ENVIRONMENTAL ASSESSMENT

PROPOSED

BRISTOL SOLAR ONE, LLC

SOLAR PROJECT

399 HILL STREET

BRISTOL, CONNECTICUT

HARTFORD COUNTY

Prepared for:

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May 2020

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1 Introduction

All-Points Technology Corporation, P.C. ("APT") prepared this Environmental Assessment ("EA") on behalf of Bristol Solar One, LLC (hereinafter referred to as the "Petitioner") for the proposed installation of a solar-based electric generating facility having an output of ±3.25 megawatts[1] ("Project") located in the City of Bristol, Connecticut ("City"). This EA has been completed to support the Petitioner's submission to the Connecticut Siting Council ("Council") of a petition for declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the construction, maintenance, and operation of the Project.

The results of this assessment demonstrate that the proposed development will comply with the Connecticut Department of Energy and Environmental Protection's ("DEEP") air and water quality standards and will not have an undue adverse effect on the existing environment and ecology.

The Project will be located at 399 Hill Street, Bristol, Connecticut ("Site"). The Site is a roughly rectangularly shaped parcel that consists of approximately 26.9 acres. The Site is mostly undeveloped agricultural land, with a farmhouse and several farm buildings located in the northeast corner. A small portion of the western extent of the Site is wooded. the Site is privately-owned and zoned Residential (R-25).

Figure 1, *Site Location Map*, depicts the location of the Site and surrounding area.

[1] The output referenced is Alternating Current (AC).

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Legend

Site

Figure 1
Site Location Map

Proposed Solar Facility - Bristol Solar One
399 Hill Street
Bristol, Connecticut

Bristol Solar One, LLC

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Map Notes:
Base Map Source: USGS 7.5 Minute Topographic Quadrangle Maps: Bristol (1984), CT
Map Scale: 1 inch = 1,000 feet
Map Date: March 2020

