LODESTAR ENERGY

October 25, 2019

VIA HAND DELIVERY

Ms. Melanie Bachman
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: Interrogatory responses of LSE Delphinus LLC of Solar Photovoltaic Facility in Enfield, Connecticut – Petition No. 1380

Dear Ms. Bachman:

LSE Delphinius LLC is a subsidiary of Lodestar Energy LLC. We are filing interrogatory responses to a petition for declaratory ruling as described above.

An original and fifteen (15) copies of the petition are attached. We have also sent you a pdf of this letter and the Interrogatory responses.

If you have any questions concerning this transmittal, please contact either myself at 860-881-0777 or Carrie Ortolano at 860-539-5137.

Sincerely,

Jeffrey J. Macel

STATE OF CONNECTICUT SITING COUNCIL

PETITION OF LSE DELPHINUS LLC FOR A DECLARATORY RULING THAT NO CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED IS REQUIRED FOR THE CONSTRUCTION, OPERATION, AND MAINTENANCE OF A 1.992 MW AC SOLAR PHOTOVOLTAIC FACILITY IN ENFIELD, CONNECTICUT

PETITION NO. 1380

OCTOBER 25, 2019

LSE DELPHINUS LLC'S RESPONSES TO THE CONNECTICUT SITING COUNCIL'S FIRST SET OF INTERROGATORIES

The Petitioner, LSE Delphinus LLC ("Lodestar" or "Petitioner"), respectfully submits this response to the Connecticut Siting Council's First Set of Interrogatories in the above-referenced Petition. In response to the Siting Council's Interrogatories, Lodestar states as follows:

Project Development

1. ***Referring to the Petition p. 3, what is the length of the power purchase agreement for the LRECs purchased by Eversource? Has PURA approved the standard contract for the power purchase agreement?***

Petitioner's LREC Agreement with Eversource is for a standard term of fifteen (15) years. The LREC Agreement has received all required approvals, including from PURA.

2. ***Referring to the Petition p. 3, what alternating current megawatt output is under contract for use by both the Town of Enfield and the Town of East Windsor (Towns)? Is all of the power being produced by this facility being sold to the Towns? If not, where will the excess power be sold?***

Currently, Petitioner is in negotiations to sell 100% of the Project's 1.992 MW AC output to the Towns.

3. ***Is the alternating current megawatt capacity of the facility fixed at a certain amount per the PPAs? Is there an option within the PPAs to allow for changes in the total output of the facility based on unforeseen circumstances?***

The Project is built at 1.992 MW AC and is expected to produce 2.9 MW DC based on the inversion rates from AC to DC power. In Enfield's latitude and based on average weather patterns, 2.9 MW DC will produce approximately 3.4 million kWh in an average year. This 3.4 million kWh will fluctuate up and down based on the sunlight and weather each year. The current accounts scheduled to receive net metering credits use in excess of 3.6 million kWh per year. There is sufficient energy usage to purchase any output in excess of expectations. The

account holders will only pay for the credits they receive, so that if there is a reduction in net metering credits, they would only pay for the credits delivered.

4. ***If a battery unit is installed in the future, would the terms of the PPA be affected?***

There is no provision in the net metering credit agreements (PPA) for changes based on future batteries so the terms of the PPA would not be impacted.

5. ***If the PPAs expire and are not renewed and the solar facility has not reached the end of its lifespan, will the Petitioner decommission the facility or seek other revenue mechanisms for the power produced by the facility?***

Lodestar's Power Purchase Agreement (PPA) has a term of twenty years. At the end of the term of the PPA, Lodestar will solicit bids to extend the PPA for the useful life of the facility which is currently projected in excess of thirty (30) years. Lodestar reserves the right to sign new revenue contracts for the sale of power after the end of the current term of its current contract in conformity with C.G.S. §16-244u.

6. ***Could the Project being designed to serve as a microgrid?***

There is no current plan for this Project to serve as a microgrid. Petitioner's interconnection agreement with Eversource is not designed for islanding the power.

7. ***Would the Petitioner participate in the ISO-NE Forward Capacity Auction? If yes, which auction(s) and capacity commitment period(s)?***

There is no current plan to participate in the ISO-NE forward capacity auction with this Project but Petitioner reserves the right to participate.

Site Components

8. ***Is any wiring for the panels installed on the racking? If such wiring is external, are there any concerns regarding potential damage from weather exposure, vegetation maintenance, or animals?***

There are no concerns regarding potential damage from any perceived sSte uses, including exposure, Site maintenance or wildlife. DC wiring is to be installed on the racking directly below the modules. The racking system is designed to incorporate the wiring close to the modules with no loose conductors. According to National Electric Code, this circuitry must be comprised of a special conductor called USE-2 also known as "photovoltaic wire." USE-2 is specifically designed for this Project. Although the circuitry is mounted below the modules and not exposed to direct sunlight, USE-2 is comprised of a unique insulation that is resistant to UV exposure for extended periods. In addition, USE-2 wire is comprised of a thicker insulation jacket that shields the circuit from animal intrusion, chafing, etc. As a fail-safe for unanticipated events, each circuit is fuse-protected, which protects the circuit from thermal concerns and short circuits.

9. ***Petition p. 6 mentions ballast foundations for the perimeter fencing whereas the site plans show pier foundations. Please clarify.***

Petitioner will utilize pier foundations for the perimeter fencing and page 6 of the Petition should be updated to reflect this correction.

10. ***The Petition Site Plan includes a concrete pad for a potential future battery. At what time would the Petitioner determine if a battery is viable for this Project?***

There is no current plan for a battery installation because such technology is not currently provided for under the existing regulatory regime. In the event that regulatory environment changes, Lodestar may seek to install batteries at the Project and would obtain any required approvals.

Interconnection

11. ***Petition p. 6 describes transmission lines and a transmission line tap whereas p. 9 describes an interconnection to Eversource's distribution system. Please clarify.***

This is not a "transmission line" in the technical sense, and is simply an on-Site circuit. The transmission line referenced on p. 6 of the Petition is the line located on Site that will carry energy generated from the solar array to the Eversource distribution circuit located on Powder Hill Road. More specifically, the line will consist of a medium voltage circuit extending from the solar array vista switchgear to the customer riser pole. Eversource will perform a tap on their distribution circuit and construct a circuit from the tap to the customer riser pole.

12. ***What is the status of the Eversource interconnection agreement?***

Petitioner has completed the interconnection application process and executed an Interconnection Services Agreement (ISA) with Eversource. Pursuant to the terms of the ISA, payment has been made, and interconnection is scheduled in 2020.

13. ***What is the output (MW AC) at the point of interconnection?***

The output of the Project at the point of interconnection is designed to be 1.970 MW AC. This slight reduction in AC output from the inverter output of 1.992 MW is due to the additional losses incurred from the 2,000 kVA transformer and conductor line losses.

Energy Production

14. What is the efficiency of the solar panels?

Typically, the efficiency of a solar panel refers to the power output of the module relative to the irradiation power (incident radiation flux) exposed to the surface area of the module. All module output ratings are determined based on the output of the PV module when exposed to 1,000 watts/square meter under standard test conditions (25 degree C and 1 ATM). This Project is designed to include modules that feature an efficiency rating of 19.8%. The proposed solar panels are rated Tier 1 and incorporate industry leading efficiency.

15. Would the power output of the solar panels decline over time? If so, estimate the percent per year.

Yes, solar panels do incur degradation over time, and such degradation is *de minimus*. The expected degradation rate is 0.3% to 0.5% per year. The solar panel warranty guarantees power generation of 85% of original production in year twenty-five (25) of operation.

16. Is the Project designed to maximize annual energy production or peak load shaving?

The Project is designed to maximize annual energy production. Shade analysis, module orientation and placement has been analyzed in detail to optimize output given existing site conditions.

17. What is the Projected capacity factor (expressed as a percentage) for the proposed Project?

The projected capacity factor for the proposed Project is 21.9%.

18. Petition p. 6 states the owner of the property would continue gravel operations for one year after construction. Would dust from gravel operations affect the output of the site?

Petitioner anticipates that the "continued operations" will be a wrap-up of the property owner's activities on the Property and relocation of any equipment and materials to other properties owned by the property owner. Therefore, Petitioner does not anticipate any dust impacting the Project's output. Notwithstanding the foregoing, Petitioner's lease agreement with the property owner requires the owner to remediate any conditions at the site that reduce or negatively impact the Project's solar production. In the event dust is created and is impacting output, the property owner would be required to remove such dust from the solar arrays.

Public Safety

19. Would the Project comply with the National Electrical Code, the National Electrical Safety Code and applicable National Fire Protection Association codes and standards?

The Project will be constructed, operated and maintained in accordance with all applicable building and fire codes in effect at the time of approval including but not limited to the codes referenced herein.

20. Referring to Petition p. 21, what is the status of the FAA filing?

A copy of the FAA's determination of no hazard is attached hereto as **Exhibit 1**.

21. Referring to Petition Tab 4 (O&M Plan), where is the O&M Manager based?

The anticipated O&M manager is based out of Westborough, Massachusetts and has significant experience in operating, managing and maintaining solar projects such as the proposed Project.

22. With regard to emergency response:

a. Would the Petitioner conduct any outreach and/or training to local emergency responders regarding site design and the site shut-down procedures listed in the Petition O&M Plan?

Yes. The Petitioner will offer training to any local emergency responders once construction of the Project is complete but prior to energization.

b. How would site access be ensured for emergency responders?

Emergency responders will install a dedicated emergency lock on all access gates to the Project. Petitioner will provide emergency responders with the necessary keys/combinations to access the Site in the event of an emergency.

c. In the event of a brush or electrical fire, how would the Petitioner mitigate potential electric hazards that could be encountered by emergency response personnel?

In the event of a brush or electrical fire, the emergency shutdown procedure will be followed as outlined in Section E of **Exhibit 4** Operations and Maintenance Plan included in Petitioner's petition filing. Once this shutdown procedure has been executed, the site will be de-energized to mitigate potential electrical hazards for emergency personnel.

d. Could the entire facility be shut down and de-energized in the event of a fire? If so, how?

Yes, in the event of a fire, the entire site can be de-energized by following the emergency shutdown procedure as outlined in Section E of **Exhibit 4** Operations and Maintenance Plan.

Environmental

23. What is the Town of Enfield's Wetland setback/buffer area? What does the green color represent on the Town's Wetland map provided in Petition Tab 15?

The Town of Enfield has a one hundred (100) foot wetlands setback/bugger area. As noted in the Petition, no portion of the Project will be within the one hundred foot setback for the single isolated wetland on the Site.

24. Please provide the Wetland Report mentioned on Petition p. 15.

Please see the wetlands report attached hereto as **Exhibit 2**.

25. Referring to Petition p. 14, what is the status of the Petitioner's response to DEEP's Natural Diversity Database review letter dated September 5, 2019?

Lodestar has engaged All Points Technology ("APT") to complete a wildlife and habitat assessment of the Site to confirm that the Project will have no impact to the species listed in the NDDB response letter dated September 5, 2019. A copy of that report is attached hereto as **Exhibit 3**. As can be seen from **Exhibit 3**, with the recommended redesign of the access drive to simply relocate a portion of the existing access drive's apron, the Project will have no impact on any of the species noted as species potentially impacted by the Project in the NDDB response dated September 5, 2019. A copy of the revised Site Plans depicting the recommended access drive revisions is attached hereto as **Exhibit 4**.

26. Although the parcel is used as a gravel quarry, does the proposed site contain any Connecticut Prime Farmland Soils, as mapped by the Natural Resource Conservation Service? If so, provide the acreage of prime farmland soils within the solar field areas.

The attached **Exhibit 5** shows the proposed Site overlain on the NRCS Farmland Classification Map. As shown on the map, only the very northeastern corner of the site, approximately 0.33 acres, is located in an area identified as prime farmland (green color). However, this area does fall within the area that has been disturbed by gravel removal activities. Thus, the former Agawam Fine Sandy Loam (prime farmland) has likely been converted to Udorthents-Pits complex, gravelly (not prime farmland), since the initial classification. Therefore, the Petitioner believes that the proposed Project will have no impact on Connecticut Prime Farmland Soils.

27. Would the residential property across from the existing/former gravel operation access drive have direct views of the solar facility?

The residential property across from the access drive will achieve partial views of the Project in leaf-off conditions. The intent of the existing row of pines on the earth berm at the entrance is

to minimize this visual access as this vegetation matures and Petitioner proposes to not disturb this existing berm and row of pines in order to continue to visually shield the Site from this neighbor.

28. Petition p. 19 states evergreens would be installed near the access road to provide visual screening. Indicate the type of evergreens and their location on the site plan.

The Petition was meant to reference the existing evergreens that are planted on an existing berm near the access road, as shown in the aerial photograph below. Petitioner proposes to leave this berm and tree planting intact to continue to provide visual screening.

29. The Site Plan indicates that the Scantic River State Park abuts the site to the northeast. Would there be any visibility of the solar facility from park trails?

The Scantic River State Park consists of a series of unblazed walking paths. The main park walking path is located adjacent to the river, well away from the Site. The Site is not visible from the main walking path. There is, however, an unblazed walking path in the park that does run within 20-30 feet of the northern and eastern Site property boundaries where the Project is likely to be visible through the trees during leaf-off conditions.

30. Petition p. 19 states existing dense vegetation surrounds the Project site. Is most of this vegetation on surrounding properties?

The dense vegetation surrounding the Project exists both on the Project Site itself and the surrounding properties. Most of the existing vegetation is located on the abutting properties. The Petitioner proposes minimal trimming of existing vegetation to account for shading but otherwise proposes to maintain as much existing vegetation on the Site as possible.

31. Would site topography limit views of the facility from surrounding areas? Please explain.

Yes. The Project is proposed in the base of a former gravel pit operation. The topography remaining from the gravel operation consists of a partial bowl with slopes climbing up from the base of the pit to the north, east and west. The placement of the Project within this bowl will certainly assist in significantly limiting views of the Project from the surrounding areas. In addition, the topography beyond the northern, western, and portion of the eastern property boundaries drops away from the Site, which also helps to limit views of the Project from these areas. Similarly, the topography drops from the elevation of the facility down to Powder Hill Road along the access drive which reduces the visibility of the solar facility from Powder Hill Road

32. Petition p. 6 states the landowner would continue gravel operations at the site for one year after completion of site construction. Where on the parcel would the gravel operation occur? How would that area be accessed? Would additional site clearing be necessary for this gravel operations/access, and if so, would clearing increase the potential for site visibility?

Petitioner anticipates that the "continued operations" will be a wrap-up of the property owner's activities on the Property and relocation of any equipment and materials to other properties owned by the property owner. Any gravel operations will continue to the south of the Project. The area would be accessed using the same access drive as the Project. Additional clearing will not be required.

Facility Construction

33. How would the posts (that support the racking system) be driven into the ground? In the event that ledge is encountered, what methods would be utilized for installation? Will blasting be required to install any site infrastructure? If not, what methods would be used if bedrock is encountered?

The posts that support the racking system are driven into the ground using a GRT post driving machine. The Site has undergone and passed an applications test to ensure the proposed racking system and post driving method will be feasible for the given Site conditions. In the unlikely event ledge is encountered, the ledge will be compromised using chipping hammers and/or a small excavator. Blasting will not be required.

34. Petition p. 8 and Site Plan Sheet 4 mention grading- Is grading proposed for the site? If so, provide a final contour plan.

Please see revised Site Plans attached hereto as **Exhibit 4**. The prior gravel removal activities at the Site have created a relatively flat area suitable for the installation of the solar field without the need for re-grading. In addition, since Petitioner now plans to largely use the existing access drive, minimal grading will be required.

35. Petition Site Plan Sheet 5 mentions topsoil stock piles. Where would the stockpiles be located?

The plans call for the entire area to be receive topsoil and be seeded prior to the installation of solar facility components. Thus, any topsoil required to be imported to the Site is likely to be spread immediately upon delivery so that there will not be a need for stockpiles. However, if short term stockpiling is required, it will be located within the area of the proposed solar array.

36. Petition Site Plan Sheet 6 shows a Cement Truck Washout Area. Where would the washout area be located?

It is anticipated that the cement truck washout area will be located near the proposed concrete pads at the southwest corner of the Site in a location to be determined by the contractor that does not interfere with staging or construction activities.

37. Has the Petitioner discussed the Project with the DEEP Stormwater Division? If so, when? Does the Petitioner intend to submit an application for a General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities to DEEP? If so, at what time?

Petitioner, through its Site engineer, has reached out to the DEEP Stormwater Division to schedule a meeting to discuss the Project. Petitioner will submit its application for a General Permit after it incorporates any feedback from that meeting and will forward its approval and any conditions thereof to the Council upon receipt.

