

**PETITION OF SHAGBARK LUMBER AND FARM SUPPLIES, INC.  
FOR A DECLARATORY RULING THAT NO  
CERTIFICATE OF ENVIRONMENTAL  
COMPATIBILITY AND PUBLIC NEED IS  
REQUIRED FOR THE CONSTRUCTION,  
OPERATION, AND MAINTENANCE OF A 1.6 MW  
AC SOLAR PHOTOVOLTAIC FACILITY IN  
EAST HADDAM, CONNECTICUT**



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**EXHIBIT LIST**

1. **Vicinity Map - 1000 scale**
  2. **Vicinity Map - 500 scale**
  3. **Site Plan (full scale set enclosed)**
  4. **Letter of Notice and list of abutters**
  5. **Natural Resource Assessment**
  6. **Eversource Impact Study**
  7. **Eversource Contingent Approval**
  8. **Soil Report**
  9. **Project Notification to State Historic Preservation Office**
  10. **Submission for FAA Review**
  11. **Virtual Net Metering Service Agreement (contingent approval)**
- 
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## I. INTRODUCTION

Pursuant to Conn. Gen. Stat. §§ 4-176 and 16-50k (a) and Conn. Agencies Regs. §§16-50j-38 *et seq.* Shagbark Lumber and Farm Supplies, Inc. (hereinafter the “Petitioner”) requests the Connecticut Siting Council (“Council”) approve by declaratory ruling the location, construction, operation, and maintenance of a solar photovoltaic facility capable of output to 1.6 MW, and associated equipment consisting of approximately 6 acres of solar panels (the “Project”) to be constructed within a 124-acre area located on 21 Mount Parnassus Road, a/k/a Route 434, East Haddam, Connecticut (the “Site”). Approximately 100 acres of the site is currently maintained in agriculture for haying and an additional five acres for beef cattle and horse pastures; the remaining acreage consists of a lumberyard, feed and grain store, hardware store operation and conservation easement.

Conn. Gen. Stat. § 16-50k (a) provides:

Notwithstanding the provisions of this chapter or title 16a, the council shall, in the exercise of its jurisdiction over the ruling site of generating facilities, approve by declaratory ruling . . . the construction or location of any customer-side distributed resources Project or facility with a capacity of not more than sixty-five megawatts, as long as such Project meets air and water quality standards of the Department of Energy and Environmental Protection.

As discussed in this petition, the Petitioner’s goal is to design an environmentally compatible Project that produces the maximum amount of energy while avoiding and minimizing adverse environmental impacts. Based on the evaluation presented in this report, the Project is not

expected to cause any significant adverse environmental impacts to the immediate and surrounding areas. Accordingly, the construction, operation, and maintenance of the Project satisfy the criteria of Conn. Gen. Stat. § 16-50k(a).

## **II. PETITIONER**

The Connecticut based Developer is PurePoint Energy (hereafter referred to as the “Developer”). It has its principal place of business at 28 Knight Street, Norwalk, CT 06851. PurePoint Energy will lead the Project construction and development.

Please address all correspondences and /or communications regarding this Petition to:

Thomas Wemyss  
PurePoint Energy  
28 Knight Street  
Norwalk, CT 06851

Please also provide a copy of all such correspondences and/or communications to Petitioner and its counsel at:

Ms. Julia Leonardo  
Shagbark Lumber and Farm Supplies, Inc.  
21 Mt. Parnassus Road  
East Haddam, CT 06423

Attorney Scott W. Jezek  
31 William F. Palmer Road  
P.O. Box 376  
Moodus, CT 06469

## **III. PROPOSED PROJECT**

### **A. PROJECT BACKGROUND**

In developing this Project, the Developer and Petitioner have taken into account the State’s

energy policy to “develop and utilize renewable energy resources, such as solar and wind energy, to the maximum practicable extent.” Conn. Gen. Stat. § 16a-35k. As a solar development, the proposed Project is considered a Class I renewable energy source under General Statute § 16-1(a)(26).

The Project creates a significant benefit for the Town of East Haddam and its residents. The Project will return currently unused farmland to productive use and cover otherwise weather exposed lumber stacks (the “Lumber Ports”). Over the course of a 25-year agreement or extensions between the Petitioner and Town of East Haddam, the Project will produce income for the landowner and allow the Petitioner to maintain itself as a generous, stable tax base for the Town. When the solar array is removed from the Property upon expiration of the lease or useful life, the prior agricultural use of the Property can resume, if so desired. During its life span, the Project will help to reduce gas emissions and pollutants. The owner of the Site is Bud and Bobby, LLC, whose ownership is identical to that of the Petitioner.

## **B. SITE SELECTION**

The Developer based the Site selection process for the Project on a detailed evaluation of the following key criteria.

- Site suitability (the large available acreage); topography; lack of biological and hydrological adverse impacts; designation of the Site by the town of East Haddam Plan of Development as suitable for industrial use; the location of the Project within the town’s IG District (IG-7) which expressly permits light industrial use; and its proximity to its two industrial parks; a public skating area and other light industrial and commercial uses;

- The Site is located within one mile of the primary station of the Town of East Haddam's Fire Department;
- The Site is already encumbered by an Eversource Energy, formerly Connecticut Light and Power Company, power line easement ( see Exhibits 1& 2);
- The Site is immediately available and affords mutual benefits to the Petitioner, Developer and Town of East Haddam and its Board of Education; and
- Proposed costs of interconnecting and proximity to critical infrastructure, particularly electrical grid access.

After performing an initial Site evaluation, the Petitioner designed of a specific layout which would best minimize negative environmental impacts. The Petitioner conducted further due diligence at the Site, negotiated fair and reasonable taxation terms with the Town, and entered into a lease with the land owner. The Developer performed significant public outreach within Town government, met with, and anticipates receiving appropriate letters of support from the Inland Wetlands and Water Course Commission, Planning and Zoning Commission and the East Haddam Boards of Selectmen and Education.

The Petitioner retained the following consultants to assist in the evaluation and design of the Project:

- PurePoint Energy - site plan development
- Roger Nemergut, Nemergut Consultants - civil engineering
- Robert Weaver - land surveying
- Eric Davison- Wildlife Biologist and certified Wetland and Soil Scientist - environmental site assessment

- Michael Sassi- Bridge Energy Services, LLC- Energy Consultant
- Scott D. Stevens- Registered Soil Scientist/ Environmental Site Assessor
- Richard Snarsky-Registered Soil Scientist and Professional Wetland Scientist

### **C. PROPERTY DESCRIPTION**

The Project Site is located on the south-central 10.5 acres of a 124-acre parcel owned by the Petitioner and commonly known as Shagbark Lumber. It is adjacent to the existing lumber yard on the south and the Eversource easement on the north. The Site is the location of the historic Dun-Rovin Farm which has been in continuous operation since about 1946. Petitioner currently hays approximately 100 acres and supports a small herd of beef cattle and horses for personal use.

During the past twenty years the Petitioner has expanded to first add a feed and grain store, then retail hardware sales and finally a lumber operation. Most recently, the Petitioner added a rooftop solar array to supply its own electricity. A site plan is provided as Exhibit 3. The portion of the Site dedicated to the Project is largely surrounded by other property of the Petitioner. The Site is bounded to the west by other undeveloped land of the Petitioner; to the east by an agricultural field owned by the Petitioner and the Eversource easement; to the south by the retail component of Shagbark and north by other undeveloped land of the Petitioner and the Eversource easement; and to the southwest by three single family residential homes including that of the Petitioner, Frederic Hunt, whose property is located on the Site. Exhibits 1 & 2 are land use maps which depict the surrounding land use within one thousand and five hundred feet of the site, respectively. Greater detail of the immediate vicinity surrounding the Site is shown on the Site Plan (Exhibit 3).

The Site itself is located at the northeast intersection of Connecticut Route 82 and Mount Parnassus Road, also known as Connecticut Route 434. The Site is accessible from several points on the north side of Route 434. The entrance points are currently large and wide enough to accommodate multiple tractor trailers entering the Site. Similarly, the interior driveways are already large enough to accommodate tractor trailer size vehicles. The primary access points lead across a paved parking lot to the Project. The Site is essentially bisected by the Eversource easement, running generally east to west. Petitioner's property to the north of the easement is devoted exclusively to agriculture use or is forest land. The Project and existing improvement are all south of the easement. This portion of the Site consists of approximately 10.5 acres and includes three noncontiguous regulated areas. To the far west of this area there is a wetland corridor originating off the northeast corner of the Petitioner's property. The three isolated wetland's areas are illustrated on the site plan. The latter two areas are all characterized as wetlands but are incorporated in the agricultural use of the site. The Project avoids all of these areas.

#### **D. PROJECT DESCRIPTION**

If this Project is approved by the Siting Council, PurePoint Energy will enter into an agreement with the Petitioner which will give the right to construct and develop the solar farm Site. The work will include clearing and grubbing; grading; construction of gravel access roads; layout and placement of foundation systems, racking, approximately 5,080 solar modules; 300 strings; 50 string inverters; installation of utility pads and associated electrical equipment; installation of electrical conduit, conduit supports, electrical poles, and overhead wire; and installation of a transmission line and associated transmission line tap. The access road will be twelve feet in width and maintained in accordance with local requirements to accommodate emergency vehicles and fire

trucks. Security fencing will be determined and installed where necessary. Any fencing installed will be six feet in height and avoid erosion barrier areas.

The solar panels and inverters will be mounted on a driven post racking system with a twenty degree tilt facing due south, while the lumber port panels will tilt at 10 degrees. Inverters will be mounted to the racking system, underneath the PV panels. The maximum height of the panels will be approximately 16 feet. An example of the type of panels and racking system that will be utilized is shown on the following page, Supplement 7-A.

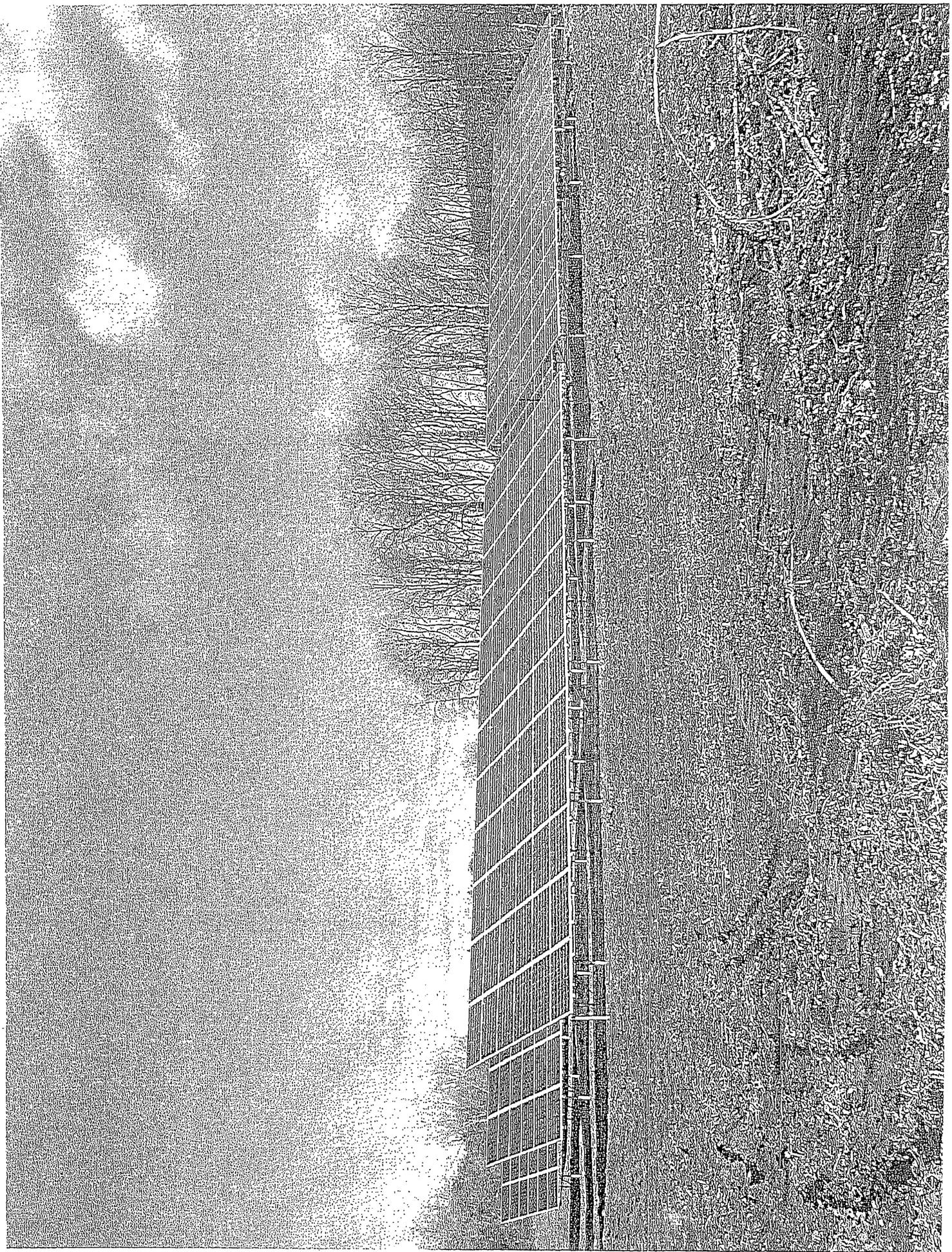
Grading is required. Limited removal of trees will be necessary to prepare the array location for equipment installation, as well as to maximize the electrical production of the system. At the end of the operational life of the Project, the Petitioner will remove all equipment (e.g. racking system, panels, inverters, electrical collection system, etc.) from the Site.

The Developer will install the facilities in the area shown on the Site Plans as Exhibit 3. The image on Supplemental 7-A is an example of a similar solar array field installed.

Project construction period is estimated at 4-6 months from Notice to Proceed.

Project Schedule:

Task	Duration
Mobilization and Site Preparation.	4 weeks
Civil Work: Road Construction, tree clearing, grading.	4 weeks
Racking and Panel Installation	4 weeks
Electrical Installation	3 weeks



Interconnection and Medium Voltage	2 weeks
System Testing	1 week
Approvals and Commissioning	2 weeks

**E. INTERCONNECTION**

The system type is a 1200 kW installation. The equipment includes fifty (50") SMA Sunny Tripower 24000TL-US three-phase 480 volt inverters. Eversource Energy has determined the Project can be interconnected to its distribution system with the following upgrades: installation of a transfer trip at the Project site; and new pad mounted transformer and overhead recloser for the DG isolation. The Project will interconnect to Eversource's overhead 23kV 3-Phase circuit that runs parallel with Mount Parnassus Road. The interconnection requires new utility poles to extend the circuit which currently service the Petitioner. The circuit will continue approximately 625 feet overhead before stepping down to a 480-Volt AC three-phase by an Eversource supplied transformer and connect to the Project's pad mount switch gear. The Project will have redundant relays and service disconnects to meet Eversource's interconnection guidelines as well as meet the requirements of the authority having jurisdiction.

Eversource completed an impact study which found no voltage issues for all the studied situations. The Project did not cause any voltage violation when generation was added along with no flicker violations. There is a nearly insignificant stability concern due to the installation being close (2.25 miles) to the Haddam 11C substation.

The Project will require the installation of a transfer trip. The trip signal will be sent along

the Eversource system and will trip the customer if there is anything abnormal between the 11C13-50Z and the customer's installation. The new service includes the installation of an overhead primary and underground riser to the new customer transformer. This line extension will be on the Petitioner's property. Along with the new service, this Project requires the installation of a recloser for isolation purposes because the size of the generation is greater than 1MVA. This installation will be secondary metered so primary metering is not needed.

**F. LOCAL INPUT AND NOTICE**

The Petitioner has actively sought input from the Town of East Haddam, its First Selectman Mark Walter and other officials throughout the planning and development of the Project. The Petitioner is already an active and productive member of the East Haddam community and currently employs a total of fifty (50) both full time and part time employees. It is a leading promoter of civic and community activities.

In support of the Project, the Petitioner has received contingent approval from Eversource to energize. It has already met regularly with the First Selectman Mark Walter and its counsel has been in frequent communication with the town's Land Use Administrator, James Ventres. The Petitioner continues to engage the town of East Haddam as the Project advances.

The Petitioner remains committed to providing the town of East Haddam with as much information regarding the Project as possible. In support of this goal, the Petitioner:

- Attended meetings with First Selectman Mark Walter; Town Land Use Administrator, James Ventres; and Boards of Education and Finance.
- Will be providing copies of the Final Site Plans to the Planning and Zoning and the Inland Wetlands and Watercourses Commissions concurrently with the submittal of this Petition to the Siting Council.

Additionally, as required by the Regulations of Connecticut State Agencies § 16-50j-40(a), the Company provided notice of this petition to all required persons and appropriate municipal officials and government agencies. Attached as Exhibit 4, is a copy of the notice of service and parties to whom it was provided.

Additionally, the Petitioner provided notice to the following Town Officials:

- First Selectman, Mark Walter
- Chairman, Planning and Zoning Commission, Cary Brownell
- Chairman, Inland Wetlands and Water Courses Commission, Randolph Dill
- Land Use Administrator, James Ventres

#### **IV. POTENTIAL ENVIRONMENTAL IMPACTS**

The Project will have no air emissions during operation and only very minor air emissions of regulated pollutants and greenhouse gases during construction. The Petitioner will control any temporary emission at the Site by enacting appropriate mitigation measures (e.g. water for dust control; avoiding mass early morning vehicle startups, etc.). Accordingly, any potential air effects produced by the Project's construction activities will be *de minimus*. During operation, the Project will produce unregulated (low) levels of air pollutants or greenhouse gases (e.g. PM, VOC, GHG or Ozone). No air permit will be required for either construction or operation of the Project.

A request for review of the Natural Diversity Database (NDDB) was submitted to the Connecticut Department of Energy and Environmental Protection (DEEP) in September 2015. DEEP responded with a letter on October 17, 2015. The NDDB review identified possible listed species that may occur within or very close to the Project Site. Also, a State species of Special Concern, an Eastern Box Turtle, was identified. In order to further evaluate whether this species is

present at the Site, the Developer retained Davison Environmental who developed an Eastern Box Turtle Protection Plan appended to his report.

The state and federal wetlands in the vicinity of the Project were delineated by Richard Snarski and Scott D. Stevens. No vernal pool habitats were located in the Project area. The wetland flags have been surveyed and mapped, and the wetland resources are shown on the attached detailed Site Plans, Exhibit 3. Detailed descriptions of the wetland resources, including a functions and value assessment, are included in Exhibit 5.

The proposed Project was designed to avoid where possible, and then minimize impacts to, existing wetland resources at the Site. As discussed above, the Site is currently accessed via an existing paved parking lot and interior farm roads. There are no proposed wetland crossings.

As discussed in Exhibit 5, limited tree removal is taking place within the flagged wetlands but nevertheless some positive impact will result from the addition of erosion protection (riprap). The report describes minimal impact from the tree removal.

The total square footage of the impacts to the wetlands is less than 5,000 square feet and no Army Corps of Engineers' permit is required. Copies of the Site Plan will be provided to the Town's Agencies listed in Section III. F. for their comment.

#### **D. STORM WATER MANAGEMENT**

The Project is not anticipated to have an adverse impact to the surrounding water and wetland resources. The proposed fixed panel solar arrays are installed on elevated racks that provide adequate height above the ground to promote vegetative growth and allow for limited filtration. The areas containing the solar arrays are being considered impervious groundcover.

Construction of the facilities will result in a grading disturbance of approximately 5 acres of

land including reconstruction of the existing access road and grading for placement of the solar arrays and clearing of adjacent trees to eliminate the potential for shading. The majority of this activity will take place in the areas previously disturbed by historic farming and commercial operations at the Site. The natural drainage patterns, which consist of sheet flow to the surrounding wetlands, are preserved reducing the potential for erosion and sedimentation.

**E. FLOOD ZONE**

No portion of the Site is located within the 100-year flood zone or special flood hazard areas except the extreme western end of a single panel just east of the existing box trailers presently used for storage. However, Zone X only includes areas of 0.2% annual chance of a flood (i.e., 500 year flood), areas of 1% annual chance flood with average depths of less than one foot or with drainage areas less than one square mile; and areas protected by levees from 1% annual chance flood. The solar facilities do not require design modifications to meet the 500-year mark.