2 Proposed Project

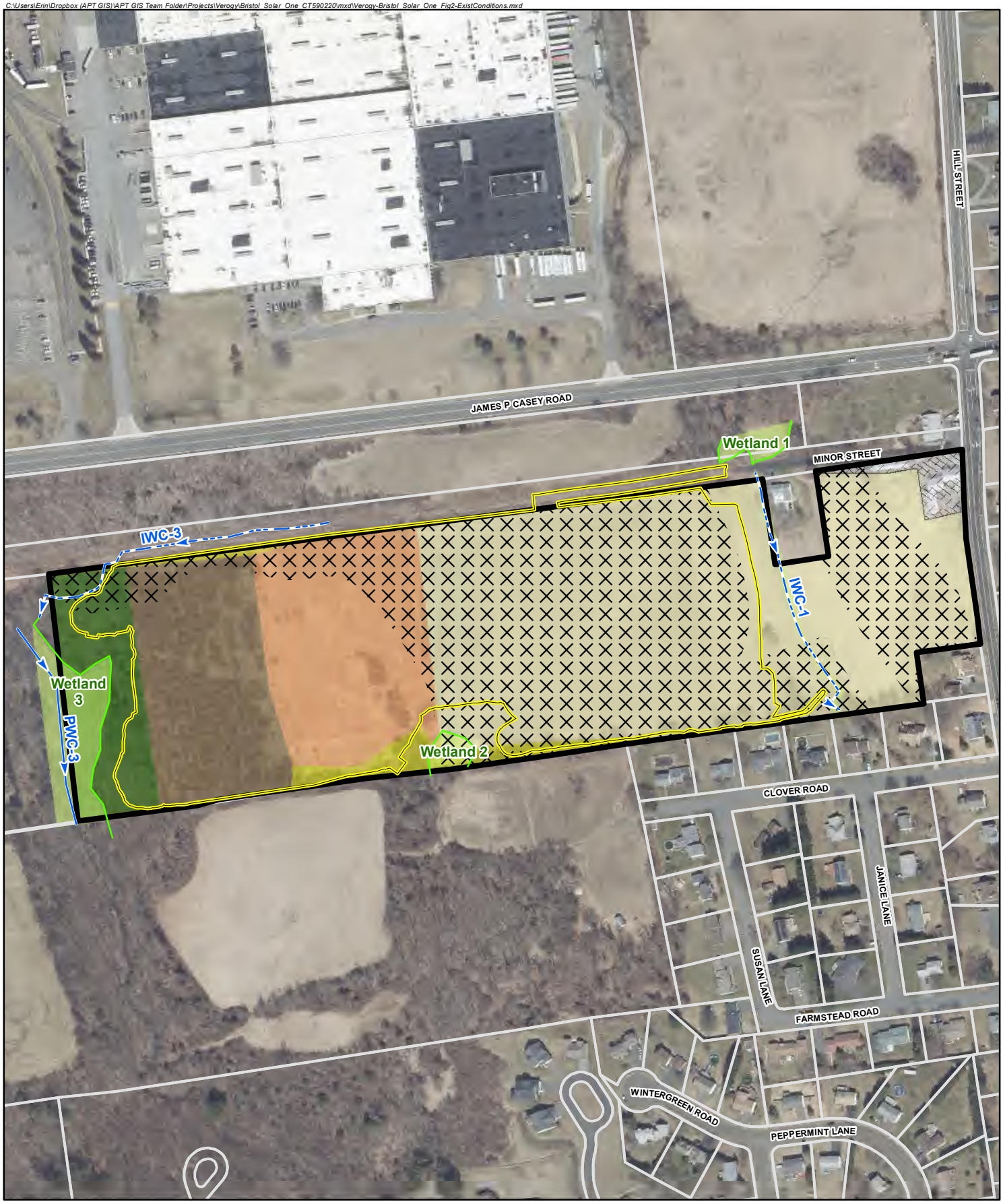
2.1 Project Setting

The Project will be primarily located within an existing agricultural field; a small portion of the western extent within the wooded area. No wetlands are located within the area proposed for development. Two (2) wetlands are located in the western and southcentral portions of the Site, with one additional wetland located off the Site to the north. Additionally, two (2) intermittent water courses ("IWC") are within the Site. One transects the eastern portion of the Site, flowing north to south from the off-Site wetland; the other flows in a westerly direction in the northwest corner.

The Site's existing topography drops gently from north to south, with ground elevations ranging from approximately 809 feet AMSL in the north to 673 feet AMSL to the south.

Figure 2, *Existing Conditions Map*, depicts current conditions on the Site.

The surrounding land use is characterized by residential/commercial development, with US Route 6 located to the south and CT Route 72 to the east. Undeveloped land becomes more prevalent farther to the northeast while more dense urban development becomes more predominant to the east and southeast.



Legend

- Site
- Approximate Parcel Boundary (CTDEEP)
- Project Area
- Delineated Wetland Boundary
- Wetland Area

Habitat Cover Type

- Developed
- Forest
- Old Field/Meadow
- Open Field
- Transitional Scrub/Shrub
- Woodland

- Intermittent Watercourse
- Perennial Watercourse
- Prime Farmland Soils

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Map Notes:
Base Map Source: CTECO 2019 Aerial Photograph
Map Scale: 1 inch = 300 feet
Map Date: May 2020

Figure 2
Existing Conditions Map

Proposed Solar Facility - Bristol Solar One
399 Hill Street
Bristol, Connecticut

Bristol Solar One, LLC

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2.2 Project Development and Operation

Upon its completion, the solar energy generating facility ("Facility") will consist of approximately 9,620 Trina TSM-DEG15MC.20(II) 390W and 1,872 Risen RSM144-6-370BMDG 370W photovoltaic modules ("panels"); 26 Solectria Solar's XGI 1500 inverters; two (2) pad mounted switchgears; three (3) transformers,[2] and two (2) service interconnection point. A ground-mounted racking system will be used to secure the panel arrays. The Facility will be surrounded by a six (6)-foot tall chain-link security fence. The proposed electrical interconnection will be to an existing distribution pole located along the Eversource right-of-way near the proposed entrance to the Site and will follow an extended gravel access road from Minor Street. The Facility will occupy approximately 13 acres, of the Site with an additional ±5.90 acres of disturbance beyond the fenced Facility limits, for a total of ±18.90 acres ("Project Area").

Proposed development drawings are provided in Appendix A, *Project Plans*.

The leading edge of the panels will be approximately thirty-six (36) inches above the existing ground surface, which will provide adequate room for any accumulating snow to "sheet" off. Any production degradation due to snow build-up has already been modeled into the annual system output and performance calculations. The Petitioner does not envision requiring any "snow removal" operations; rather, the snow will be allowed to melt or slide off.

Construction activities within the Project Area will include tree clearing, grading, incorporating stormwater best management practices, installing erosion and sedimentation (E&S") control measures, grass berm construction, racking and module installation, electrical trenching, landscape screening installation, and new access road development. Tree clearing beyond the fenced area will be required to facilitate construction. Existing grades throughout the Project Area will remain except in areas of the stormwater management/E&S features and the grass berms, which will require some manipulation (cuts/fills) and regrading.