38. Petition p. 14 states the site would be seeded with a pollinator mix. Does this selected mix include shade tolerant species to allow for growth in areas shaded by the solar panels?

The revised Site Plans (attached hereto as **Exhibit 4**) have been revised to clarify the sequence for spreading topsoil and seed. Much of the Site will be reclaimed by spreading topsoil and seeding with a conservation seed mix prior to the Site control transferring to the Petitioner. Once the Petitioner begins work, the plans call for the installation and seeding of all remaining disturbed and bare soil areas with a companion seed mix containing ryegrass and fescues. This will establish a base vegetative cover to stabilize the entire area prior to the installation of the solar equipment. Upon completion of installation of the solar equipment and fencing, the area will be overseeded with a combination of a New England wildflower seed mix and a dixie reseeding crimson clover. The rye, fescue and crimson clover are shade tolerant; whereas the wildflower mix and clover both provide flowers for pollinators.

Facility Maintenance

39. The Petition O&M Plan mentions monitoring of vegetation outside of the solar field perimeter fence. What is the anticipated frequency of clearing in these areas and how would clearing be accomplished if stumps are to remain?

The proposed frequency of clearing of areas outside of the array is anticipated to be once every ten (10) years. In the event this is required, this will be accomplished using hand tools/chainsaws.

40. Would pesticides or herbicides be used at the site? If so, specify anticipated products and use.

Pesticides and herbicides will not be used at the Site by Petitioner.

41. Would there be periodic cleanings of the solar panels to remove dust that may accumulate from gravel operations, and if so, would chemicals be used?

Cleaning of the solar panels is not generally necessary given the frequent precipitation incurred in the Connecticut climate. There is no periodic cleaning plan and will be performed on an as-needed basis. In the event that cleaning is performed, no chemicals will be used.

Respectfully submitted,

Petitioner
LSE DELPHINUS LLC

By: _____
Jeffrey J. Macel, Manager
Carrie Larson Ortolano, Associate General Counsel
% Lodestar Energy LLC
40 Tower Lane, Suite 145
Avon, CT 06001

EXHIBIT 1
FAA DETERMINATION OF NO HAZARD

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2019-ANE-4582-OE

Issued Date: 10/07/2019

Lodestar
Kevin Midei
6 ridgebury Rd
Avon, CT 06001

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel Powder Hill
Location:	Enfield, CT
Latitude:	41-58-37.90N NAD 83
Longitude:	72-32-21.20W
Heights:	157 feet site elevation (SE)
	10 feet above ground level (AGL)
	167 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 L Change 2.

This determination expires on 04/07/2021 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2019-ANE-4582-OE.

Signature Control No: 415334287-419046390 (DNE)
David Maddox
Specialist

Attachment(s)
Case Description
Map(s)

2 MW Solar Array

Sectional Map for ASN 2019-ANE-4582-OE

EXHIBIT 2
WETLANDS REPORT

Richard Zulick R.S, S.S.

Consulting Soil Science

400 Nott Highway
Ashford, CT 06278
(860) 429-1918

September 10, 2019

RE: Connecticut Siting Council Petition for Declaratory Ruling #1380, LSE Delphinsus, LLC for project located on Powder Hill Road, Enfield, CT

To Whom /t May Concern:

The wetlands shown on this plan (attached hereto as Exhibit 1) were field delineated by me in accordance with the standards of the standards of the National Cooperative Soil Survey and the definition of wetlands as found in the Connecticut General Statutes, Chapter 440, Section 22A-38.

This delineation is not intended to be used for soil mapping but to identify the wetland soils relative to the development and management of this parcel. The wetland boundaries have been marked with florescent pink and blue flagging. The flags are numbered WB1 to W10.

The entire area of proposed development has been disturbed through its long history as an active gravel bank. The soils are classified as Udorthents. This map unit consists of nearly level and gently sloping areas where the original soils have been cut away or covered with a loamy fill material. Most areas have been graded to a smooth surface.

Where the original soil has been cut away, Udorthents, loamy, typically consist of the exposed substrata of Boxford, Charlton, Newport, Paxton, Pittstown, or Woodridge soils. In areas that have been filled they consist of several soils or of one soil removed from an offsite cut. These areas have a loamy texture, dominantly fine sandy loam. The soils in these areas are slightly darker in the uppermost 6 to 10 inches than in the underlying material, and they resemble topsoil. In many areas the fill is compact and firm when dry. Most of these areas are covered with grass vegetation.

Wetland

The small identified wetland area demonstrates a hydric regime resulting from the break out associated with both the up gradient cut and overland flow from the gravel operation to the north.

The wetland area was inspected to determine wetland functions and values utilizing the Army Corps. of Engineers methodology as outlined in "The Highway Methodology Workbook Supplement". The wetland exhibited the following wetland functions and values with the corresponding rationale:

Ground water recharge and discharge: ***potential for and public or private wells occur downstream of the wetland, wetland is underlain by permeable soils present in and adjacent to the wetland.***

Sediment/toxicant retention: ***potential sources of sediment exist in the watershed above the wetland, opportunity for sediment trapping by slow moving water exists. Opportunity for sediment trapping and sediment accumulation is present.***

No watercourses or vernal pools have been identified on this property.

It is my professional opinion that this proposal will result in no significant adverse impact to either the wetland or upland area.

Please feel free to contact me at the above number if additional services are required or if you have any questions regarding this delineation.

Thank You,

Richard Zulick R.S , Soil Scientist

N/F
State of Connecticut
Department of Energy &
Environmental Protection
165 Capitol Ave
Hartford, CT 06106
PID: 5318

N/F
Estate of Helen Batchelor et al
c/o Constance Bragg
1486 S. Branch Pky
Springfield, MA 01129
PID: 5630

N/F
Leland & Joanne Hawthorne
P.O. Box 325
Somers, CT 06071
PID: 11506

N/F
Noah Harkin
18 Powder Hill Rd
Enfield, CT 06082
PID: 15450

N/F
Jill Wolodko &
Paul Williams
133 Cottage Rd
Enfield, CT 06082
PID: 15177

N/F
Kyle E Chapin
19 Powder Hill Rd
Enfield, CT 06082
PID: 1548

N/F
Robert H. & Wesley Dietz
21 Powder Hill Rd
Enfield, CT 06082
PID: 15453

N/F
Jill Wolodko & Paul Williams

N/F
Connecticu Water Company
93 West Main St.
Clinton, CT 06413
PID: 15452

OLD ROAD
REMNANTS OF OLD ROAD
231.31'
440'
(Total)
257.31'
Subject Parcel
Area = 1,063,904 S.F.
(24.42± Acres)
EXIST. TREELINE, TYP.
FORMER GRAVEL PIT
RIPRAP
CHECKDAM, TYP.
EXIST. WETLAND
100' WETLAND
REGULATED AREA
IRON PIN FOUND
IRON PIN FOUND
4.0' EAST OF
PROPERTY LINE
GRANITE
MON. WITH
"H" HELD
CL&P
27652
36" PINE
36" PINE
24" OAK
18" CMP
STONE
DRAIN
DBL/18"
MPL
CL&P
13730
18"
MPL
JERSEY
BARRIER
RIPRAP
FL=103.0
DBL/18"
MPL
GATE
EX. CB
TF=103.4
15" HDPE
Powder Hill Road
25' FROM
EXIST. CENTER
OF ROAD HELD
BIT. DRIVE
18"
OAK
18"
PINE
12"
OAK
10"
OAK
36"
OAK
CL&P
26979
LP
MONUMENT
FOUND
CL&P
89026
GUIDERAIL
EX. CB
TF=99.2
CL&P
26981

LEGEND

	EXISTING UTILITY POLE
	PROPOSED UTILITY POLE
DH	PROPOSED OVERHEAD UTILITIES
UG	PROPOSED UNDERGROUND UTILITIES
	EXISTING CATCH BASIN
	EXISTING STORM SEWER
	EXISTING SIGN
	EXISTING IRON PIN (FOUND)
	EXISTING MONUMENT (FOUND)
135x5	EXISTING SPOT GRADE
135.5	PROPOSED SPOT GRADE
136	EXISTING CONTOUR
136	PROPOSED CONTOUR
	EXISTING TREELINE
	PROPOSED TREELINE
	PROPERTY LINE

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

Map Reference:

"Boundary Survey Prepared For Powder Hill Sand and Gravel, L.L.S.
Powder Hill Road, Enfield Connecticut 4-12-07 No. 2005-093"
By J.R. Russo & Associates

DEED REFERENCES:

Susan S. Starr Family L.P. to Powder Hill Sand and Gravel, L.L.C. Dated June 4, 1998 -Volume 1123 Page 225 ELR;

NOTES:

1. Parcel does not lie in area subject to inundation by 1% Annual Chance of Flood per Flood Insurance Rate Map Number 09002B0009C Map Revised June 17, 2002;
2. Parcel does not lie in Inland Wetlands;
3. Parcel lies in R-88 Zone;
4. Parcel lies in Level A Aquifer Protection Area;
5. Horizontal Datum is Connecticut Geodetic Survey NAD83 based on CTGS Monuments #1605 and #5594;
6. Vertical Datum is NGVD29 (Town Aerial Datum);

This survey and map has been prepared in accordance with Sections 20-300b-1 thru 20-300b-20 of the Regulations of Connecticut State Agencies - "Minimum Standards for Surveys and Maps in the State of Connecticut" as endorsed by the Connecticut Association of Land Surveyors, Inc. It is a Property Survey based on a Resurvey conforming to Horizontal Class A-2 & a Topographic Survey conforming to Class T-2.

This document and copies thereof are valid only if they bear the live signature and embossed seal of the designated professional. Unauthorized alterations render any declaration hereon null and void.

TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

RUSSO
SURVEYORS·ENGINEERS
SERVING CT & MA
J.R. Russo & Associates, LLC
1 Shoham Rd East Windsor, CT 06088 • CT 860.623.0969 • MA 413.785.1118
www.jrrusso.com • info@jrrusso.com

LODESTAR ENERGY

REVISIONS

BY: LF/RLS	CHK: JEU

Powder Hill Road Solar
Prepared For
LSE Delphinus LLC
Powder Hill Road
Enfield, CT
Map 084 Lot 0015 Zone: R88

Existing Conditions

DATE
9-10-19

SCALE
1"=60'

JOB NUMBER
2018-059

SHEET
2 of 6

S:\ACad\2018 Civil 3D\2018-059 Lodestar Powder Hill\Russo Drawings\2018-059.dwg

EXHIBIT 3
WILDLIFE AND HABITAT ASSESSMENT

Habitat Assessment Summary

To: Lodestar Energy
40 Tower Lane - Suite 145
Avon, CT 06001
Attn: Carrie Ortolano

Date: October 24, 2019

Re: Habitat Assessment
Proposed Solar Facility
22 Powder Hill Road
Enfield, Connecticut

Dear Ms. Ortolano:

This letter summarizes the results of a Habitat Assessment completed at the referenced property (or "Site") in response to the Connecticut Department of Energy and Environmental Protection ("CTDEEP") Natural Diversity Data Base ("NDDB") letter dated September 5, 2019 (NDDB Preliminary Assessment No.: 201908914).

Background

A ±10-acre portion of the ±24-acre Site is proposed for development of a solar facility ("Project Area"). A review of publicly-available CTDEEP NDDB mapping reveals that the Site is neither within nor in close proximity to a mapped polygon. The closest mapped NDDB area relative to the Site is ±0.5 mile away.

In its letter, the CTDEEP provided Lodestar with a list of State Listed Species known to occur within or close to the boundaries of this property. To prevent impacts to State-listed species, the DEEP recommended field surveys of the Site be performed by a qualified biologist. When Lodestar Energy was issued the letter, the time of year to conduct surveys for several of the target species had passed. As a result, All-Points Technology Corporation, P.C. ("APT") coordinated Site visits by qualified biologists and botanists familiar to CTDEEP and experienced with the target species. APT and its subconsultants evaluated the entire property, with specific focus on the Project Area, to determine the Site's suitability for hosting the target species.

The species identified by CTDEEP are included in Table 1. In addition to the species, two (2) terrestrial communities were also identified in the CTDEEP letter, including floodplain forest habitat and Sand Barren Critical Habitat.

Site visits were completed on October 15 and 20, 2019 to characterize the habitats on the property and, to the extent feasible, identify species and critical habitats indicated in the CTDEEP letter. The primary investigators at the Site included Eric Davison (wildlife biologist), Dennis Quinn (herpetologist) and Bill Moorhead (botanist).

Habitat Assessment Summary

No suitable habitat was identified within the Project area for the listed species, with one exception. There is suitable potential habitat for Hoary Plantain[1] along the southernmost entry road, which is now blocked off by a Jersey Barrier, where access to the solar facility was initially proposed. This unused sand/gravel surface supports a plant community very similar to that at other sites in the region where Hoary Plantain has been found. As a result, Lodestar Energy plans to relocate the entrance northward to avoid this area entirely. This shift will effectively clear the Project Area of any potential adverse impacts to listed species and habitat identified by the CTDEEP.

The results of the field investigation also determined that no floodplain forest habitat exists at the Site. Potential Sand Barren Critical Habitat was observed bordering the northern property boundary.

An Existing Habitat map depicting several of the resources discussed herein is included as an attachment to this report.

Based on the presence of suitable habitat for Wood and Eastern Box turtle on the periphery of the Site, we recommend protective measures be employed during construction, as discussed in Mr. Quinn's report.

Outside the proposed Project Area, potential habitat was found for on and extending off the Site for the remaining plant species. Two of these species (Sand Blackberry and Low Frostweed) are detectable at this time of year, so Mr. Moorhead was able to conduct a field survey during his Site visit and did not find them present. It is too late in the season to survey Hooker's Orchid However, this is a species that grows in rich woods; the only arguable potential habitat at the Site is the forested ravine at the south end of the parcel. All of these areas will be left undisturbed by the project development.

The results of Mr. Davison's avian survey indicate that the Site does not contain suitable vegetation (i.e., plant type or structure) and lacks adequate area (i.e., acreage) to support breeding populations of either Savannah sparrow or Vesper sparrow. Of the entire Site's +24 acres, only ±8 acres consist of "open" habitat that could potentially support grassland breeding (i.e., free of trees and material stockpiles). This is too small an area to support a breeding population of either of these grassland species. Additionally, the vegetation present within this open area is too sparsely vegetated to support nesting sites.

The individual inspection reports referenced herein are attached to this letter.

Four (4) aquatic species were included in the DEEP letter (Eastern pondmussel, Eastern pearlshell, Slimy sculpin and Bridle shiner). These species are likely associated with the nearby Scantic River, which is located approximately 570 feet northeast of the Site (at its nearest point). No watercourses or other suitable habitat[2] for these species exist on the Site. No discharge of stormwater to the Scantic River would occur as a result of the project development.

---

[1] Hoary Plantain is a spring ephemeral herbaceous species that cannot be effectively surveyed until about mid-May.

[2] A small isolated wetland is located in the southern portion of the Site; however, it has no connectivity to the Scantic River or other watercourses.

With respect to the four (4) beetle species, the Project Area does not appear to provide suitable habitat. Ground beetle can refer to any member of more than 40,000 insect species, they can be found in almost any terrestrial habitat on Earth. Ground beetles (in this case, *Geopinus incrassatus)* generally prefer to burrow in sand and often under logs partially buried in sand. Similarly, the vast majority of tiger beetle are also ground-dwellers with an affinity for sandy surfaces. Different species can be found along the seashore and in the sand dunes, in open expanses or paths in wooded forests, and upon clay banks in close proximity to lakes and rivers.

Due to timing limitations, it was not possible to directly survey the Site for the physical presence of tiger beetles. Generally, these species are inhabitants of blowouts, dry forest clearings, dunes and other upland, fine, sparsely vegetated (dry) sands (Knisley and Schultz 1997, Leonard and Bell 1999, Sikes 1999, Sikes et al. in prep.). Loose and shifting sparsely vegetated sandy soils are considered to provide optimal tiger beetle habitat.

The Project Area is a former sand and gravel lot and remains active today with material stockpiles and the routine use of heavy machinery. Fine-grained sands have historically been removed and the remaining subsoil consists of heavily compacted material unfavorable for burrowing insects.

As introduced above, a sand barren is located on the northern periphery of the Site. This area may possess suitable habitat for one or more of the beetle species; however, this area is well beyond the Project Area and will not be disturbed.

In response to Lodestar Energy's Petition submittal to the Connecticut Siting Council ("Council), the CTDEEP reviewed the solar project proposal, including conducting a field review on October 2, 2019. In its October 11, 2019 letter to the Council, CTDEEP confirmed that the Site itself is not a known NDDB area and characterized the property as a suitable location for solar development, specifically stating:

> "This location fits several criteria that DEEP has identified for solar production: re-use of a disturbed site, not located within a known Natural Diversity Database Area, no wetlands within the project footprint, minimal grading needed, and the manufactured topography of the site allows for no offsite drainage."

