

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE: :
 :
 :
 PETITION OF PAWCATUCK SOLAR : PETITION NO. 1345
 CENTER, LLC FOR A DECLARATORY :
 RULING THAT A CERTIFICATE OF :
 ENVIRONMENTAL COMPATIBILITY AND :
 PUBLIC NEED IS NOT REQUIRED FOR THE :
 CONSTRUCTION, OPERATION AND :
 MAINTENANCE OF A 15 MW AC SOLAR :
 PHOTOVOLTAIC PROJECT ON ELLA :
 WHEELER ROAD IN NORTH STONINGTON, :
 CONNECTICUT : JULY 30, 2018

RESPONSES OF PAWCATUCK SOLAR CENTER, LLC
TO CONNECTICUT SITING COUNCIL INTERROGATORIES – SET ONE

On June 28, 2018, the Connecticut Siting Council (“Council”) issued Interrogatories to Pawcatuck Solar Center, Inc. (the “Petitioner”), relating to Petition No. 1345. Below are the Petitioners responses.

Project Notice and Development

Question No. 1

Regarding Petition Tab J, was a copy of the petition served on the Town of North Stonington Conservation Commission? If not, please provide notice.

Response

A copy of Petition No. 1345 was mailed to William Ricker, Chairman of the North Stonington Conservation Commission on June 29, 2018.

Question No. 2

What is the relationship between the Petitioner and the developer? If the project is

approved, identify all permits necessary for construction and operation and which entity will hold the permit(s)?

Response

The Petitioner is a single purpose Connecticut limited liability company established in 2016 to develop, construct and operate the Pawcatuck Solar Center (the “Project”). In addition to the approval needed from the Council, the Project will be required to register under the Connecticut DEEP General Permit for the Discharge of Storm Water and Dewatering Wastewater from Construction Activity and receive all necessary electrical and building permits from the Town of North Stonington.

Question No. 3

What entity/subcontractor will be constructing the facility? Has this entity/subcontractor constructed other solar projects 5 MW or greater in the Northeast? If so, list similar projects.

Response

As mentioned in the Petition, Coronal Energy LLC (“Coronal”) will lead the development team but has not yet selected a contractor to construct the facility. Ultimately, Coronal will select a contractor who has experience with solar project development in the northeast, with comparable site conditions and with projects larger than 5 MW in size.

Question No. 4

Page 3 of the Petition references Coronal Energy, LLC, under its former names, Coronal Development Services and Heliosage Energy, “successfully secured Siting Council approval for the development of the Fusion Solar Center in Sprague... and Somers Solar Center in Somers.” Footnote 2 on Page 3 of the Petition indicates, “The Fusion Solar Center project in Sprague was conveyed to DESRI CT Fusion Acquisition, LLC in 2017, prior to the commencement of

construction (Emphasis added). The Somers Solar Center project was conveyed to CleanPath Energy before it was conveyed to Dominion Energy in 2013 who oversaw construction of the facility (Emphasis added).”

- a) If the project is approved by the Council, does Coronal Energy, LLC plan to transfer its interests to another entity prior to the commencement or completion of project construction as it had done with the Fusion Solar Center project in Sprague and the Somers Solar Center project in Somers?
- b) If the answer above is yes, how will compliance with the conditions of the Council’s final decision on the petition and compliance with the conditions and regulations of the Council’s approval of a Development and Management Plan for the project be achieved?

Response

The Petitioner does not currently intend to transfer its interest in the Project to another entity prior to commencement or completion of construction. Coronal’s market strategy is to develop, hold and maintain this generation asset. If this strategy changes at any time in the future, the Project transferee would be responsible for compliance with the Council’s approval and all special conditions and requirements of the Development and Management Plan.

For your information, in accordance with recent request from Town officials in North Stonington, the Petitioner expects to change the Project name from the “Pawcatuck Solar Center” to “North Stonington Solar Center” to more accurately reflect the location of the facility. If and when this change occurs, the Petitioner will notify the Council.

Question No. 5

Page 1 of the Petition references that Pawcatuck Solar Center, LLC was a “participant

and awardee of the CT DEEP Tri-State RFP,” which RFP is also known as the “New England Clean Energy RFP.” However, the Project site is not listed under the “New England Clean Energy RFP Bidders Selected for Contract Negotiation” on the New England Clean Energy RFP website. It is listed under the “DEEP Small-Scale Clean Energy RFP Projects Selected to Move Forward” on the DEEP Small-Scale Clean Energy RFP website:

http://www.ct.gov/deep/lib/deep/press_releases/2016/2016nov28smallscaleenergy.pdf

Please explain.

Response

The Project did not participate in the CT DEEP Tri-State RFP which is for projects larger than this one. This reference in the Petition was an error. The Project participated in the DEEP Small-Scale Clean Energy RFP. We apologize for the confusion.

Question No. 6

Does the Petitioner have a contract to sell the electricity and renewable energy certificates (RECs) it expects to generate with the proposed project? If so, to which public utility? If the electricity is to be sold to more than one public utility, provide the percentage to be sold to each public utility.

Response

Yes, the Petitioner holds executed Power Purchase Agreements with The United Illuminating Company (“UI”) (19.64%) and The Connecticut Light and Power Company d/b/a Eversource Energy (“Eversource”) (80.36%).

Question No. 7

What authority approves the power purchase agreement (PPA) for the facility? Has a PPA with United Illuminating and Eversource been executed? If not, when would the PPA be

finalized?

Response

Separate PPAs have been executed with UI and Eversource. Both PPAs were approved by PURA in Docket No. 17-01-11 - PURA Review of Public Act 15-107(b) Small-Scale Energy Resource Agreements.

Question No. 8

What is the length of the power purchase agreement? Are there provisions for any extension of time in the PPA? Is there an option to renew?

Response

The PPAs has a term of 20 years. There are no provisions for extension or renewal options.

Question No. 9

Is the alternating current megawatt capacity of the facility fixed at a certain amount per the PPA and/or the RFP?

Response

The total of the two PPAs is limited to 15 MW AC.

Question No. 10

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

Response

Pursuant to the PPA, the "Seller" must take (i) all necessary and appropriate actions to qualify and participate; and (ii) commercially reasonable actions to be selected and compensated in every auction applicable to the Services Term, in any capacity market, including the Forward

Capacity Market and any successor capacity market.”

The Petitioner is preparing to participate in the next FCM auction for the 2022/2023 commitment period.

Proposed Site

Question No. 11

Is the site parcel, or any portion thereof, part of the Public Act 490 Program? If so, how does the municipal land use code classify the parcel(s)? For example, is/are the parcel(s) classified as “Tillable D – good to fair”? How would the project affect the use classification?

Response

No portion of the 278 acre subject parcel (the “Property”) is subject to the Public Act 490 program.

Question No. 12

Has the State of Connecticut Department of Agriculture purchased any development rights for the project site or any portion of the project site as part of the State Program for the Preservation of Agricultural Land?

Response

No.

Question No. 13

Is any portion of the site currently in productive agricultural use? If so, approximately how many acres are in production? Is the property farmed by the property owner or is it leased to a third party?

Response

Yes. An approximately 110 acres portion of the Property is leased to a third party who has been made aware that the Property is to be developed. Approximately 70 acres are used for active farming.

Question No. 14

Could the project qualify under the Agricultural Virtual Net Metering Program or other renewable energy program?

Response

No. All of the power produced by the Project is being sold to Eversource and/or UI directly.

Question No. 15

Referring to Petition Exhibit G, p. 22, how many acres within the Limit of Disturbance are mapped as Connecticut Prime Farmland Soils, and of this figure, how many acres are in active agricultural production?

Response

Statewide Important Farmland Soils: Approximately 12.5 acres

Prime Farmland Soils: Approximately 68.6 acres

Active Agricultural Production: Approximately 70 acres

Question No. 16

What impacts, if any, would the proposed project have on future soil productivity of the site?

Response

Recognizing that development of the Project has a useful life and may be considered a

temporary, albeit a longer-term, use of the land, the proposed vegetative under-sowing and routine maintenance plan between and underneath the solar panels are designed to be minimally intrusive, protect existing topsoil resources from erosion and soil loss and promote future soil health.

Significant portions of the Property have been used for cultivation of corn for several years. Cornfields are dominated by a single crop species, while the vegetation under the Project's solar panels will be more varied. The Project would modify the existing monoculture agricultural fields into a mix native perennial grasses, legumes, and other flowering forbs. This will allow soil organic matter content and structure to recover from continuous tillage and compaction and provide more biodiversity than current conditions provide. Vegetation under and between the solar panels can also provide more suitable habitat for wildlife, particularly for pollinating insects such as bees and butterflies that would support other varied wildlife. Overall soil nutrient and pH levels will likely drop over time since regular applications of fertilizers and limestone required to sustain monoculture crops would no longer occur.

The existing cornfields at the Property consist of annual row crops where weed suppression between the rows often promotes considerable amounts of bare ground that can cause substantial losses of topsoil high in nutrients to erosion that end up in adjacent wetlands and waterbodies resulting in eutrophic surface water conditions that can adversely affect wildlife. The proposed meadow vegetation under the Project's solar arrays would be perennial in nature, providing year-round cover and reducing the potential for erosion and nutrient runoff.

The Project will not require the regular use of insecticides, fungicides or fertilizers, whether synthetic or natural (e.g. manure), all of which can eventually enter surface and drinking water sources.

Question No. 17

Referring to Petition p. 16, what modifications suggested by the Department of Agriculture were incorporated into the design of the facility?

Response

There were no site layout or design modifications offered by the Department of Agriculture. Site layout and design modifications were made by the Petitioner to reduce or eliminate the potential for impacts on certain species that are known to exist on or near the Project area. These modifications reduced the total amount of agricultural land ultimately used as a part of the Project area.

Question No. 18

Have any land use development plans been previously approved by the municipality for the proposed site in the past?

Response

Yes. The most recent prior plan called for the Property to be development as an amusement park.

Question No. 19

Provide the distance, direction and address of the nearest off-site residence from the solar field perimeter fence?

Response

The nearest off-site residence to the Project's perimeter fence is located approximately 580 feet to the southeast, located at 318 Boombridge Road, owned by John W. Moran Estate and Lorraine H. Morrone. Please refer to the Nearest Residence Map provided in Attachment 1.

Question No. 20

Page 3 of Exhibit B, Decommissioning Plan states, “Pawcatuck Solar Center and the landowner of the site have agreed to a decommissioning bond that will be established for the project, thereby guaranteeing its proper and complete removal from the property at the termination of the land contract.” Referencing the June 25, 2018 comment letter from the Department of Agriculture, does this agreement include provisions for soil restoration at the site to the satisfaction of the landowner?

Response

No. The above referenced agreement with the Property owner does not include a requirement for soil restoration.

Energy Production

Question No. 21

Identify the loss assumption(s) for the proposed project. For example, would the proposed facility provide 15.0 MW AC at the point of interconnection? Is the 15.0 MW AC rating based on operation under optimal conditions or is it an average of expected daily conditions?

Response

The Project will provide 15.0 MW AC at the point of interconnection under nominal conditions. The actual Project output will fluctuate based on temperature, irradiance, and various loss factors such as soiling and degradation.

Question No. 22

What is the projected capacity factor (expressed as a percentage) for the proposed project?

Response

The projected AC capacity factor for the Project is approximately 24.2%.

Question No. 23

Would the impact of soft shading, such as air pollution or hard shading, such as bird droppings or weather events, such as snow or ice accumulation, dust, pollen, etc. reduce the energy production of the proposed project? If so, was this included in the proposed projects capacity factor and/or loss assumptions?

Response

Yes, these factors do have a negative impact on energy production. These impacts are included in the capacity factor and loss assumptions for the Project.

Question No. 24

Petition p. 14 states that the proposed solar system will keep the electric grid stable. Please explain this statement given the lack of energy production at night, and the dependence of the angle of the sun, the length of the day, and weather conditions for daily energy production.

Response

As a general statement, the solar facility production will overlap in large part with the anticipated peak demand times of the local electric grid. Further, the Project will participate in the ISO New England capacity market, which ensures adequate future capacity to meet load growth projections, as well as sufficient capacity to serve peak load under grid contingency situations. These factors, coupled with additional diversification of the generation mix in New England, yield a net benefit for grid stability.

Question No. 25

What is the status of the interconnection agreement with Eversource?

Response

Eversource is currently in the System Impact Study phase for the Project, which is projected for completion in the third quarter (Q3) of 2018. At that time, it is expected that an Interconnection Agreement for the Project will be tendered.

Question No. 26

Is the project being designed to accommodate the potential for a future battery storage system? If so, please indicate the anticipated size of the system, where it may be located on the site, and the impact it may have on the PPA.

Response

The system is not being designed to accommodate the potential for a future battery storage system. It is, however, feasible that new technologies would allow for such implementation at a later time.

Question No. 27

Could the project be designed to serve as a microgrid?

Response

Under current or projected authorizations for the Project, it could not be designed to serve as a microgrid.

Site Components and Solar Equipment

Question No. 28

Provide the following information regarding the Project solar panels:

- a) What is the anticipated wattage of the panels?
- b) What is the anticipated size of the panels?
- c) What is the efficiency of the solar panels?

- d) Will the panels be mounted in a portrait or landscape fashion?
- e) What is the minimum and maximum overall height of the panels above grade?

Provide a specification sheet if the panel model has been selected.

Response

- a) The anticipated wattage of the panels is 340 watts.
- b) The size of the panels is consistent with the typical form factor of polycrystalline silicon PV modules at approximately 2 meters by 1 meter.
- c) The efficiency of the solar panels is between 15% and 16%.
- d) The panels will be mounted in a landscape fashion (long edge parallels east-west) on the tracker assemblies.
- e) The minimum height of the panels above grade will be 2 feet, and the maximum will be 10 feet depending on spot elevations at the Property.

The panel model specifications are subject to change as additional optimization and market conditions may dictate, but a copy of a representative specification is included for reference in Attachment 2.

Question No. 29

Provide the following information regarding the Project single-axis rack/tracking system:

- a) How many panels will each rack hold?
- b) How does the tracking system operate mechanically?
- c) What are the expected minimum and maximum angles during tracking?
- d) What is the expected power production gain in using a tracking system as opposed to using fixed panels?
- e) How much power will the tracking system consume, and has that been accounted

for in the projected net gain?

- f) What is the rated design wind speed and structural limits of snow accumulation on the solar panels and the rack/tracking system?
- g) Can freezing temperatures negatively impact the tracking system?

Provide a specification sheet if the rack/tracking system model has been selected, or, if the exact model has not been determined, a sheet for a similar system currently available.

Response

- a) Based on the current equipment specification, each rack holds a maximum of 84 panels but may be adjusted for less as necessary.
- b) The tracking system uses a central motor with drive arm connected to approximately 20 to 30 tracker arms via a gear assembly that allows for simultaneous movement.
- c) The tracker will rotate between 52 and -52 degrees.
- d) The expected power production gain is 20 to 25% as opposed to using a fixed tilt racking system.
- e) The tracking system will consume approximately 300-400 kWh per MW DC on an annual basis, or roughly 8.3 MWh per year – this number is accounted for in the Project output estimate.
- f) The system will be designed to meet applicable local structural codes for wind speed and snow load.
- g) The system is designed to withstand temperatures down to -30 degrees Fahrenheit, but could automatically disengage if a stall condition was sensed that may impact motor operation.

Representative specifications for the rack/tracking system are included in Attachment 3.

Question No. 30

Referring to the Site Plans in Petition Exhibit C, what is the aisle width between the solar panel rows? With the exception of the spadefoot toad management area, is the aisle row width uniform throughout the Project area?

Response

The aisle width is approximately 9 feet. The distance is consistent throughout the site with the exception of the Spadefoot Toad Management Area.

Question No. 31

Were string inverters considered for this project? If so, what factors led the current design of several large inverters rather than the use of string inverters?

Response

String inverters were considered for this Project. However, central inverters were selected due to the applicant's familiarity with the solution, the technical and economic feasibility of the solution, and the applicant's relationships with manufacturers. The Petitioner continues to consider its options in this regard.

Question No. 32

Petition Exhibit G, p. 1, states that the proposed project will incorporate six utility scale inverters and transformers. Provide the specification sheets if the inverters and transformers have been selected.

Response

Specification sheets for the inverters and transformers are included in Attachment 4.

Question No. 33

Petition Exhibit G p. 1 states that the proposed project would have six utility scale inverters and transformers on pads whereas Exhibit C- Drawing EXC-C shows seven pads. What how many pads will be installed? List the equipment located on each pad.

Response

Seven pads are shown as one accounts for the switchgear to be located at the terminus of the Project generation tie line. The other six will include the inverter, transformer, associated disconnects, and Supervisory Control and Data Acquisition (the "SCADA") equipment, and meteorological equipment.

Question No. 34

Has the route of underground electrical conduit connecting the arrays to the pads and pads to the interconnection point been determined? If so, provide a drawing.

Response

The routing of the underground electrical conduit has been considered and is shown on the preliminary engineering drawing included in the Petition.

Question No. 35

Petition Exhibit C Erosion and Control Plans (100 and 700 series) under key notes no. 1 reference Electrical and Structural Plans. Provide such plans.

Response

Electrical and structural plans for the facility have not been prepared. The Grading and Drainage Concept Plans are meant to represent to the Council what could be expected in final engineering plans for the Project, and as such the note represents that these plans are part of a larger set. The full set of plans will not be created until the time of final engineering in

preparation for stormwater and building permits.

Question No. 36

At what point will the underground electrical connection transition to an overhead progression to the 13.8 kV distribution system? What type of equipment and utility pole is required for this transition? Would an underground route to Eversource's electric distribution system be more reliable?

Response

The electrical connection transitions to overhead just outside of the fence line of the Project (see upper right quadrant of D-1 on C-110 in Exhibit C of the Petition). After the connection passes under the fence line, it enters the switchgear, and then transitions overhead via a single riser pole. Pole-mounted metering will be located at the transition point as well. While an underground route to Eversource's distribution system may be more reliable, the relative magnitude of reliability improvement in comparison to an overhead solution is expected to be minimal and would not warrant the anticipated additional cost and disturbance required for such a solution.

Question No. 37

Referring to Petition Exhibit B, p. 3, what structures require reinforced concrete?

Response

The structures requiring reinforced concrete are the inverter pads and any equipment pads required at the point of interconnection, such as the Project switchgear.

Public Safety

Question No. 38

Would the solar facility have a protection system to shut the facility down in the event of

a fault within the facility or isolate the facility during abnormal grid disturbances or during other power outage events?

Response

The Project would have a protection system that would disconnect the facility from the grid under certain contingency scenarios, as well as fault monitoring that would shut the facility down, as is required per Eversource interconnection guidelines and applicable IEEE and UL standards.

Question No. 39

If there was an operational issue in one section of the solar field, can this section be disconnected at the inverter location so that the remaining sections can still produce power?

Response

Yes, it is possible to isolate sections of the solar field down to the PV string level to allow for partial power production under such situations.

Question No. 40

Would the project comply with the National Electrical Code, the National Electrical Safety Code and any applicable National Fire Protection Association codes and standards?

Response

The Project would comply with all listed codes and standards, as well as others required by the utility that include IEEE and UL standards.

Question No. 41

Where is the nearest airport and/or airfield? Would glare from the solar arrays have any impact on air navigation? Has a glare analysis been conducted? If not, under what circumstances would a FAA glare analysis be required?

Response

The nearest airport is the Westerly State Airport in Washington County, RI. The Project has utilized the FAA's Notice Criteria Tool and, as a result of this tool, is not required to file with the FAA for their review. *See* Petition - Exhibit M. A glare hazard analysis has not been conducted and is not required by the FAA for this Project. The Petitioner would need to file with the FAA prior to construction if:

- The structure will exceed 200 feet above ground level
- The structure will be in proximity to an airport and will exceed the slope ratio
- The structure involves construction of a traverse-way (i.e. highway, railroad, waterway, etc.) and once adjusted upward with the appropriate vertical distance would exceed a standard of 77.9(a) or (b)
- The structure will emit frequencies, and does not meet the conditions of the FAA Co-location Policy your structure will be in an instrument approach area and might exceed part 77 Subpart C
- The proposed structure will be in proximity to a navigation facility and may impact the assurance of navigation signal reception
- The structure will be on an airport or heliport
- Filing has been requested by the FAA

Question No. 42

Petition p. 18 describes "biodegradable oil for cooling." What is the "biodegradable oil? Please provide a Material Safety Data Sheet for this oil. How much oil will be used in oil-filled equipment?

Response

Typically, transformers such as this use biodegradable oils such as Envirotamp FR3 Fluid. The MSDS for this oil is provided in Attachment 5. Each transformer uses approximately 650 gallons of fluid.

Question No. 43

Are there any existing or proposed outbuildings, structures, etc. that could present a hazard to the solar facility equipment or interconnection route?

Response

There are no known existing or proposed outbuilding or structures that could present a hazard to the solar facility equipment or its interconnection route.

Question No. 44

With regard to emergency response:

- a. Is outreach and/or training necessary for local emergency responders in the event of a fire or other emergency at the site?
- b. How would site access be ensured for emergency responders?
- 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?

How would the entire facility be shut down and de-energized in the event of a fire?

Response

- a) It is Coronal's practice for all of its facilities to ensure that local emergency responders are contacted, and that appropriate training is provided based on site specifics.

- b) Site access for first responders is ensured through the use of a “knox box” or equivalent that allows 24/7 rapid access to all project access gate locations.
- c) In the event of a fire, emergency response personnel would have access to the main AC disconnect that would disconnect the Project from the Eversource grid, cease inverter operation, and de-energize the solar facility.

Environmental

Question No. 45

Provide the carbon debt payback period in years (or days) using the formula below with U.S. EPA data.

$$\text{Carbon Debt Payback in Years} = \frac{(\text{Acres of trees to be cleared})(0.85 \text{ MT CO}_2 \text{ per acre-year})(\text{Service life of facility in years})}{(\text{Annual Energy Production in kWh})(7.44 \times 10^{-4} \text{ MT CO}_2 \text{ per kWh-year})}$$

Response

With 98 acres of trees cleared, assuming a 35-year facility life, and 32,000,000 kWh of annual energy production, the Carbon Debt Payback in Years is equivalent to 0.122, or approximately 45 days.

Question No. 46

Referencing Petition p. 21 and footnote 5, please provide a copy of the results from the U.S. EPA Greenhouse Gas Equivalencies Calculator.

Response

The Equivalency Results requested are included in Attachment 6.

Question No. 47

Referring to Petition p. 17, a reference is made to “ACS”. What entity is “ACS”?

Response

The inclusion of this reference is incorrect. The sentence should be modified to read “Stone walls and piles within the fence line area will be removed as part of the clearing and site preparation process”.

Question No. 48

Would glare from the solar panels attract birds (ex. appear as water) and create a collision hazard? Are there any studies in the northeast regarding glare and avian mortality for ground mounted solar arrays in the northeast?

Response

While the body of scientific research is small regarding the impact of solar generation facilities as collision hazards for birds, there is little evidence that the solar panels create a significant collision risk both in terms of the research that does exist, as well as Coronal’s experience as an owner and operator of solar facilities. There are no known studies regarding glare and avian mortality for ground mounted solar arrays in the northeast.

Question No. 49

Petition p. 9 lists 98 acres of trees to be cleared. Is this value for trees within the Limit of Clearing (LOC) or Limit of Disturbance (LOD)?

Response

This value references the clearing required within the Limit of Clearing (LOC).

Question No. 50

Does the 144 acre Project area represent the LOD or LOC?

Response

The 144-acre Project area represents the LOC which is inclusive of the LOD.

Question No. 51

Site Plan C-101 Legend shows an assumed 25-foot wetland setback. Why was this setback distance selected in developing the Project? What is the Town's wetland setback?

Response

On average, the Project maintains an approximately 44-foot setback from nearby wetland resources with some locations closer and some farther from the proposed fenced facility limits. A variety of factors went into developing a 25-foot wetland setback as a design constraint goal for the Project. Factors that went into developing this constraint included: the existing agricultural land use which has eliminated much of the native vegetative buffer that historically existed surrounding the identified wetland areas; the functions and values of wetland resource areas, many of which have been impacted by the historical and existing agricultural use of the Property; the passive land use associated with a solar facility (e.g., very limited impervious surfaces, lack of human activity, lack of pollutants from storm water runoff, meadow habitat provided within and surrounding the solar arrays, etc.); prioritization given to State-listed species protection/mitigation (primarily Eastern spadefoot toad); prioritization given to the vernal pool and surrounding wetland and terrestrial habitat; and, the minimum renewable energy output needs for the Project. In order to properly balance all of these interests while maintaining a viable project, the 25-foot wetland setback design constraint was determined to be a suitable design constraint goal for this particular project while at the same time providing proper protection to nearby wetland resources and their associated functions and values.

The Project recognizes that all wetlands have intrinsic value, with some wetland areas being more or less ecologically valuable than others. But if a wetland or watercourse is known to be ecologically significant, or to have a critical function or value (i.e., habitat for an endangered

species, flood control, water quality renovation/retention, etc.) a wider, more protective, upland review area, or setback, was deemed to be appropriate. For example, Wetland 4 which contains the one vernal pool on the Property, was identified as being more ecologically sensitive than other wetland resources (with exception given to the Pawcatuck River and bordering floodplain wetland system). As a result, an average setback of greater than 100 feet (and upwards of ±150 feet) is provided to this comparatively more ecologically sensitive wetland.

For portions of the Project area that encroach closer to wetlands, where the 25-foot wetland setback was applied, much of that encroachment occurs within existing cultivated fields where there is either no or minimal vegetated buffer currently provided. This is particularly true for portions of the Project in proximity to Wetlands 1,2, 8 and 9. Using Wetland 1 as an example, in instances where the proposed fence line approaches (and in a couple of locations encroaches into) the 25-foot setback, such setback areas are characterized by cultivated fields void of any mature vegetation. These existing setback or buffer areas are subject to ongoing erosion due to large areas of soil being exposed for much of the year as a result of the active cultivation. Although those portions of the Project are located in relatively close proximity to wetlands, following construction they will be planted with a meadow seed mix that contains various grasses and forbs with a focus on native plants that would end up enhancing the wetland setback area. With this permanent establishment of vegetation, soils would no longer be subject to erosion and deposition of sediment (which carries excessive nutrient loading from the cultivated fields along with residue of herbicides and pesticides) into the nearby wetland system. As a result of the proposed Project, these wetland setback or buffer areas will be enhanced and provide important function in support of the adjacent wetland system. In the case of Wetland 9, which is associated with a perennial stream that feeds Lewis Pond, the Project would not

encroach closer to this wetland than the existing edge of the cultivated field. Although Lewis Pond is a highly eutrophic waterbody due to cow pasture and paddock areas surrounding and including the actual pond (cows have access into the pond, assumedly to provide a ready water source for drinking), the Project considers this wetland system ecologically sensitive, despite the agricultural impacts, since this stream system is a tributary to the Pawcatuck River. As a result, an average setback of 50 feet (and upwards of approximately 120 feet) is provided in the far eastern portion of the Project.

The Town of North Stonington Inland Wetlands Commission (“IWC”) does not require a specific wetland setback. The IWC does regulate an “Upland Review Area”, defined as “land areas situated within 100 feet from the boundary of any inland wetland or watercourse.” Any inland wetland or watercourse as well as land within 100 feet of any wetland or watercourse (100-foot Upland Review Area) is defined as a “Regulated Area” by these local wetland regulations. However, the IWC does not outright restrict activities within Upland Review Area, or even within wetlands or watercourse for that matter; no “non-disturbance area” or “setback” is defined in their regulations.

Question No. 52

How would tree clearing in wetlands be accomplished? What type of machinery would be used to cut the trees and to remove the logs/canopy? What would be the remaining stump height above grade for trees cut within wetlands? Were taller snag “stumps” contemplated to enhance wildlife value?

Response

Selective tree removal in wetlands required to eliminate shading effect on nearby solar panels would be accomplished with the use of various equipment to minimize disturbance to

wetland vegetation that will remain and compaction of wetland soils. This would be performed likely with a combination of hand cutting and the use of logging equipment such as forwarders, feller-bunchers with cutting heads, harvester-processor, etc. Any equipment entering into wetlands would use truck mats and/or swamp mats to minimize disturbance in wetlands, resulting in only temporary wetland impacts. Where safe to do so, mats would be placed directly over shrubs to minimize impact to the wetland understory vegetative cover. Tree tops and logs would be removed from the wetland although some slash would be allowed to remain to provide temporary cover for wildlife. Typically, trees will be cut 2-3 feet off the ground surface with no tree stumps removed. In addition, a minimum of 20 snags will be created to enhance wildlife habitat by selecting trees that are a minimum 6 inches diameter at breast height (“DBH”) and cutting the tree at a height of 6-8 feet from the ground surface; ten of those trees would be 12 inches or greater DBH.

Question No. 53

How many acres of forest in Wetland 1, Wetland 2 and Wetland 5 would be cleared for the Project? Do these mature forested wetlands provide critical habitat for on-site species? Are forested wetlands important breeding areas and migratory pathways for birds? How would the clearing of the mature forested wetlands affect on-site wildlife use?

Response

A total of 4.83 acres is proposed for clearing in Wetlands 1, 2 and 5.

Table 2 of the APT Environmental Assessment document lists eight wetland-dependent species potentially utilizing these wetlands. Of those eight species, three species, the brown creeper, hairy woodpecker and Louisiana water thrush require forested wetlands for breeding. Therefore, the conversion of forested to scrub-shrub cover would result in a loss of habitat for

these species. However, for the alder flycatcher, American woodcock and gray catbird, the conversion from forest to scrub-shrub wetland will be beneficial. The remaining species would be unaffected, as these species are capable of utilizing a wide range of wetland habitat types.

We do not anticipate clearing of these wetlands to interrupt migratory pathways. While large scale streams/ridges, or ridgelines are areas of concentrated migration, small forested wetlands do not function in that manner, as they are not large-scale linear landscape features that migrating birds use for orientation.

Question No. 54

Referring to Petition p. 30: If utility poles are installed within wetlands, would the poles be treated with any chemicals to prevent decay? If so, what kind of chemicals and could such chemicals leach into the underlying wetland?

Response

Wooden poles are typically used for new distribution line projects and such poles are often time treated with a preservative to prevent decay and insect damage to extend the service life of the pole and ensure greater reliability. The most common preservative used by manufacturers who supply wooden poles to electrical distribution systems in the northeast is Chromated Copper Arsenate (“CCA”); CCA is a chemical preservative comprised of arsenic, chromium, and copper. The use of CCA is still allowed in non-residential applications. However, considering the potential sensitivity of wooden poles treated with CCA (or other preservatives) contemplated for placement in wetlands the Applicant intends to prioritize avoidance of wetland locations in design of the generation tie line. If impacts are unavoidable, the Applicant is willing to consider alternative pole types in these locations.

Question No. 55

Referring to Petition Exhibit G, REMA Vernal Pool Investigation Report:

- a) Page 1 indicates the amphibian breeding pool “encompasses 277 acres.” Please explain.
- b) Page 7 indicates that no construction activities should take place within the CTH during the immigrating period for spotted salamanders between March 15th and April 30th... In the next paragraph, it states that no mowing should take place within the CTH during the peak immigrating and emigrating movements of amphibians to and from the breeding pool: March 15th to April 30th and July 1st to September 15th. Why is there no July 1st to September 15th restriction during the construction phase?
- c) Given recent warmer spring temperatures and the site’s geographical location along the coast, is March 15th too late in the breeding season for a protective seasonal restriction?
- d) Page 34, Figure 6 indicates 37 percent of the CTH remains as agricultural field- will this be active agricultural field or will these areas be allowed to revert to old field?
- e) Is the discussion of habitat use beyond the 750 foot CTH by adult salamanders supported by any field data?
- f) Is there insufficient forested area within the 750 foot CTH area to support the population breeding in the pool?
- g) Would the best conservation strategy for this vernal pool be to not only restore the vernal pool envelope but also to restore some additional forested areas within the

CTH?

- h) Why was a decision made to restore the vernal pool envelope using only seed mixes? Was consideration given to replanting the envelope areas to be restored with native shrubs and trees? Was consideration given to restoring duff layers in the restored areas and imbedding cover objects? Wouldn't restoration of forest and shrub cover, and restoration of the duff layer increase the utility and productivity (for amphibians) of the vernal pool envelope?
- i) How much of the forested strips and patches located within 750 feet of the vernal pool will be lost due to the proposed development? How much will be reforested? Express this in both acreage and percentages.
- j) Page 6 states the forested areas within the CTH would be left intact. Are portions of the forested CTH within the "Shade Zone" and if so, would they be managed only as shrubland and not as upland forest? Does managed shrubland provide the same habitat values for vernal pool species as forest land?
- k) Would de-compaction of the old farm road adjacent to the south edge of the vernal pool enhance the CTH?

Referring to Petition Exhibit G, p. 6 refers to a "classic vernal pool" whereas p. 15 refers to a "cryptic vernal pool". Please clarify.

Response

- a) This sentence should be revised to read "The pool is located in the central portion of the overall development site, which encompasses approximately 277 acres." The 277 acres refers to the entirety of the two larger parcels comprising a majority of the Site, but note that the Site also includes a portion of two additional parcels

totaling approximately 76 acres.