The Facility is unstaffed; after construction is complete and the Facility is operable, traffic at the Site will be minimal. It is anticipated that the Facility will require mowing and routine maintenance of the electrical equipment one (1) time per year. Annual maintenance will typically involve two (2) technicians for a day. Repairs will be made on an as-needed basis.

[2] The proposed transformers are one (1) 250 kVA, one (1) 1,000 kVA and one (1) 2,000 kVA.

2.2.1 Access

The Facility will be accessed from the north, utilizing an existing gravel road (Minor Street), which originates off Hill Street and abuts the Site to the north.

Approximately 450 feet of Minor Street will need to be improved to enter the Project Area. A new ±450-foot gravel road will be constructed to provide access into the Project Area for construction, service and maintenance vehicles. Both the improvements to Minor Street and the new access road will require minimal grading and consist primarily of gravel resurfacing. There are no existing interior roads within the boundaries of the Project Area. See Figure 3, *Proposed Conditions Map.*

2.2.2 Public Health and Safety

The Project will meet or exceed applicable local, state, national and industry health and safety standards and requirements related to electric power generation. The Facility will not consume any raw materials, will not produce any by-products and will be unstaffed during normal operating conditions. The Facility will be enclosed by a six (6)-foot tall chain-link fence. The main entrance to the Facility will be gated, limiting access to authorized personnel only. All City emergency response personnel will be provided access via a Knox Pad lock. The system will be remotely monitored and will have the ability to remotely de-energize in case of an emergency. Three (3) secondary gates will be installed along the western and southern fence lines to provide access for maintenance of stormwater management basins.

2.2.3 Local, State and Federal Land Use Plans

The Project is consistent with state and federal policies and will support the state's energy goals by developing a renewable energy resource while not having a substantial adverse environmental effect. Although local land use requirements do not apply to this Project, it has been designed to meet the intent of the City's land use regulations, to the extent feasible. The Site is located within the City's Residential (R-25) Zone.

Additionally, the Project complies with Section 4.3.3 (3) of the City's 2018 Plan of Conservation and Development which seeks to" *…encourage energy-efficient patterns of development and land use, the use of solar and other renewable forms of energy, and energy conservation…."*

The Project will benefit the local community by improving electrical service for existing and future development in the City through the availability of enhanced local generating capacity that does not rely on the congested regional electrical transmission networks.

3 Environmental Conditions

This section provides an overview of the current environmental conditions at the Site and an evaluation of the Project's potential impacts on the environment. The results of this assessment demonstrate that the Project will comply with the Connecticut Department of Energy and Environmental Protection's ("DEEP") air and water quality standards and will not have an undue adverse effect on the existing environment and ecology.

Please refer to Figure 3, *Proposed Conditions Map* for a depiction of the Project and its compatibility with the Site resources discussed herein.

3.1 Habitat and Wildlife

Six (6) habitat types (vegetative communities) have been identified on the Site. Transitional ecotones separate these distinct habitat types while peripheral wetland habitats are also located in proximity to the Project Area. Wetland habitats observed are described within their larger habitat types; detailed descriptions of the wetland habitats can be found in Section 3.2 Water Resources.

The varied habitats, which have the ability to support several species, are as follows:

- Forested;
- Woodland;
- Old Field/Meadow;
- Open Field;
- Transitional Scrub/Shrub; and
- Developed.

Figure 2, *Existing Conditions Map*, depicts current conditions on the Site, abutting properties, and several features discussed below. Table 1, *Habitat Assessment and Impacts Table* provides calculations of the total on-Site areas for each of the referenced habitat types and the area proposed to be impacted by the Project.

3.1.1 Habitat Types

Forested

Forested habitat, located in the far western extent of the Site, is generally composed of a complex of upland and wetland forested habitats. Collectively, this habitat type accounts for 2.44 acres of the Site. A more detailed description of the wetland forested habitat variant found in this area is included within the wetland discussion presented in Section 3.4.

Upland forest on the Site is dominated by red maple (*Acer rubrum*), multiflora rose (*Rosa multiflora*), and honeysuckle (*Lonicera morowii*), silky dogwood (*Cornus amomum*), and Asiatic bittersweet (*Celastrus orbiculatus*). This habitat largely consists of even-aged forest with diameters ranging from 12 to 16 inches. The canopy is generally closed with pockets of openings consisting of a denser scrub/shrub understory.