Further, the October 11th letter references the NDDB September letter and indicates that "Some of the species on the list could be found in the Scantic River, which is over 600 feet away from the site. The species list is not intended to be site specific, but species of concern have been noted in the Town of Enfield." The October review letter supports Lodestar Energy's Petition that the project would not adversely affect air or water quality of the State by concluding:

> "Due to the long-term use of this site as a sand and gravel operation, and the bowl-shaped topography created in the process, this site will not impact the wetland outside of the project or waterbodies offsite. Air quality is not a concern for this project."

Table 1 summarizes the listed species identified by CTDEEP and the Site's suitability to support them.

Table 1 – Listed Species

Scientific Name	Common Name	Habitat Suitability
Cicindela formosa generosa	Big sand tiger beetle	No suitable habitat within Project Area. Sand barren habitat along northern property boundary may provide habitat opportunities; this area will not be disturbed by Project.
Cicindela lepida	Dune ghost tiger beetle	
Cicindela tranquebarica	Dark-bellied tiger beetle	
Geopinus incrassatus	Ground beetle	
Ligumia nasuta	Eastern pondmussel	No suitable habitat on-Site.
Margaritifera	Eastern pearlshell	No suitable habitat on-Site.
Cottus cognatus	Slimy sculpin	No suitable habitat on-Site.
Notropis bifrenatus	Bridle shiner	No suitable habitat on-Site.
Passerculus sandwichensis	Savannah sparrow	No suitable habitat on-Site.
Pooecetes gramineus	Vesper sparrow	No suitable habitat on-Site.
Scaphiopus holbrookii	Eastern spadefoot	No suitable habitat on-Site.
Terrapene carolina	Eastern box turtle	Potential habitat on Site periphery; Protective measures proposed.
Glyptemys insculpta	Wood turtle	
Platanthera hookeri	Hooker's orchid	No suitable habitat within/proximate to Project Area.*
Helianthemum propinquum	Low frostweed	No suitable habitat within/proximate to Project Area.**
Rubus cuneifolius	Sand blackberry	No suitable habitat within/proximate to Project Area.**
Plantago virginica	Hoary plantain	No suitable habitat on-Site.***

Notes:
*A forested ravine at the south end of property may provide suitable habitat for this species.
** A field survey for these two species did not identify any specimens on-Site.
***The original proposed access did exhibit potential habitat for this species; it has since been relocated to an area devoid of suitable habitat.

Based on the results of this habitat assessment and supporting statements made in the CTDEEP October 11th letter, it is our opinion that no know listed species or critical habitat would be impacted by the proposed solar project.

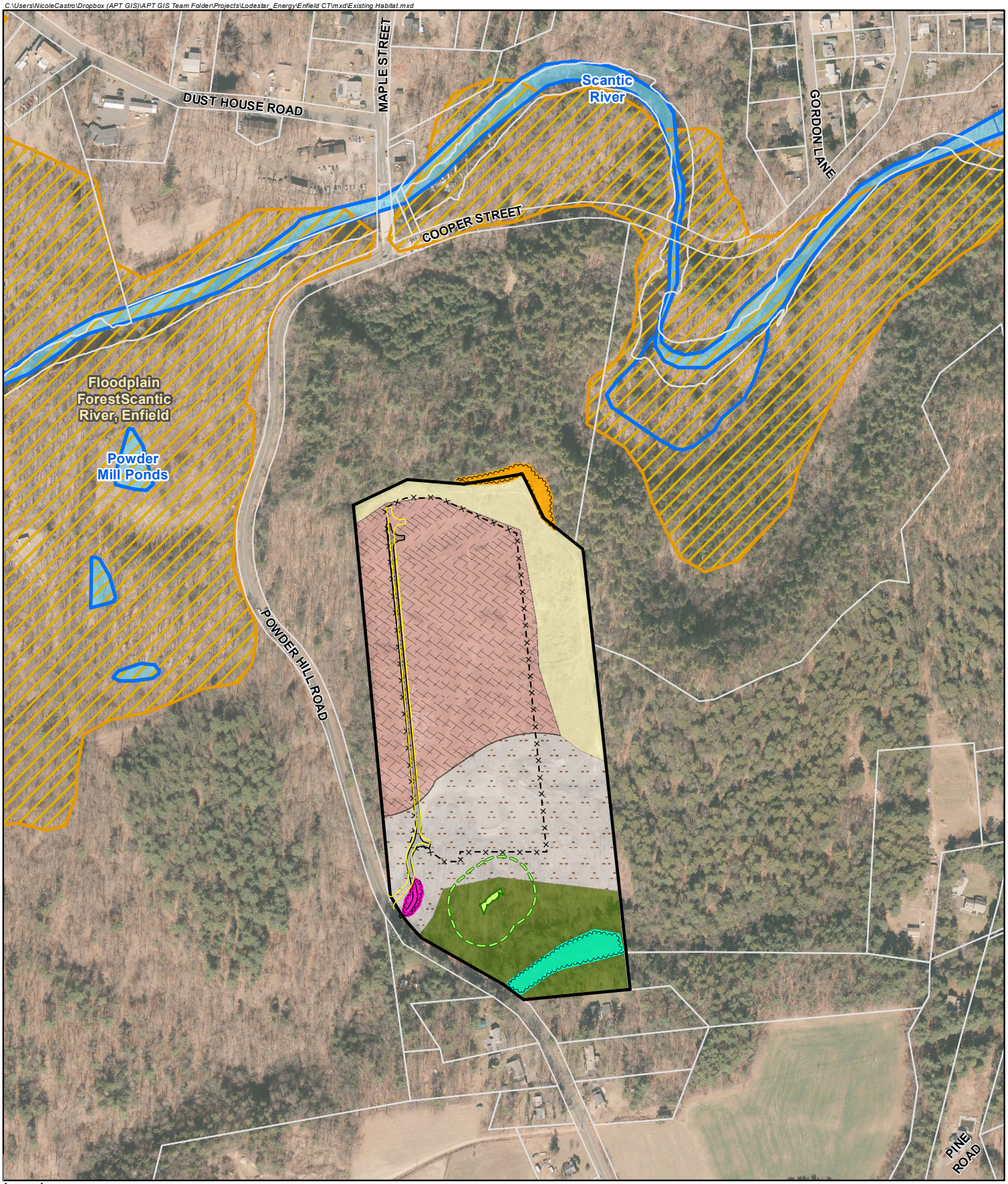
Sincerely,
ALL-POINTS TECHNOLOGY CORP., P.C.

Michael Libertine
Director of Siting and Permitting

Attachments

ATTACHMENTS

C:\Users\NicoleCastro\Dropbox (APT GIS)\APT GIS Team Folder\Projects\Lodestar_Energy\Enfield CT\mxd\Existing Habitat.mxd



Legend

- Subject Property
- Project Area / Perimeter Fence
- Access Drive
- Originally Proposed Access Road
- Wetland Boundary
- 100' Wetland Buffer
- Wetland Area
- Watercourse (CTDEEP)
- Open Water (CTDEEP)

Habitat Covery Type

- Disturbed/Recently Graded Area
- Old Field (mugwort and black locust)
- Stockpile Area
- White Pine-Dominated Woods
- Potential Habitat for sand barren
- Potential Habitat for hoary plantain
- Potential Habitat for hooker's orchid
- Critical Habitat (CTDEEP; July 2009)
- Approximate Parcel Boundary

N

400 200 0 400 Feet

Map Notes:
Base Map Source: CTECO 2016 Aerial Photograph
Map Scale: 1 inch = 400 feet
Map Date: October 2019

Existing Habitat Map

Solar Energy Facility
22 Powder Hill Road
Enfield, CT

LODESTAR ENERGY

ALL-POINTS TECHNOLOGY CORPORATION

William H. Moorhead III
Consulting Field Botanist
486 Torrington Road
Litchfield, Connecticut 06759
Phone and Fax: (860) 567-4920
Cell: (860 543-1786
Email: whmoorhead@optonline.net

October 22, 2019

Mr. Michael Libertine
All Points Technology Corporation
3 Saddlebrook Drive
Killingworth, CT 06419

Dear Mr. Libertine,

I am writing to report the results of my assessment of the suitability of habitats for State-listed rare plants at the site of the proposed Powder Hill Road Solar on Powder Hill Road, Enfield, Connecticut. I am also writing able to provide of results of a partial survey for some of the rare plants.

I am a consulting field botanist with 30 years of experience conducting surveys for rare plants and plant communities in the Northeast, the bulk of that time working in Connecticut. Based on our telephone conversations ca. Oct 15, it was my understanding that I should conduct a reconnaissance of the entire 25± site, with special attention to the proposed construction areas, to determine if there was potential habitat for the following 4 State-listed plants for which survey was recommended by CTDEEP-NDDB in their letter dated Sept 5, 2019:

Scientific Name	Common Name	State-listing Status
Platanthera hookeri	Hooker's Orchid	Special Concern (Historic)
Helianthemum[sic] *propinquum*[1]	Low Frostweed	Special Concern
Rubus cuneifolius	Sand Blackberry	Special Concern
Plantago virginica	Hoary Plantain	Special Concern

If I determined that there existed suitable habitat for any of these species within the area of proposed construction, and definitive survey could not be conducted at this time of year, I understood that I was to provide comments and recommendations regarding when best to survey.

I completed my site reconnaissance, and conducted limited actual survey for two of the above-listed species, on Oct. 20, 2019.

EXECUTIVE SUMMARY OF RESULTS.

There is no potential habitat, in my opinion, for any of the 4 State-listed plants within the any of the proposed construction areas, except under the footprint of a portion of the proposed new entrance road to the site. There is suitable potential habitat for Hoary Plantain in the southern of the 2 existing entry roads to the site, which is now blocked off by a Jersey Barrier. This unused sand/gravel surface supports a plant community very similar to that at sites where Hoary Plantain has been found. Hoary Plantain is a spring ephemeral herbaceous species that cannot be effectively surveyed for until about mid-May. Outside of the proposed construction areas, I judged that there was potential habitat for Hoary Plantain, Sand Blackberry, and Low Frostweed in different places on the slopes that rise from the basin to the parcel boundaries. In areas that had not been recently bush-hogged, I was able to conduct actual survey for Sand Blackberry and Low Frostweed, which are detectable at this time of year, and did not find them. I could not effectively survey the recently bush-hogged areas, and some parts of these areas appeared

[1] This species is found in the current Endangered Species Regulations listed by the scientific name *Crocanthemum propinquum*

to have the appropriate soil characteristics (i.e., sandier, drier) to be potentially suitable for Sand Blackberry. The only clearly suitable habitat for Low Frostweed is a small Sand Barren with some floristic integrity at the northeast corner of the parcel (which had not been recently bush-hogged), but there are a few other areas of sandier soil on the east side of the parcel, outside of the construction area, that might support this species. Regarding Hooker's Orchid, for which it is too late to survey this year, it is a species of rich woods; the only arguable potential habitat at the site is the forested ravine at the south end of the parcel. This area is outside of the proposed disturbance associated with this project.

EXISTING HABITAT CONDITIONS IN THE PROPOSED CONSTRUCTION AREAS AS THEY RELATE TO SUITABILITY OF HABITAT FOR STATE-LISTED PLANTS.

In this section, I assess the existing habitat conditions I observed at the site during my site visit on Oct. 20, 2019, as they relate to suitability of habitat for state-listed plants.

Northern Portion of Proposed Solar Array Area.

On Oct. 20, 2019, the northern part (~half) of the proposed solar array area, which was

Figure 1. Northern ~half of the Solar array area, looking ~NNW. Pink-flagged stake at about center of photo, near water' edge, marks point along western border of solar array area.

marked in the field with flagged stakes, was in large part a flooded depression. This flooding was presumably due to the combination of the heavy rain ~3 days before[2] and low infiltration rate of the substrate, due in turn to some combination of high compaction and textural class. Large portions of the area that were not flooded were unvegetated, due apparently to recent heavy equipment traffic and/or grading. Green areas on the opposite sides of the flooded area had a thin cover of rye grass (*Lolium* sp.) and clover (*Trifolium repens*), doubtless planted, mixed with annual weeds. All of the soil material that I observed in these non-flooded areas had a large enough component of fines (silt and/or clay) that it would be classified as sandy loam and/or loamy sand.

Regarding the question of suitability of the proposed solar array area as habitat for Sand Blackberry, Hoary Plantain, and Low Frostweed, if the area were suddenly left as it is indefinitely, all 3 are upland species that are intolerant of prolonged flooding, so the portion of the area that floods for days or more at a time is unsuitable for all 3 species based on hydrology. All 3 species typically occur only on dry or xeric sites with excessively drained soils. Low Frostweed occurs only in Sand Barrens or Sand-Barren-like habitat on sandy or gravelly sandy soils with virtually no fines. Sand Blackberry occurs on both sandy soils and loamier soils, but on the latter only when dry or xeric due to shallow depth to bedrock. Hoary Plantain is similar, but has also been observed growing out of gravel banks and on rock outcrops. Based on the evident loamy textural class of the soil/substrate in the non-flooding parts of the proposed solar array area, it would not have a dry enough moisture regime to be suitable habitat for any of these 3 species. All of these are low species intolerant of shade and competition from plants that grow tall and dense on mesic soils.

Southern Portion of Proposed Solar Array Area.

The existing habitat in the southern half (approximately) of the proposed solar array area is a mosaic of heavily trafficked unvegetated mineral substrate in the "yard" of the existing facility, large piles of what appears to be topsoil, road demolition material, not-

[2] 24-hr rainfall totals of between 1.82" and 2.65" were recorded in the vicinity of the site between 7 AM Oct. 16 and 7 AM Oct 17, according to Community Collaborative Rain, Hail, and Snow Network observers (https://www.cocorahs.org/)

very-recently disturbed areas that support dense rank meadows dominated by the invasive Mugwort (*Artemisia vulgaris*) and a few other species, and some small areas of cool-season-grass-dominated habitat resembling an unkempt lawn. None of these areas are appropriate habitat for any of the 3 above-discussed State-listed species.

Proposed Access Road Area.

The proposed new site access road crosses a portion of an existing unpaved gravelly sand

Figure 2. Former closed off entry road. The potential Hoary Plantain habitat also includes the part of the entry road that is behind the photographer. Photo looking north.

entry road that is no longer used and is blocked off by a Jersey Barrier. This un-used road now supports a plant community, including many native plants, typical of the dry, sandy, gravelly sites from which Hoary Plantain has been documented, and therefore it is, in my opinion, suitable habitat for Hoary Plantain. Hoary Plantain is a spring ephemeral that cannot be surveyed for effectively at this time of year; mid-May through late-June is the best time to survey for it. This is also arguable suitable habitat for Sand Blackberry and Low Frostweed, which occasionally occur in gravelly sandy roads, but they are detectable at this time of year, and I did not observe them here on Oct. 20.

POTENTIAL STATE-LISTED PLANT HABITAT OUTSIDE THE CONSTRUCTION AREA.

Outside of the proposed construction areas, I judged that there was potential habitat for Hoary Plantain, Sand Blackberry, and Low Frostweed in different places on the slopes that rise from the basin to the parcel boundaries. In areas that had not been recently bush-hogged, I was able to conduct actual survey for Sand Blackberry, and Low Frostweed, which are detectable at this time of year, and did not find them. I could not effectively survey the recently bush-hogged areas, and some parts of these areas appeared to have the appropriate soil characteristics (i.e., sandier, drier) to be potentially suitable for Sand Blackberry. The only clearly suitable habitat for Low Frostweed is a small Sand Barren with some floristic integrity at the northeast corner of the parcel (which had not been recently bush-hogged), but there are a few other areas of sandier soil on the east side of the parcel that a surveyor for this species should check, to err on the side of caution. Regarding Hooker's Orchid, for which it is too late to survey this year, it is a species of rich woods; the only arguable potential habitat at the site is the forested ravine at the south end of the parcel.