**F. DRINKING WATER RESOURCES**

No surface drinking water supplies are located in the Town of East Haddam. Due to their absence in the Project area the proposed Project will not impact any drinking water sources or aquifer protection areas.

**G. SCENIC VALUES AND VISUAL RENDERINGS**

The Project is located approximately 800 feet east of Routes 82 and 151 and 400 feet north of Route 434 and is screened by Shagbark Lumber; active agricultural fields used for haying; and existing woods. As a result, the visibility of the Project from Routes 151, 82 and 434 is extremely limited, and the potential for visual impact is minor.

The nearest sensitive visual receptors to the Project were determined to be the existing three

residential houses on the north side of Route 434. The Project will include the planting of select evergreen species along the northern limits to minimize the visual impact to these properties. In addition, the use of low profile components (e.g., racking system, panels, inverters, etc.) and the existing topography of the Site significantly reduces potential visible impact.

#### **H. PUBLIC HEALTH AND SAFETY**

The Developer is extremely concerned with safety. Overall, the Project will meet or exceed all health and safety requirements applicable for electric power generation. Each employee working on Site will:

- Receive required general and Site-specific health and safety training;
- Comply with all health and safety controls as directed by local, state, and federal requirements;
- Understand and employ the Site health and safety plan;
- Know the location of local emergency care facilities, travel times, ingress and egress routes; and
- Immediately report all unsafe conditions to the construction manager.

During construction, heavy equipment will be required to access the Project Site and higher levels of noise are anticipated; however, the Developer will conduct all activities during normal working hours.

#### **I. FEDERAL AVIATION ADMINISTRATION DETERMINATIONS**

The Developer submitted a Form 7460-1 to the Federal Aviation Authority. The maximum height of the solar Project will be 16 feet above the Site elevation. The Project is located directly south of the power lines which are higher than 50 feet. The trees to the west and south of the Project are in excess of 50 feet as well. Due to the existing power lines and trees and that no crane

will be used during installation, the Project expects to receive a Determination of No Hazard to Air Navigation by the end of January 2016.

**V. CONCLUSION**

The Project, a grid-side distributed resources facility with a maximum capacity of 1.6 MW, is among the types of Projects the Council can approve by declaratory ruling. Accordingly, and for the reasons stated herein, because the proposed Project will meet state air and water quality standards and will not have a substantial adverse effect on the environment, Petitioner respectfully requests the Council approve the location and construction of the proposed Project by declaratory ruling.

Respectfully submitted,

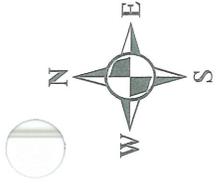
Shagbark Lumber and Farm Supplies, LLC

By: \_\_\_\_\_

Scott W. Jezek, Attorney

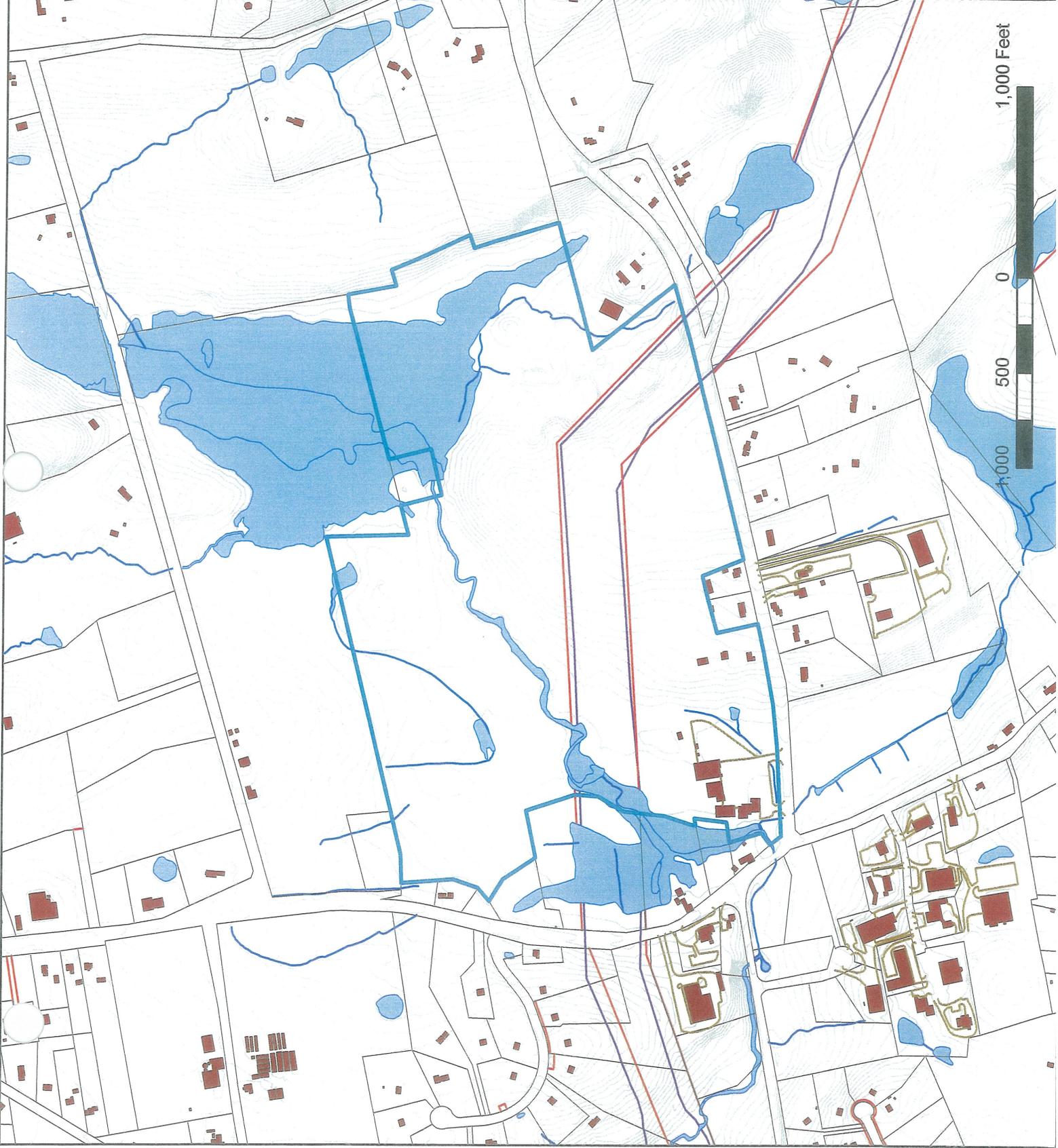
Law Offices of Scott W. Jezek  
31 W.F. Palmer Road  
P.O. Box 376  
Moodus, Connecticut 06469  
Telephone: 860-873-1449  
[scott@jezeklaw.com](mailto:scott@jezeklaw.com)

# Exhibit 1

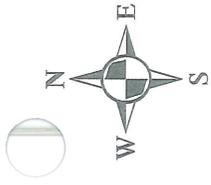


### Legend

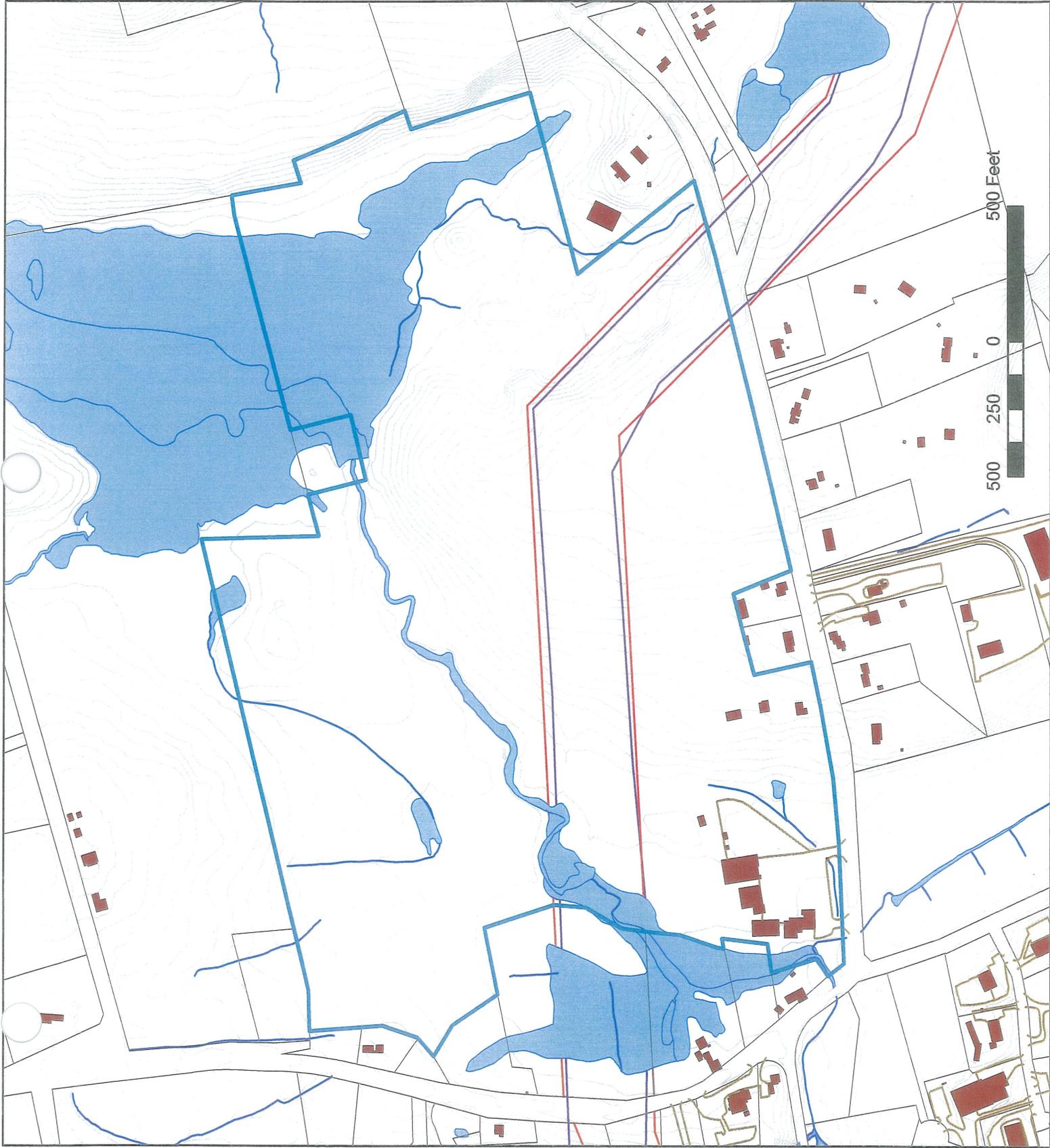
-  Property line
-  buildings
-  streams
-  water
-  PL Easement
-  Power line
-  parking arc
-  contours 5 ft



## Exhibit 2



- Legend**
- Property line
  - buildings
  - streams
  - water
  - PL Easement
  - Power line
  - parking arc
  - contours 5 ft



# Exhibit 3



ROGER D. NEMERGUT  
PROFESSIONAL ENGINEER  
LIC. NO. 10088  
JASON A. NEMERGUT  
PROFESSIONAL ENGINEER  
LIC. NO. 26088

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THIS DRAWING SHALL NOT BE  
USED FOR CONSTRUCTION  
UNLESS THE DESIGN  
ENGINEER'S RAISED  
PROFESSIONAL SEAL APPEARS  
ON THE PLAN; AND THE  
OWNER/CONTRACTOR HAS  
CONTACTED THE DESIGN  
ENGINEER TO VERIFY THAT THEY  
ARE IN POSSESSION OF THE  
LATEST APPROVED DESIGN  
PLANS.

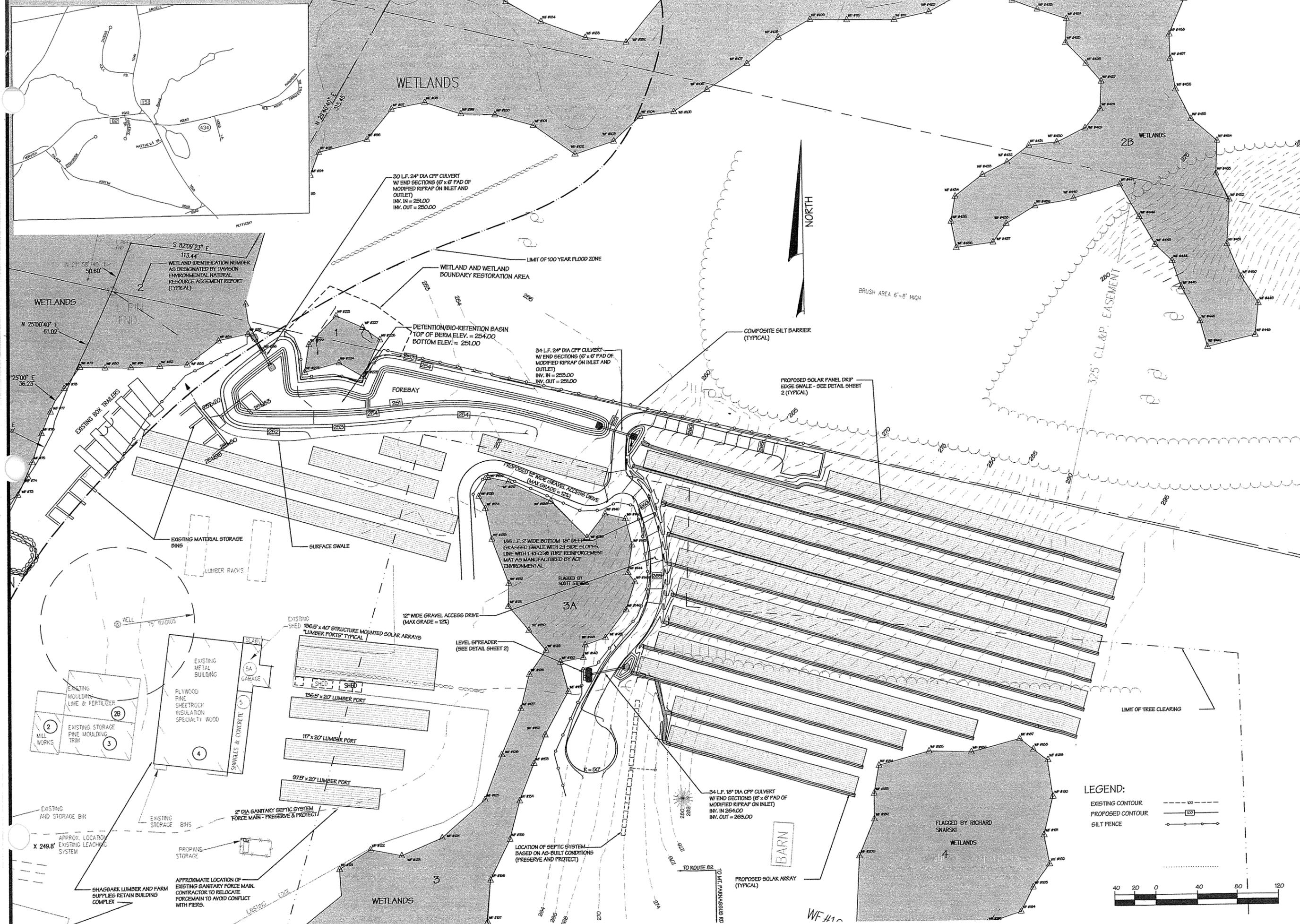
**SITE PLAN - PROPOSED SOLAR  
GENERATION FACILITY**  
SHAGBARK LUMBER AND FARM SUPPLIES  
21 MT PARNASSUS ROAD  
EAST HADDAM CONNECTICUT  
MAP: 27 LOT: 91

DATE: 1/5/16  
DRAWN BY: J.A.N.  
CHECKED BY: R.D.N.  
SCALE: 1" = 40'

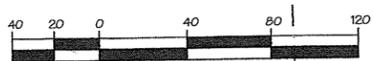
CAD FILE: 423-15-06

NO.	DATE	REVISIONS

SHEET



**LEGEND:**  
EXISTING CONTOUR ——— 10'  
PROPOSED CONTOUR ——— 10'  
SILT FENCE ———



# Exhibit 4

# Law Office of Scott W. Jezek

31 William F. Palmer Road, P.O. Box 376, Moodus, CT 06469

Scott W. Jezek  
Deborah L. Barbi  
Terrance D. Lomme, of Counsel



Telephone (860) 873-1449  
Facsimile (860) 873-1113  
mail@jezeklaw.com

January 27, 2016

Via Certified Mail

Addresses on attached page.

Re: Petition of Shagbark Lumber and Farm Supplies, Inc.(hereinafter referred to as “Shagbark”) to the Connecticut Siting Council for a Declaratory Ruling for the Location and Construction of a 1.6 Megawatt Solar Electric Generating Facility at 21 Mount Parnassus Road, East Haddam, CT.

To the Persons on the Attached List:

Pursuant to Section 16-50j-40 of the Connecticut Siting Council’s (the Council) regulations, we are notifying you that Shagbark intends to file on or shortly after January 26, 2016, a petition for declaratory ruling with the Council. The petition will request the Council’s approval of the location and construction of approximately 1.6 megawatt (“MW”) solar electric generating facility (the “Facility”) at 21 Mount Parnassus Road, East Haddam, Connecticut.

The Facility will be a facility (as defined in Connecticut General Statutes §16-1 (a)(38) under 65 MW that complies with the air and water quality standards of the Connecticut Department of Energy and Environmental Protection (“DEEP”), and that will not have a substantial adverse environmental effect. Electricity generated by the Facility will be exported to the electric grid.

If you have any questions regarding the proposed Facility, please contact any of the following:

Ms. Julia Leonardo  
Shagbark Lumber and  
Farm Supplies, Inc.  
21 Mt. Parnassus Road  
East Haddam, CT 06423  
[julia@shagbarklumber.com](mailto:julia@shagbarklumber.com)  
860-873-1946

Attorney Scott W. Jezek  
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Connecticut Siting Council  
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[Siting.council@ct.gov](mailto:Siting.council@ct.gov)  
860-827-2935

Sincerely,

Scott W. Jezek

SWJ/plb  
enc.

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Boynton Beach, FL 33435

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Mr. Robert G. and Mrs. Beverly J. Ventres  
29 Mt. Parnassus Rd.  
East Haddam, CT 06423

Mr. Walter Canfield  
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East Haddam, CT 06423

Ms. Deborah Hoffman  
46 Mt. Parnassus Rd.  
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Mr. Robert R. and Mrs. Marjorie H. Callthrap  
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Mrs. Helen Hoffman  
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Mr. John and Mrs. Geraldine Hutra  
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Mr. Robert Casner  
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Ms. Judith G. Trotochaud  
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East Haddam, CT 06423

Ms. Martha M. Tonnucci and  
Mr. W. Lu Armand  
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Ms. Ariadne Acquaviva  
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Bud and Bobby Enterprises, LLC  
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# Exhibit 5



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

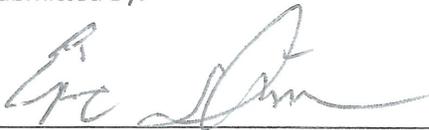
## Natural Resource Assessment

Proposed Solar Generation Facility  
Shagbark Lumber and Farm Supply Property  
21 Mount Parnassus Road, East Haddam

### Submitted To:

Julia Leonardo, Controller  
Shagbark Lumber & Farm Supplies, Inc.  
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### Submitted By:



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January 16, 2016

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## 1.0 INTRODUCTION

A natural resource assessment was conducted at 21 Mount Parnassus Road in East Haddam (the “Site”) on behalf of Shagbark Lumber and Farm Supplies, Inc. (the “Applicant”). Figures 1 and 2, *Site Location Map* and *USGS Topographic Map*, depict the location of the Site and surrounding area.

A ±1.5 megawatt solar-based electric generation facility (the “Project”) is proposed at the Site. This assessment report has been completed to support the Applicant’s submission of a petition for declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the construction, maintenance, and operation of the Project.