Project development will include clearing of mature vegetation along the eastern extent of the existing "edge" upland forest habitat due to avoid shading. The effect of this clearing will have only a marginal impact. Therefore, the Project is not expected to result in a significant negative impact to Forested Habitat.

Woodland

This habitat type is located in the western portion of the Site immediately east of the Forested uplands discussed above and occupies approximately 3.82 acres. This area consists of lightly forested habitat with less than 50 percent canopy closure and a dense understory. The woodland habitat represents a transitional zone between early succession/old field and more mature forested habitats. Due to a dominance of understory invasive species, native understory reinitiating has been stunted. Diameter of mature trees were observed ranging from 8 to 16 inches.

Dominant plants in the understory include the invasive non-native species multiflora rose, Japanese barberry (*Berberis thunbergii*), and honeysuckle. Dominant species in the overstory include red maple with suppressed codominant species such as black cherry (*Prunus serotina*) and red oak (*Quercus rubrum*).

This habitat will be entirely removed to construct the Project. This conversion is not considered a significant impact because the existing woodland habitat is heavily dominated by non-native species and is too small an area to support key habitat-specialist species.

Old Field/Meadow

This habitat type encompasses approximately 4.37 acres and occurs within the west-central portion of the Site as a transitional ecotone between woodland habitats to the west and maintained open field areas to the east. This habitat type has developed as a successional trend similar to the open field areas to the east that have been allowed to naturally revegetate with dense herbaceous vegetation and sporadic scrub/shrub species. Dominant species within this habitat type include cool season grasses, red clover (*Rifolium pratense*), goldenrod (*Solidago spp.*), multiflora rose, and honeysuckle.

A majority of this habitat type will be impacted by the Project. However, as this habitat type is predominantly herbaceous open field vegetation that will subsist in-between the proposed arrays and, to a lesser degree, under the panels, impacts to this habitat type will be minimized.

Open Field

This habitat encompasses approximately 14.76 acres within the central and eastern portions of the Site. This habitat type is dominated by cool season grasses and red clover. Open Field habitat on the Site consists of hayfields that are mowed on an annual basis. The routine maintenance of these hayfields has maintained this habitat type by suppressing other herbaceous and shrub species.

A majority of the Project-related impacts are proposed within Open Field habitat. This area is entirely composed of cool season grasses, maintained through routine mowing, so development of the Project should not result in a significant impact to this habitat. Post-construction vegetation maintenance would be similar to the current management of this habitat, with some areas slightly affected by shading from the panel arrays.

Transitional Scrub/Shrub

This habitat occupies approximately 0.97 acres on the southcentral and northwest property borders and provides ecotype transitions between open field/old field areas and the unimproved Minor Street extension. This habitat type is characterized by dense scrub/shrub vegetation. The

area is heavily dominated by invasive species that have been historically or periodically cleared, thus preventing the establishment of more mature vegetation.

Dominant plant species in vegetated areas include typical colonizers of disturbed habitat, including the invasive non-native multiflora rose and honeysuckle with sparse native shrub species like grey dogwood (*Carunus racemosa*) and staghorn sumac (*Rhus typhina*).

Roughly half of this habitat is proposed for removal. Project-related impacts to the transitional scrub/shrub habitat will not likely result in a significant negative impact to Site resources. While loss of this habitat will occur, similar" edge" and transitional habitats will be created in areas where forest/woodland clearing is proposed.

Developed Areas

The Project would have no substantive adverse impacts to developed areas of the Site, which consist of four (4) existing buildings and paved parking areas.

Table 1: Habitat Assessment and Impacts Table

Table 1: Habitat Assessment and Impacts Table		
Habitat Type	Total Area On-Site (+/- ac.)	Area Affected by Project (+/- ac.)
Forested	2.44	0.79
Woodland	3.82	3.80
Old Field/Meadow	4.37	4.31
Open Field	14.76	9.15
Transitional Scrub/Shrub	0.97	0.49
Developed	0.49	n/a

3.1.2 Wildlife

While a diversity of habitat is present on the Site, in general the size of these habitats and surrounding development characteristics create a limiting factor for utilization by wildlife. Habitat specialists, including mammals and birds, that require large contiguous habitat blocks are not supported by the existing environment on the Site. With the exception of the Open Field habitat, the habitat blocks are less than five acres in size. The Open Field habitat, although nearly 15 acres, is mechanically managed.