Sincerely,

William H. Moorhead III, Consulting Field Botanist

Attachments:

Moorhead Curriculum Vitae

Curriculum Vitae

William H. Moorhead III

486 Torrington Road
Litchfield, Connecticut 06759
(860) 567-4920
whmoorhead@optonline.net

TECHNICAL EXPERTISE

- Inventory of Rare/Threatened/Endangered plants, natural communities, and Critical Habitats
- Mapping of vegetation, plant/natural communities using both traditional and modern tools and techniques (including various remote sensing coverages and GIS softwares)
- Identification and inventory of urban street trees
- Classification and mapping of vegetation, plant and natural communities, and Critical Habitats in the northeastern U.S.
- Various methods for sampling vegetation (e.g., relevé method) and plant populations, for purposes of description and monitoring over time
- Restoration, management, and monitoring of rare plant populations and plant/natural communities
- Interpretation and ground-truthing aerial photographic imagery and other remote sensing coverages
- Delineation of Tidal Wetlands in Connecticut
- Federal Jurisdictional ("Army Corps") Wetlands delineation
- Sampling, identification, and analysis of freshwater aquatic macro-invertebrate communities for water quality evaluation
- Lecturer and instructor in native and invasive plant identification, rare plant and plant/community inventory, ecology and management, and wetland delineation, at secondary school, college undergraduate, graduate school, and adult professional levels
- Wetland restoration and mitigation planning, implementation, and monitoring
- Review and technical critique of wetlands permit and other environmental applications
- Review of conservation & management plans, technical journal articles, books relating to rare plant conservation, identification and ecology
- Invasive plant control and eradication in rare plant/natural communities and Critical Habitats
- Sampling and an identification of stream macro-invertebrates for water quality assessments

PROFESSIONAL EXPERIENCE

Twenty-nine years conducting rare plant surveys (more than 900 new occurrences of State-listed rare plants documented, 31 State-Historic plants rediscovered, in CT, MA, NY, MD, and VA) and natural community inventories, vegetation sampling, analysis, and classification. Twenty years using ESRI and other GIS software and GPS equipment to map natural communities, vegetation, and rare plant occurrences. Four cumulative years conducting freshwater macro-invertebrate/water quality investigations. Two cumulative years experience conducting Federal Jurisdictional Wetlands delineation. Ca. 2.5 cumulative years experience in

delineation of State of Connecticut jurisdictional tidal wetlands and lands below high tide line, and general regulatory experience.

EMPLOYMENT

1996-present **Self-employed Consulting Field Botanist/Plant Community Ecologist:** rare plant and natural community, Critical Habitat survey and inventory; classification and mapping of ecological communities and Critical Habitats; Federal and State tidal wetland delineation; technical support of environmental permit applications; technical support of oppositions to environmental permit applications.

MAJOR PROJECTS:

- From 1996-2005, contract inventory botanist/ecologist for the Connecticut Natural Diversity Data Base, Connecticut Department of Environmental Protection. Scope of work included:
  - Survey for and documentation of State-listed vascular plants. Highlights of this work: rediscovery of 19 State-Historic taxa; ~390 new populations and unmapped historic sites discovered/rediscovered; first state records for 2 native species; and first state records for several non-native species.
  - Vegetation reconnaissance and collection of relevé data from plant communities of special conservation significance; data used in development of state and national vegetation classifications.
  - Rare plant inventory, classification and digital (GIS) mapping of the vegetation of four CT Natural Area Preserves (NAP), totaling 3,476 acres cumulatively: Canaan Mountain NAP, Kitchel NAP, Pachaug Great Meadows and Mount Misery NAPs, and Matianuck NAP.
  - Assistance with environmental review, periodic reevaluation of state ranks and legal status of species in state, training of interns, coordination with The Nature Conservancy and other NGOs.
- From 2004 to present, instructor of 1- and 2-day workshops on identification of more challenging plant groups, including genus *Carex*, cool- and warm-season grasses, grass-like plants, and willows. Also have regularly taught workshops in distinguishing invasive plants from native look-a-likes in winter and summer.
- From 2017 to present, conducting a total floristic inventory and inventory and mapping of Critical Habitats and rare plants of The Preserve, a 1000-acre natural area in Old Saybrook, CT.
- From 2012 through 2015, conducted an inventory and mapping of Critical Habitats and rare plants of the 41 in-fee parcels (2500± ac, cumulatively) of the Steep Rock Association preserve system, in Washington, CT.
- In 2012 and 2013, as subcontractor to Fitzgerald Halliday, Inc., conducted inventory of rare plants and critical habitats at the 680-ac Sikorsky Memorial Airport in Stratford, CT. Occurrences of 4 State-listed plants documented, 3 of these previously unknown at the airport. Also delineated state Tidal Wetlands in a portion of the study area.
- Contract botanical survey for MA NHESP in June, 2010, to relocate/update status of not-recently-observed State-listed plant populations in Berkshire County, in support of BIOMAPS 2 critical habitat mapping project. Twenty-seven State-listed plant occurrences documented.
- Contract botanical survey for MA NHESP in 2009, for globally rare sedge *Eleocharis diandra*, along Connecticut River in MA. Eight *Eleocharis diandra* occurrences documented and *Eleocharis ovata* documented for the first time (3 occurrences) on the CT River. Twenty-one populations of other State-listed plants documented. New occurrences of State-listed plants totaling ~2 1.

- Contract botanical survey for MA NHESP, 2008-2009, surveying for State-listed plants within 500-m-radius of Housatonic River from Pittsfield to Sheffield, MA. Approx. 138 new State-listed plant populations documented, including rediscovery of 1 State-Historic species and 1 Berkshire County-Historic species, 19 previously known populations relocated & updated.
- Principal Investigator in 2006-2009 research project, funded by the Long Island Sound License Plate Fund, describing and mapping the complex mosaic of plant communities in a 330-acre brackish tidal wetland system on the lower Connecticut River, involving collection and analysis of 950 stratified random floristic plots.
- From 2004 to 2006, research and preparation of the Eightmile River Watershed Biodiversity Report, commissioned by the National Park Service and the Eightmile River Wild & Scenic Study Committee, summarizing existing information on plant, animal, and natural community diversity in the watershed.
- Co-investigator in 2005-2007 rare plant and natural community survey for private landowner of 600+ ac in Alford and West Stockbridge, MA; 5 new State-listed and 3 Watch-list species documented.
- In 2005, as subcontractor to The Maguire Group (consultant to CONN-DOT), classified and described vegetation and natural communities, and performed avian point counts along 15 avian survey transects (14 cumulative miles) in the proposed Rte. 11 corridor in Salem, East Lyme, Montville, and Waterford, CT; ancillary to main tasks, new occurrences of 1 Federally-Threatened and 4 State-listed plants were documented.
- Co-investigator in 2004 survey to rediscover a State-historic plant in Greenfield, Massachusetts, funded by a Massachusetts Natural Heritage and Endangered Species Program's Small Research Grant; occurrences of 5 State-listed and 4 Watch-list species documented.
- In 2003 and 2004, botanical consultant to Northwest Conservation District and King's Mark Environmental Review Team, in review of large proposed golf course-subdivision project in Norfolk, CT; 5 new State-rare species occurrences documented.
- Survey, 2003-2006, of the 62-mi^2 Eightmile River watershed in Middlesex and New London Counties, CT, for rare plants and significant natural communities, commissioned by the National Park Service and the Eightmile River Wild & Scenic Study Committee; 35 new rare species occurrences (more than doubling number of know extant occurrences) and 101 priority natural community occurrences were documented; results delivered as digital GIS product.
- Farmington River Watershed Association's 2002 Farmington River Biodiversity Project: 7-month inventory of rare plants and priority natural communities in 7-town (214 mi^2) study area in the lower Farmington River watershed; approx. 100 new rare species populations documented, tripling number of known extant occurrences, and 160 priority natural community occurrences documented.
- Inventory, 2000-2007, of nine parcels in western Connecticut ranging from 60 to 400 acres, in technical support of applications for State Open Space Acquisition Grants by local and national land preservation groups, including Trust For Public Land, Roxbury Land Trust, Sharon Land Trust, Cornwall Land Trust, and Southbury Land Trust. Eighteen new occurrences of State-listed plants documented.

5/2011-2012 **Botanical Data Specialist: employed full-time by New England Wildflower Society (NEWFS), Framingham, MA.** Researched and assembled plant character data for input into the data base that

supports the random access plant identification key at NEWFS' "Go Botany" web site. Also conducted quality control of data entered by other less experienced data specialists.

2008-2009 **GIS Mapper of "Critical Habitats": part-time employee of University of Connecticut Dept. of Ecology & Evolutionary Biology**, I created a digital GIS coverage of several types of "Critical Habitats", which are natural communities identified in Metzler & Wagner's 1998 document "Thirteen of Connecticut's Most Imperiled Ecosystems". I used a synthesis of interpretation of remote sensing imagery, Connecticut Natural Diversity Data Base data, and data from past and current field surveys of my own and others. I was responsible for creating or editing more than 2000 Critical Habitat polygons and populating associated attribute data base, which are now part of the "Critical Habitats" GIS coverage available at the CTDEEP and CT ECO websites.

2005-present **Botanist: Casual employee of Parsons Transportation Group.** Types of work have included survey for and documentation of rare plants, classification and mapping of natural communities, vegetation component of Federal Jurisdictional Wetland delineation, and sampling of vegetation monitoring plots in mitigation wetlands, inventories of urban street trees. Geographic areas in which I have worked: CT, MA, MD, NYC boroughs, and VA. Major projects:

- In 2015, member of teams delineating Federal Jurisdictional Wetlands delineations along route of proposed AMTRAK high-speed rail service between Richmond and Washington, DC. My responsibilities included vegetation sampling, assessment of habitat potential for Federally-listed plants, rare plant documentation, and stream habitat quality assessments.
- In 2015, conducted inventory of 1,100± street trees in a 50-square-block area of Long Island City (a part of Queens), NY. I was responsible for identifying, measuring, mapping, and assessing the condition of each tree (also conducted similar but smaller scale street tree inventories in Brooklyn, Queens, and The Bronx in 2012 and 2013).
- In 2010 and 2011, in Maryland, part of team delineating Federal Jurisdictional Wetlands along existing AMTRAK rail line between BWI Airport and downtown Baltimore. Also assisted Straughan Environmental staff in conducting survey for and documentation of rare plants.
- From 2010 to 2014, collected yearly total floristic data from vegetation monitoring plots in three CT DOT mitigation wetlands in Bristol and Wilton, CT.
- In 2007, conducted survey in Richmondtown, Staten Island, NY, for State-listed rare E/T/SC plants and rare/uncommon natural communities, in support of NY-DOT roadway improvement project.
- In 2006, conducted an inventory of State-listed endangered plants and significant natural communities, and classified and mapped vegetation of 500-ac Groton-New London Airport; 9 new State-listed species documented on property (follow-up re-survey and monitoring of mitigation conducted in 2013 and 2014).

1994-1996 **Ecologist: Virginia's Natural Heritage Program (VA Department of Conservation and Recreation, Division of Natural Heritage)**:
Key responsibilities:

- Together with the Division's other two ecologists, development of vegetation classifications of study areas in Virginia's mountain provinces and in the southeastern coastal plain, via the collection and analysis of relevé data using the Braun-Blanquet tabular comparison approach. Project leader responsibility for:
  - an intensive vegetation survey of a 9,900-ac study area in the George Washington National Forest in the Ridge and Valley Province. Tasks included collection and analysis of 50+

relevés, classification and mapping of the vegetation at the Land Type Phase level, and production of accompanying report for U.S.D.A. Forest Service contract
    - Nature Conservancy contract calling for collection/assemblage of relevés from Virginia's pitch pine-scrub oak woodland and related vegetation. Tasks included collection of new relevés, a Braun-Blanquet analysis and classification of these and existing relevés, and production of a report.
- Analysis of relevé data and other community data to advance Virginia state vegetation classification.
- Inventory for and collection of relevés and other documentation from Virginia's globally rare, state-rare, and exemplary natural communities, both in fulfillment of contracts with the Jefferson National Forest, Dept. of Defense, and NASA, and *de novo* inventory.
- Technical assistance, including advice and collection of relevé data, to natural area preserve stewardship section in development of resource management plans
- Technical assistance, including project review, to the environmental review section.

6-12/1993 **Independent Consulting Field Ecologist, doing business as Western Highlands Consulting, Woodbury, Connecticut.**
Key Projects:

- Contract work for CT-DEP-Natural Diversity Data Base: performing field surveys to locate and characterize occurrences of RTE plant species; collecting relevé data from Atlantic White Cedar swamp and calcareous fens for use in development of state and national vegetation classifications
- Sampling and identification of stream macro-invertebrates, using RBP III and other protocols, as subcontractor to several environmental consulting firms.
- Survey, characterization, and mapping of vegetation and habitats for several clients in support of land use permit applications, *e.g.* wetlands permit applications, Superfund clean-up plans.

1/1991-6/1993 **Environmental Analyst (Biological): Office of Long Island Sound Programs (OLISP), Connecticut Department of Environmental Protection.**
Key responsibilities:

- Investigation of violations of State Tidal Wetlands Act and Structures, Dredging, and Fill Statutes, using botanical/ecological expertise and aerial photo interpretive skills to determine jurisdictional boundaries, identify violations, determine degree of environmental harm and make recommendations to the Commissioner for appropriate site remediation requirements
- Negotiation of consent orders with violators of Tidal Wetlands and Structures & Dredging Acts
- Provided testimony at enforcement hearings and trials
- Documentation of State-listed species occurrences
- Technical assistance within my areas of expertise to OLISP Permitting and Coastal Programs sub-offices, other DEP bureaus and State agencies, municipalities, and private entities
- Coordination of the Long Island Sound Clean Water Account Research Fund
- Review and evaluation of site remediation and restoration plans
- Review and processing of applications for Structures & Dredging and Tidal Wetlands permits.

1983-1990 **Consulting Field Biologist/Ecologist, Stereo-photogrammetrist, and Seller of Maps, doing business as Western Highlands Consulting, Woodbury, Connecticut.** Field biology/ecology component less than ½ time until about 12/87, full-time thereafter. Representative projects. It was in this period

that I received from Dr. Karl Tolonen most of my initial training in field botany and ecology, and stream bio-monitoring techniques. Key projects and experience:

- Survey and mapping of occurrences of RTE plant species and critical habitats in and near the proposed right-of-way for the Iroquois Gas Transmission System Ltd. 24" natural gas pipeline: surveyed the entire CT portion and part of the NY portion, a total of approximately 700 acres and 55 linear miles. Also provided botanical support for the delineation of Federal Jurisdictional Wetlands. 3/90-6/91.
- Sampling, identification, and analysis of freshwater aquatic macro-invertebrate communities, using RBP III and other protocols, as subcontractor to The Ecological Consulting Services (EcoS, Dr. Karl Tolonen, principal).
- Performed multi-season bird and wildlife inventories, vegetation inventories and habitat/plant community maps, water quality assessments of streams, ponds, and lakes, delineation of Federal Jurisdictional Wetlands, delineation of watercourses, and site design evaluations, working as subcontractor to EcoS on a number of residential and commercial development projects seeking permits in Colchester, Fairfield, Marlborough, Glastonbury, Westport, West Hartford, East Lyme, Stamford, Cromwell, and Rocky Hill, Connecticut. 9/85-3/90.
- Produced an evaluation of construction-related sedimentation impacts and a wetland restoration plan for a 5-acre inland wetland on the site of the Mall at Buckland Hills, Manchester, CT, 8/89-8/90. Client: Fuss & O'Neill, Inc., Manchester, CT.
- Performed a biological/ecological inventory of a large seasonal pond, provided site design recommendations, and testified before the Glastonbury Conservation Commission on behalf of The Balf Co., Newington, CT, in support of their application for a town mining/excavation permit, 4/89-2/90. Client: Fuss & O'Neill, Inc.
- Planning and installation of a number of interpretive nature trails on Girl Scouts of America properties, 4/84-5/90.
- Provided technical support to a citizen's group opposing a proposed 19-lot subdivision in Brooklyn, CT, in the form of application review and testimony before the local zoning commission on biological issues, 11/89.

1984-1986 **Lab & Field Technician: Internship with CT Dept. of Environmental Protection (CTDEP), Water Compliance Unit.** I conducted a variety of data collection and data processing tasks in support of CTDEP's monitoring of physical, chemical, and biotic water quality parameters of streams and lakes in the state. Working under the supervision of and with training by former CTDEP chief macro-invertebrate taxonomist Guy Hoffman, I identified stream macro-invertebrate Surber samples. I entered and ran computer analyses on macro-invertebrate sample data. Collected stream and lake water samples for chemical and physical analyses, and measured chemical and physical parameters in the field with various types of equipment. Performed multiple data collection and analysis tasks during 24-hour stream modelling dye studies. Collected and prepared for chemical analysis fish and shellfish.

SPECIAL PROJECTS

Partner in research funded in part by The Nature Conservancy into changes in vegetation due to beaver activity at Beckley Bog, Norfolk, CT, 5/87-7/90.

From 2005 to present, in cooperation with Farmington river Watershed Association and the Town of Avon, CT, principal investigator and technical advisor in longitudinal experiment in non-chemical control of Japanese

Barberry (*Berberis thunbergii*), using volunteer labor, and restoration of native understory vegetation in a high floodplain forest ecosystem at Fisher Meadows Recreation Area, Avon, CT.