In addition to resource investigations conducted by the primary biologist Eric Davison, this report includes studies conducted by several other resource specialists. Herpetologist Dennis Quinn conducted amphibian and reptile surveys and Botanist Ken Metzler assessed plant community types and habitat for rare plant species. Additionally, the Applicant contracted with two soil scientists who previously delineated the wetlands and watercourses at the Site (see Section 3.2). These studies were used collectively to develop this report.

## 2.0 SITE DESCRIPTION

Existing site features and the proposed Project location are illustrated on Figure 3, *Site Features Map*. The Site consists of a single parcel (East Haddam tax map #27, lot #30) totaling 137.5 acres situated on the north side of Mount Parnassus Road. The Site is an active farm with a number of hayfields, barns and other outbuildings as well as several residential dwellings. Livestock include chickens, horses and cows. The southwest portion of the Site is operated as a commercial business “Shagbark Lumber and Farm Supplies, Inc.” selling lumber, farm supplies, hardware and other goods. The business includes a main retail building along with a number of outbuildings and storage yards. The Project is proposed to be located both within and immediately adjacent to this existing active commercially developed area.

The Site lies in East Haddam approximately one mile due east of the Connecticut River. The Site’s primary frontage lies along Mount Parnassus Road, a two lane road which is the primary thoroughfare between downtown East Haddam and the village of Millington to the east. The Site also fronts on State Route 151 (a.k.a. Town Street); however, no improved access is currently present at this location.

Geographically the Site lies on a broad glacial till plateau situated above the Connecticut River roughly between Bald Hill, Poplar Hill and Landing Hill. The primary natural resource present on the Site is Succor Brook. The Site lies in the central portion of the Succor Brook Watershed (CT DEEP local basin #4000-50) which drains directly to the Connecticut River at the Goodspeed Opera House in downtown East Haddam.

Site elevations range from ± 250 feet above sea level (ASL) to ± 300 feet ASL. The Project area slopes from east to west, lying at roughly 250-270 feet ASL. An Eversource Utility right-of-way (ROW) runs east-west across the northerly limits of the Project area.

## 3.0 WETLANDS

A number of wetlands occur within the Project area. These wetlands are illustrated and numbered for reference on Figure 4 - *Habitat Types Map* and summarized in Table 1. Within each wetland system, sub-

units were identified to indicate areas where the plant community or hydrology varies within each larger wetland system.

Table 1: Summary of wetland and watercourse characteristics

Wetland #	Habitat Type	Hydrologic Regime	Description
1	wet meadow	Seasonally saturated	Disturbed due to frequent use; marginally wet
2	Succor Brook corridor	Perennial stream	Succor Brook with bordering floodplain swamp
2A	Marsh	Permanently ponded	Man-made detention basin within lumber yard
2B	Forested wetland / wet meadow	Seasonally saturated	Hillside wetland draining to Succor Brook; upper limits are active hayfield
2C	Marsh	Seasonally flooded	Marsh adjacent to parking lot; a stream drains through this area from the Rotary Pond into Succor Brook
3	Wet meadow / marsh	Seasonally saturated	The wetland includes pastureland and active hayfield
3A	Wet meadow	Seasonally saturated	A portion of the wetland is in the active hayfield; the wetland is ditched and drains south
3B	Wet meadow	Seasonally saturated	This portion of the wetland is an active cow pasture
3C	Wet meadow	Seasonally flooded	Ditched wetland adjacent to parking lot
4	Forested wetland	Seasonally saturated	Small isolated wetland within active pasture
<p><b>Wetland Hydrologic Regimes</b></p> <p>Seasonally saturated – the soil is saturated to the surface, especially early in the growing season, but unsaturated conditions prevail by the end of the season in most years. Surface water is absent except for groundwater seepage and overland flow.</p> <p>Seasonally flooded – surface water is present for extended periods, especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.</p> <p>Permanently flooded – flooded throughout the year in all years.</p>			

### 3.1 Wetland Descriptions

#### Wetland 1

Wetland 1 is a small isolated wetland fragment. The hydrology is seasonally saturated and marginally wet, with only scattered hydrophytic plants present including sallow sedge (*Carex lurida*), short-tail rush (*Juncus brevicaudatus*), and begger's tick (*Bidens frondosa*). The majority of the wetland is dominated by upland species such as goldenrods (*Solidago canadensis*, *S. graminea*) and mugwort (*Artemisia vulgaris*). The soils shows signs of shallow fill and disturbance associated with Site activities. The areas surrounding the wetland are used for stockpiling and equipment storage.

#### Wetland 2

Wetland 2 consists of the Succor Brook stream corridor and contiguous wetland sub-units 2A, 2B and 2C all of which drain directly to Succor Brook. Succor Brook is a perennial tributary to the Connecticut River. The brook has a cobbly-stony substrate and is bordered by a floodplain red maple swamp. Vegetation within the bordering forested wetland includes red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), spicebush (*Lindera benzoin*), sweet pepperbush (*Clethra alnifolia*), skunk cabbage (*Symplocarpus foetidus*), clearweed (*Pilea pumila*), jewelweed (*Impatiens capensis*) and cinnamon fern (*Osmunda cinnamomea*).

Invasive plant species are present including multiflora rose (*Rosa multiflora*) and Japanese barberry (*Berberis thunbergii*). Adjacent to the active lumber yard the vegetation bordering Succor Brook consists of dense shrubs dominated by multiflora rose, brambles (*Rubus sp.*), grapevine (*Vitis sp.*) with speckled alder (*Alnus incana*) also occurring.

Area 2A consists of a small man-made and permanently flooded detention basin. The basin is bordered by a riprap fill slope and is vegetated primarily with cattails (cattails (*Typha latifolia*)). The basin captures surface water runoff from the material storage yard.

Area 2C consists of an open marsh bordering the retail building's main parking lot and Mount Parnassus Road. The area contains a small stream which carries flows from the Rotary Club skating pond into Succor Brook.

#### Wetland 3

Wetland 3 is located primarily to the south of the Project area and consists of two sub-units 3A and 3B. Area 3A consists primarily of a managed hayfield which is connected to southern portions of Wetland 3 by an excavated ditch. The vegetation is primarily sapling red maple with an understory of dense patches of invasive multiflora rose and scattered smooth arrowwood (*Viburnum dentatum*) shrubs. On the margins of the field are tussock sedge (*Carex stricta*) goldenrods, Joe-Pye-weed (*Eutrochium sp.*), New York ironweed (*Vernonia noveboracensis*), and the invasive reed canary grass (*Phalaris arundinacea*).

Area 3B is the southern end of the wetland adjacent to the retail store and parking lot. This area is an active cow and horse pasture. Area 3C consists of a channelized ditch with culverts that carries flows from the northeast portion of Wetland 3 across the entrance and exit drives into Succor Brook.

#### Wetland 4

This is a small isolated wetland located within the pasture area. The wetland is heavily grazed by livestock. The soils are trampled and the ground cover is sparse. The canopy is composed of several trees including red maple, American elm, and black gum (*Nyssa sylvatica*). Typical shrubs such as spicebush (*Lindera benzoin*), alder (*Alnus rugosa*), and invasive shrubs such as Japanese barberry, bush honeysuckle (*Lonicera sp.*), multiflora rose, and Japanese honeysuckle (*Lonicera japonica*) occur in patches. Several patches of sphagnum moss occur throughout. The wetland has a seasonally-saturated hydrology.

### **3.2 Wetland Delineation**

Project area wetlands were delineated by Soil Science and Environmental Services, Inc. (SS&ES) as well as Soil Scientist Richard Snarski. A copy of the SS&ES wetland delineation report is included in Appendix A. These wetland boundaries were reviewed by Registered Soil Scientist Eric Davison and found to be substantially correct and accurately depicted on the *Site Plans* drafted by Nemergut Consulting dated January 5, 2016.

The wetland delineation 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.

### 3.3 Wetland Soil Types

The soil types were identified by review of digitally available soil survey information from the Natural Resources Conservation Service (NRCS) as well as onsite field investigations. The following wetland soil types are present in the Project area:

Aquents - a miscellaneous land type used to denote man-made or man-disturbed areas that are wet. These soils have an aquic soil moisture regime and can be expected to support hydrophytic vegetation. Typically, these soils occur in places where less than 2 feet of earthen material have been placed over poorly or very poorly drained soils; areas where the natural soils have been mixed so that the natural soil layers are not identifiable; or where the soil materials have been excavated to the watertable.

Ridgebury series - consists of very deep, somewhat poorly and poorly drained soils formed in glacial till derived mainly from granite, gneiss and schist. They are nearly level to gently sloping soils in low areas in uplands. This series includes phases that are poorly drained and the wetter part of somewhat poorly drained. A perched, fluctuating water table above the dense till saturates the solum to or near the surface for 7 to 9 months of the year.

Ridgebury, Leicester and Whitman Complex - this 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.

Walpole series - consists of very deep, poorly drained sandy soils formed in water-sorted glacial outwash and stratified drift. They are nearly level to gently sloping soils in low-lying positions on terraces and plains. Walpole soils have a water table within 1' of the soil surface much of the year.

Scarboro series - consists of very deep, very poorly drained soils on outwash plains, deltas, and terraces. They are nearly level soils in depressions. The water table is at or near the surface for 6 to 12 months of the year, and many areas are ponded for short periods. This is a mineral soil, but it has a mucky surface horizon.

Saco series - consists of very deep, very poorly drained soils formed in silty alluvial deposits. They are nearly level soils on flood plains, subject to frequent flooding. Depth to the coarse-textured substratum layers is more than 40 inches. The surface soil is very dark gray to black silt loam, underlain directly by a mottled, gray to grayish brown substratum. Some pedons have a mucky surface up to 5 inches thick. The soils formed in depressions in recent silty alluvium. In places water is ponded on the surface from late fall through early spring. These soils flood in the spring and after periods of heavy rainfall.

Fluvaquents-Udifluvents - consist primarily of poorly and very poorly drained, alluvial soils. These very deep soils are formed in recently deposited alluvial sediments on floodplains. Fluvaquents have a seasonal watertable at a depth of 0 to 1.5 feet. These soils are subject to flooding.

#### 4.0 UPLAND HABITATS

Upland (non-wetland) habitats within and adjacent to the Project area include:

- hayfield with hedgerows
- developed (buildings, parking lot and material storage yard)
- pasture and old field
- mixed hardwood forest

##### Mixed Hardwood Forest

Areas of mixed hardwood forest border portions of Succor Brook. This habitat type is well outside of the Project area and consists of typical mixed hardwoods including red oak (*Quercus rubra*), hickories (*Carya sp.*), red maple, black cherry (*Prunus serotina*) and black birch (*Betula lenta*).

##### Hayfield with Hedgerows

The hayfield was recently mowed prior to our field work and is composed of European cool-season grasses, including species such as orchard grass, timothy, and awn-less brome (*Bromus inernus*).

A hedgerow separates the pasture from the hayfield. It contains a stone wall with widely separated maple and hickory trees. A dense thicket of multiflora rose forms a dense barrier between the two habitats.

##### Pasture and Old Field

These areas are infrequently mowed and regularly grazed and therefore are maintained in an early-successional vegetative stage. Plant species include dense low woody shrubs and herbaceous vegetation. Plant species include goldenrod, mugwort, sumac (*Rhus sp.*), brambles, with scattered eastern red cedar (*Juniperus virginiana*), black cherry (*Prunus serotina*), red maple and hickory (*Cary sp.*) trees. The habitat contains a number of introduced and non-native species such as whorled bedstraw (*Galium mullugo*), multiflora rose, bush honeysuckle (*Lonicera sp.*), Japanese barberry, autumn olive (*Elaeagnus umbellata*) and tree-of-heaven (*Ailanthus altissima*).

#### 5.0 WILDLIFE

An inventory of amphibians, reptiles and birds was conducted within a defined “study area” which surrounds the proposed Project area. The study area is illustrated on *Figure 4 – Habitat Types Map*. The following sections describe the species observed within the study area.

##### *5.1 Amphibians and Reptiles*

Amphibian and reptile surveys were conducted on 9/17, 10/15 and 10/21/2015. Surveys were conducted between the hours of 9:30 AM and 3:30 PM in conditions ranging from 55°F and partly cloudy to 77°F and sunny. Methods consisted of visual encounter and cover object surveys (totaling 810 cover objects). A total of eleven amphibian species and two reptile species were observed within the study area. Most of the observed biodiversity was associated with the Succor brook corridor and Daniels Road swamp with the

exception of one spring peeper located in Wetland 4. The overall majority of habitats within the study area were degraded and/or not suitable as core amphibian and reptile habitat. Although agricultural and pasture lands can provide habitat for amphibians and reptiles they are often used to a much greater extent as travel corridors when species are migrating between primary habitats bisected by these lands.

**Table 2: Comprehensive Species List**

Common Name	Scientific Name	Status	9/17/2015	10/15/2015	10/21/2015
<b>Amphibians</b>					
spotted salamander	<i>Ambystoma maculatum</i>	IS	1 metamorph	****	****
two-lined salamander	<i>Eurycea bislineata</i>	****	6 adult	3 adult	3 adult
four-toed salamander	<i>Hemidactylium scutatum</i>	****	****	****	1 adult
dusky salamander	<i>Desmognathus fuscus</i>	****	****	5 adult	6 adult
redback salamander	<i>Plethodon cinereus</i>	****	2 adult	2 adult	1 adult
gray treefrog	<i>Hyla versicolor</i>	****	1 calling	****	****
wood frog	<i>Rana sylvatica</i>	IS	2 adult; 1 metamorph	1 metamorph	****
green frog	<i>Rana clamitans</i>	****	9 adult	****	5 adult
spring peeper	<i>Pseudacris crucifer</i>	****	1 adult	****	****
American toad	<i>Bufo americanus</i>	****	1 adult	****	****
pickerel frog	<i>Rana palustris</i>	****	****	****	2 adult
<b>Reptiles</b>					
garter snake	<i>Thamnophis sirtalis</i>	****	****	****	1 shed
painted turtle	<i>Chrysemys picta</i>	****	3 adult	****	1 adult

**Status**

IS – vernal pool indicator species; FS – vernal pool facultative species

Wildlife Action Plan Conservation Status (CS)

VI – very important; MI – most important; IM – important

**5.2 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 vernal pools.

Two vernal pool indicator species, the wood frog and spotted salamander, were observed in the study area. Observations included several adult and metamorph wood frog as well as a metamorph spotted salamander in areas of mixed hardwood forest in the northeast portions of the study area near Succor Brook. The presence of these species in terrestrial habitat indicates the presence of a nearby vernal pool. 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. Often, vernal pools are depressions or impoundments within larger wetland systems. These vernal pool habitats are commonly referred to as "cryptic" vernal pools.

No classic vernal pools occur in the project area or study area. Based on the locations of the indicator species observed, a likely cryptic vernal pool was identified in the study area and is illustrated on Figure 4 – *Habitat Types Map*. This potential vernal pool is located within Wetland 2, and consists of an old excavated pond with stone dam located within the reaches of Succor Brook. The pond contains an elevated outlet which has been enhanced by beaver activity, resulting in an open ponded area within the Succor Brook channel. The upstream portions of the impoundment consist of an open marsh. This is the most feasible location of the vernal pool based on the presence of suitable hydrology and its close proximity (less than 300 feet) to observed indicator species. Wetlands 1, 3 and 4 do not have a suitable hydrologic regime to support breeding by vernal pool indicator species.

### **5.3 Breeding Birds**

Due to the timing of the project's initiation, an inventory of breeding birds was not possible. As a result, an inventory of birds that potentially breed within the study area based on the presence/absence of suitable habitat was developed. This list was compiled primarily by reviewing published data on the breeding birds of the State. The primary source utilized was *The Atlas of Breeding Birds of Connecticut* (Bevier, 1994), which is the result of a five-year study (1982-1986) of all bird species known to breed in the State. The study is the most comprehensive review to date of Connecticut's breeding birds. Additional resources utilized include DeGraaf and Yamasaki (2001).

The 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 inventory is subdivided by habitat type. A species is listed under the habitat(s) which represent its primary breeding type. However, a species should be considered to be potentially present within the ecotones associated with their primary habitat at any given time.

The list of birds potentially breeding within the study area is provided in Table 3. This list reflects the agricultural uses present, as the study area provides habitat for a number of early-successional habitat generalists (e.g., northern oriole) as well as a few specialists (e.g., field sparrow) typically found in farmlands used for grazing and hay production. While both hayfield and old field (a.k.a. shrublands) habitats are present, and these habitat types have the potential to support a number of rare birds, the size and

configuration of these habitats severely limits their ability to support target species. Neither habitat type exceeds the ideal minimum threshold which is generally considered to be  $\pm 10$  acres for shrublands and  $\pm 25$  acres for grasslands. Additionally, the frequency of hay cutting, which includes two to four cuttings per year beginning in June, is a major limiting factor for ground nesting grassland birds.

A single state-listed bird species was identified as potentially present in the study area, the broad-winged hawk. The broad-winged hawk is not considered a habitat specialist but rather a generalist that requires habitat considered common throughout Connecticut. The Broad-winged Hawk inhabits deciduous or mixed forest types often near a lake, pond or wetland. Bevier (1994:102) noted that “the Broad-winged Hawk exhibits a diversified nest Site habitat selection”. Due to the generalized nature of the habitat utilized by this species, it inevitably is included in almost any habitat-based breeding bird inventory.