Despite their relatively small size, the complexity of habitats on Site do provide higher quality habitat for species that are more tolerant of human disturbance, habitat fragmentation and 'edge' effects. Generalist wildlife species, including several song birds and mammals such as raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), grey squirrel (*Sciurus carolinensis*), Virginia opossum (*Didelphus virginiana*), and eastern chipmunk (*Tamias striatus*), could be expected to use these areas on the Site.

Due to the small and isolated nature of the habitat blocks associated with the Site, the Project will not likely result in a significant impact to those wildlife species utilizing them, as the habitat types being lost or converted as a result of the Project also occur elsewhere either on or adjacent to the Site.

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Legend

- Site
- Approximate Parcel Boundary (CTDEEP)
- Limit of Disturbance
- Perennial Watercourse
- Intermittent Watercourse
- Delineated Wetland Boundary
- Wetland Area
- Solar Modules
- Gravel Access Road
- Concrete Equipment Pad
- Stormwater Basin
- Stormwater Gravel
- Grass Berm
- Treeline
- Stormwater Swale
- Perimeter Fence
- Landscape Screening

Map Notes:
Base Map Source: CTECO 2019 Aerial Photograph
Map Scale: 1 inch = 300 feet
Map Date: May 2020

300 150 0 300 Feet

N W E S

Figure 3
Proposed Conditions Map

Proposed Solar Facility - Bristol Solar One
399 Hill Street
Bristol, Connecticut

Bristol Solar One, LLC

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3.1.3 Core Forest Determination

APT evaluated the size and extent of the contiguous interior forest block (or "core forest") present within and adjacent to the Site using two (2) publicly available GIS-based datasets designed to assess impacts to core forest habitat. In addition, an independent evaluation was performed (based on GIS analysis of 2016 leaf-off aerial photography, field observations and professional experience). The first dataset, the Department's *Forestland Habitat Impact Mapping* [3], does not include the Site within an area mapped as core forest. The second dataset, UConn's Center for Land Use Education and Research's ("CLEAR") Forest Fragmentation Analysis ("FFA")[4] study, designates "core forest" as greater than 300 feet from non-forested habitat. This 300-foot zone is referred to as the "edge width" and represents sub-optimal breeding habitat for forest-interior birds due to decreased forest quality, increased levels of disturbance, and increased rates of nest predation and brood parasitism within this transitional forest edge ("edge effect"). The FFA study identifies three categories of core forest: small (< 250 acres); medium (250-500 acres); and large (>500 acres). Based on the FFA criteria, the Site does not contain any forested habitats identified as "core" forest. This is consistent with APT's independent analysis, which indicates that no interior forest block is located on Site. While limited forested habitat does exist on the western side of the Site, this forested habitat is entirely influenced by "edge" effects and is not considered core forest habitat.

In accordance with Connecticut General Statutes §16-50k(a), the Petitioner sent correspondence to DEEP Forestry in May, 2020 to demonstrate that the Project will not materially affect core forest. The Petitioner received electronic confirmation that the Project will not "…*have a material impact to core forest…"* from DEEP Forestry on May 21, 2020. The Petitioner was also notified on May 21, 2020, that the Connecticut Siting Council was in receipt of the same electronic confirmation and the filing had been received.

[3] Source: http://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=7b81844bab634281b544c20bf2d7bfb8: This spatial screening layer identifies prime contiguous and connected core forestland blocks. If the project intersects with the Forestland Habitat Impact Map there is a potential for material effects to core forest.

[4] CLEAR's FFA: http://clear.uconn.edu/projects/landscape/forestfrag/forestfrag_public%20summary.pdf

3.2 Rare Species

3.2.1 Natural Diversity Data Base

The DEEP Natural Diversity Data Base ("NDDB") program performs hundreds of environmental reviews each year to determine the impact of proposed development projects on state listed species and to help landowners conserve the state's biodiversity. In furtherance of this endeavor, the DEEP also developed maps to serve as a pre-screening tool to help applicants determine if there is the potential project-related impact to state-listed species.

The NDDB maps represent approximate locations of (i) endangered, threatened and special concern species and, (ii) significant natural communities in Connecticut. The locations of species and natural communities depicted on the maps are based on data collected over the years by DEEP staff, scientists, conservation groups, and landowners. In some cases, an occurrence represents a location derived from literature, museum records and/or specimens. These data are compiled and maintained in the NDDB. The general locations of species and communities are symbolized as shaded (or cross-hatched) areas on the maps. Exact locations have been masked to protect sensitive species from collection and disturbance and to protect landowner's rights whenever species occur on private property.