From 1993 to present, volunteer collection of seeds from rare plant populations for testing and banking by the New England Wildflower Society's conservation program.

From 2000 to 2017, participant in 9 Bioblitzes in Connecticut, Rhode Island, and Massachusetts as member of botanical inventory teams.

EDUCATION

1986 **B.S. Chemistry with concentration in Biology**, Charter Oak College, based on course work completed at Middlesex Community College, University of Connecticut, and Central Connecticut State University.

1983 **A.S. Environmental Science**, Middlesex Community College.

***Post-graduate course work*:**

2018 **Soil Fertility –** 3 credits, graduate level, UMASS CPE program. Instructor: Dr. Allen Barker.

2017 **Hydric Soils and Advanced Hydric Soils** – 2 credits, graduate level, UMASS CPE program. Instructor: Mickey Spokas.

2017 **Soil Microbiology** – 3 credits, graduate level, UMASS CPE program. Instructor: Dr. Stephen Simkins.

2016 **Soil Morphology and Mapping** – 3 credits, graduate level, UMASS CPE program. Instructor: Peter c. Fletcher.

2005 ***Isoetes* Identification –** 1.5-day identification and ecology workshop, Delta Institute of Natural History, Bowdoin, ME. Instructor: Carl Lewis.

2005 ***Dryopteris* and its Hybrids** – 1.5-day identification workshop, Delta Institute of Natural History, Bowdoin, ME. Instructor: James D. Montgomery.

2002 **Dragonflies and Damselflies of Southern New England** – 1-day workshop, Center for Conservation & Biodiversity, University of Connecticut. Instructors: Dave Wagner, Mike Thomas.

1996 ***Carex* section Ovales Identification Workshop** – 2-day identification and ecology workshop, University of Connecticut and Connecticut Museum of Natural History. Instructor: Dr. Anton Reznicek.

1996 ***Sphagnum* Identification Workshop** – 2-day identification and ecology workshop, University of Connecticut and Connecticut Museum of Natural History. Instructor: Dr. Anton Damman.

1995 **Prescribed Burn Crew Training Workshop** – 2 day workshop, certificate, Virginia Dept. of Conservation and Recreation, Division of Natural Heritage.

1993 **Field Methods in Ecology** (EEB 452) - graduate level, 2 credits, University of Connecticut. Instructor: Dr. Anton Damman.

1993 **Soils** (PLSC 250) - undergraduate level, 3 credits, University of Connecticut. Instructor: Harvey Luce.

1992 **Sedge Identification and Ecology** – 1-week identification and ecology workshop, certificate, Eagle Hill Wildlife Research Station, Steuben, ME. Instructor: Dr. Anton Reznicek.

1991 **Wetland Evaluation Technique (W.E.T. III)** – 32-hour training seminar, certificate, National Highway Institute, Federal Highway Administration.

1989 **Delineation of Federal Jurisdictional Wetlands** – 5-day training seminar, certificate, The National Wetland Science Training Cooperative.

1987 **Geomorphology** - graduate level, 3 credits, University of New Haven.

MAJOR PRESENTATIONS

2017 **"A Longitudinal Experiment in Volunteer-Powered Restoration of a *Berberis thunbergii*-Infested Floodplain Forest"** – An updated 20-minute illustrated talk presented at the Long Island Invasive Species Management Area's June 2017 Invasive Species Conference, Brentwood, NY.

2016 **"A Longitudinal Experiment in Volunteer-Powered Restoration of a *Berberis thunbergii*-Infested Floodplain Forest"** – A 20-minute illustrated talk presented at the CT Invasive Plant Working Group's Oct 2016 Invasive Plant Symposion, Storrs, CT.

1995 **"Old Growth Forests of Peters Mountain, Alleghany County, Virginia."** A 20-minute illustrated talk presented at the 73rd Annual Meeting of the Virginia Academy of Science, May 23-26, 1995, VA Military Institute, Lexington, VA.

REPRESENTATIVE TECHNICAL REPORTS

Moorhead, W.H. III. 2017. A Survey of Rare and Uncommon Plants Occurring on Steep Rock Association In-fee Preserves, with an Updated Inventory of Critical Habitats and other Significant Communities. Prepared for the Steep Rock Association, Washington, CT; 57 pp. plus appendices, including digital GIS products.

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Moorhead, W.H. III. 2015. An Inventory of Critical Habitats, Other Significant Natural Communities and Vegetation Types in Steep Rock Association In-Fee Preserves. Prepared for the Steep Rock Association, Washington, CT; 59 pp. plus appendices, including digital GIS products.

Moorhead, W.H. III. 2010. A Survey for Rare Plants at Aton Forest: Results of Moorhead Field Surveys 2005-2010. 31 pp. plus appendices, including digital GIS products.

Moorhead, W.H. III, C. Chadwick, S. Prisloe, J. Barrett, and N.E. Barrett. 2009. The Vegetation Mosaic of Ragged Rock Creek Tidal Marsh, Connecticut River, Old Saybrook, Connecticut. A final report to Department of Environmental Protection, State of Connecticut. A Long Island Sound License Plate Research Fund project. 39 pp. plus appendices, including digital GIS products.

Moorhead, W.H. III. 2006. Eightmile River Watershed Biodiversity Report. Prepared for the Eightmile River Wild and Scenic Study Committee. 138 pp. plus digital GIS product.

Moorhead, W.H. III. 2005. Pachaug Great Meadow Natural Area Preserve and Mount Misery Brook – Rhododendron Sanctuary Natural Area Preserve, Voluntown, New London County, Connecticut: A Survey of Rare Vascular Plant Species and Provisional Classification and Mapping of Vegetation and Natural Communities. 69 pp. plus appendices, including digital GIS products.

Moorhead, W.H. III. 2004. Final Summary Report of Eightmile River Watershed Rare Plant and Community Survey, 19 Jun – 27 Oct 2003. 19 pp. plus appendices, including digital GIS products.

Moorhead, W.H. III. 2004. Matianuck Sand Dunes Natural Area Preserve, Windsor, Hartford County, Connecticut: Provisional Classification and Mapping of Vegetation and Natural Communities. 23 pp. plus appendices, including digital GIS products.

Moorhead, W.H. III. 2003. Farmington River Watershed Association 2002 Biodiversity Project. Rare Plant and Natural Community Inventory. Summary Report. 22 pp. plus

Moorhead, W.H. III. 2001. Kitchel Natural Area Preserve, Litchfield County, Connecticut. A survey of rare vascular plant species and significant natural communities and provisional classification and mapping of vegetation and natural communities. 69 pp. plus appendices.

Moorhead, W.H. III. 2000. Canaan Mountain Natural Area Preserve, Litchfield County, Connecticut: a survey of rare vascular plant species and significant natural communities, and provisional mapping of vegetation and natural communities. Unpublished report submitted to the Connecticut Natural Diversity Data Base, Connecticut Dept. of Environmental Protection. 128 pp. plus appendices.

Fleming, G.P. and W.H. Moorhead III. 1998. Comparative wetlands ecology study of the Great Dismal Swamp, Northwest River, and North Landing River in Virginia. Natural Heritage Tech. Rep. 98-9, VA Dept. of Conservation and Recreation, Div. of Natural Heritage, Richmond. Unpublished report submitted to the U.S. EPA.
181 pp. plus appendices

Fleming, G.P. and W.H. Moorhead III. 2000. Plant communities and ecological land units of the Peters Mountain area, James River Ranger District, George Washington and Jefferson National Forests, Virginia. Natural Heritage Tech. Rep. 00-07, VA Dept. of VA Dept. of Conservation and Recreation, Div. of Natural Heritage, Richmond. Unpublished report submitted to the USDA Forest Service. 195 pp. plus appendices

Fleming, G.P. and W.H. Moorhead III. 1996. Ecological land units of the Laurel Fork area, Highland County, Virginia. Natural Heritage Tech. Rep. 96-08, VA Dept. of VA Dept. of Conservation and Recreation, Div. of Natural Heritage, Richmond. Unpublished report submitted to the USDA Forest Service. 114 pp. plus appendices

Belden, A. Jr. and W.H. Moorhead III. 1996. A Natural Heritage Inventory of the Clinch Ranger District III, George Washington and Jefferson National Forests, Virginia. Natural Heritage Tech. Rep. 96-10, VA Dept. of VA Dept. of Conservation and Recreation, Div. of Natural Heritage, Richmond. Unpublished report submitted to the USDA Forest Service. 106 pp. plus appendix.

Ludwig, J.C., W.H. Moorhead, and A. Belden. 1995. A Natural Heritage Inventory of the Clinch Ranger District II, George Washington and Jefferson National Forests. Natural Heritage Tech. Report 95-3. Virginia Dept. of Conservation and Recreation, Division of Natural Heritage. Unpuplished report submitted to the USDA Forest Service. 66 pp. plus appendices.

Hobson, C.S., D.J. Stevenson, and W.H. Moorhead. 1995. A Natural Heritage Inventory of the Polecat Creek Watershed, Caroline County, Virginia and Preliminary Results of a Mark-Recapture Study of *Elliptio complanata*. Natural Heritage Tech. Report 95-12. Virginia Dept. of Conservation and Recreation, Division of Natural Heritage. Unpuplished report submitted to the Chesapeake Bay Local Assistance Department. 60 pp. plus appendices.

REFEREED PUBLICATIONS

Moorhead W.H. III, B.A. Connolly, C.R. Mangels, and N.E. Barrett. 2017. Big Leaf Magnolia: A New Addition to the Flora of New England. Rhodora: Vol. 119, No. 980, pp. 349-354.

Moorhead, W. H. III and E. J. Farnsworth. 2004. *Floerkea proserpinacoides* Willd. (False mermaid-weed) Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, Massachusetts, USA. 76 pp.

Van Alstine, N.E., W.H. Moorhead III, Allen Belden, Jr., T.J. Rawinski, and J.C. Ludwig. 1996. Recently discovered populations of small whorled pogonia (*Isotria medeoloides*) in Virginia. Banisteria 7:3-10.

AFFILIATIONS

CTDEEP Endangered Species Advisory Committee for Plants, 2017 – present (committee member)
New England Plant Conservation Program (NEPCoP), CT Task Force, 1996 – present (member)
Flora Novae Angliae Advisory Committee, 2005 – 2011(committee member)
Flora Conservanda Update Committee, 2008 – 2012(committee member)
New England Botanical Club, 1999 – present (member).
Connecticut Botanical Society, 1990 – present (member)
North American Benthological Society, 1989 – 1993 (member).
Connecticut Invasive Plant Working Group, 2015 – present (steering committee member)
Early Detection and Distribution Mapping System (EDDMapS), 2017 – present (Lead verifier of invasive plant reports in CT)
Connecticut Association of Wetland Scientists (CAWS), 2015-present (associate member)

References and samples of previous work furnished upon request

Powder Hill Road Solar

Habitat Assessment : Eastern Spadefoot, Eastern Box Turtle and Wood Turtle

22 Powder Hill Road, Enfield Connecticut
NDDB Preliminary Determination No. 201908914
Prepared by: Dennis P. Quinn

Background:

Eastern Spadefoot:

The Eastern Spadefoot (*Scaphiopus holbrookii*), the only member of the spadefoot family (Scaphiopodidae) east of the Mississippi River, is among the rarest amphibians in the northeastern United States. It is listed as Endangered under Connecticut's Endangered Species Act and designated as Most Important in Connecticut's Wildlife Action Plan for Species of Greatest Conservation Need (CT DEEP 2015). New England populations are scattered and disjunct, and typically found in low elevation river valleys with sandy, well-drained soils. Some of these already localized populations have been extirpated, presumably related to urban/suburban development (Klemens 1993). These extirpations likely resulted from impacts to their breeding pools, which are often not afforded wetland protection status due to their highly ephemeral nature and difficulty in detecting breeding activity of spadefoots.

In the northern reaches of the Central Connecticut River Valley, spadefoots have been documented in the towns of Somers and Manchester. The record from Somers is known from a single individual observed in a swimming pool off Florida Road and the Manchester site is a known breeding population within a highly urbanized landscape, however breeding has not been documented at this location in recent years although the historic breeding pool is still present and maintaining a suitable hydrology for spadefoot reproduction. Although extensive surveys have been conducted in the northern Central Connecticut River Valley, no reconfirmation of historic sites have been made and no new extant populations of spadefoot have been documented. It is likely that spadefoots still occur within this region of the state, but continue to evade detection.

Eastern Box Turtle:

Eastern box turtles (*Terrapene c. carolina*) range throughout the eastern half of North America, reaching their north-eastern range limit in Connecticut where they favor low-lying regions of the State below 500 feet (Klemens et al. *in press*). Once abundant and widely distributed in Connecticut, the eastern box turtle is now listed as a species of Special Concern under Connecticut's Endangered Species Act and as Very Important in Connecticut's Wildlife Action Plan for Species of Greatest Conservation Need (CT DEEP 2015). Over the past few decades eastern box turtles have been experiencing a rapid decline throughout their range. These declines are often attributed to habitat destruction, fragmentation, degradation, alteration and over exploitation for the commercial pet trade (Klemens, 2000). These impacts are compounded by the box turtle's delayed sexual maturity (typically 15 years in CT), low reproductive potential (one clutch of approximately 6 eggs every one to two years), and high nest and

hatchling depredation rates. Doroff and Keith (1990) have reported that a population of box turtles could not maintain long-term viability with the loss of just a single adult per season.

Box turtles are the only fully terrestrial turtle species in Connecticut, using a mosaic of habitats seasonally. During the spring, box turtles prefer early and late successional habitats, but by late summer move into shadier and cooler upland forests. Hibernacula locations of adults are generally reported to occur within forests (Quinn 2008). Eastern box turtles are considered to be faithful to their home ranges from year to year, with some excursions beyond to look for mates or to nest (Dodd 2001). For terrestrial turtles, the size of the home range is inversely related to the quality of the home range as determined by food availability, protection, nesting sites, access to mates (Stickel, 1950), habitat structure (Dodd, 2001), and age (Schwartz and Swartz 1991). Average home-range sizes and distances moved have been calculated in two studies representing three box turtle populations in Connecticut (Quinn and Gruner, 2008 and Quinn, 2008). Based on the results of the fore mentioned box turtle studies (n = 38) had average home-ranges of 12.23 acres, ranging from 0.98 to 40.03 acres, with an average straight-line movement of 1,230.31 feet (maximum 3,444.90 feet) (Quinn et al., 2017 and Quinn, 2008).

Wood Turtle:

The core distribution of the wood turtle in Connecticut falls within the eastern and western uplands, where sustainable populations are associated with high quality rivers and streams and their associated riparian and upland habitats. Scattered populations of wood turtles occur at lower elevations along the coast and within the central Connecticut River valley. However, many of these sites have been significantly compromised by habitat loss and fragmentation in these urbanized regions of the state. These “urban populations” are often represented by observations of only a handful of older turtles with little evidence of juvenile recruitment. The wood turtle is listed as a species of Special Concern under Connecticut's Endangered Species Act and as Very Important in Connecticut's Wildlife Action Plan for Species of Greatest Conservation Need (CT DEEP 2015).

Due to their connection to riparian systems, coupled with the vulnerability of these systems to direct and indirect impacts at a watershed scale, the Connecticut Wood Turtle Conservation Map (CT-WTCM) was developed based on an analysis of data on the distribution of wood turtles in Connecticut presented in Klemens 1993, with a review of additional data collected during the period 1994-2017 in Klemens et al, *in prep.* Mapping of Scale Level Hydrography Lines were chosen to help guide conservation and management decisions focusing on “management zones” as recommended by the Northeast Wood Turtle Working Group in Status and Conservation of the Wood Turtle in the Northeastern United States (Jones et al., 2015). Within mapped areas, conservation and management decisions can be guided at a more local level by focusing on “management zones”. These include – (Zone 1)” Riverine (instream); (Zone 2):300 feet from the edges of the river primarily encompassing the floodplain habitat; and (Zone 3): 1,000 extending beyond the boundary of Zone 2 primarily encompassing upland habitats (Figure 3). For Scale Level Hydrography Lines 5 and 6, an additional conservation zone (Zone 4):100 feet from edge of river, was added to maintain water quality of these feeder streams.

Results:

On October 15th 2019, a site visit was conducted to determine if any suitable habitat for the eastern spadefoot, eastern box turtle or wood turtle occurs at the subject property at 22 Powder Hill Road. During this visit no suitable habitat for the eastern spadefoot was observed. The property has been extensively mined, altered and graded, leaving no suitable spadefoot habitat, including no breeding habitat.