- b) Due to the practicalities of such a construction effort, it is not feasible to restrict construction during the period of July 1st to September 15th. However, while some mortality of emerging neomorphs would be expected, as explained in the report, it is not anticipated to affect the adult population.
- c) This range takes into account the somewhat warmer temperatures in the coastal zone and is based on data collected in Rhode Island. While a small minority of individuals may move earlier than March 15th, or later than April 30th, the data show that the bulk of movement, that is, more than 90%, happens during the stated time period.
- d) Areas outside of the Spadefoot Habitat Management Zone, vernal pool restoration areas, and the fence and stormwater controls for the solar farm will be maintained by the landowner. It is unknown what the landowner's intentions are for these areas.
- e) Yes. With regard to spotted salamanders, 146 egg masses indicate a sizable population. Given that only 33 – 50% of female salamanders breed in a given year, and considering that the ratio of adult males to females averages 2.6:1, the spotted salamander population (excluding juveniles) could be 760 adults or more for this site. Given typical population densities of salamanders in optimal forested habitat, it is unlikely that this sizable population could be accommodated within the pool's CTH. Thus, it is reasonable to postulate that at this site, most of the adult spotted salamanders inhabit wooded areas beyond the CTH. The literature would suggest that this species can migrate to breeding pools

from up to one quarter mile away.

- f) As stated in the previous response, the bulk of the spotted salamander population inhabits forested areas beyond the CTH at this site. Since much of the forested area will be left undisturbed within the CTH as well as outside of the CTH, particularly to the south, the preferred optimal habitat will remain to support the terrestrial phase of spotted salamanders as well as wood frogs, which are not as abundant at this pool.
- g) The Petitioner would agree and warrants that this is already the goal of the Project. The field in the southwestern quadrant of the CTH will be removed from agricultural production and seeded with a specialized seed mix that contains shrub seeds (i.e. sumac, dogwoods, viburnum). This will provide the initial matrix for gradual and natural reforestation, eventually becoming optimal habitat for vernal pool amphibians. It is expected that within 2 or 3 years this area will be utilized by these species at moderate to high levels compared to its present condition.
- h) Consideration was given to restoration using shrubs and trees, but a high mortality rate would be anticipated due to significant deer populations in the area. While planting from seed requires more time to establish vegetation, it is expected to provide a more robust and resilient habitat in the long term. Since a majority of the VPE is intact at present, restoration of the duff layer is not considered necessary.
- i) Selective clearing for shading purposes is proposed for a 0.38 acre (< 1% of total CTH) windrow within the 750-foot CTH, but no other clearing is proposed. As mitigation, 0.5 acres (50% of total VPE) of reforestation is proposed within the

VPE zone and 4 acres (9.5% of total CTH) reforestation is proposed within the CTH zone.

- j) The only portion of the CTH which requires management would be 0.38 acres of the windrow, as explained in the answer above. This area is not considered to provide optimal terrestrial forested habitat for amphibians and therefore selective clearing activities in this area would not have a likely adverse effect on the existing vernal pool breeding population.
- k) As a best practice for ensuring seed germination, de-compaction via rototilling to an approximate depth of 6 inches should take place in seeded areas. As vegetation is established, root growth will further de-compact the soils. However, care must be taken to avoid compromising existing vernal pool hydrology, given the fact that the compaction of the farm road is in part responsible for keeping water in the pool. Note that the preservation and enhancement of pool hydrology includes the installation of a stable channel where the existing pool outlet is located over the farm road.
- l) The vernal pool in question on the site is a classic vernal pool. The reference to a “cryptic vernal pool” on page 15 is simply part of a broader, contextual explanation of vernal pools and their various characteristics.

Question No. 56

Referring to Petition Exhibit G, p. 12 of the Environmental Assessment, under the heading, “Spadefoot Toad,” the fourth sentence of the second paragraph states, “Interestingly, the spadefoot breeding pool is not a wetland, as an examination of the pool basin revealed that the soils present are moderately-well drained, and therefore do meet the wetland soil criteria based

on state statute” (Emphasis added). Should the sentence state, “and therefore do not meet the wetland soil criteria based on state statute”?

Response

The statement provided in the Environmental Assessment referenced herein should have read “...and therefore do not meet the wetland soil criteria based on state statute”.

Question No. 57

Referring to Petition Exhibit G, Appendix C -Spadefoot Toad Study, please provide the following information:

- a) Figure 7: How much of the forest within the polygon area will be removed and/or altered by the Project?
- b) Were any efforts made to conduct nocturnal eyeshine studies on the large tracts of forest that will be cleared as part of this project?
- c) Is this population isolated or are there other populations in the area where interbreeding can occur? Do individuals traverse forests to find new breeding areas or is movement strictly across open areas?
- d) Is it possible that other populations of spadefoot toad exist on the site that could be impacted by the proposed project? Has sufficient survey effort been expended on the entire site to conclude that the only area on the subject property where spadefoot toads occur is in the northern field?
- e) Page 7: Where were the other two potential breeding pools located? Would restoration of one or both of these pools benefit the future viability of this population?
- f) Page 6 mentions detention basins as providing suitable habitat for spadefoot

toads. Would there be a benefit in altering one or more of the proposed detention basins for use as potential habitat?

- g) Is there a special seed mix specific to the solar array within the spadefoot toad management area?
- h) How will vegetation within the solar array and the “no build zone” areas of spadefoot toad management area be maintained once the project is operational?
- i) What is the aisle spacing of the solar arrays within the spadefoot toad management area? How was this width determined? What studies show that wide aisle spacing is beneficial to toad populations? If the arrays in this area were moved to the east with standard aisle spacing, couldn't more un-altered vegetation closer to the identified population be retained and thus benefit the population?
- j) How will the spadefoot toad be protected during the decommissioning process?

Please provide Mr. Quinn's curriculum vitae.

Response

- a) Approximately 93.48 acres will be altered by either clearing and grubbing, just clearing and no grubbing, or selective clearing activities.
- b) Yes, nocturnal eyeshine surveys were conducted throughout the entire Project area, including within forested areas.
- c) This is not an isolated population, however no targeted surveys for spadefoots were conducted outside of the Project area. One spadefoot was encountered moving from west to east across Boom Bridge Road during 2018 field surveys indicating they do occur outside of the Project area. Additionally, Christopher Raithel (Rhode Island DEM-Division of Fish and Wildlife) has encountered

spadefoots in both Connecticut and Rhode Island along Boom Bridge Road on either side of the Pawcatuck River. Spadefoots will transverse forests to find new breeding areas, movements are not restricted to open areas.

Please refer to the map provided in Attachment 7 that provides additional clarification of the spadefoot locational data (located in Exhibit G – Environmental Assessment, Appendix C) and distinguishes individual toad activity from clusters of observations of a single individual.

While little is known about eastern spadefoot population sizes, research performed to date focuses on movement and habitat use patterns to better understand the conservation needs of this species. In a study conducted by Ryan et al., between 2008 and 2011 a total of 32 adult and 12 juvenile spadefoots were documented from two sites within the Quinebaug River drainage in Windham County, Connecticut. A breeding event, after just under 4 inches of rain, observed by Jeffrey Cavallaro on June 7th and 8th, documented approximately 25 breeding pairs and 10 individuals (total approximately 60 adult toads) within a breeding pool in Plainfield, CT. Brad Timm reports on 45 adults captured at four breeding wetlands in the coastal dunes of the Cape Cod National Seashore during his radio-telemetry study. Anecdotally, activity of spadefoots at the North Stonington appears much lower than those of a population in Lisbon, CT where active toads have been observed on multiple occasions where no activity was documented in North Stonington. This passive monitoring of the Lisbon population may suggest that this population has higher densities of spadefoots compared to the North Stonington population.

- d) The individuals found on-site likely belong to a larger population, however extensive surveys (198 man-hours), over the course of 11 optimal nights, were conducted throughout the proposed Project area and no additional spadefoot activity was documented. It is however, likely that adult spadefoots will and do use other areas within the proposed Project area. The study team searched for additional breeding sites through dip-net surveys in all ephemeral wetland and pooled areas within the Project site on two separate occasions during the day. These surveys took place during a time period where three breeding pools in Connecticut had documented larvae (the onsite breeding pool, 1 pool in Lisbon, and 1 pool in Plainfield). No additional breeding pools were documented during these survey efforts within the proposed Project area. The study team is confident that the core area of spadefoot activity within the proposed Project area has been identified.
- e) One pool was located just north of the existing breeding pool along the same forested edge and was likely hydrologically connected to the current pool historically. The study team believes that the restoration of the current breeding pool will adequately fulfill the breeding requirements for spadefoots in this area of the proposed Project area. The second potential breeding pool is located along the eastern edge of the agricultural field just north of the terminus of Ella Wheeler Road. This area appeared, through historic aerial imagery, to contain standing water, but during follow-up field investigation was determined to be completely altered and graded as a result of farming activities. The study team feels that attempting to re-create the appropriate breeding hydrology in this area would be

difficult and potentially create a decoy pool that could ultimately act as a population sink.

- f) The study team investigated this as a potential option to increase the number of breeding areas within the proposed Project area, but after consultation with the Petitioner's engineering team and evaluation of detailed hydrological calculations it was determined that the necessary hydrological conditions required for both breeding and larval development could not be reliably achieved. The detention basin mentioned on page 6, that is currently being used as a breeding pool in Plainfield, CT, is low flow and only manages water on a small one-acre plot of land to prevent basement flooding for one residential property.

The study team did consider expanding the no build zone easterly to incorporate the toad activity observed along the access road. However, following a detailed review of the collected survey and movement data, it was determined that the overwhelming majority of the adult and juvenile spadefoots were dispersing to the northwest from the breeding pool, in the opposite direction of the access road. Only three adults, three juveniles and 1 metamorph (21.8% of documented spadefoots) were observed in this area. As a result, it was determined that expanding the no build zone to the east would provide no significant benefit to the spadefoot population.

The study team also does not believe there would be a benefit to spadefoots if the tree line immediately adjacent to the breeding pool was left undisturbed. No spadefoot activity was documented along this edge. This is likely due to damper conditions in this area and reduced levels of sun exposure, making this area less

thermally advantageous than the edge habitats along the northern field edge where much of the spadefoot activity was observed.

- g) Yes. See Page 44 of the Environmental Assessment Report. The seed mix will be derived from this species list as specific site conditions permit at the direction of the Environmental Monitor.
- h) The vegetation will be managed through regular mowing. Due to the nocturnal activity of Eastern spadefoot toads, there is no seasonal restrictions for mowing activities for this species.
- i) There is 20 feet spacing between panel rows in a limited area just east of the breeding pool. The remainder of the spadefoot management area has panel rows spaced at 9.5 feet. The spacing of 20 feet is experimental, since there are no studies that show wide aisle spacing is beneficial (or detrimental) to spadefoot populations. In lieu of the typical approach of protecting as much habitat as possible the study team recommended a limited area of wide aisle spacing to determine if there is differential use of wide aisle spacing vs. closely spaced panels. Although not the typical approach, this idea was presented and discussed in detail with the CT Department of Energy and Environmental Protection Wildlife Division and after careful consideration determined acceptable in an attempt to further our understanding of the potential impacts solar fields may have on spadefoots. The post-construction monitoring of spadefoots will provide useful insight to the scientific community as well as regulatory agencies on how different mitigation strategies may benefit spadefoot populations, including the use of this wider aisle spacing technique.

- j) The decommissioning process will require follow-up surveys to determine how best to avoid impacts to spadefoots at that time. Developing a protection plan now for an action that would not take place for twenty years is not feasible.

Mr. Quinn's curriculum vitae is provided in Attachment 8.

Question No. 58

Is the site within the range of the Northern-long eared bat? If so, would any proposed tree clearing occur within 0.25 miles of a known northern long-eared bat hibernaculum or within 150 feet of a known occupied maternity roost tree?

Response

According to the U.S. Fish and Wildlife Service ("USFWS") New England Field Office, Northern long-eared bat's ("NLEB") range encompasses the entire State of Connecticut. Consultation with the Connecticut Department of Energy & Environmental Protection ("CTDEEP") Wildlife Division Natural Diversity Data Base *Northern long-eared bat areas of concern in Connecticut to assist with Federal Endangered Species Act Compliance map* (February 1, 2016) revealed that the proposed facility is not within 150 feet of a known occupied maternity roost tree and is not within 0.25 mile of a known NLEB hibernaculum. The nearest NLEB habitat resource to the proposed activity is located in North Branford ±47 miles to the west. This map reveals that there are currently no known NLEB maternity roost trees in Connecticut. Therefore, the proposed Project is not likely to adversely affect NLEB.

Question No. 59

Is the Project site within the New England Cottontail Focus Area? If so, has the Petitioner consulted with DEEP regarding potential Project development impacts to populations and habitat for this species?

Response

The site is located within a New England Cottontail focus area. We have not formally consulted with the CT DEEP on the impacts of the Project on New England Cottontail. The New England Cottontail inhabits shrubland/old field and immature forest. Most of the site consists of cornfield and forest which do not represent suitable cover types for this species. The Project is impacting only a small amount (approximately 2.8 acres) of habitat potentially suitable for cottontail. Such a small loss of habitat is unlikely to adversely impact this species, if present. Additionally, within the spadefoot habitat management zone the Project is converting approximately 10 acres of agricultural land to early-successional meadow and shrubland habitat that may also benefit cottontail habitat.

Question No. 60

Referring to Petition p. 23, would the Petitioner comply with any DEEP recommended seasonal construction restrictions and/or mitigation plans related to State-listed species?

Response

Yes, the Petitioner would comply with any DEEP recommended seasonal construction restrictions and/or mitigation plans related to State-listed species. The Petitioner, through its representative Dennis Quinn of CTHerp Consultant, LLC, a herpetologist with extensive experience with Eastern spadefoot toad, has been in consultation with Jenny Dickson of the DEEP Wildlife Division regarding both the ongoing monitoring plan for Eastern spadefoot toad and the proposed mitigation plan. The details of this plan were provided in Exhibit G – Environmental Assessment, Appendix C. The Petitioner is in the process of submitting these materials to DEEP as part of its formal State-listed species consultation. The other State-listed species identified during the DEEP preliminary consultation that would have a seasonal

construction restriction is red bat. As noted in the Environmental Assessment, tree clearing work would not be conducted between May 1st and August 15th to avoid impact to summer roosting bats. This season restriction for red bat is consistent with DEEP's recommendations on other projects.

Question No. 61

Referring to Petition Exhibit G, on page 12 of the Environmental Assessment, there is reference to a July 17, 2016 letter received from Dawn McKay at DEEP. Please provide a copy of the letter.

Response

A copy of the July 17, 2016 Natural Diversity Data Base Preliminary Assessment letter (NDDB No. 201607723) from Dawn McKay at DEEP is provided in Attachment 9.

Question No. 62

Referring to the June 25, 2018 DEEP comment letter on page 3, please provide a copy of the April 2017 DEEP NDDB preliminary assessment letter that requested site surveys for the listed species and protection strategies for the species identified as present or potentially present.

Response

The Petitioner has only received the July 17, 2016 Natural Diversity Data Base Preliminary Assessment letter, referenced in the response to Question No. 62. The recommendations to perform surveys for the four species identified in this letter represents fairly standard language from DEEP for these preliminary assessments. Oftentimes, as is the case for this Project, once more detailed information is provided to DEEP with respect to the Project and its potential impacts, seasonal restrictions, mitigation plans, documentation of no likely adverse impact, etc. often negates the need to perform surveys. The only State-listed species determined

to require a survey was Eastern spadefoot toad. The Petitioner has recommended a season construction restriction for red bat (refer to response to Question No. 60) and the remaining two State-listed species, sparkling jewelwing and Eastern pearlshell, are associated with the Pawcatuck River; no suitable habitat for these species is identified within the Project's development limits.

Question No. 63

Please provide a copy of any requests for an updated DEEP NDDDB assessment, as well as the results of survey work and protection strategies referenced on page 4 of the June 25, 2018 DEEP comment letter.

Response

The Petitioner is in the process of submitting these materials to DEEP as part of its formal State-listed species consultation, which will include the results of the Eastern spadefoot toad survey and recommended mitigation. The Council will be provided with a copy of this submission.

Question No. 64

What is the status of the consultation with the DEEP NDDDB?

Response

Please refer to the Petitioner's response provided to Question No. 63.

Question No. 65

Referring to Petition Exhibit A, Tree Shading Map, how was the "annual shade path" calculated/determined? What would be the managed tree/vegetation canopy height within the Shade Management Zones?

Response

The annual shade path calculation uses the average tree height to determine the impacts of shading during the hours of 10 AM to 2 PM on December 21, the winter solstice, considering the lat/long of the Site. While the ideal case is that the solar panels see no shading throughout the year, by maintaining a shade-free environment for the solar panels during the specified window, the Petitioner can still achieve economic levels of efficiency for the facility. In the shade path area, the managed canopy height would be determined with consideration to the proximate location of the solar panels. As an example, assuming a minimum distance of 30 feet from the location of trees located in the specified shade path area, the maximum canopy height required to achieve the 10 AM – 2 PM window on the winter solstice would be approximately 12 feet depending on the exact orientation of the panels in relation to the tree line.

Question No. 66

What is the length of the posts and to what depth would the posts be driven into the ground to provide structural stability? What type of posts are being used (e.g. steel, galvanized)? Are any impacts to groundwater quality anticipated from factory coatings on the posts?

Response

The total length of the posts is between 14 and 16 feet. The posts will be driven to an approximate depth of 10 to 12 feet and will be standard galvanized steel H- or I-beams. There are no impacts to groundwater quality anticipated from the coatings on the posts.

Question No. 67

Referencing the June 25, 2018 DEEP comments on page 4, how would development of the solar project impact and/or address:

- a) the potential designation of the Wood-Pawcatuck River system as a Wild and Scenic River;
- b) the EPA Sole Source Aquifer Designation of the watershed; and
- c) chronic flooding problems at locations along the Pawcatuck River.

Response

- a) The National Wild and Scenic Rivers System was established by Congress in 1968 to protect certain outstanding rivers from the harmful effects of new federal projects such as dams and hydroelectric facilities. Since then over 200 rivers or river segments have been protected nationwide, including six in New England. To be considered a “Wild and Scenic” river it must be free flowing and have at least one outstanding natural, cultural, or recreational value.

Since 2010 the Wood-Pawcatuck Watershed Association and its partners have been working to get national recognition of the Outstandingly Remarkable Values of seven rivers in southeastern New England – the Beaver, Chipuxet, Green Fall - Ashaway, Pawcatuck, Queen - Usquepaugh, Shunock, and Wood Rivers. If the rivers are designated as Wild and Scenic, the designation will give the local municipalities a voice, through the Stewardship Council and the National Park Service, in protecting the rivers’ Outstandingly Remarkable Values (ORVs) from any harmful effects of new federally funded or permitted construction or development of projects affecting the designated portions of the rivers. On June 5, 2018 the Study Committee voted to adopt the Wood-Pawcatuck Wild and Scenic Stewardship Plan.

The proposed Pawcatuck Solar Center satisfies many of the recommendations contained within the *Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan for the Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaugh, Shunock, and Wood Rivers*, dated June 2018, for the protection of the Pawcatuck River. The proposed Pawcatuck Solar Center satisfies the following stewardship plan recommendations: avoid development within the 100-foot riparian buffer to the Pawcatuck River (the Pawcatuck River bank is ± 300 feet from the nearest fence line of the proposed solar facility); avoid the direct discharge of stormwater to the Pawcatuck River; and, utilize low-impact development techniques to pre-treat stormwater runoff prior to discharging to any tributaries of the Pawcatuck River. One recommendation is to carefully site new alternative energy installations to already impacted areas. The Applicant believes this solar project satisfies the intent of this recommendation by principally using existing cultivated fields (impact areas) for siting this solar facility. It should also be pointed out that elimination of the current farming practices on this property will eliminate an existing non-point source of pollution caused by the untreated stormwater runoff from the agricultural fields which eventually discharge to the Pawcatuck River.

- b) The EPA defines a Sole Source Aquifer (“SSA”) as one which supplies at least 50% of the drinking water consumed in the area overlying the aquifer. EPA guidelines also require that these areas have no alternative drinking water sources(s) which could physically, legally, and economically supply water to all who depend on the aquifer for drinking water. The Safe Drinking Water Act gives EPA the authority to designate aquifers which are the sole or principal

drinking water source for an area, and which, if contaminated, would create a significant hazard to public health. After a SSA is designated, no commitment for federal financial assistance may be provided for any project which the EPA determines may contaminate the aquifer through its recharge area so as to create a significant hazard to public health. An additional benefit of designating an area as a SSA is the increased public awareness of the nature and value of local ground water resources.

The proposed Pawcatuck Solar Center is located in the southeastern portion of the Pawcatuck River SSA, which occupies ±300 square miles in southwestern Rhode Island and southeastern Connecticut. Please refer to the Pawcatuck River Sole Source Aquifer Map provided in Attachment 10. Within the watershed limits of the SSA, there is a localized stratified drift aquifer adjacent to the Pawcatuck River, of which portions extend onto the far southern and eastern portions of the Project site. Please refer to the Surficial Aquifer Potential Map provided in Attachment 11. All solar panels are contained in a solid matrix, are insoluble and are enclosed. Therefore, releases are not a concern. Also, a comprehensive erosion and sedimentation control plan and stormwater management plan will avoid sedimentation releases and will provide for appropriate treatment of stormwater runoff that will avoid possible water quality impacts that could affect the SSA.

- c) The intent of the storm water design as per the applicable Connecticut standards is to ensure that post-construction runoff from the site mimics, or improves upon, the pre-construction conditions in terms of water volume and peak flow. As

shown in Exhibit D of the Petition, the development is anticipated to maintain or improve peak discharge rates in all watershed locations in the 10-, 25-, and 100-year storm conditions. Thus, it would follow that the development will not contribute to any existing flooding issues.

Question No. 68

Referencing the June 25, 2018 DEEP comments on page 2, for the crossing of Wetland 1, at what point would the road cross the wetland? If the crossing is in the area of concern in the comments, could the road crossing be moved to the north or south? Provide a drawing detail for the crossing area.

Response

At least a portion of the proposed crossing location in Wetland 1 would occur within 'dense' vegetation noted on page 2 of the referenced June 25, 2018 DEEP comment letter. The road crossing could be shifted slightly to the north or south to avoid this dense vegetation area. This slight shift in the road crossing of Wetland 1 could be made in the field during construction at the direction of an Environmental Monitor based on actual field conditions. It is anticipated that this slight shift would not substantially change the wetland impacts associated with the proposed road crossing by more than 100 square feet. A detail drawing of the proposed wetland crossing is provided in an updated set of Grading and Drainage Plans, dated April 18, 2018 included in Attachment 12. Four (4) full size (24" x 36") sets of the Updated Grading and Drainage Plans are also attached as a bulk file exhibit.

Facility Construction

Question No. 69

How does the Petitioner anticipate construction phasing? Given the large size of the

LOD, different types of terrain cover, separate solar array areas, and localized detention basins and sediment traps, would the solar field areas be constructed in distinct sections? Please be as specific as possible with regard to site phasing and work tasks in each phase. Does proposed phasing account for possible seasonal construction restrictions due to the presence of protected species?

Response

A Construction Sequence was provided on sheet C-720 of the plan set that provided the general phasing that was anticipated. The Project intends to create a more detailed construction sequence in both a written format as well as providing a set of Phased Erosion and Sedimentation (“E&S”) Control Plans that will provide a visual of the anticipated sequence of construction. These phased plans would also be able to provide the contractor with access routes into and around the site during each phase to help reduce overall site compaction and help to protect the proposed erosion control features during each phase. This more detailed construction sequence will work to take into account seasonal construction restrictions in the areas where required due to the presence of protected species.

It is anticipated that the site as a whole would be divided up in to distinct sections (i.e. Northeast Section, Northwest Section, and South Section) and each section would have a sequence of construction that pertained to the work that was occurring specific to it. It is anticipated that these sections will be divided up based on the contributing watersheds as that will be factor in the E&S Design.

To provide the Council with a more detailed construction sequence that may be expected we have prepared a sample anticipated construction sequence below for the Northeast Section of the site that has a majority of the proposed clearing work. Note that the below section assumes

items such as, Pre-Construction Meeting, Construction Entrance Installing, etc. would have been completed.

Northeast Section (Sample Anticipated Construction Sequence)

NE Phase 1

1. Flag Access Routes to and through Northeast Section
2. Flag Clearing Limits required for the installation of Sediment Basins, Temporary Diversion Swales, and other E&S Control Measures as defined on the Plans
3. Perform Clearing and Grubbing in Flagged Area defined above
4. Install Perimeter E&S Control Measures (Compost Sock, Fiber Roll, Silt Fence)
5. Inspect Perimeter Control Measures
6. Install and Temporarily Stabilize Sediment Basins (Future Stormwater Basins)
7. Install Temporary Diversion Swales (Future Permanent Swales)
8. Perform Implementation Inspection on E&S Measures installed above and receive sign off that they were installed per plan.
9. Staged Clearing Sequence
 - 9.1. Flag Staged Clearing Limits as shown on the plans.
 - 9.2. Clear Stage 1
 - 9.3. Grub Stage 1
 - 9.4. Perform Grading and Earthwork in Stage 1
 - 9.5. Clearing for Stage 2 (This work can start at same time as Stage 1 Grading and Earth works)
 - 9.6. Temporarily Stabilize Stage 1
 - 9.7. Grub Stage 2

- 9.8. Perform Grading and Earthwork in Stage 2
- 9.9. Clearing for Stage 3 (This work can start at same time as Stage 1 Grading and Earth works)
- 9.10. Temporarily Stabilize Stage 2
- 9.11. Gurb Stage 3
- 9.12. Perform Grading and Earthwork in Stage 3
- 9.13. Temporarily Stabilize Stage 3
10. Install Access Roads and Equipment Pads
11. Install Racking Posts
12. Perform Trenching and Install Conduits
13. Install Racking
14. Install PV Panels
15. Final Grading Repairs
16. Final Access Road Repairs
17. Initial Cleaning and Repair of Permanent Drainage Features used for E&S Controls
18. Final Seeding and Watering as required to achieve growth and Permanent Stabilization
19. Permanent Stabilization is deemed established per the Stormwater Pollution Control Plan
20. Monitor Section for 3 Months
21. Final Adjustments and Cleaning of Permanent Drainage Features used for E&S Controls

22. Removal of Remaining Temporary E&S Controls for the Section

Question No. 70

Petition Exhibit G p. 29, Section 3.5, states that, “A gravel staging and parking area is planned along the north side of the access drive at the northwestern end of the Site.” Will this location also be used as a clean out site for cement trucks following the foundation pours for the inverters and transformers? Is the gravel staging area a permanent feature?

Response

A designated concrete washout area will be located within the gravel staging and parking area. Concrete washout areas will have sufficient capacity to retain liquid and solid waste and shall be disposed of properly offsite once construction is completed. The exact location shall be determined by the Project contractor. Gravel staging is set up for the construction of the Project and will remain in a service staging area once construction is completed.

Question No. 71

Petition p. 16 states initial engineering efforts focused on stormwater and erosion control design. Are these features contained within the “Stormwater Engineering Concept Report”? Has the project been designed to properly contain runoff during construction from high intensity, short duration storms? If so, would these measures require controls sized differently than those specified in the concept report? Please describe these measures.

Response

Stormwater analysis and designed management control are contained within the Stormwater Engineering Concept Report. The controls listed in this concept report have been designed to meet the design criteria from the 2004 Connecticut Stormwater Quality Manual. The controls on these stormwater management basins have been designed to pass the 2, 10, 25, and

100 year-24 hour storm events. The swales and other conveyance measures will be evaluated to flow reaches the stormwater management basins prior to leaving the site. Furthermore, the Project will evaluate the United States Department of Agriculture, Natural Resources Conservation Service National Engineering Handbook Part 630 Hydrology Chapters, Chapter 4 Storm Rainfall Depth and Distribution (Draft) September 2015 to determine if the site should develop a synthetic rainfall distribution for a shorter duration high intensity storm.

Question No. 72

Sheet 801 of the Stormwater Engineering Concept Report, shows post-construction vegetative cover types 59 and 72. Why are two different codes used for vegetation within the solar field areas?

Response

Per the USDA Web Soil Survey contained in the Stormwater Engineering Concept Report the northeast and south areas of the Project are primarily Hydrologic Soil Group B, while the northwest is significantly Hydrologic Soil Group C. The Curve Number difference on C-801 is a result of the difference in soil type for the same post-construction vegetative cover.

Question No. 73

What is the final vegetative cover with in solar field area? Is the selected vegetation a fast growing or slow growing? How would the final cover be applied, standard seeding or through hydro-seeding?

Response

Final vegetative cover will be a seed mix conforming to Figure TS-2 of the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. The final vegetation will be tailored to solar fields and will be a slow growing meadow type seed mixture. Planting of the

seeds will likely be a combination of drill seeding and hydro-seeding.

Question No. 74

What effect would runoff from the solar panel drip edge have on site drainage patterns?

Would channelization below the drip edge be expected?

Response

Given that the panels are mounted to trackers that track the sun from east to west, there is less opportunity for concentrated drip edge runoff to occur than on a fixed-tilt racking system, though the Petitioner acknowledges that the tracker will not be operating in the night time hours. Channelization below the drip edge is not expected as the water hitting the ground from the solar panel will be just as it would during a rain event, additionally the flow off the panels will be flowing mostly perpendicular to the existing grades.

Question No. 75

Petition Exhibit C Erosion and Control Plans (700 series) shows numerous swales directing runoff to basins and sediment traps. What is the minimum and maximum allowed slope for the swales?

Response

The minimum swale slope to the extent practical will be 1% in order to prevent ponding within the swale. The maximum swale slope onsite for the Project is equal to the existing slope of the land. During the construction phase of the Project swales will be protected from erosion as required, utilize features such as armoring, check dams, velocity dissipaters, and other BMPs.

Question No. 76

Petition Exhibit C - Erosion and Control Plans (700 series) show a reference to "Trees to be cleared and stabilized immediately" with differing corresponding detail notes. Is there a

specific reference note detail for tree clearing? If so, provide.

Response

The note on C-102 referencing C-720 was a mistake as it is pointing to an area that is to be cleared but not stumped or grubbed so no stabilization is expected in this area.

Question No. 77

Petition Exhibit C - Sheet 701 depicts fiber rolls along the hillside that terminate at proposed solar array access ways. What is preventing stormwater from flowing downslope along the fiber rolls then directly down each access way? Assuming the access ways would be rutted by vehicles, could this cause direct, high velocity channelization?

Response

The Petitioner has updated its Grading and Drainage plans, dated 4/18/18, and fiber rolls have been removed in the latest drawing of C-701. (*See Updated plans are included in Attachment 12*). However, note that, if required to help break up some of the long flows down the slope, the fiber rolls would be placed on contour to avoid channelization.

By placing the fiber rolls on contour, they will be perpendicular to the flow of stormwater on site, as such they will help to reduce the channelization of water.

The access ways through the site will be defined and stabilized to reduce the potential of rutting on site. Since rutting could be attributed to erosion it will be noted in the SWPCP that rutting will be required to be repaired during construction operations.

Question No. 78

Petition Exhibit C Sheet C-002 SWPPP Note 6 states all bare soil not worked on within 14 days will be seeded or mulched. Are seeded grasses effective in providing temporary soil stability and infiltration if these stabilized areas will be subsequently impacted by vehicles and

construction equipment?

Response

If such areas will be subsequently impacted by vehicles and construction equipment, the Petitioner would not propose that they be stabilized. In the case that an area is, for some reason, impacted after it has been temporarily stabilized, the disturbance will be noted and re-stabilization efforts will follow. It is anticipated that a combination of seed and mulch would be used for stabilization which is expected to be effective in providing soil stability while also promoting infiltration. Note that construction phasing will seek to minimize the number of exposed areas to the fullest extent practicable at all times.

Question No. 79

If site clearing and construction work is conducted during winter months, what additional erosion and sedimentation controls would be deployed to control potential accelerated runoff due to frozen or partially frozen ground?

Response

If the Project is subject to winter construction additional measures will be required for construction, as an item like Silt Fence cannot be typically installed when the ground is frozen. Other measures such as compost filter socks or haybale-stoned berms may be required. Additional measures can also be note for the maintenance of Erosion and Control measures such as checking for snow and ice build-up that could lead to issues during the winter months.

Question No. 80

Petition p. 17 states earth work is necessary for equipment tolerances. What tolerances are necessary? What is the desired slope within the solar array area?

Response

The array tracker specified has a 6% North-South maximum tolerance slope. Earthwork is required to meet these tolerances within the array area. The east/west slope tolerance is much higher but practically limited to approximately 15% by installation equipment.

Question No. 81

Estimate the amounts of cut and fill in cubic yards for a) access roads and b) general site grading, if applicable.

Response

See quantities on C-001 of Exhibit C in the Petition. Note that civil analysis balances the cut/fill quantities to avoid soil import or export. Access roads will require approximately 17,000 CY of raw cut/fill. General site grading will require approximately 150,000 CY of raw cut/fill.

Question No. 82

What is the average depth to groundwater within the Project area?

Response

The Petitioner commissioned a Geotechnical Engineering Survey, which was completed in January 2018. The survey consisted of 8 standard penetration test (SPT) borings to depths of approximately 17 feet below ground surface (BGS), and 10 test pits that were excavated to depths of approximately 10 feet BGS. Groundwater was observed in two of the borings at locations of 11 to 13 feet BGS (perched) and 16 feet BGS, respectively. Groundwater was observed in three of the test pits at depths of 6 feet BGS, 6 feet BGS, and 9 feet BGS, respectively.