APT reviewed the most recent DEEP NDDB mapping (December 2019) to determine if any such species or habitats occur on or within 0.25-mile of the Site. The NDDB mapping reveals the Site is located within an area potentially containing Threatened, Endangered, or Special Concern species and/or critical habitats.

3.2.2 NDDB Consultation

In conformance with DEEP and Council requirements, APT submitted a review request to the NDDB with respect to this Project on February 24, 2020. APT received a response from DEEP on March 27, 2020, stating that records indicate that known extant populations of two State-listed Special Concern species exist in the vicinity of the Site: Eastern box turtle (*Terrapene carolina carolina*) and Bobolink (*Dolichonyx oryzivorus*). Copies of APT's submission and DEEP's response are provided in Appendix D, *DEEP NDDB Correspondence.*

Eastern Box Turtle

DEEP recommended a series of construction-related protection strategies be implemented, including: providing awareness/identification training to contractors/workers prior to initiation of construction activities; establishing exclusion zones to prevent unintentional mortality to migrating eastern box turtles; and monitoring compliance with these protection measures. APT's *Resources Protection Plan* has incorporated protective measures for this species (see Appendix C).

Additionally, the Petitioner has committed to implementing wildlife management strategies by designing the bottom of the security fence six (6) inches above final grade. This gap will allow for unimpeded turtle (and any other small wildlife) migration and prevent individuals from being trapped within the fence line. See Appendix A, *Project Plans* for fencing details.

Bobolink

Bobolinks are grassland birds that require open grassy areas to forage, breed and nest with the species breeding season approximately between May and August, breeding in grasslands as small as five acres. The regular maintenance of the hayfield on this Site has likely precluded successful breeding by Bobolink in the past. DEEP has recommended restricting construction activities between May 20th and August 20th to minimize potential impacts to these species. Protection measures for this species have been incorporated into the *Resources Protection Plan* provided as Appendix C.

The Petitioner has agreed to start construction after August 20th to minimize potential impacts to Bobolinks. In the event the construction schedule is modified, additional strategies to protect this species have been detailed in the Appendix C, *Resources Protection Plan*.

3.2.3 USFWS Consultation

The northern long-eared bat ("NLEB"; *Myotis septentrionalis*) is a federally-listed[5] threatened species also known to occur in the vicinity of the Site. The NLEB's range encompasses the entire State of Connecticut and suitable NLEB roost habitat includes trees (live, dying, dead, or snag) with a diameter at breast height ("DBH") of three (3) inches or greater.

[5] Listing under the federal Endangered Species Act

The *Northern long-eared bat areas of concern in Connecticut to assist with Federal Endangered Species Act Compliance map* (February 1, 2016) was reviewed to determine the locations of any known maternity roost trees or hibernaculum in the state. This map reveals that there are currently no known NLEB maternity roost trees in Connecticut. The nearest NLEB habitat resource to the Site is located in Litchfield, approximately 8.3 miles to the northwest.

The Project will result in the removal of a number of trees with greater than three (3) inches DBH.[6] Since tree removal activities can potentially impact NLEB habitat, APT completed a determination of compliance with Section 7 of the Endangered Species Act of 1973 for the Project.

In compliance with the US Fish and Wildlife Service ("USFWS") criteria for assessing NLEB, the Project will not likely result in an adverse effect or incidental take[7] of NLEB and does not require a permit from USFWS. A letter confirming compliance was received by USFWS on January 9, 2020. Thus, no further consultation with USFWS is required.

A full review of the *Endangered Species Act (ESA) Compliance Determination* is provided in Appendix E, *USFWS and NDDB Compliance Statement*.

3.3 Water Resources

3.3.1 Wetlands and Watercourses

APT Registered Soil Scientist Matthew Gustafson identified portions of three (3) wetlands on or proximate to the Site, comprising approximately 0.89 acres, during a field inspection and wetland delineation completed on November 8, 2019. The results of the field delineation are summarized below and additional information is provided in Appendix B, *Wetland Inspection Report*. The locations of these resources are depicted on Figure 2, *Existing Conditions Map*.

Wetland 1 is located off-Site and consists of a complex of hillside seep wetlands, an interior emergent swamp, and associated intermittent watercourse. Wetland 1 receives road drainage from James P. Casey Road and then continues to drain south through a 36-inch reinforced concrete pipe that conveys flows under Minor Street. A well-confined intermittent watercourse

[6] Suitable NLEB roost habitat includes trees (live, dying, dead, or snag) with a diameter a DBH of three (3) inches or greater.