Although no box turtles were encountered during the site visit, they are known to occur in this region of the state. The periphery outside of the proposed development area is suitable habitat, especially for basking and nesting females. Additionally, the surrounding forested habitat is suitable for hibernating turtles. The core area of the site, where the proposed solar field is being constructed, is not suitable habitat due to its highly altered non-vegetated scarified state and current mining activities. However, box turtles may transverse this scarified area from time to time as the migrate between various habitat types.

Although no wood turtles were encountered during the site visit, they are known to occur in the Scantic River. Due to the high levels of development and fragmentation surrounding the Scantic River, this drainage is not included in the CT-WTCM plan because this compromised region is not likely to contribute to the long-term sustainability of wood turtle populations in Connecticut. Although not considered a long-term priority site for wood turtle sustainability in CT, suitable basking and nesting habitat does occur around the periphery of the proposed development area, within 550ft (167m) from the closest bank of the Scantic River. The core area of the site, where the proposed solar field is being constructed, is not suitable habitat due to its highly altered non-vegetated scarified state and current mining activities. However, wood turtles may transverse this scarified area from time to time as the migrate between various habitat types.

***Recommended Turtle Protection Measures*:**

As a precautionary measure to avoid potential injury or death to either box or wood turtles during construction activities, it is recommended that the provided *Turtle Protection Measures* be implemented if construction is to occur during the months of May and June, when nesting turtle activity is occurring and edge habitat use at its highest. *Due to the lack of suitable habitat within the proposed development area, no impacts are anticipated if construction occurs outside of this two-month restriction period.*

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 fencing 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 (net less), 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 intent of the barrier is to segregate the majority of the work zone and isolate it from foraging/migrating/dispersing herpetofauna. Oftentimes complete isolation of a work zone is not feasible due to accessibility needs and locations of staging/material storage areas, etc. In those circumstances, 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 temporary silt fencing backed 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. In areas where the silt fence cannot be buried, the fencing should be placed with the unburied flap facing away from the construction area and covered with six inches of crushed stone. The Environmental Monitor and/or 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 of rain or greater. All compromised areas of silt fence should be repaired immediately. The extent of the barrier fencing should 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 the Environmental Monitor.

e. No equipment, vehicles or construction materials shall be stored outside of the isolation barrier fencing.

f. 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 preconstruction meeting with a qualified herpetologist. This orientation and educational session will consist of an introductory meeting providing photos of herpetofauna that may be encountered during construction activities, including box and wood 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 Turtle Protective Measures as described in Section 3 below.

b. The education session will also focus on means to discriminate between the species of concern and other native species to avoid unnecessary “false alarms”. Encounters with all species will be documented.

c. The Contractor will immediately report any encounters with box turtles or wood turtles to the environmental monitor. Educational poster materials will be provided and must be displayed on the job site to maintain worker awareness as the project progresses.

3. Turtle Protective Measures

a. 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.

b. Extra caution shall be taken by the Contractor during early morning and evening hours so that basking or foraging turtles are not harmed by construction activities.

4. Reporting

a. Following completion of the construction project, a summary report to the CTDEEP documenting the monitoring and maintenance of the barrier fence and erosion control measures should be completed.

b. Any observations of state listed species will be reported to CTDEEP with photo-documentation (if possible) and with specific information on the location and disposition of the animal. These data will be collected by the Environmental Monitor and reported to the CTDEEP.

Recommended Mitigation Measures:

Although no direct impacts to the early/late successional edge habitat will result from the construction of the solar facility, maintaining this shrub and herbaceous ecotone between the development and forested edge would benefit both the box and wood turtle. To maintain this early/late successional ecotone, five-year mowing cycles may be implemented during the inactive period for these species between the months of November to March.

Literature Cited:

Connecticut Department of Energy and Environmental Protection, Bureau of Natural Resources (CT DEEP). 2015. 2015 Connecticut Wildlife Action Plan.

Dodd, C.K. 2001. North American Box Turtles. University of Oklahoma Press, Norman, OK. 267 pp.

Doroff, A. M. and L. B. Keith. 1990. Demography and ecology of an ornate box turtle (Terrapene ornate) population in south-central Wisconsin. Copeia 1990:387-399.

Jones, M.T., L.L. Willey, T.S.B. Akre, and P.R. Sievert. 2015. Status and conservation of the wood turtle in the Northeastern United States. Northeast Wood Turtle Working Group. Northeast Association of Fish and Wildlife Agencies Technical Report, January 2015.

Klemens, M.W. 1993. Amphibian and reptiles of Connecticut and adjacent regions. State Geological and Natural History Survey of Connecticut Bulletin 112:1–318.

Klemens, M.W., H.J. Gruner, D.P. Quinn and E.R. Davison. *In press*. Conservation of Amphibians and Reptiles in Connecticut. Department of Energy and Environmental Protection, Hartford CT.

Quinn, D., H.J. Gruner, and S. Cronkite. 2017. Eastern box turtle and eastern hog-nosed snake final monitoring report 2011. Parsons Transportation Group Project 18-113/129 U.S. Route 7 Bypass, Brookfield, Connecticut. Connecticut Department of Transportation.

Quinn, D. 2008. A radio-telemetric study of the eastern box turtle (*Terrapene carolina carolina*) home range, habitat use, and hibernacula selection in Connecticut. M.Sc. Thesis. Department of Biology, Central Connecticut State University, New Britain, CT. 84 pp.

Stickel, L.F. 1950. Population and home range relationships of the box turtle, *Terrapene c. carolina* (Linnaeus). Ecological Monographs 20:351-378.

Stickel, L.F. 1989. Home range behavior among box turtles (*Terrapene c. carolina*) of a bottomland forest in Maryland. Journal of Herpetology 23:40–44.

October 23, 2019

Mr. Michael Libertine
All Points Technology Corporation
3 Saddlebrook Drive
Killingworth, CT 06419

RE: State-listed species habitat assessment
Proposed Powder Hill Road Solar Facility
Powder Hill Road, Enfield
CT DEEP NDDB Determination No. 201908914

Mr. Libertine,

Davison Environmental assessed a 24.42 acre parcel ("the Site") where a solar power generation facility is proposed on the northeast side of Powder Hill Road in Enfield ("Project area") for the presence of suitable breeding habitat for two State-listed grassland bird species, the endangered Vesper Sparrow (*Pooecetes gramineus*) and special concern Savannah Sparrow (*Passerculus sandwichensis*).

The site was walked on October 15, 2019. Due to the seasonal timing of this work beyond the breeding season for both species (i.e., circa May-June), presence/absence surveys could not be conducted. Therefore, my work focused on assessing the Site for the presence of breeding habitat. Provided herein are my findings.

Site Conditions

The Site was historically utilized for sand and gravel extraction and processing. Material extraction activities are no longer occurring, and the Site is now used primarily as a material stockpile yard (see photos 1-3). Material stockpiles cover ±9 acres within the southern one-third of the Site. Within the remaining ±15 acres two cover types occur: (1) recently graded unvegetated or sparsely vegetated soils (±8 acres); and (2) old field (mowed with scattered trees and shrubs, ±8 acres). See attached *site photographs* illustrating relevant site conditions.

During our site visit, bulldozer grading of the northern portions of the Site was ongoing. These areas were sparsely vegetated with pioneer meadow grasses and forbs (see photos 4-5). Along the northeastern limits of the Site is old field habitat dominated by mugwort (*Artemesia vulgaris*) with scattered black locust (*Robinia pseudoacacia*) trees (see photo 6). This meadow area had been recently mowed.

Habitat Requirements for Vesper Sparrow (*Pooecetes gramineus*)

The Vesper Sparrow inhabits sparsely vegetated grasslands. The species is considered a moderate habitat generalist, breeding in dry, open habitats with short, sparse, and patchy herbaceous vegetation; some bare ground; and low to moderate shrub or tall forb cover (Jones and Cornely, 2002). In Connecticut, the Vesper Sparrow inhabits moderate to large sized grasslands. The recorded 50% incidence of occurrence field size was 50 acres[1] and the minimum area habitat required is considered 25 acres (Comins et. al. 2003).

Habitat Requirements for Savannah Sparrow (*Passerculus sandwichensis*)

The Savannah Sparrow inhabits grasslands with dense ground vegetation consisting of a mixture of short and tall grasses in moist habitat with a thick layer of dead grass, scattered saplings, shrubs and forbs (Comins et. al. 2003). In Connecticut, similar to the Vesper Sparrow, Savanah Sparrow inhabits moderate to large-sized grasslands. The recorded 50% incidence of occurrence field size was 50 acres and the minimum area habitat required is considered 20-40 acres (Comins et. al. 2003).

Habitat Suitability for Grassland Birds

Both the Vesper Sparrow and Savannah Sparrow are rare breeders in the State. They require moderate to large-sized grasslands for breeding (i.e., >±20 acres). Known breeding habitats are typically anthropogenically managed either as hayfields, airport runway safety zones or on open space parcels managed specifically for grassland birds.

The Site does not contain suitable vegetation (i.e., plant type or structure) and lacks adequate area (i.e., acreage) to support breeding populations of either species. Of the Site's ±24 acres, only 8 acres consists of "open" habitat that could potentially support grassland breeding; i.e., free of trees and material stockpiles. This is too small of an area to support a breeding population of either of these species. Furthermore, the vegetation present within this open area is too sparsely vegetated to support nest sites. While it should be noted that through successional processes the

[1] 50% incidence refers to the point where the species reaches a 50% incidence on a single, habitat specific point count census. That is to say that the species is found 50% of the time in habitat patches of the given size. Though the species may occur on smaller tracts, the given area is considered the minimum amount of appropriate habitat in which the species would have a 50% chance of being found.

vegetation could develop over time into a plant community that is structurally suitable for grassland bird breeding, the major limiting factor remains the overall small size of the Site with respect to these species minimum area requirements. This does not mean that an individual (e.g., during migration) or even a breeding pair could not utilize the Site at some point in time, but rather that the site does not meet the known habitat requirements for either species and does not have the potential to be a population Site.

If you have any questions regarding my findings, please feel free to contact me.

Sincerely,

Eric Davison
Wildlife Biologist

Attachments: Site Photographs

<u>*References*</u>

Comins, P., Hanisek, G., and Oresman, S. 2003. Protection Connecticut's Grassland Heritage: A report of the Connecticut grasslands working group. Audubon Connecticut.

Jones, S.L. and J.E. Cornely (2002). Vesper Sparrow, version 2.0. In The Birds of North American (A.F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA.

Powder Hill Road, Enfield
Site Photographs (taken October 15, 2019)

Photo 1: material stockpile area (looking west)

Photo 2: stockpiles of bituminous millings and concrete

Powder Hill Road, Enfield
Site Photographs (taken October 15, 2019)

Photo 3: material stockpile area (looking east)

Photo 4: northern area of site showing recently graded and sparsely vegetated zone (looking northwest)

Powder Hill Road, Enfield
Site Photographs (taken October 15, 2019)

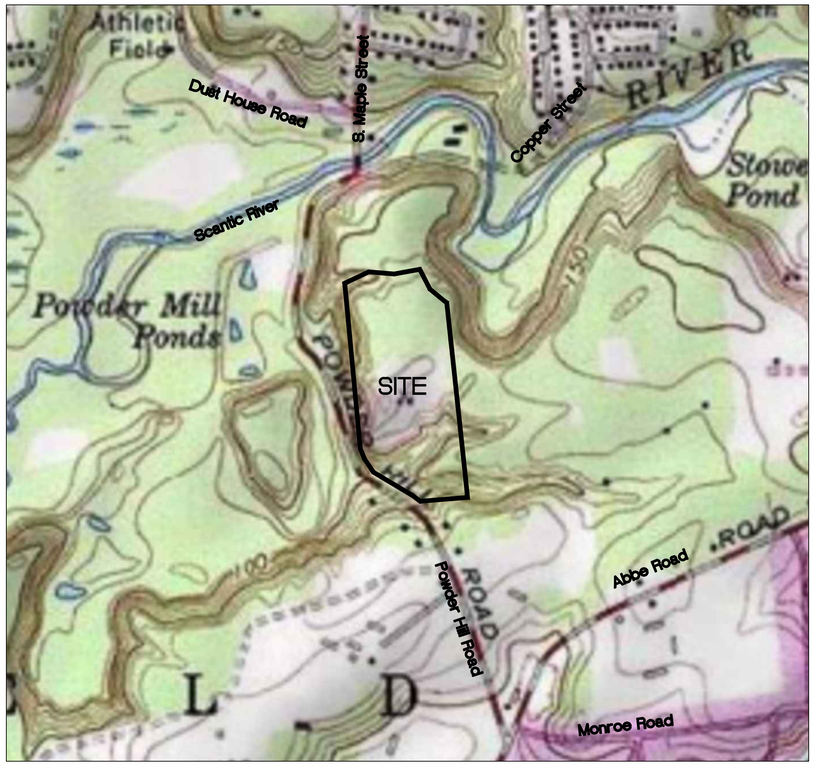
Photo 5: northern area of site showing recently graded and sparsely vegetated zone (looking northeast); wooden stakes indicate limits of Project area

Photo 6: recently mowed old field area in northwest corner of Site

EXHIBIT 4
REVISED SITE PLANS

Powder Hill Road Solar

Powder Hill Road
Enfield, Connecticut
Map 084 Lot 0015 Zone: R88



SITE LOCUS MAP
1"=500'

Owner
Powder Hill Sand & Gravel, LLC
38 Post Office Road
Enfield, CT 06082

Applicant
LSE Delphinus LLC
140 Tower Lane, Suite 145
Avon, CT 06001

LODESTAR ENERGY

Prepared By
RUSSO
SURVEYORS·ENGINEERS
SERVING CT & MA
J.R. Russo & Associates, LLC
1 Shoham Rd East Windsor CT 06088 • CT 860.623.0569 • MA 413.785.1158
www.jrrusso.com • info@jrrusso.com

DRAWING INDEX

SHEET TITLE	SHEET NO.	LATEST REVISION
CIVIL		
COVER SHEET	1 of 6	9–10–19
EXISTING CONDITIONS	2 of 6	9–10–19
OVERALL SITE PLAN	3 of 6	9–10–19
SITE PLAN	4 of 6	9–10–19
EROSION & SEDIMENT CONTROL NOTES	5 of 6	9–10–19
DETAILS	6 of 6	9–10–19

S:\Acad\2018 Civil 3D\2018-059 Lodestar Powder Hill\Russo Drawings\2018-059.dwg

N/F
State of Connecticut
Department of Energy &
Environmental Protection
165 Capitol Ave
Hartford, CT 06106
PID: 5318

N/F
Estate of Helen Batchelor et al
c/o Constance Bragg
1486 S. Branch Pky
Springfield, MA 01129
PID: 5630

N/F
Leland & Joanne Hawthorne
P.O. Box 325
Somers, CT 06071
PID: 11506

N/F
Noah Harkin
18 Powder Hill Rd
Enfield, CT 06082
PID: 15450

N/F
Jill Wolodko &
Paul Williams
133 Cottage Rd
Enfield, CT 06082
PID: 15177

N/F
Kyle E Chapin
19 Powder Hill Rd
Enfield, CT 06082
PID: 1548

N/F
Robert H. & Wesley Dietz
21 Powder Hill Rd
Enfield, CT 06082
PID: 15453

N/F
Jill Wolodko & Paul Williams

N/F
Connecticu Water Company
93 West Main St.
Clinton, CT 06413
PID: 15452

OLD ROAD
REMNANTS OF OLD ROAD
231.31'
440'
(Total)
257.31'
Subject Parcel
Area = 1,063,904 S.F.
(24.42± Acres)
EXIST. TREELINE, TYP.
FORMER GRAVEL PIT
RIPRAP
CHECKDAM, TYP.
EXIST. WETLAND
100' WETLAND
REGULATED AREA
IRON PIN FOUND
IRON PIN FOUND
4.0' EAST OF
PROPERTY LINE
GRANITE
MON. WITH
"H" HELD
CL&P
27652
36" PINE
36" PINE
24" OAK
18" CMP
STONE
DRAIN
DBL/18"
MPL
CL&P
13730
18"
MPL
JERSEY
BARRIER
RIPRAP
FL=103.0
DBL/18"
MPL
GATE
EX. CB
TF=103.4
15" HDPE
Powder Hill Road
25' FROM
EXIST. CENTER
OF ROAD HELD
BIT. DRIVE
18"
OAK
18"
PINE
12"
OAK
10"
OAK
36"
OAK
CL&P
26979
LP
MONUMENT
FOUND
CL&P
89026
GUIDERAIL
EX. CB
TF=99.2
CL&P
26981

LEGEND

	EXISTING UTILITY POLE
	PROPOSED UTILITY POLE
DH	PROPOSED OVERHEAD UTILITIES
UG	PROPOSED UNDERGROUND UTILITIES
	EXISTING CATCH BASIN
	EXISTING STORM SEWER
	EXISTING SIGN
	EXISTING IRON PIN (FOUND)
	EXISTING MONUMENT (FOUND)
135x5	EXISTING SPOT GRADE
135.5	PROPOSED SPOT GRADE
136	EXISTING CONTOUR
136	PROPOSED CONTOUR
	EXISTING TREELINE
	PROPOSED TREELINE
	PROPERTY LINE

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

Map Reference:

"Boundary Survey Prepared For Powder Hill Sand and Gravel, L.L.S.
Powder Hill Road, Enfield Connecticut 4-12-07 No. 2005-093"
By J.R. Russo & Associates

DEED REFERENCES:

Susan S. Starr Family L.P. to Powder Hill Sand and Gravel, L.L.C. Dated June 4, 1998 -Volume 1123 Page 225 ELR;

NOTES:

1. Parcel does not lie in area subject to inundation by 1% Annual Chance of Flood per Flood Insurance Rate Map Number 09002B0009C Map Revised June 17, 2002;
2. Parcel does not lie in Inland Wetlands;
3. Parcel lies in R-88 Zone;
4. Parcel lies in Level A Aquifer Protection Area;
5. Horizontal Datum is Connecticut Geodetic Survey NAD83 based on CTGS Monuments #1605 and #5594;
6. Vertical Datum is NGVD29 (Town Aerial Datum);

This survey and map has been prepared in accordance with Sections 20-300b-1 thru 20-300b-20 of the Regulations of Connecticut State Agencies - "Minimum Standards for Surveys and Maps in the State of Connecticut" as endorsed by the Connecticut Association of Land Surveyors, Inc. It is a Property Survey based on a Resurvey conforming to Horizontal Class A-2 & a Topographic Survey conforming to Class T-2.