Table 3: Inventory of potential breeding birds

Common Name	Scientific Name	Habitat Type
Acadian Flycatcher	<i>Empidonax vireescens</i>	S, MF
American Black Duck	<i>Anas rubripes</i>	S, M/WM
American Goldfinch	<i>Carduelis tristis</i>	P, H
American Redstart	<i>Setophaga ruticilla</i>	MF
American Robin	<i>Turdus migratorius</i>	D, H, P
American Woodcock	<i>Scolopax minor</i>	OF, P, H
Barn Swallow	<i>Hirundo rustica</i>	H, P
Barred Owl	<i>Strix varia</i>	MF, H
Belted Kingfisher	<i>Ceryle alcyon</i>	S
Black-and-white Warbler	<i>Mniotilta varia</i>	MF
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	MF, OF
Black-capped Chickadee	<i>Parus atricapillus</i>	MF
Blue Jay	<i>Cyanocitta cristata</i>	MF, OF
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	OF, MF
Blue-winged warbler	<i>Vermivora pinus</i>	OF
Broad-winged Hawk (SC)	<i>Buteo platypterus</i>	MF
Brown Creeper	<i>Certhia americana</i>	FW
Brown-headed Cowbird	<i>Molothrus ater</i>	MF, P, OF
Downy Woodpecker	<i>Picoides pubescens</i>	MF
Eastern Bluebird	<i>Sialia sialis</i>	H, P
Eastern Kingbird	<i>Tyrannus tyrannus</i>	H, OF, P
Eastern Wood-Pewee	<i>Contopus virens</i>	MF
Field Sparrow	<i>Spizella pusilla</i>	OF, P
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	MF
Great Horned Owl	<i>Bubo virginianus</i>	MF, H, P
Hairy Woodpecker	<i>Picoides villosus</i>	MF
Hermit Thrush	<i>Catharus guttatus</i>	MF, FW

Table 3 continued....		
Common Name	Scientific Name	Habitat Type
House Finch	<i>Carpodacus mexicanus</i>	D
House Sparrow	<i>Passer domesticus</i>	D
Louisiana Waterthrush	<i>Seiurus motacilla</i>	S, FW
Mallard	<i>Anas platyrhynchos</i>	S
Northern Cardinal	<i>Cardinalis cardinalis</i>	D
Northern Flicker	<i>Colaptes auratus</i>	MF, OF, P
Northern Oriole	<i>Icterus galbula</i>	MF, OF
Northern Waterthrush	<i>Seiurus noveboracensis</i>	FW
Orchard Oriole	<i>Icterus spurius</i>	H, P, OF
Ovenbird	<i>Seiurus aurocapillus</i>	MF
Pileated Woodpecker	<i>Dryocopus pileatus</i>	MF
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	MF
Red-eyed Vireo	<i>Vireo olivaceus</i>	MF
Red-shouldered Hawk	<i>Buteo lineatus</i>	MF, FW
Red-tailed Hawk	<i>Buteo jamaicensis</i>	MF, OF, H, P
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	M/WM, H
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	MF
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	OF, H, P
Rufous-sided Towhee	<i>Pipilo erythrophthalmus</i>	OF, MF
Scarlet Tanager	<i>Piranga olivacea</i>	MF
Swamp Sparrow	<i>Melospiza georgiana</i>	M/WM
Tree Swallow	<i>Tachycineta bicolor</i>	H, P
Tufted Titmouse	<i>Parus bicolor</i>	MF
Warbling Vireo	<i>Vireo gilvus</i>	MF, H, M/WM
White-breasted Nuthatch	<i>Sitta carolinensis</i>	MF
Wild Turkey	<i>Meleagris gallopavo</i>	MF, OF, H, FW
Wood Duck	<i>Aix sponsa</i>	S, M/WM
Wood Thrush	<i>Hylocichla mustelina</i>	MF
Worm-eating Warbler	<i>Helmitheros vermivorus</i>	MF
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	OF
Yellow-throated Vireo	<i>Vireo flavifrons</i>	MF, H
KEY SC – State-listed species of special concern Habitat Types: FW - Forested wetland M/WM - Marsh and wet meadow S - stream MF - mixed hardwood forest H - hayfield with hedgerows D - developed (buildings, parking and material storage yard) P - pasture OF – old field		

## 6.0 NATURAL DIVERSITY DATABASE REVIEW & STATE-LISTED SPECIES HABITAT

The Connecticut Department of Energy & Environmental Protection's ("CT DEEP's") Natural Diversity Database ("NDDDB") program represents current documented data showing the known locations of any endangered, threatened or special concern species and significant natural communities. The most recent NDDDB mapping dated September 2015 was reviewed, revealing that a cluster of NDDDB areas overlap the Site. As a result, an application to the NDDDB was submitted, and formal response has not yet been received. However, the list of known species and rare plant communities was provided by CT DEEP Environmental Analyst Dawn McKay on October 17, 2015. The list includes eight species and one rare plant community type which are known to occur in the vicinity of the Site. These species preferred habitat and potential to occur in the study area are described in the following sections:

### State-Listed Plant Species

The following two plant species and one rare plant community type were identified in the NDDDB review:

- Indian paintbrush (*Castilleja coccinea*) - State Endangered
- Pale Green Orchid (*Platanthera flava* var. *herbiola*) - State Special Concern
- Other Botanical Habitats - rich orchid area

An assessment of the Project area for these state-listed plant species and rare habitats was conducted by botanist Ken Metzler on October 28, 2015. His findings are attached in Appendix C and excerpted below (in italics):

*Castilleja coccinea* – This Connecticut Endangered plant has limited state distribution occurring in open calcareous seeps and other scattered rich sites. In 2001, a New England Wild Flower Society Conservation and Research Plan (Shenk and Holsinger, 2001) listed five extant populations, with a number of historic populations, including one in East Haddam, lost primarily to vegetation succession. Based on my seasonal field review and the habitats described below, there is no evidence that this species occurs on this site.

*Platanthera flava* var. *herbiola* – This Connecticut Special Concern orchid occurs in low meadows and open swamp. Formerly occasional or frequent, this species has apparently declined throughout Connecticut to population numbers low enough to warrant Special Concern status. In my 30+ years of field observations, I have observed this plant twice. Whitetail deer heavily browse native woodland orchids with many similar species experiencing steep declines in numbers. Based on my seasonal field review and the habitats described below, there is no evidence that this or any other of the woodland orchids occurring on this site.

*Rich Orchard area* - this unique habitat occurs off the site on the Rotary Club sponsored skating pond directly to the south of Mount Parnassus Road. This site is a former cranberry bog that is flooded in the winter for recreational purposes.

### State-listed Wildlife Species

In addition to these state-listed plant species, the following one invertebrate, two birds, one reptile, one mammal and one fish species were also identified in the vicinity of the Site:

Bog Copper (*Lycaena epixanthe*) – special concern

The bog copper is a butterfly that almost exclusively nectar on their host plant, cranberries. The species inhabits acid bogs with cranberries. Host plants include large cranberry (*Vaccinium macrocarpon*) and small cranberry (*Vaccinium oxycoccos*). No suitable habitat is present within the study area for this species. Nearby suitable habitat includes the Rotary Club skating pond on the south side of Mount Parnassus Road.

Banded Sunfish (*Enneacanthus obesus*)-special concern

The banded sunfish is a small, stout-bodied sunfish that inhabits shallow, weedy backwaters of acidic swamps, ponds and streams (Jacobs and O'Donnell, 2009). In Connecticut, banded sunfish are limited to the eastern coastal plain in scattered sites along the lower Connecticut River Valley and eastward to Rhode Island and also north in ponds and streams along the Quinebaug River Valley. The banded sunfish is known to occur in the Succor Brook stream system.

Red-headed Woodpecker (*Melanerpes erythrocephalus*) - endangered

Open woodlands, groves of large trees in old fields, and wooded swamps; nest in cavities in snags (dead or dying trees). A decline in farming and the associated loss of open woodlots through forest succession have reduced the amount of suitable habitat for the red-headed woodpecker in Connecticut. Competition for suitable nesting cavities with the non-native European starling has also contributed to the decline in populations. The aggressive starlings often take over cavities excavated by woodpeckers. The red-headed woodpecker was known to occur historically in the Daniels Road swamp which is located over 1,200 feet away from the Project area.

New England Cottontail (*Sylvilagus transitionalis*) - no state-listing status; candidate for federal listing

The New England cottontail inhabits open fields, meadows, yards, and other grassy areas. These habitats contain areas of dense horizontal and vertical woody cover 3 to 15 feet high, with multiple layers of vegetation and having a minimum stem density of 20,000 stems per acre. Such thick habitat ideally is an extensive tangle of saplings, vines, shrubs, and weeds interrupted by openings where rabbits can feed on grasses and other herbaceous plants. While low hanging coniferous branches may be used for cover, regenerating deciduous tree and shrub species are preferred. New England cottontail also need well-drained areas for nesting and thick cover in which to hide from predators. Primary habitat occurs in the dense shrublands associated with the utility line ROW, with potential use of hayfields and other agricultural areas expected.

Eastern Box Turtle (*Terrapene carolina*) – special concern

Box turtle are widespread throughout the low-lying portions of Connecticut. They favor old field habitat and deciduous forest ecotones, including powerline cuts and logged over woodland (Klemens, 1993). Box turtles utilize different habitat types at different times of the year (Dodd, 2001). Early-successional habitats are generally inhabited during months with moderate temperate while forested habitats are utilized during the heat of the summer as well as for hibernation (Erb, 2011). The primary spring and early summer habitat occurs in the dense shrubland associated with the utility ROW. Late summer and fall habitat occurs in the mixed hardwood forest boarding portions of Succor Brook. Early spring and late summer use of the wetland system is expected.

Bald Eagle (*Haliaeetus leucocephalus*) - threatened

Bald eagle require tall trees along rivers, lakes and coastal waters remote from human disturbance for nesting. In New England, the nest tree is usually a white pine that extends above the surrounding canopy and is located, on average, within 40 meters from water. Known locations and suitable habitat for bald eagle lie along the Connecticut River mainstem and Salmon River Cove areas which are over a quarter of a mile away.

## 7.0 IMPACT ASSESSMENT & MITIGATION MEASURES

### 7.1 *Wetland Impacts & Mitigation*

The fundamental concept of wetland impact analysis is based on the precept that wetland impacts should first be avoided where possible. Secondly, if practicable alternatives do not exist to avoid wetland impacts, then impacts should be minimized. Thirdly, unavoidable wetland impacts should be mitigated.

The Project has been successful in avoiding direct permanent wetland impacts. The only activity proposed within wetlands is tree clearing. Development activity is proposed adjacent to wetlands and therefore there is the potential for secondary impacts to occur. Secondary impacts associated with development adjacent to wetlands are typically the result of erosion and sedimentation during construction as well as post-construction degradation of wetlands through improper stormwater management. The potential for such secondary impacts will be minimized through the use of a number of Best Management Practices (BMP's) as described in the following sections.

In addition to these BMP's, restoration of Wetland 1 and the buffer area surrounding Wetland 1 is proposed as mitigation. Restoration details are outlined in Appendix F - *Wetland Restoration and Bio-retention Basin Establishment Plan* and are illustrated on the site plans. The mitigation area totals 7,200 square feet and includes the entirety of Wetland 1 along with a 25-foot buffer surrounding the wetland. The wetland is presently disturbed and will be restored by removing shallow fill, debris and stockpiled material from the wetland, followed by the planting of native vegetation to establish a wet meadow habitat.

#### Erosion and Sedimentation Control Measures

The potential for soil erosion and subsequent deposition in wetlands or watercourses exists at any construction project that involves soil disturbance. In order to minimize the potential for soil erosion and sedimentation, all erosion and sedimentation ("E&S") control measures have been designed in accordance with the standards and specifications of the "2002 Connecticut Guidelines for Soil Erosion and Sediment Control".

Large portions of the Project area are flat or gently sloping and therefore there is little risk for erosion and sedimentation. Project E&S control measures include the use of silt fencing and straw waddles (a.k.a. silt socks). These measures, if properly installed and maintained, should be effective at preventing erosion and sedimentation into wetlands.

#### Stormwater Management Measures

Stormwater discharge from developed lands has the potential to degrade downstream wetlands and watercourses if both the quantity and quality of stormwater are not properly managed. A detailed

stormwater management plan was developed for the Project. This stormwater management plan, developed by Nemergut Consulting, was reviewed for adherence with best design practices proven to prevent degradation of downstream waters from stormwater runoff. These practices are detailed in various technical documents including the CT Department of Energy and Environmental Protection's (DEEP) guidance document 2004 Connecticut Stormwater Quality Manual (the "Stormwater Manual").

The proposed stormwater management plan utilizes a bio-retention basin, stone trenches and grass filter strips to capture and treat stormwater runoff. Runoff from the solar panels is first captured from the panel drip edge by a series of 1-foot wide stone trenches running parallel to the arrays. These stone trenches include stone check dams that will slow the flow velocity and allow for increased infiltration. Runoff generated from between the arrays will be captured by grass filter strips and will then sheetflow to the stone trenches. Water from the trenches will ultimately be discharge to a bioretention basin located in the northwest corner of the project area.

The stormwater basin is designed to capture and treat the Water Quality Volume (WQV) and includes a forebay to capture and sequester sediment (i.e., Total Suspended Solids, or TSS). The basin will be constructed to include wetland soils and vegetation. Passive filtering of stormwater runoff through wetland vegetation will reduce nutrients and other pollutants through plant uptake and adsorption. Water from the basin will discharge through a culvert into an existing channel that drains to the floodplain wetlands bordering Succor Brook.

The stormwater management plan conforms to the "Primary Treatment Practice" guidelines defined by the DEEP Stormwater Manual. A primary treatment practice is one that effectively captures and treats stormwater pollutants including sediment, petroleum hydrocarbons and nutrients such as phosphorus and nitrogen. Additionally, the system is designed to manage the water quality volume through detention and slow release of water in a manner that will not increase peak flow rates, thereby reducing the likelihood of downstream erosion or increased flooding.

It should be noted that due to the land-use proposed, high pollutant loads (i.e., nutrients, petroleum hydrocarbons and other pollutants) from stormwater runoff are not expected, particularly when compared to a residential or commercial development of similar scale. This is due to the fact these conventional types of development include higher vehicular traffic, septic systems effluent and manicured lawns which are the primary sources of stormwater pollutants. Nevertheless, the bio-retention basin has been designed in a manner to maximize pollutant removal.

## **7.2 *Habitat / Wildlife Impacts and Mitigation***

The following sections describe the affects to wildlife and their habitat along with proposed avoidance and mitigation measured aimed at reducing negative effects on these resources.

### **Permanent Habitat Alteration**

Habitat loss is an unavoidable consequence of land development. The Project area consists entirely of habitats which are already in intensive commercial or agricultural use. Therefore, impacts to sensitive or previously undisturbed habitats are not proposed. The Project area will result in  $\pm$  4.5 acres of permanent

land disturbance. Of that 4.5 acre area, 1.3 acres is currently developed, 2.3 acres consists of hayfield and 0.9 acres consists of pasture.

#### **Wetland Tree Removal**

A total of  $\pm$  1.74 acres of tree clearing within Wetland 3 and Wetland 4 will be required to allow for proper sun exposure to the solar panels. These wetlands are currently in agricultural use including livestock pasture and hayfield. As a result, tree cover is sparse and the trees present are mostly small in diameter. A field survey of trees greater than six inches in diameter (d.b.h.) was conducted within the limits of clearing. A total of 51 trees will require removal; 24 in Wetland 3 and 27 in Wetland 4. The majority of these trees are red maple trees less than 12-inches in diameter. The site plans include sequencing notes that call for winter tree removal by hand, with tree stumps to be left in place to prevent soil disturbance and degradation of the wetland. Due to the high density of shrubs and herbaceous plants present in these areas, they will quickly revert to dense emergent and shrub-dominated wetlands once the tree canopy is removed.

#### **Upland Tree Removal**

Upland areas in which tree removal will be required include 3.38 acres of pasture and 0.82 acres of hayfield. These areas are largely free of trees. Tree removal will include 66 trees, predominately within the hedgerow which separates the pasture and hayfield.

#### **Vernal Pool Impacts**

A single vernal pool was identified in the study area. In order to assess this pool qualitatively, the methodology described in *Best Development Practices, Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States* (Calhoun and Klemens, 2002, a.k.a. the BDP manual) was used. This assessment methodology utilizes a three-tiered rating system, with the tier designation determined by examining the biological value of the pool in conjunction with the condition of the habitat surrounding the pool, which is the area used by vernal pool amphibians during the non-breeding season. The higher the species diversity and abundance coupled with an undeveloped and forested landscape surrounding the pool, the higher the tier rating. Tier 1 pools are considered the highest quality pools, while Tier 3 are the lowest.

The single vernal pool identified on the site meets the biological criteria of a Tier 1 pool due to the fact that the two indicator species present in the study area, wood frog and spotted salamander, are presumed to breed in this pool.

With respect to the condition of the *Vernal Pool Envelope* (VPE, 0 to 100 feet) and the *Critical Terrestrial Habitat* (CTH, 100 to 750 feet) conservation zones surrounding the pool, the landscape criteria for a Tier 1 pool (less than 25% development in the VPE and less than 50% development within the CTH) is met and therefore this vernal pool is a Tier 1 pool<sup>1</sup>.

In order to assess the Project's compliance with the guidelines of the BDP manual, an analysis of the post-development condition was conducted and is illustrated on Figure 5 - *Vernal Pool Analysis Map*. No direct

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<sup>1</sup> At present there is only a minor encroachment or stored equipment within the CTH zone; therefore, the existing level of development was considered to be zero.

impact to the vernal pool is proposed and no activity is proposed within the VPE conservation zone. The total area of development proposed within the CTH is 0.67 acres or 1.47%. There is presently no development within the CTH zone and therefore the total developed area (post-development) will be 1.47% which is well below the allowable 25% development threshold. Therefore the Project complies with the BDP manual guidelines for vernal pool protection.

### **Breeding Bird Impacts**

Work is expected to begin during the winter and early spring of 2016. Therefore, it is anticipated that the work area will be cleared, grubbed and graded prior to commencement of the migratory bird breeding season (i.e., prior to May). As a result, there will be minimal disruption to breeding birds. The primary impact to birds will be habitat loss (hayfield and pasture). However, this habitat loss consists of a relatively small area totaling 3.2 acres, most of which is hayfield that is of low value for birds due to the intensive hay cutting regime.

### **State-listed Species**

A total of eight species and one rare plant community were identified in the NDDDB consultation. The Project area lacks suitable habitat for most of these species, as most are associated with two nearby areas which are well removed from the Project area; the Rotary Club skating pond on the south side of Mount Parnassus Road and the large beaver pond wetland located along Daniels Road to the northeast.

Table 4 summarizes the potential for occurrence of the various listed species/habitats identified in the NDDDB consultation. For those species potentially present within or immediately adjacent to the Project area (highlighted in orange), proposed mitigation measures are indicated in the far right column of Table 4.

Of the nine species/habitats identified in the NDDDB review, suitable habitat is present for two of these species, the eastern box turtle and the New England cottontail. Minimal loss of suitable habitat for these species is proposed, and the potential for incidental take will be minimized through the use of exclusion fencing to restrict access to areas of active construction. Based on our analysis we do not anticipate any adverse impacts to these two species.

One additional species, the banded sunfish, was identified as potentially present immediately adjacent to the Project area within Succor Brook. No direct impacts are proposed to the brook, and no additional loss of buffer vegetation is proposed adjacent to the brook. Degradation of water quality will be avoided through the use of a bio-retention basin to properly treat the stormwater before it discharges to Succor Brook.

Table 4: State-listed species – potential presence, impacts and mitigation measures

Species	Potentially Present		Potential habitat areas	Proposed Mitigation Measures
	Project Area	Overall Site		
Indian paintbrush	No	No	Records are from an offsite meadow on Rte. 149	None necessary; no potential for secondary impacts
Pale green orchid	No	Yes	Rotary Club skating pond and Wetland Area 2C	None necessary; no potential for secondary impacts
Rich orchid area	No	No	Offsite at Rotary Club skating pond	None necessary; no potential for secondary impacts
Bog copper	No	No	Offsite at Rotary Club skating pond	None necessary; no potential for secondary impacts
Banded sunfish	No	Yes	Succor Brook	No direct impact to stream habitat is proposed; proposed stormwater management plan will prevent degradation of water quality in Succor Brook
Red-headed woodpecker	No	Yes	Beaver pond; northeast corner of property	Suitable habitat over 1,200 feet away; therefore no potential for secondary impacts
New England Cottontail	Yes	Yes	Utility line ROW (primary); possible use of hayfield & pasture within Project area	Highly mobile species therefore incidental take unlikely; only minimal loss (3.2 acres) of sub-optimal habitat is proposed; exclusion fencing will deter use of construction zone
Eastern box turtle	Yes	Yes	Shrubland/hayfield ecotone	A box turtle protection plan is proposed to prevent incidental take (See Appendix E)
Bald Eagle	No	No	Connecticut River & Salmon River	Suitable habitat lies over ¼ miles away; therefore, no potential for secondary impacts

## 8.0 REFERENCES

Bevier, Louis. 1994. The Atlas of Breeding Birds of Connecticut. Department of Environmental Protection. State Geological and Natural History Survey of Connecticut, bulletin #113.

Calhoun, A.J.K and M.W. Klemens. 2002. Best Development Practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States. MCA Technical Paper No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York.

Cech, R. and Tudor, G. 2005. Butterflies of the East Coast. Princeton University Press, Princeton, NJ

DeGraaf, R.M., Yamasaki, M. 2001. *New England wildlife: habitat, natural history and distribution.* University Press of New England.

Jacobs, R.P and E. O'Donnell. 2009. *A pictorial guide to freshwater fishes of Connecticut.* Connecticut Department of Environmental Protection, Hartford, CT.

Klemens, M.W. 1993. *Amphibians of Connecticut and Adjacent Regions.* State Geological and Natural History Survey of Connecticut, Bulletin 112.

Klemens, M.W. 2000. *Amphibians and reptiles of Connecticut, a checklist with notes on conservation status, identification and distribution.* CT Department of Environmental Protection, bulletin 32.