[7] "Incidental take" is defined by the Endangered Species Act as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." For example, harvesting trees can kill bats that are roosting in the trees, but the purpose of the activity is not to kill bats.

(IWC 1) is formed from this point discharge outfall and continues through the eastern end of the Site before reaching the southern property boundary and continuing farther south off the Site. Hydrological patterns associated with this wetland consist of an altered seep system confined by an existing access road that results in a mix of seasonal saturation from seepage, artificial flooding due to a restricted outfall, and intermittent flooding from stormwater inputs. As a result of historic alterations to this resource, vegetation classes range from interior emergent vegetation to edge scrub/shrub and forested vegetation. The intermittent watercourse consists of an unnamed south-flowing stream with a 3- to 5-foot wide, well confined channel and sandy bottom. Banks bordering the intermittent watercourse generally consist of open field with sparse areas of scrub/shrub growth. Evidence of seasonal flooding or ponding water was noted during the inspection.

Wetland 2 consists of a headwater wetland seep system located at a topographic low-point at the southwestern edge of the existing Open Field. This system drains south ultimately off the Site. Portions of this wetland are dominated by emergent vegetation and edge scrub/shrub micro-habitats resulting from historic edge clearing associated with adjacent agricultural fields.

Located in the western extent of the Site, Wetland 3 is a complex of hillside seep wetlands, an interior perennial watercourse (PWC 3), and a secondary, feeder intermittent watercourse (IWC 3). This latter feature was historically formed as part of a drainage swale along the unimproved western portion of Minor Street and drains into Wetland 3 from the east. The interior perennial watercourse drains from north to south along the Site's western boundary. Bordering areas to the interior perennial watercourse consist of broad forested floodplain wetlands with complexes of edge hillside seep systems.

Wetland 3 contains a complex of hydrological conditions ranging from seasonal saturation (hillside seeps), seasonal flooding (bordering areas to the perennial watercourse), and artificial flooding (areas associated with the drainage swale). These conditions, combined with historic and regular vegetation maintenance, have created vegetation classes ranging from interior and edge emergent areas with transitional scrub/shrub habitats to forested wetland habitat.

No direct conveyances were noted between the two (2) watercourses. The perennial watercourse is characterized by an approximately 6-foot wide channel with sandy/cobble bottom and flows ranging from 2 to 4-inches deep at the time of inspection. The intermittent watercourse is characterized by a 2 to 3-foot-wide channel formed in sandy/gravelly material. A hard-bottom

crossing was noted where Minor Street crosses the drainage swale. The defined bank and channel of the intermittent stream diminishes and is lost as it discharges into bordering wetlands associated with the perennial watercourse.

3.3.2 Wetland Impacts

No wetlands or watercourses will be directly impacted by the Project. Portions of the Project Area will require minimal grading proximate to these resources, including access road improvements and installation of stormwater and landscape screening features. All clearing and grading limits for the Facility's infrastructure (solar arrays, associated equipment and fencing) would maintain a minimum setback of ±50 feet to wetlands.

There are Project-related exceptions to this 50-foot minimum setback associated with access stormwater features, and landscape screening outside the Facility fence line discussed below.

Limited grading associated with improvements to Minor Street will be located close to the southeast border of Wetland 1. These proposed activities would occur within existing developed and disturbed areas.

Stormwater features will be located less than 50 feet to IWC 1 and IWC 2. Upland areas adjacent to IWC 1 generally consist of well-maintained hayfield with no bordering vegetated wetlands; therefore, the installation of a minor stormwater drainage swale will not likely result in a significant impact to the resource and would actually protect this resource from potential erosion or discharge of sediment. Proposed clearing activities in proximity to the intermittent watercourse (man-made drainage swale identified as IWC 3) that drains into Wetland 3 would not impact its principal function, which is conveyance of surface flows from the roadbed. Table 2, *Wetlands Impacts Table* provided below details all direct impacts to wetlands, and distances to wetland resources.

Landscape screening features, consisting of the installation of forty-one (41) – ten (10) foot tall emerald green arborvitaes, will be installed along a portion of the southern property line to soften views from abutting properties to the southeast of the Facility. The eastern extent of these plantings will be located less than 50 feet to IWC 1. Upland areas adjacent to this portion IWC 1 generally consist of well-maintained hayfield with no bordering vegetated wetlands; therefore,

the plantings will not likely result in a significant impact to the resource and would provide additional habitat for a wide variety of wildlife.