This document and copies thereof are valid only if they bear the live signature and embossed seal of the designated professional. Unauthorized alterations render any declaration hereon null and void.

TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

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SURVEYORS·ENGINEERS
SERVING CT & MA
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www.jrrusso.com • info@jrrusso.com

LODESTAR ENERGY

REVISIONS

BY: LF/RLS	CHK: JEU

Powder Hill Road Solar
Prepared For
LSE Delphinus LLC
Powder Hill Road
Enfield, CT
Map 084 Lot 0015 Zone: R88

Existing Conditions

DATE
9-10-19

SCALE
1"=60'

JOB NUMBER
2018-059

SHEET
2 of 6

S:\ACad\2018 Civil 3D\2018-059 Lodestar Powder Hill\Russo Drawings\2018-059.dwg

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www.jrrusso.com • info@jrrusso.com

LODESTAR ENERGY

REVISIONS	
10-23-19	RELOCATE DRIVEWAY
BY: LF/TAC	CHK: JEU

Powder Hill Road Solar

Prepared For
LSE Delphinus LLC
Powder Hill Road
Enfield, CT
Map 084 Lot 0015 Zone: R88

Overall Site Plan

DATE
9-10-19

SCALE
1"=80'

JOB NUMBER
2018-059

SHEET
3 of 6

N/F
State of Connecticut
Department of Energy &
Environmental Protection
165 Capitol Ave
Hartford, CT 06106
PID: 5318

N/F
Estate of Helen Batchelor et al
c/o Constance Bragg
1486 S. Branch Pky
Springfield, MA 01129
PID: 5630

N/F
Leland & Joanne Hawthorne
P.O, Box 325
Somers, CT 06071
PID: 11506

231.31'
440'
(Total)
440'
257.31'

Subject Parcel
Area = 1,063,904 S.F.
(24.42± Acres)

202'±
212'±

EXIST. TREELINE, TYP.

PHOTOVOLTAIC (PV) MODULE, TYP.

10'
25'

CHAIN LINK FENCE

Noah Harkin
18 Powder Hill Rd
Enfield, CT 06082
PID: 15450

N/F
Jill Wolodko &
Paul Williams
133 Cottage Rd
Enfield, CT 06082
PID: 15177

PROP. SOLAR ARRAY
FENCED AREA = 429,294 SF
(9.86± AC)
8,570 PANELS

NEWLY GRADED AND BARE AREAS TO RECEIVE MIN. 4" TOPSOIL & SEED W/ COMPANION SEED MIX BY KINGS AGRISEEDS INC. OR EQUAL. UPON COMPLETION OF INSTALLATION OF PANELS AND EQUIPMENT, OVERSEED WITH COMBINATION OF NEW ENGLAND WILDFLOWER MIX BY N.E. SEED OR EQUAL AND DIXIE RESEEDING CRIMSON CLOVER BY KINGS AGRISEEDS INC. OR EQUAL. TYP.

PROP. SILT FENCE

EXIST. WETLAND

100' WETLAND REGULATED AREA

20'X40' CONC. PAD FOR BATTERY STORAGE

20'x30' CONC. PAD FOR SWITCH GEAR, TRANSFORMER & INVERTER

JERSEY BARRIERS TO BE REMOVED

UTILITY METER

UTILITY RECLOSER

GATE

CUSTOMER RISER POLE

CUSTOMER LOAD BREAK

STORMWATER SAMPLING LOCATION CB OUTLET

UTILITY LOAD BREAK

INSTALL INLET PROTECTION IN EXIST. CB

REPLACE EXIST. TYPE CL CATCH BASIN TOP WITH TYPE C TOP

EXIST. PAVEMENT TO BE REMOVED INSTALL MIN. 4" TOPSOIL & SEED

PROP. SILT FENCE, TYP.

SAWCUT PAVEMENT

CONNECT TO EXIST. POWER DISTRIBUTION LINE COORDINATE W/ UTILITY COMPANY

N/F
Kyle E Chapin
19 Powder Hill Rd
Enfield, CT 06082
PID: 1548

N/F
Robert H. & Wesley Dietz
21 Powder Hill Rd
Enfield, CT 06082
PID: 15453

N/F
Connecticu Water Company
93 West Main St.
Clinton, CT 06413
PID: 15452

50'
25'R
40'
25'R
15' TYP.
15' WIDE GRAVEL ACCESS ROAD
HAMMERHEAD TURNAROUND
STUMPS OUT SIDE OF FENCE TO REMAIN, TYP.
PROP. TREELINE, TYP.
100'
HAMMERHEAD TURNAROUND
PROP. SILT FENCE

N/F
Jill Wolodko & Paul Williams

LEGEND

- EXISTING UTILITY POLE
- PROPOSED UTILITY POLE
- OH — PROPOSED OVERHEAD UTILITIES
- UG — PROPOSED UNDERGROUND UTILITIES
- EXISTING CATCH BASIN
- EXISTING STORM SEWER
- EXISTING SIGN
- EXISTING IRON PIN (FOUND)
- EXISTING MONUMENT (FOUND)
- 135x5 EXISTING SPOT GRADE
- 135.5 PROPOSED SPOT GRADE
- 136 EXISTING CONTOUR
- 136 PROPOSED CONTOUR
- EXISTING TREELINE
- PROPOSED TREELINE
- PROPERTY LINE
- LIMIT OF WETLANDS

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

This survey and map has been prepared in accordance with Sections 20-300b-1 thru 20-300b-20 of the Regulations of Connecticut State Agencies – "Minimum Standards for Surveys and Maps in the State of Connecticut" as endorsed by the Connecticut Association of Land Surveyors, Inc. It is a Property Survey based on a Resurvey conforming to Horizontal Class A-2 & a Topographic Survey conforming to Class T-2.

This document and copies thereof are valid only if they bear the live signature and embossed seal of the designated professional. Unauthorized alterations render any declaration hereon null and void.

TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

S:\Acad\2018 Civil 3D\2018-059 Lodestar Powder Hill\Russo Drawings\2018-059.dwg

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www.jrrusso.com • info@jrrusso.com

LODESTAR ENERGY

10-23-19	RELOCATE DRIVEWAY	
10-15-19	SEEDING NOTE	

REVISIONS

BY: LF/TAC | CHK: JEU

Powder Hill Road Solar

Prepared For
LSE Delphinus LLC

Powder Hill Road
Enfield, CT
Map 084 Lot 0015 Zone: R88

Site Plan

DATE
9-10-19

SCALE
1"=60'

JOB NUMBER
2018-059

SHEET
4 of 6

PERMANENT SEEDING (PS)

SPECIFICATIONS

Time Of Year

Seeding dates in Connecticut are normally April 1 through June 15 and August 15 through October 1. Spring seedings give the best results and spring seedings of all mixes with legumes is recommended. All disturbed areas are to be seeded with the Solar Farm Seed Mix as soon as possible after placement of topsoil. Stormwater basin shall be seeded upon completion of construction and removal of accumulated sediment. Strips between panels shall be overseeded with Eastern Pollinator Mix upon completion of installation of panels and electric conduit.

Site Preparation

Grade in accordance with the Land Grading measure which is in the Connecticut Guidelines For Soil Erosion and Sediment Control latest edition.

Install all necessary surface water controls.

For areas to be mowed remove all surface stones 2 inches or larger. Remove all other debris such as wire, cable tree roots, pieces of concrete, clods, lumps, or other unsuitable material.

Seed Selection

Initial Seeding upon spreading topsoil:
- Companion Mix by King Agriseeds Inc. or equal
- 60% Dwarf Perennial Ryegrass
- 20% Creeping Fescue
- 20% Chewing Fescue

Overseeding after installation of equipment:
- N.E. Wildflower Mix Eastern Pollinator Mix by N.E. Seed or approved equal and Dixie Reseeding Crimson Clover by King Agriseeds Inc. or equal

Seedbed Preparation

Apply topsoil, if necessary, in accordance with the Topsoiling measure which is in the Connecticut Guidelines For Soil Erosion and Sediment Control latest edition.

Apply ground limestone and fertilizer according to soil test recommendations (such as those offered by the University of Connecticut Soil Testing Laboratory or other reliable source).

Where soil testing is not feasible on small or variable sites, or where timing is critical, fertilizer may be applied at the rate of 300 pounds per acre or 7.5 pounds per 1,000 square feet of 10–10–10 or equivalent and limestone at 4 tons per acre or 200 pounds per 1,000 square feet.

Work lime and fertilizer into the soil to a depth of 3 to 4 inches with a disc or other suitable equipment.

Inspect seedbed just before seeding. If the soil is compacted, crusted or hardened, scarify the area prior to seeding.

Seed Application

Apply selected seed at rates per manufacturer's recommendations uniformly by hand, cyclone seeder, drill, cultipacker type seeder or hydroseeder (slurry including seed, fertilizer). Normal seeding depth is from 0.25 to 0.5 inch. Increase seeding rates by 10% when hydroseeding or frost crack seeding. Seed warm season grasses during the spring period only.

Mulching

See guidelines in the Mulch For Seed measures.

MAINTENANCE

Inspect temporary soil protection area at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inch or greater during the first growing season.

Where seed has been moved or where soil erosion has occurred, determine the cause of the failure and repair as needed.

DUST CONTROL (DC)

SPECIFICATIONS

Mechanical Sweeping

Use mechanical sweeping on paved areas where dust and fine materials accumulate as a result of truck traffic, pavement saw cutting spillage, and wind or water deposition from adjacent disturbed areas. Sweep daily in heavily traveled areas.

Water

Periodically moisten exposed soil surfaces on unpaved travelways to keep the travelway damp.

Non-Asphaltic Soil Tackifier

Non–asphaltic soil tackifier consists of an emulsified liquid soil stabilizer of organic, inorganic or mineral origin, including, but not limited to the following: modified resins, calcium chloride, complex surfactant copolymers or high grade latex acrylics. The solutions shall be non–asphaltic, non toxic to human, animal and plant life, non corrosive and nonflammable. Materials used shall meet local, state and federal guidelines for intended use. All materials are to be applied according to the manufacturer's recommendations and all safety guidelines shall be followed in storing, handling and applying materials.

MAINTENANCE

Repeat application of dust control measures when fugitive dust becomes evident.

MULCH FOR SEED (MS)

SPECIFICATIONS

Materials

Types of Mulches within this specification include, but are not limited to:

1. Hay: The dried stems and leafy parts of plants cut and harvested, such as alfalfa, clovers, other forage legumes and the finer stemmed, leafy grasses. The average stem length should not be less than 4 inches. Hay that can be windblown should be anchored to hold it in place.

2. Straw: Cut and dried stems of herbaceous plants, such as wheat, barley, cereal rye, or brome. The average stem length should not be less than 4 inches. Straw that can be windblown should be anchored to hold it in place.

3. Cellulose Fiber: Fiber origin is either virgin wood, post–industrial/pre–consumer wood or post consumer wood complying with materials specification (collectively referred to as "wood fiber"), newspaper, kraft paper, cardboard (collectively referred to as "paper fiber") or a combination of wood and paper fiber. Paper fiber, in particular, shall not contain boron, which inhibits seed germination. The cellulose fiber must be manufactured in such a manner that after the addition to and agitation in slurry tanks with water, the fibers in the slurry become uniformly suspended to form a homogeneous product. Subsequent to hydraulic spraying on the ground, the mulch shall allow for the absorption and percolation of moisture and shall not form a tough crust such that it interferes with seed germination or growth. Generally applied with tackifier and fertilizer. Refer to manufacturer's specifications for application rates needed to attain 80%–95% coverage without interfering with seed germination or plant growth. Not recommended as a mulch for use when seeding occurs outside of the recommended seeding dates.

Tackifiers within this specification include, but are not limited to: Water soluble materials that cause mulch particles to adhere to one another, generally consisting of either a natural vegetable gum blended with gelling and hardening agents or a blend of hydrophilic polymers, resins, viscosifiers, sticking aids and gums. Good for areas intended to be mowed. Cellulose fiber mulch may be applied as a tackifier to other mulches, provided the application is sufficient to cause the other mulches to adhere to one another. **Emulsified asphalts are specifically prohibited for use as tackifiers due to their potential for causing water pollution following its application.**

Nettings within this specification include, but are not limited to: Prefabricated openwork fabrics made of cellulose cords, ropes, threads, or biodegradable synthetic material that is woven, knotted or molded in such a manner that it holds mulch in place until vegetation growth is sufficient to stabilize the soil. Generally used in areas where no mowing is planned.

Site Preparation

Grade according to plans and allow for the use of appropriate equipment for seedbed preparation, seeding, mulch application and mulch anchoring.

Application

Timing: Applied immediately following seeding. Some cellulose fiber may be applied with seed to assist in marking where seed has been sprayed, but expect to apply a second application of cellulose fiber to meet the requirements of **Mulch For Seed** in the Connecticut Guidelines For Soil Erosion and Sediment Control latest edition.

Spreading: Mulch material shall be spread uniformly by hand or machine resulting in 80%–95% coverage of the disturbed soil when seeding within the recommended seeding dates. Applications that are uneven can result in excessive mulch smothering the germinating seeds. For hay or straw anticipate an application rate of 2 tons per acre. For cellulose fiber follow manufacture's recommended application rates to provided 80%–95% coverage.

When seeding outside the recommended seeding dates, increase mulch application rate to provide between 95%–100% coverage of the disturbed soil. For hay or straw anticipate an application rate to 2.5 to 3 tons per acre.

When spreading hay mulch by hand, divide the area to be mulched into approximately 1,000 square feet and place 1.5–2 bales of hay in each section to facilitate uniform distribution.

For cellulose fiber mulch, expect several spray passes to attain adequate coverage, to eliminate shadowing, and to avoid slippage.

Anchoring: Expect the need for mulch anchoring along the shoulders of actively traveled roads, hill tops and long open slopes not protected by wind breaks.

When using netting, the most critical aspect is to ensure that the netting maintains substantial contact with the underlying mulch and the mulch, in turn, maintains continuos contact with the soil surface. Without such contact, the material is useless and erosion can be expected to occur.

MAINTENANCE

Inspect mulch for seed area at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inch or greater until the grass has germinated to determine maintenance needs.

Where mulch has been moved or where soil erosion has occurred, determine the cause of the failure and repair as needed.

TEMPORARY SEEDING (TS)

SPECIFICATIONS

Site Preparation

Install needed erosion control measures such as diversions, grade stabilization structures, sedimentation basins and grassed waterways in accordance with the approved plan.

Grade according to plans and allow for the use of appropriate equipment for seedbed preparation, seeding, mulch application and mulch anchoring.

Seedbed Preparation

Loosen the soil to a depth of 3–4 inches with a slightly roughened surface. If the area has been recently loosened or disturbed, no further roughening is required. Soil preparation can be accomplished by tracking with a bulldozer, discing harrowing, raking or dragging with a section of chain link fence.