Question No. 83

Are there any known off-site private water wells near the LOD? If so, how would the

petitioner protect the wells and/or water quality from construction impacts or vibrations?

Response

There are no known off-site private water wells near the LOD, nor are any expected given that the array location is well-buffered from adjacent residences. Additionally, it is anticipated that groundwater flow would be toward the Pawcatuck River on the southern boundary of the site, and no residences exist between the Project location and the river. Project development is not expected to impact the groundwater adversely.

Question No. 84

Petition Exhibit G, Appendix E Wetland and Vernal Pool Protection Plan Section 6 mentions “any incidents of sediment release into the wetland resource areas shall will be reported within 24 hours to the Town of Branford Inland Wetlands Director.” Please clarify. The text states daily inspection reports will be prepared by the Environmental Monitor. Is the Environmental Monitor on-site daily to report on compliance issues? If not, what individual will be responsible for examining both the erosion and sediment controls and species protection measures on a daily basis? Would this individual be recording written observations using a daily report form?

Response

The reference to the Town of “Branford” was in error and the correct reference should have been “any incidents of sediment release into the wetland resource areas will be reported within 24 hours to the Connecticut Siting Council.”

The term “daily inspection report” is a reference to a report generated by the Environmental Monitor for the particular day the inspection was performed. It is not meant to be representative of inspections made “daily” by the Environmental Monitor, who would

periodically inspect the Project to ensure compliance with species protection plans. During the pre-construction meeting with the contractor and construction management team, requirements for species protection measures (among others, including wetland and vernal pool resources), the Environmental Monitor will stress the need for daily monitoring by the contractor and/or construction management team for maintenance of all erosion and stormwater controls and should any species observations or concerns arise the need to immediately contact the Environmental Monitor. The Environmental Monitor would then follow up with an inspection and make note of any observations or concerns in that “daily” inspection report.

Question No. 85

Petition Exhibit G, Appendix E Wetland and Vernal Pool Protection Plan Section 5 mentions the possible use of pesticides and herbicides at the site. When and where would these substances be used?

Response

The Petitioner does not anticipate the need to apply pesticides or herbicides at the site. It is unlikely that pesticides would ever need to be used at the site since the proposed seed mix and mitigation plantings include a broad spectrum of species, including native plants, such that even if some insect damage is observed it likely will not have an overall effect on the establishment of permanent vegetation at the site. The use of herbicides may be necessary, but the application would likely only be associated with the control of non-native invasive plants should they have an adverse impact on the establishment of native plants, particularly within the proposed mitigation areas. However, other strategies would be considered first before choosing to use pesticides.

Question No. 86

What is the status of the stormwater design? Could the Project footprint be reconfigured to avoid siting the solar array on steeply sloped areas, particularly in the northeastern portion of the site?

Response

The stormwater design as represented in the Stormwater Engineering Concept Report is approximately 80% complete. The Project footprint could not be reconfigured to avoid siting the solar array on the sloped areas in the northeastern area of the site. While these locations are less ideal for use as part of the array footprint when compared to a flat site location, the current site design represents the most reasonable balance of protection of the Spadefoot Toad, protection of the centrally-located vernal pool (using associated Best Development Practices), and project efficiency/economics. The Petitioner has given special consideration to stormwater and erosion control in the area where steeper slopes are present on site and believes the controls specified will provide more-than-adequate protection against potential issues.

Question No. 87

Does the project construction schedule account for:

- a) seasonal wildlife restrictions;
- b) site stabilization;
- c) phased implementation of stormwater controls; and
- d) weather delays?

Response

The Project Construction Schedule included in the Petition does account for seasonal wildlife restrictions, the implementation of stormwater controls and site stabilization to the

extent that they are known at this time. The Project's Construction Schedule remains focused but may need to be adjusted as development progresses.

Maintenance Questions

Question No. 88

Petition p. 18 mentions an Operations and Maintenance (O&M) Plan. Has a preliminary O&M Plan been prepared? If so, please submit.

Response

An Operations and Maintenance (O&M) Plan has not yet been prepared for this Facility. All O&M assumptions are based on site-specific environmental information, and the Petitioner's experience with other solar facilities in this area of the country.

Question No. 89

Would any mowing be required under or around the proposed solar panels/modules, and if so, approximately how often would mowing occur? Would the petitioner adhere to any seasonal restrictions due to the presence of any protected species?

Response

Mowing would be completed on a regular basis, average every two months, depending on the growth rate of grasses on site. Note that a low maintenance seed mix that includes some native plants has been specified for use between and underneath the solar panels to minimize mowing required and avoid shading of the panels. In the Summer months, mowing is typically more frequent but the Petitioner would adhere to any seasonal restrictions noted in the Environmental Assessment.

Question No. 90

Describe the type and frequency of vegetation management for the site. Include areas

inside and outside of the perimeter fence, as well as detention basins and swales.

Response

Vegetation will be mowed, as needed (typically every 6 to 8 weeks), inside and along the perimeter fence and within detention basins and swales. Vegetation within the area leased by the Project and outside the perimeter fence will also be maintained as required for operations, but with consideration to the need for a soft eco-tone transition between remaining cleared and forested areas. The Spadefoot Habitat Management Zone will be maintained in accordance with the EA plans provide to the Council.

Question No. 91

Referencing Page 28 of Exhibit G, indicate the location, type, and purpose of the proposed landscaping. What nearby visual receptor would be able to view the Project?

Response

This language was included in the Petition in error. No landscaping is proposed for this Project, due to its well-shielded location with few nearby residences.

Question No. 92

What type of annual maintenance is required for the rack/tracking system? Are the solar array access aisles of a sufficient width to facilitate required maintenance activities?

Response

Annual routine maintenance will be performed on the tracker motors and arms as specified by the manufacturer. Row spacing is sufficient to allow for proper maintenance of the tracking system.

Question No. 93

Would the installed solar panels require regular cleaning to remove dust, dirt, bird

droppings etc.? How would this be accomplished? Would any chemicals be used or only water?
Would this maintenance activity have any impact to adjacent wetlands, watercourses or groundwater?

Response

Due to ample precipitation throughout the year in this location, the Petitioner does not anticipate the need for panel washing.

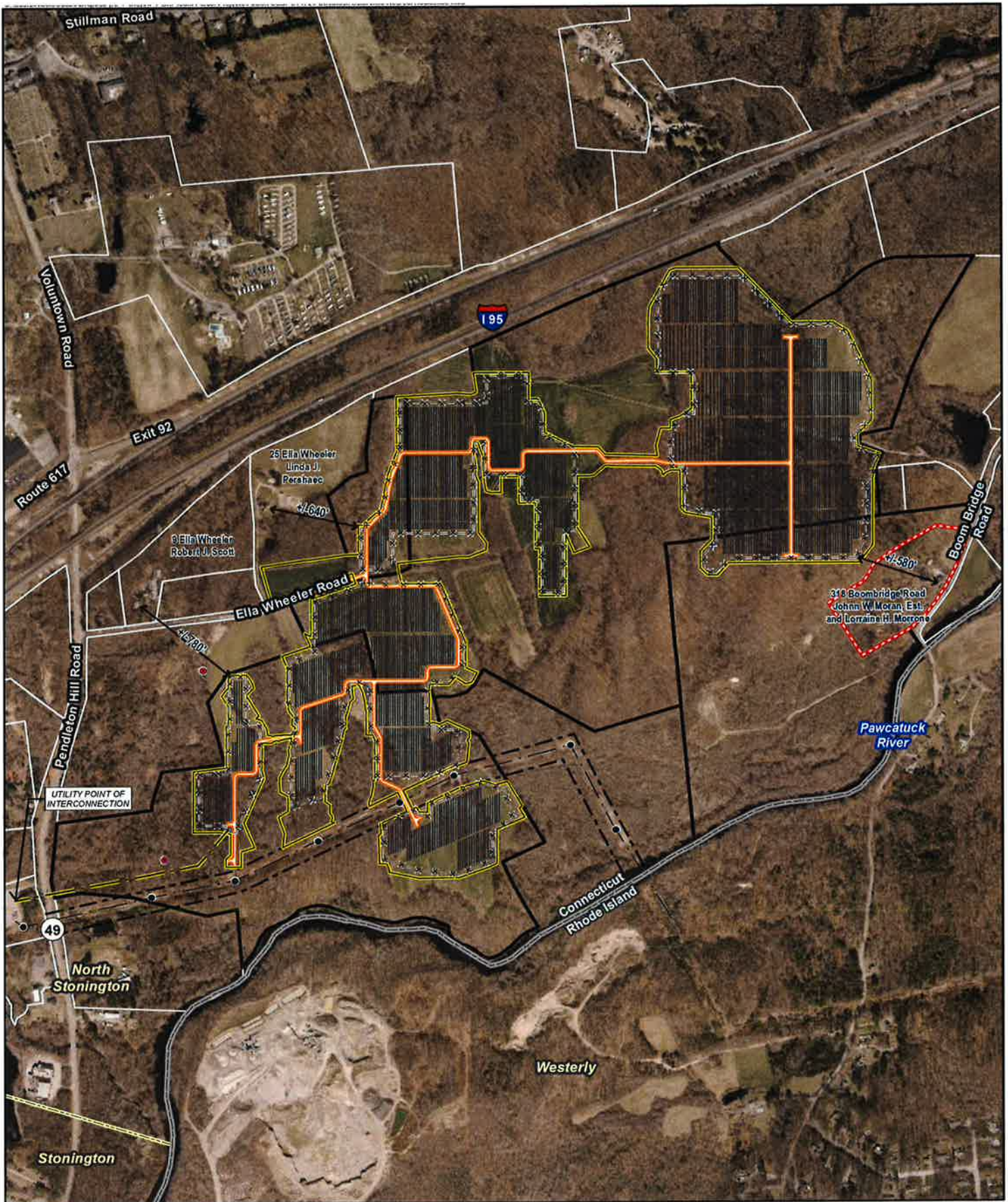
Question No. 94

Would the petitioner store any replacement modules on-site in the event solar panels are damaged by hail, prey shells or other impact hazards? How would damaged panels be detected?

Response

Yes, spare modules will be stored onsite. There will be a locked storage container within the perimeter fence for storing spare parts.

ATTACHMENT 1



- Legend**
- Site
 - Project Area
 - Nearest Residence
 - Approximate Parcel Boundary
 - Module
 - Perimeter Fence
 - Access Road
 - Proposed Overhead Tie Line Corridor
 - Transmission Line
 - Approximate Transmission Right-of-Way
 - Transmission Tower
 - Culvert
 - Town Line
 - State Line

Nearest Residence Map

Proposed Pawcatuck Solar Center
 Ella Wheeler Road
 North Stonington, Connecticut

Map Notes:
 Base Map Source: CTECO 2016 Aerial Photograph
 Map Scale: 1 inch = 900 feet
 Map Date: July 2018









ATTACHMENT 2



MAXPOWER (1500 V) CS6U-325 | 330 | 335 | 340M

Canadian Solar's new 1500 V module is a product for high voltage systems, which can increase the string length of solar systems by up to 50%, saving BOS costs.

KEY FEATURES

-  Designed for high voltage systems of up to 1500 V_{DC}, saving on BoS costs
-  Cell efficiency of up to 20.0 %
-  Outstanding low irradiance performance: 96.5 %
-  High PTC rating of up to 91.7 %
-  IP67 junction box for long-term weather endurance
-  Heavy snow load up to 5400 Pa, wind load up to 2400 Pa

25 years linear power output warranty

10 years product warranty on materials and workmanship

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001:2008 / Quality management system
ISO 14001:2004 / Standards for environmental management system
OHSAS 18001:2007 / International standards for occupational health & safety

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730: VDE / CE
UL 1703 / IEC 61215 performance: CEC listed (US)
UL 1703: CSA / IEC 61701 ED2: VDE / IEC 62716: VDE / Take-e-way



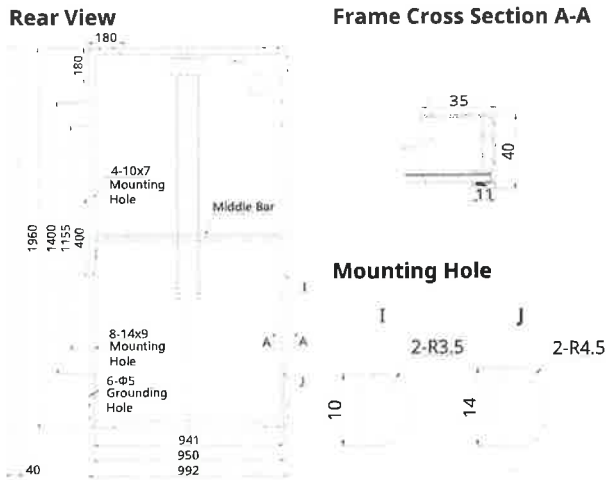
* As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. As a leading PV project developer and manufacturer of solar modules with over 15 GW deployed around the world since 2001, Canadian Solar Inc. (NASDAQ: CSIQ) is one of the most bankable solar companies worldwide.

CANADIAN SOLAR INC.

545 Speedvale Avenue West, Guelph, Ontario N1K 1E6, Canada, www.canadiansolar.com, support@canadiansolar.com

ENGINEERING DRAWING (mm)



ELECTRICAL DATA | STC*

CS6U	325M	330M	335M	340M
Nominal Max. Power (Pmax)	325 W	330 W	335 W	340 W
Opt. Operating Voltage (Vmp)	37.4 V	37.5 V	37.8 V	37.9 V
Opt. Operating Current (Imp)	8.69 A	8.80 A	8.87 A	8.97 A
Open Circuit Voltage (Voc)	45.8 V	45.9 V	46.1 V	46.2 V
Short Circuit Current (Isc)	9.21 A	9.31 A	9.41 A	9.48 A
Module Efficiency	16.72 %	16.97 %	17.23 %	17.49 %
Operating Temperature	-40°C ~ +85°C			
Max. System Voltage	1500 V (IEC) or 1500 V (UL)			
Module Fire Performance	TYPE 1 (UL 1703) or CLASS C (IEC 61730)			
Max. Series Fuse Rating	15 A			
Application Classification	Class A			
Power Tolerance	0 ~ + 5 W			

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.

ELECTRICAL DATA | NOCT*

CS6U	325M	330M	335M	340M
Nominal Max. Power (Pmax)	235 W	238 W	242 W	245 W
Opt. Operating Voltage (Vmp)	34.1 V	34.2 V	34.5 V	34.6 V
Opt. Operating Current (Imp)	6.88 A	6.96 A	7.01 A	7.10 A
Open Circuit Voltage (Voc)	42.0 V	42.1 V	42.3 V	42.4 V
Short Circuit Current (Isc)	7.46 A	7.54 A	7.62 A	7.67 A

* Under Nominal Operating Cell Temperature (NOCT), irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

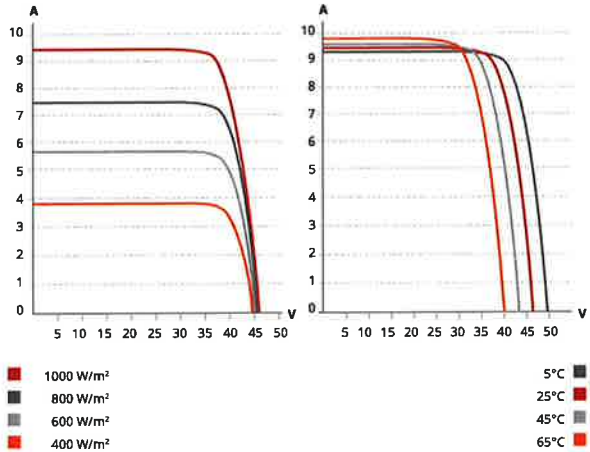
PERFORMANCE AT LOW IRRADIANCE

Outstanding performance at low irradiance, average relative efficiency of 96.5 % from an irradiance of 1000 W/m² to 200 W/m² (AM 1.5, 25°C).

The specification and key features described in this datasheet may deviate slightly and are not guaranteed. Due to on-going innovation, research and product enhancement, Canadian Solar Inc. reserves the right to make any adjustment to the information described herein at any time without notice. Please always obtain the most recent version of the datasheet which shall be duly incorporated into the binding contract made by the parties governing all transactions related to the purchase and sale of the products described herein.

Caution: For professional use only. The installation and handling of PV modules requires professional skills and should only be performed by qualified professionals. Please read the safety and installation instructions before using the modules.

CS6U-335M / I-V CURVES



MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline, 6 inch
Cell Arrangement	72 (6 × 12)
Dimensions	1960 × 992 × 40 mm (77.2 × 39.1 × 1.57 in)
Weight	22.4 kg (49.4 lbs)
Front Cover	3.2 mm tempered glass
Frame Material	Anodized aluminium alloy
J-Box	IP67, 3 diodes
Cable	PV1500DC-F1 4 mm ² (IEC) & 12 AWG 2000 V (UL), 1160 mm (45.7 in)
Connector	T4 series or PV2 series
Per Pallet	26 pieces, 635 kg (1400 lbs)
Per container (40' HQ)	624 pieces

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.41 % / °C
Temperature Coefficient (Voc)	-0.31 % / °C
Temperature Coefficient (Isc)	0.053 % / °C
Nominal Operating Cell Temperature	45±2 °C

PARTNER SECTION



ATTACHMENT 3



DuraTrack[®] HZ v3

RELIABILITY IS POWER.

167×

fewer components than
competitive trackers

25,000+

Megawatt Years of Operation

ARRAY TECHNOLOGIES, INC.

3901 Midway Place NE
Albuquerque, NM 87109 USA

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+1 855.TRACKPV (872.2578)
+1 505.881.7572

sales@arraytechinc.com

arraytechinc.com

THE MOST RELIABLE TRACKER UNDER THE SUN

HIGHEST POWER DENSITY.

Higher density means more power and more profit. DuraTrack HZ v3 offers the unique ability to maximize the power density of each site, boasting 6% more density than our closest competitor.

LEADING TERRAIN ADAPTABILITY.

Uneven terrain? Hill yes! Our flexibly linked architecture, with articulating driveline joints and forgiving tolerances, create the most adaptable system in market for following natural land contours and creates the greatest power generation potential from every site.

FEWER COMPONENTS. GREATER RELIABILITY.

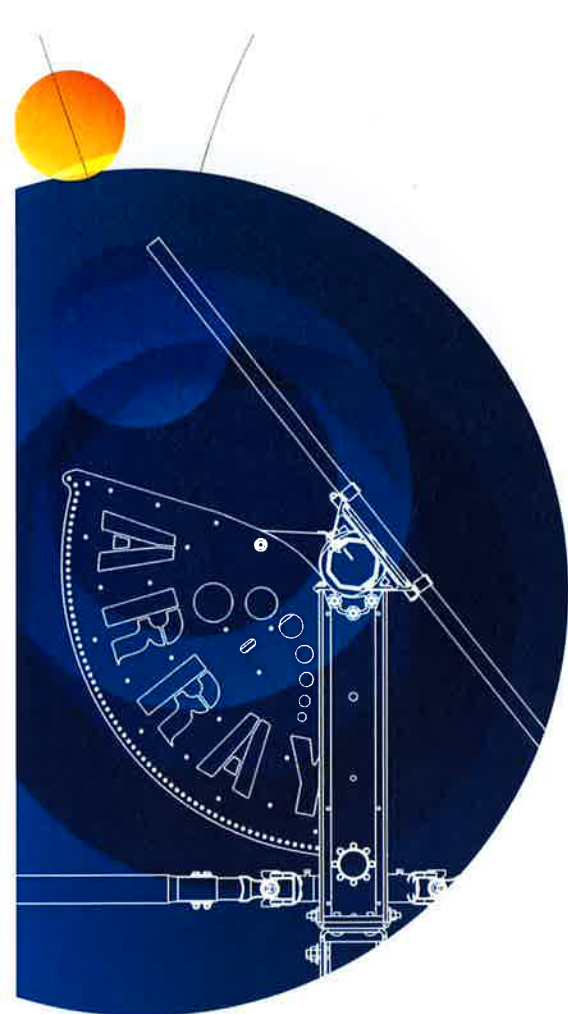
Less is more. Array was founded on a philosophy of engineered simplicity. Minimizing potential failure points (167 times fewer components than competitors), DuraTrack HZ v3 consistently delivers higher reliability and superior uptime.

FAILURE-FREE WIND DESIGN.

DuraTrack HZ v3 was designed and field tested to withstand some of the harshest conditions on the planet. It is the only tracker on the market that reliably handles wind events with a fully integrated, fully automatic wind-load mitigation system.

ZERO SCHEDULED MAINTENANCE.

Three decades of solar tracker system design, engineering and testing has resulted in uncompromising reliability. Maintenance-free motors and gears, fewer moving parts, and industrial-grade components means maintenance-free energy generation.



DuraTrack® HZ v3

COST VERSUS VALUE

We believe value is more than the cost of a tracking system. It's about building with forgiving tolerances and fewer parts so construction crews can work efficiently. It means protecting your investment with a failure-free wind management system. It also includes increasing power density. But most of all, value is measured in operational uptime, or reliability.

THE GLOBAL LEADER IN RELIABILITY

Array has spent decades designing and perfecting the most reliable tracker on the planet. Fewer moving parts, stronger components and intelligent design that protects your investment in the harshest weather are but a few of the innovative differences that keep your system running flawlessly all day and you resting easy at night.

STRUCTURAL & MECHANICAL FEATURES/SPECIFICATIONS

Tracking Type	Horizontal single axis
MW per Drive Motor	Up to 1.036800 MW DC using 360W crystalline
String Voltage	Up to 1,500V DC
Maximum Linked Rows	32
Maximum Row Size	90 modules crystalline, 90 modules glass-on-glass, 240 modules First Solar 4, 72 modules First Solar 6
Drive Type	Rotating gear drive
Motor Type	2 HP, 3 PH, 480V AC
Motors per 1 MW DC	Less than 1
East-West / North-South Dimensions	Site / module specific
Array Height	54" standard, adjustable (48" min height above grade)
Ground Coverage Ratio (GCR)	Flexible, 28-45% typical, others supported on request
Terrain Flexibility	N-S tolerance: 0° - 8.5° standard, 15° optional Driveline: 40° in all directions
Modules Supported	Most commercially available, including frameless crystalline and thin film
Tracking Range of Motion	± 52° standard, ± 62° optional
Operating Temperature Range	-30°F to 140°F (-34°C to 55°C)
Module Configuration	Single-in-portrait standard. Two-or-three in landscape (framed or frameless), four-in-landscape (thin film) also available.
Module Attachment	Single fastener, high-speed mounting clamps with integrated grounding. Traditional rails for crystalline in landscape, custom racking for thin film and frameless crystalline per manufacturer specs.
Materials	HDG steel and aluminum structural members
Allowable Wind Load (IBC 2012)	135 mph, 3-second gust exposure C
Wind Protection	Passive mechanical system relieves wind and obstruction damage — no power required

ELECTRONIC CONTROLLER FEATURES/SPECIFICATIONS

Solar Tracking Method	Algorithm with GPS input
Control Electronics	MCU plus Central Controller
Data Feed	MODBUS over Ethernet to SCADA system
Night-time Stow	Yes
Tracking Accuracy	± 2° standard, field adjustable
Backtracking	Yes

INSTALLATION, OPERATION & MAINTENANCE

PE Stamped Structural Calculations & Drawings	Yes
On-site Training & System Commissioning	Yes
Connection Type	Fully bolted connections, no welding
In-field Fabrication Required	No
Dry Slide Bearings & Articulating Driveline Connections	No lubrication required
Scheduled Maintenance	None required
Module Cleaning Compatibility	Robotic, Tractor, Manual

GENERAL

Annual Power Consumption (kWh per 1 MW)	400 kWh per MW per year, estimated
Land Area Required per 1 MW	Approx. 4 to 4.5 acres per MW @ 33% GCR (site and design specific)
Energy Gain vs. Fixed-Tilt	Up to 25%, site specific
Warranty	10 year structural, 5 year drive & control components
Patent Numbers	US patent 8,459,249 US patent 9,281,778 US patent 9,581,678 B2 and patents pending
Codes and Standards	UL Certified (3703 & 2703)

ATTACHMENT 4

A partner you can trust.

Bankability. Reliability. Serviceability.

TMEiC, a multi-billion \$ joint venture between Toshiba & Mitsubishi-Electric, is a global leader for PV inverter technology innovation.

Bankability

The financial strength you need in an inverter partner. TMEiC is a diversified industrial systems company, serving steel, oil & gas, mining, container crane and a wide variety of power electronics applications.

- #1 market share leader in the Japanese market and #1 worldwide for inverters >99KW
- More than 9,000 MW of PV inverters installed world-wide
- Over 30 years of PV inverter manufacturing and R&D experience

Reliability

A level above the competition. TMEiC was the first company to implement advanced 3-level NPS topology and an advanced hybrid cooling system for PV central inverters.

- First central inverter to achieve 99% maximum efficiency
- Heatpipe-based cooling minimizes particle entrance, increasing uptime & reducing O&M cost
- With over 9,000 MW installed, TMEiC has only had two IGBT field failures.

Serviceability

We're there when you need us! TMEiC's well proven technology is further enhanced with the industry's leading service structure.

- 24/7 US based phone support
- Comprehensive customer training system
- Extended warranty of up to 20 years
- Optional performance guarantee

Global Locations



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2060 Cook Dr., Salem, VA 24153 • +1 (540) 283-2000
Email: SolarPV@tmeic.com • www.tmeic.com

Contents subject to change without notice
The Samurai Series name is used by TMEiC exclusively in North America.
Photo courtesy of Signal Energy

TMEiC

We drive industry

SOLAR WARE® Samurai Series

Up to 3200 kW, 1500V



The world's first 1500VDC
PV inverter certified to UL1741

TMEiC

P-1307-V
Revised March 2017

SOLAR WARE® SAMURAI

Four Power Classes

- 3200 kW – 3200 kVA (1500 V)
- 2700 kW – 2700 kVA (1500 V)
- 2500 kW – 2500 kVA (1500 V)
- 1833 kW – 2000 kVA (1000 V)

1500Vdc Series

- UL 1741 Certified
- Reduces cable mass to minimize cost & enhance flexible plant design
- Reduces combiner box and number of inverters

Award Winning Central Inverters for the Solar Industry

- Advanced multilevel inverter - 56% of switching loss reduction
- Maximized and optimized efficiency at high load
- Wide MPPT range allowing for best in class DC/AC Ratios
- Flexible DC-input configuration to meet complex array configuration

Maximize Revenue & Improve ROI

- High-yield power generation – Maximum efficiency of 99%
- High-efficiency in any weather
- Realize large capacity with fewer inverters
- Reduce site work and BOS investment

Grid Connection Features

TMEIC developed the grid connection features working with Japanese power companies. All of TMEIC's utility scale inverters include the latest interconnection technology. These features include:

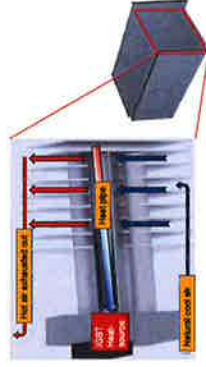
- Power factor control
- Reactive/Active power control
- TMEIC's proprietary anti-islanding technique utilizes a slip mode frequency shift method
- Advanced Fault Ride Through Features

Advanced Hybrid Cooling System

The first heat pipe air-cooled PV inverter
Utilizing TMEIC heat pipe technology, the inverter runs without fan operation up to 50% load. Heat-pipe cooling significantly simplifies thermal management, because it uses fewer parts and only a slow-speed fan with a heat pipe heat sink. TMEIC's advanced hybrid cooling solution:

- Simple & Robust
- High Reliability
- Significantly reduces O&M costs
- Small Footprint

The Fan-less mode runs when the inverter is below 50% load @ 50°C. Natural convection provides necessary cooling. Cool air enters from the bottom, flows through the heat pipe, and hot air is exhausted from the top.



SPECIFICATIONS

Type	PVL-L0833GR	PVL-L1833GRQ	PVL-L1833GRM	PVH-L2500GR	PVH-L2700GR	PVH-L3200GR
Rated Power	833 kW	1667 kW	1833 kW / 2000 kVA	2500 kW / 2500 kVA	2700 kW / 2700 kVA	3200 kW / 3200kVA
Rated Voltage (3-phase)	418V +10%, -12%	418V +10%, -12%	418V +10% ¹	550V +10% ¹	600V +10% ¹	600V (+10%, -12%)
Rated Frequency	60/50 Hz (+0.5 Hz, -0.7 Hz)	60/50 Hz (+0.5 Hz, -0.7 Hz)	60/50 Hz (+0.5 Hz, -0.7 Hz)	60/50 Hz	60/50 Hz (+0.5Hz, -0.7Hz)	50Hz / 60Hz (+0.5Hz, -0.7Hz)
Rated Power Factor	Over 0.99	Over 0.99	Over 0.99	Over 0.99	Over 0.99	Over .99
Reactive Capability (AC)	+/-762kVAR	+/-762kVAR	+/-800kVAR	+/-900kVAR ⁴	+/-1020kVAR ⁴	
Rated Current	1265 Arms	2532 Arms	2762 Arms	2624 Arms	2598 Arms	3079Arms
Maximum Current	1438 Arms	2877 Arms	2762 Arms	2624 Arms	2598 Arms	3079Arms
Maximum Eff.	99%	99%	99%	98.8%	98.8%	98.9%
CEC Efficiency	98.5%	98.5%	98.5%	98.5%	98.5%	98.5% ⁵
Maximum Voltage	1000 Vdc	1000 Vdc	1000 Vdc	1500 Vdc	1500 Vdc	1500 Vdc
MPPT Operation Range	605 Vdc - 950 Vdc ²	605 Vdc - 950 Vdc ²	605 Vdc - 950 Vdc	800 Vdc - 1300 Vdc	875 Vdc - 1300 Vdc	875Vdc - 1300Vdc
Ingress Protection Ratings	NEMA3R	NEMA3R	NEMA3R	NEMA3R	NEMA3R	NEMA3R
Installation	Outdoor	Outdoor	Outdoor	Outdoor	Outdoor	Outdoor
Environ. Conditions	-20°-55°C (4°-131°F) Derate from 50°-55° C ³	-20°-55°C (4°-131°F) Derate from 50°-55° C ³	-20°-55°C (4°-131°F) Derate from 50°-55° C ³	-20°-55°C (4°-131°F) Derate from 40°-55°C ³	-20°-50° (4°-122°F)	-20°-50° (4°-122°F)
Max. Altitude	2000 m (contact TMEIC for ratings above 2000 m)	2000 m (contact TMEIC for ratings above 2000 m)	2000 m (contact TMEIC for ratings above 2000 m)			
Input (DC) Side	Ground Fault, DC Reverse Current, Over Voltage, Over Current	Ground Fault, DC Reverse Current, Over Voltage, Over Current	Ground Fault, DC Reverse Current, Over Voltage, Over Current			
Grid (AC) Side	Anti-islanding, Over/Under Voltage, Over/Under Frequency, Over Current	Anti-islanding, Over/Under Voltage, Over/Under Frequency, Over Current	Anti-islanding, Over/Under Voltage, Over/Under Frequency, Over Current			
Grid Assistance	Reactive/Active Power Control, Power Factor Control, Fault Ride Through (optional)	Reactive/Active Power Control, Power Factor Control, Fault Ride Through (optional)	Reactive/Active Power Control, Power Factor Control, Fault Ride Through (optional)			
User Interface	LCD (3.8 inch, QVGA) with Touch-Screen	LCD (3.8 inch, QVGA) with Touch-Screen	LCD (3.8 inch, QVGA) with Touch-Screen			
Communication	Modbus/TCP	Modbus/TCP	Modbus/TCP			
Fault Analysis	Fault Event Log, Waveform Acquisition via memory card	Fault Event Log, Waveform Acquisition via memory card	Fault Event Log, Waveform Acquisition via memory card			
Compliance	UL1741(CSA); 107.1MEE15A7; NEC standard	UL1741(CSA); 107.1MEE15A7; NEC standard	UL1741(CSA); 107.1MEE15A7; NEC standard			
Cooling Method	Advanced Hybrid Cooling	Advanced Hybrid Cooling	Advanced Hybrid Cooling			
Standard Number of Inputs	1	1	1	1	1	1
Standard Control Power Supply	Control Power Supply from Inverter output and Capacitor backup circuit (3 sec. compensation)	Control Power Supply from Inverter output and Capacitor backup circuit (3 sec. compensation)	Control Power Supply from Inverter output and Capacitor backup circuit (3 sec. compensation)			
Weight	7940 lbs (3600kg)	11,500 lbs (5200 kg)	11,500 lbs (5200 kg)	13,228 lbs (6000 kg)	13,228 lbs (6000 kg)	12,125 lbs. (5500 kg) ⁶
Dimensions (H x W x D)	92 x 118 x 46 inch (2286x3000x1150 mm)	92 x 197 x 46 inch (2286x5000x1150 mm)	92 x 197 x 46 inch (2286x5000x1150 mm)	92 x 197 x 46 inch (2286x5000x1150 mm)	92 x 197 x 46 inch (2286x5000x1150 mm)	92 x 197 x 46 inch (2286x5000x1150 mm)
Floor Space	5,348 sq. in. (3.45m ²)	8,914 sq. in. (5.75 m ²)	8,914 sq. in. (5.75 m ²)	8,914 sq. in. (5.75 m ²)	8,914 sq. in. (5.75 m ²)	8,914 sq. in. (5.75 m ²)
Color	Cabinet: Sand White #DicsB3, Roof: Gray #Murel N4.5					

Notes:

- ¹ Full power available at and above nominal voltage. Derate will apply below nominal voltage.
- ² Transition from constant DC voltage mode to MPPT mode occurs between 595V and 605V.
- ³ Contact a TMEIC Sales Manager for detailed temperature-related derates.
- ⁴ Available reactive capability with reduction in active power.
- ⁵ Preliminary testing.

1000-NC

MV 3-Phase Transformer

kVA	2750 kVA 3 Phase Pad Mounted Transformer
Special Application	Two-Winding
Temperature Rise	65 degree rise at 40C maximum ambient temperature
Cooling Class	KNAN
Frequency	60 Hz
Duty Cycle	Designed for step-up operation
Insulating fluid	FR3
Elevation	Designed for operation at 1000 m (3300 ft.) above sea level
Sound Level	NEMA TR1 Standard
High Voltage	34500 Grounded Wye Volts, 150kV BIL
Electrostatic Shield	Electrostatic Shield between Primary & Secondary Windings
	Ground Shield Bushing
kV Class	35 kV
High Voltage Configuration	Dead Front, Loop Feed
High Voltage Bushings	600 amp Cooper dead break one-piece bushings (Qty: 6)
Neutral Bushings	250 amp 2 hole spade bushing
Load-break Switching	15-38 kV, 300A 2 Position
Switch Cover	Padlock cover over Switch (Outside of Cabinet)
Overcurrent Protection	Internal Cartridge in Series with Parallel oil-immersed partial range current limiting fuse x 6
Expulsion Fuses	Internal Expulsion x 3
Low Voltage	600 Delta Volts, 45kV BIL
kV Class	15 kV
Low Voltage Bushings	Integral aluminum 6-hole spade bushings (Qty: 3)
Bushing Supports	Standard LV Bushing Support Assembly
Cabinet hardware	Penta-head cabinet door bolts
Coatings	Touch-up paint (Qty: 2)
Taps	2 - 2.5% taps above and 2 - 2.5% taps below nominal
Certifications	UL Listed (UL logo on nameplate)
Notifications	Shock and Arc Flash Warning Decal
	Liquid level gauge with Alarm Contact
	Thermometer, dial-type with Alarm Contact
	Pressure/vacuum gauge with Alarm Contact
Gauges & Fittings	Schrader valve
	Pressure relief device, 50 SCFM
	Drain valve with sampler (1") located outside of cabinet, with cover
	Oil Fill Plug
Tank accessories	IEEE standard two-hole ground pads (Qty: 3)
	Nitrogen Blanket
Special Feature	Load break switch located outside cabinet on HV side padlocked door
	Padlock cover over drain valve

Note: Secondary oil containment is not included with transformer. If required, a provision should be made onsite by others.

ATTACHMENT 5

Dielectric Fluids

Envirotemp™ FR3™ Fluid

DESCRIPTION

Envirotemp™ FR3™ fluid is a renewable, bio-based natural ester dielectric coolant for use in distribution and power class transformers where its unique fire safety, environmental, electrical, and chemical properties are advantageous. Acceptance limits for new fluid are shown in Table 1. More than 20 years of field experience (with over one million transformers in service) confirms excellent performance.

Envirotemp FR3 fluid is formulated from seed oils and performance enhancing additives. It does **not** contain petroleum, halogens, silicones or corrosive sulfur. It

quickly and thoroughly biodegrades¹ in the environment. The fluid is non-toxic in acute aquatic² and oral toxicity tests³. The Color Green tint reflects its favorable environmental profile (See Table 2) and readily distinguishes it from petroleum based oils.

Envirotemp FR3 fluid has exceptionally high flash/fire points of approximately 330/360 °C - the highest ignition resistance of any high fire point dielectric fluid currently available. It qualifies as a "high-fire-point", "less-flammable", "IEC Class K", and "non-propagating" fluid. Envirotemp FR3 fluid is Approved⁴ by FM Global and Classified⁵ by Underwriters Laboratories as a Less-Flammable

Dielectric Liquid for use in complying with the National Electric Code⁶ (NEC) and insurance listing requirements⁷.

Envirotemp FR3 fluid is compatible with standard transformer construction materials and components. Envirotemp FR3 fluid should be stored, handled, and processed in a similar meticulous manner as transformer mineral oil. See Cargill's Envirotemp FR3 Fluid Storage and Handling Guide, S10, for additional information.

A transformer filled with FR3 fluid complies with the transformer temperature operating range requirements defined in IEEE C57.12.00 and IEC 60076-1.

TABLE 1

Acceptable values for receipt of shipments of new FR3 fluid

PROPERTY	Standard test methods		ASTM D6871	IEC 62770
	ASTM	ISO/IEC	As-received new fluid property requirements	Unused new fluid property requirements
Physical				
Color	D1500	ISO 2211	≤1.0	
Flash Point PMCC (°C)	D93	ISO 2719		≥250
Flash Point COC (°C)	D92	ISO 2592	≥275	
Fire Point (°C)	D92	ISO 2592	≥300	>300
Pour Point (°C)	D97	ISO 3016	<-10	≤-10
Density at 20°C (g/cm ³)		ISO 3675		
Relative Density (Specific Gravity) 15°C	D1298		≤0.96	≤0.96
Viscosity (mm ² /sec)	D445	ISO 3104		
	100 °C		≤15	≤15
	40 °C		≤50	≤50
	0 °C		≤500	
Visual Examination	D1524	IEC 61099 9.2	bright and clear	clear, free from sediment and suspended matter
Biodegradation		OECD 301	readily biodegradable	readily biodegradable
Electrical				
Dielectric Breakdown (kV)	D877		≥30	
Dielectric Breakdown (kV)				
	1mm gap	D1816	≥20	
	2mm gap	D1816	≥35	
	2.5mm gap	IEC 60156		≥35
Gassing Tendency (mm/min)	D2300		≤0	
Dissipation Factor				
	25°C (%)	D924	≤0.20	
	90°C (tan δ)	IEC 60247		≤0.05
	100°C (%)	D924	≤4.0	
Chemical				
Corrosive Sulfur	D1275	IEC 62697	non-corrosive	non-corrosive
Water Content (mg/kg)	D1533	IEC 60814	≤200	≤200
Acid Number (mg KOH/g)	D974	IEC 62021.3	≤0.06	≤0.06
PCB Content (mg/kg)	D4059		not detectable	free from PCBs
Oxidation Stability (48 hrs, 120°C)		IEC 61125C		
	Total Acidity (mg KOH/g)	IEC 62621.3		≤0.6
	Viscosity at 40°C (mm ² /sec)	ISO 3104		≤ 30% increase over initial
	Dissipation Factor at 90°C (tan δ)	IEC 60247		≤ 0.5

NOTE: Specifications should be written referencing only the defined ASTM or IEC industry standard acceptance values and test methods. The listed 'typical' values are average values summarized from a significant number of data points over many years; they are not to be identified as acceptance values.

ASTM D6871 Standard Specification for Natural (Vegetable Oil) Ester Fluids Used in Electrical Apparatus.

IEC 62770: Fluids for electrotechnical applications - Unused natural esters liquids for transformers and similar electrical equipment.

1 Per OPPTS 835.3110

2 Per OECD 203, Method B

3 Per OECD 420

4 Less-Flammable Transformer Fluids, Approval Guide - Electrical Equipment, FM Approvals, FM Global, Norwood, MA, USA

5 EOVK.MH10678, Transformer Fluids, UL Listed and Classified Products, Underwriters Laboratories, Northbrook, IL, USA

6 National Electrical Code, NFPA 70, National Fire Protection Association, Quincy, MA, USA

7 Transformers, 5-4, Property Loss Prevention Sheets, FM Global, Norwood, MA, USA

The information presented herein is believed to be true and accurate. However, all statements, recommendations and suggestions are made without guarantee, express or implied, and are subject to change without notice. WE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE and FREEDOM FROM INFRINGEMENT and disclaim all liability in connection with the use of the products or information contained herein. All such risks are assumed by the equipment manufacturer/user and the final determination of suitability of each use application is the responsibility of the equipment manufacturer/user. Products may present unknown hazards and should be used with caution. Although certain hazards are described herein, we do not guarantee that these are the only hazards that exist.

In addition to new distribution and power class transformers, a variety of other equipment, including voltage regulators, sectionalizing switches, transformer rectifiers, and electromagnets use Envirotemp FR3 fluid. The fluid is also used in retrofill applications for transformers and other fluid-filled distribution and power equipment.

ENVIRONMENTAL AND HEALTH

Envirotemp FR3 fluid is specifically formulated to help minimize health and environmental risks. The base oils come from renewable resources - commodity seeds - and are recyclable and reusable.

The US and California Environmental Protection Agencies published Envirotemp FR3 fluid's Environmental Technology Verification Report in 2003. The verification process includes biodegradation and toxicity testing. Results from the aquatic biodegradation test confirm that Envirotemp FR3 fluid's rate of biodegradation is the same as that of the standard reference material. Envirotemp FR3 fluid meets the "ultimately biodegradable" criteria (Figure 1). When tested for acute oral toxicity, Envirotemp FR3 fluid is not toxic.

The Edible Oil Regulatory Reform Act (US Public Law 104-55, 1995) makes Envirotemp FR3 fluid eligible for current and future regulatory relief. The options of alternative spill response procedures, such as bio-based remediation, are now available. The fluid's inherent viscosity and tendency of thin layers to polymerize help prevent migration along the surface and into subsurface soils.

The EPA, Occupational Safety & Health Administration (OSHA), and the Department of Transportation (DOT) do not list Envirotemp FR3 fluid as hazardous. Its Hazardous Material Information System (HMIS) rating is 1 for both health and reactivity. Envirotemp FR3 fluid is not classified as bio-accumulating or mutagenic. It is not listed as a carcinogen by National Toxicology Program (NTP), in International Agency for Research on Cancer (IARC) monographs, or by OSHA Regulation. The products of complete combustion of Envirotemp

TABLE 2
Envirotemp™ FR3™ fluid's Environmental Attributes

Attribute	Results	Method
Aquatic Biodegradation [%]	>99	EPA OPPTS 835.3100
Ready Biodegradation [%]	>99	EPA OPPTS 835.3110
Acute Aquatic Toxicity	Non-toxic	OECD 203
Acute Oral Toxicity	Non-toxic	OECD 420
Biobased Material Content	>95%	USDA Biopreferred Program
Total Life Cycle Carbon Footprint	Carbon Neutral	Department of Commerce NIST BEES V4.0
Overall Environmental impact	1/4th impact of mineral oil	Department of Commerce NIST BEES V4.0

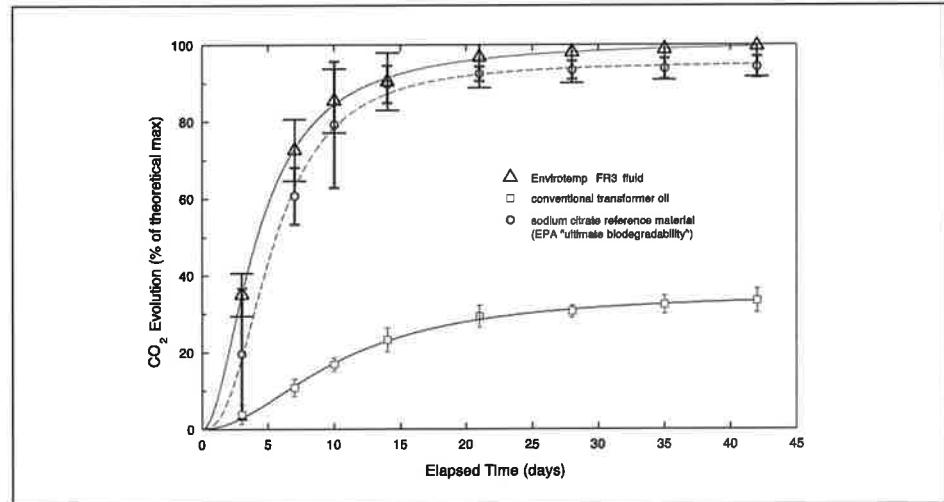


Figure 1.
Aerobic Aquatic Biodegradation Graph EPA Test OPPTS 835.3100

TABLE 3
Greenhouse gases^a attributed to transformer fluid for its complete life cycle.

Category	Grams Per Unit ^b		Tons Per 1000 Gallons	
	Mineral Oil	Envirotemp FR3 Fluid	Mineral Oil	Envirotemp FR3 Fluid
Raw Materials	1,048,184	-381,590	2.306	-0.839
Manufacturing	544,363	160,212	1.198	0.352
Transportation	122,478	71,498	0.269	0.157
Use	154,124	153,450	0.339	0.338
End of Life	30,825	30,690	0.068	0.068
Total	1,899,973	34,260	4.180	0.075

^a a carbon dioxide equivalents
^b In BEES 4.0e, one unit is a 1000 kVA transformer containing 500 gallons of fluid

FR3 fluid are essentially carbon dioxide and water.

SUSTAINABILITY

Building for Environmental and Economic Sustainability (BEES) software⁶, available from the National Institute of Standards and Technology, uses a life-cycle assessment approach, analyzing raw material acquisition,

manufacture, transportation, installation, use, and recycling and waste management, to determine a product's global warming potential.

Table 3 shows the BEES amounts of greenhouse gas generated from raw materials through end of life for mineral oil and Envirotemp FR3 fluid. The cost of mineral oil, in terms of carbon

⁶ BEES, Version 4.0e, Building and Fire Research Laboratory, National Institute of Standards and Technology, August 2007, <http://www.bfrl.nist.gov/oe/software/bees/>

emissions, is expensive. Meanwhile, Envirotemp FR3 fluid is relatively inexpensive, about 8.2 lb/gal less green house gas emitted to produce it. Additionally, the study reports that Envirotemp FR3 fluid's overall environmental performance impact score is 1/4th that reported for mineral oil (and that's without consideration for Envirotemp FR3 fluid's transformer insulation life extending properties). This cumulative score results from adding the impacts of water intake, smog, ozone depletion, indoor air, human health, habitat alteration, global warming, fossil fuel depletion, eutrophication, ecological toxicity, critical air pollutants, and acidification.

Envirotemp FR3 fluid, and transformers filled with Envirotemp FR3 fluid are listed in the US Federal BioPreferredSM Products Program, making them readily identifiable as BioPreferred to all applicable Federal agencies. Envirotemp FR3 fluid is an excellent option for ISO 14000, Green Build, and other similar environmental programs that promote the use of alternative, environmentally preferable and sustainable materials and procedures.

FIRE SAFETY

Envirotemp FR3 fluid has a fire point of approximately 360°C, well above the minimum of 300°C required for high fire point fluid classifications. Its flash point (approximately 330°C) is higher than the fire point of most other ignition resistant dielectric fluids in use today (Figure 2).

In laboratory and full-scale ignition tests, Envirotemp FR3 fluid has demonstrated greater fire resistance than other dielectric fluid types. Based on large-scale arc ignition testing, FM Global concluded that the probability of a pool fire evolving from Envirotemp FR3 fluid was so low that a heat release rate need not be determined or considered for FM Global approval.

Based on large-scale arc ignition and hot metal ignition tests, FM Global recognizes Envirotemp FR3 fluid as an equivalent safeguard to space separation, fire barriers, and fire suppression systems for most installations.

FM Global recognizes Envirotemp FR3 fluid as a component of Approved transformers per FM Global Standard 3990. When used in transformers

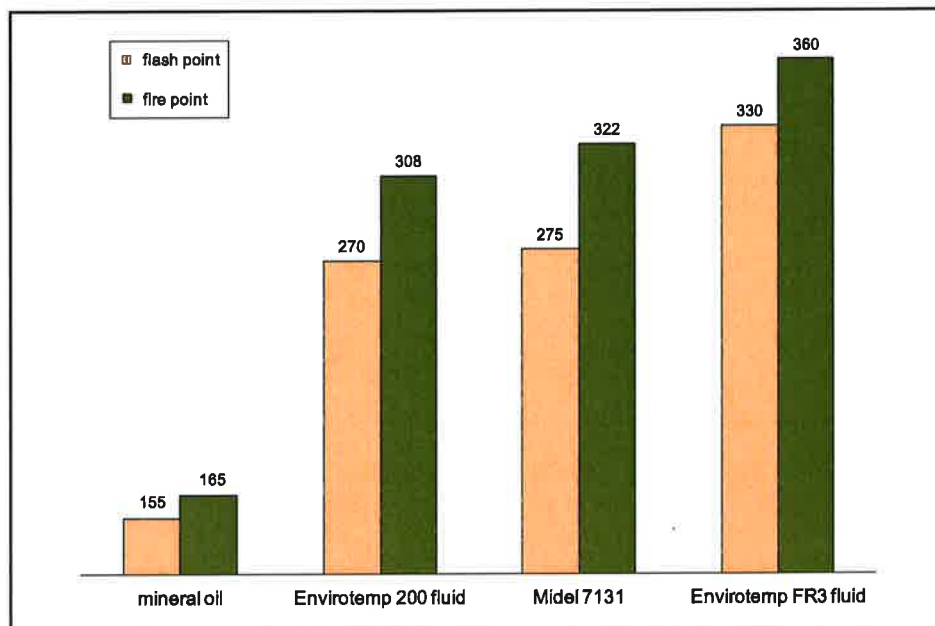


Figure 2.
Flash & Fire Point of Dielectric Fluids (°C).

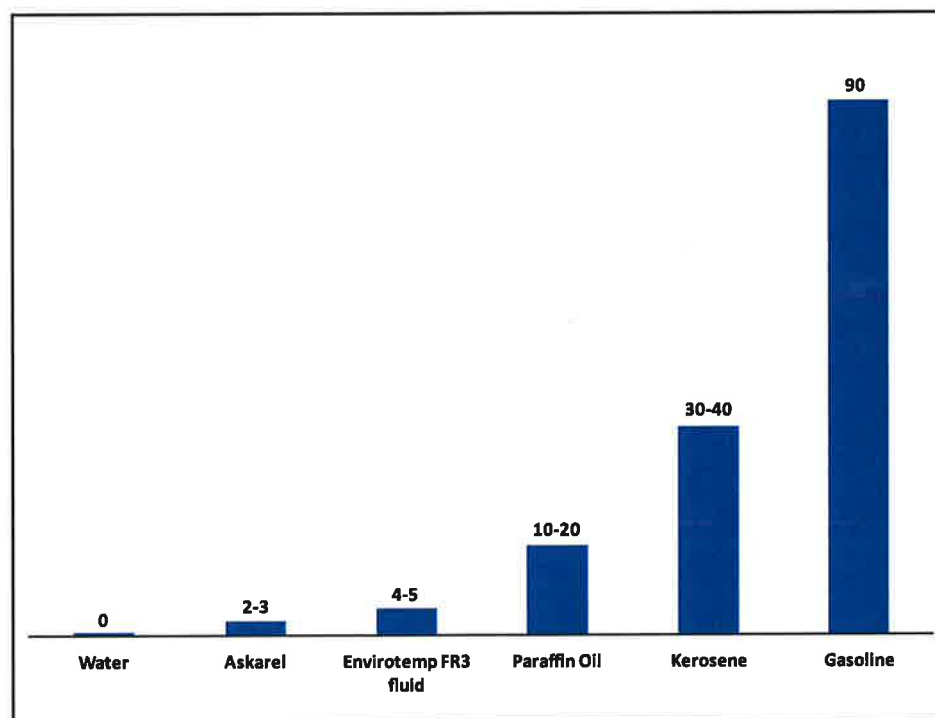


Figure 3.
Fire Hazard Rating UL Standard 340.

containing 10,000 gallons of fluid or less, transformers' separation distance to buildings and other equipment may be up to 1/10th the distance required for mineral oil filled transformers, without fire walls or deluge systems.

OSHA recognizes this FM Global standard as fitting the definition of a Listed and Labeled Product per NEC Section 110-3(b). The standard

permits Envirotemp FR3 fluid-filled transformers to be installed indoors, typically without sprinklers or vaults, with a minimum clearance to walls of just 3 feet (0.9M).

UL Standard 340 compares the fire hazard ratings of various fluids. Figure 3 shows the favorable rating assigned to Envirotemp FR3 fluid.

**TABLE 4
Transformer Insulating Paper End-of-Life (Hours)**

End-of-Life Basis	150°C			170°C		
	Mineral Oil	Envirotemp FR3 Fluid	IEEE Basis	Mineral Oil	Envirotemp FR3 Fluid	IEEE Basis
Retained Tensile Strength	50%	3100	>4000*	1602	240	1300
	25%	4000	>4000*	3327	490	4000
	Degree of Polymerization 200	3200	>4000*	3697	480	3400
						746

* Paper did not reach end-of-life over the duration of the test. To be conservative, extrapolation was not employed.

There are no known reports of dielectric pool fires involving Envirotemp FR3 fluid filled transformers.

MEETING THE CODES

Less-Flammable fluids are recognized as a fire safeguard in Section 15 of the National Electrical Safety Code (Accredited Standards Committee C2) for generation and distribution substations. Envirotemp FR3 fluid meets the National Electrical Code Section 450-23 requirements as a listed less-flammable liquid. It is covered by OSHA Article §1910.305, Section 5(v).

Envirotemp FR3 fluid is FM Global Approved and Underwriters Laboratories Classified "Less-Flammable" per NEC Article 450-23, fitting the definition of a Listed Product per NEC. For additional information, request Cargill's NEC Requirement Guidelines 2008 Code Options for the Installation of Listed Less-Flammable Liquid Filled Transformers.

FLUID/PAPER INSULATION SYSTEM

The unique chemical structure of Envirotemp FR3 fluid provides superior insulation system performance compared to other types of dielectric fluids. The thermal properties of Envirotemp FR3 fluid make it a more efficient coolant than higher molecular weight silicone and hydrocarbon dielectric coolants.

Envirotemp FR3 fluid has an exceptional ability to remove water generated by aging paper. This enables the fluid to significantly reduce the aging rate of transformer insulating paper. Per IEEE C57.100, accelerated

aging tests show that Thermally Upgraded Paper (TUK) paper insulation aged in Envirotemp FR3 fluid takes 5-8 times longer to reach the same end-of-life points as TUK paper insulation aged in conventional mineral oil.

Table 4 compares the time to reach insulation end-of-life for TUK paper aged in Envirotemp FR3 fluid and conventional transformer oil. The time to insulation end-of-life calculated using the IEEE C57.91 loading guide is included for comparison. Accelerated aging tests show similar thermal aging improvement for non-thermally upgraded Kraft paper.

APPLICATIONS

NOTE: The suitability of each application of Envirotemp FR3 fluid is the responsibility of the user. Contact Cargill Envirotemp FR3 Fluids group for application guidelines.

New Transformers

Distribution and Power class transformers filled with Envirotemp FR3 fluid for indoor, submersible and outdoor applications are available from manufacturers worldwide.

For indoor applications, Envirotemp FR3 fluid-filled transformers provide the proven technical and performance advantages of liquid-filled designs over dry types as well as a lower total life cycle cost when compared to all other transformer types.

Many types of Envirotemp FR3 fluid-filled transformers are in service: pole-mounted, pad-mounted, networks, reactors, small, medium and large substations, transmission substations, and generator step-ups. Envirotemp FR3 fluid-filled transformers are accepted in both

industry and government. Contact Cargill Envirotemp FR3 Fluids group for a copy of the Envirotemp FR3 Fluid User's List, Bulletin B110.

Retrofilling Transformers

Envirotemp FR3 fluid is especially suited for upgrading the environmental and fire safety of mineral oil-filled transformers. It is miscible with mineral oil, high molecular weight hydrocarbons and other ester fluids. FR3 fluid is not miscible with silicone and should not be applied in transformers previously containing silicone. FR3 fluid can also be used in PCB (Askarel) replacement initiatives.

Unlike most other fluid types, the residual transformer oil in a properly retrofilled transformer should not reduce the fire point of Envirotemp FR3 fluid below the NEC minimum of 300°C (Figure 4). This is true even after full equilibrium has been achieved between the replacement fluid and the residual mineral oil in the paper.

Additional advantages of retrofilling with Envirotemp FR3 fluid include high dielectric strength, better match of dielectric constant to Kraft paper insulation, excellent lubricity, material compatibility, and a coefficient of expansion similar to conventional transformer oil. Envirotemp FR3 fluid has superior resistance to coking and sludge formation when compared to conventional transformer oil. In addition to passing the Power Factor Valued Oxidation (PFVO) test, Doble Laboratories' Sludge-Free Life tests resulted in no measurable sludge. The fluid also acts as a drying agent for transformer insulation that has become wet from aging, extending the useful life of the transformer insulation system.

Switching Devices

With excellent dielectric strength retention (Figure 5), lubricity, and gassing tendencies, Envirotemp FR3 fluid is an excellent switching medium at normal operating temperatures. Proven applications include new and retrofilled sectionalizing switches and transformers with load break accessories such as Bay-O-Net and current-limiting fusing, on-off and four position switches, and Vacuum Fault Interruption protection devices.

⁹ P.J. Hopkinson, L. Dix, "Tapchangers for De-energized Operation In Natural Ester Fluid, Mineral Oil, and Silicone" IEEE/PES Transmission & Distribution Conference & Exposition, July 26-30, 2009, Calgary Canada

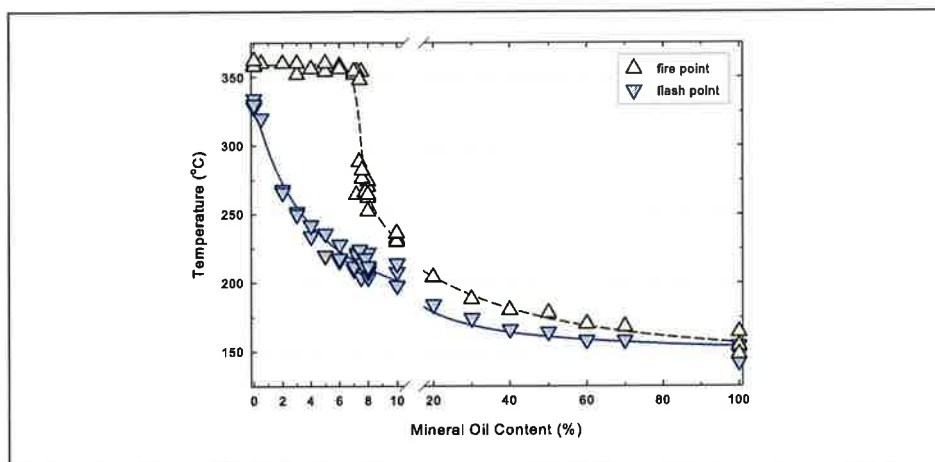


Figure 4.
Envirotemp™ FR3™ fluid Flash & Fire Point Variation with Conventional Transformer Oil Content.

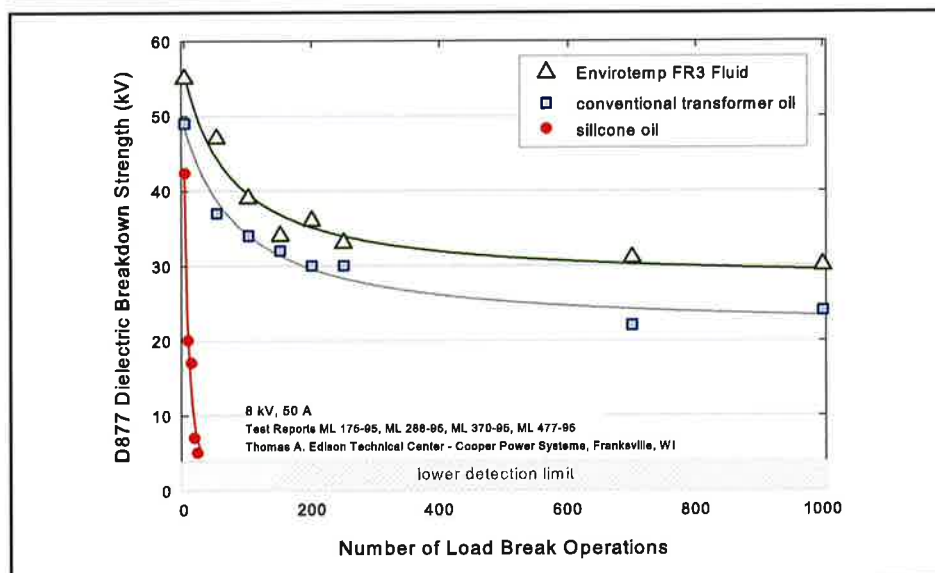


Figure 5.
Fluid loadbreak dielectric strength retention comparison.

Accelerated life tests confirm stationary contacts are most stable in Envirotemp FR3 fluid[®]. In coking tests, Envirotemp FR3 fluid produced less than 1/20th of the deposits that were produced in conventional mineral oil.

Due to the low temperature viscosity difference of Envirotemp FR3 fluid compared to conventional transformer oil, the equipment manufacturer should verify applications at low ambient temperatures.

Other Applications

The inherent safety and performance properties of Envirotemp FR3 fluid have led to its application in electrical equipment other than transformers, including industrial electromagnets,

superconducting motors, klystron modulators, transformer/rectifier sets, and heat transfer applications. Envirotemp FR3 fluid has excellent lubricity, an important characteristic for application in equipment with moving parts. High voltage bushing applications also appear promising due to the fluid's excellent ability to minimize insulating paper degradation and its low gassing tendency value of approximately -79 $\mu\text{l}/\text{min}$.

STORAGE AND HANDLING

Similar meticulous procedures for storing and handling conventional transformer mineral oil should be followed with Envirotemp FR3 fluid. To help maintain the extremely low

percent moisture saturation at time of fluid manufacture, exposure time to air should be minimized. Drum and tote storage should be indoors or outdoors protected from the elements, including sunlight. Refer to the Cargill Envirotemp FR3 Fluid Storage and Handling Guide S10.

Note: To maintain the optimal fluid properties for its intended use as an electrical insulating fluid, exposure to oxygen, moisture, and other contaminants must be minimized. Except for short storage periods, material that has been immersed in Envirotemp FR3 fluid should not be exposed to air. Thin films of natural esters tend to polymerize much faster than conventional transformer oil. For equipment drained of Envirotemp FR3 fluid, it is recommended that the equipment be placed in an inert gas environment, be re-immersed in fluid, or rinsed with mineral oil. Where the transformer power factor is a concern, hot air drying is an unacceptable process for assemblies already impregnated with a natural ester fluid. For impregnated assemblies that require additional drying, a method of drying that does not expose the impregnated insulation to air is required to avoid excessive oxidation of the dielectric fluid.

FLUID MAINTENANCE

Periodic preventive maintenance tests for Envirotemp FR3 fluid-filled equipment should follow the same schedule used for transformers filled with conventional transformer oil. Key tests on fluid samples include:

1. Dielectric Strength: The IEEE C57.147 minimum acceptable ASTM D1816, 2mm gap limits for continued use of service-aged Envirotemp FR3 fluid are 40 kV (≤ 69 kV), 47 kV ($69 \leq \text{kV} < 230$), and 50 kV (≥ 230 kV).
2. Flash Point and Fire Point. Small amounts of mineral oil will not significantly reduce the fire point of Envirotemp FR3 fluid. Contamination above 7% may lower the fire point below 300°C. If contamination is suspected, the flash and fire points should be measured.



Figure 6. Prior to shipment, Envirotemp™ FR3™ fluid undergoes extensive quality assurance testing. The facility where Envirotemp FR3 fluid is produced is ISO 9001 Certified.

FUNCTIONAL SPECIFICATION FOR NEW ENVIROTEMP FR3 NATURAL ESTER LESS-FLAMMABLE TRANSFORMER DIELECTRIC COOLANT

1.0 Scope

1.1. This specification describes a non-toxic (in acute aquatic¹⁰, and oral toxicity¹¹ tests), biodegradable¹², fire resistant, bio-based¹³ natural ester dielectric fluid. It is intended for use in electrical equipment as an environmentally preferred, less-flammable insulating and cooling medium.

2.0 Requirements

2.1 Fluid Manufacturer

Fluid manufacturer shall have a minimum of ten (10) years experience producing and testing dielectric coolants. Manufacturer upon request shall provide AC withstand and impulse withstand for both gap and creep from 3mm to 150mm.

2.2 Dielectric Coolant

The dielectric coolant shall be a biobased biodegradable, be FM Global Approved, UL® Classified as a less-flammable fluid. It shall meet the property limits listed below. The base fluid shall be 100% derived from seed oils.

2.3 Acceptable values for receipt of shipments of new Envirotemp FR3 fluid are shown in Table 1

2.4 Environmental and Health Third Party Validations

The fluid shall have a US EPA Environmental Technology Verification (ETV) Statement published. The fluid shall meet the test limits shown in Table 2

2.5 Packaging

The electrical insulating fluid shall be furnished in sealed vessels suitable for the purpose, including 5-gallon containers, 55-gallon drums, 330-gallon totes, or in bulk. Each vessel

shall have tampering indicating devices.

3.0 Recommended Customer Receiving Quality Control

3.1 Inspection

Each lot received shall be visibly inspected for container integrity. Verify that tamper proof seals are intact and no leaks are visible.

3.2 Receiving Tests

Samples shall be taken from containers per ASTM D 923 Section 2.2, as follows:

Lot Size (gallons)	Number of Containers Sampled
600 or less	1
601 - 3000	2-6
3001 or more	6 minimum (10% of quantity of containers recommended)

When material will be combined for production, samples may be mixed together in equal proportions to create a composite sample for testing. Minimum tests required are dielectric strength and visual inspection. Dissipation factor test is highly recommended, although not essential.

4.0 Important information

4.1 Storage

Avoid storing drums and totes outdoors. Extreme temperature variations can stress the integrity of container protective seals. Exposure of totes to sunlight can cause fluid discoloration

4.2 Intended Use

The use of electrical insulating and cooling fluid is generally dictated by the engineering design of the electrical apparatus. The electrical insulating fluid covered by this specification is intended for use as an insulating and cooling medium in electrical equipment.

3. Dissolved gas analysis of Envirotemp FR3 fluid is particularly useful for high value equipment or equipment servicing critical loads.
4. Color and appearance, dissipation factor, acid number, resistivity, viscosity, and interfacial tension are indicators of possible fluid contamination or unusual degradation.

For fluid that cannot be reconditioned, disposal options include selling to lube oil recyclers, rendering companies, or providers of fuel for industrial boilers and furnaces. Used fluid uncontaminated by controlled hazardous materials does not fall under the jurisdiction of the Federal Used Oil Regulation (CFR Title 40 Part 279).

¹⁰ Per OECD 203, Method B

¹¹ Per OECD 420

¹² Per US EPA OPPTS 835.3100 and US EPA OPPTS 835.8110 (f)

¹³ Per USDA Biopreferred minimum biobased content for Fluid-Filled Transformers - Vegetable Oil-Based

4.3 Fluid Transfer

When transferring electrical insulating fluid from its original container, take care to prevent contamination with moisture, dust, and foreign matter. These impurities can cause deterioration of the dielectric strength and electrical performance.

4.4 Partial Containers

Provide nitrogen blanket for partially filled containers, and properly seal to prevent contamination.

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IEEE Standard C57.104-2008, IEEE Standard C57.91-2011, IEEE Standard C57.147-2008,
IEEE Standard C57.154-2012, 2017 National Electrical Safety Code (NEC), IEEE C2-2017,
IEC 62770:2013, IEC 60076-14:2013 are trademarks of the Institute of Electrical and
Electronics Engineers, Inc., and the International Electrotechnical Commission.
UL® is a registered trademark of the Underwriters Laboratories Inc.
NEC® is a registered trademark of the National Electrical Code.
ANSI® is a registered trademark of the American National Standards Institute
FM Global® is a registered trademark of Factory Mutual Insurance Company
BioPreferred® is a service mark of the The United States Department of Agriculture



Cargill Industrial Specialties
P.O. Box 5700, MS 66
Minneapolis, MN 55440-5700
1-800-842-3631
envirottempfluids.com

ATTACHMENT 6

Equivalency Results

[How are they calculated?](#)

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

23,815 Metric Tons

Greenhouse gas emissions from

 5,100 Passenger vehicles driven for one year	 58,369,961 Miles driven by an average passenger vehicle	 8,298 Tons of waste recycled instead of landfilled
---	--	---

 1,187 Garbage trucks of waste recycled instead of landfilled
--

CO2 emissions from

 2,679,751 gallons of gasoline consumed	 26,055,737 Pounds of coal burned	 315 tanker trucks' worth of gasoline
---	---	---



① **2,572**
homes' energy use for one year



① **6**
Wind turbines running for a year



① **3,569**
homes' electricity use for one year



① **130**
railcars' worth of coal burned



① **797,020**
Incandescent lamps switched to LEDs



① **55,137**
barrels of oil consumed



① **973,548**
propane cylinders used for home barbeques



① **0.006**
coal-fired power plants in one year



Carbon sequestered by



617.192



tree seedlings
grown for 10
years

-or-



acres of U.S.
forests in one
year

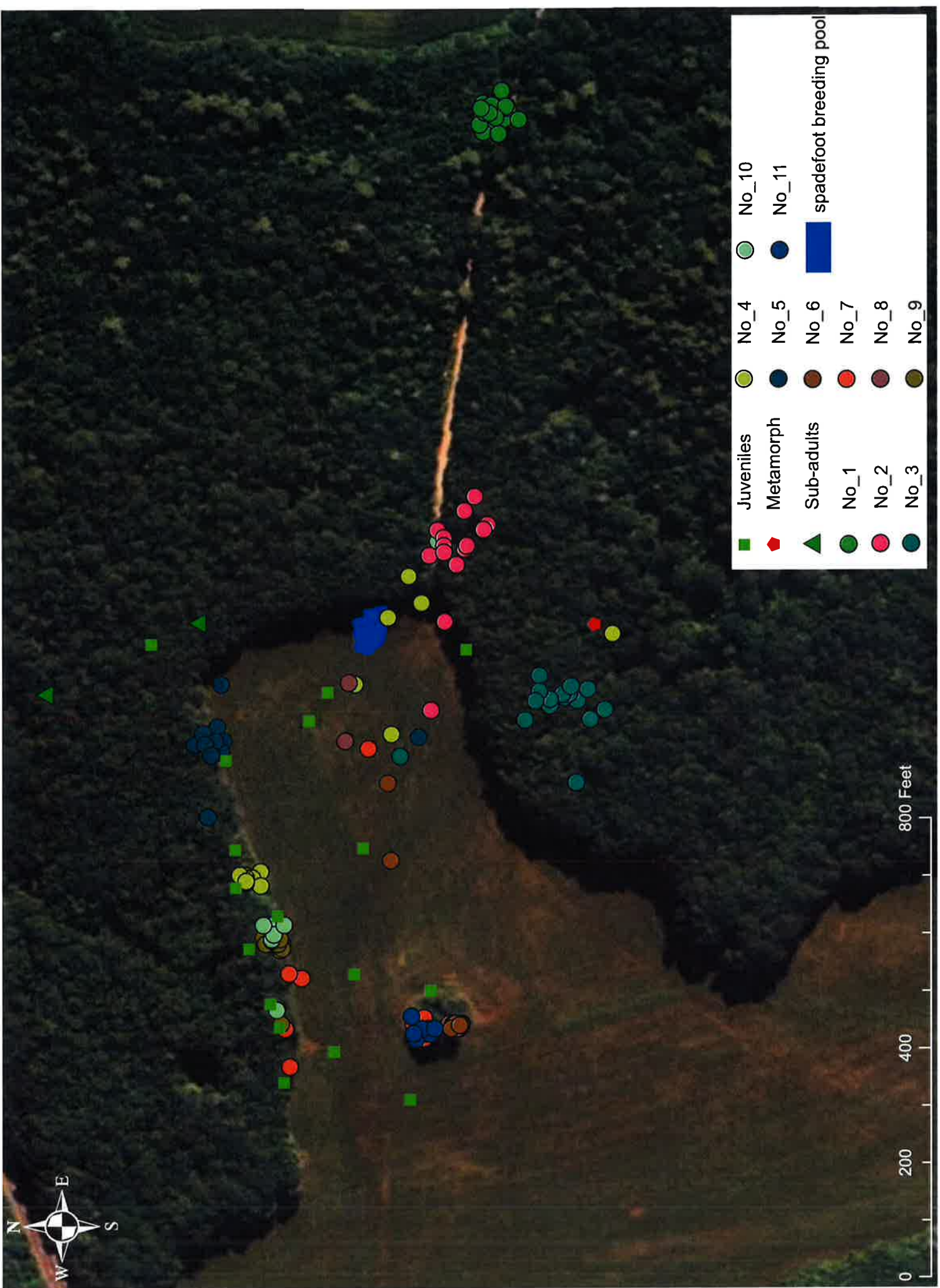
-or-



acres of U.S.
forests
preserved from
conversion to
cropland in one
year

194

ATTACHMENT 7



Individual Spadefoot Locations

ATTACHMENT 8

Dennis P. Quinn

40 Pine Street
Plantsville, CT 06479
Phone: (203) 430-7830
E-mail: ctherpconsultant@gmail.com
www.ctherpconsultant.com

EDUCATION

University of Massachusetts, Amherst, MA.

- New England Regional Soil Science Certificate Program. (2014)

Central Connecticut State University (CCSU), New Britain, CT.

- Masters in Ecology and Environmental Science. Thesis research: Radio-telemetry of eastern box turtles to determine home-range, habitat use and hibernacula selection in CT. (2008)
- Bachelors in Biology with a concentration in Ecology, Biodiversity and Evolutionary Biology. (2002)

Recognized Qualified Bog Turtle Surveyor - Housatonic/Hudson Recovery Unit - United States Fish & Wildlife Service

PADI Certified Scuba Diver. (1999)

EMPLOYMENT

Owner – CTherpConsultant, LLC. Plantsville, CT. (2007 – present)

CTherpConsultant, LLC was founded in 2007 to facilitate the pursuit and passion I have for amphibian and reptile research, conservation and preservation. A wide variety of ecological services are offered by my company, ranging from general wildlife and habitat characterization surveys, to detailed environmental impact assessments complete with land use planning, mitigation design and monitoring. I have worked directly with a variety of State and Federally threatened and endangered species, ranging from the diploid blue-spotted salamander and spadefoot toad, to the bog turtle. I currently serve as the consulting herpetologist for the Connecticut Department of Energy and Environmental Protection where I coordinate state and northeast regional amphibian and reptile research and conservation projects associated with both the Regional Conservation Needs and State Wildlife Grant programs.

Clients:

CT Department of Energy and Environmental Protection
CT Department of Transportation
Farmington River Watershed Association
Fitzgerald & Halliday, Inc.
Michael W. Klemens, LLC
O & G Industries, Inc.

Regional Water Authority
Simsbury Land Trust
Wildlife Management Institute
Steep Rock Association
MA Division of Fisheries & Wildlife, NHESP
Parsons Corporation

Creator and maintainer of www.ctherpetology.com: A photographic atlas to the amphibians and reptiles of Connecticut.

Wildlife Photographer – photographs can be viewed at www.dennisquinnphotography.com

Associate Scientist, Parsons Corporation East Berlin, CT. (2005 - 2007)

- Radio-telemetric study of eastern box turtles and eastern hog-nosed snakes for ConnDOT CT Route 7 Bypass. Responsible for data collection, terrestrial mitigation design, assist with culvert design and placement, data analysis, and report preparation.
- Northern slimy salamander presence/absence survey for ConnDOT CT Route 7 Bypass. Responsibilities included field surveys and assist in report preparation.

Environmental Scientist, Maguire Group Inc. New Britain, CT. (2005)

- Field surveys for proposed Route 11 corridor and assisted in preparation of the environmental impact statement.
- Impact Assessment for emergency by-pass pipeline, data analysis, technical writing and mitigation planning.

Herpetological Field Surveyor, Farmington River Watershed and Wildlife Conservation Society (2002)

- Surveyed local reptile and amphibian populations throughout the Farmington River Valley. Identification, data collection, photography.

EMPLOYMENT IN EDUCATION

Adjunct Instructor, Naugatuck Valley Community College Waterbury, CT. (2004 - present)

Courses Taught:

Bio 105 Introductory Biology - Lec/Lab

Bio 171 Field Biology - Lec/Lab

Bio 145 General Zoology - Lec/Lab

Technical Advisor, CCSU New Britain, CT. (2011 - present)

- Serve as a technical research advisor to undergraduate and graduate students working on research in the field of herpetology.
- Graduate Thesis Committee – serve as an expert external committee member for herpetological theses.

Environmental Science Instructor, Post University Waterbury, CT. (2006)

Courses Taught:

Bio 134 General Biology - Lab

Env 200 Sustainable Development - Lec

Bio 200 Ecology - Lec

Env 230 Environmental Policy - Lec

Received honors for outstanding service to students in environmental science instruction.

Graduate Teaching Assistant, CCSU New Britain, CT. (2003)

Courses Taught:

Bio 121 General Biology I - Lab

Bio 202 Principles of Ecology and Evolution - Lab

PUBLICATIONS

- Quinn, D. 2016. *Macrophotography: Capture Larger-Than-Life Photographs of Nature's Smallest Subjects*. Amherst Media, Inc. Buffalo, NY.
- Gruner, H. and Quinn, D. 2012. Project 18-113/129 U.S. Route 7 Bypass Brookfield, Connecticut, Slimy Salamander (*Plethodon glutinosus*) Ridge-wide Habitat Study, Kent to Bethel, Connecticut. Connecticut Department of Transportation, Newington, CT.
- Quinn, D. 2011. The Timber Rattlesnake: A Modern Day Legend. *Connecticut Wildlife*. Volume 31, No. 1, Jan/Feb 2011.
- Quinn, D. and Gruner, H. 2010. Project 18-113 U.S. Route 7 Bypass Brookfield, Connecticut, Eastern Box Turtle and Eastern Hog-nosed Snake Monitoring Report 2009. Connecticut Department of Transportation, Newington, CT.
- Quinn, D. 2009. Project 131-190 Removal of Bridge No. 00518 and Intersection Improvements Route 10 and Route 322 Southington, Connecticut: Eastern Box Turtle and Wood Turtle Presence/Absence Surveys and Report. Connecticut Department of Transportation, Newington, CT.
- 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. Central Connecticut State University, New Britain, CT. 84 pp.

PRESENTATIONS, RADIO and VOLUNTEER WORK

Seminars:

- Mystic Aquarium. CT Amphibians and Reptiles and their Conservation Challenges. (2015)
- WNPR Where We Live hosted by John Dankosky Everything You Want to Know About Turtles. (2014)
- WNPR An Atlas to Track Connecticut Critters that Slither, Hop and Crawl. (2014)
- UCONN Department of Pathobiology and Veterinary Science Seminar Series. CT Amphibians and Reptiles and their Conservation Challenges. (2014)
- CT Department of Energy and Environmental Protection. CT Salamanders and their Conservation Challenges. (2014)
- CT Department of Energy and Environmental Protection. *Natural History of the Northern Copperhead*. (2013)
- CT Department of Energy and Environmental Protection. *Natural History of the Hog-nosed Snake*. (2013)
- Simsbury Land Trust 25th Anniversary Celebration. *Connecticut Reptiles and Amphibians*. (2006)
- Biological Sciences Seminar Series. CCSU. *Land Management and Conservation Strategies for the Reptiles and Amphibians of the Farmington River Valley* (2002)

Volunteer:

Nutmeg Big Brothers Big Sisters. Big Brother Mentor. (2007 – 2010)

Regional Water Authority. A Walk with Connecticut's Reptiles and Amphibians. Pine Hill Recreational Area. (2010)

Connecticut Bio Blitz.

- Keney Park and Goodwin College. Hartford, CT. (2009)
- Wilbert Snow School. Middletown, CT. (2007)
- Two Rivers Magnet School. East Hartford, CT. (2005)

Wethersfield Nature Center. Reptile Day. Gave interactive talk with school children on reptiles and amphibians. (2005)

Simsbury Land Trust. Educational walk on vernal pools and the fauna that depend on them for survival. (2003, 2004 & 2005)

COMPUTER EXPERIENCE

Microsoft Office: Word, Excel, Access, Power Point; PC-ORD, ArcGIS, Graphical Analysis, Sigma Plot, Adobe Photoshop.

AWARDS and HONORS

Leeds M. Carluccio Award: For outstanding student service and leadership in Biological Sciences (2002)

Member Tri-beta National Honor Society (2002)

REFERENCES

Dr. Michael Klemens. Research Associate in Herpetology. American Museum of Natural History. fenbois@aol.com.

(203) 448-8068. New York, NY 10024

Hank Gruner, Vice President of Programs. Connecticut Science Center, Hartford, CT. 06106. hgruner@ctsciencecenter.org

(860) 712-1308.

Dr. Barbra Nicholson, Professor. Central Connecticut State University, New Britain, CT. 06050. nicholsonb@ccsu.edu.

(860) 832-2706.

Cynthia Donaldson, Naugatuck Valley Community College, Waterbury, CT. 06708.

cdonaldson@nvcc.commnet.edu (203) 596-8703.

ATTACHMENT 9



Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

July 17, 2016

Mr. Dean Gustafson
All-Points Technology Corporation
3 Saddlebrook Drive
Killingworth, CT 06419
dgustafson@allpointstech.com

Project: Preliminary Site Assessment of Pawcatuck Solar Center in North
Stonington, Connecticut
NDDDB Preliminary Assessment No.: 201607723

Dear Dean,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map provided for a Preliminary Site Assessment of Pawcatuck Solar Center in North Stonington, Connecticut.

According to our records there are known extant populations of State Listed Species known that occur within or close to the boundaries of this property. I have attached a list of these species to this letter. Please be advised that this is a preliminary review and not a final determination. A more detailed review will be necessary to move forward with any subsequent environmental permit applications submitted to DEEP for the proposed project. **This preliminary assessment letter cannot be used or submitted with your permit applications at DEEP.** This letter is valid for one year.

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

1. Survey date(s) and duration
2. Site descriptions and photographs
3. List of component vascular plant and animal species within the survey area (including scientific binomials)
4. Data regarding population numbers and/or area occupied by State-listed species

5. Detailed maps of the area surveyed including the survey route and locations of State-listed species
6. Statement/résumé indicating the biologist's qualifications

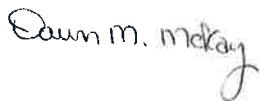
The site surveys report should be sent to our CT DEEP-NDDDB Program (deep.nddbrequest@ct.gov) for further review by our program biologists along with an updated request for another NDDDB review. Incomplete reports may not be accepted.

If you do not intend to do site surveys to determine the presence or absence of state-listed species, please let us know how you will protect the state-listed species from being impacted by this project. You may submit these best management practices or protection plans with your new request for an NDDDB review.

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

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

Sincerely,

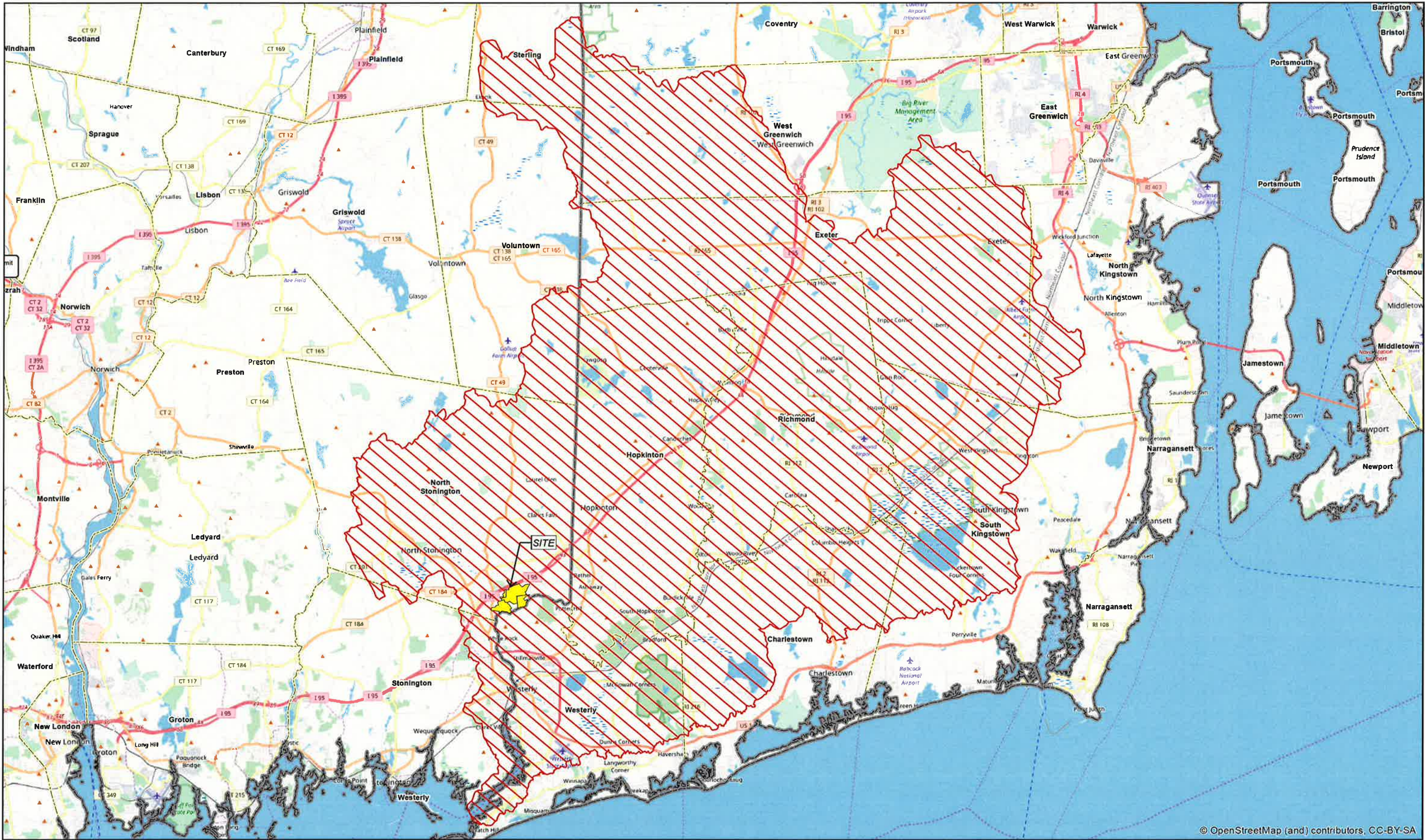


Dawn M. McKay
Environmental Analyst 3

Species List for NDDB Request

Scientific Name	Common Name	State Status
Invertebrate Animal		
<i>Calopteryx dimidiata</i>	Sparkling jewelwing	T
<i>Margaritifera margaritifera</i>	Eastern pearlshell	SC
Vertebrate Animal		
<i>Lasiurus borealis</i>	Red bat	SC
<i>Scaphiopus holbrookii</i>	Eastern spadefoot	E

ATTACHMENT 10

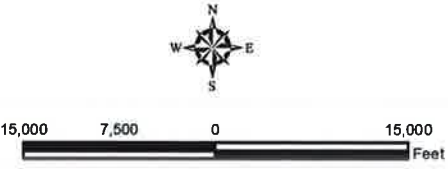


© OpenStreetMap (and) contributors, CC-BY-SA

Legend

- Site
- Pawcatuck River Sole Source Aquifer (CTDEEP GIS)
- Town Line
- State Line

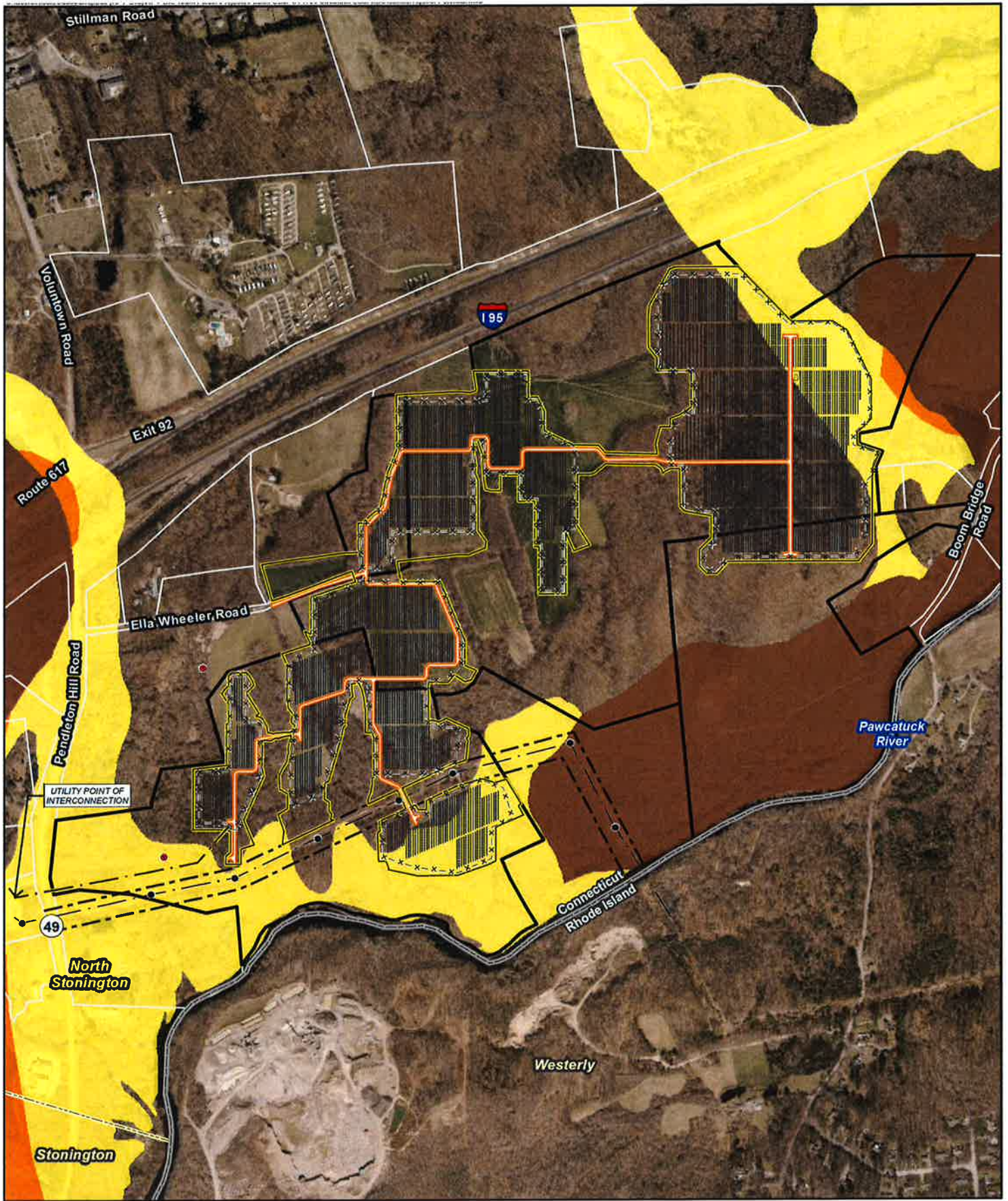
Map Notes:
 Base Map Source: ESRI Open Street Map
 Map Scale: 1 inch = 15,000 feet
 Map Date: July 2018



Pawcatuck River Sole Source Aquifer
 Proposed Pawcatuck Solar Center
 Ella Wheeler Road
 North Stonington, Connecticut



ATTACHMENT 11



- Legend**
- Site
 - Project Area
 - Approximate Parcel Boundary
 - Module
 - Perimeter Fence
 - Access Road
 - Proposed Overhead Tie Line Corridor
 - Transmission Line
 - Approximate Transmission Right-of-Way
 - Transmission Tower
 - Culvert
 - Town Line
 - State Line

- Surficial Aquifer Potential (CTDEEP GIS)**
- Coarse-Grained Deposits, 50-100 ft
 - Coarse-Grained Deposits, 0-50 ft
 - Other Stratified Drift Deposits, Variable Thickness

Surficial Aquifer Potential Map

Proposed Pawcatuck Solar Center
 Ella Wheeler Road
 North Stonington, Connecticut

Map Notes:
 Base Map Source: CTECO 2016 Aerial Photograph
 Map Scale: 1 inch = 900 feet
 Map Date: July 2018



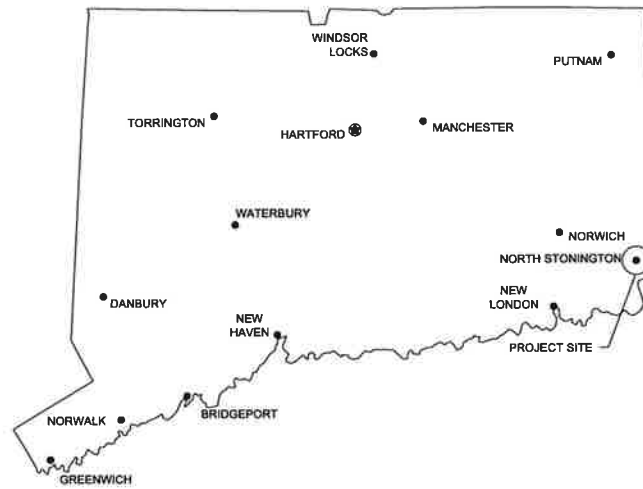
ATTACHMENT 12

GRADING AND DRAINAGE PLANS FOR PAWCATUCK SOLAR CENTER

ELLA WHEELER ROAD, NORTH STONINGTON,
NEW LONDON COUNTY, CT 06359



PROJECT LOCATION:



PROJECT SCOPE:

SOLAR ELECTRIC SYSTEM
THE PROJECT ENTAILS THE INSTALLATION OF A 15 MW AC SOLAR PHOTOVOLTAIC SYSTEM IN NEW LONDON COUNTY, CONNECTICUT.
THE INSTALLATION CONSISTS OF NEW GROUND MOUNTED STRUCTURES WITH MOUNTED PHOTOVOLTAICS.
THE PROJECT SCOPE OF WORK FOR THESE CONSTRUCTION DRAWINGS PERTAINS ONLY TO THE GRADING AND DRAINAGE/SITE IMPROVEMENT WORK DEPICTED ON THESE PLANS.

STANDARDS AND CONDITIONS:

- THESE GRADING AND DRAINAGE PLANS SHALL CONFORM TO THE FOLLOWING CODE VERSIONS:
- 2012 INTERNATIONAL BUILDING CODE
 - 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL
 - 2004 CONNECTICUT STORMWATER QUALITY MANUAL
 - 2000 CONNECTICUT DEPARTMENT OF TRANSPORTATION (DOT) DRAINAGE MANUAL
 - 2012 INTERNATIONAL FIRE CODE

PROJECT TEAM:

OWNER/SITE CONTACT
PAWCATUCK SOLAR CENTER, LLC

DESIGN ENGINEERING FIRM/CIVIL ENGINEER
BLUE OAK ENERGY
1560 DREW AVENUE
DAVIS, CA 95618
CONTACT: JUAN BRAVO, PE
TEL: (530) 747-2026

PROJECT UTILITY INFORMATION:

GAS
SPECTRA ENERGY OPERATING COMPANY, LLC/
EVERSOURCE

ELECTRIC
EVERSOURCE

TELEPHONE
FRONTIER COMMUNICATIONS

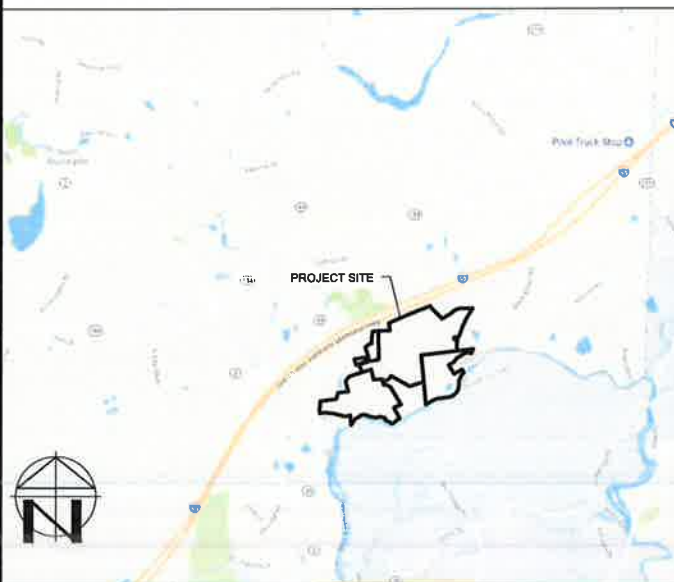
CABLE TV
COMCAST OF GROTON, INC

SEWER
TOWN OF NORTH STONINGTON

STORM DRAIN
TOWN OF NORTH STONINGTON/CTDOT

WATER
SOUTHEASTERN CONNECTICUT WATER AUTHORITY

VICINITY MAP:



AERIAL MAP:



SITE INFORMATION:

NORTH EAST PARCEL: APN: 123-3694 AREA: ± 180.42 ACRES GROSS
NORTH WEST PARCEL: APN: 123-3161 AREA: ± 13.31 ACRES GROSS
SOUTH EAST PARCEL: APN: 123-0140 AREA: ± 62.61 ACRES GROSS
SOUTH WEST PARCEL: APN: 126-0006 AREA: ± 97.11 ACRES GROSS

LAND DEVELOPMENT DATA:

TOTAL PROPERTY AREA 354 AC
PROJECT AREA WITHIN FENCE 118 AC
AREA OF TREE CLEARING (SELECTIVELY) 8 AC
AREA OF TREE CLEARING AND GRUBBING 70 AC
AREA OF TREE CLEARING AND NO GRUBBING 14 AC
VOLUME OF GRADING (CUT RAW) 150,000 CY
VOLUME OF GRADING (FILL RAW) 150,000 CY
LINEAR FEET OF GRAVEL ROADS 11,490 LF

DRAWING INDEX:

DWG NO.	TITLE	REV NO.
C-001	TITLE SHEET	
C-002	CIVIL NOTES & ABBREVIATIONS	
C-101	EXISTING SITE CONDITIONS & TOPOGRAPHY	
C-102	TREE CLEARING PLAN	
C-110	OVERALL GRADING & DRAINAGE PLAN	
C-111	GRADING & DRAINAGE PLAN - AREA NORTH EAST	
C-112	GRADING & DRAINAGE PLAN - AREA NORTH WEST	
C-113	GRADING & DRAINAGE PLAN - AREA SOUTH	
C-301	SECTIONS & DETAILS	
C-701	EROSION AND SEDIMENTATION CONTROL PLAN - AREA NORTH EAST	
C-702	EROSION AND SEDIMENTATION CONTROL PLAN - AREA NORTH WEST	
C-703	EROSION AND SEDIMENTATION CONTROL PLAN - AREA SOUTH	
C-720	EROSION AND SEDIMENTATION CONTROL NOTES & DETAILS	

PRELIMINARY
NOT FOR CONSTRUCTION

PROJECT: PAWCATUCK SOLAR CENTER
DRAWING NO. C-001

ELLA WHEELER ROAD
NORTH STONINGTON, CT 06359

TITLE SHEET

DATE: 04.18.18
BY: LJK
CHECKED: JLB
DESIGNED: P.M.
PROJECT #: 001.18.005
FILE NAME: 001.dwg
DRAWN: J.T.LJK
DATE: 04/18/2018

CT SITING COUNCIL
DESCRIPTION: PAWCATUCK SOLAR CENTER

DATE: 04.18.18
BY: LJK
CHECKED: JLB
DESIGNED: P.M.
PROJECT #: 001.18.005
FILE NAME: 001.dwg
DRAWN: J.T.LJK
DATE: 04/18/2018

INTERNAL USE ONLY:
DRAWN: J.T.LJK
CHECKED: JLB
DESIGNED: P.M.
PROJECT #: 001.18.005
FILE NAME: 001.dwg
DRAWN: J.T.LJK
DATE: 04/18/2018

CAUTION:

- 1. CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT FOR LOCATION OF UNDERGROUND UTILITIES AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION - PHONE (DIAL 800-922-4455) OR 811. CONTRACTOR SHALL VERIFY ALL EXISTING UTILITIES PRIOR TO BEGINNING ANY WORK ON THIS SITE.