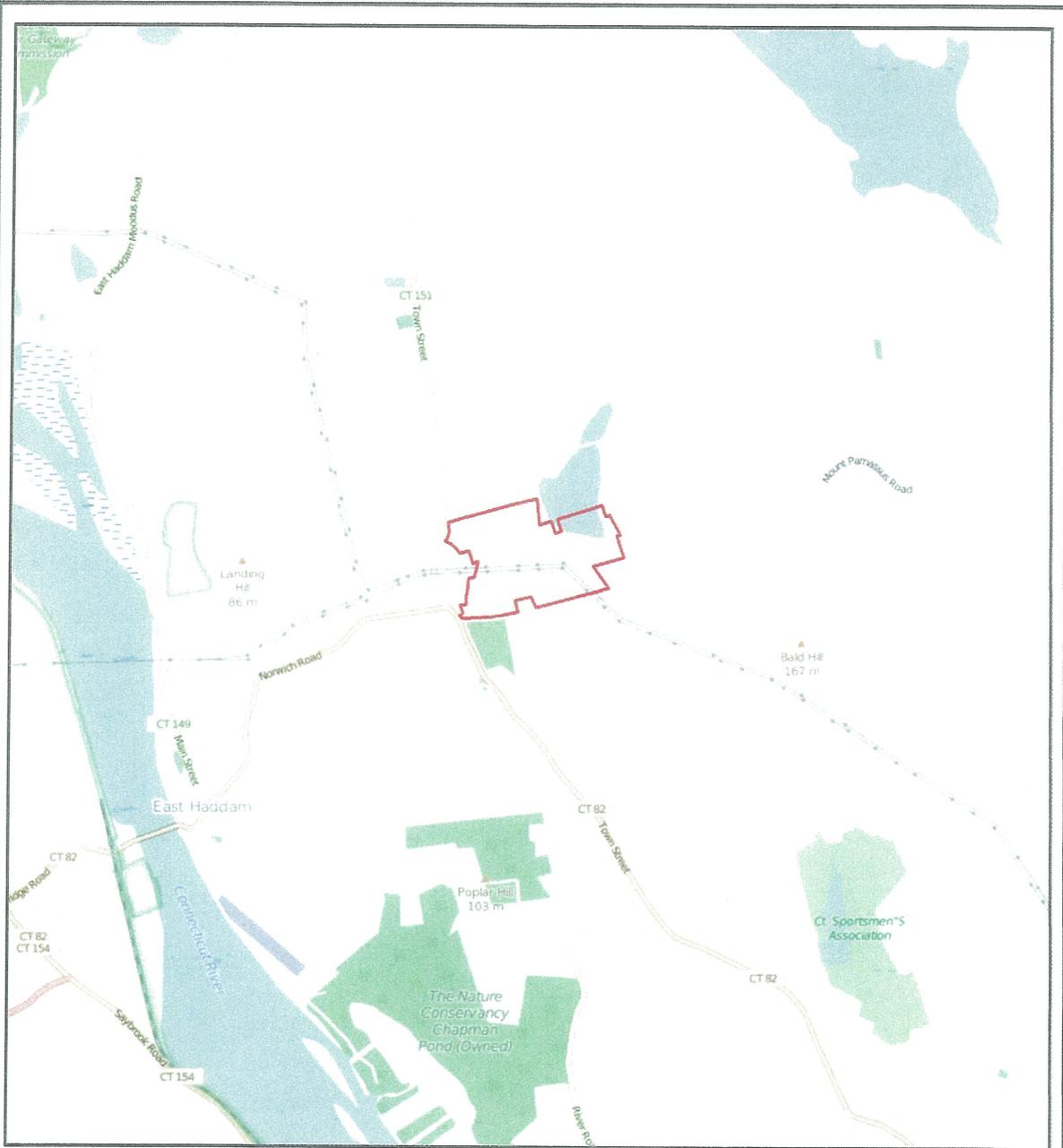
Mitsch, W.J. and Gosselink, J.G. 2007. *Wetlands, fourth edition.* John Wiley and Sons, Inc.

NEC Regional Technical Committee, BMP Subcommittee, U.S. Fish and Wildlife Service, U.S. Department of Agriculture Natural Resources Conservation Service, Wildlife Management Institute, and wildlife agencies from Connecticut, Massachusetts, Maine, New Hampshire, New York, and Rhode Island. 2013. *Best Management Practices: How to Make and Manage Habitat for the New England Cottontail.*

The Connecticut Department of Environmental Protection. 2004. *2004 Stormwater Quality Manual.* Bureau of Water Management. 79 Elm Street, Hartford, CT 06106.

## Figures

Figure No.	Title
1	Site Location Map
2	USGS Topographic Map
3	Site Features Map
4	Habitat Types Map
5	Vernal Pool Analysis Map



**FIGURE 1**  
 Site Location Map  
 21 Mount Parnassus Road  
 East Haddam, CT

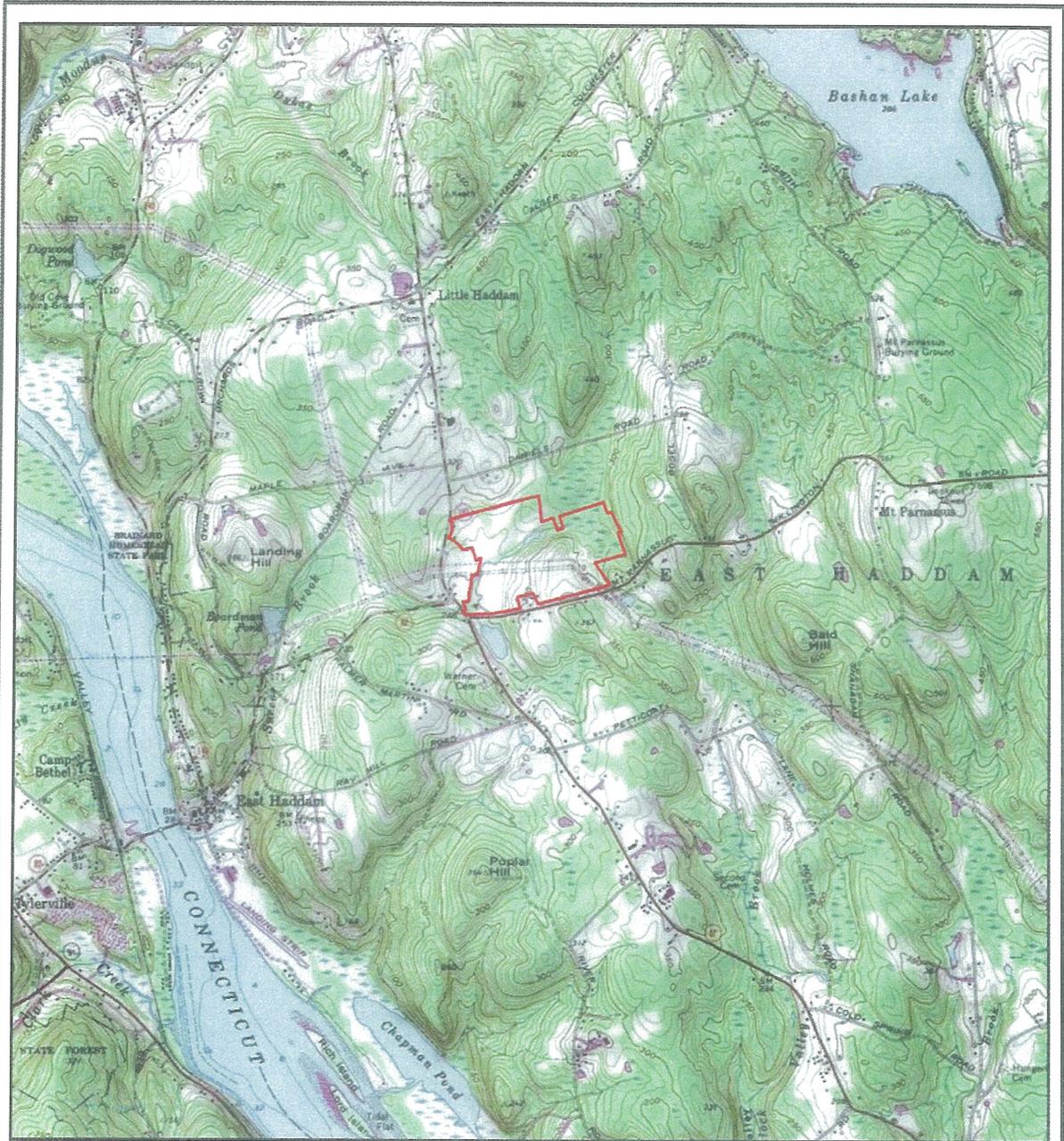
**Legend**  
 Site Boundary

**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 1,250 2,500 Feet

**N**

Davison Environmental, LLC  
 10 Maple Street  
 Chester, CT 06412  
 860-803-0936



**FIGURE 2**  
USGS Topographic Map  
21 Mount Parnassus Road  
East Haddam, CT

**Legend**  
[Red outline] Site Boundary

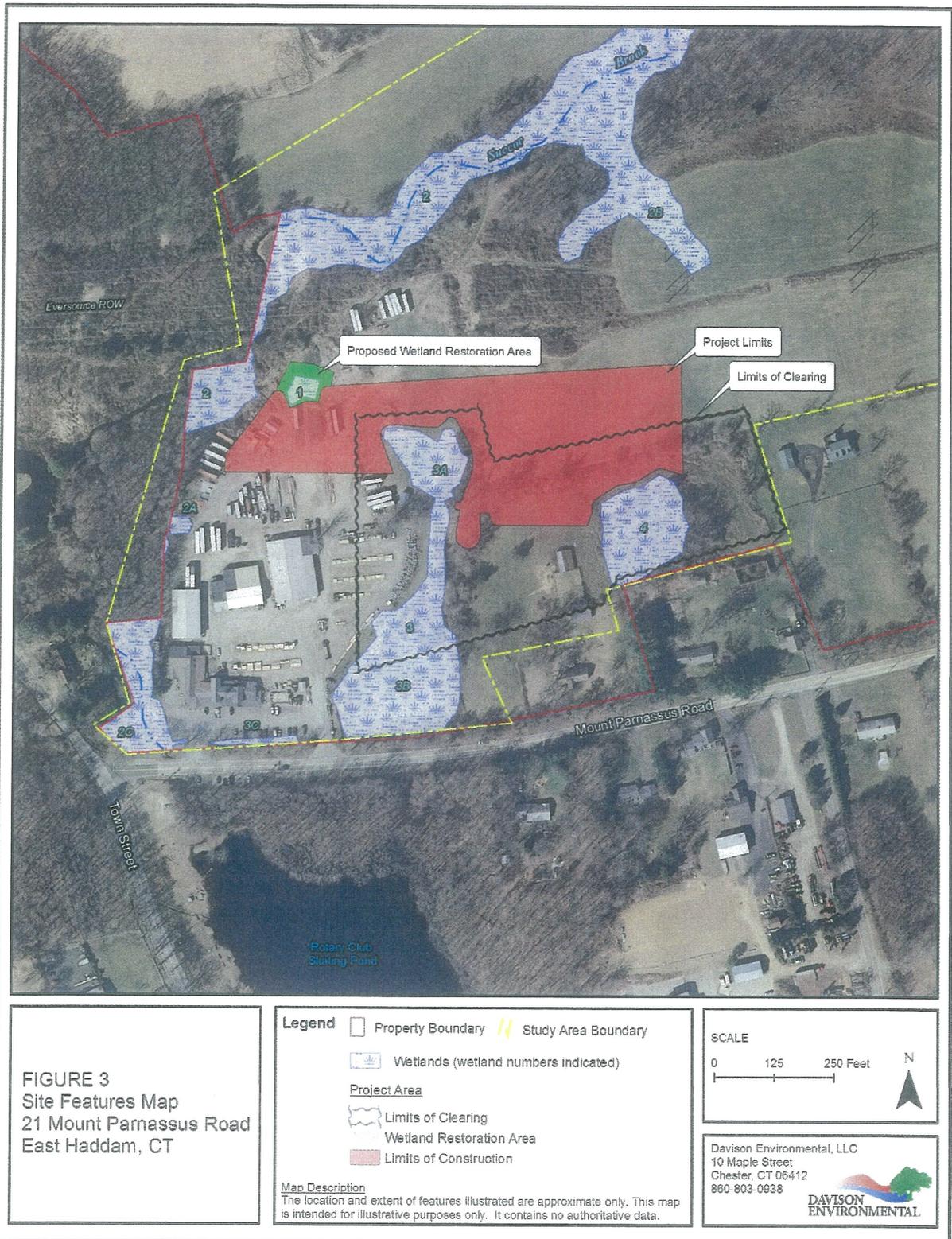
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The location and extent of features illustrated are approximate only. This map is intended for illustrative purposes only. It contains no authoritative data.

**SCALE**  
0 1,250 2,500 Feet



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860-803-0936





**FIGURE 3**  
 Site Features Map  
 21 Mount Parnassus Road  
 East Haddam, CT

**Legend**

- Property Boundary
- Study Area Boundary
- Wetlands (wetland numbers indicated)

**Project Area**

- Limits of Clearing
- Wetland Restoration Area
- Limits of Construction

**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      125      250 Feet

N

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**FIGURE 4**  
 Habitat Types Map  
 21 Mount Parnassus Road  
 East Haddam, CT

**Legend**

**Habitat Types**

- Developed / Disturbed
- Old Field
- Hayfield in Wetland
- Hayfield
- Hayfield in Wetlands
- Mixed Hardwood Forest
- Pasture
- Wetlands

Property Boundary

Study Area Boundary

**SCALE**

0 200 400 Feet

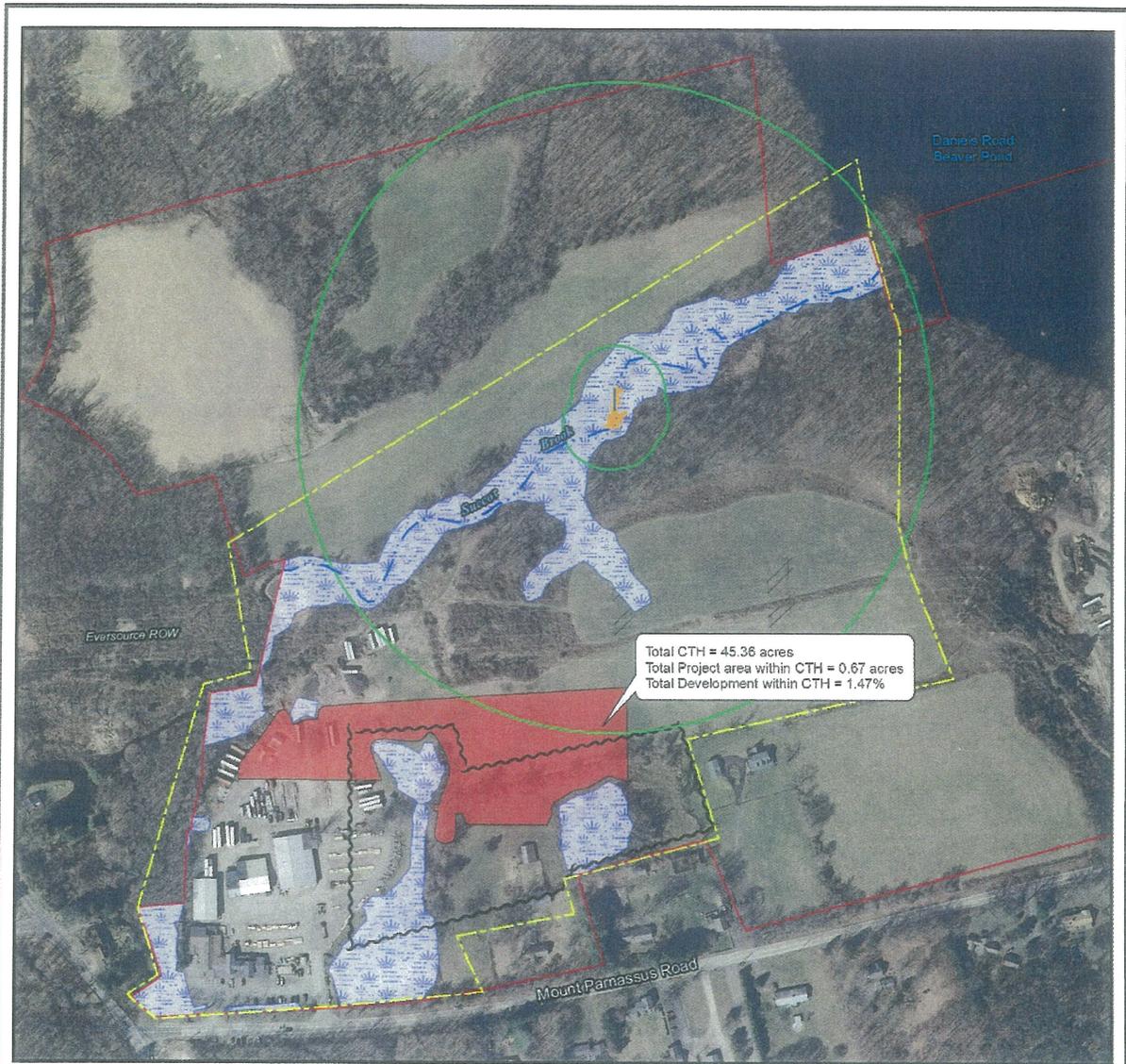


Map Description

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

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**FIGURE 5**  
 Vernal Pool Analysis Map  
 21 Mount Parnassus Road  
 East Haddam, CT

**Legend**

- Property Boundary
- Study Area Boundary
- Potential Vernal Pool
- Vernal Pool Conservation Zones  
100 foot and 100-750 foot
- Wetlands

**Project Area**

- Limits of Clearing
- Limits of Construction

**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**

0 175 350 Feet



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## Appendices

Appendix	Title
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A	Site Photos
B	Wetland Delineation Report (by Soil Science and Environmental Services, Inc.)
C	Habitat Assessment & Endangered Species Review Letter (by botanist Ken Metzler)
D	CT DEEP NDDDB Query Results (preliminary from Dawn McKay, 10-17-15)
E	Eastern Box Turtle Protection Plan
F	Wetland Restoration and Bio-retention Basin Establishment Plan



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**Appendix A**  
Site Photos





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Wetland 1





Photo 1: Wetland 1 looking north across proposed restoration area



Photo 2: Wetland 1 looking northwest across proposed restoration area



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Wetland 2





Photo 3: detention basin in Wetland 2



Photo 4: Succor Brook



Photo 5: forested floodplain wetlands bordering Succor Brook



Photo 6: detention basin in Wetland 2



Photo 7: forested areas of Wetland 2; note dense Japanese barberry shrub cover



Photo 8: Wetland 2C along edge of parking lot and Mt. Parnassus Road



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## Wetland 3





Photo 9: ditched portion of Wetland 3C along south side of parking lot



Photo 10: open pasture portion of Wetland 3B



Photo 11: northeast portion of Wetland 3A



Photo 12: northwest portion of 3A; this area is an active hayfield



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Wetland 4





Photo 13: Wetland 4; note heavily grazed soils and young trees



Photo 14: central portion of Wetland 4



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Project Area





Photo 15: central portions of project area looking west



Photo 16: central portions of project area looking east



Photo 17: northeast hayfield portions of project area looking west



Photo 18: northern portions of project area looking east



Photo 19: central portions of project area looking east



Photo 20: northeast portion of project area looking south towards hedgerow and Wetland 4



Photo 21: central portions of project area looking south



Photo 22: project area bordering Wetland 3A, looking south



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**Vernal Pool**





Photo 23: presumed vernal pool looking east (upstream) from dam



Photo 24: vernal pool looking north

# SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

95 Silo Drive \* Rocky Hill \* Connecticut \* 06067 \* (203) 272-7837 \* ssesinc@yahoo.com

## WETLANDS/WATERCOURSES AND SOIL REPORT

**PROJECT TITLE AND LOCATION:** Western portion of 21 Mt. Parnassus Road, East Haddam, CT

### **NUMBERING SEQUENCE OF WETLAND BOUNDARY LINE MARKERS:**

WF#1 thru 33	34 thru 111	112 thru 170	171 thru 191	192 thru 204	205 thru 220
221 thru 228	229 thru 239				

Plot and locate watercourses and ponds as shown on sketch map.

### **SOILS SECTION:**

*Soil Legend: State Soil Number/County Soil Symbol, Soil Series Name, Taxonomic Class & Brief Description.*

### **WETLAND SOILS**

- Aq Aquents - This is a poorly to very poorly drained, disturbed soil where two or more feet of the original soil surface has been altered by filling, excavation and/or grading. Aquents are characterized by a seasonal to prolonged high groundwater table at or near the ground surface. Aquents are capable of supporting a prevalence of hydrophytic plants.
- 2 Ridgebury fine sandy loam (Aeric Epiaquepts) - This is a deep, poorly drained, glacial till soil developed in a friable, coarse-loamy textured, solum over dense, basal till (hardpan). The till was derived from schist, gneiss and granite. Ridgebury soils occur on glaciated plains, hills and ridges. The hardpan is within 20 to 30 inches.
- 3 Ridgebury, Leicester & Whitman soils (Aquepts) - These are poorly drained and very poorly drained, coarse-loamy textured, glacial till soils. The till was derived from schist, gneiss and granite. These soils occur on glaciated plains, hills and ridges. Ridgebury and Whitman soils contain dense basal till (hardpan) in the subsoil within 20 to 30 inches.
- 13 Walpole sandy loam (Aeric Endoaquepts) - This is a deep, poorly drained, friable, coarse-loamy textured soil developed over sandy and gravelly outwash. Outwash soils occur in valleys, outwash plains and terraces.
- 15 Scarboro muck (Histic Humaquepts) - This is a deep, very poorly drained soil with a thin mucky surface overlying sandy and gravelly outwash. The outwash was derived from schist, gneiss and granite. Outwash soils occur in valleys, outwash plains and terraces.
- 108 Saco silt loam (Fluvaquentic Humaquepts) - This is a deep, very poorly drained, friable, silty soil formed in alluvial sediments derived from schist, gneiss and granite. Saco soils developed in nearly level floodplains and along rivers and streams which are subject to frequent flooding.
- 109 Fluvaquents-Udifuvents This soil map unit consists of well drained to very poorly drained, nearly level soils that formed in recent alluvial deposits. The soils are occasionally to frequently flooded, which often results in stream scouring, lateral erosion and shifting of soil from place to place. Soil characteristics, such as texture and stoniness, are usually highly variable within short distances.

see nonwetland soils on next page (2b)

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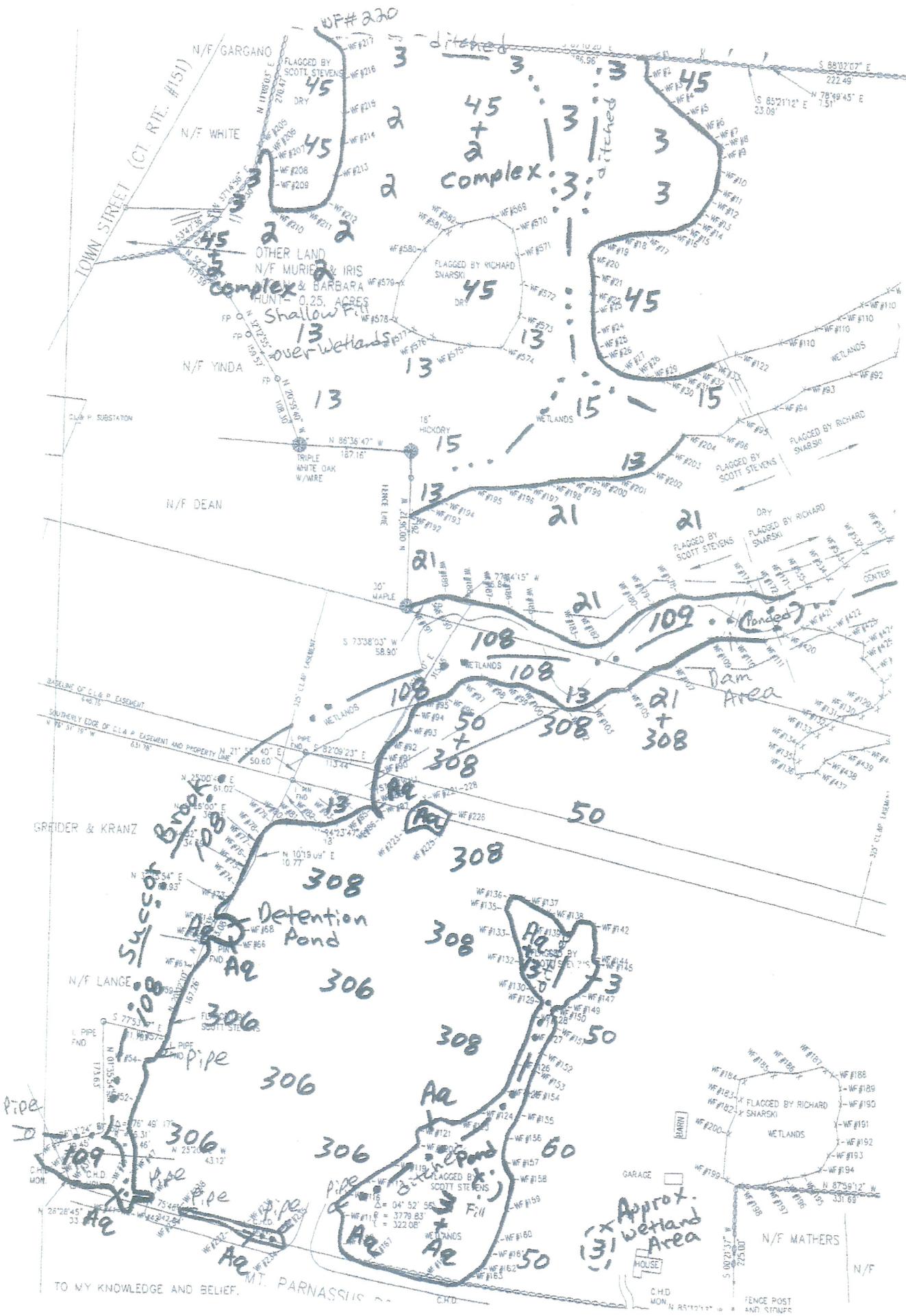
Plot and locate watercourses and ponds as shown on sketch map.

**SOILS SECTION:**

*Soil Legend: State Soil Number/County Soil Symbol, Soil Series Name, Taxonomic Class & Brief Description.*

### NON-WETLAND SOILS

- 21 Ninigret and Tisbury soils (Aquic Dystrudepts) - These are deep, moderately well drained, friable, coarse-loamy and loamy textured soils developed over sandy and gravelly outwash derived from schist, gneiss and granite. Outwash soils occur in valleys, outwash plains and terraces.
- 45 Woodbridge fine sandy loam (Aquic Dystrudepts) - This is a deep, moderately well drained, glacial till soil developed in a friable, coarse-loamy textured, solum over dense, basil till (hardpan). The till was derived from schist, gneiss and granite. Woodbridge soils occur on glaciated plains, hills and ridges. The hardpan is within 20 to 40 inches.
- 50 Sutton fine sandy loam (Aquic Dystrudepts) - This is a deep, moderately well drained, friable, coarse-loamy textured, glacial till soil derived from schist, gneiss and granite. Sutton soils occur on glaciated plains, hills and ridges.
- 60 Canton and Charlton fine sandy loam (Typic Dystrudepts) - These are deep, well drained, friable, coarse-loamy over sandy and coarse-loamy textured, glacial till soils derived from schist, gneiss and granite. Canton and Charlton soils occur on glaciated plains, hills and ridges.
- 306 Udorthents-Urban land complex This map unit consists of extensive areas where soils have been disturbed from land development along with large areas of impervious surfaces associated with streets, parking lots, buildings and other structures.
- 308 Udorthents, smoothed This is a well drained to moderately well drained soil area that has had two or more feet of the original soil surface altered by filling, excavation or grading activities. Udorthents, smoothed soils commonly occur on leveled land and fill landforms.



TO MY KNOWLEDGE AND BELIEF, MT. PARNASSIUS CHD.

Garage  
House  
C.H.D. MON. N 85°10'12" W  
FENCE POST AND STUPE

## DEFINITIONS AND METHODOLOGY FOR IDENTIFICATION OF STATE REGULATED WETLANDS & WATERCOURSES

Wetlands and watercourses are regulated in the State of Connecticut by the 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 Natural 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).

## METHODOLOGY FOR IDENTIFICATION OF SOILS, WETLANDS & WATERCOURSES

1) **SOILS IDENTIFICATION**: Soils are investigated by digging test holes with a spade and auger. Test holes are typically dug to depths of between 15 and 40 inches. Based on soil features, including coloration patterns, texture and depths to restrictive layers, the soils are identified by soil series name utilizing the classification system of the National Cooperative Soil Survey. Soil series map numbers correspond with the State Soil Map Legend established by USDA, NRCS in the State of Connecticut Soil Survey. For further soils information, refer to the NRCS website for CT: [www.ct.nrcs.usda.gov](http://www.ct.nrcs.usda.gov)

2) **INLAND WETLAND DELINEATION**: Soil test holes and borings are made in selected areas in order to determine the lateral extent of Inland Wetlands. The boundaries of the Inland Wetlands are identified in the field and delineated with consecutively numbered survey tapes, unless instructed by the client to only map wetland boundaries for planning purposes. The approximate locations of the wetland boundaries are hand drawn onto a map and are included with the wetlands report.

3) **IDENTIFICATION OF WATERCOURSES**: Very often the locations of ponds, streams and rivers are already shown on a survey map. If a watercourse is absent from a survey map, then survey tapes, labeled "watercourse" or "intermittent watercourse" are placed along the channel and the approximate location of the watercourse is also sketched onto the map.

4) **TIDAL WETLANDS DELINEATION**: Tidal Wetlands are identified based on a predominance of tidal wetland plants and observation of physical markings or water laid deposits resulting from tidal action. Tidal Wetland boundaries are delineated by locating the upland limits of those plants listed in section 22a-29(2) to the extent that these plants reflect inundation by tides.

### WETLANDS/WATERCOURSES AND SOIL REPORT

Shagbark Lumber & Farm Supplies

21 Mt. Parnassus Road, PO Box 451

East Haddam, CT 06423

SSES Job No: 2015-36-CT-EHD

Client Job No:

Site Inspection Date: 6/17, 7/10, 7/13 & 7/16/15

**PROJECT TITLE AND LOCATION:** Western portion of 21 Mt. Parnassus Road, East Haddam, CT  
(Approx. 30-35 acres)

#### IDENTIFICATION OF WETLANDS AND WATERCOURSES RESOURCES

WETLANDS AND WATERCOURSES PRESENT ON PROPERTY: Yes XX No \_\_\_\_\_

Wetlands: Inland Wetlands XX

Watercourses: Streams XX

Tidal Wetlands \_\_\_\_\_

Waterbodies XX

Remarks:

#### VEGETATION COMMUNITIES PRESENT IN WETLANDS

Forest XX Sapling/Shrub XX Wet Meadow XX Marsh \_\_\_\_\_ Field/Lawn XX

#### SOIL MOISTURE CONDITION

Dry XX

Moist XX

Wet \_\_\_\_\_

#### WINTER CONDITIONS

Frost Depth: \_\_\_\_\_ inches

Snow Depth: \_\_\_\_\_ inches

The classification system of the National Cooperative Soil Survey, USDA, Natural Resources Conservation Service and the State Soil Legend were used in this investigation. The investigation was conducted by the undersigned Registered Soil Scientist. A sketch map showing wetland boundaries and the numbering sequence of wetland markers, watercourses and soil types in both wetland and non-wetlands are included with this report. After the wetland boundary and/or watercourse flags have been located/plotted by the surveyor, it is recommended that a copy of the survey map be sent to our firm for review. All wetland boundary lines established by the undersigned Registered Soil Scientist are subject to change until officially adopted by local, state or federal regulatory agencies.

Respectfully Submitted by

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

*Scott D. Stevens*

Scott D. Stevens  
Registered Professional Soil Scientist

Habitat Assessment and Endangered Species Review for:

PurePoint Energy  
Shagbark Lumber Site  
21 Mount Parnassas Road  
East Haddam, Connecticut

November 22, 2015

On October 28, 2015, I visited the above referenced site to determine the presence or suitability of occurrence of several Connecticut State-listed plants and habitats that are documented to occur in the vicinity of the proposed project (NDDB 2015). These include:

State-listed Vascular Plants

*Castilleja coccinea* (Indian paintbrush) - State Endangered  
*Platanthera flava* var. *herbiola* (Pale green orchid) - State Special Concern

Other Botanical Habitats

Rich orchid area

Each of these species and a habitat assessment of the site are as follows:

*Castilleja coccinea* – This Connecticut Endangered plant has limited state distribution occurring in open calcareous seeps and other scattered rich sites. In 2001, a New England Wild Flower Society Conservation and Research Plan (Shenk and Holsinger, 2001) listed five extant populations, with a number of historic populations, including one in East Haddam, lost primarily to vegetation succession. Based on my seasonal field review and the habitats described below, there is no evidence that this species occurs on this site.

*Platanthera flava* var. *herbiola* – This Connecticut Special Concern orchid occurs in low meadows and open swamp. Formerly occasional or frequent, this species has apparently declined throughout Connecticut to population numbers low enough to warrant Special Concern status. In my 30+ years of field observations, I have observed this plant twice. Whitetail deer heavily browse native woodland orchids with many similar species experiencing steep declines in numbers. Based on my seasonal field review and the habitats described below, there is no evidence that this or any other of the woodland orchids occurring on this site.

Rich Orchard area

This unique habitat occurs off the site on the Rotary Club sponsored skating pond directly to the south of Mount Parnassus Road. This site is a former cranberry bog that is flooded in the winter for recreational purposes.

## Impacted Habitats

### Wetland 1

This wet area is a small unremarkable wetland with very few, scattered hydrophytic plants, e.g. sallow sedge (*Carex lurida*), short -tail rush (*Juncus brevicaudatus*), and begger's tick (*Bidens frondosa*). The majority of the site is dominated by upland species such as goldenrods (*Solidago canadensis*, *S. graminea*) and mugwort (*Artemisia vulgaris*). This habitat was likely classified solely by soil conditions.

### Wetland 3A

This wetland occurs primarily within the mowed hayfield, connected to Wetland 3 by an excavated ditch. The vegetation is primarily sapling red maple with an understory of dense patches of the invasive multiflora rose and scattered smooth arrowwood (*Viburnum dentatum*) shrubs. On the margins of the field are tussock sedge (*Carex stricta*) goldenrods, Joe-Pye-weed (*Eutrochium* sp), New York ironweed (*Vernonia noveboracensis*), and reed canary grass (*Phalaris arundinacea*).

### Wetland 4

This wetland is heavily grazed by livestock. The soils are trampled and the ground cover is sparse. The canopy is composed of several trees including red maple, American elm, and black gum (*Nyssa sylvatica*). Typical shrubs such as spicebush (*Lindera benzoin*), alder (*Alnus rugosa*), and invasive shrubs such as Japanese barberry, bush honeysuckle (*Lonicera* sp.), multiflora rose, and Japanese honeysuckle (*Lonicera japonica*) occur in patches. Several patches of sphagnum moss occur throughout.

### Hedge Row

This habitat separated the rough pasture from the hay field. It contains a stonewall with widely separated maple and hickory trees. A dense thicket of multiflora rose forms an impenetrable barrier between the two habitats.

### Hayfield

This habitat was recently mowed prior to the time of visit and is composed of European cool season grasses, including species such as orchard grass, timothy, and awn-less brome (*Bromus inermis*).

### Rough Field

This habitat separates the hayfield from the truck body storage area. Dominated primarily by goldenrod species and mugwort, it contains several introduced species such as whorled bedstraw (*Galium mullugo*), the invasive autumn olive, and on a pile of excavated soil, a fine specimen of the inappropriately named invasive tree-of-heaven (*Ailanthus altissima*).

### Truck Body Storage Area

This area is highly disturbed storage area for derelict and functional equipment.

Referenced Material

Connecticut Natural Diversity Data Base. 2015. E-mail communication with Dawn McKay, Environmental Analyst, Connecticut Department of Energy and Environmental Protection.

Haines, Arthur. 2011. Flora Novae Angliae: A Manual for the Identification of Native and Naturalized Higher Vascular Plants of New England. New England Wild Flower Society. Framingham, Massachusetts.

Shenk, Gregory and Kent Holsinger. 2001. *Castilleja coccinea* (L.) Sprengel (Indian paintbrush) Conservation and Research Plan. New England Wild Flower Society. Framingham, Massachusetts.

Respectively submitted;



Kenneth J. Metzler  
Ecologist/Botanist  
18 Baxter Road  
Willington, Connecticut  
06279

# Species List for NDDDB Request

Scientific Name	Common Name	State Status
<b>Invertebrate Animal</b>		
Lycaena epixanthe	Bog copper	SC
<b>Other (Botanical)</b>		
Rich orchid area		
<b>Vascular Plant</b>		
Castilleja coccinea	Indian paintbrush	E
Platanthera flava var. herbiola	Pale green orchid	SC
<b>Vertebrate Animal</b>		
Enneacanthus obesus	Banded sunfish	SC
Haliaeetus leucocephalus	Bald eagle	T
Melanerpes erythrocephalus	Red-headed woodpecker	E
Sylvilagus transitionalis	New England Cottontail	Candidate Species for Federal Listing
Terrapene carolina carolina	Eastern box turtle	SC

E = Endangered, T = Threatened, SC = Special Concern, \* Extirpated

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## APPENDIX E: Box Turtle Protection Plan

Shagbark Lumber and Farm Supply

21 Mount Parnassus Road, East Haddam, CT

Implementation Period: 2016

## Eastern Box Turtle Protection Plan

Eastern Box Turtle, a State Special Concern species afforded protection under the Connecticut Endangered Species Act and listed as a **Greatest Conservation Need species in Connecticut's Comprehensive Wildlife Conservation Strategy (CT DEP 2005)**, is known to occur within the vicinity of the site. The following protective measures are recommended to satisfy requirements from the Connecticut Department of Energy & Environmental Protection ("CTDEEP") Wildlife Division and follow protocols developed from previous rare species consultations and state-approved protection plans.

It is of the utmost importance that the Contractor complies with the requirement for the installation of protective measures and the education of its employees and subcontractors performing work on the project site if work will occur during the Eastern Box Turtle's active period (approximately April 15th to October 15th). Davison Environmental, LLC will serve as the Environmental Monitor for this project to ensure that Eastern Box Turtle protection measures are implemented properly and will provide an education session on Eastern Box Turtle prior to the start of construction activities. The Contractor shall contact Eric Davison at least 5 business days prior to the pre-construction meeting. Mr. Davison can be reached by phone at (860) 803-0938 or via email at [eric@davisonenvironmental.com](mailto:eric@davisonenvironmental.com).

The proposed recommended Eastern Box Turtle protection program consists of several components: isolation of the project perimeter; targeted searches of the project area prior to construction; periodic inspection and maintenance of isolation structures; education of all contractors and sub-contractors prior to initiation of work on the site; and reporting.

### 1. Isolation Measures & Erosion and Sedimentation Controls

- a. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals. These products or reinforced silt fence should not be used on the project. Temporary erosion control products, either erosion control blankets, fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (netless) and/or netting composed of planar woven natural biodegradable fiber should be used to avoid/minimize wildlife entanglement.
- b. Installation of erosion and sedimentation controls (i.e., silt fencing), required for erosion control compliance and creation of a barrier to migrating/dispersing herpetofauna, should be installed by the Contractor prior to clearing activities or any earthwork.
- c. The Environmental Monitor will inspect the work zone area prior to and following erosion control barrier installation to ensure the area is free of eastern box turtles and the barrier is satisfactorily installed. The intent of the barrier is to segregate the majority of the work zone and isolate it from foraging/migrating/dispersing herpetofauna. In certain circumstances when complete isolation of a work zone is not feasible due to accessibility needs, the barriers will be positioned to deflect migrating/dispersal routes away from the work zone to minimize

potential encounters with herpetofauna. All openings in the isolation barrier, used during the work day for accessibility, should be closed with hay bales at the completion of each day.

- d. The fencing will consist of non-reinforced conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven to ten-foot intervals using four-foot oak stakes or approved equivalent. The Contractor is responsible for daily inspections of the fencing for tears or breeches in the fabric and accumulation levels of sediment, particularly following storm events of 0.25 inch or greater. Davison Environmental will provide periodic inspections of the fencing throughout the duration of construction activities, generally on a biweekly frequency or more frequently if site conditions warrant.
- e. The extent of the barrier fencing will be as shown on the site plans. The Contractor should have available additional barrier fencing should field conditions warrant extending the fencing as directed by Davison Environmental.
- f. No equipment, vehicles or construction materials shall be stored outside of the isolation barrier fencing.
- g. All silt fencing shall be removed within 30 days of completion of work and permanent stabilization of site soils.

## **2. Contractor Education**

- a. Prior to work on site, the Contractor shall attend an educational session at the pre-construction meeting with Davison Environmental. This orientation and educational session will consist of an introductory meeting with Davison Environmental providing photos of herpetofauna that may be encountered during construction activities, including eastern box turtles, emphasizing the non-aggressive nature of these species, the absence of need to destroy wildlife that might be encountered and the need to follow Protective Measures as described in Section 3 below.
- b. The Contractor will be provided with cell phone and email contacts for Davison Environmental to immediately report encounters with any turtles or other herpetofauna. Educational poster materials will be provided by Davison Environmental and displayed on the job site to maintain worker awareness as the project progresses.

## **3. Turtle Protective Measures**

- a. Prior to the start of construction each day, the Contractor shall search the entire work area for turtles.
- b. If a turtle is found, it shall be immediately moved by carefully grasped in both hands, one on each side of the shell, between the turtle's forelimbs and the hind limbs, and placed just outside of the isolation barrier closest to where it was encountered.

- 
- c. Special care shall be taken by the Contractor during early morning and evening hours and on overcast rainy days so that possible basking or foraging turtles are not harmed by construction activities.

#### 4. Reporting

- a. Following completion of the construction project, Davison Environmental will provide a summary report to the Connecticut Siting Council and CTDEEP documenting the monitoring and maintenance of the barrier fence and erosion control measures.
  - b. Any observations of eastern box turtle or other state listed species will be reported to CTDEEP by Davison Environmental with photo-documentation (if possible) and with specific information on the location and disposition of the animal.
- 
- 

## Bio-retention Basin and Wetland Restoration Area Plan Notes

Shagbark Lumber and Farm Supply

21 Mount Parnassus Road, East Haddam

This plan provides specifications on the grading, soil amendments and plantings necessary to establish a native plant community within the bioretention basin and Wetland/Wetland Buffer Restoration Area. The Wetland/Wetland Buffer Restoration Area consists of the entirety of Wetland 1, as well as a 25-foot wide upland (non-wetland) buffer surrounding Wetland 1 totaling 7,200 s.f.

1. Wetland Scientist Eric Davison of Davison Environmental, LLC (860-803-0938) will oversee this work. Eric Davison will be notified a minimum of seven (7) business days prior to the start of work (including excavation and grading, soil transfer and planting) to monitor and oversee implementation.
2. As Wetland 1 consists of shallow fill/disturbed soil material overlying original wetland soils, excavation will consist of removal of fill material until the underlying native wetland soil is exposed. Minor modifications to this grading plan may be made in the field by the wetland scientist in response to subsurface hydrologic conditions. The supervising wetland scientist will inspect the sub-grade to ensure that the proper hydrology has been established. Areas not found to contain underlying native hydric soils will be supplemented with prepared topsoil as described in Note #4 below.
3. Wetland 1 and the buffer restoration area shall be cleared of all material stockpiles, debris and stored equipment prior to the start of work.
4. The bioretention basin bottom soil mix shall consist of 50-60% sand, 20-30% topsoil, and 20-30% well aged compost (at least one year) or peat moss. This soil mix shall be a minimum of 12 inches deep.
5. Compaction of the basin bottom during final grading shall be minimized to the maximum extent feasible by the use of excavation hoes, light equipment with turf type tires, or wide track equipment. Allow the soil mixture to settle naturally through rain events or presoak after placement.
6. Plant the basin and restoration area per the table below. The seed mixes are a product of New England Plants, Inc. Amherst, MA ([www.newp.com](http://www.newp.com)) and should be installed per the manufacturers recommended specifications (see spec sheets attached). The seeding areas should be contiguous so as to blend into a single vegetated unit included the basin and the restoration area.

<u>Seeding Location</u>	<u>Seed Mix</u>	<u>Seeding Rate</u>
Bioretention basin and Wetland 1	New England WetMix	2,500 s.f. / lb
Bioretention basin side slopes and Wetland 1 buffer restoration area	New England Conservation and Wildlife Mix	1,750 s.f. / lb



## NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002  
 PHONE: 413-549-8000 FAX 413-549-4000  
 EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

### New England Wetmix (Wetland Seed Mix)

Botanical Name	Common Name	Indicator
<i>Carex lurida</i>	Lurid Sedge	OBL
<i>Carex scoparia</i>	Blunt Broom Sedge	FACW
<i>Verbena hastata</i>	Blue Vervain	FACW
<i>Carex lupulina</i>	Hop Sedge	OBL
<i>Scirpus atrovirens</i>	Green Bulrush	OBL
<i>Panicum rigidulum</i>	Redtop Panic Grass	FACW+
<i>Deschampsia cespitosa</i>	Tufted Hairgrass	FACW
<i>Bidens aristosa</i>	Tickseed Sunflower/Bur Marigold	FACW
<i>Eleocharis palustris</i>	Creeping Spike Rush	OBL
<i>Juncus effusus</i>	Soft Rush	FACW+
<i>Carex crinita</i>	Fringed Sedge	OBL
<i>Mimulus ringens</i>	Square Stemmed Monkey Flower	OBL
<i>Aster puniceus</i>	Swamp Aster	OBL
<i>Eupatorium perfoliatum</i>	Boneset	FACW
<i>Glyceria canadensis</i>	Rattlesnake Grass	OBL
<i>Asclepias incarnata</i>	Swamp Milkweed	OBL
<i>Helianthus autumnale</i>	Common Sneezeweed	FACW+
<i>Penthorum sedoides</i>	Ditch Stonecrop	OBL

PRICE PER LB. \$135.00  
 REQ. QUANTITY: 1 LBS.  
 TOTAL \$135.00  
 APPLY: 18 LBS/ACRE  
 1 LB/2500 SQ FT  
 MINIMUM QUANTITY: 1 LBS

The New England Wetmix (Wetland seed mix) contains a wide variety of native seeds which are suitable for most wetland restoration sites that are not permanently inundated. All species are best suited to moist disturbed ground as found in most wet meadows, scrub shrub, or forested wetland restoration areas. This mix is well suited for

detention basin borders, and the bottom of detention basins not generally under standing water. The seeds will not germinate under inundated conditions. If planted during the fall months, the seed mix will germinate the following spring. During the first season of growth, several species will produce seeds, while other species will produce seeds after the second growing season. Not all species will grow in all wetland situations. This mix is composed of the wetland species most likely to grow in created/restored wetlands and should produce more than 75% ground cover in two full growing seasons. Always apply on clean bare soil. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper soil-seed contact. Best results are obtained with a Spring seeding. Late Spring and Summer seeding will benefit with a light mulching of clean weed-free straw to conserve moisture. If conditions are drier than usual, watering may be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not recommended. Preparation of a clean weed free soil surface is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is \$/bulk pound, FOB warehouse, plus S&H and applicable taxes.



## NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET  
AMHERST, MA 01002

PHONE: 413.548.8000

FAX: 413.549.4000

EMAIL: INFO@NEWP.COM

WEB ADDRESS: WWW.NEWP.COM

### New England Conservation/Wildlife Mix

BOTANICAL NAME	COMMON NAME	IND.
<i>Elymus virginicus</i>	Virginia Wild Rye	FACW-
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Festuca rubra</i>	Creeping Red Fescue	FACU
<i>Andropogon gerardii</i>	Big Bluestem	FAC
<i>Chamaecrista fasciculata</i>	Partridge Pea	FACU
<i>Panicum clandestinum</i>	Deer Tongue	FAC+
<i>Panicum virgatum</i>	Switch Grass	FAC
<i>Sorghastrum nutans</i>	Indian Grass	UPL
<i>Helenium autumnale</i>	Common Sneezeweed	FACW+
<i>Heliopsis helianthoides</i>	Ox Eye Sunflower	UPL
<i>Verbena hastata</i>	Blue Vervain	FACW
<i>Asclepias syriaca</i>	Common Milkweed	FACU-
<i>Aster umbellatus</i>	Flat Topped/Umbrella Aster	FACW
<i>Eupatorium purpureum</i>	Purple Joe Pye Weed	FAC
<i>Solidago juncea</i>	Early Goldenrod	
<i>Zizia aurea</i>	Golden Alexanders	FAC

PRICE PER LB. \$36.50

MIN. QUANTITY: 2 LBS.

TOTAL \$73.00

APPLY: 25 LBS/ACRE

1 LB/1750 SQ FT

MINIMUM QUANTITY: 2 LBS

The New England Conservation/Wildlife Mix provides a permanent cover of grasses, wildflowers and legumes to provide both good erosion control and wildlife habitat value. This mix is designed to be a no maintenance seeding, and it is appropriate to cut and fill slopes, detention basin slopes, and disturbed areas adjacent to commercial and residential projects. Always apply on clean bare soil. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper seed to soil contact. Best results are obtained with a Spring seeding. Late Spring through early Summer seeding will benefit with a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering will be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free soil surface is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged.

Price is \$/bulk pound, FOB warehouse, plus S&H and applicable taxes.

# Exhibit 6

21 Mt Parnassus Rd, East Haddam, CT

# Shagbark Lumber Inc

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*Conducted by Adam Woodruff- Assets & Strategy*

**EVERSOURCE**

## Abstract

This system impact study is to examine the proposed 1.2MW of photovoltaic generation being installed at the Shagbark location. The installation fails the zone loading so a full circuit impact study was needed. The studied impacts are voltage issues, equipment ratings, and protection concerns. Also in the study were transfer trip requirements for this installation.

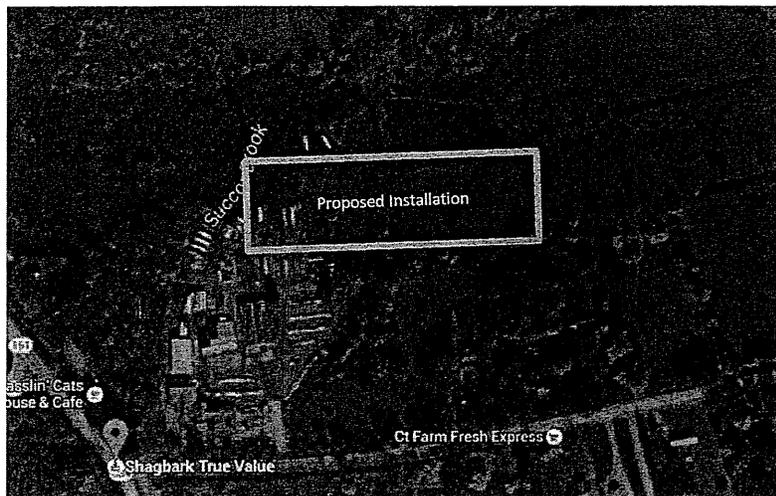
This study found that there were no voltage issues for all the studied situations. This installation did not cause any voltage violation when the generation was added along with no flicker violations. There is a nearly insignificant stability concern due to the installations close proximity to the substation. Due to the amount of generation on the circuit and the risk of islanding transfer trip is needed for this installation. Power Line Carrier will be implemented for transfer trip. The need for transfer trip is also needed so the customer doesn't generate on the alternative circuit. No protection changes are needed as the fault contribution of the generation is minimal.

## Introduction

The purpose of this study is to determine electrical system impacts of a photovoltaic (PV) electric generation source connected to the distribution primary system at the Shagbark Lumber location. The electric system impacts considered in this study are voltage, equipment ratings, and protections concerns. Recommendations will be based on assurance that all the customers are within the established ratings for voltage, equipment loading, and fault protection.

## Project Location

The Shagbark project proposes to connect 1.2 MW AC PV facility to the Eversource 11C Haddam Substation. The project will be located at 21 Mt Parnassus Rd in East Haddam, CT, as show below. The circuit distance from Haddam 11C substation to the project interconnection point is about 2.25 miles.





## System Configuration

The primary distribution voltage of the customer is 23kV and comes from the Haddam 11C substation. The customer is fed off the 11C13 feeder and their backup contingency feeder is the 15L68 circuit from the Bokum 15L substation. The customer is located on a three phase overhead tap in an automatic loop zone. The customer's PV is connected to a new three phase transformer that will be installed as part of this job. The customer's circuit has existing generation. There is 800kW of existing photovoltaic generation on the circuit including 140kW at the customer location.

## System Loading

The system loading on the 11C13 circuit was measured to be 10.5 MVA in July 2015. The minimum was measured to be 4.6 MVA in October of 2014.

## Generation Characteristics

The customer spec sheet shows them using the SMA Sunny Tri-power 24000TL-US inverter. They have a nameplate rating of 24kW, and the customer will be installing 50 total inverters for a total of 1.2 MW of generation.



## System Stability

A stiffness calculation was done to determine the stability of the interconnection;

$$\text{Stiffness Factor} = \frac{D_{\text{System Fault Duty}} (A)}{DG \text{ total output } (A)}$$

$$\text{Stiffness Factor} = 127.6$$

With the stiffness factor between 100 and 250 there is a nearly insignificant concern. There is a very little concern unless the DG is started and stopped frequently or has unusual fluctuations. With this installation being in close proximity to the substation there are no stability concerns with it.

## Voltage Impact

CT regulatory requirements require adherence to a voltage at -5% to +3% PU. The modeling software uses a nominal voltage of 120 as the output, so the voltages from the model will need to stay between 114 and 123.6. This portion of the study will determine if the interconnection can maintain these requirements at peak and minimum loading conditions. The study will look at both peak and minimum loading during time in which the generator is in parallel with the Eversource system.



### Peak loading

At peak loading steady state conditions with generation at unity power factor, the system is able to sustain voltage within PURA limitations. No upgrades or adjustments are needed to voltage regulation equipment upstream for the generation facility.

Normal Configuration Peak Loading					
Gen Off			Gen On		
121.8	121.5	121.6	122	121.7	121.7

Flicker: The average flicker is at worst case of 0.16%. This meets standards defined by the IEEE STD 141-1993 Flicker tolerance curve.

### Minimum loading

At minimum loading steady state conditions with generation at unity power factor, the system is able to sustain voltage within PURA limitations. No upgrades or adjustments are needed to voltage regulation equipment upstream for the generation facility.

Normal Configuration Min Loading					
Gen Off			Gen On		
122.7	122.6	122.6	122.9	122.8	122.8

Flicker: The average flicker is at worst case of 0.16%. This meets standards defined by the IEEE STD 141-1993 Flicker tolerance curve.

### Contingencies

In the case of an outage the customer zone is transferred to the 15L58 circuit. The customer generation will not be allowed to operate on the 15L68 circuit. This is because of possible voltage concerns due to bi-directional regulators on the contingent 15L68 circuit. The customer will be transfer tripped using power line carrier in the case of a customer zone getting swapped.

### **Operational Restrictions & Anti-Islanding Protection**

System conditions where generation may be greater than 67% of the minimum load were examined to study potential islanding risks. The circuit has existing PV which causes a greater concern for islanding along with this proposed installation.

### Operation Restrictions

The photovoltaic generator at the Shagbark lumber facility will not be able to operate if the upstream device 11C13-50Z or anything between that device and the customer are open. The



generator will not be able to operate if the circuit is switched in an abnormal state or the feeder breaker is open at the Haddam 11C substation.

The 11C13-62R is a recloser that is the protective device for the customer's zone. In that zone the generation to minimum load is 200%. With a ratio greater than the allowed 67% transfer trip is needed for the zone. The next upstream device is the 11C13-50Z. The generation to minimum load for the 11C13-50Z is 93%. This ratio is greater than the allowed 67% so transfer trip is needed for this zone. The 11C13 feeder breaker is the next upstream device and has a generation to minimum load of 45%. With the ratio below 67% transfer trip is not needed at the substation.

### Locations Required for Transfer Trip

The transfer trip method that is used for this installation is Power Line Carrier (PLC). The trip signal will be sent along the Eversource system and will transfer trip the customer if there is anything abnormal between the 11C13-50Z and the customer's installation.

The PLC equipment will be installed on the source side of the 11C13-50Z and a second location at the customer's installation. The PLC will trip the customer breaker using a control cable that will be ran from the PLC installation on the customer site to the customers breaker. The customer will be responsible to run the conduit for this control cable, from the pole to the breaker.



### **System Upgrades & New Service**

Along with the installation of transfer trip for the customer there are some system upgrades along with the new service to feed the customers. The new service includes the installation of overhead primary and underground riser to the new customer transformer. This line extension will be on the customer property. Along with the new service this project needs the installation of a recloser for isolation purposes because of the size of the generation is greater than 1MVA. This installation will be secondary metered so primary metering isn't needed.



# Exhibit 7

## Contingent Approval

December 8, 2015

**Project Name** Shagbark Lumber Inc.  
**Project Address** 21 Mount Parnassus Road, East Haddam, CT 06423  
**System Type** 1200 kW PV installation  
**Equipment** twenty-seven (50) SMA Sunny Tripower 24000TL-US three-phase 480 volt inverters

The Connecticut Light and Power Company d/b/a Eversource Energy, has completed the Impact Study for the above stated project and has determined that the proposed project can be interconnected to the Eversource distribution system with the following upgrades:

1. Transfer trip will be required at the project site
2. A new pad mounted transformer and overhead recloser for DG isolation



Please refer to the Appendix C (Impact Study Report) of the Interconnection Agreement for any special conditions that will be required for this project. Please refer to Appendix F for the list of milestones required to interconnect this project. Should you have any question please do not hesitate to contact me.

Sincerely

*James A Cerkanowicz*

James A Cerkanowicz, PE  
Project Manager – Distributed Energy Resources  
**Eversource Energy**  
107 Selden Street, Berlin, CT 06037  
Tel: 860-665-5108  
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# Exhibit 8



United States  
Department of  
Agriculture

NRCS

Natural  
Resources  
Conservation  
Service

A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants

# Custom Soil Resource Report for State of Connecticut



# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# How Soil Surveys Are Made

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

## Custom Soil Resource Report

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

## Soil Map

---

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Source Report  
Soil Map



## MAP LEGEND

 Area of Interest (AOI)	 Soil Map Unit Polygons	 Spoil Area
 Soil Map Unit Lines	 Soil Map Unit Points	 Stony Spot
 Special Point Features	 Blowout	 Very Stony Spot
 Blowout	 Borrow Pit	 Wet Spot
 Borrow Pit	 Clay Spot	 Other
 Clay Spot	 Closed Depression	 Special Line Features
 Closed Depression	 Gravel Pit	 Water Features
 Gravel Pit	 Gravelly Spot	 Streams and Canals
 Gravelly Spot	 Landfill	 Transportation
 Landfill	 Lava Flow	 Rails
 Lava Flow	 Marsh or swamp	 Interstate Highways
 Marsh or swamp	 Mine or Quarry	 US Routes
 Mine or Quarry	 Miscellaneous Water	 Major Roads
 Miscellaneous Water	 Perennial Water	 Local Roads
 Perennial Water	 Rock Outcrop	 Background
 Rock Outcrop	 Saline Spot	 Aerial Photography
 Saline Spot	 Sandy Spot	
 Sandy Spot	 Severely Eroded Spot	
 Severely Eroded Spot	 Sinkhole	
 Sinkhole	 Slide or Slip	
 Slide or Slip	 Sodic Spot	

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut  
 Survey Area Data: Version 14, Sep 22, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 28, 2011—Apr 18, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map-unit boundaries may be evident.

## Map Unit Legend

State of Connecticut (CT600)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
50B	Sutton fine sandy loam, 3 to 8 percent slopes	0.9	12.7%
60C	Canton and Charlton soils, 8 to 15 percent slopes	2.1	28.4%
60D	Canton and Charlton soils, 15 to 25 percent slopes	0.6	7.9%
102	Pootatuck fine sandy loam	2.5	33.5%
103	Rippowam fine sandy loam	1.3	17.6%
<b>Totals for Area of Interest</b>		<b>7.4</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

## Custom Soil Resource Report

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## State of Connecticut

### 50B—Sutton fine sandy loam, 3 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 9lp3  
*Elevation:* 0 to 1,200 feet  
*Mean annual precipitation:* 43 to 56 inches  
*Mean annual air temperature:* 45 to 55 degrees F  
*Frost-free period:* 140 to 185 days  
*Farmland classification:* All areas are prime farmland

#### Map Unit Composition

*Sutton and similar soils:* 80 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Sutton

##### Setting

*Landform:* Depressions, drainageways  
*Down-slope shape:* Concave  
*Across-slope shape:* Linear  
*Parent material:* Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

##### Typical profile

*Ap - 0 to 6 inches:* fine sandy loam  
*Bw1 - 6 to 12 inches:* fine sandy loam  
*Bw2 - 12 to 24 inches:* fine sandy loam  
*Bw3 - 24 to 28 inches:* fine sandy loam  
*C1 - 28 to 36 inches:* gravelly fine sandy loam  
*C2 - 36 to 65 inches:* gravelly sandy loam

##### Properties and qualities

*Slope:* 3 to 8 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Moderately well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.57 to 5.95 in/hr)  
*Depth to water table:* About 18 to 30 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Moderate (about 6.9 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 2w  
*Hydrologic Soil Group:* B

#### Minor Components

##### Charlton

*Percent of map unit:* 5 percent  
*Landform:* Hills

## Custom Soil Resource Report

*Down-slope shape:* Linear  
*Across-slope shape:* Linear

### **Canton**

*Percent of map unit:* 4 percent  
*Landform:* Hills  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex

### **Paxton**

*Percent of map unit:* 3 percent  
*Landform:* Drumlins, hills, till plains  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex

### **Leicester**

*Percent of map unit:* 3 percent  
*Landform:* Depressions, drainageways  
*Down-slope shape:* Linear  
*Across-slope shape:* Concave

### **Woodbridge**

*Percent of map unit:* 2 percent  
*Landform:* Drumlins, hills  
*Down-slope shape:* Concave  
*Across-slope shape:* Linear

### **Rainbow**

*Percent of map unit:* 2 percent  
*Landform:* Drumlins, hills  
*Down-slope shape:* Linear  
*Across-slope shape:* Concave

### **Narragansett**

*Percent of map unit:* 1 percent  
*Landform:* Hills, till plains  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex

## **60C—Canton and Charlton soils, 8 to 15 percent slopes**

### **Map Unit Setting**

*National map unit symbol:* 9lpp  
*Elevation:* 0 to 1,200 feet  
*Mean annual precipitation:* 43 to 54 inches  
*Mean annual air temperature:* 45 to 55 degrees F  
*Frost-free period:* 140 to 185 days  
*Farmland classification:* Farmland of statewide importance

### **Map Unit Composition**

*Canton and similar soils:* 45 percent  
*Charlton and similar soils:* 35 percent

## Custom Soil Resource Report

*Minor components: 20 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Canton

#### Setting

*Landform: Hills*

*Down-slope shape: Linear*

*Across-slope shape: Convex*

*Parent material: Coarse-loamy over sandy and gravelly melt-out till derived from granite and/or schist and/or gneiss*

#### Typical profile

*Oe - 0 to 1 inches: moderately decomposed plant material*

*A - 1 to 3 inches: gravelly fine sandy loam*

*Bw1 - 3 to 15 inches: gravelly loam*

*Bw2 - 15 to 24 inches: gravelly loam*

*Bw3 - 24 to 30 inches: gravelly loam*

*2C - 30 to 60 inches: very gravelly loamy sand*

#### Properties and qualities

*Slope: 8 to 15 percent*

*Depth to restrictive feature: More than 80 inches*

*Natural drainage class: Well drained*

*Runoff class: Low*

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high  
(0.57 to 5.95 in/hr)*

*Depth to water table: More than 80 inches*

*Frequency of flooding: None*

*Frequency of ponding: None*

*Available water storage in profile: Low (about 5.6 inches)*

#### Interpretive groups

*Land capability classification (irrigated): None specified*

*Land capability classification (nonirrigated): 3e*

*Hydrologic Soil Group: B*

### Description of Charlton

#### Setting

*Landform: Hills*

*Down-slope shape: Linear*

*Across-slope shape: Linear*

*Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss*

#### Typical profile

*Ap - 0 to 4 inches: fine sandy loam*

*Bw1 - 4 to 7 inches: fine sandy loam*

*Bw2 - 7 to 19 inches: fine sandy loam*

*Bw3 - 19 to 27 inches: gravelly fine sandy loam*

*C - 27 to 65 inches: gravelly fine sandy loam*

#### Properties and qualities

*Slope: 8 to 15 percent*

*Depth to restrictive feature: More than 80 inches*

*Natural drainage class: Well drained*

*Runoff class: Low*

## Custom Soil Resource Report

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 5.95 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water storage in profile:* Low (about 5.9 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3e

*Hydrologic Soil Group:* B

### Minor Components

#### Sutton

*Percent of map unit:* 5 percent

*Landform:* Depressions, drainageways

*Down-slope shape:* Concave

*Across-slope shape:* Linear

#### Leicester

*Percent of map unit:* 5 percent

*Landform:* Depressions, drainageways

*Down-slope shape:* Linear

*Across-slope shape:* Concave

#### Chatfield

*Percent of map unit:* 5 percent

*Landform:* Hills, ridges

*Down-slope shape:* Convex

*Across-slope shape:* Linear

#### Hollis

*Percent of map unit:* 5 percent

*Landform:* Hills, ridges

*Down-slope shape:* Convex

*Across-slope shape:* Convex

## 60D—Canton and Charlton soils, 15 to 25 percent slopes

### Map Unit Setting

*National map unit symbol:* 9lpq

*Elevation:* 0 to 1,200 feet

*Mean annual precipitation:* 43 to 54 inches

*Mean annual air temperature:* 45 to 55 degrees F

*Frost-free period:* 140 to 185 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Canton and similar soils:* 45 percent

## Custom Soil Resource Report

*Charlton and similar soils: 35 percent*

*Minor components: 20 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Canton

#### Setting

*Landform: Hills*

*Down-slope shape: Linear*

*Across-slope shape: Convex*

*Parent material: Coarse-loamy over sandy and gravelly melt-out till derived from granite and/or schist and/or gneiss*

#### Typical profile

*Oe - 0 to 1 inches: moderately decomposed plant material*

*A - 1 to 3 inches: gravelly fine sandy loam*

*Bw1 - 3 to 15 inches: gravelly loam*

*Bw2 - 15 to 24 inches: gravelly loam*

*Bw3 - 24 to 30 inches: gravelly loam*

*2C - 30 to 60 inches: very gravelly loamy sand*

#### Properties and qualities

*Slope: 15 to 25 percent*

*Depth to restrictive feature: More than 80 inches*

*Natural drainage class: Well drained*

*Runoff class: Low*

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high  
(0.57 to 5.95 in/hr)*

*Depth to water table: More than 80 inches*

*Frequency of flooding: None*

*Frequency of ponding: None*

*Available water storage in profile: Low (about 5.6 inches)*

#### Interpretive groups

*Land capability classification (irrigated): None specified*

*Land capability classification (nonirrigated): 4e*

*Hydrologic Soil Group: B*

### Description of Charlton

#### Setting

*Landform: Hills*

*Down-slope shape: Linear*

*Across-slope shape: Linear*

*Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss*

#### Typical profile

*Ap - 0 to 4 inches: fine sandy loam*

*Bw1 - 4 to 7 inches: fine sandy loam*

*Bw2 - 7 to 19 inches: fine sandy loam*

*Bw3 - 19 to 27 inches: gravelly fine sandy loam*

*C - 27 to 65 inches: gravelly fine sandy loam*

#### Properties and qualities

*Slope: 15 to 25 percent*

*Depth to restrictive feature: More than 80 inches*

*Natural drainage class: Well drained*

## Custom Soil Resource Report

*Runoff class:* Low

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 5.95 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water storage in profile:* Low (about 5.9 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 4e

*Hydrologic Soil Group:* B

### **Minor Components**

#### **Sutton**

*Percent of map unit:* 5 percent

*Landform:* Depressions, drainageways

*Down-slope shape:* Concave

*Across-slope shape:* Linear

#### **Leicester**

*Percent of map unit:* 5 percent

*Landform:* Depressions, drainageways

*Down-slope shape:* Linear

*Across-slope shape:* Concave

#### **Chatfield**

*Percent of map unit:* 5 percent

*Landform:* Hills, ridges

*Down-slope shape:* Convex

*Across-slope shape:* Linear

#### **Hollis**

*Percent of map unit:* 5 percent

*Landform:* Hills, ridges

*Down-slope shape:* Convex

*Across-slope shape:* Convex

## **102—Pootatuck fine sandy loam**

### **Map Unit Setting**

*National map unit symbol:* 9ljn

*Elevation:* 0 to 1,200 feet

*Mean annual precipitation:* 43 to 54 inches

*Mean annual air temperature:* 45 to 55 degrees F

*Frost-free period:* 140 to 185 days

*Farmland classification:* All areas are prime farmland

## Custom Soil Resource Report

### Map Unit Composition

*Pootatuck and similar soils: 80 percent*

*Minor components: 20 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Pootatuck

#### Setting

*Landform: Flood plains*

*Down-slope shape: Linear*

*Across-slope shape: Concave*

*Parent material: Coarse-loamy alluvium*

#### Typical profile

*Ap - 0 to 4 inches: fine sandy loam*

*Bw1 - 4 to 16 inches: fine sandy loam*

*Bw2 - 16 to 21 inches: fine sandy loam*

*Bw3 - 21 to 29 inches: sandy loam*

*C1 - 29 to 35 inches: stratified very gravelly coarse sand to loamy fine sand*

*C2 - 35 to 40 inches: stratified very gravelly coarse sand to loamy fine sand*

*C3 - 40 to 65 inches: stratified very gravelly coarse sand to loamy fine sand*

#### Properties and qualities

*Slope: 0 to 3 percent*

*Depth to restrictive feature: More than 80 inches*

*Natural drainage class: Moderately well drained*

*Runoff class: Very low*

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high  
(0.57 to 5.95 in/hr)*

*Depth to water table: About 18 to 30 inches*

*Frequency of flooding: Frequent*

*Frequency of ponding: None*

*Available water storage in profile: Low (about 5.5 inches)*

#### Interpretive groups

*Land capability classification (irrigated): None specified*

*Land capability classification (nonirrigated): 2w*

*Hydrologic Soil Group: B*

### Minor Components

#### Suncook

*Percent of map unit: 5 percent*

*Landform: Flood plains*

*Down-slope shape: Linear*

*Across-slope shape: Convex*

#### Occum

*Percent of map unit: 5 percent*

*Landform: Flood plains*

*Down-slope shape: Linear*

*Across-slope shape: Linear*

#### Lim

*Percent of map unit: 3 percent*

*Landform: Flood plains*

*Down-slope shape: Concave*

## Custom Soil Resource Report

*Across-slope shape:* Concave

### **Rippowam**

*Percent of map unit:* 3 percent

*Landform:* Flood plains

*Down-slope shape:* Linear

*Across-slope shape:* Concave

### **Saco**

*Percent of map unit:* 2 percent

*Landform:* Flood plains

*Down-slope shape:* Concave

*Across-slope shape:* Concave

### **Limerick**

*Percent of map unit:* 2 percent

*Landform:* Flood plains

*Down-slope shape:* Concave

*Across-slope shape:* Concave

## **103—Rippowam fine sandy loam**

### **Map Unit Setting**

*National map unit symbol:* 9ljp

*Elevation:* 0 to 1,200 feet

*Mean annual precipitation:* 43 to 54 inches

*Mean annual air temperature:* 45 to 55 degrees F

*Frost-free period:* 140 to 185 days

*Farmland classification:* Farmland of statewide importance

### **Map Unit Composition**

*Rippowam and similar soils:* 80 percent

*Minor components:* 20 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### **Description of Rippowam**

#### **Setting**

*Landform:* Flood plains

*Down-slope shape:* Linear

*Across-slope shape:* Concave

*Parent material:* Coarse-loamy alluvium

#### **Typical profile**

*A - 0 to 5 inches:* fine sandy loam

*Bg1 - 5 to 12 inches:* fine sandy loam

*Cg2 - 12 to 19 inches:* fine sandy loam

*Cg3 - 19 to 24 inches:* sandy loam

*Cg4 - 24 to 27 inches:* sandy loam

*Cg5 - 27 to 31 inches:* loamy sand

*Cg6 - 31 to 65 inches:* stratified very gravelly coarse sand to loamy fine sand

## Custom Soil Resource Report

### Properties and qualities

*Slope:* 0 to 3 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Poorly drained

*Runoff class:* Very low

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 5.95 in/hr)

*Depth to water table:* About 0 to 18 inches

*Frequency of flooding:* Frequent

*Frequency of ponding:* None

*Available water storage in profile:* Low (about 5.9 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 4w

*Hydrologic Soil Group:* B/D

### Minor Components

#### Suncook

*Percent of map unit:* 5 percent

*Landform:* Flood plains

*Down-slope shape:* Linear

*Across-slope shape:* Convex

#### Occum

*Percent of map unit:* 5 percent

*Landform:* Flood plains

*Down-slope shape:* Linear

*Across-slope shape:* Linear

#### Pootatuck

*Percent of map unit:* 3 percent

*Landform:* Flood plains

*Down-slope shape:* Linear

*Across-slope shape:* Concave

#### Lim

*Percent of map unit:* 3 percent

*Landform:* Flood plains

*Down-slope shape:* Concave

*Across-slope shape:* Concave

#### Saco

*Percent of map unit:* 2 percent

*Landform:* Flood plains

*Down-slope shape:* Concave

*Across-slope shape:* Concave

#### Limerick

*Percent of map unit:* 2 percent

*Landform:* Flood plains

*Down-slope shape:* Concave

*Across-slope shape:* Concave

# Custom Soil Resource Report



# References

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American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_054262](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262)

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053577](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577)

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053580](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580)

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2\\_053374](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374)

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

## Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053624](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624)

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_052290.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf)

# Exhibit 9



State Historic Preservation Office

One Constitution Plaza | Hartford, CT 06103 | 860.256.2800 | Cultureandtourism.org

PROJECT REVIEW COVER FORM

1. This information relates to a previously submitted project.

You do not need to complete the rest of the form if you have been previously issued a SHPO Project Number. Please attach information to this form and submit

SHPO Project Number (Not all previously submitted projects will have project numbers)

Project Address (Street Address and City or Town)

2. This is a new Project.

If you have checked this box, it is necessary to complete ALL entries on this form .

Project Name Shagbark Lumber Utility Scale PV Installation

Project Location 21 Mount Parnassus Road Include street number, street name, and or Route Number. If no street address exists give closest intersection.

City or Town East Haddam In addition to the village or hamlet name (if appropriate), the municipality must be included here.

County Middlesex County If the undertaking includes multiple addresses, please attach a list to this form.

Date of Construction (for existing structures)

PROJECT DESCRIPTION SUMMARY (include full description in attachment):

Installation of 16 Ground Mount Structures & 4 Carport

TYPE OF REVIEW REQUESTED

a. Does this undertaking involve funding or permit approval from a State or Federal Agency?

Yes No

Table with 4 columns: Agency Name/Contact, Type of Permit/Approval, State, Federal

b. Have you consulted the SHPO and UCONN Dodd Center files to determine the presence or absence of previously identified cultural resources within or adjacent to the project area?

Yes No

If yes: Was the project site wholly or partially located within an identified archeologically sensitive area?

Does the project site involve or is it substantially contiguous to a property listed or recommended for listing in the CT State or National Registers of Historic Places?

Does the project involve the rehabilitation, renovation, relocation, demolition or addition to any building or structure that is 50 years old or older?



State Historic Preservation Office

One Constitution Plaza | Hartford, CT 06103 | 860.256.2800 | Cultureandtourism.org

PROJECT REVIEW COVER FORM

The Historic Preservation Review Process in Connecticut Cultural Resource Review under the National Historic Preservation Act – Section 106 http://www.achp.gov/106summary.html involves providing technical guidance and professional advice on the potential impact of publicly funded, assisted, licensed or permitted projects on the state's historic, architectural and archaeological resources.

Project review is conducted in two stages. First, the SHPO assesses affected properties to determine whether or not they are listed or eligible for listing in the Connecticut State or National Registers of Historic Places. If so, it is deemed "historic" and worthy of protection and the second stage of review is undertaken. The project is reviewed to evaluate its impact on the properties significant materials and character.

ALL PROJECTS SUBMITTED FOR REVIEW MUST INCLUDE THE FOLLOWING MATERIALS\*:

PROJECT DESCRIPTION Please attach a full description of the work that will be undertaken as a result of this project. Portions of environmental statements or project applications may be included. The project boundary of the project should be clearly defined\*\*

PROJECT MAP This should include the precise location of the project – preferably a clear color image showing the nearest streets or roadways as well as all portions of the project. Tax maps, Sanborn maps and USGS quadrangle maps are all acceptable, but Bing and Google Earth are also accepted if the information provided is clear and well labeled. The project boundary should be clearly defined on the map and affected legal parcels should be identified.

PHOTOGRAPHS Clear, current images of the property should be submitted. Black and white photocopies will not be accepted. Include images of the areas where the proposed work will take place. May require: exterior elevations, detailed photos of elements to be repaired/replaced (windows, doors, porches, etc.) All photos should be clearly labeled.

Table with 4 columns: Requirement, Yes, N/A, Comments. Rows include: For Existing Structures (Property Card), For New Construction (Project plans or limits of construction, Historic District renderings, Soils Maps, Historic Maps), For non-building-related projects (Property Card, Soils Map, Historic Maps).

PROJECT CONTACT

Name NATALIE CASTRO Title PROJECT MANAGER
Firm/Agency PUREPOINT ENERGY, LLC
Address 28 KNIGHT STREET
City NORWALK State CONNECTICUT Zip 06851
Phone (203) 642-4105 Cell (203) 258-6426 Fax (203) 548-9045
Email NCASTRO@PUREPOINTENERGY.COM

\*Note that the SHPO's ability to complete a timely project review depends largely on the quality of the materials submitted.
\*\* Please be sure to include the project name and location on each page of your submission.

# Exhibit 10



Federal Aviation  
Administration

<< OE/AAA

**Project Submission Success**  
**Project Name: PUREP-000349470-15**

Project PUREP-000349470-15 has been submitted successfully to the FAA.

Your filing is assigned Aeronautical Study Number (ASN):

**2015-ANE-1949-OE**  
**2015-ANE-1950-OE**  
**2015-ANE-1951-OE**  
**2015-ANE-1952-OE**  
**2015-ANE-1953-OE**

Please refer to the assigned ASN on all future inquiries regarding this filing.

Please return to the system at a later date for status updates.

It is the responsibility of each e-filer to exercise due diligence to determine if coordination of the proposed construction or alteration is necessary with their state aviation department. Please use the link below to contact your state aviation department to determine their requirements:  
[State Aviation Contacts](#)

*To ensure e-mail notifications are delivered to your inbox please add [noreply@faa.gov](mailto:noreply@faa.gov) to your address book. Notifications sent from this address are system generated FAA e-mails and replies to this address will NOT be read or forwarded for review. Each system generated e-mail will contain specific FAA contact information in the text of the message.*

11/29/2015

Project Submission Success<br>Project Name: PUREP-000349470-15



# Exhibit 11

Application ID: 061515020

**Virtual Net Metering Service Agreement**

The Connecticut Light and Power Company doing business as Eversource Energy (the Company) has completed its review of the **Shagbark Lumber** Virtual Net Metering (VNM) Application, including any supplemental information provided to the Company, for the **1200 kW** distributed generation facility located at **21 Mount Parnassus Road, East Haddam, CT**. The Company hereby provides an agreement for commencement of participation by this facility in the Company's VNM program ("Agreement").

Your participation in the VNM program is contingent upon agreement with the information set forth in the attached **VNM Credit Cap Calculation** which identifies and details the expected operation of your VNM facility, and the excess kWh and rate applicable in determining the annual VNM credit cap for this facility. By signing this Agreement you agree to this cap, and to abide by all other provisions of the Company's VNM Rider in order to qualify for and receive VNM credits.

Please sign this Agreement, initial the attachments and return all documents to the Company. Upon review and acceptance of these documents the Company will counter sign and establish the date of acceptance into the VNM queue for the facility described herein, as stated below.

By [Signature] \_\_\_\_\_ *Customer Signature*  
Its [Signature] \_\_\_\_\_  
Date 9/22/15 \_\_\_\_\_

VNM Queue Acceptance Date: \_\_\_\_\_

By \_\_\_\_\_ *Company Signature*  
Its \_\_\_\_\_  
Date \_\_\_\_\_

Attachments