Apply ground limestone and fertilizer according to soil test recommendations (such as those offered by the University of Connecticut Soil Testing Laboratory or other reliable source).

If soil testing is not feasible on small or variable sites, or where timing is critical, fertilizer may be applied at the rate of 300 pounds per acre or 7.5 pounds per 1,000 square feet of 10–10–10 or equivalent.

Seeding

Apply seed uniformly by hand, cyclone seeder, drill, cultipacker type seeder or hydroseeder. The temporary seed shall be Rye (grain) applied at a rate of 120 pounds per acre. Increase seeding rates by 10% when hydroseeding.

Mulching

See guidelines in the Mulch For Seed measures.

MAINTENANCE

Inspect temporary seeding area at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inch or greater for seed and mulch movement and rill erosion.

Where seed has been moved or where soil erosion has occurred, determine the cause of the failure and repair as needed.

SOIL EROSION & SEDIMENT CONTROL NOTES

1. All soil erosion and sediment control work shall be done in strict accordance with the Connecticut Guidelines For Soil Erosion and Sediment Control latest edition.
2. Any additional erosion/sediment control deemed necessary by the engineer during construction, shall be installed by the developer. In addition, the developer shall be responsible for the repair/replacement and/or maintenance of all erosion control measures until all disturbed areas are stabilized to the satisfaction of the town staff.
3. All soil erosion and sediment control operations shall be in place prior to any grading operations and installation of proposed structures or utilities and shall be left in place until construction is completed and/or area is stabilized.
4. In all areas, removal of trees, bushes and other vegetation as well as disturbance of the soil is to be kept to an absolute minimum while allowing proper development of the site. During construction, expose as small an area of soil as possible for as short a time as possible.
5. The developer shall practice effective dust control per the soil conservation service handbook during construction and until all areas are stabilized or surface treated. The developer shall be responsible for the cleaning of nearby streets, as ordered by the town, of any debris from these construction activities.
6. All fill areas shall be compacted sufficiently for their intended purpose and as required to reduce slipping, erosion or excess saturation. Fill intended to support buildings, structures, conduits, etc., shall be compacted in accordance with local requirements or codes.
7. Topsoil is to be stripped and stockpiled in amounts necessary to complete finished grading of all exposed areas requiring topsoil. The stockpiled topsoil is to be located as designated on the plans. Topsoil shall not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or in a condition that may otherwise be detrimental to proper grading or proposed sodding or seeding.
8. Any and all fill material is to be free of brush, rubbish, timber, logs vegetative matter and stumps in amounts that will be detrimental to constructing stable fills. Maximum side slopes of exposed surfaces of earth to be 3:1 or as otherwise specified by local authorities.
9. Soil stabilization should be completed within 5 days of clearing or inactivity in construction.
10. Waste Materials – All waste materials (including wastewater) shall be disposed of in accordance with local, state and federal law. Litter shall be picked up at the end of each work day.
11. The Contractor shall maintain on–site additional erosion control materials as a contingency in the event of a failure or when required to shore up existing BMPs. At a minimum, the on–site contingency materials should include 30 feet of silt fence and 5 straw haybales with 10 stakes.

CHECKLIST FOR EROSION CONTROL PLAN

PROJECT: Powder Hill Road Solar

LOCATION: Powder Hill Road, Enfield, CT

PROJECT DESCRIPTION: Construction of 10± acres of ground mounted solar panels.

PARCEL AREA: 24.4 acres

RESPONSIBLE PERSONNEL: LSE Delphinus LLC, Kevin Midea (410) 274–2716

EROSION AND SEDIMENT CONTROL PLAN PREPARER: J.R. Russo & Associates, LLC

CHECKLIST:

Work Description Erosion & Sediment Control Measures	Location	Date Installed	Initials	Date Removed	Initials
Install silt fence	As shown on plan.				
Install sediment barrier at CB	As shown on plan.				

MAINTENANCE OF MEASURES:

Location	Description or Number	Date	Initials

Project Dates:

Date of groundbreaking for project:

Date of final stabilization:

PROJECT NARRATIVE AND CONSTRUCTION SEQUENCE

This project is located at the former Powder Hill Sand & Gravel LLC pit on Powder Hill Road in Enfield, Connecticut. The proposed activity is the construction of a 2.0 MW AC photovoltaic solar facility. The suggested schedule of construction is as follows:

1. Utilize existing 240' paved drive for site access during construction to minimize off–site tracking and dust.
2. Install perimeter silt fence (GSF) in areas downgradient of the site as shown on the project plans..
3. Clear trees. Grub stumps within proposed security fence. Stumps outside of security fence to remain. Fill stump holes as necessary.
4. Install portion of access drive north of existing paved drive.
5. Spread topsoil over all remaining bare soil and disturbed areas. If prior to October 30th, seed all areas with permanent Companion Seed Mix by Kings Agricseed Inc. or equal. If after October 30th, return in the spring to seed with the permanent seed mix.
6. Install foundations and solar panels.
7. Install electrical equipment and distribution lines.
8. Install security fence.
9. Overseed solar facility with New England Wildflower Mix by N.E. Seed or equal combined with Dixie Reseeding Crimson Clover by Kings Agriseed Inc.
10. Demolish existing paved drive and install new gravel drive. Restore disturbed areas with topsoil and seed with permanent Companion Seed Mix by Kings Agricseed Inc. or equal.
11. Remove silt fence after site is fully stabilized.

Construction of this site is anticipated to begin in the Fall of 2019, pending approvals. Site work is anticipated to be completed within one construction season. Temporary erosion control measures shall be installed prior to any soil disturbance and maintained throughout construction until soils have been stabilized with permanent vegetation.

The Contractor shall keep the area of disturbance to a minimum and establish vegetative cover on exposed soils as soon as practical. All soil and erosion control measures shall be installed and maintained in accordance with these plans and the "Connecticut DEEP Guidelines for Soil Erosion and Sediment Control", as amended. The Contractor shall verify all conditions noted on the plans and shall immediately notify the Engineer of any discrepancies.

The developer shall be responsible for the repair/replacement/maintenance of all erosion control measures until all disturbed areas are stabilized. Sediment deposits shall be periodically removed from the upstream sides of silt fence (GSF). This material is to be spread and stabilized in areas not subject to erosion, or to be used in areas which are not to be paved or built on. Silt fences (GSF) are to be replaced as necessary to maintain proper filtering action. Silt fence (GSF) shall remain in place and shall be maintained to insure efficient sediment capture until all areas above the erosion checks are stabilized and vegetation has been established.

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LODESTAR ENERGY

REVISIONS		
BY: LF/TAC	CHK: JEU	
10–15–19	SEEDING	

Powder Hill Road Solar

Prepared For

LSE Delphinus LLC

Powder Hill Road
Enfield, CT
Map 084 Lot 0015 Zone: R88

Erosion & Sediment Control Notes

DATE: 9–10–19

SCALE: As Noted

JOB NUMBER: 2018–059

SHEET: 5 of 6

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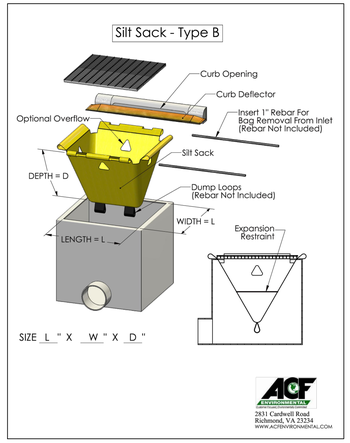
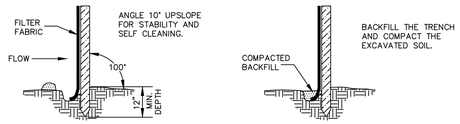
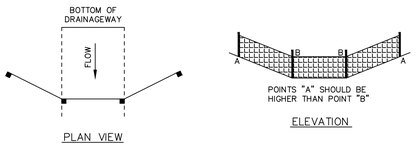


NOTE:
SILT SACK SHALL BE SIZED TO FIT EACH INLET GRATE (SINGLE OR DOUBLE) AND SHALL BE CLEANED AND MAINTAINED UNTIL THE CONTRIBUTING WATERSHED IS STABILIZED WITH VEGETATION AND/OR COMPACTED PROCESSED STONE BASE.

CB GRATE INLET PROTECTION (IP)

NOT TO SCALE

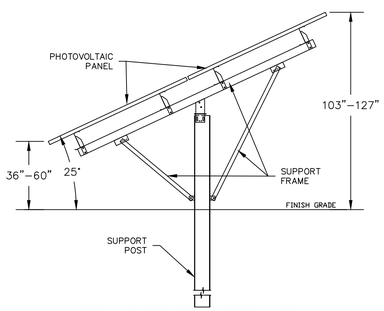




SOURCE: U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, STORRS, CONNECTICUT

GEOTEXTILE SILT FENCE

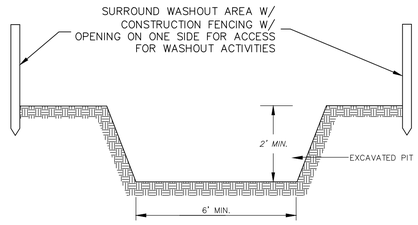
NOT TO SCALE



NOTE: NOT FOR CONSTRUCTION. SEE SPECIFIC POST & RACKING SYSTEM PLANS BY OTHERS.

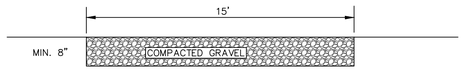
TYPICAL RACKING ELEVATION

NOT TO SCALE



CEMENT TRUCK WASHOUT AREA

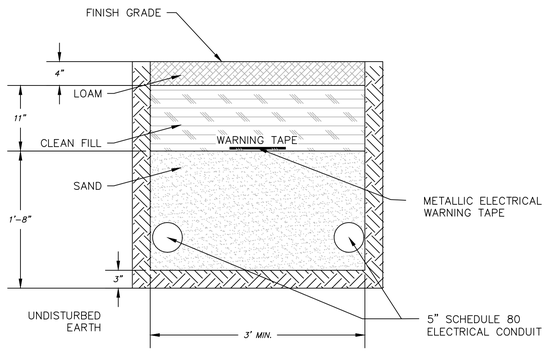
NOT TO SCALE



NOTES:
1. SUBGRADE SHALL BE EVALUATED IN THE FIELD FOR STABILITY. WHERE SUBGRADE IS WET OR CANNOT BE PROOF ROLLED WITHOUT SIGNIFICANT RUTTING OR MOVEMENT, ADDITIONAL STABILIZATION MEASURES WILL BE REQUIRED AND MAY INCLUDE EXCAVATION & INSTALLATION OF ADDITIONAL GRAVEL AND/OR INSTALLATION OF A GEOTEXTILE AS DIRECTED BY THE ENGINEER.
2. FINISH GRADE SHALL BE SET SO AS TO MAINTAIN EXISTING SHEET FLOW ACROSS THE DRIVEWAY.

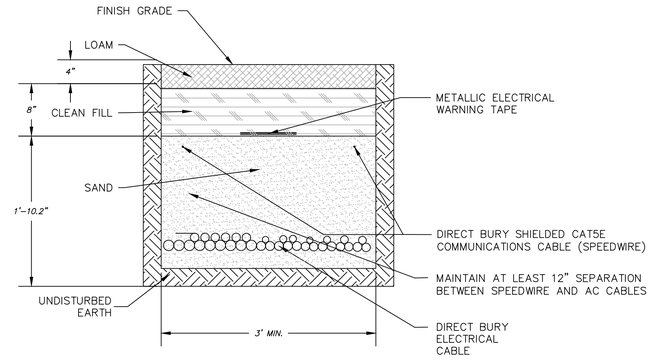
DRIVEWAY DETAIL

NOT TO SCALE



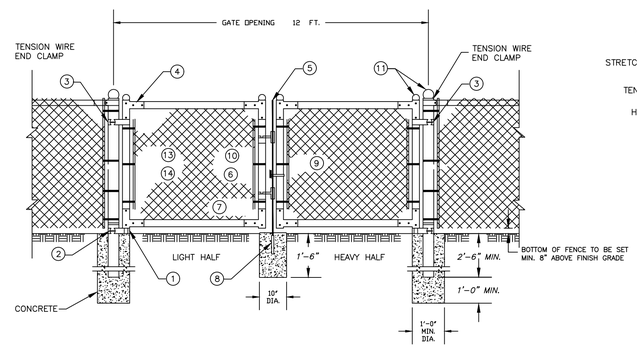
MEDIUM VOLTAGE CABLE TRENCH DETAIL (MV)

NOT TO SCALE



INVERTER POWER & COMMS CABLE TRENCH DETAIL (INV/C)

NOT TO SCALE

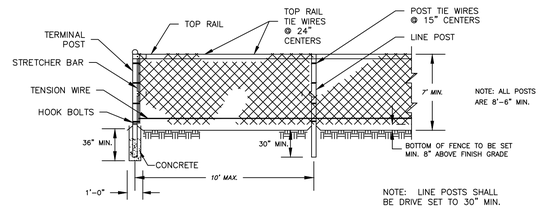


GATE DETAIL

LEGEND

PART NO.	DESCRIPTION	QUANTITY
1	STRAIGHT PLUG	2
2	BOTTOM HINGE	2
3	TOP HINGE	2
4	CORNER ELBOW	8
5	PLUNGER ROD	1
6	LATCH FORK	2
7	FORK CATCH	2
8	PLUNGER ROD CATCH	1
9	LOCK KEEPER GUIDE	1
10	LOCK KEEPER	1
11	ORNAMENTAL TOPS	6
12	TRUSS RODS	4
13	STRETCHER BAR	4
14	HOOK BOLTS	12

NOTE:
THE FENCING SHALL BE #9 GAGE FENCE FABRIC, STANDARD 2–INCH CHAIN LINK DIAMOND MESH.



NOTE: LINE POSTS SHALL BE DRIVE SET TO 30" MIN. ALL TERMINAL POSTS SHALL BE SET IN CONCRETE

FENCE DETAILS

SHAPE, SIZE AND WEIGHT REQUIREMENTS FOR FENCE POSTS AND RAILS			
ITEM	SHAPE	OUTSIDE DIMENSIONS INCHES	WEIGHT LBS./LIN. FT.
**			
TERMINAL POSTS	ROUND	2.375	3.65
	*ROUND	2.375	3.12
LINE POSTS	ROUND	1.90	2.72
	*ROUND	1.90	2.28
TOP & BRACE RAILS	ROUND	1.66	2.27
	*ROUND	1.66	1.84
* GRADE B HIGH STRENGTH STEEL			
** INCLUDES END, CORNER, ANGLE, INTERSECTION AND INTERMEDIATE BRACED POSTS			

GATE FRAME MEMBERS SIZE AND WEIGHT		
GATE FRAME	OUTSIDE DIMENSIONS INCHES	WEIGHT LBS./LIN. FT.
ROUND	1.66	2.27
*ROUND	1.66	1.84
* GRADE B HIGH STRENGTH STEEL		

GATE POST SIZE AND WEIGHT		
GATE LEAF WIDTH OF 6 FT. OR LESS	OUTSIDE DIMENSIONS INCHES	WEIGHT LBS./LIN. FT.
ROUND	2.875	5.79
*ROUND	2.875	4.64
* GRADE B HIGH STRENGTH STEEL		

CONSTRUCTION NOTES

1. MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE MANUFACTURER'S SPECIFICATIONS.
2. ALL POSTS SHALL BE INSTALLED VERTICALLY. WHERE POSTS ARE INSTALLED ON AN INCLINED SURFACE, THE ANGLE OF THE POST SHALL BE ADJUSTED SO THAT THE POST WILL BE VERTICAL.
3. THE FENCING SHALL BE #9 GAGE FENCE FABRIC, STANDARD 2–INCH CHAIN LINK DIAMOND MESH.

CHAIN LINK FENCE DETAIL

NOT TO SCALE

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EXHIBIT 5
CONNECTICUT PRIME FARMLAND SOILS

Farmland Classification—State of Connecticut
(Powder Hill Solar)

Map Scale: 1:2,590 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13	Walpole sandy loam, 0 to 3 percent slopes	Farmland of statewide importance	1.2	3.5%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland	1.0	3.1%
29B	Agawam fine sandy loam, 3 to 8 percent slopes	All areas are prime farmland	3.4	10.4%
36B	Windsor loamy sand, 3 to 8 percent slopes	Farmland of statewide importance	1.2	3.7%
38E	Hinckley loamy sand, 15 to 45 percent slopes	Not prime farmland	8.6	26.2%
109	Fluvaquents-Udifluvents complex, frequently flooded	Not prime farmland	0.4	1.1%
305	Udorthents-Pits complex, gravelly	Not prime farmland	17.0	52.0%
Totals for Area of Interest			**32.8**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower