrife	Native
197	<i>Maianthemum canadense</i>	Canada-mayflower	Native
198	<i>Maianthemum racemosum</i>	feathery false Solomon's-seal	Native
199	<i>Medeola virginiana</i>	Indian cucumber root	Native
200	<i>Melampyrum lineare</i>	cow-wheat	Native
201	<i>Microstegium vimineum</i>	Japanese stiltgrass	Invasive
202	<i>Mikania scandens</i>	climbing hempvine	Native
203	<i>Mimulus ringens</i>	Allegheny monkey-flower	Native
204	<i>Mitchella repens</i>	partridge-berry	Native
205	<i>Monotropa uniflora</i>	one-flowered Indian-pipe	Native
206	<i>Morella caroliniensis</i>	small bayberry	Native
207	<i>Muhlenbergia sobolifera</i>	rock muhly	Native
208	<i>Myosoton aquaticum</i>	giant-chickweed	Non-native
209	<i>Nabalus trifoliolatus</i>	three-leaved rattlesnake-root	Native
210	<i>Nuttallanthus canadensis</i>	oldfield-toadflax	Native
211	<i>Nyssa sylvatica</i>	black-gum	Native
212	<i>Onoclea sensibilis</i>	sensitive fern	Native
213	<i>Osmorhiza claytonii</i>	bland sweet-cicely	Native
214	<i>Osmunda regalis</i>	royal fern	Native
215	<i>Osmundastrum cinnamomeum</i>	cinnamon fern	Native
216	<i>Ostrya virginiana</i>	hop-hornbeam	Native
217	<i>Oxalis stricta</i>	common yellow wood sorrel	Native
218	<i>Packera aurea</i>	golden groundsell	Native
219	<i>Panicum dichotomiflorum</i> var. <i>dichotomiflorum</i>	fall panicgrass	Native
220	<i>Parathelypteris noveboracensis</i>	New York fern	Native
221	<i>Parathelypteris simulata</i>	Massachusetts fern	Native
222	<i>Parthenocissus quinquefolia</i>	Virginia-creeper	Native
223	<i>Paspalum setaceum</i> var. <i>setaceum</i>	slender bentgrass	Native
224	<i>Persicaria longiseta</i>	Oriental lady's-thumb smartweed	Invasive
225	<i>Persicaria punctata</i>	dotted smartweed	Native
226	<i>Persicaria sagittata</i>	arrow-leaved tearthumb	Native
227	<i>Phegopteris connectilis</i>	long beech fern	Native
228	<i>Phragmites australis</i>	common reed	Invasive
229	<i>Phytolacca americana</i>	American pokeweed	Native
230	<i>Pilea pumila</i>	Canada clearweed	Native
231	<i>Pinus strobus</i>	eastern white pine	Native
232	<i>Piptochaetium avenaceum</i>	black-seeded spear grass	Native

	Scientific Name	Common Name	Status
233	<i>Plantago aristata</i>	bracted plantain	Non-native
234	<i>Plantago lanceolata</i>	English plantain	Non-native
235	<i>Plantago rugelii</i>	Rugel's plantain	Native
236	<i>Platanthera clavellata</i>	little club-spur bog-orchid	Native
237	<i>Platanthera sp. (grandiflora or psycodes)</i>	bog-orchid	Native
238	<i>Poa annua</i>	annual blue grass	Non-native
239	<i>Poa compressa</i>	flat-stemmed blue grass	Invasive
240	<i>Polygala sanguinea</i>	blood milkwort	Native
241	<i>Polygonatum biflorum</i>	King Solomon's-seal	Native
242	<i>Polypodium virginianum</i>	rock polypody	Native
243	<i>Polystichum acrostichoides</i>	Christmas fern	Native
244	<i>Potentilla canadensis</i>	dwarf cinquefoil	Native
245	<i>Potentilla norvegica</i>	Norwegian cinquefoil	Native
246	<i>Potentilla simplex</i>	common cinquefoil	Native
247	<i>Prunella vulgaris</i>	common selfheal	Native
248	<i>Prunus serotina</i>	black cherry	Native
249	<i>Pseudognaphalium obtusifolium</i>	blunt-leaved rabbit-tobacco	Native
250	<i>Pyrola americana</i>	American shinleaf	Native
251	<i>Pyrola elliptica</i>	elliptic-leaved shinleaf	Native
252	<i>Quercus alba</i>	eastern white oak	Native
253	<i>Quercus montana</i>	mountain chestnut oak	Native
254	<i>Quercus velutina</i>	black oak	Native
255	<i>Ranunculus acris</i>	tall buttercup	Non-native
256	<i>Ranunculus recurvatus</i>	hooked buttercup	Native
257	<i>Rhexia virginica</i>	Virginia meadow-beauty	Native
258	<i>Rhododendron viscosum</i>	clammy azalea	Native
259	<i>Rhus copallinum</i>	winged sumac	Native
260	<i>Rhus glabra</i>	smooth sumac	Native
261	<i>Rhynchospora capitellata</i>	brownish beaksedge	Native
262	<i>Rosa multiflora</i>	multiflora rose	Invasive
263	<i>Rubus allegheniensis</i>	common blackberry	Native
264	<i>Rubus flagellaris</i>	northern blackberry	Native
265	<i>Rubus hispidus</i>	bristly blackberry	Native
266	<i>Rubus occidentalis</i>	black raspberry	Native
267	<i>Rubus phoenicolasius</i>	wine raspberry	Non-native
268	<i>Rudbeckia hirta var. pulcherrima</i>	black-eyed coneflower	Non-native
269	<i>Rumex acetosella</i>	common sheep sorrel	Invasive
270	<i>Sambucus nigra</i>	black elderberry	Native
271	<i>Sassafras albidum</i>	sassafras	Native
272	<i>Schedonorus arundinaceus</i>	tall rye grass	Non-native
273	<i>Schizachyrium scoparium</i>	little bluestem	Native
274	<i>Scirpus cyperinus</i>	common woolsedge	Native
275	<i>Scirpus hattorianus</i>	mosquito bulrush	Native
276	<i>Scutellaria lateriflora</i>	mad dog skullcap	Native
277	<i>Sericocarpus asteroides</i>	toothed white-topped-aster	Native
278	<i>Setaria faberi</i>	Chinese foxtail	Non-native
279	<i>Sisyrinchium montanum var. crebrum</i>	strict blue-eyed-grass	Native
280	<i>Smilax glauca</i>	glaucous-leaved greenbrier	Native
281	<i>Smilax herbacea</i>	carrion-flower	Native
282	<i>Smilax rotundifolia</i>	roundleaf greenbrier	Native
283	<i>Solidago odora</i>	licorice goldenrod	Native
284	<i>Solidago puberula</i>	downy goldenrod	Native
285	<i>Solidago rugosa</i>	common wrinkle-leaved goldenrod	Native
286	<i>Solidago caesia</i>	blue-stem goldenrod	Native
287	<i>Spiraea alba</i>	white meadowsweet	Native
288	<i>Swida alternifolia</i>	alternate-leaved dogwood	Native
289	<i>Symphotrichum lateriflorum</i>	calico American-aster	Native
290	<i>Symphotrichum novi-belgii</i>	New York American-aster	Native

	Scientific Name	Common Name	Status
291	<i>Symphyotrichum lanceolatum</i> ssp. <i>lanceolatum</i> var. <i>lanceolatum</i>	lance-leaved American-aster	Native
292	<i>Symphyotrichum racemosum</i>	small white American-aster	Native
293	<i>Symphyotrichum dumosum</i>	bushy American-aster	Native
294	<i>Symphyotrichum undulatum</i>	wavy-leaved American-aster	Native
295	<i>Symphyotrichum patens</i>	late purple American-aster	Native
296	<i>Symplocarpus foetidus</i>	skunk-cabbage	Native
297	<i>Taraxacum laevigatum</i>	red-seeded dandelion	Non-native
298	<i>Thalictrum pubescens</i>	tall meadow-rue	Native
299	<i>Toxicodendron vernix</i>	poison-sumac	Native
300	<i>Toxicodendron radicans</i>	poison-ivy	Native
301	<i>Trichostema dichotomum</i>	forked bluecurls	Native
302	<i>Trifolium pratense</i>	red clover	Non-native
303	<i>Trifolium aureum</i>	palmate hop clover	Non-native
304	<i>Triodanis perfoliata</i>	clasping-leaved Venus'-looking-glass	Native
305	<i>Typha latifolia</i>	broad-leaved cat-tail	Native
306	<i>Uvularia perfoliata</i>	perfoliate bellwort	Native
307	<i>Uvularia sessilifolia</i>	sessile-leaved bellwort	Native
308	<i>Vaccinium angustifolium</i>	lowbush blueberry	Native
309	<i>Vaccinium corymbosum</i>	highbush blueberry	Native
310	<i>Vaccinium pallidum</i>	hillside blueberry	Native
311	<i>Verbascum thapsus</i>	common mullein	Non-native
312	<i>Veronica officinalis</i>	common speedwell	Non-native
313	<i>Viburnum dilatatum</i>	linden arrowwood	Non-native
314	<i>Viburnum acerifolium</i>	maple-leaved viburnum	Native
315	<i>Viola sagittata</i>	arrowhead violet	Native
316	<i>Viola palmata</i>	wood violet	Native
317	<i>Vitis aestivalis</i>	summer grape	Native
318	<i>Vitis labrusca</i>	fox grape	Native

Attachment 5

Observed and Potential Bird Species

Attachment 5: Observed and Potential Bird Species

	Terrestrial Habitats				Aquatic Habitats	
	Scrub-Shrub (Logging Roads)	Oak/Pine Forest	Scrub-Shrub (Powerline ROW)	Edge	Forested Wetland	Stream
Turkey Vulture ^B	P	P	O	P		
Sharp-shinned Hawk ^{M (S-E)}	P	P	P			
Cooper's Hawk ^B	P	P	P	P		
Red-shouldered Hawk ^B	P	P	P		P	
Broad-winged Hawk ^{B (S-SC)}		P		P		
Red-tailed Hawk ^B	P	P	O	P	O	
Rough-legged Hawk ^M	P		P	P	P	
Wild Turkey ^B	P	P	P	P		
Wilson's (Common) Snipe ^M	P		P		P	
American Woodcock ^B	P	O	P		O	
Mourning Dove ^B	O	P	O	P		
Black-billed Cuckoo ^B	P	P	P		P	
Yellow-billed Cuckoo ^B	P	P	P			
Eastern Screech-Owl ^B	P	P	P	P		
Great Horned Owl ^B	P	P	P	P	P	
Barred Owl ^B	P	P	P	P		

P = Potential to occur O = observed by VHB during Early Summer/Late Fall 2019

B = breeding in Connecticut M = migrant/visitor

S-E = State-endangered S-T= State-threatened S-SC = State-Special Concern

Source: DeGraaf, Richard M. and Mariko Yamasaki. 2001. New England Wildlife: Habitat, Natural History and Distribution, University Press of New England, Hanover, New Hampshire, 2001.

Bevier, L. R. (Ed.). 1994. Atlas of Breeding Birds of Connecticut. Bulletin 113. State Geological and Natural History Survey of Connecticut. 461 p.

CTDEEP. 2015. Connecticut Wildlife Action Plan. http://www.ct.gov/deep/cwp/view.asp?a=2723&q=329520&deepNav_GID=1719#Revision

	Terrestrial Habitats				Aquatic Habitats	
	Scrub-Shrub (Logging Roads)	Oak/Pine Forest	Scrub-Shrub (Powerline ROW)	Edge	Forested Wetland	Stream
Northern Saw-whet Owl ^{B (S-SC)}		P				
Whip-poor-will ^{B (S-SC)}	P	P	P	P		
Ruby-throated Hummingbird ^B	P	P	P			
Red-bellied Woodpecker ^B	O	P	O			
Pileated Woodpecker ^B		P				
Yellow-bellied Sapsucker ^B		P				
Downy Woodpecker ^B	O	P	P			
Hairy Woodpecker ^B	O	P	O			
Northern Flicker ^B	P	P	P	P		
Eastern Wood-Pewee ^B	O	P	P		O	
Willow Flycatcher ^B				P		
Least Flycatcher ^B		P				
Eastern Phoebe ^B	P	P	P	P	P	
Great Crested Flycatcher ^B	O	O	O		O	
Eastern Kingbird ^B	P	P	P	P	P	
White-eyed Vireo ^B	P	P	P		P	
Yellow-throated Vireo ^B	O	P			O	
Warbling Vireo ^B	O	P	P			
Red-eyed Vireo ^B	P	P	O			
Blue Jay ^B	O	O	P	P		
American Crow ^B	P	P	P	P		

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	Terrestrial Habitats				Aquatic Habitats	
	Scrub-Shrub (Logging Roads)	Oak/Pine Forest	Scrub-Shrub (Powerline ROW)	Edge	Forested Wetland	Stream
Tree Swallow ^B	P	P	P	P	P	P
Barn Swallow ^B	P	P	O	P		P
Black-capped Chickadee ^B	O	P	P		P	
Tufted Titmouse ^B	O	P	O		O	
Red-breasted Nuthatch ^B		P				
White-breasted Nuthatch ^B	O	P	P			
Brown Creeper ^B		P				
Carolina Wren ^B	P	P	P		P	
House Wren ^B	O	P	O	P	O	
Winter Wren ^B		P			P	
Golden-crowned Kinglet ^B		P				
Ruby-crowned Kinglet ^M		P				
Blue-gray Gnatcatcher ^B	P	P	P		P	
Eastern Bluebird ^B	O	P	P	P	P	
Veery ^B	P	P	O		P	
Hermit Thrush ^B	P	P	P		P	
Wood Thrush ^B	P	P	O		O	
American Robin ^B	O	O	O	P	O	
Gray Catbird ^B	O	P	O	P	P	
Northern Mockingbird ^B			P			
Brown Thrasher ^{B (S-SC)}			P			
Cedar Waxwing ^B	O	P	O	P	P	

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	Terrestrial Habitats				Aquatic Habitats	
	Scrub-Shrub (Logging Roads)	Oak/Pine Forest	Scrub-Shrub (Powerline ROW)	Edge	Forested Wetland	Stream
Blue-winged Warbler ^B	P	P	O	P	P	
Golden-winged Warbler ^{B (S-E)}	P	P	P			
Nashville Warbler ^B		P			P	
Yellow Warbler ^B	P	P	O		P	
Yellow-rumped Warbler ^M		P				
Chestnut-sided Warbler ^B	P		P		P	
Black-throated Green Warbler ^B		P				
Pine Warbler ^B	O	P	O		O	
Prairie Warbler ^B	P		O			
Black-and-white Warbler ^B		P				
American Redstart ^B	P	P	O		P	
Worm-eating Warbler ^B		O			O	
Ovenbird ^B	O	O	O		O	
Northern Waterthrush ^B		P			P	
Louisiana Waterthrush ^B		P				P
Common Yellowthroat ^B	P	P	O		P	
Hooded Warbler ^B	P	P	P		P	
Canada Warbler ^B		P			P	
Scarlet Tanager ^B	O	O	O			
Eastern Towhee ^B	O	O	O	P	O	
American Tree Sparrow ^M	P	P	P	P	P	

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	Terrestrial Habitats				Aquatic Habitats	
	Scrub-Shrub (Logging Roads)	Oak/Pine Forest	Scrub-Shrub (Powerline ROW)	Edge	Forested Wetland	Stream
Chipping Sparrow ^B	O	P		P	O	
Field Sparrow ^B			P			
Fox Sparrow ^M	P	P	P			
Song Sparrow ^B	P	P	P	P	P	
White-throated Sparrow ^M	P	P	P	P		
Dark-eyed Junco ^B		P		P		
Northern Cardinal ^B	P	P	O		P	
Rose-breasted Grosbeak ^B		P	O		P	
Indigo Bunting ^B	P	P	O	P		
Red-winged Blackbird ^B	P		P	P	P	
Common Grackle ^B	P	P	P	P	O	
Brown-headed Cowbird ^B	O	P	P	P	O	
Baltimore Oriole ^B	O	O	O		O	
House Finch ^B		P				
Pine Siskin ^M	P	P	P	P	P	
American Goldfinch ^B	O	P	P	P	P	
House Sparrow ^P				P		

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Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

July 5, 2019

Mr. Jeffery Shamas
VHB, Inc.
100 Great Meadows Road
Wethersfield, CT 06109
jshamas@vhb.com

Project: Preliminary Assessment for the Installation of Photovoltaic Electric Generating Facility for GRE Gacurux LLC, 117 Old Mill Road in Waterford, Connecticut
NDDDB Preliminary Assessment No.: 201905764

Dear Jeffery Shamas,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map provided for the Preliminary Assessment for the Installation of Photovoltaic Electric Generating Facility for GRE Gacurux LLC, 117 Old Mill Road in Waterford, Connecticut. According to our records there are known extant populations of State Listed Species known that occur within or close to the boundaries of this property. The species known from this area include:

Plants

Isotria medeoloides (Small whorled pogonia)

Status: Federal Threatened and State Endangered

Habitat: Mesic woods, often near vernal streams in dry mixed or deciduous woods, frequently under beech trees

Blooms: Mid-May through Mid-June

Aristida longespica var. *geniculate* (Neddlegrass)

Status: State Special Concern

Habitat: Dry or moist sandy and gravelly soils

Blooms: August through October

Polygala nuttallii (Nuttall's milkwort)

Status: State Threatened

Habitat: Dry, open sandy soils and rocky crevices

Blooms: July through September

Animals

Terrapene carolina carolina (Eastern box turtle)

Clemmys guttata (Spotted turtle)

Thamnophis sauritus (Eastern ribbon snake)

Opheodrys vernalis (smooth green snake)

Caprimulgus vociferus (Whip-poor-will)

Best times to survey for whip-poor-will are when moon is at least half illuminated and above the horizon, and not obscured by clouds. You will want minimal wind for your survey. In our experience, detection rates increase also after midnight, before sunrise. With a 6 minute survey point, that is 3 min of silent listening followed by callback, followed by 3 minutes of silent listening, you will have 60% probability of detecting the bird, given it is present, within 400m of your survey point. You will need to conduct multiple points in your project area on multiple nights to be sure that it is not there at all.

Please be advised that this is a preliminary review and not a final determination. A more detailed review will be necessary to move forward with any subsequent environmental permit applications submitted to DEEP for the

proposed project. This preliminary assessment letter cannot be used or submitted with your permit applications at DEEP. This letter is valid for one year.

To prevent impacts to State-listed species, field surveys of the site should be performed by a qualified biologist when these target species are identifiable. A report summarizing the results of such surveys should include:

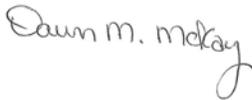
1. Survey date(s) and duration
2. Site descriptions and photographs
3. List of component vascular plant species and animal species within the survey area (including scientific binomials)
4. Data regarding population numbers and/or area occupied by State-listed species
5. Detailed maps of the area surveyed including the survey route and locations of State-listed species.
6. Statement/résumé indicating the biologist's qualifications to work with the taxon. A CT DEEP Scientific Collectors Permit may be required to survey for wildlife species and you should ask if your qualified biologist has one to work with taxon at this site.

The site surveys report should be sent to our CT DEEP-NDDDB Program (deep.nddbrequest@ct.gov) for further review by our program biologists along with an updated request for another NDDDB review. If you do not intend to do site surveys to determine the presence or absence of state-listed species, please let us know how you will protect the state-listed species from being impacted by this project with protection or conservation plans for the species.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. The result of this review does not preclude the possibility that listed species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits.

Please contact me if you have further questions at (860) 424-3592, or dawn.mckay@ct.gov . Thank you for consulting the Natural Diversity Data Base.

Sincerely,



Dawn M. McKay
Environmental Analyst 3



Memorandum

To: Ms. Dawn M. McKay
CTDEEP
Natural Diversity Database Program
79 Elm Street
Hartford, CT 06106-5127

Date: October 2, 2019

Project #: 42496.00

From: Jeffrey Shamas, PWS, CE, CSS

Re: 2019 Rare Species Survey Summary
16.78 MW-AC Solar Project (GRE Gacurux LLC)
117 Oil Mill Road, Waterford, Connecticut

GRE Gacurux, LLC is proposing development of an approximately 78-acre, 15.8-megawatt AC photovoltaic electric generating facility in Waterford, CT (the Project). The Project has been sited on an approximately 150-acre property with frontage on Oil Mill Road, northeast of the I-395/I-95 interchange (the Site; see Figure 1).

The CTDEEP and Connecticut Siting Council have requested that wildlife surveys for several state-listed be conducted throughout the Site as part of the pre-construction environmental due-diligence and permitting for the Project. A July 5, 2019 letter from the CT DEEP Natural Diversity Data Base (NDDDB) indicated that field surveys should be conducted for eight state-listed species from three taxonomic groups. Table 1 lists the state-listed species that were requested for evaluation on the Site.

Table 1 State-listed Species Targeted for Survey

Taxonomic Group	Scientific Name	Common Name	Connecticut Status
Vascular Plant	<i>Aristida longespica var. geniculata</i>	Needlegrass	Special Concern
Vascular Plant	<i>Isotria medeoloides</i>	Small Whorled Pogonia	Endangered (US Threatened)
Vascular Plant	<i>Polygala nuttallii</i>	Nuttall's Milkwort	Threatened
Reptile	<i>Clemmys gutatta</i>	Spotted Turtle	Special concern
Reptile	<i>Opheodrys vernalis</i>	Smooth Green Snake	Special concern
Reptile	<i>Terrapene carolina carolina</i>	Eastern Box Turtle	Special concern
Reptile	<i>Thamnophis sauritus</i>	Eastern Ribbon Snake*	Special concern
Bird	<i>Caprimulgus vociferus</i>	Whip-poor-will	Special concern

According to the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool, federally-listed species that may occur of the Project Site, and/or may be affected by the project include Small Whorled Pogonia (*Isotria medeoloides*) and Northern Long-eared Bat (*Myotis septentrionalis*; see Attachment 1 USFWS Consultation Response Letter dated September 17, 2019).

100 Great Meadow Road
Suite 200
Wethersfield, CT 06109-2377
P 860.807.4300

On behalf of GRE Gacrux, LLC, VHB's environmental scientists surveyed the Site for state and federally-listed plants and state-listed birds during May, June, August, and October 2019. Northern Long-eared Bat surveys were not conducted because NDDDB did not identify this species as potentially occurring on the site.

A summary of site conditions and the survey methodologies and findings of VHB's investigations are presented below.

Site Description

Much of the Site was recently logged and contains a network of access roads and skidder roads. Unlogged areas include successional forest, mature hardwood forest, and freshwater wetlands. An electrical transmission corridor bisects the Site in a southwest to northeast alignment. Several stone walls were observed on the Site or along the boundaries of the site. Rolling to moderately-steep topography generally slopes up to a ridge located along the southeastern Site boundary. Rocks and boulders are abundant throughout the Site and rock outcrops and ledges exist along the southeastern ridge. Five general vegetation cover types exist throughout the Site: recently logged uplands, upland forest, wetlands, electrical transmission right-of-way, and disturbed access roads.

Land use surrounding the Site is largely undeveloped forest in all cardinal directions, except for sparse residential development along Oil Mill Road to the northwest (see Figure 2). Portions of the forest located to the southeast of the Site have been recently logged. Oil Mill Brook skirts the northeast corner of the Site and Stony Brook is located approximately 500 feet to the east of the Site.

Recently Logged Uplands

Recently logged uplands are the dominant vegetation cover type on the Site. Much of the canopy has been removed and only scattered copses and solitary trees exist within the deforested area (see Photos 1-4). Recently logged upland areas that do not contain abundant woody debris (fallen trees, logs, branches, slash, and wood chips) currently exhibit growth by disturbance-tolerant species. Dominant vegetation within the recently logged uplands includes American burnweed (*Erechtites hieraciifolius* var. *hieraciifolius*), hay-scented fern (*Dennstaedtia punctilobula*), bladder-pod lobelia (*Lobelia inflata*), Swan's sedge (*Carex swanii*), Pennsylvania sedge (*Carex pennsylvanica*), rushes (*Juncus secundus* and *J. tenuis*), great plains flatsedge (*Cyperus lupulinus*), blackberries (*Rubus* spp.), and mountain laurel (*Kalmia latifolia*).

Upland Forest

A stand of sub-mature upland forest exists in the northeastern Site. This area contains young trees having low diameters at breast height (see Photo 5). The understory contains sparse shrub and ground cover. Dominant species include black birch (*Betula lenta*), red maple (*Acer rubrum*), black cherry (*Prunus serotina*), hay-scented fern, and roundleaf greenbrier (*Smilax rotundifolia*), and Canada-mayflower (*Maianthemum canadense*).

Areas of mature forest, with canopies comprised of black birch, oaks (*Quercus* spp.), American beech (*Fagus grandifolia*), shagbark hickory, and hop-hornbeam (*Ostrya virginiana*) exist in the southeastern portions of the Site. In general, the forest understory is comprised of dense heath cover [mountain laurel (*Kalmia latifolia*), black huckleberry (*Gaylussacia baccata*), lowbush blueberry (*Vaccinium angustifolium*) (see Photos 6 and 7). The rocky outcrops, ledges, and slopes along the southeastern ridge, however, contain a diverse understory with several rich woods species such

as woodland agrimony (*Agrimonia rostellata*), wood violet (*Viola palmata*), perfoliate bellwort (*Uvularia perfoliata*), northern maidenhair fern (*Adiantum pedatum*), black-seeded spear grass (*Piptochaetium avenaceum*), Bosc's rosette-panicgrass (*Dichantherium boscii*), hairy wood brome (*Bromus pubescens*), nodding fescue (*Festuca subverticillata*), and southern long-awned wood grass (*Brachyletrum erectum*; see Photo 8).

Wetlands

A large wetland complex exists in the northern portion of the Site. The northern wetlands are associated with or drain towards Oil Mill Brook via rocky seeps and intermittent drainages. A small, hillside seep that drains to the east toward Stony Brook exists along the eastern property boundary. Wetland areas are primarily forested, except those that occur within the transmission line right-of-way. Wetland understory composition is somewhat variable containing areas of sparse shrub and herbaceous vegetation, to shrubby thickets, and areas of dense graminoid growth (see Photos 9-12).

Dominant wetland vegetation includes red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), coastal sweet-pepperbush (*Clethra alnifolia*), northern spicebush (*Lindera benzoin*), common winterberry (*Ilex verticillata*), cinnamon fern (*Osmundastrum cinnamomeum*), spinulose wood fern (*Dryopteris carthusiana*), skunk-cabbage (*Symplocarpus foetidus*), sedges (*Carex* spp.), sweet wood-reed (*Cinna arundinacea*). Wetlands located within the electrical transmission right-of-way also contain hydrophytes such as speckled alder (*Alnus incana*), climbing hempvine (*Mikania scandens*), broad-leaved cat-tail (*Typha latifolia*), and common reed (*Phragmites australis*).

Electrical Transmission Right-of-way

The electrical transmission right-of-way lacks tree canopy species and contains shrubby thickets interspersed with meadow-like habitat (see Photos 13-15). An access road extends along the right-of-way length. Vegetation is comprised of a mix of native and non-native weedy species. Dominant shrub and vines include mountain laurel, multiflora rose (*Rosa multiflora*), common blackberry, American hazelnut (*Corylus americana*), roundleaf greenbrier, and Asiatic bittersweet (*Celastrus orbiculatus*). The more open meadow areas contain little bluestem (*Schizachyrium scoparium*), poverty grass (*Danthonia spicata*), goldenrods (*Euthamia* spp. and *Solidago* spp.), and several members of the pea family including garden bird's-foot-trefoil (*Lotus corniculatus*), round-headed and hairy bush-clovers (*Lespedeza capitata* and *L. hirta*), clovers (*Trifolium* spp.), and round-leaved trailing tick-trefoil (*Desmodium rotundifolium*). Other weedy species associated with the right-of-way access road are listed below.

Disturbed Access Roads

The site contains a network of access roads and skid roads. Most of the access roads are topped with stone, gravel or wood chips while the skid roads have vehicle tracks through the native soils (see Photos 16-18). Vegetation within and along the various roads are limited to weedy, disturbance-tolerant species such as Japanese stiltgrass (*Microstegium vimineum*), Oriental lady's-thumb smartweed (*Persicaria longisetata*), hairy crabgrass (*Digitaria sanguinalis*), Japanese-clover (*Kummerowia striata*), flat-stemmed blue grass (*Poa compressa*), common wormwood (*Artemisia vulgaris*), Chinese foxtail (*Setaria faberi*), tufted lovegrass (*Eragrostis pectinacea*), slender bentgrass (*Paspalum setaceum* var. *setaceum*), tufted hair-sedge (*Bulbostylis capillaris*), and threeawn/needlegrass (*Aristida* sp.). Hydrophytes such as common woolsedge (*Scirpus cyperinus*), mosquito bulrush (*Scirpus hattorianus*), brownish beaksedge (*Rhynchospora capitellata*), dwarf St. john's-wort (*Hypericum mutilum*), and lesser St. John's-wort (*Hypericum canadense*) were also observed within rutted skid roads.

Vascular Plant Survey Methodology

VHB Senior Ecologist, Brett Trowbridge, conducted visual, walking, surveys for Needlegrass (*Aristida longespica* var. *geniculata*), Small Whorled Pogonia, and Nuttall's Milkwort (*Polygala nuttallii*) throughout the Project Site on August 1, 2, 14, 15, 19, and October 1, 2019. Pertinent field notes, including a list of observed vascular plant species were recorded during surveys and representative photographs taken. In general, rocky outcrops, logging haul roads, cart paths, and the electrical transmission line access roads were specifically targeted for Needlegrass and Nuttall's Milkwort. Formerly forested areas and upland woods, including the margins of wetland areas, were targeted for Small Whorled Pogonia.

Vascular Plant Survey Findings

State or federally-listed vascular plants were not detected on the Project Site during six 2019 survey days. Over 300 taxa were observed and the list of observed vascular plant species is presented within Attachment 4.

Aristida dichotoma, a non-regulated congener and common species that often grows with Needlegrass, was somewhat common within the electrical transmission line access roads (see Photo 19).

Indian Cucumber (*Medeola virginiana*), which has a similar gestalt to Small Whorled Pogonia, was observed in a few areas throughout the site, primarily within wooded areas adjacent to streams and wetlands. Orchid observations on the Site included the little club-spur bog-orchid (*Platanthera clavellata*) and a purple fringed bog-orchid (*P. grandiflora* or *P. psycodes*), both observed within forested wetlands.

Blood milkwort (*Polygala sanguinea*), a congener of Nuttall's Milkwort with larger sepals and wider racemes, was observed within sandy disturbed soil of the electrical transmission right-of-way (see Photo 20).

Invasive plants observed on the Site include tree-of-heaven (*Ailanthus altissima*), Japanese barberry (*Berberis thunbergii*), Asiatic bittersweet, autumn-olive (*Elaeagnus umbellata*), burning-bush (*Euonymus alatus*), Japanese honeysuckle (*Lonicera japonica*), Japanese stiltgrass, Oriental lady's-thumb smartweed, common reed, flat-stemmed blue grass, multiflora rose, and common sheep sorrel (*Rumex acetosella*).

Reptile Survey Methodology

Dedicated surveys or trapping for Spotted Turtle, Smooth Green Snake, Eastern Box Turtle, and Eastern Ribbon Snake were not conducted. However, during botanical survey transects throughout the Site Mr. Trowbridge conducted a habitat evaluation for each target species and maintained awareness that rare herpetological observations were possible. Approximately, 42 survey hours were conducted during the five survey days (August 1, 2, 14, 15, 19, and October 1, 2019). Surveys were conducted between 8:00 AM and 7 PM during sunny or cloudy conditions.

Reptile Survey Findings

State-listed reptiles were not observed during the 2019 surveys. Observed herptiles included green frogs and wood frogs, including recently metamorphosed yearlings (see Photo 21). These observations were primarily made within or near wetland areas.

The Site lacks suitable primary habitat for Spotted Turtles (*Clemmys gutatta*). Although pockets of water may exist during spring high-water conditions, the wetlands on the Site generally drain to the northwest and do not appear to flood to suitable depths or contain emergent hummocks to support overwintering by Spotted Turtles. The onsite wetland features offer suitable migration habitat for this species and the pockets of water that have been demonstrated by others to provide suitable vernal pool breeding habitat, could provide spring foraging opportunities for Spotted Turtles.

The Site's mosaic of cleared areas, sunny thickets, copses, wetlands, and forest provides a diversity of microhabitats for potential use by Eastern Box Turtles (*Terrapene carolina carolina*), including basking, migration, and feeding on berries, mushrooms, and invertebrates. Upland forest or recently cleared uplands provide suitable overwintering opportunities for this species. The open access roads and areas with piles of wood chips provide suitable nesting habitat for both Spotted and Eastern Box Turtles (see Photo 22).

The Site's shallow wetlands and open areas offer suitable foraging, migration, and basking habitat for Smooth Green (*Opheodrys vernalis*) and Ribbon Snakes (*Thamnophis sauritus*). Open upland areas of Site offer suitable nesting and birthing habitat for both species, respectively. Overwintering habitat also exists within rock crevices and upland burrows.

Bird Survey Methodologies

General breeding bird surveys and dedicated aural surveys (call-response) for Whip-poor-will (*Caprimulgus vociferous*) were conducted on the Site. To ensure that seasonal windows for species identification were not missed, the general breeding bird surveys were conducted on May 21, 2019 and June 14, 2019, prior to receiving a response from the CTDEEP NDDDB. When the July 5, 2019 NDDDB response letter was received, VHB shifted survey efforts to focus specifically on Whip-poor-wills.

Breeding Bird Survey Methodology

An inventory of potential breeding birds was developed based on information from survey point counts and field observations, the Atlas of Breeding Birds of Connecticut (Bevier ed. 1994), New England Wildlife (DeGraaf and Yamasaki 2001), and NDDDB data. Survey point counts for breeding birds were conducted by VHB biologists, Jeffrey Peterson and Chelsea Glinka on May 21, 2019 and June 14, 2019.

Eastern Whip-poor-will Surveys

Two nighttime call-response surveys for the eastern Whip-poor-will (*Caprimulgus vociferous*) were conducted by VHB biologists, Jeffrey Peterson and Maggie Murphy during clear conditions on June 24, 2019 and July 16-17, 2019. The surveys were conducted by listening at various locations throughout the Site. Survey locations, which are also presented within Figure 3, were accessed via walking. At each location, the biologists engaged in three minutes of silent listening, followed by six minutes of alternating between playing a whip-poor-will call recording and silent listening.

The June survey was conducted between the hours of 1:18 AM and 4:18 AM with a waning gibbous moon phase (59.4 percent illumination). Temperatures were in the high-70's with high humidity and call-response sampling occurred at five locations.

The July survey was conducted on July 16 into July 17, 2019 between the hours of 9:00 PM to 2:00 AM under a full moon. The temperatures were in the mid-70's with high humidity. Call-response sampling occurred at nine locations.

Bird Survey Findings

A list of potential and observed breeding bird species is provided in Attachment 5.

Whip-poor-wills were not detected during VHB's surveys, however, the woodlands on and near the Site provide suitable nesting habitat and the clearings on the Site offer suitable foraging and mating habitat.

Conclusions

The 98-acre Site contains various habitats suitable for several state-listed species. However, during several days and nighttime surveys, VHB's biologist did not detect the NDDB-targeted plant and animal species (see Table 2).

Table 2 State-listed Species Survey Summary

Scientific Name	Common Name	Suitable Habitat Present	Detected During 2019
<i>Aristida longespica var. geniculata</i>	Needlegrass	Yes	No
<i>Isotria medeoloides</i>	Small Whorled Pogonia	Yes	No
<i>Polygala nuttallii</i>	Nuttall's Milkwort	Yes	No
<i>Clemmys gutatta</i>	Spotted Turtle	Secondary habitat only	No
<i>Opheodrys vernalis</i>	Smooth Green Snake	Yes	No
<i>Terrapene carolina carolina</i>	Eastern Box Turtle	Yes	No
<i>Thamnophis sauritus</i>	Eastern Ribbon Snake*	Yes	No
<i>Caprimulgus vociferus</i>	Whip-poor-will	Yes	No

References:

- Bevier, L. R. (Ed.). Atlas of Breeding Birds of Connecticut. 1994. Bulletin 113. State Geological and Natural History Survey of Connecticut. 461 p.
- DeGraaf, R.M. and Yamasaki, M. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH.
- Fusco, Paul. July/August 2013. Invisible bird of the forest: The eastern whip-poor-will. Connecticut Wildlife. Connecticut Department of Energy and Environmental Protection: Bureau of Natural Resources Wildlife Division. Accessed June 11, 2019.
- Klemens, M. W. 1993. Amphibians and reptiles of Connecticut and adjacent regions. State Geological and Natural History Survey of Connecticut, Bulletin No. 112, Connecticut Department of Environmental Protection, Hartford, CT.
- Moon phases and lunar calendar for Waterford, CT. The Old Farmer's Almanac. <https://www.almanac.com/astronomy/moon/calendar/zipcode/06385/2019-06#>. Accessed June 11, 2019.
- U.S. Fish and Wildlife Service. Official Species Consultation. Information for Planning and Consultation. <https://ecos.fws.gov/ipac/>. Accessed September 17, 2019.
- Veit, R.R. and Peterson, W.R. 1993. Birds of Massachusetts. Natural History of New England Survey.

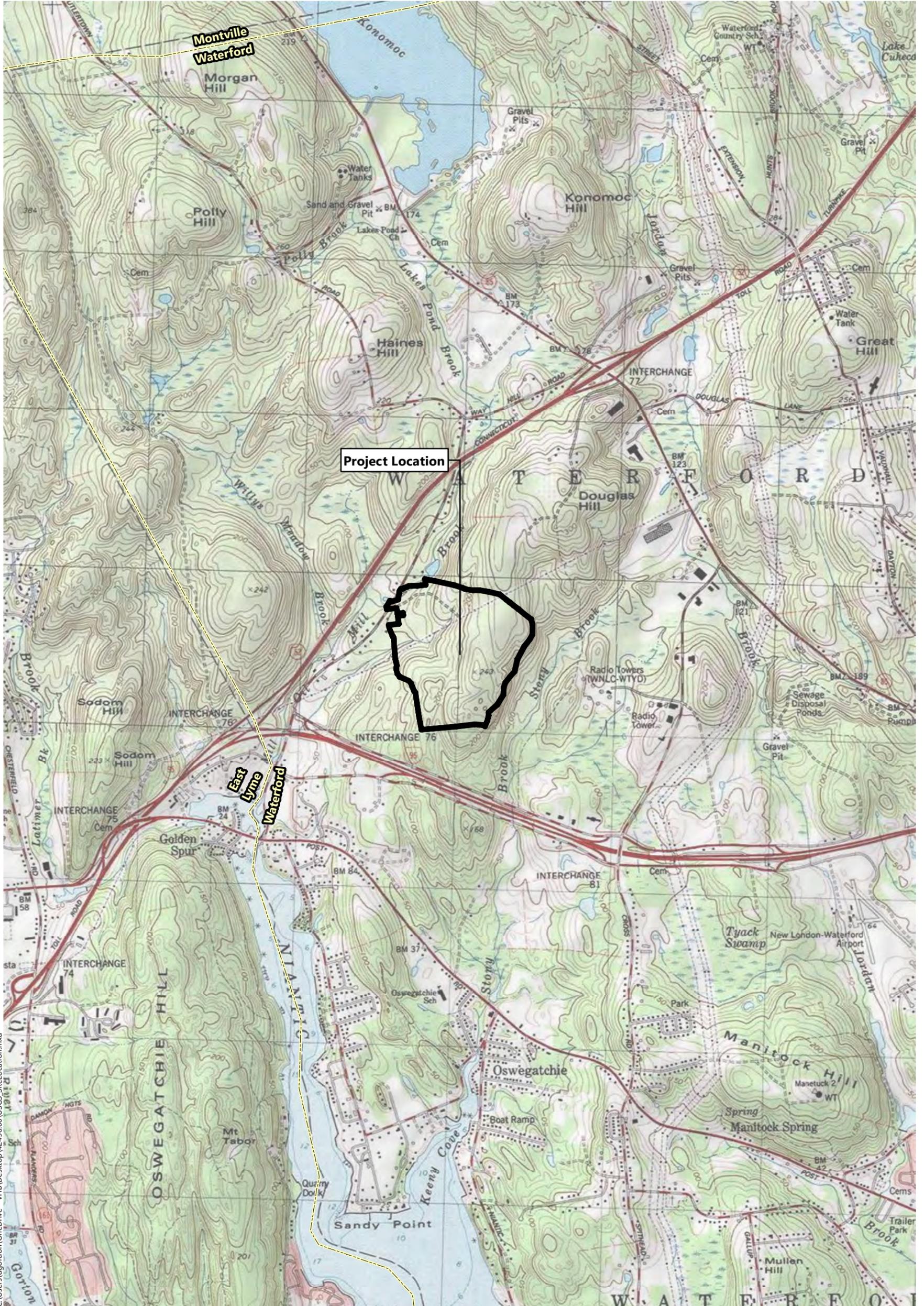
Figures

- Figure 1 USGS Locus Map
- Figure 2 Aerial Overview Map
- Figure 3 Bird Survey Locations

Attachments:

- Attachment 1 USFWS Consultation Response Letter (September 17, 2019)
- Attachment 2 Representative Site Photographs
- Attachment 3 Biologist Qualifications
- Jeffrey C. Peterson, Senior Soil and Wetland Scientist
Brett Trowbridge, Senior Ecologist
- Attachment 4 Observed Vascular Plant List
- Attachment 5 Observed and Potential Bird Species

Figure 1 USGS Locus Map



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42496.00 - Oil Mill Rd

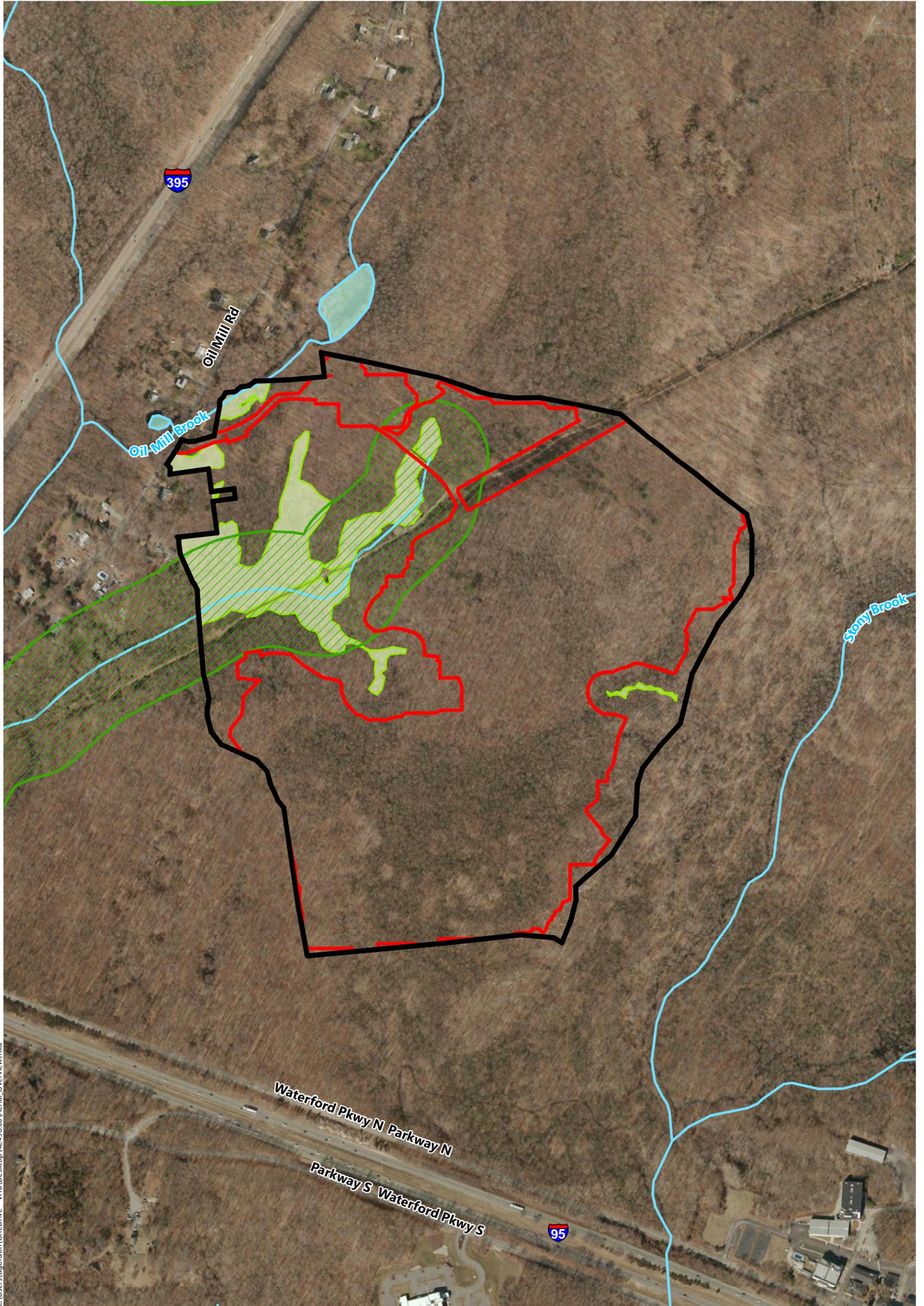
Waterford, Connecticut

- Property Boundary
- Town Boundary

USGS Locus Map

Source: VHB, CTDEEP, ESRI

Figure 2 Aerial Overview Map



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42496.00 - Oil Mill Rd

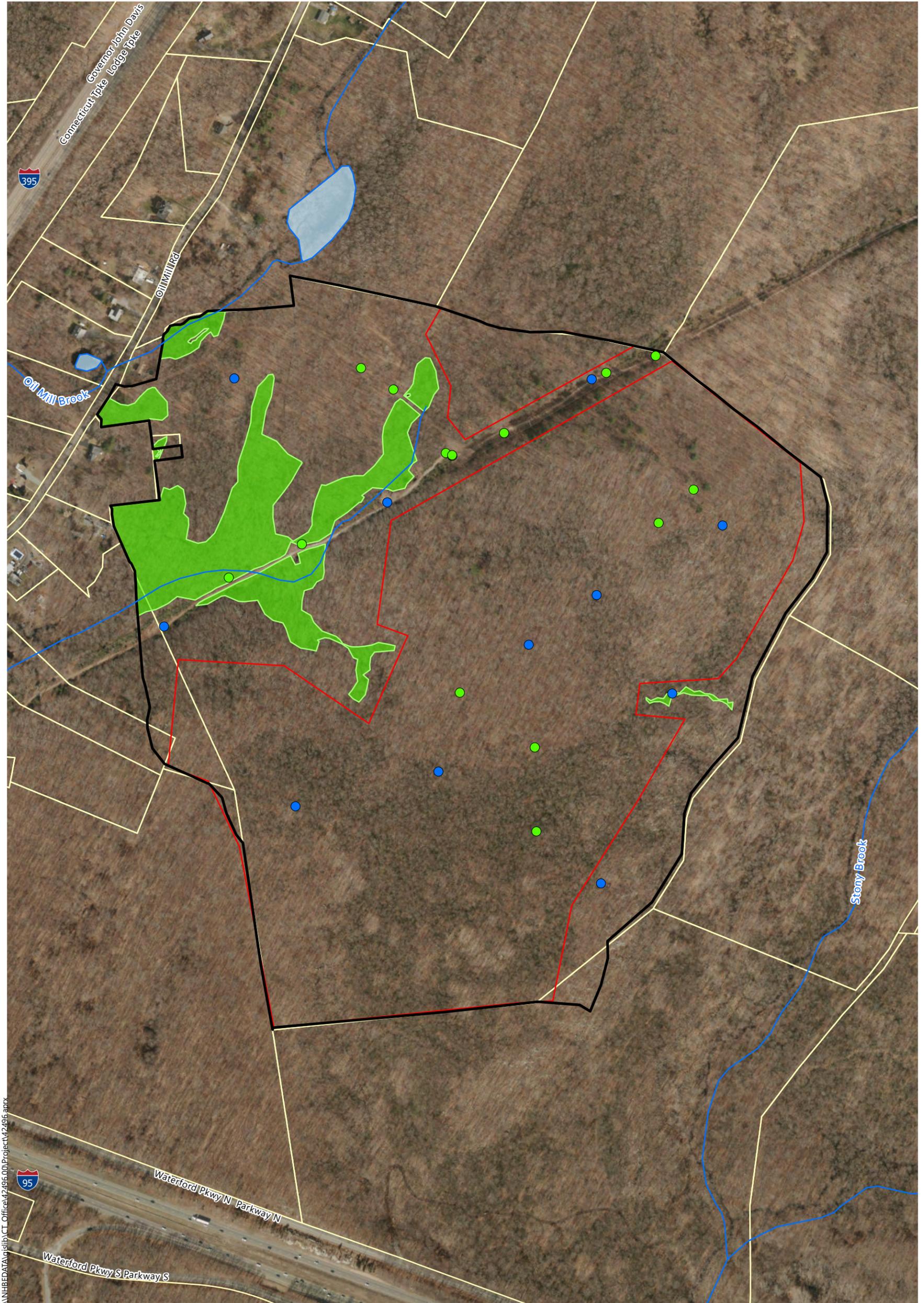
Waterford, Connecticut

- Property Boundary
- Limit Of Work
- Stream/River
- Delineated Wetland Edge
- Water Body
- Wetland Resource Area
- NDDB Habitat (December 2018)

Aerial Overview

Source: VHB, CTDEEP, ESRI

Figure 3 Bird Survey Locations



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Waterford Solar

Waterford, Connecticut

- Parcel Boundary
- Limit of Work
- Delineated Wetland Edge
- Wetland Resource Area
- Adjacent Parcels
- Whip-poor-will Survey Point
- Breeding Bird Survey Point
- Stream/River
- Waterbody

Bird Survey Figure

Source: VHB, CTDEEP, ArcGIS Online

Attachment 1

USFWS Consultation Response Letter



United States Department of the Interior



FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
<http://www.fws.gov/newengland>

In Reply Refer To:
Consultation Code: 05E1NE00-2019-SLI-2902
Event Code: 05E1NE00-2019-E-07594
Project Name: Proposed Waterford Solar

September 17, 2019

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office

70 Commercial Street, Suite 300

Concord, NH 03301-5094

(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2019-SLI-2902

Event Code: 05E1NE00-2019-E-07594

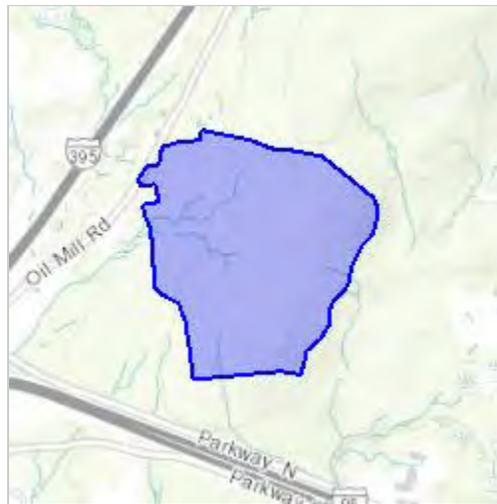
Project Name: Proposed Waterford Solar

Project Type: ** OTHER **

Project Description: Proposed development site for solar farm by Green Skies Renewable Energy.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/41.37937745707926N72.1773439474141W>



Counties: New London, CT

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Flowering Plants

NAME	STATUS
Small Whorled Pogonia <i>Isotria medeoloides</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1890	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

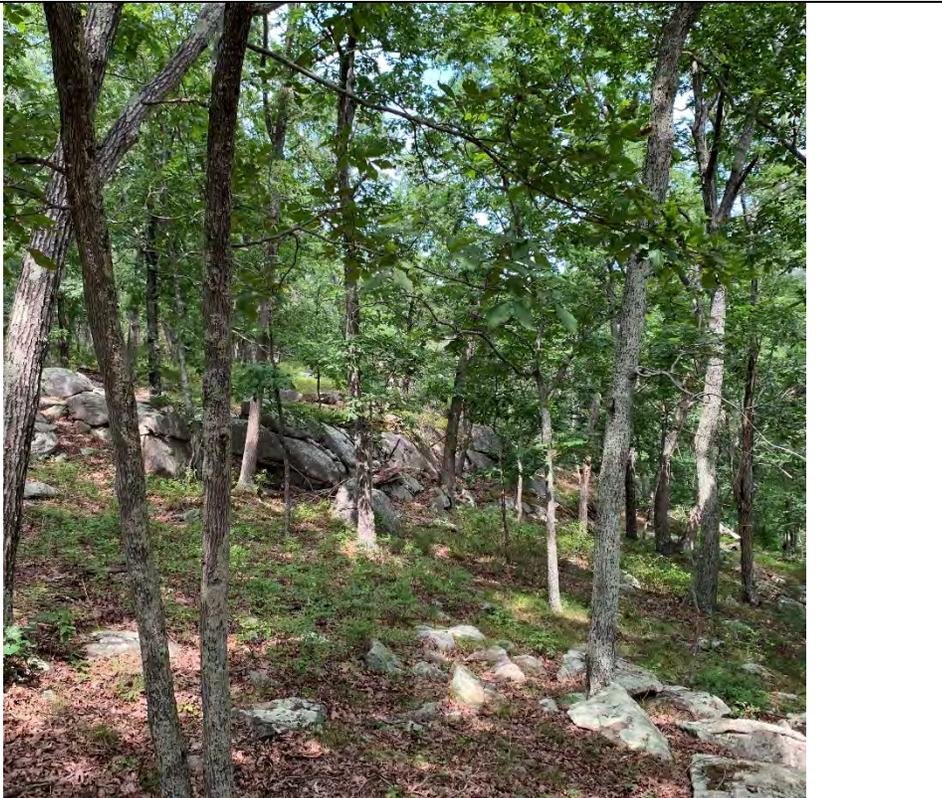
Attachment 2

Representative Site Photographs

Photo 1	Description:
	<p>Northwesterly view of recently cleared forest within the western portion of the Site with generally open canopy interspersed with copses and solitary trees.</p> <p>August 1, 2019</p>
Photo 2	Description:
	<p>Southwesterly view of recently cleared forest within the central portion of the Site with sparse tree cover and growth by disturbance-tolerant species within the open landscape.</p> <p>August 15, 2019</p>

Photo 3	Description:
	<p>Northwesterly view of recently cleared forest near the central portion of the Site. The electrical transmission right-of-way is visible in the background.</p> <p>August 2, 2019</p>
Photo 4	Description:
	<p>Northeasterly view of an uncut copse with a sedge-dominated understory along the northern property line, west of the right-of-way.</p> <p>August 1, 2019</p>

Photo 5	Description:
	<p>Northwesterly view of the stand of sub-mature forest located along the northern property boundary, east of the right-of-way. Trees within this forested area are somewhat closely spaced and have low dbhs.</p> <p>August 2, 2019</p>
Photo 6	Description:
	<p>Southerly view of the southwestern portion of the Site with a mature forest area containing an understory dominated by short and tall heath species.</p> <p>August 2, 2019</p>

Photo 7		<p>Description:</p> <p>Northeasterly view of the rocky, wooded slope near the southeastern property boundary.</p> <p>August 2, 2019</p>
Photo 8		<p>Description:</p> <p>Southerly view of an uncut copse along a rocky ridge located within the eastern portion of the proposed solar array. The eastern slopes of the ridge contain vascular plants associated with rich woodlands.</p> <p>August 15, 2019</p>

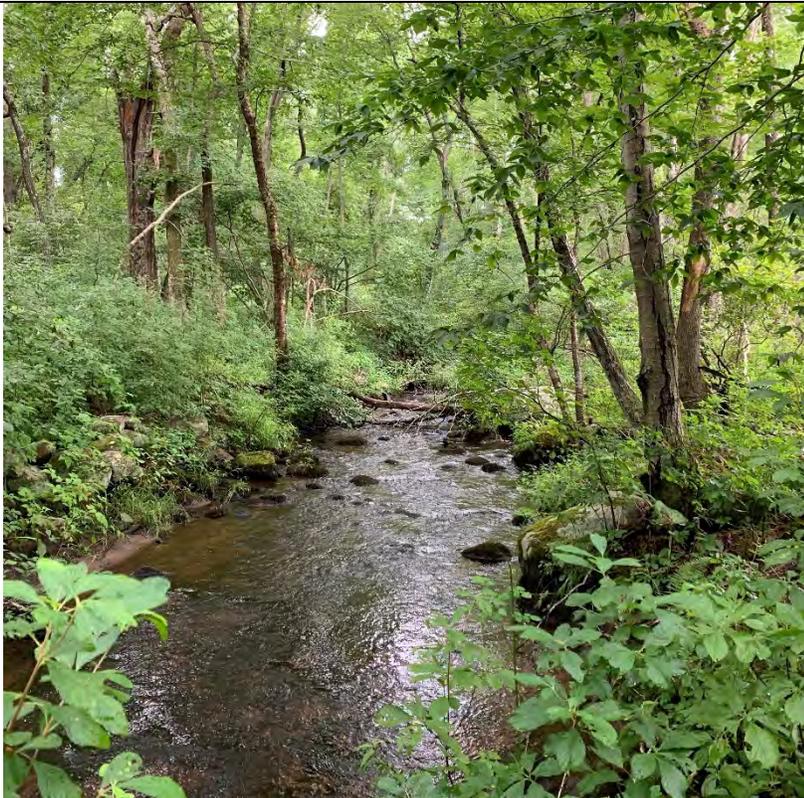
<p>Photo 9</p> 	<p>Description:</p> <p>Northeasterly view of Oil Mill Brook located along the northwestern corner of the property.</p> <p>August 14, 2019</p>
<p>Photo 10</p> 	<p>Description:</p> <p>Northerly view of the large wetland system in the northern portion of the Site with mucky soil and sparse shrub cover.</p> <p>August 2, 2019</p>

Photo 11	Description:
	<p>Southwesterly view of a more open portion of the large wetland system in the northern portion of the Site. This area contains variable microtopography with sparsely vegetated pockets between rocks and buttressed tree roots.</p> <p>August 2, 2019</p>

Photo 12	Description:
	<p>Southwesterly view of the shrubby, thicketed wetlands on both sides of the electrical transmission right-of-way access road.</p> <p>August 1, 2019</p>

<p>Photo 13</p> 	<p>Description:</p> <p>Northeasterly view of the northeastern portion of the right-of-way containing shrubby thickets interspersed with meadow-like habitat.</p> <p>August 1, 2019</p>
<p>Photo 14</p> 	<p>Description:</p> <p>Southwesterly view of the northeastern portion of the right-of-way containing shrubby thickets interspersed with meadow-like habitat.</p> <p>August 1, 2019</p>

<p>Photo 15</p>  <p>A photograph showing a grassy, slightly elevated area with various green plants and shrubs. A utility pole is visible on the left side, and power lines stretch across the sky. The background is filled with dense trees under a clear blue sky.</p>	<p>Description:</p> <p>Northeasterly view of the right-of-way with a mix of native and non-native shrubs and herbs.</p> <p>August 1, 2019</p>
<p>Photo 16</p>  <p>A photograph of a gravel access road winding through a wooded area. The road is covered with patches of green grass and weeds. The surrounding forest is dense with tall trees and lush undergrowth.</p>	<p>Description:</p> <p>Easterly view of the gravel access road at the Site entrance with abundant coverage by Japanese stiltgrass and Oriental lady's-thumb smartweed.</p> <p>August 1, 2019</p>

Photo 17	Description:
	<p>Northerly view of a haul road within the central portion of the Site.</p> <p>August 1, 2019</p>
Photo 18	Description:
	<p>Northeasterly view of the access road within the central portion of the right-of-way, top-dressed with riprap and containing various weeds.</p> <p>August 19, 2019</p>

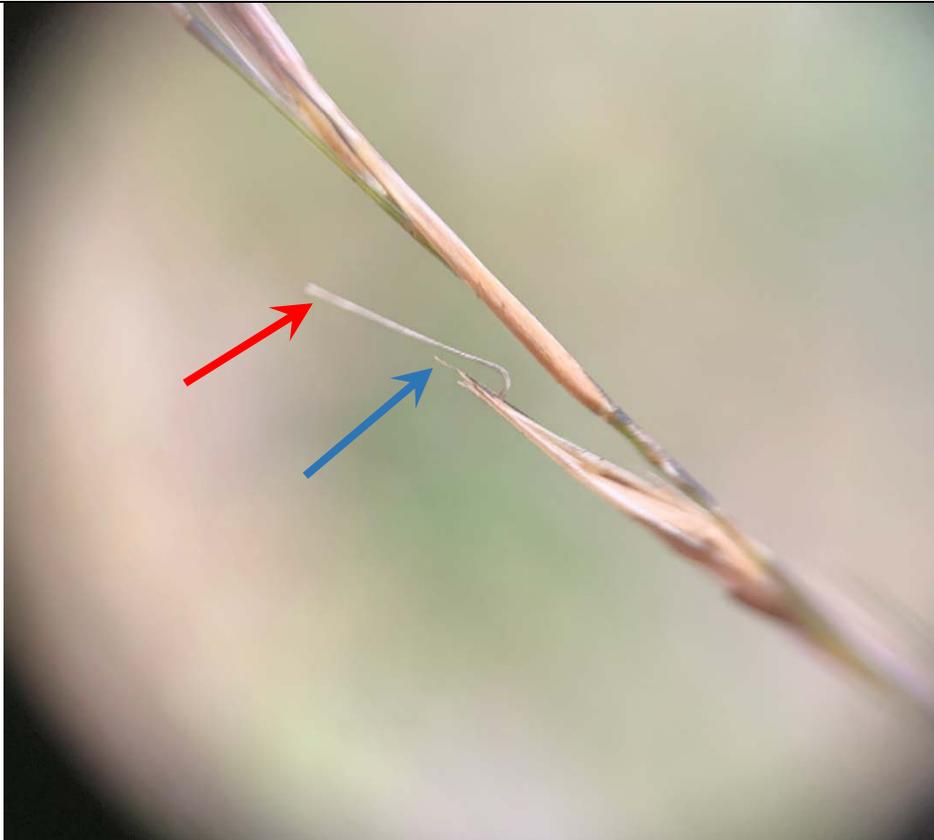
Photo 19	Description:
	<p>14x magnification of a floret of <i>Aristida dichotoma</i>, with a long central lemma awn (red arrow), and diminutive lateral lemma awns (blue arrow). This species, observed within the access roads of the electrical transmission right-of-way, is a common associate of the state-listed Needlegrass.</p> <p>October 1, 2019</p>
Photo 20	Description:
	<p>Blood milkwort, a congener of Nuttall's Milkwort with larger sepals and wider racemes, observed within the electrical transmission right-of-way.</p> <p>August 1, 2019</p>

Photo 21	Description:
	<p>Yearly wood frog captured within the wetlands in the northern portion of the Site.</p> <p>August 2, 2019</p>

Photo 22	Description:
	<p>Large, open staging area with dense wood chip cover that could provide suitable nesting habitat for turtles.</p> <p>August 1, 2019</p>

Attachment 3

Biologist Qualifications

Jeffrey C. Peterson, CPSS, PWS, CPESC, ENV SP

Senior Soil and Wetland Scientist



Education

Graduate Coursework, Soil Science, University of Massachusetts, 2003

Graduate Coursework, Soil Science, University of Connecticut, 1996

BS, Biology, Ecology, University of Connecticut, 1977

Registrations/Certifications

Certified Professional Soil Scientist (Soil Science), 2001

Certified Professional in Erosion and Sediment Control (Erosion and Sediment Control Planning), 2003

Professional Wetland Scientist (Wetland Science), 2015

Licensed Soil Evaluator (Soil Evaluation) RI, 2001

Certified Wetland Delineator (Federal Wetland Delineation) USACE Baltimore Dist., 1993

Envision™ Sustainability Professional, 2013

Jeff is a Soil Scientist and Plant Ecologist with VHB specializing in hydric soil identification, plant taxonomy, and delineation and evaluation of wetland resources. As a senior member of the Environmental Staff, his responsibilities include permit preparation and expert witness testimony for complex energy and transportation projects. He has expertise in wetland delineation, identification of and conservation planning for rare plant and animal taxa, wetland functional value assessment and impact analysis, and site selection, design and monitoring study development for compensatory wetland creation, enhancement, and restoration projects.

41 years of professional experience

Tobacco Valley Solar Project, Simsbury, CT

Jeff led the preparation of the natural resource documentation supporting the Petition for a Declaratory Ruling from the Connecticut Siting Council (CSC) for a proposed 26.4 MW for a solar photovoltaic development. Jeff delineated the wetland resources on the 300 acre Project property. He also coordinated with the CTDEEP Natural Diversity Data Base (NDDDB) staff to conduct breeding bird surveys, and rare flora and fauna surveys. He drafted the conservation measures plan to protect state-listed species within the project area that were approved by the NDDDB Program. Jeff provided expert testimony on anticipated project effects to water quality and wildlife before the CSC in public hearings for the project which was approved in a unanimous vote by the CSC. He also prepared high intensity and site specific soil surveys of the agricultural soils in the project area to inventory prime farmland prior to project implementation. He also wrote the resource conservation sections of the Development and Management Plans required for the Project.

Groton New London Airport Rare Species Surveys, Wetland Mitigation Monitoring Report, and Invasive Species Report, Groton, CT

Under an on-call environmental services contract with the Connecticut Airport Authority (CAA), Jeff led a small team conducting field surveys for two state-listed rare plants present on the airfield and reported on the populations trends by reviewing previous reports. He also completed an annual wetland mitigation monitoring report required by the U.S. Army Corps of Engineers and the Connecticut Department of Energy (CTDEEP) for a tidal wetland creation and enhancement project along the Poquonnock River on airport property. Additionally, he completed an invasive species field investigation and management report for the CAA. Jeff led these efforts and coordinated with CAA and airfield staff to maximize the efficiency of field efforts.

T.F. Green Airport, Runway Safety Improvements Wetland Mitigation, Warwick, RI

After successfully completing the Environmental Impact Statement (EIS) marked by the issuance of a Record of Decision by the FAA, VHB was retained by the Rhode Island Airport Corporation (RIAC) to develop the wetland mitigation program to offset impacts associated with safety improvements to the Runway 16- 34 safety areas. Jeff coordinated with the Rhode Island Department of Environmental Management's (RIDEM) Freshwater



Wetlands, Water Quality, and Rhode Island Pollution Discharge Elimination Programs along with the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency to expedite approvals. Jeff authored the sections of the Application to Alter Wetlands dealing with the wetland mitigation and coordinated the approval of the Individual USACE Permit for this critical project. The program consists of five sites, primarily on airport property, that offset the functions lost due to the filling of 2.63 acres of wetland. The program restored and created three acres of floodplain wetland at the Runway 34 end, stabilized a severely eroding stream channel, enhanced 700 linear feet of a channelized stream to a natural meandering pattern, and restored 1.5 acres of floodplain wetland system north of Warwick Pond. This work included the replacement of an undersized culvert that created a severe localized flooding problem and restricted anadromous fish and wildlife passage. VHB was retained by the RIAC to provide technical assistance during construction of the mitigation sites and the preparation of progress reports for the regulatory agencies. The completed mitigation program is now being monitored by Jeff and other VHB staff.

National Grid, Rhode Island Reliability Project, North Smithfield to Warwick, RI

VHB was retained by National Grid to provide environmental services for proposed improvements to a 24-mile transmission line corridor through northern Rhode Island. Jeff completed vernal pool and rare, threatened, and endangered (RTE) species surveys along the 24-mile long project corridor that passes through six Rhode Island municipalities. Data collected were used to complete the Rhode Island Department of Environmental Management (RIDEM) Application to Alter a Freshwater Wetland and U.S. Army Corps of Engineers (USACE) Category II Programmatic General Permit applications. He responded to requests by the RIDEM for field locations of RTE taxa in the northern portion of the project and negotiated with RIDEM staff to establish protocols for work in the vicinity of RTE stations included in the project permit approval documents issued by RIDEM.

Calais LNG, Wildlife Habitat Assessment, Calais, ME

Retained as part of a multi-company team collecting data for an Environmental Impact Study for a proposed liquefied natural gas (LNG) receiving terminal and gas transmission pipeline. VHB was given the task of documenting the existing conditions for wildlife and plant community resources. Jeff conducted habitat assessments along portions of the 21-mile alignment, focusing on the vegetation in ombrotrophic bogs. He also assisted in the collection of breeding bird survey data used in the preparation of federal applications.

Northeast Utilities Transmission Line Environmental Assessment, Central Connecticut

As part of the regional New England East-West Solution project, VHB was retained to perform environmental and constructability assessments for adding a new transmission line within an existing 35-mile transmission corridor through central Connecticut. Mr. Peterson identified and assessed vernal pool habitat within the right-of-way (ROW) and produced a report classifying the sixty vernal pools encountered. He worked with other VHB wetland scientists collecting data to prepare data forms documenting the limits of wetlands and coordinated the data collection effort for the wetland functional analysis. He assisted in the preparation of documentation for the project petition to the Connecticut Siting Council. He also coordinated with the staff of Connecticut's Natural

Biodiversity Data Base (NDDDB) to inventory and report on populations of rare plant and wildlife species in the ROW. Element occurrence forms were completed to document the rare taxa encountered in the field. These forms were forwarded to the client and subsequently to the NDDDB to update records. He also conducted field surveys of 10 alternative route segments for the project, which involved identifying and mapping potential constraints such as rare threatened and endangered species, cold water fisheries, wetlands, public water supply aquifers, and erosion hazards.

Professional Boards and Committees:

Board of Directors, Southern New England Chapter of the Soil and Water Conservation Society since 2017

Member, New England Hydric Soils Technical Committee since 1999

Past Vice-President Society of Soil Scientists of Southern New England

Affiliations/Memberships

Soil Science Society of America

Society of Soil Scientists of Southern New England

Soil and Water Conservation Society

Society of Wetland Scientists

Massachusetts Association of Wetland Scientists

Recent Contributions and Presentations

Technical Review Committee for the *Rhode Island Soil Erosion and Sediment Control Handbook (2016)*.

Review Editor: *New England Hydric Soils Technical Committee. 2018 Version 4, Field Indicators for Identifying Hydric Soils in New England*. New England Interstate Water Pollution Control Commission, Lowell, MA.

Peterson, J. and L. Vanderveer. 2015. Use of avian surveys to successfully permit the widening of powerline corridors by assessing potential effects and benefits to wildlife. In *Proceedings of the 11th International Symposium on Environmental Concerns in Right-of-Way Management*. pp 399 to 405.

Peterson and Lizewski. 2015 T.F. Green Airport Runway 34 Safety Improvement Project Wetland Mitigation Program. Presented at the Society for Wetland Scientists Annual Conference in Providence, RI.

Peterson and Brousseau. 2019. Monitoring Wetland Hydrology and Floodplain Storage Function of Compensatory Wetlands at T.F. Green Airport. Poster Presentation at the Society of Wetland Scientist's Annual Conference. Baltimore, MD.

Brett Trowbridge

Senior Ecologist



Education

BS, Biotechnology, Worcester Polytechnic Institute, 2002

Affiliations/ Memberships

New England Botanical Club (NEBC) Councillor (2019-present)

New England Botanical Club President (2017-2019)

NEBC Herbarium Volunteer

New England Plant Conservation Program (NEPCoP) Task Force Member

NEPCoP Plant Conservation Volunteer Corps Member

Botanical Club of Cape Cod and the Islands

Torrey Botanical Society

New York Flora Association

Timber Rattlesnake Recovery Group

Massachusetts Association of Conservation Commissioners

Association of Massachusetts Wetland Scientists

Conservation Commissioner Princeton, MA (2014-2017)

Brett is a Senior Ecologist in the Natural Sciences Group in VHB's Worcester, Massachusetts, office. He has a diverse background in environmental services, specializing in botanical inventories, wildlife surveys, habitat assessments, vernal pool ecology, wetland delineation, wetlands and wildlife permitting, mitigation, and construction monitoring. Brett has successfully contributed to numerous local, state, and federal environmental permit applications in the Northeast. He frequently integrates Global Positioning System (GPS) and Global Information System (GIS) technologies into his field work and permitting.

17 years of professional experience

The Ridge at Talcott Mountain, Simsbury, CT

Brett conducted vernal pool evaluations throughout wetlands on a 173-acre site and performed habitat assessments, and surveys for several CT state-listed herpetological (*Ambystoma jeffersonianum*, *Ambystoma laterale*, *Clemmys guttata*, *Heterodon platirhinos*, *Lithobates pipiens*, *Terrapene carolina*, and *Thamnophis sauritus*) and vascular plant species (*Carex davisii*, *Desmodium glabellum*, *Drymocallis arguta*, *Elymus wiegandii*, *Hydrophyllum virginianum*, and *Silene stellata*). He subsequently prepared a Habitat Assessment & Project Description for CT DEEP Review and submitted observation records for each observed rare species.

New England Power Company Transmission Line Reliability Project, Tewksbury, Pelham, Windham, Hudson, Londonderry, NH

For this interstate transmission reliability project, Brett performed due-diligence field work and negotiated approvals to work within state-listed species habitat areas with the NH Fish and Game and the NH Natural Heritage Bureau. His field work entailed pre-construction surveys and habitat evaluations for NH state-listed reptiles (black racer, spotted, wood, and Blanding's turtles) and pre-construction botanical surveys. He subsequently prepared state-listed snake, turtle, and plant protection plans to be implemented during construction. Brett provided environmental monitoring to ensure on-site compliance with permit conditions during ~12 months of construction, including capturing and translocating rare herpetiles away from work zones. He is currently monitoring project work areas to document restoration of rare plant habitat areas.

Substation Upgrades and Transmission Line Reconfiguration, Adams, MA

Brett assisted with permitting under MA Division of Fisheries and Wildlife, MA Department of Environmental Protection, and US Army Corps of Engineers regulations for this transmission reliability project, which included work within rare species habitat and involved temporary and permanent impacts to wetlands and rare species. He performed pre-construction, due-diligence botanical surveys, and prepared a rare plant protection plan and a comprehensive 2-acre wetland rehabilitation plan, which included tree and shrub plantings, mowing, and treatment of invasive plants. Brett provided construction monitoring during site work and wetland rehabilitation. He commenced long-term monitoring of the site during 2019 to document effectiveness of treatments and confirm that site conditions meet wetland rehabilitation goals.

Solar Development, Merrimack, NH

Brett conducted weekly surveys for eastern hognose snake and black racers prior to commencement of construction for a 12-acre, ground-mounted solar array involving tree removal and grading. His field work also included surveys for vascular plants: *Viola pedate*

Brett Trowbridge

and *Aristida longispica* var. *geniculata*. Brett documented snake and rare plant observations throughout the site and prepared report materials for NHF&G.

Granite Bridge Pipeline and Liquefied Natural Gas Facility, Manchester, Auburn, Candia, Raymond, Epping, Brentwood, Exeter, and Stratham, NH

Brett identified areas of suitable turtle nesting along the 27-mile project alignment to be surveyed for state-listed turtle nesting during and in advance of construction. Brett worked with NHF&G to establish an appropriate snake survey protocol and is currently conducting surveys within areas that have been identified as potential habitat for black racers.

Rumney Salt Marsh Restoration Monitoring, Saugus, MA

DEP Wetland Variance and USACE Section 404/Section 10 Permits for Logan Runway Safety Area projects require post-construction monitoring of a 4.2-acre salt marsh restoration area of Rumney Marsh. Brett implemented the post-construction monitoring protocol, including establishment of monitoring locations, installation of permanent markers, accretion sampling stations, and a tide staff gauge. Brett has conducted 2 years of vegetation, accretion, and hydrology monitoring, and prepared associated memoranda and annual reports. Brett will continue monitoring marsh reestablishment during 2019.

Eversource New Right-of-way, Hudson, Stowe, Marlborough, Sudbury, MA

For this ± 7.6-mile-long, new transmission line project, Brett conducted vernal pool evaluations and habitat assessments for MA state-listed whip-poor-will, wood turtle, eastern box turtle, and blue-spotted salamander. Brett prepared Massachusetts Endangered Species Act (MESA) Project Review Checklist for the project review by the MA Division of Fisheries and Wildlife (MA DFW).

Town Well Testing, Maynard, MA

Brett generated a Blanding's turtle protection plan for the Town of Maynard Department of Public Works for groundwater pump testing associated with a potential new Town public water supply well. After receiving approval from the MA DFW to serve as the qualified biologist for the project and obtaining a Scientific Collection Permit from the MA DFW, Brett conducted a turtle training session for project workers and conducted turtle surveys throughout the work area immediately prior to the daily construction.

Wellesley College Science Center Renovations, Wellesley, MA

For this three-year, multi-phase renovation and construction project, Brett performed a habitat assessment within the wetland buffer zone on the project site. After field inspection, Brett documented the site conditions and habitat features and made recommendations pertaining to wildlife within a letter to the Wellesley Natural Resources Commission (WNRC). Subsequently, Brett met the WNRC agent at the project site to discuss wildlife considerations for the project.

Eversource Line 312 Structure Replacement, Montague, MA

Brett generated an eastern box turtle protection plan and obtained a Scientific Collection Permit for handling this state-listed species during project construction. Brett also conducted surveys for *Celastrus scandens* for this transmission infrastructure project. Following construction, Brett provided a summary of protection plan activities and submitted rare species observation records to the MA DFW.

Worcester Airport CAT III ILS & Taxiway Improvements, Worcester, MA

The CAT-III ILS and Taxiway Project at the Worcester Airport resulted in the permanent loss of bordering vegetated wetlands and Massport designed and constructed a 7,320 square

Brett Trowbridge

foot compensatory wetland. Habitat for grasshopper sparrow was also altered during the project and a Conservation and Management Permit was issued by the MA DFW. During 2018, Brett conducted multiple vegetation monitoring events, preparing interim reports after each, and prepared an annual year end summary report. He will monitor the restored wetland again during fall 2019. During spring 2019, Brett generated a vascular plant species list of the airports grasslands and conducted follow-up monitoring for grasshopper sparrows, with positive findings for this species.

Attachment 4

Observed Vascular Plant List

	Scientific Name	Common Name	Status
1	<i>Abutilon theophrasti</i>	velvetleaf Indian-mallow	Non-native
2	<i>Acalypha virginica</i>	Virginia three-seeded-Mercury	Native
3	<i>Acer rubrum</i>	red maple	Native
4	<i>Acer saccharum</i>	sugar maple	Native
5	<i>Achillea millefolium</i>	common yarrow	Native
6	<i>Adiantum pedatum</i>	northern maidenhair fern	Native
7	<i>Agrimonia rostellata</i>	woodland agrimony	Native
8	<i>Agrostis capillaris</i>	colonial bentgrass	Non-native
9	<i>Agrostis perennans</i>	autumn bentgrass	Native
10	<i>Ailanthus altissima</i>	tree-of-heaven	Invasive
11	<i>Alnus incana</i>	speckled alder	Native
12	<i>Ambrosia artemisiifolia</i>	common ragweed	Native
13	<i>Amelanchier laevis</i>	smooth serviceberry	Native
14	<i>Anemone quinquefolia</i>	wood anemone	Native
15	<i>Anthoxanthum odoratum</i>	sweet vernalgrass	Non-native
16	<i>Apios americana</i>	common ground-nut	Native
17	<i>Apocynum cannabinum</i>	hemp dogbane	Native
18	<i>Aralia nudicaulis</i>	wild sarsaparilla	Native
19	<i>Arisaema triphyllum ssp. pusillum</i>	Jack-in-the-pulpit	Native
20	<i>Arisaema triphyllum ssp. triphyllum</i>	Jack-in-the-pulpit	Native
21	<i>Aristida dichotoma</i>	churchmouse threawn	Native
22	<i>Artemisia vulgaris</i>	common wormwood	Non-native
23	<i>Asclepias incarnata</i>	swamp milkweed	Native
24	<i>Asclepias tuberosa</i>	butterfly milkweed	Native
25	<i>Asplenium platyneuron</i>	ebony spleenwort	Native
26	<i>Athyrium angustum</i>	narrow lady fern	Native
27	<i>Baptisia tinctoria</i>	yellow wild indigo	Native
28	<i>Bartonia virginica</i>	Virginia screwstem	Native
29	<i>Berberis thunbergii</i>	Japanese barberry	Invasive
30	<i>Betula alleghaniensis</i>	yellow birch	Native
31	<i>Betula lenta</i>	black birch	Native
32	<i>Boehmeria cylindrica</i>	small-spiked false nettle	Native
33	<i>Brachyletrum aristosum</i>	northern long-awned wood grass	Native
34	<i>Brachyletrum erectum</i>	southern long-awned wood grass	Native
35	<i>Bromus pubescens</i>	hairy wood brome	Native
36	<i>Bulbostylis capillaris</i>	tufted hair-sedge	Native
37	<i>Carex atlantica var. capillacea</i>	prickly bog sedge	Native
38	<i>Carex lurida</i>	sallow sedge	Native
39	<i>Carex straminea</i>	eastern straw sedge	Native
40	<i>Carex tenera</i>	delicate quill sedge	Native
41	<i>Carex appalachica</i>	Appalachian sedge	Native
42	<i>Carex arctata</i>	drooping woodland sedge	Native
43	<i>Carex brunnescens</i>	brownish sedge	Native
44	<i>Carex cephaloidea</i>	thin-leaved sedge	Native
45	<i>Carex cephalophora</i>	oval-headed sedge	Native
46	<i>Carex debilis</i>	white-edged sedge	Native
47	<i>Carex digitalis</i>	slender woodland sedge	Native
48	<i>Carex gynandra</i>	nodding sedge	Native
49	<i>Carex intumescens</i>	greater bladder sedge	Native
50	<i>Carex laxiculmis</i>	spreading sedge	Native
51	<i>Carex laxiflora</i>	broad loose-flowered sedge	Native
52	<i>Carex leptalea</i>	bristly-stalk sedge	Native
53	<i>Carex lurida</i>	sallow sedge	Native
54	<i>Carex mesochorea</i>	midland sedge	Native
55	<i>Carex muehlenbergii</i>	Muhlenberg's sedge	Native
56	<i>Carex normalis</i>	greater straw sedge	Native
57	<i>Carex pennsylvanica</i>	Pennsylvania sedge	Native
58	<i>Carex projecta</i>	necklace sedge	Native

	Scientific Name	Common Name	Status
59	<i>Carex retroflexa</i>	reflexed sedge	Native
60	<i>Carex rosea</i>	rosy sedge	Native
61	<i>Carex scabrata</i>	eastern rough sedge	Native
62	<i>Carex scoparia</i>	pointed broom sedge	Native
63	<i>Carex sparganioides</i>	bur-reed sedge	Native
64	<i>Carex stipata</i>	awl-fruited sedge	Native
65	<i>Carex swanii</i>	Swan's sedge	Native
66	<i>Carex tribuloides</i>	blunt broom sedge	Native
67	<i>Carex vestita</i>	velvet sedge	Native
68	<i>Carex virescens</i>	ribbed sedge	Native
69	<i>Carpinus caroliniana</i>	American hornbeam	Native
70	<i>Carya ovata</i>	shagbark hickory	Native
71	<i>Carya cordiformis</i>	bitternut hickory	Native
72	<i>Castanea dentata</i>	American chestnut	Native
73	<i>Celastrus orbiculatus</i>	Asiatic bittersweet	Invasive
74	<i>Cerastium fontanum</i>	mouse-ear chickweed	Non-native
75	<i>Chamaecrista nictitans</i>	wild sensitive-pea	Native
76	<i>Chimaphila maculata</i>	pipsissewa	Native
77	<i>Chrysosplenium americanum</i>	golden-saxifrage	Native
78	<i>Cinna arundinacea</i>	sweet wood-reed	Native
79	<i>Circaea canadensis</i>	enchanter's-nightshade	Native
80	<i>Cirsium vulgare</i>	common thistle	Non-native
81	<i>Clematis virginiana</i>	Virginia virgin's-bower	Native
82	<i>Clethra alnifolia</i>	coastal sweet-pepperbush	Native
83	<i>Coleataenia longifolia ssp. rigidula</i>	long-leaved redtop-panicgrass	Native
84	<i>Comptonia peregrina</i>	sweet-fern	Native
85	<i>Corylus americana</i>	American hazelnut	Native
86	<i>Crocianthemum canadense</i>	Canada frostweed	Native
87	<i>Cyperus lupulinus</i>	great plains flatsedge	Native
88	<i>Cyperus strigosus</i>	straw-colored flatsedge	Native
89	<i>Dactylis glomerata</i>	orchard grass	Non-native
90	<i>Danthonia compressa</i>	flattened oatgrass	Native
91	<i>Danthonia spicata</i>	poverty grass	Native
92	<i>Dendrolycopodium hickeyi</i>	Hickey's tree-clubmoss	Native
93	<i>Dendrolycopodium obscurum</i>	princess pine	Native
94	<i>Dennstaedtia punctilobula</i>	eastern hay-scented fern	Native
95	<i>Desmodium rotundifolium</i>	round-leaved trailing tick-trefoil	Native
96	<i>Dianthus armeria</i>	Deptford pink	Non-native
97	<i>Dichantherium boreale</i>	northern rosette-panicgrass	Native
98	<i>Dichantherium boscii</i>	Bosc's rosette-panicgrass	Native
99	<i>Dichantherium clandestinum</i>	deer-tongue rosette-panicgrass	Native
100	<i>Dichantherium depauperatum</i>	starved rosette-panicgrass	Native
101	<i>Dichantherium sphaerocarpon</i>	round-fruited rosette-panicgrass	Native
102	<i>Digitaria sanguinalis</i>	hairy crabgrass	Non-native
103	<i>Diphasiastrum digitatum</i>	southern ground-cedar	Native
104	<i>Diphasiastrum tristachyum</i>	blue ground-cedar	Native
105	<i>Doellingeria umbellata</i>	tall white-aster	Native
106	<i>Dryopteris carthusiana</i>	spinulose wood fern	Native
107	<i>Dryopteris intermedia</i>	evergreen wood fern	Native
108	<i>Dryopteris marginalis</i>	marginal wood fern	Native
109	<i>Echinochloa sp.</i>	barnyard grass	Unknown
110	<i>Elaeagnus umbellata</i>	autumn-olive	Invasive
111	<i>Eleocharis obtusa</i>	blunt spikesedge	Native
112	<i>Eleusine indica</i>	goosegrass	Non-native
113	<i>Elymus sp.</i>	rye cultivar	Non-native
114	<i>Epilobium coloratum</i>	eastern willow-herb	Native
115	<i>Eragrostis pectinacea</i>	tufted lovegrass	Native
116	<i>Eragrostis spectabilis</i>	purple lovegrass	Native

	Scientific Name	Common Name	Status
117	<i>Erechtites hieraciifolius</i> var. <i>hieraciifolius</i>	American burnweed	Native
118	<i>Erigeron canadensis</i>	Canada fleabane	Native
119	<i>Euonymus alatus</i>	burning-bush	Invasive
120	<i>Eupatorium perfoliatum</i>	boneset thoroughwort	Native
121	<i>Eurybia divaricata</i>	white wood-aster	Native
122	<i>Euthamia caroliniana</i>	coastal plain grass-leaved-goldenrod	Native
123	<i>Euthamia graminifolia</i>	common grass-leaved-goldenrod	Native
124	<i>Eutrochium dubium</i>	coastal plain Joe-Pye weed	Native
125	<i>Eutrochium maculatum</i>	spotted Joe-Pye weed	Native
126	<i>Fagus grandifolia</i>	American beech	Native
127	<i>Fallopia convolvulus</i>	black bindweed	Non-native
128	<i>Festuca rubra</i>	red fescue	Non-native
129	<i>Festuca subverticillata</i>	nodding fescue	Native
130	<i>Fraxinus americana</i>	white ash	Native
131	<i>Galium circaeazans</i>	forest licorice bedstraw	Native
132	<i>Galium lanceolatum</i>	lance-leaved licorice bedstraw	Native
133	<i>Galium mollugo</i>	whorled bedstraw	Non-native
134	<i>Galium pilosum</i>	hairy bedstraw	Native
135	<i>Galium tinctorium</i>	stiff three-petaled bedstraw	Native
136	<i>Galium trifidum</i> ssp. <i>trifidum</i>	three-petaled bedstraw	Native
137	<i>Galium triflorum</i>	fragrant bedstraw	Native
138	<i>Gaylussacia baccata</i>	black huckleberry	Native
139	<i>Geranium maculatum</i>	spotted crane's-bill	Native
140	<i>Geum canadense</i>	white avens	Native
141	<i>Glyceria striata</i>	fowl manna grass	Native
142	<i>Hamamelis virginiana</i>	American witch-hazel	Native
143	<i>Hieracium pilosella</i>	mouse-ear hawkweed	Non-native
144	<i>Hieracium praealtum</i>	tall hawkweed	Non-native
145	<i>Hieracium scabrum</i>	rough hawkweed	Native
146	<i>Hieracium caespitosum</i>	yellow hawkweed	Non-native
147	<i>Hieracium paniculatum</i>	panicked hawkweed	Native
148	<i>Hydrocotyle americana</i>	American marsh-pennywort	Native
149	<i>Hylodesmum nudiflorum</i>	naked tick-trefoil	Native
150	<i>Hypericum gentianoides</i>	orange-grass St. John's-wort	Native
151	<i>Hypericum mutilum</i>	dwarf St. john's-wort	Native
152	<i>Hypericum canadense</i>	lesser St. John's-wort	Native
153	<i>Hypericum perforatum</i>	common St. John's-wort	Non-native
154	<i>Hypericum punctatum</i>	spotted St. John's-wort	Native
155	<i>Hypopitys lanuginosa</i>	hairy pine-sap	Native
156	<i>Hypochaeris radicata</i>	hairy cat's-ear	Non-native
157	<i>Hypoxis hirsuta</i>	common star-grass	Native
158	<i>Ilex opaca</i>	American holly	Native
159	<i>Ilex verticillata</i>	common winterberry	Native
160	<i>Impatiens capensis</i>	jewelweed	Native
161	<i>Juncus brevicaudatus</i>	short-tailed rush	Native
162	<i>Juncus canadensis</i>	Canada rush	Native
163	<i>Juncus effusus</i>	common soft rush	Native
164	<i>Juncus marginatus</i>	grass-leaved rush	Native
165	<i>Juncus pylaei</i>	Pylaei's soft rush	Native
166	<i>Juncus secundus</i>	lopsided rush	Native
167	<i>Juncus tenuis</i>	path rush	Native
168	<i>Juniperus virginiana</i>	eastern red cedar	Native
169	<i>Kalmia latifolia</i>	mountain laurel	Native
170	<i>Krigia virginica</i>	Virginia dwarf-dandelion	Native
171	<i>Kummerowia striata</i>	Japanese-clover	Non-native
172	<i>Lactuca canadensis</i>	tall lettuce	Native
173	<i>Lechea intermedia</i>	round-fruited pinweed	Native
174	<i>Lechea mucronata</i>	hairy pinweed	Native

	Scientific Name	Common Name	Status
175	<i>Lechea tenuifolia</i>	narrow-leaved pinweed	Native
176	<i>Leersia virginica</i>	white cut grass	Native
177	<i>Lepidium campestre</i>	field pepperweed	Non-native
178	<i>Lespedeza capitata</i>	round-headed bush-clover	Native
179	<i>Lespedeza hirta</i>	hairy bush-clover	Native
180	<i>Lespedeza procumbens</i>	trailing bush-clover	Native
181	<i>Lespedeza violacea</i>	wand bush-clover	Native
182	<i>Lindera benzoin</i>	northern spicebush	Native
183	<i>Linum virginianum</i>	woodland yellow flax	Native
184	<i>Liriodendron tulipifera</i>	tuliptree	Native
185	<i>Lobelia inflata</i>	bladder-pod lobelia	Native
186	<i>Lonicera japonica</i>	Japanese honeysuckle	Invasive
187	<i>Lotus corniculatus</i>	garden bird's-foot-trefoil	Non-native
188	<i>Ludwigia alternifolia</i>	square-pod water-primrose	Native
189	<i>Luzula multiflora</i>	common wood rush	Native
190	<i>Lycopodium clavatum</i>	common clubmoss	Native
191	<i>Lycopus virginicus</i>	Virginia water-horehound	Native
192	<i>Lyonia ligustrina</i>	maleberry	Native
193	<i>Lysimachia ciliata</i>	fringed yellow-loosestrife	Native
194	<i>Lysimachia borealis</i>	starflower	Native
195	<i>Lysimachia hybrida</i>	lowland yellow-loosestrife	Native
196	<i>Lysimachia quadriflora</i>	four-floured yellow-loosestrife	Native
197	<i>Maianthemum canadense</i>	Canada-mayflower	Native
198	<i>Maianthemum racemosum</i>	feathery false Solomon's-seal	Native
199	<i>Medeola virginiana</i>	Indian cucumber root	Native
200	<i>Melampyrum lineare</i>	cow-wheat	Native
201	<i>Microstegium vimineum</i>	Japanese stiltgrass	Invasive
202	<i>Mikania scandens</i>	climbing hempvine	Native
203	<i>Mimulus ringens</i>	Allegheny monkey-flower	Native
204	<i>Mitchella repens</i>	partridge-berry	Native
205	<i>Monotropa uniflora</i>	one-flowered Indian-pipe	Native
206	<i>Morella caroliniensis</i>	small bayberry	Native
207	<i>Muhlenbergia sobolifera</i>	rock muhly	Native
208	<i>Myosoton aquaticum</i>	giant-chickweed	Non-native
209	<i>Nabalus trifoliolatus</i>	three-leaved rattlesnake-root	Native
210	<i>Nuttallanthus canadensis</i>	oldfield-toadflax	Native
211	<i>Nyssa sylvatica</i>	black-gum	Native
212	<i>Onoclea sensibilis</i>	sensitive fern	Native
213	<i>Osmorhiza claytonii</i>	bland sweet-cicely	Native
214	<i>Osmunda regalis</i>	royal fern	Native
215	<i>Osmundastrum cinnamomeum</i>	cinnamon fern	Native
216	<i>Ostrya virginiana</i>	hop-hornbeam	Native
217	<i>Oxalis stricta</i>	common yellow wood sorrel	Native
218	<i>Packera aurea</i>	golden groundsell	Native
219	<i>Panicum dichotomiflorum</i> var. <i>dichotomiflorum</i>	fall panicgrass	Native
220	<i>Parathelypteris noveboracensis</i>	New York fern	Native
221	<i>Parathelypteris simulata</i>	Massachusetts fern	Native
222	<i>Parthenocissus quinquefolia</i>	Virginia-creeper	Native
223	<i>Paspalum setaceum</i> var. <i>setaceum</i>	slender bentgrass	Native
224	<i>Persicaria longiseta</i>	Oriental lady's-thumb smartweed	Invasive
225	<i>Persicaria punctata</i>	dotted smartweed	Native
226	<i>Persicaria sagittata</i>	arrow-leaved tearthumb	Native
227	<i>Phegopteris connectilis</i>	long beech fern	Native
228	<i>Phragmites australis</i>	common reed	Invasive
229	<i>Phytolacca americana</i>	American pokeweed	Native
230	<i>Pilea pumila</i>	Canada clearweed	Native
231	<i>Pinus strobus</i>	eastern white pine	Native
232	<i>Piptochaetium avenaceum</i>	black-seeded spear grass	Native

	Scientific Name	Common Name	Status
233	<i>Plantago aristata</i>	bracted plantain	Non-native
234	<i>Plantago lanceolata</i>	English plantain	Non-native
235	<i>Plantago rugelii</i>	Rugel's plantain	Native
236	<i>Platanthera clavellata</i>	little club-spur bog-orchid	Native
237	<i>Platanthera sp. (grandiflora or psycodes)</i>	bog-orchid	Native
238	<i>Poa annua</i>	annual blue grass	Non-native
239	<i>Poa compressa</i>	flat-stemmed blue grass	Invasive
240	<i>Polygala sanguinea</i>	blood milkwort	Native
241	<i>Polygonatum biflorum</i>	King Solomon's-seal	Native
242	<i>Polypodium virginianum</i>	rock polypody	Native
243	<i>Polystichum acrostichoides</i>	Christmas fern	Native
244	<i>Potentilla canadensis</i>	dwarf cinquefoil	Native
245	<i>Potentilla norvegica</i>	Norwegian cinquefoil	Native
246	<i>Potentilla simplex</i>	common cinquefoil	Native
247	<i>Prunella vulgaris</i>	common selfheal	Native
248	<i>Prunus serotina</i>	black cherry	Native
249	<i>Pseudognaphalium obtusifolium</i>	blunt-leaved rabbit-tobacco	Native
250	<i>Pyrola americana</i>	American shinleaf	Native
251	<i>Pyrola elliptica</i>	elliptic-leaved shinleaf	Native
252	<i>Quercus alba</i>	eastern white oak	Native
253	<i>Quercus montana</i>	mountain chestnut oak	Native
254	<i>Quercus velutina</i>	black oak	Native
255	<i>Ranunculus acris</i>	tall buttercup	Non-native
256	<i>Ranunculus recurvatus</i>	hooked buttercup	Native
257	<i>Rhexia virginica</i>	Virginia meadow-beauty	Native
258	<i>Rhododendron viscosum</i>	clammy azalea	Native
259	<i>Rhus copallinum</i>	winged sumac	Native
260	<i>Rhus glabra</i>	smooth sumac	Native
261	<i>Rhynchospora capitellata</i>	brownish beaksedge	Native
262	<i>Rosa multiflora</i>	multiflora rose	Invasive
263	<i>Rubus allegheniensis</i>	common blackberry	Native
264	<i>Rubus flagellaris</i>	northern blackberry	Native
265	<i>Rubus hispida</i>	bristly blackberry	Native
266	<i>Rubus occidentalis</i>	black raspberry	Native
267	<i>Rubus phoenicolasius</i>	wine raspberry	Non-native
268	<i>Rudbeckia hirta var. pulcherrima</i>	black-eyed coneflower	Non-native
269	<i>Rumex acetosella</i>	common sheep sorrel	Invasive
270	<i>Sambucus nigra</i>	black elderberry	Native
271	<i>Sassafras albidum</i>	sassafras	Native
272	<i>Schedonorus arundinaceus</i>	tall rye grass	Non-native
273	<i>Schizachyrium scoparium</i>	little bluestem	Native
274	<i>Scirpus cyperinus</i>	common woolsedge	Native
275	<i>Scirpus hattorianus</i>	mosquito bulrush	Native
276	<i>Scutellaria lateriflora</i>	mad dog skullcap	Native
277	<i>Sericocarpus asteroides</i>	toothed white-topped-aster	Native
278	<i>Setaria faberi</i>	Chinese foxtail	Non-native
279	<i>Sisyrinchium montanum var. crebrum</i>	strict blue-eyed-grass	Native
280	<i>Smilax glauca</i>	glaucous-leaved greenbrier	Native
281	<i>Smilax herbacea</i>	carrion-flower	Native
282	<i>Smilax rotundifolia</i>	roundleaf greenbrier	Native
283	<i>Solidago odora</i>	licorice goldenrod	Native
284	<i>Solidago puberula</i>	downy goldenrod	Native
285	<i>Solidago rugosa</i>	common wrinkle-leaved goldenrod	Native
286	<i>Solidago caesia</i>	blue-stem goldenrod	Native
287	<i>Spiraea alba</i>	white meadowsweet	Native
288	<i>Swida alternifolia</i>	alternate-leaved dogwood	Native
289	<i>Symphotrichum lateriflorum</i>	calico American-aster	Native
290	<i>Symphotrichum novi-belgii</i>	New York American-aster	Native

	Scientific Name	Common Name	Status
291	<i>Symphyotrichum lanceolatum</i> ssp. <i>lanceolatum</i> var. <i>lanceolatum</i>	lance-leaved American-aster	Native
292	<i>Symphyotrichum racemosum</i>	small white American-aster	Native
293	<i>Symphyotrichum dumosum</i>	bushy American-aster	Native
294	<i>Symphyotrichum undulatum</i>	wavy-leaved American-aster	Native
295	<i>Symphyotrichum patens</i>	late purple American-aster	Native
296	<i>Symplocarpus foetidus</i>	skunk-cabbage	Native
297	<i>Taraxacum laevigatum</i>	red-seeded dandelion	Non-native
298	<i>Thalictrum pubescens</i>	tall meadow-rue	Native
299	<i>Toxicodendron vernix</i>	poison-sumac	Native
300	<i>Toxicodendron radicans</i>	poison-ivy	Native
301	<i>Trichostema dichotomum</i>	forked bluecurls	Native
302	<i>Trifolium pratense</i>	red clover	Non-native
303	<i>Trifolium aureum</i>	palmate hop clover	Non-native
304	<i>Triodanis perfoliata</i>	clasping-leaved Venus'-looking-glass	Native
305	<i>Typha latifolia</i>	broad-leaved cat-tail	Native
306	<i>Uvularia perfoliata</i>	perfoliate bellwort	Native
307	<i>Uvularia sessilifolia</i>	sessile-leaved bellwort	Native
308	<i>Vaccinium angustifolium</i>	lowbush blueberry	Native
309	<i>Vaccinium corymbosum</i>	highbush blueberry	Native
310	<i>Vaccinium pallidum</i>	hillside blueberry	Native
311	<i>Verbascum thapsus</i>	common mullein	Non-native
312	<i>Veronica officinalis</i>	common speedwell	Non-native
313	<i>Viburnum dilatatum</i>	linden arrowwood	Non-native
314	<i>Viburnum acerifolium</i>	maple-leaved viburnum	Native
315	<i>Viola sagittata</i>	arrowhead violet	Native
316	<i>Viola palmata</i>	wood violet	Native
317	<i>Vitis aestivalis</i>	summer grape	Native
318	<i>Vitis labrusca</i>	fox grape	Native

Attachment 5

Observed and Potential Bird Species

Attachment 5: Observed and Potential Bird Species

	Terrestrial Habitats				Aquatic Habitats	
	Scrub-Shrub (Logging Roads)	Oak/Pine Forest	Scrub-Shrub (Powerline ROW)	Edge	Forested Wetland	Stream
Turkey Vulture ^B	P	P	O	P		
Sharp-shinned Hawk ^{M(S-E)}	P	P	P			
Cooper's Hawk ^B	P	P	P	P		
Red-shouldered Hawk ^B	P	P	P		P	
Broad-winged Hawk ^{B(S-SC)}		P		P		
Red-tailed Hawk ^B	P	P	O	P	O	
Rough-legged Hawk ^M	P		P	P	P	
Wild Turkey ^B	P	P	P	P		
Wilson's (Common) Snipe ^M	P		P		P	
American Woodcock ^B	P	O	P		O	
Mourning Dove ^B	O	P	O	P		
Black-billed Cuckoo ^B	P	P	P		P	
Yellow-billed Cuckoo ^B	P	P	P			
Eastern Screech-Owl ^B	P	P	P	P		
Great Horned Owl ^B	P	P	P	P	P	
Barred Owl ^B	P	P	P	P		

P = Potential to occur O = observed by VHB during Early Summer/Late Fall 2019

B = breeding in Connecticut M = migrant/visitor

S-E = State-endangered S-T= State-threatened S-SC = State-Special Concern

Source: DeGraaf, Richard M. and Mariko Yamasaki. 2001. New England Wildlife: Habitat, Natural History and Distribution, University Press of New England, Hanover, New Hampshire, 2001.

Bevier, L. R. (Ed.). 1994. Atlas of Breeding Birds of Connecticut. Bulletin 113. State Geological and Natural History Survey of Connecticut. 461 p.

CTDEEP. 2015. Connecticut Wildlife Action Plan. http://www.ct.gov/deep/cwp/view.asp?a=2723&q=329520&deepNav_GID=1719#Revision

	Terrestrial Habitats				Aquatic Habitats	
	Scrub-Shrub (Logging Roads)	Oak/Pine Forest	Scrub-Shrub (Powerline ROW)	Edge	Forested Wetland	Stream
Northern Saw-whet Owl ^{B (S-SC)}		P				
Whip-poor-will ^{B (S-SC)}	P	P	P	P		
Ruby-throated Hummingbird ^B	P	P	P			
Red-bellied Woodpecker ^B	O	P	O			
Pileated Woodpecker ^B		P				
Yellow-bellied Sapsucker ^B		P				
Downy Woodpecker ^B	O	P	P			
Hairy Woodpecker ^B	O	P	O			
Northern Flicker ^B	P	P	P	P		
Eastern Wood-Pewee ^B	O	P	P		O	
Willow Flycatcher ^B				P		
Least Flycatcher ^B		P				
Eastern Phoebe ^B	P	P	P	P	P	
Great Crested Flycatcher ^B	O	O	O		O	
Eastern Kingbird ^B	P	P	P	P	P	
White-eyed Vireo ^B	P	P	P		P	
Yellow-throated Vireo ^B	O	P			O	
Warbling Vireo ^B	O	P	P			
Red-eyed Vireo ^B	P	P	O			
Blue Jay ^B	O	O	P	P		
American Crow ^B	P	P	P	P		

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	Terrestrial Habitats				Aquatic Habitats	
	Scrub-Shrub (Logging Roads)	Oak/Pine Forest	Scrub-Shrub (Powerline ROW)	Edge	Forested Wetland	Stream
Tree Swallow ^B	P	P	P	P	P	P
Barn Swallow ^B	P	P	O	P		P
Black-capped Chickadee ^B	O	P	P		P	
Tufted Titmouse ^B	O	P	O		O	
Red-breasted Nuthatch ^B		P				
White-breasted Nuthatch ^B	O	P	P			
Brown Creeper ^B		P				
Carolina Wren ^B	P	P	P		P	
House Wren ^B	O	P	O	P	O	
Winter Wren ^B		P			P	
Golden-crowned Kinglet ^B		P				
Ruby-crowned Kinglet ^M		P				
Blue-gray Gnatcatcher ^B	P	P	P		P	
Eastern Bluebird ^B	O	P	P	P	P	
Veery ^B	P	P	O		P	
Hermit Thrush ^B	P	P	P		P	
Wood Thrush ^B	P	P	O		O	
American Robin ^B	O	O	O	P	O	
Gray Catbird ^B	O	P	O	P	P	
Northern Mockingbird ^B			P			
Brown Thrasher ^{B (S-SC)}			P			
Cedar Waxwing ^B	O	P	O	P	P	

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	Terrestrial Habitats				Aquatic Habitats	
	Scrub-Shrub (Logging Roads)	Oak/Pine Forest	Scrub-Shrub (Powerline ROW)	Edge	Forested Wetland	Stream
Blue-winged Warbler ^B	P	P	O	P	P	
Golden-winged Warbler ^{B (S-E)}	P	P	P			
Nashville Warbler ^B		P			P	
Yellow Warbler ^B	P	P	O		P	
Yellow-rumped Warbler ^M		P				
Chestnut-sided Warbler ^B	P		P		P	
Black-throated Green Warbler ^B		P				
Pine Warbler ^B	O	P	O		O	
Prairie Warbler ^B	P		O			
Black-and-white Warbler ^B		P				
American Redstart ^B	P	P	O		P	
Worm-eating Warbler ^B		O			O	
Ovenbird ^B	O	O	O		O	
Northern Waterthrush ^B		P			P	
Louisiana Waterthrush ^B		P				P
Common Yellowthroat ^B	P	P	O		P	
Hooded Warbler ^B	P	P	P		P	
Canada Warbler ^B		P			P	
Scarlet Tanager ^B	O	O	O			
Eastern Towhee ^B	O	O	O	P	O	
American Tree Sparrow ^M	P	P	P	P	P	

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	Terrestrial Habitats				Aquatic Habitats	
	Scrub-Shrub (Logging Roads)	Oak/Pine Forest	Scrub-Shrub (Powerline ROW)	Edge	Forested Wetland	Stream
Chipping Sparrow ^B	O	P		P	O	
Field Sparrow ^B			P			
Fox Sparrow ^M	P	P	P			
Song Sparrow ^B	P	P	P	P	P	
White-throated Sparrow ^M	P	P	P	P		
Dark-eyed Junco ^B		P		P		
Northern Cardinal ^B	P	P	O		P	
Rose-breasted Grosbeak ^B		P	O		P	
Indigo Bunting ^B	P	P	O	P		
Red-winged Blackbird ^B	P		P	P	P	
Common Grackle ^B	P	P	P	P	O	
Brown-headed Cowbird ^B	O	P	P	P	O	
Baltimore Oriole ^B	O	O	O		O	
House Finch ^B		P				
Pine Siskin ^M	P	P	P	P	P	
American Goldfinch ^B	O	P	P	P	P	
House Sparrow ^P				P		

P = Potential to occur O = observed by VHB during Early Summer/Late Summer 2019

B = breeding in Connecticut M = migrant/visitor

S-E = State-endangered S-T = State-threatened S-SC = State-Special Concern

Source: DeGraaf, Richard M. and Mariko Yamasaki. 2001. New England Wildlife: Habitat, Natural History and Distribution, University Press of New England, Hanover, New Hampshire, 2001.

Bevier, L. R. (Ed.). 1994. Atlas of Breeding Birds of Connecticut. Bulletin 113. State Geological and Natural History Survey of Connecticut. 461 p.

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