ENGINEER'S GENERAL NOTES:

- 1. UNLESS SHOWN OR SPECIFIED OTHERWISE, ALL CONSTRUCTION AND MATERIALS SHALL COMPLY WITH THE TOWN OF NORTH STONINGTON ORDINANCES.
- 2. THE CONTRACTOR SHALL NOT BEGIN ANY WORK SHOWN ON THESE PLANS UNTIL THE SIGNATURE OF APPROVAL OF THE TOWN ENGINEER IS AFFIXED HEREON AND ALL APPLICABLE PERMITS HAVE BEEN OBTAINED.
- 3. THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH TOWN STAFF, OTHER AGENCY STAFF, CONTRACTOR, MATERIAL TESTING LAB, CONSULTANTS, AND OTHER APPROPRIATE PERSONNEL REPRESENTING THE DEVELOPER AT LEAST 2 WORKING DAYS IN ADVANCE OF ANY CONSTRUCTION ACTIVITIES.
- 4. CONTRACTORS SHALL BE RESPONSIBLE FOR COORDINATING THEIR OPERATIONS WITH ALL REQUIRED MATERIALS TESTING SERVICES AS REQUIRED BY THE TOWN OF NORTH STONINGTON IMPROVEMENT STANDARDS AND THE TOWN OF NORTH STONINGTON INSPECTOR. EACH PHASE OF CONSTRUCTION SHALL BE TESTED AND APPROVED BY THE TOWN INSPECTOR PRIOR TO PROCEEDING TO SUBSEQUENT PHASES.
- 5. CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES INVOLVED IN THE DEVELOPMENT PRIOR TO BEGINNING OF WORK.
- 6. UTILITIES TO BE INSTALLED UNDER EXISTING PAVEMENTS SHALL BE OPEN CUT UNLESS OTHERWISE NOTICED ON PLANS.
- 7. NO PAVEMENT WORK WILL OCCUR WITHIN THE ROAD RIGHT-OF-WAY PRIOR TO COMPLETION OF ANY NECESSARY UTILITY POLE REMOVAL AND UTILITY UNDERGROUND WORK WITHIN THAT RIGHT-OF-WAY.
- 8. CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SURVEY MONUMENTS AND/OR OTHER SURVEY MARKERS DURING CONSTRUCTION. ALL MONUMENTS OR MARKERS DESTROYED DURING CONSTRUCTION SHALL BE REPLACED BY A LICENSED STATE LAND SURVEYOR AT THE CONTRACTOR'S EXPENSE.
- 9. PRIOR TO REQUESTING COUNTY ACCEPTANCE OF IMPROVEMENTS, THE CONTRACTOR SHALL SET STANDARD SURVEY MONUMENTS AT LOCATIONS REFERENCED BY ENGINEER. ALL SURVEY MONUMENTS SHALL BE PUNCHED AND SHALL BEAR THE LICENSE NUMBER OF THE SURVEYOR.
- 10. CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL CURRENTLY APPLICABLE SAFETY LAWS OF ALL JURISDICTIONAL BODIES. THE CONTRACTOR IS DIRECTED TO CONTACT THE OFFICE OF SAFETY AND HEALTH ADMINISTRATION (OSHA). THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL BARRICADES, SAFETY DEVICES, AND CONTROL OF TRAFFIC WITHIN AND AROUND THE CONSTRUCTION AREA. FOR ALL TRENCH EXCAVATION 5 FEET OR MORE IN DEPTH, THE CONTRACTOR SHALL OBTAIN A PERMIT PRIOR TO BEGINNING ANY EXCAVATION.
- 11. PUBLIC SAFETY AND TRAFFIC CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND AS MAY BE DIRECTED BY THE TOWN OF NORTH STONINGTON. ANY LANE CLOSURES (VEHICLE OR BICYCLE) SHALL BE APPROVED IN ADVANCE BY THE TOWN OF NORTH STONINGTON. SAFE VEHICULAR, BICYCLE, AND PEDESTRIAN ACCESS SHALL BE PROVIDED AT ALL TIMES.
- 12. THE CONTRACTOR SHALL MAINTAIN CONTINUOUS TEMPORARY TRAFFIC BARRICADES, WITH OPERABLE FLASHING DEVICES, SPACED AT INTERVALS OF NOT TO EXCEED 50 FEET WHENEVER THE WORK AREA IS ADJACENT TO AN EXISTING TRAFFIC LANE AND THERE IS A PAVEMENT CUT, TRENCH, OR DITCH WHICH IS OVER 2 INCHES IN DEPTH, OR IF THE TRAFFIC LANE USED BY VEHICLES IS NOT PAVED. IF THE CUT, TRENCH OR DITCH IS MORE THAN 10 FEET FROM A TRAFFIC LANE, THEN THE BARRICADE SPACING MAY BE GREATER, PROVIDED THAT IT DOES NOT EXCEED 200 FEET.
- 13. CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES CONTRACTOR SHALL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF THE CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONTRACTOR FURTHER AGREES TO INDEMNIFY AND HOLD THE TOWN OF NORTH STONINGTON, ITS OFFICERS, EMPLOYEES, AGENTS, AND VOLUNTEERS HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF THE WORK ON THIS PROJECT.
- 14. ALL CONSTRUCTION AND MATERIAL DELIVERY VEHICLES SHALL USE THE DESIGNATED ACCESS AND HAUL ROUTE(S) TO THE CONSTRUCTION SITE. THE ROUTE(S) SHALL BE MONITORED DURING THE PROJECT FOR ANY DAMAGE AND DEBRIS ATTRIBUTABLE TO THE PROJECT VEHICLES.
- 15. WHERE WORK IS BEING DONE IN AN OFF-SITE EASEMENT THE CONTRACTOR SHALL NOTIFY THE PROPERTY OWNER TWO WORKING DAYS PRIOR TO COMMENCING WORK WITHIN SAID EASEMENT. COPIES OF ALL SIGNED/APPROVED OFF-SITE EASEMENT AND/OR RIGHT-OF-ENTRY DOCUMENTS SHALL BE PROVIDED TO THE TOWN OF NORTH STONINGTON.

DEMOLITION NOTES:

- 1. CONTRACTOR SHALL COMPLY WITH ALL GENERAL AND STATE REQUIREMENTS INVOLVING THE REMOVAL AND DISPOSAL OF HAZARDOUS MATERIAL(S).
- 2. BACKFILL ALL DEPRESSIONS AND TRENCHES FROM DEMOLITION TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER.
- 3. REMOVAL OF LANDSCAPING SHALL INCLUDE ROOTS AND ORGANIC MATERIALS TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER.
- 4. PRIOR TO BEGINNING DEMOLITION WORK ACTIVITIES, CONTRACTOR SHALL INSTALL EROSION CONTROL MEASURES OUTLINED IN THE EROSION CONTROL PLAN & DETAILS.
- 5. THE CONTRACTOR SHALL MAINTAIN ALL SAFETY DEVICES, AND SHALL BE RESPONSIBLE FOR CONFORMANCE TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS LAWS AND REGULATIONS.
- 6. THE CONTRACTOR SHALL PROTECT FROM DAMAGE ALL EXISTING IMPROVEMENTS FACILITIES AND STRUCTURES WHICH ARE TO REMAIN. ANY ITEMS DAMAGED BY THE CONTRACTOR OR HIS AGENTS OR ANY ITEMS REMOVED FOR HIS USE SHALL BE REPLACED IN EQUAL OR BETTER CONDITION AS APPROVED BY THE OWNER'S REPRESENTATIVE.
- 7. COORDINATE WITH ELECTRICAL, MECHANICAL, LANDSCAPING AND ARCHITECTURAL DRAWINGS FOR UTILITY SHUT-DOWN/DISCONNECT LOCATIONS. CONTRACTOR IS TO SHUT OFF ALL UTILITIES AS NECESSARY PRIOR TO DEMOLITION. CONTRACTOR IS TO COORDINATE SERVICE INTERRUPTIONS WITH THE CLIENT, DO NOT INTERRUPT SERVICES TO ADJACENT OFF-SITE OWNERS.
- 8. THIS PLAN IS NOT INTENDED TO BE A COMPLETE CATALOGUE OF ALL EXISTING STRUCTURES AND/OR UTILITIES. THE INTENT OF THIS PLAN IS TO DISCLOSE GENERAL INFORMATION KNOWN BY THE ENGINEER AND TO SHOW THE LIMITS OF THE AREA WHERE WORK WILL BE PERFORMED. THIS PLAN SHOWS THE EXISTING FEATURES TAKEN FROM A FIELD SURVEY, FIELD INVESTIGATIONS AND AVAILABLE INFORMATION. THIS PLAN MAY OR MAY NOT ACCURATELY REFLECT THE TYPE OR EXTENT OF THE ITEMS TO BE ENCOUNTERED AS THEY ACTUALLY EXIST. WHERE EXISTING FEATURES ARE NOT SHOWN, IT IS NOT IMPLIED THAT THEY ARE NOT TO BE DEMOLISHED OR REMOVED. THE CONTRACTOR SHALL PERFORM A THOROUGH FIELD INVESTIGATION AND REVIEW OF THE SITE WITHIN THE LIMIT OF WORK SHOWN IN THIS PLAN SET TO DETERMINE THE TYPE, QUANTITY AND EXTENT OF ANY AND ALL ITEMS. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR DETERMINING THE EXTENT OF EXISTING STRUCTURES AND/OR UTILITIES AND QUANTITY OF WORK INVOLVED IN REMOVING THESE ITEMS FROM THE SITE.

ENGINEER'S GRADING NOTES:

- 1. THE CONTRACTOR SHALL NOT ADJUST GRADES ON THIS PLAN WITHOUT PRIOR WRITTEN APPROVAL OF THE ENGINEER.
- 2. CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS REQUIRED TO PROTECT ADJACENT PROPERTIES DURING THE GRADING OPERATIONS.
- 3. THE GEOTECHNICAL ENGINEERING REPORT (SOILS REPORT) PREPARED BY TERRACON CONSULTANTS, INC, DATED JANUARY 8, 2018, FOR THE SITE SHALL BE CONSIDERED AS PART OF THESE PLANS. ALL GRADING SHALL BE DONE IN ACCORDANCE WITH THE RECOMMENDATIONS AND SPECIFICATIONS CONTAINED IN THE SOILS REPORT.
- 4. IF THE OWNER/APPLICANT DIRECTS THE ENGINEER TO DEVIATE FROM THE SOILS REPORT RECOMMENDATIONS (MATERIALS, METHODS, ETC.), REGARDLESS OF JURISDICTIONAL REQUIREMENTS OR EXCEPTIONS, THE OWNER/APPLICANT SHALL INDEMNIFY AND HOLD THE ENGINEER HARMLESS OF ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF THE GRADING WORK ON THIS PROJECT.
- 5. ALL GRADING SHALL BE DONE UNDER THE OBSERVATION OF A GEOTECHNICAL ENGINEER. ALL AREAS TO BE FILLED SHALL BE PREPARED TO BE FILLED AND ALL FILL SHALL BE PLACED IN ACCORDANCE WITH THE RECOMMENDED GRADING SPECIFICATIONS AND SPECIAL PROVISIONS ATTACHED TO THE SOILS INVESTIGATIONS FOR THIS PROJECT. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PLACE, SPREAD, WATER AND COMPACT THE FILL IN STRICT ACCORDANCE WITH THESE SPECIFICATIONS.
- 6. CONSTRUCTION OBSERVATIONS AND COMPACTION TESTS SHALL BE MADE BY THE GEOTECHNICAL ENGINEER DURING THE FILLING AND COMPACTION OPERATIONS SO THAT HE CAN STATE HIS OPINION THAT THE FILL WAS CONSTRUCTED IN ACCORDANCE WITH THE EARTHWORK SPECIFICATIONS.
- 7. IN THE CASE OF CONFLICTS, THE REQUIREMENTS OF THE EARTHWORK SPECIFICATIONS PREPARED FOR THE PROJECT BY THE SOILS ENGINEER SHALL GOVERN THE REQUIREMENTS OF THIS PLAN AND THESE NOTES. PLANS SHALL BE REVISED ACCORDINGLY.
- 8. GRADING CONTRACTOR SHALL COORDINATE THE GRADING OPERATION WITH UTILITY COMPANIES PERTAINING TO CONFLICTS REQUIRING REMOVAL/RELOCATION/ADJUSTMENT OF EXISTING POWER POLES, UNDERGROUND PIPES/CONDUITS, VAULTS/BOXES, ETC, OR ANY OTHER UTILITY ADJUSTMENTS NECESSARY TO PERFORM THE SCOPE OF WORK.

ENGINEER'S GRADING NOTES (CONTINUED):

- 9. DURING CONSTRUCTION, THE CONTRACTOR SHALL PROPERLY GRADE ALL EXCAVATED SURFACES TO PROVIDE POSITIVE DRAINAGE AND PREVENT PONDING OF WATER. THE CONTRACTOR SHALL CONTROL SURFACE WATER TO AVOID DAMAGE TO ADJOINING PROPERTIES OR TO FINISHED WORK ON THE SITE. THE CONTRACTOR SHALL TAKE REMEDIAL MEASURES TO PREVENT EROSION OF FRESHLY GRADED AREAS AND UNTIL SUCH TIME AS PERMANENT DRAINAGE AND EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
- 10. ALL TRENCHES SHALL BE BACKFILLED PER THE SPECIFICATIONS WITH APPROPRIATE TESTS BY THE GEOTECHNICAL ENGINEER TO VERIFY COMPACTION VALUES.

STORM WATER POLLUTION CONTROL PLAN (SWPCP) NOTES:

- 1. THE SWPPP MUST BE DEVELOPED AND IMPLEMENTED BEFORE ANY LAND-DISTURBING ACTIVITIES. SEDIMENT CONTROLS SUCH AS ROCK SITE ENTRANCE PADS, TRAPS, BASINS, AND SILT FENCES MUST BE INSTALLED BEFORE LAND CLEARING, EXCAVATION, OR PLACEMENT OF FILL MATERIAL.
- 2. DETENTION BASINS, IF USED, MUST BE CONSIDERED FIRST AND MUST PERFORM AS SEDIMENT BASINS UNTIL THE CONTRIBUTING DRAINAGE AREA IS SEEDDED AND STABILIZED. OUTLETS MUST BE MODIFIED, IF NECESSARY, TO MAXIMIZE DETENTION AND SEDIMENT REMOVAL DURING CONSTRUCTION.
- 3. INSTALL CONSTRUCTION ENTRANCE TO MINIMIZE THE TRACKING OF MUD, SOIL, AND ROCK FROM CONSTRUCTION AREAS ONTO PUBLIC ROADWAYS. SOIL AND ROCK TRACKED ONTO THE ROADWAY MUST BE REMOVED DAILY.
- 4. SOIL STOCKPILES MUST BE LOCATED AWAY FROM STREAMS, PONDS, SWALES AND CATCH BASINS. STOCKPILES MUST BE SEEDDED, MULCHED, AND ADEQUATELY CONTAINED THROUGH THE USE OF SILT FENCE WITHIN SEVEN (7) DAYS IF PLANNING TO LEAVE UNATTENDED FOR 30 DAYS OR MORE.
- 5. SEDIMENT-LADEN WATER ENCOUNTERED DURING TRENCHING, BORING, OR OTHER EXCAVATION ACTIVITIES MUST BE PUMPED TO A SEDIMENT TRAPPING OR FILTERING DEVICE AND CLEANED BEFORE BEING DISCHARGED. DISCHARGES TO STORM DRAINS, DITCHES, OR WATER BODIES MUST BE COVERED BY CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENT PROTECTION (CTDEEP) PERMIT.
- 6. IF CONSTRUCTION ACTIVITIES ARE COMPLETE OR HAVE BEEN TEMPORARILY HALTED FOR MORE THAN SEVEN (7) DAYS, STABILIZATION ACTIVITIES WILL BE IMPLEMENTED WITHIN (3) DAYS.
- 7. ALL AREAS WITHIN 25 FT WETLANDS AND 100 FT OF STREAMS, RIVERS, LAKES, AND SINKHOLES (EXCEPT WHERE NOTED OTHERWISE ON PLANS) MUST BE FLAGGED AS OFF-LIMITS TO VEHICLES, EQUIPMENT, AND SOIL DISTURBANCE ACTIVITIES.
- 8. GOOD HOUSEKEEPING PRACTICES MUST BE APPLIED TO PREVENT CONTAMINATED RUNOFF OR OTHER IMPACTS FROM PAINT OR CONCRETE WASTES, FUELS AND OILS, TRASH AND LITTER, OR OTHER MATERIALS.
- 9. SILT FENCES, DITCH CHECK DAMS, NON-PERMANENT SEDIMENT TRAPS, AND OTHER TEMPORARY CONTROLS MUST BE REMOVED AFTER VEGETATION IN UPGRADATION AREAS IS ESTABLISHED AND DITCHES ARE DEEMED STABLE PER THE GUIDELINES.
- 10. GOOD HOUSEKEEPING MEASURES FOR MATERIALS STORAGE AND HANDLING, VEHICLE FUELING AND MAINTENANCE, SPILL RESPONSE AND CLEANUP, AND WASTE MANAGEMENT MUST BE FOLLOWED TO ENSURE THAT RUNOFF FROM THE SITE IS FREE OF CONTAMINANTS.
- 11. ALL BMPs WILL BE SELECTED, INSTALLED, OPERATED, AND MAINTAINED ACCORDING TO 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL, MANUFACTURER'S REQUIREMENTS, OR STANDARD INDUSTRY PRACTICE, AS APPROPRIATE.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) REQUIREMENT:

- 1. ALL CONSTRUCTION ON OFFSITE OR ONSITE IMPROVEMENTS SHALL ADHERE TO NPDES (NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM) BEST MANAGEMENT PRACTICES TO PREVENT DELETERIOUS MATERIALS OR POLLUTANTS FROM ENTERING THE TOWN OF NORTH STONINGTON STORM DRAIN SYSTEMS.
- 2. ERODED SEDIMENTS AND OTHER POLLUTANTS MUST BE RETAINED ON SITE AND MAY NOT BE TRANSPORTED FROM THE SITE VIA SHEET FLOW, SWALES, AREA DRAINS, NATURAL DRAINAGE COURSES, OR WIND.
- 3. STOCKPILES OF EARTH AND OTHER CONSTRUCTION RELATED MATERIALS MUST BE PROTECTED FROM BEING TRANSPORTED FROM THE SITE BY THE FORCES OF WIND OR WATER.
- 4. FUELS, OILS, SOLVENTS, AND OTHER TOXIC MATERIALS MUST BE STORED IN ACCORDANCE WITH THEIR LISTING AND ARE NOT TO CONTAMINATE THE SOIL AND SURFACE WATERS. ALL APPROVED STORAGE CONTAINERS ARE TO BE PROTECTED FROM THE WEATHER. SPILLS MUST BE CLEANED UP IMMEDIATELY AND DISPOSED OF IN A PROPER MANNER. SPILLS MAY NOT BE WASHED INTO THE DRAINAGE SYSTEM.
- 5. EXCESS OR WASTE CONCRETE MAY NOT BE WASHED INTO THE PUBLIC RIGHT-OF-WAY OR ANY OTHER DRAINAGE SYSTEM. PROVISIONS SHALL BE MADE TO RETAIN CONCRETE WASTES ON SITE UNTIL THEY CAN BE DISPOSED OF AS SOLID WASTE.
- 6. TRASH AND CONSTRUCTION RELATED SOLID WASTES MUST BE DEPOSITED INTO A COVERED RECEPTACLE TO PREVENT CONTAMINATION AND DISPERSAL BY WIND.
- 7. SEDIMENTS AND OTHER MATERIALS MAY NOT BE TRACKED FROM THE SITE BY VEHICLE TRAFFIC. THE CONSTRUCTION ENTRANCE ROADWAYS MUST BE STABILIZED SO AS TO INHIBIT SEDIMENTS FROM BEING DEPOSITED INTO THE PUBLIC RIGHT-OF-WAY. ACCIDENTAL DEPOSITIONS MUST BE SWEEP UP IMMEDIATELY AND MAY NOT BE WASHED DOWN BY RAIN OR OTHER MEANS.
- 8. ANY SLOPES WITH DISTURBED SOILS OR DENUDED OF VEGETATION MUST BE STABILIZED SO AS TO INHIBIT EROSION BY WIND AND WATER.
- 9. CLEAN UP ALL SPILLS USING DRY METHODS.
- 10. CALL 911 IN CASE OF A HAZARDOUS SPILL.
- 11. UPON SATISFACTORY COMPLETION OF THE WORK, THE ENTIRE WORK SITE SHALL BE CLEANED BY THE CONTRACTOR AND LEFT WITH A SMOOTH AND NEATLY GRADED SURFACE FREE OF CONSTRUCTION WASTE, RUBBISH, AND DEBRIS OF ANY NATURE.

DUST CONTROL:

- 1. WATER TRUCKS SHALL BE PRESENT AND IN USE AT THE CONSTRUCTION SITE. ALL PORTIONS OF THE SITE SUBJECT TO BLOWING DUST SHALL BE WATERED AS OFTEN AS DEEMED NECESSARY BY THE CLIENT/INSPECTOR IN ORDER TO INSURE PROPER CONTROL OF BLOWING DUST FOR THE DURATION OF THE PROJECT.
- 2. ALL PUBLIC STREETS AND MEDIANS SOILED OR LITTERED DUE TO THIS CONSTRUCTION ACTIVITY SHALL BE CLEANED AND SWEEPED ON A DAILY BASIS DURING THE WORK WEEK, OR AS OFTEN AS DEEMED NECESSARY BY THE CLIENT / INSPECTOR, OR TO THE SATISFACTION OF THE TOWN OF NORTH STONINGTON DEPARTMENT OF PUBLIC WORKS.
- 3. ALL TRUCKS HAULING SOIL, SAND, AND OTHER LOOSE MATERIALS SHALL BE COVERED WITH TARPULINS OR OTHER EFFECTIVE COVERS.
- 4. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DUST CONTROL MEASURES AND FOR OBTAINING ALL REQUIRED PERMITS AND APPROVALS.
- 5. REFER TO THE PROJECT STORM WATER POLLUTION CONTROL PLAN (SWPCP) REPORT FOR ADDITIONAL DUST CONTROL GUIDELINES.

KEEPING PLANS CURRENT:

- 1. THE CONTRACTOR SHALL KEEP UP-TO-DATE AND ACCURATE A COMPLETE RECORD SET OF PRINTS FOR THE CONTRACT DRAWINGS SHOWING EVERY CHANGE FROM THE ORIGINAL DRAWINGS MADE DURING THE COURSE OF CONSTRUCTION INCLUDING EXACT FINAL LOCATION, ELEVATION, SIZES, MATERIALS, EAS CHANGES AND DESCRIPTION OF ALL WORK. RECORDS SHALL BE "REDLINED" ON A SET OF CONSTRUCTION PLAN DRAWINGS. A COMPLETE SET OF CORRECTED AND COMPLETED RECORD DRAWING PRINTS SHALL BE SUBMITTED TO THE TOWN ENGINEER AND DEVELOPER'S CIVIL ENGINEER PRIOR TO FINAL ACCEPTANCE FOR REVIEW AND APPROVAL BY THE TOWN ENGINEER.

ABBREVIATIONS:

AB	AGGREGATE BASE
AC	ASPHALT CONCRETE
APPROX	APPROXIMATE
AVG	AVERAGE
BLOG	BUILDING
BMP	BEST MANAGEMENT PRACTICES
BNDY	BOUNDARY
BOT	BOTTOM
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CN	CURVE NUMBER
COI	CHANGE OF INFORMATION
CONC	CONCRETE
CP	CONTROL POINT
CPP	CORRUGATED PLASTIC PIPE
EG	EXISTING GRADE
EP	EDGE OF PAVEMENT
ELEC	ELECTRICAL
ELEV.	ELEVATION
ESMT	EASEMENT
ETW	EDGE OF TRAVELED WAY
EXIST.	EXISTING
FG	FINISHED GRADE
FL	FLOW LINE
FR	FIBER ROLL
FS	FINISHED SURFACE
FT	FEET
GB	GRADE BREAK
HT	HEIGHT
ID	IDENTIFICATION
IRRIG	IRRIGATION
LF	LINEAR FEET
LP	LIGHT POLE
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
(N.I.C.)	NOT IN CONTRACT
NOI	NOTICE OF INTENT
NPDES	NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM
OH	OVERHEAD LINE
OAE	OR APPROVED EQUAL
P/L	PROPERTY LINE
PP	POWER POLE
PROP.	PROPOSED
R	RADIUS
RD	ROAD
RW	RIGHT-OF-WAY
SD	STORM DRAIN
SF	SILT FENCE
SPT	SPOT ELEVATION
SQ FT	SQUARE FEET
SS	SANITARY SEWER
ST	STREET
SWPCP	STORMWATER POLLUTION CONTROL PLAN
TC	TIME OF CONCENTRATION
TEMP	TEMPORARY
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
VIF	VERIFY IN FIELD
YR	YEAR



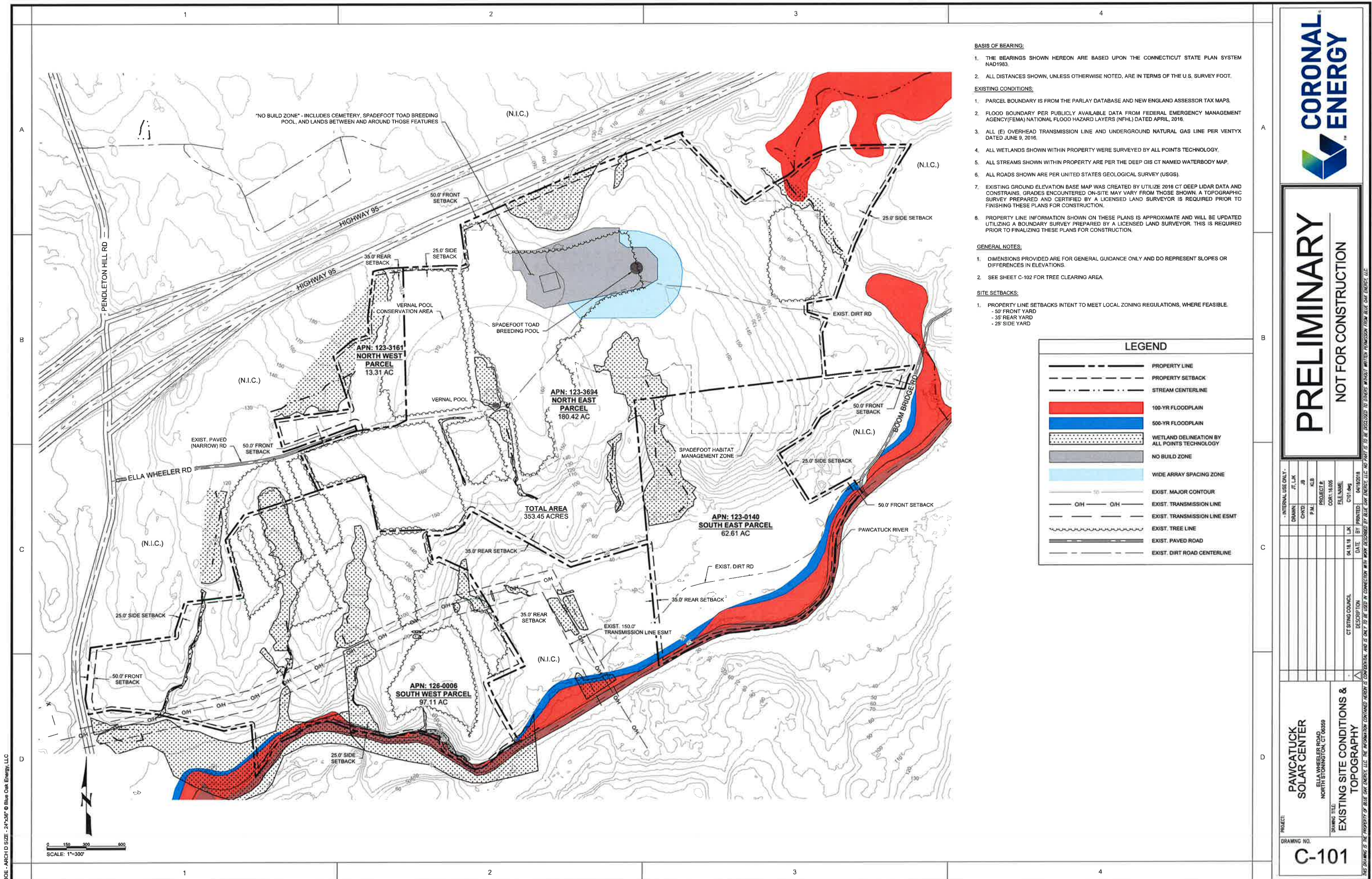
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DATE	04/18/18
BY	LJK
PRINTED	04/18/18
DESCRIPTION	CT SITING COUNCIL

PAWCATUCK SOLAR CENTER
ELLA WHEELER ROAD
NORTH STONINGTON, CT 06359

CIVIL NOTES & ABBREVIATIONS

DRAWING NO. **C-002**



BASIS OF BEARING:

1. THE BEARINGS SHOWN HEREON ARE BASED UPON THE CONNECTICUT STATE PLAN SYSTEM NAD1983.
2. ALL DISTANCES SHOWN, UNLESS OTHERWISE NOTED, ARE IN TERMS OF THE U.S. SURVEY FOOT.

EXISTING CONDITIONS:

1. PARCEL BOUNDARY IS FROM THE PARLAY DATABASE AND NEW ENGLAND ASSESSOR TAX MAPS.
2. FLOOD BOUNDARY PER PUBLICLY AVAILABLE DATA FROM FEDERAL EMERGENCY MANAGEMENT AGENCY(FEMA) NATIONAL FLOOD HAZARD LAYERS (NFHL) DATED APRIL, 2016.
3. ALL (E) OVERHEAD TRANSMISSION LINE AND UNDERGROUND NATURAL GAS LINE PER VENTYX DATED JUNE 9, 2016.
4. ALL WETLANDS SHOWN WITHIN PROPERTY WERE SURVEYED BY ALL POINTS TECHNOLOGY.
5. ALL STREAMS SHOWN WITHIN PROPERTY ARE PER THE DEEP GIS CT NAMED WATERBODY MAP.
6. ALL ROADS SHOWN ARE PER UNITED STATES GEOLOGICAL SURVEY (USGS).
7. EXISTING GROUND ELEVATION BASE MAP WAS CREATED BY UTILIZE 2016 CT DEEP LIDAR DATA AND CONSTRAINS. GRADES ENCOUNTERED ON-SITE MAY VARY FROM THOSE SHOWN. A TOPOGRAPHIC SURVEY PREPARED AND CERTIFIED BY A LICENSED LAND SURVEYOR IS REQUIRED PRIOR TO FINISHING THESE PLANS FOR CONSTRUCTION.
8. PROPERTY LINE INFORMATION SHOWN ON THESE PLANS IS APPROXIMATE AND WILL BE UPDATED UTILIZING A BOUNDARY SURVEY PREPARED BY A LICENSED LAND SURVEYOR. THIS IS REQUIRED PRIOR TO FINALIZING THESE PLANS FOR CONSTRUCTION.

GENERAL NOTES:

1. DIMENSIONS PROVIDED ARE FOR GENERAL GUIDANCE ONLY AND DO REPRESENT SLOPES OR DIFFERENCES IN ELEVATIONS.
2. SEE SHEET C-102 FOR TREE CLEARING AREA.

SITE SETBACKS:

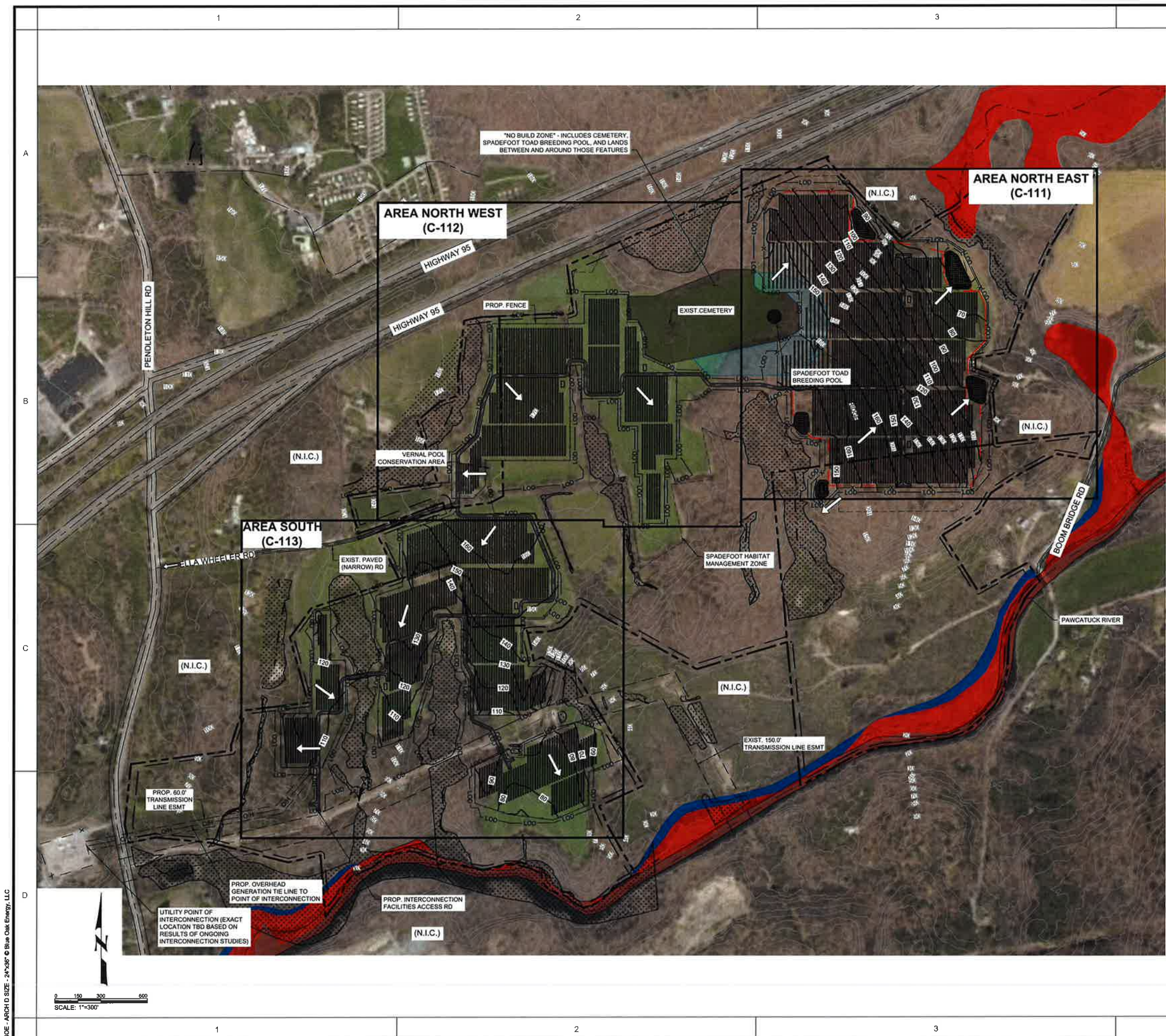
1. PROPERTY LINE SETBACKS INTENT TO MEET LOCAL ZONING REGULATIONS, WHERE FEASIBLE.
 - 50' FRONT YARD
 - 35' REAR YARD
 - 25' SIDE YARD

LEGEND	
	PROPERTY LINE
	PROPERTY SETBACK
	STREAM CENTERLINE
	100-YR FLOODPLAIN
	500-YR FLOODPLAIN
	WETLAND DELINEATION BY ALL POINTS TECHNOLOGY
	NO BUILD ZONE
	WIDE ARRAY SPACING ZONE
	EXST. MAJOR CONTOUR
	EXST. TRANSMISSION LINE
	EXST. TRANSMISSION LINE ESMT
	EXST. TREE LINE
	EXST. PAVED ROAD
	EXST. DIRT ROAD CENTERLINE

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<p>PROJECT: PAWCATUCK SOLAR CENTER ELLA WHEELER ROAD NORTH STONINGTON, CT 06359</p> <p>DRAWING TITLE: EXISTING SITE CONDITIONS & TOPOGRAPHY</p> <p>DRAWING NO.: C-101</p>	<p><small>INTERNAL USE ONLY -</small></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>DRAWN: JT, LAK</td> <td>PROJECT E: COR-18-005</td> </tr> <tr> <td>CHECK: JB</td> <td>FILE NAME: C101.dwg</td> </tr> <tr> <td>P.L.M. KLS</td> <td>DATE: 04-18-18</td> </tr> <tr> <td>DATE: 04-18-18</td> <td>DATE: 04-18-18</td> </tr> <tr> <td>DATE: 04-18-18</td> <td>DATE: 04-18-18</td> </tr> </table>	DRAWN: JT, LAK	PROJECT E: COR-18-005	CHECK: JB	FILE NAME: C101.dwg	P.L.M. KLS	DATE: 04-18-18	DATE: 04-18-18	DATE: 04-18-18	DATE: 04-18-18	DATE: 04-18-18
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LEGEND

	PROPERTY LINE
	SETBACK
	STREAM
	WETLAND DELINEATION BY ALL POINTS TECHNOLOGY
	EXIST. MAJOR CONTOUR
	PROP. SOLAR TRACKER
	PROP. ACCESS ROAD
	PROP. FENCE
	LIMIT OF DISTURBANCE
	PROP. SWALE
	DIRECTION OF STORM RUNOFF
	NO BUILD ZONE
	WIDE ARRAY SPACING ZONE
	EXIST. PAVED ROAD
	100-YR FLOODPLAIN
	500-YR FLOODPLAIN
	EXIST. TRANSMISSION LINE
	EXIST. TRANSMISSION LINE ESMT
	PROP. MAJOR CONTOUR

- GENERAL NOTES:**
1. THE OVERALL HISTORICAL DRAINAGE PATTERNS ARE TO REMAIN.
 2. THE INTENT OF THE GRADES SHOWN IS TO MATCH THE EXISTING GRADES AS CLOSE AS POSSIBLE WITH A MINIMUM GRADING IN ORDER TO PROVIDE CONTINUOUS SLOPE ALONG SECTIONS OF TRACKERS.
 3. THE ENTIRE SITE SHALL BE CLEARED AND GRUBBED IN ACCORDANCE WITH THE EROSION AND SEDIMENTATION PLANS AND SEQUENCE OF CONSTRUCTION PROVIDED HEREIN.
 2. FOR TREE CLEARING SEE SHEET C-102.



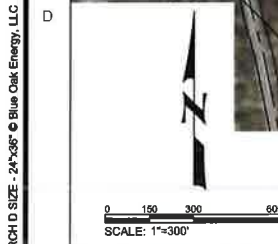
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CHKD: PAM	JOB: KLB
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DESCRIPTION: CT SITING COUNCIL	DATE: 04/18/18

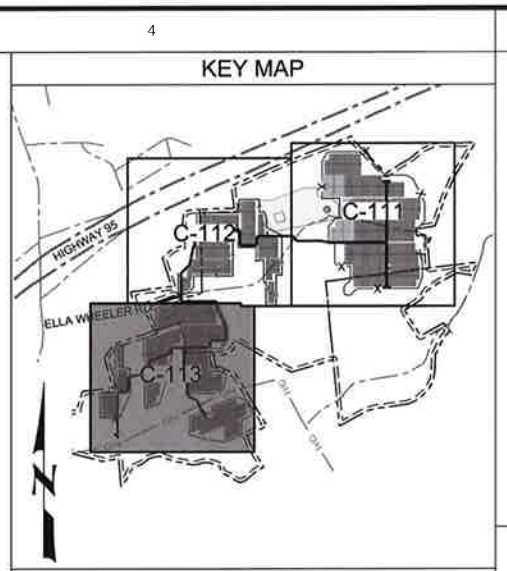
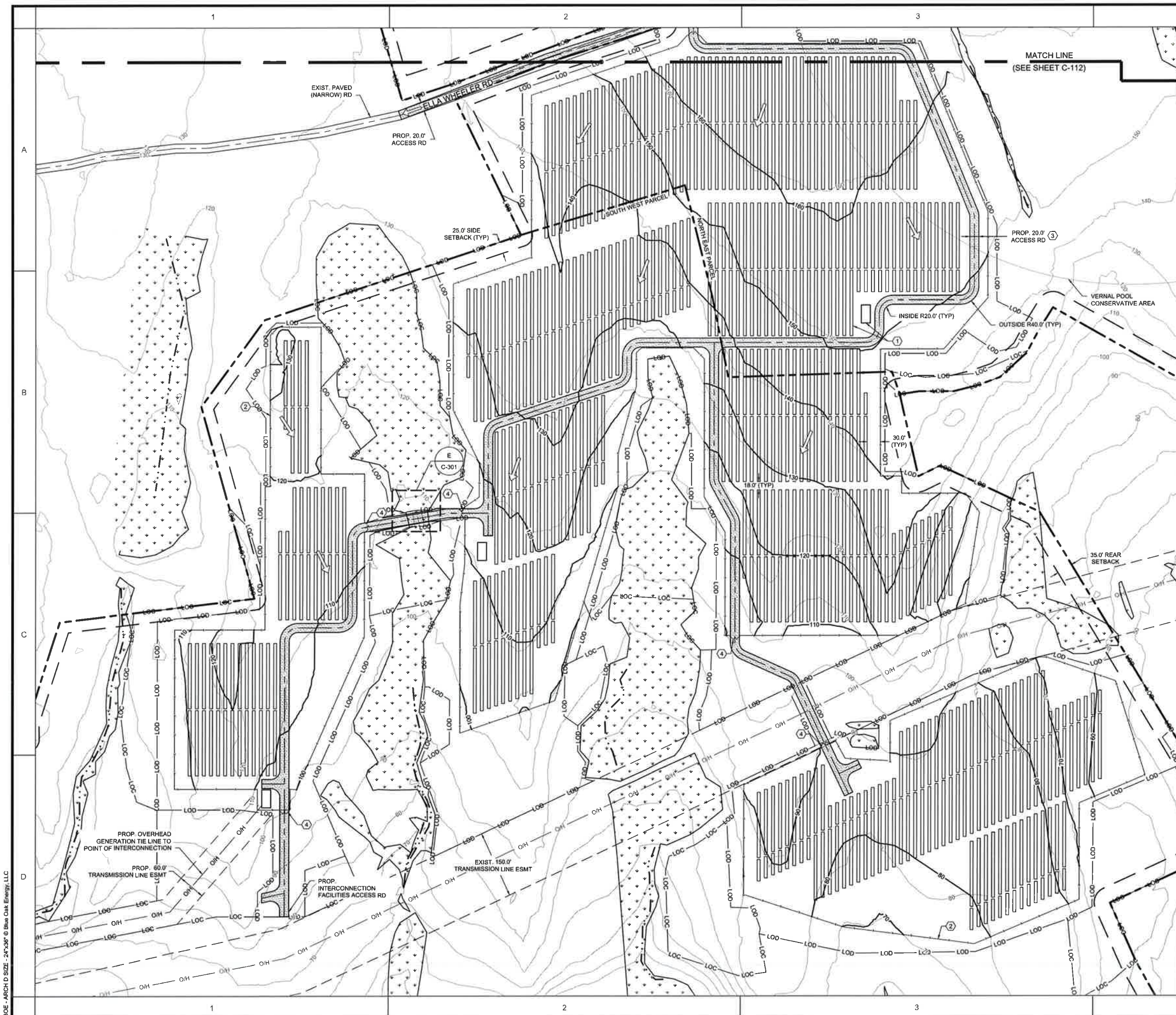
PROJECT: PAWCATUCK SOLAR CENTER
ELLA WHEELER ROAD
NORTH STONINGTON, CT 06399

DRAWING TITLE: OVERALL GRADING & DRAINAGE PLAN

DRAWING NO: C-110



BOE - ARCH D SIZE - 24"x36" © Blue Oak Energy, LLC



LEGEND

	PROPERTY LINE
	SETBACK
	STREAM
	WETLAND DELINEATION BY ALL POINTS TECHNOLOGY
	EXIST. MAJOR CONTOUR
	PROP. SOLAR TRACKER
	PROP. ACCESS ROAD
	PROP. FENCE
	LIMIT OF DISTURBANCE
	LIMIT OF CLEARING
	DIRECTION OF STORM RUNOFF
	EXIST. PAVED ROAD
	EXIST. TRANSMISSION LINE
	EXIST. TRANSMISSION LINE ESMT
	PROP. TRANSMISSION LINE
	PROP. MAJOR CONTOUR

- KEYED NOTES:**
- PROPOSED SOLAR ARRAY AND OTHER ELECTRICAL EQUIPMENT (SEE ELECTRICAL AND STRUCTURAL PLANS).
 - PROPOSED 6' TALL CHAINLINK FENCE WITH 1 FT BARBED WIRE PER DOT STANDARD CHAINLINK FENCE, SHEET NO HW-913-01.
 - PROPOSED 20' WIDE ACCESS ROAD, (SEE SECTION D ON C-301)
 - PROPOSED 24' WIDE DOUBLE SWING GATE. GATE SHALL BE LOCKED WITH FIRE DEPARTMENT APPROVED PAD LOCK.

- GENERAL NOTES:**
- DIMENSIONS PROVIDED ARE FOR GENERAL GUIDANCE ONLY AND DO REPRESENT SLOPES OR DIFFERENCES IN ELEVATIONS.
 - FOR TREE CLEARING SEE SHEET C-102.

811
Know what's below.
Call before you dig.

0 50 100 200
SCALE: 1" = 100'

DRAWN: JT, LJK		PROJECT #:	
CHKD: KJB	DATE:	FILE NAME:	DATE:
P/AL:	DATE:	FILE NAME:	DATE:
PROJECT #:		DATE:	
CORR. #:		DATE:	
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PROJECT #:		DATE:	
CORR. #:		DATE:	

PROJECT: PAWCATUCK SOLAR CENTER
ELLA WHEELER ROAD
NORTH STONINGTON, CT 06338

DRAWING TITLE: GRADING & DRAINAGE PLAN - AREA SOUTH

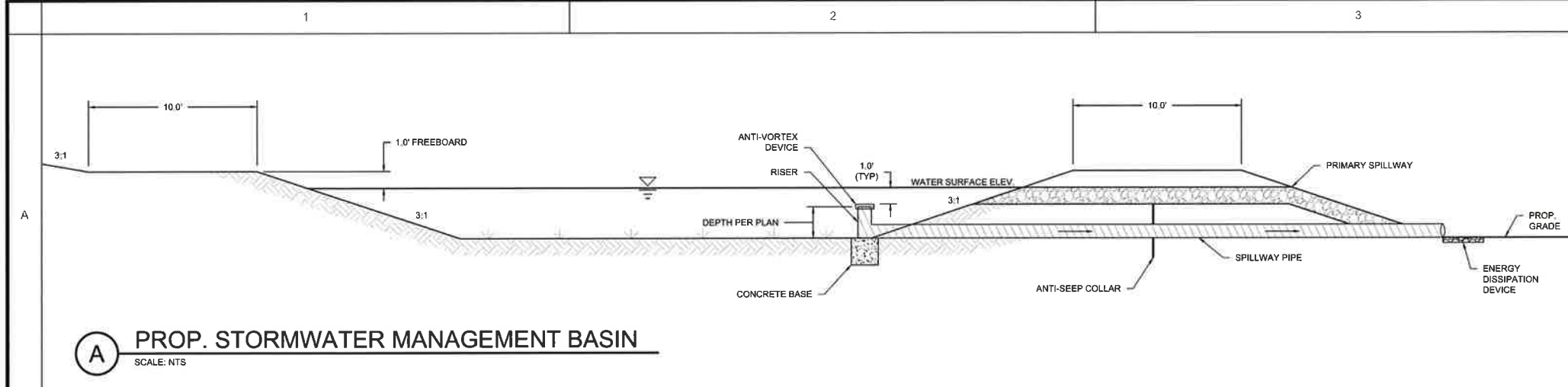
DRAWING NO.: C-113

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CORONAL ENERGY

PRELIMINARY
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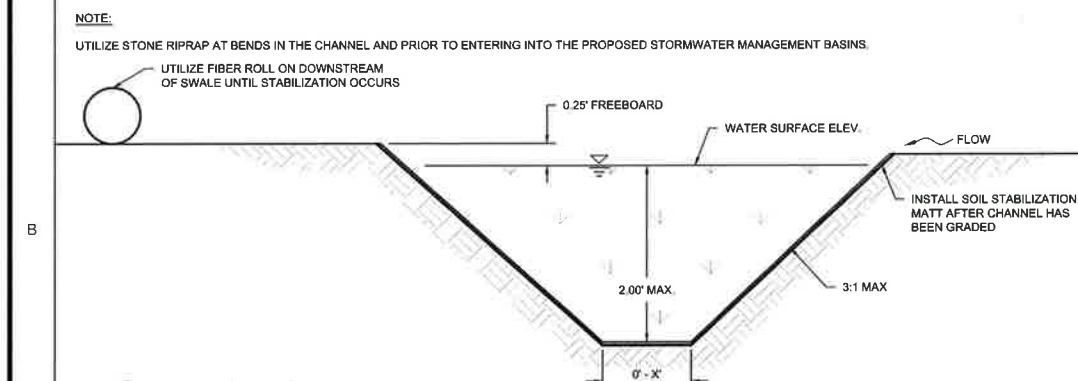
B0E - ARCH D SIZE - 24"x36" © Blue Oak Energy, LLC



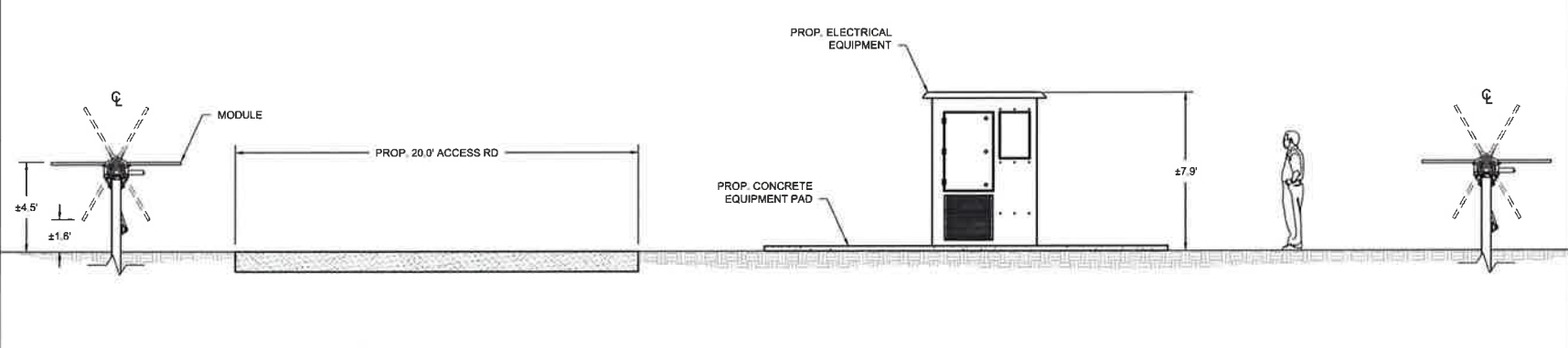
PRELIMINARY BASIN SIZING							
BASIN NO	VOLUME (CY)	BASIN TOP	BASIN BOT	RISER ELEV	SPILLWAY ELEV	RISER DETAILS	SPILLWAY DETAILS
NE1	990	95.0	90.0	93.0	94.0	18" DIA. CMP RISER	20FT LONG BROAD CRESTED SPILLWAY
NE2	2250	59.5	54.5	56.0	56.5	18" DIA. CMP RISER	20FT LONG BROAD CRESTED SPILLWAY
NE3	1250	90.5	85.5	88.8	89.5	18" DIA. CMP RISER	20FT LONG BROAD CRESTED SPILLWAY
NE4	330	143.0	138.0	141.0	142.0	12" DIA. CMP RISER	20FT LONG BROAD CRESTED SPILLWAY
NE5	720	146.0	141.0	144.0	145.0	18" DIA. CMP RISER	20FT LONG BROAD CRESTED SPILLWAY

NOTES:
 1. THE PERMANENT STORMWATER MANAGEMENT BASINS HAVE BEEN SIZED PER THE CONNECTICUT WATER QUALITY MANUAL.
 2. OUTFALL PIPING, SPILLWAY, EMBANKMENT DESIGN & BASIN SIZING WERE DETERMINED UTILIZING CONNECTICUT METHODOLOGY, TR-55 AND HEC-HMS DRAINAGE PROGRAMS.
 3. PERMANENT BASINS SHALL BE INSTALLED WITH A CUTOFF TRENCH OF IMPERVIOUS MATERIAL AND PIPES SHALL BE EQUIPPED WITH AN ANTI-SEEP COLLAR. THESE WILL BE DETAILED IN FINAL ENGINEERING

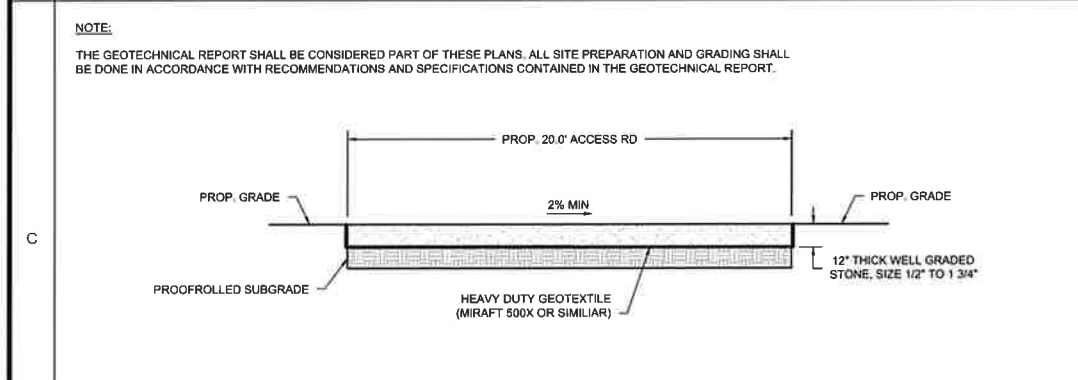
A PROP. STORMWATER MANAGEMENT BASIN
SCALE: NTS



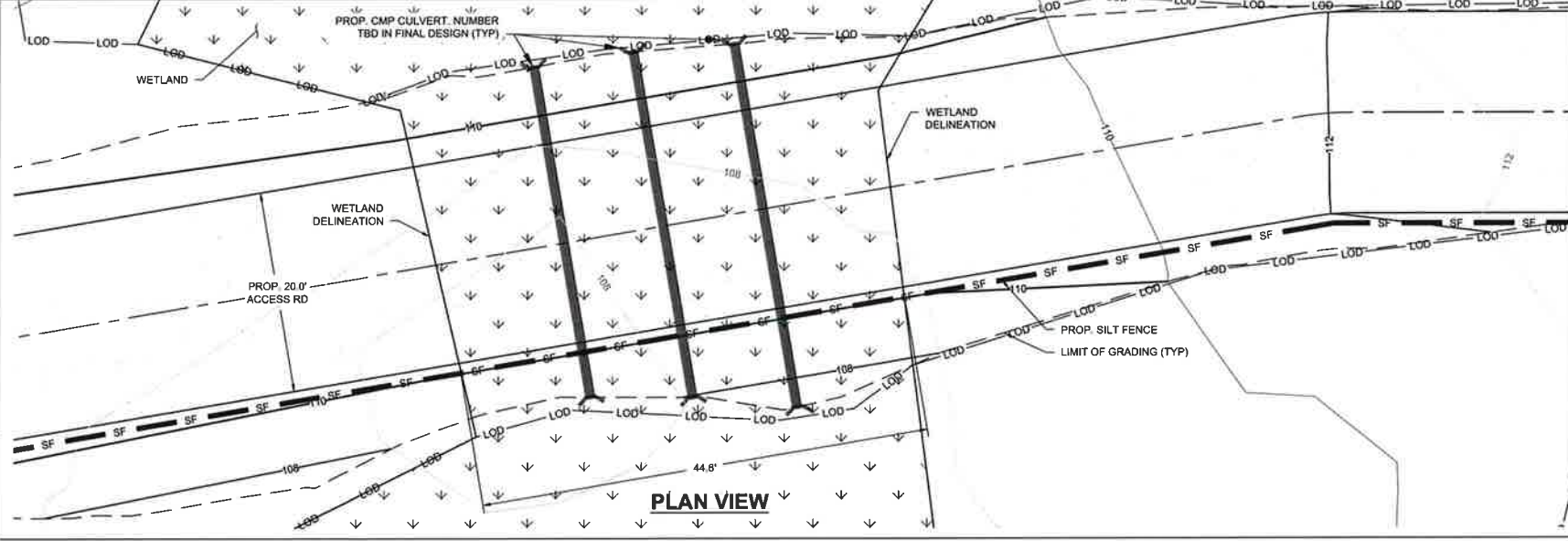
B PROP. SWALE
SCALE: NTS



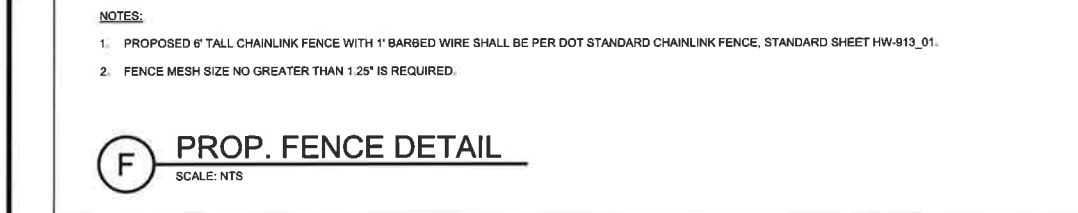
C TYPICAL TRACKER AND EQUIPMENT PAD ELEVATION
SCALE: NTS



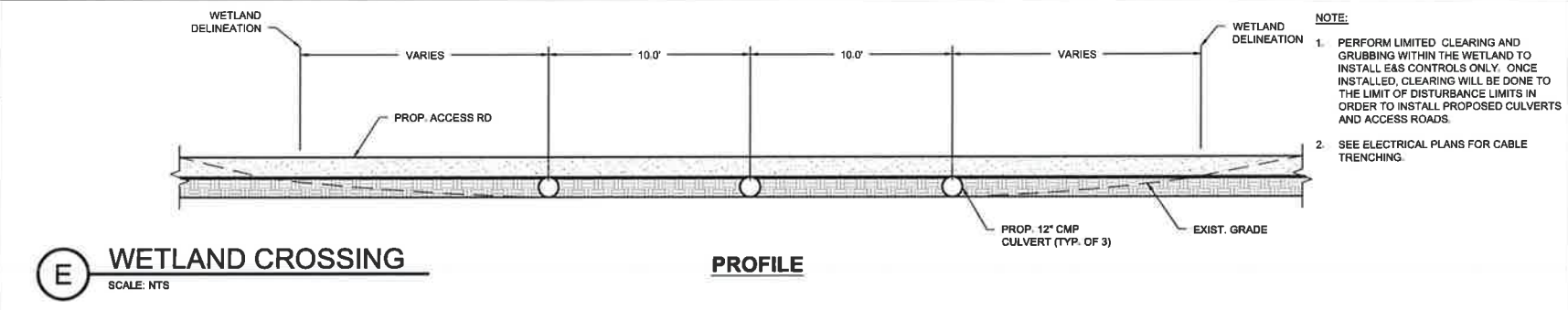
D PROP. ACCESS ROAD
SCALE: NTS



E WETLAND CROSSING
SCALE: NTS



F PROP. FENCE DETAIL
SCALE: NTS



E WETLAND CROSSING
SCALE: NTS

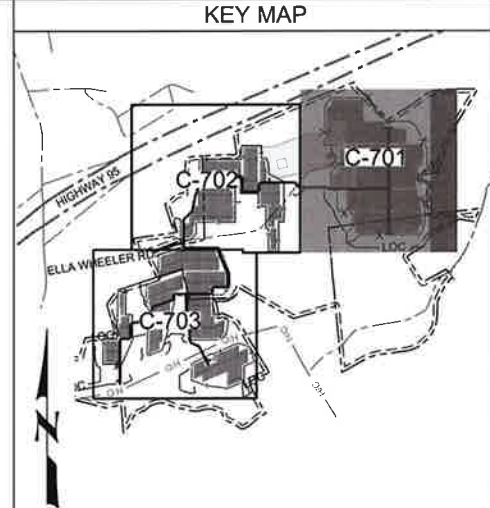
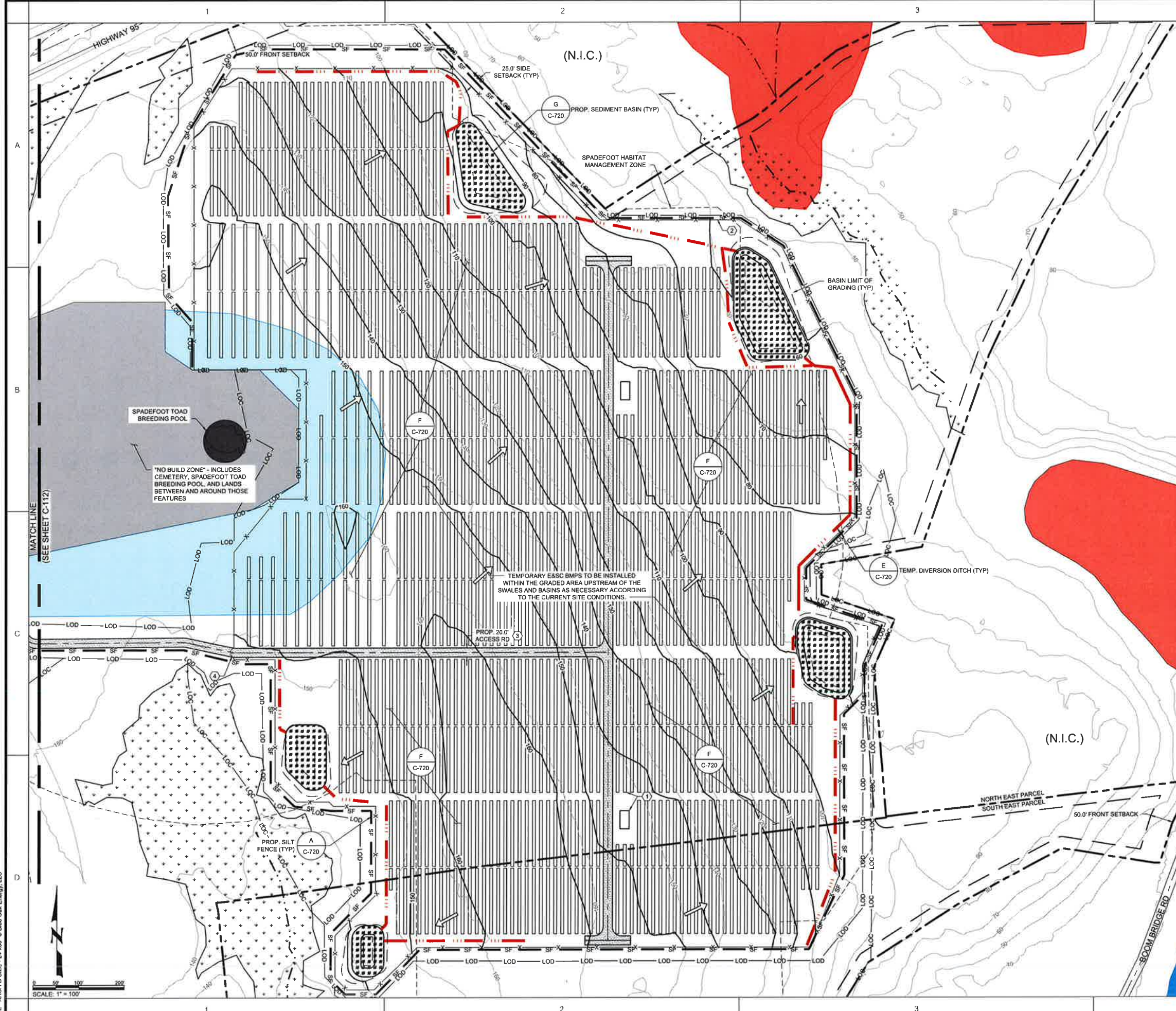
NOTE:
 1. PERFORM LIMITED CLEARING AND GRUBBING WITHIN THE WETLAND TO INSTALL EAS CONTROLS ONLY. ONCE INSTALLED, CLEARING WILL BE DONE TO THE LIMIT OF DISTURBANCE LIMITS IN ORDER TO INSTALL PROPOSED CULVERTS AND ACCESS ROADS.
 2. SEE ELECTRICAL PLANS FOR CABLE TRENCHING.



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INTERNAL USE ONLY	DATE	BY	PRINTED	DATE	BY	PROJECT	FILE NAME	DATE	BY	PROJECT	FILE NAME
DRAWN	04/18/18	JT/LJK	04/18/18	04/18/18	JT/LJK	PAWCATUCK SOLAR CENTER	041818_PAWC	04/18/18	JT/LJK	PAWCATUCK SOLAR CENTER	041818_PAWC
CHECKED		CHVD									
DESIGNED		PM									
PROJECT LEAD		KLB									
PROJECT MANAGER											
PROJECT ENGINEER											
PROJECT SUPERVISOR											
PROJECT COORDINATOR											
PROJECT ASSISTANT											

PROJECT: PAWCATUCK SOLAR CENTER
 ELLA WHEELER ROAD
 NORTH STONINGTON, CT 06359
 DRAWING NO. C-301
 SECTIONS & DETAILS



LEGEND

	PROPERTY LINE
	SETBACK
	STREAM
	WETLAND DELINEATION BY ALL POINTS TECHNOLOGY
	EXIST. MAJOR CONTOUR
	PROP. SOLAR TRACKER
	PROP. ACCESS ROAD
	PROP. FENCE
	TEMP. DIVERSION DITCH
	LIMIT OF DISTURBANCE
	LIMIT OF CLEARING
	PROP. SILT FENCE
	DIRECTION OF STORM RUNOFF
	NO BUILD ZONE
	WIDE ARRAY SPACING ZONE
	EXIST. DIRT ROAD CENTERLINE
	100-YR FLOODPLAIN
	PROP. MAJOR CONTOUR

- KEYED NOTES:**
- PROPOSED SOLAR ARRAY AND OTHER ELECTRICAL EQUIPMENT (SEE ELECTRICAL AND STRUCTURAL PLANS).
 - PROPOSED 6' TALL CHAINLINK FENCE WITH 1 FT BARBED WIRE PER DOT STANDARD CHAINLINK FENCE, SHEET NO HW-913-01.
 - PROPOSED 20' WIDE ACCESS ROAD.
 - PROPOSED 24' WIDE DOUBLE SWING GATE. GATE SHALL BE LOCKED WITH FIRE DEPARTMENT APPROVED PAD LOCK.
- GENERAL NOTES:**
- DIMENSIONS PROVIDED ARE FOR GENERAL GUIDANCE ONLY AND DO REPRESENT SLOPES OR DIFFERENCES IN ELEVATIONS.
 - FOR ADDITIONAL INFORMATION ON WATERSHEDS SEE SHEETS C-800 & C-801 IN THE STORMWATER ENGINEERING CONCEPT REPORT.
 - FOR TREE CLEARING SEE SHEET C-102.

CT DEEP TEMPORARY EROSION & EROSION CONTROL SIZING

WATERSHED ID	DRAINAGE AREA (AC)	TOTAL REQUIRED STORAGE (CY)	E&S MEASURE
NE1	8.80	313	BASIN
NE2	24.10	857	BASIN
NE3	10.60	377	BASIN
NE4	2.90	103	BASIN
NE5	6.70	238	BASIN

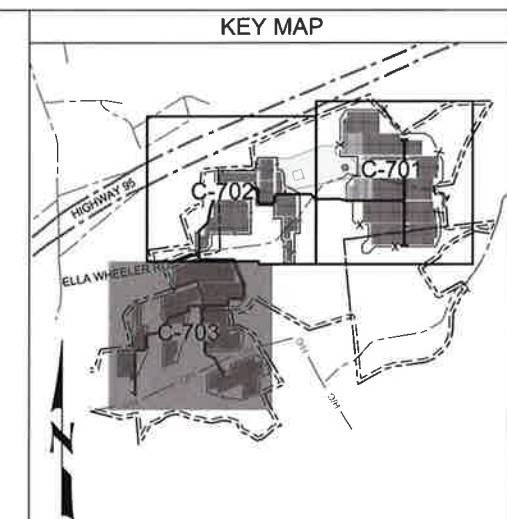
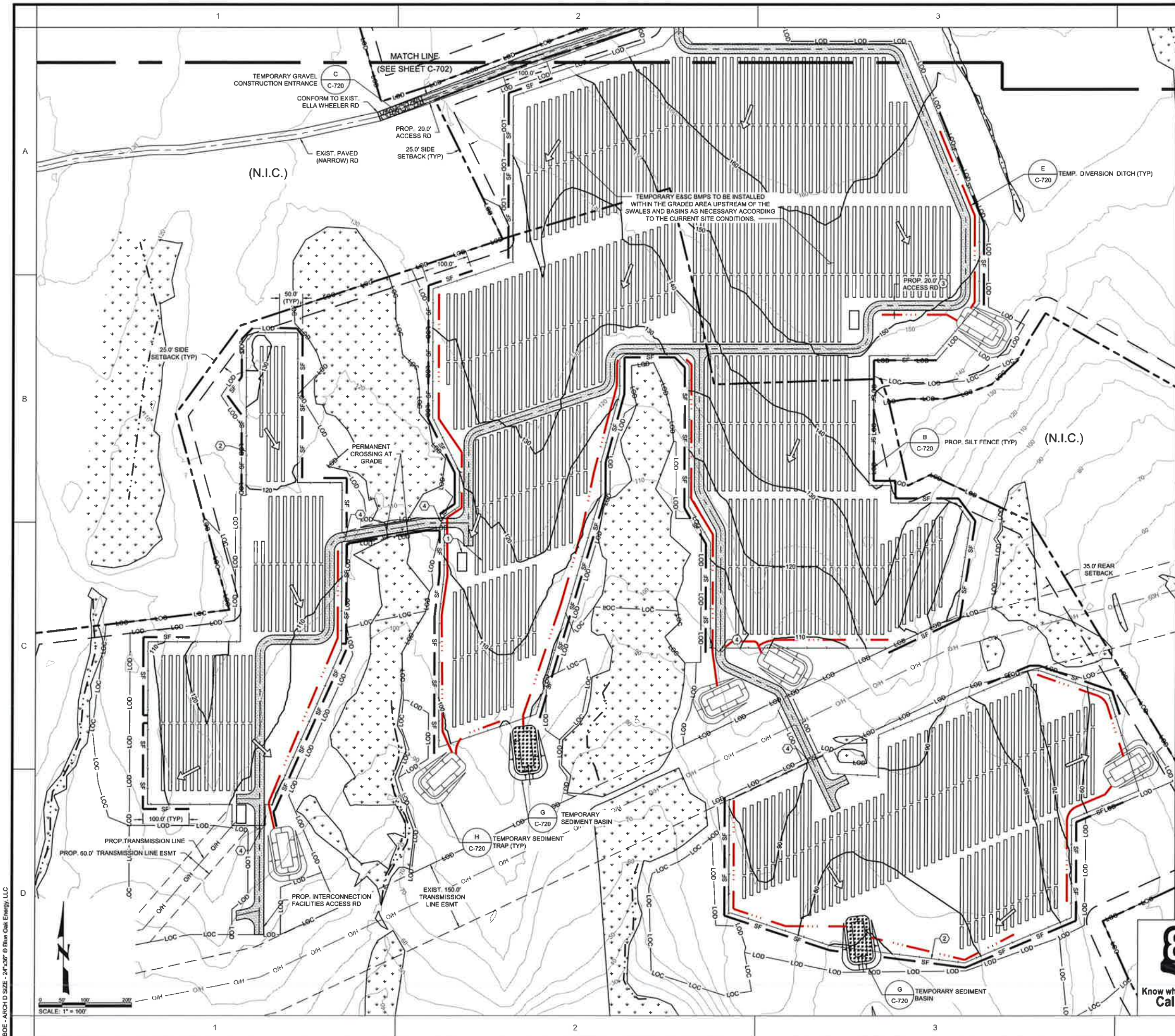


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DRAWN	JT_LJK	DATE	04/18/18
CHECKED	JB	PRINTED	04/18/18
DATE	04/18/18	FILE NAME	C701.dwg
PROJECT	COR116105	DESCRIPTION	CT SITING COUNCIL

PROJECT: PAWCATUCK SOLAR CENTER
 DRAWING TITLE: EROSION & SEDIMENTATION PLAN - AREA NORTH EAST
 DRAWING NO. C-701



LEGEND

	PROPERTY LINE
	SETBACK
	STREAM
	WETLAND DELINEATION BY ALL POINTS TECHNOLOGY
	EXIST. MAJOR CONTOUR
	PROP. SOLAR TRACKER
	PROP. ACCESS ROAD
	PROP. FENCE
	TEMP. DIVERSION DITCH
	LIMIT OF DISTURBANCE
	LIMIT OF CLEARING
	PROP. SILT FENCE
	DIRECTION OF STORM RUNOFF
	EXIST. PAVED ROAD
	EXIST. TRANSMISSION LINE
	EXIST. TRANSMISSION LINE ESMT
	PROP. TRANSMISSION LINE
	PROP. MAJOR CONTOUR

- KEYED NOTES:**
- PROPOSED SOLAR ARRAY AND OTHER ELECTRICAL EQUIPMENT (SEE ELECTRICAL AND STRUCTURAL PLANS).
 - PROPOSED 6' TALL CHAINLINK FENCE WITH 1 FT BARBED WIRE PER DOT STANDARD CHAINLINK FENCE, SHEET NO HW-913-01.
 - PROPOSED 20' WIDE ACCESS ROAD.
 - PROPOSED 24' WIDE DOUBLE SWING GATE. GATE SHALL BE LOCKED WITH FIRE DEPARTMENT APPROVED PAD LOCK.

- GENERAL NOTES:**
- DIMENSIONS PROVIDED ARE FOR GENERAL GUIDANCE ONLY AND DO REPRESENT SLOPES OR DIFFERENCES IN ELEVATIONS.
 - FOR ADDITIONAL INFORMATION ON WATERSHEDS SEE SHEETS C-800 & C-801 IN THE STORMWATER ENGINEERING CONCEPT REPORT.
 - FOR TREE CLEARING SEE SHEET C-102.

CT DEEP TEMPORARY EROSION & EROSION CONTROL SIZING

WATERSHED ID	DRAINAGE AREA (AC)	TOTAL REQUIRED STORAGE (CY)	E&S MEASURE
S1	0.87	-	SILT FENCE
S2	0.78	-	SILT FENCE
S3	0.74	-	SILT FENCE
S4	3.01	403	TRAP
S5	0.82	-	SILT FENCE
S6	0.82	-	SILT FENCE
S7	4.18	560	TRAP
S8	1.00	-	SILT FENCE
S9	1.00	-	SILT FENCE
S10	8.60	341	BASIN
S11	5.00	670	TRAP
S12	4.95	663	TRAP
S13	9.53	339	BASIN
S13A	4.75	639	TRAP
S14	0.71	-	SILT FENCE
S15	0.72	-	SILT FENCE
S16	4.53	607	TRAP



PRELIMINARY
NOT FOR CONSTRUCTION

PAWCATUCK SOLAR CENTER
EROSION & SEDIMENTATION PLAN - AREA SOUTH

PROJECT: PAWCATUCK SOLAR CENTER
DRAWING NO. C-703

DATE: 04.18.18
BY: [Redacted]
CHECKED: [Redacted]
DESIGNED: [Redacted]

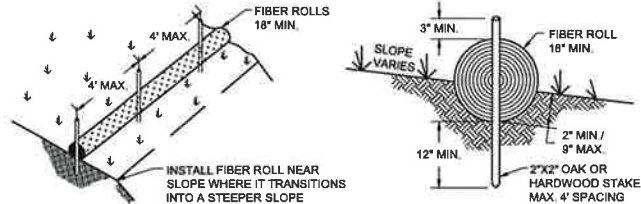
SCALE: 1" = 100'

CONSTRUCTION SPECIFICATIONS

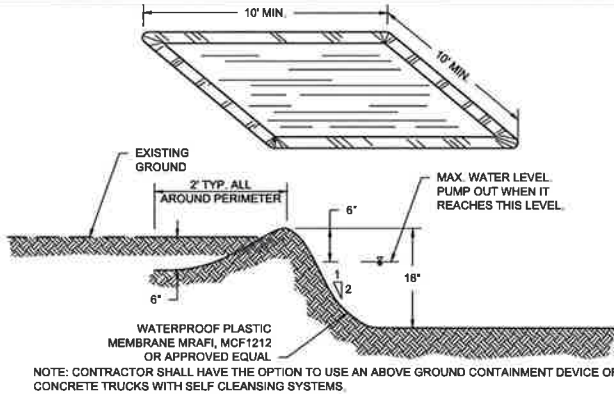
1. INSTALL FIBER ROLL ALONG A LEVEL CONTOUR.
2. FIBER ROLL SHALL BE A MINIMUM OF 2" EMBEDDED IN THE GROUND AND A MAXIMUM OF 9" EMBEDDED.
3. USE 2"x2" OAK OR HARDWOOD STAKES AT A SPACING OF 4' MAX TO ANCHOR FIBER ROLL INTO GROUND.

MAINTENANCE

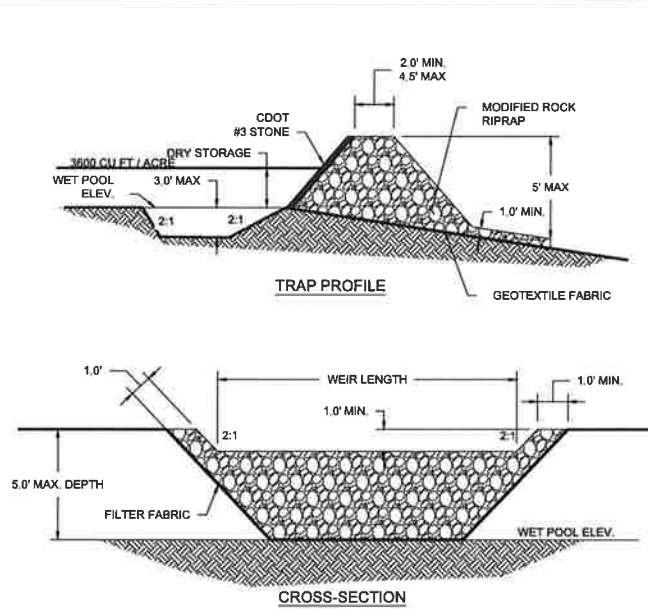
INSPECT FIBER ROLL WEEKLY AND AFTER EACH SIGNIFICANT RAINFALL EVENT (1/2 INCH OR GREATER). REMOVE ACCUMULATED SEDIMENT AND ANY DEBRIS. FIBER ROLL MUST BE REPLACED IF CLOGGED OR TORN. IF PONDING BECOMES EXCESSIVE, FIBER ROLL MAY NEED TO BE REPLACED WITH A LARGER DIAMETER OR A DIFFERENT MEASURE.



A FIBER ROLL
SCALE: NTS



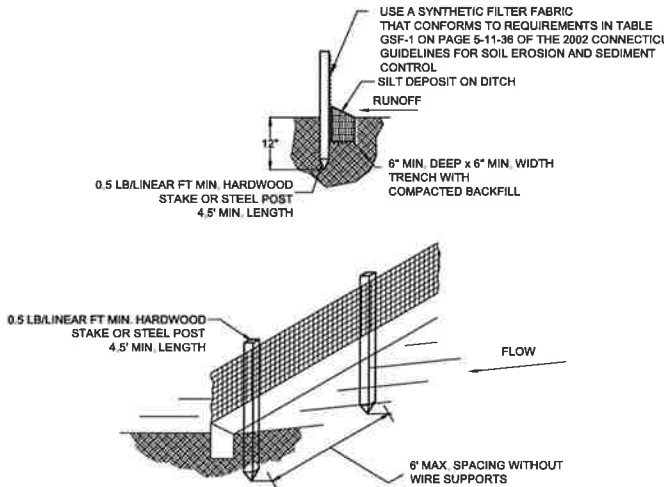
D CONCRETE WASHOUT
SCALE: NTS



CONSTRUCTION SPECIFICATIONS

1. SEDIMENT TRAP SHALL CONFORM TO TST TEMPORARY SEDIMENT TRAP FROM 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL.
2. ENSURE THAT THE FILL MATERIAL FOR EMBANKMENT IS FREE OF ROOTS, WOODY VEGETATION, OR OTHER OBJECTIONABLE MATERIAL.
3. CONSTRUCTION THE OUTLET SECTION IN THE EMBANKMENT. PROTECT RIPRAP AND SOIL FROM PIPING USING FILTER FABRIC.
4. SEDIMENT TRAP SHOULD OUTFALL TO STABLE GROUND.
5. SEDIMENT TRAPS LOCATED NEAR THE VERNAL POOLS SHALL INSTALL DEWATERING DEVICES SUCH AS SKIMMERS OR SUBDRAINS TO IMPROVE INFILTRATION. THESE WILL BE SIZED AND DESIGNED DURING FINAL ENGINEERING TO PROVIDE DEWATERING WITHIN A 48-72 HOUR PERIOD. THE USE OF PUMPS FOR DEWATERING THE BASINS CAN BE UTILIZED IF NATURAL INFILTRATION IS NOT ADEQUATE.

H TEMPORARY SEDIMENT TRAP (TST)
SCALE: NTS



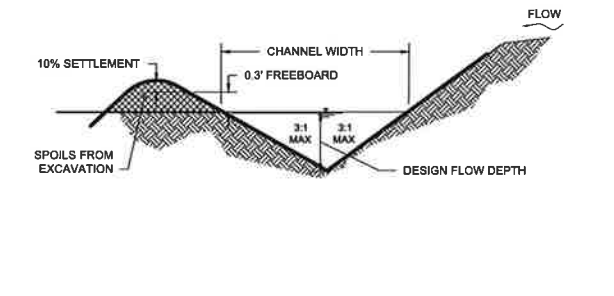
CONSTRUCTION SPECIFICATIONS

1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2. SILT FENCE SHALL BE LOCATED AT 10 FEET DOWN GRADIENT FROM THE TOE OF SLOPE.
3. DO NOT LAYOUT PERIMETER CONTROL SILT FENCE AT PROPERTY CORNERS AS A SINGLE RUN. INSTALL SILT FENCE IN SECTION UTILIZING J HOOKS SO RUNOFF DOES NOT CONCENTRATE AND OVERWHELM THE SYSTEM. CONTRIBUTING DRAINAGE TO SECTIONS OF SILT FENCE SHOULD BE 1 ACRE OR LESS.
4. WHEN THE CONTOUR CAN NOT BE FOLLOWED INSTALL THE SILT FENCE SUCH THAT PERPENDICULAR WINGS ARE CREATED TO BREAK THE VELOCITY OF WATER FLOWING ALONG THE FACE. SPACING SHALL BE AT 75 FEET MAX.
5. FOR FURTHER INFORMATION SEE BMP GSF SILT FENCE FROM 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL.

MAINTENANCE

INSPECT SILT FENCE AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1/2 INCH OR GREATER) RAINFALL EVENT. MAKE ANY REQUIRED REPAIRS IMMEDIATELY. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN TO REDUCE PRESSURE ON THE FENCE. REMOVE SEDIMENT DEPOSITS AND BRING AREA TO GRADE AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED.

B TYPICAL SILT FENCE (GSF)
SCALE: NTS



E TEMPORARY DIVERSION DITCH
SCALE: NTS

- NOTES:**
1. IF CONSTRUCTION ACTIVITIES ARE COMPLETE OR HAVE BEEN TEMPORARILY HALTED FOR MORE THAN SEVEN (7) DAYS, STABILIZATION ACTIVITIES WILL BE IMPLEMENTED WITHIN THREE (3) DAYS.
 2. AREAS THAT REMAIN DISTURBED BUT INACTIVE FOR AT LEAST 30 DAYS SHALL RECEIVE TEMPORARY SEEDING OR SOIL PROTECTION WITHIN SEVEN (7) DAYS.

GROUND STABILIZATION

AREA DESCRIPTION	STABILIZATION TIME FRAME
DIVERSION DITCH	7 DAYS
SLOPES STEEPER THAN 3:1	7 DAYS
SLOPES FLATTER THAN 3:1	7 DAYS
ALL OTHER AREAS	7 DAYS

TEMPORARY SEEDING SCHEDULE

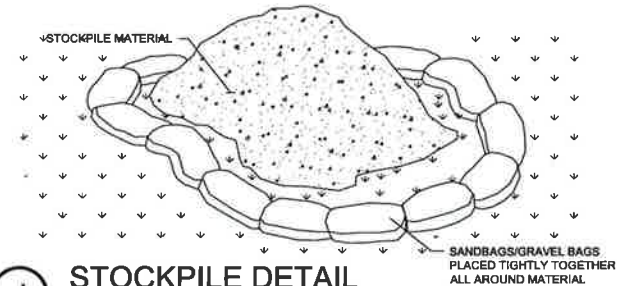
- FERTILIZE 300 LBS/ACRE UTILIZING 10-10-10
- LIME 2 TONS/ACRE
- MULCH IF OUTSIDE OF OPTIMUM SEEDING DATES
- UTILIZE SEED MIX CONFORMING TO FIG. TS-2 OF THE 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL

PERMANENT SEEDING SCHEDULE

- FERTILIZE 500 LBS/ACRE UTILIZING 10-10-10, OAE
- LIME 2 TONS/ACRE
- UTILIZE SEED MIX CONFORMING TO FIG. TS-2 OF THE 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL

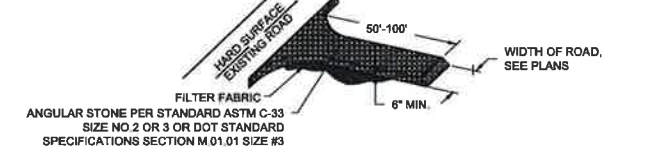
F SEEDING DETAIL
SCALE: NTS

- NOTE(S):**
1. PROTECTION OF STOCKPILES IS A YEAR-ROUND REQUIREMENT.
 2. LOCATE STOCKPILES A MINIMUM OF 50 FEET AWAY FROM CONCENTRATED FLOWS OF STORM WATER, DRAINAGE COURSES, AND DRAIN INLETS.
 3. IMPLEMENT WIND EROSION/TRANSPORT CONTROL PRACTICES AS APPROPRIATE.
 4. ALL STOCKPILES SHALL BE COVERED, STABILIZED, OR PROTECTED WITH A TEMPORARY LINEAR BARRIER (I.E. SANDBAGS, ETC.) PRIOR TO THE ONSET OF PRECIPITATION.

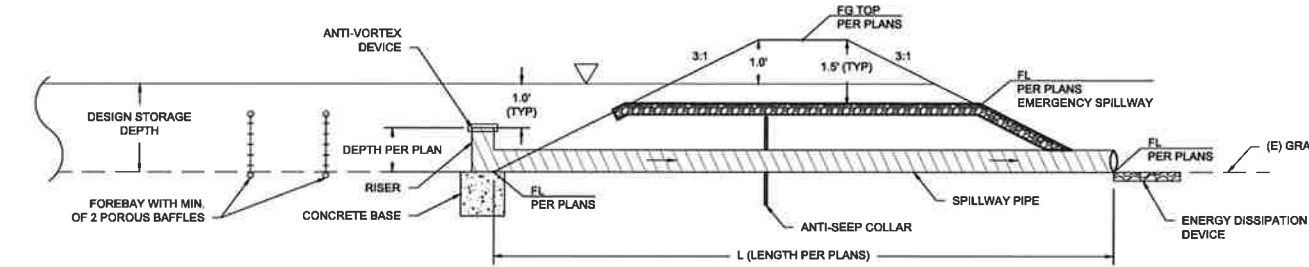


J STOCKPILE DETAIL
SCALE: NTS

- CONSTRUCTION SPECIFICATIONS**
1. TO CONSTRUCT CLEAR THE ENTRANCE AND EXIT AREA OF ALL VEGETATION ROOTS AND OTHER OBJECTIONABLE MATERIAL AND PROPERLY GRADE IT.
 2. PLACE THE GRAVEL OVER A GEOTEXTILE FABRIC TO THE SPECIFIC GRADE AND DIMENSIONS SHOWN ON THE PLANS.
 3. FOR FURTHER INFORMATION SEE BMP CE CONSTRUCTION ENTRANCE FROM THE 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL.
- MAINTENANCE**
- MAINTAIN THE GRAVEL IN A CONDITION TO PREVENT MUD OR SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. THIS MAY REQUIRE PERIODIC TOPDRESSING WITH ADDITIONAL STONE. IMMEDIATELY REMOVE ALL OBJECTIONABLE MATERIALS SPILLED, WASHED OR TRACKED INTO PUBLIC ROADWAYS.



C TEMPORARY GRAVEL CONSTRUCTION ENTRANCE (CE)
SCALE: NTS



NOTES

1. EARTHEN EMBANKMENT SHALL BE SEEDDED WITH TEMPORARY VEGETATION IMMEDIATELY AFTER INSTALLATION.
2. CONSTRUCTION OPERATION SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION ARE MINIMIZED.
3. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE UPSLOPE DRAINAGE AREA HAS BEEN STABILIZED.
4. SEDIMENT TRAP SHOULD OUTFALL TO STABLE GROUND.

G TYPICAL SEDIMENT BASIN SPILLWAY PROFILE
SCALE: NTS

EROSION AND SEDIMENTATION CONTROL NOTES:

1. CONTRACTOR SHALL ASSUME THE CONCEPTS ON THE EROSION AND SEDIMENTATION CONTROL PLAN, IF PROVIDED, ARE SCHEMATIC MINIMUM REQUIREMENTS, THE FULL EXTENT OF WHICH ARE TO BE DETERMINED BY THE CONTRACTOR. CONTRACTOR IS RESPONSIBLE FOR THE EXACT DESIGN AND EXTENT OF THE EROSION CONTROL SYSTEM SO THAT IT WORKS WITH THE CONTRACTOR'S INTENDED USE AND MANAGEMENT OF THE CONSTRUCTION SITE.
2. ALL EROSION CONTROL FACILITIES SHALL BE INSPECTED BY THE CONTRACTOR AND REPAIRED, AS REQUIRED, AT THE CONCLUSION OF EACH WORKING DAY DURING THE RAINY SEASON. THE CONTRACTOR SHALL INSPECT THE EROSION CONTROL FACILITIES AND MAKE NECESSARY REPAIRS PRIOR TO ANTICIPATED STORMS AND AT REASONABLE INTERVALS DURING STORMS OF EXTENDED DURATION. REPAIRS TO DAMAGED FACILITIES SHALL BE MADE IMMEDIATELY UPON DISCOVERY.
3. AS SOON AS PRACTICAL FOLLOWING EACH STORM, THE CONTRACTOR SHALL REMOVE ANY ACCUMULATION OF SILT OR DEBRIS FROM THE EROSION CONTROL SEDIMENT BASINS AND SHALL CLEAR THE OUTLET PIPES OF ANY BLOCKAGE.
4. STOCKPILED MATERIAL SHALL BE COVERED WITH VISQUEEN OR A TARPULIN UNTIL THE MATERIAL IS REMOVED FROM THE SITE. ANY REMAINING BARE SOIL THAT EXISTS AFTER THE STOCKPILE HAS BEEN REMOVED SHALL BE COVERED UNTIL A NATURAL GROUND COVER IS ESTABLISHED OR IT MAY BE SEEDDED OR PLANTED TO PROVIDE GROUND COVER PRIOR TO THE FALL RAINY SEASON.
5. PRIOR TO THE COMMENCEMENT OF ANY CLEARING, GRADING, OR EXCAVATION, THE CONTRACTOR SHALL VERIFY THAT THE CLIENT HAS SUBMITTED TO THE CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENT PROTECTION (CTDEEP) NECESSARY MATERIALS SHALL BE AVAILABLE ON SITE AND STOCKPILED AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS IMMINENT.
6. CONTRACTOR SHALL MAINTAIN ADJACENT STREETS IN A NEAT, CLEAN, DUST FREE AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF THE CLARK COUNTY INSPECTOR. THE ADJACENT STREET SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREETS AFFECTED BY THEIR CONSTRUCTION. METHOD OF STREET CLEANING SHALL BE DRY SWEEPING OF ALL PAVED AREAS. NO STOCKPILING OF BUILDING MATERIALS WITHIN THE CLARK COUNTY RIGHT-OF-WAY IS PERMITTED.
7. ALL EROSION CONTROL MATERIALS SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR UNLESS OTHERWISE NOTED.
8. PROTECT DOWN SLOPE DRAINAGE COURSES, STREAMS, AND STORM DRAINS WITH ROCK FILLED SAND BAGS, TEMPORARY DRAINAGE SWALES, SILT FENCES, EARTH BERMS, STORM DRAIN INLET FILTERS AND/OR STRAW BALES USED ONLY IN CONJUNCTION WITH PROPERLY INSTALLED SILT FENCES.

CONSTRUCTION SEQUENCE

- PREPARE LIMITS OF CONSTRUCTION & CONSTRUCTION ENTRANCE**
1. FLAG THE LIMITS OF CONSTRUCTION NECESSARY TO FACILITATE THE PRE-CONSTRUCTION MEETING.
 2. HOLD PRE-CONSTRUCTION MEETING. (REMEMBER TO CALL BEFORE YOU DIG 1-800-922-4455).
 3. FLAG REMAINDER OF THE LIMITS OF CONSTRUCTION AND TREE PROTECTION ZONES.
 4. INSTALL THE CONSTRUCTION ENTRANCE.
- INSTALL TEMPORARY E&S CONTROLS**
5. SELECTIVELY REMOVE TREES PER PLAN FOR INSTALLATION OF E&S CONTROLS.
 6. INSTALL PERIMETER EROSION AND SEDIMENT CONTROLS AND TREE PROTECTION DEVICES IN ACCORDANCE WITH THE E&S PLAN.
 7. CONSTRUCT SEDIMENT BASINS, TRAPS, DIVERSIONS, AND OTHER E&S CONTROLS AS SHOWN ON THE PLANS.
- ROUGH GRADING OF THE SITE**
8. UTILIZE PHASING TO REMOVE TREES WITHIN SITE AS GRADING OCCURS.
 9. IF REQUIRED, STRIP AND STOCKPILE ALL TOPSOIL THAT IS WITHIN THE FOOTPRINT OF THE CONSTRUCTION SITE OR AS INDICATED ON PLANS AND REFERENCE STOCKPILE MANAGEMENT FOR EROSION AND SEDIMENT CONTROLS. EITHER REMOVE TREE STUMPS TO AN APPROVED DISPOSAL SITE OR CHIP IN PLACE AS INDICATED ON THE PLANS.
 10. MAKE ALL CUTS AND FILLS REQUIRED. ESTABLISH THE SUBGRADE FOR INVERTER PADS AND ACCESS ROADWAY, AS REQUIRED.
- INSTALL PERMANENT E&S CONTROLS AND DRAINAGE SYSTEM**
11. BEGIN CONSTRUCTION OF THE ACCESS ROADS AND INVERTER PADS AS INDICATED ON THE PLANS.
 12. FOR CONSTRUCTION OF THE WETLAND CROSSING SEE DETAIL E, ON C-301
 13. PRIOR TO INSTALLING SURFACE WATER CONTROLS SUCH AS TEMPORARY DIVERSIONS AND STONE DIKES, INSPECT EXISTING CONDITIONS TO ENSURE DISCHARGE LOCATIONS ARE STABLE. IF NOT STABLE, REVIEW DISCHARGE CONDITIONS WITH THE DESIGN ENGINEER AND IMPLEMENT ADDITIONAL STABILIZATION MEASURES PRIOR TO INSTALLING WATER SURFACE CONTROLS.
 14. INSTALL ALL PERMANENT DRAINAGE SYSTEMS SUCH AS SWALES AND BASINS AS INDICATED ON THE PLANS OR OTHERWISE MODIFIED BY THE DESIGN ENGINEER TO ADJUST FOR UNFORSEEN SITE CONDITIONS.
- FINISH GRADING OF THE SITE**
15. PREPARE SUB-BASE, SLOPES, SHOULDER AREAS, ACCESS ROADS AND ANY OTHER AREA OF DISTURBANCE FOR FINAL GRADING.
 16. INSTALL ACCESS ROADS AS INDICATED ON PLANS. FOLLOW GEOTECHNICAL RECOMMENDATIONS FOR STRUCTURAL ROAD SECTIONS AND RELATIVE COMPACTION.
 17. PLACE TOPSOIL WHERE REQUIRED. COMPLETE THE PERIMETER LANDSCAPE PLANTINGS.
 18. FINE GRADE, RAKE, SEED AND MULCH AS INDICATED ON PLANS
- SOLAR FIELD**
19. INSTALLATION OF PV SYSTEM.
- FINAL STABILIZATION**
20. UPON SUBSTANTIAL COMPLETION OF THE ACCESS ROADS, COMPLETE THE BALANCE OF SITE WORK AND STABILIZATION OF ALL OTHER DISTURBED AREAS.
 21. INSPECT ALL PERMANENT SWALES, BASINS, AND DRAINAGE SYSTEMS IN GENERAL AND CLEAN AS NEEDED.
 22. AFTER SITE IS STABILIZED REMOVE TEMPORARY EROSION AND SEDIMENT CONTROLS (E.G. GEOTEXTILE SILT FENCES).

ACTIVITY	CONSTRUCTION SCHEDULE											
	MONTHS											
	1	2	3	4	5	6	7	8	9	10	11	12
PREPARE LIMITS OF CONSTRUCTION AND CONSTRUCTION ENTRANCE												
INSTALL TEMPORARY E&S CONTROLS												
ROUGH GRADING OF THE SITE												
INSTALL PERMANENT E&S CONTROL AND DRAINAGE SYSTEMS												
FINISH GRADING OF THE SITE												
INSTALL OF PV SYSTEM												
FINAL STABILIZATION												
EROSION CONTROL MAINTENANCE												



PRELIMINARY
NOT FOR CONSTRUCTION

DRAWN	BY	DATE	BY	DATE
CHECKED	BY	DATE	BY	DATE
PROJECT #	FILE NAME	DATE	BY	DATE
PROJECT #	FILE NAME	DATE	BY	DATE

PAWCATUCK SOLAR CENTER
EROSION AND SEDIMENTATION CONTROL NOTES & DETAILS
C-720