To promote protection of wetlands and watercourses during construction, safeguards have been developed to avoid unintentional impacts to these resources, including a Project-specific Resources Protection Plan and the installation and maintenance of E&S controls in accordance with the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control*. See Appendix C, *Resources Protection Plan*. By implementing these management techniques throughout the duration of construction, potential adverse impacts to wetland resources will be mitigated.

Potential long-term secondary impacts to wetland resources associated with the operation of this Facility are minimized by several factors. The development will be unstaffed (generating negligible traffic), use an existing gravel/dirt access drive (reducing the creation of impervious surfaces), and treating the majority of the ground beneath the solar arrays with native grass/vegetation (providing ample opportunity for surface water to infiltrate or slow prior to discharge to surrounding resources). As such, the Project will not have a likely adverse impact to wetland resources.

Table 2: Wetlands Impacts Table

Table 2: Wetland Impacts Table		
Direct Impacts to Wetland 1 (ac.)	0	
Direct Impacts to Wetland 2 (ac.)	0	
Direct Impacts to Wetland 3 (ac.)	0	
Total Direct Impacts to Wetlands (ac.)	0	
Project Proximity to Wetlands (from limit of disturbance)	Distance (+/- ft.)	Direction (of wetland from LOD)
Project Proximity to Wetland 1	8	Northeast
Project Proximity to Wetland 2	50	South
Project Proximity to Wetland 3	50	West
Project Proximity to IWC-1	18	East
Project Proximity to PWC-3	110	West
Project Proximity to IWC-3	5	Northwest

3.3.3 Vernal Pools

During its field inspection, APT assessed all three (3) wetland resource areas for indications of vernal pool resources. Based on a lack of evidence of seasonally flooded areas observed on that date, it does not appear that any potential vernal pool breeding habitat exists on the Site. Therefore, the Project will not result in any impacts to vernal pool resources.

3.3.4 Floodplain Areas

APT reviewed the United States Federal Emergency Management Agency ("FEMA") Flood Insurance Rate Maps ("FIRM") for the Site. A FIRM is the official map of a community on which FEMA has delineated both the special hazard areas and risk premium zones applicable to the community. The Site is mapped on FIRM PANEL #09003C0455F, dated September 26, 2008. Based upon the reviewed mapping, the Site is classified as an unshaded Zone X, which is defined as areas of minimal flooding, typically above the 500-year flood level.

The Project is outside the influence of 100- and 500-year floodplains and will have no effect on these resources. No special considerations or precautions relative to flooding are required for the Project.

3.4 Water Quality

The Facility will be unstaffed and no potable water uses or sanitary discharges are planned. No liquid fuels are associated with the operation of the Facility. Once operative, the stormwater generated by the proposed development will be properly handled and treated in accordance with the 2004 *Connecticut Stormwater Quality Manual*.

3.4.1 Groundwater

Groundwater underlying the Site is classified by DEEP as "GA". This classification indicates groundwater within the area is presumed to be suitable for human consumption without treatment.[8] Based upon a review of available DEEP mapping, the Site is not located within a mapped preliminary or final Aquifer Protection Area.

[8] Designated uses in GA classified areas include existing private and potential public or private supplies of drinking water and base flow or hydraulically connected surface water bodies.

The Project will have no adverse environmental effect on ground water quality.

3.4.2 Surface Water

Based upon a review of DEEP mapping, the majority of the Site is located in Major Drainage Basin 4 (Connecticut River), Regional Basin 43 (Farmington River), and Sub Regional Drainage Basin 4315 (Pequabuck River). The western portion of the Site (including the majority of the Project Area) is located in Local Drainage Basin 4315-03 while the eastern portion of the Site is located in Local Drainage Basin 4315-07.

Based upon DEEP mapping, three (3) unnamed surface waterbodies are located in proximity to the Site. The first is the perennial stream associated with Wetland 3, which meanders along the western boundary of the Site. The second is intermittent watercourse ("IWC") 1 draining from Wetland 1 while the third is IWC 3 draining towards Wetland 3. Both unnamed surface waterbodies are classified by the DEEP as Class A.[9]

The Project will have no adverse environmental effect on surface water quality.

3.4.3 Stormwater Management

The Project has also been designed to meet the current draft of DEEP's *Appendix I, Stormwater Management at Solar Array Construction Projects*. As a result of the clearing, there will be an increase in stormwater runoff within the Project Area. That increase will require mitigation through the installation of stormwater management basins. While the change in proposed post-development drainage characteristics from existing conditions is not considered significant, *Appendix I* requires a reduction of on-Site soils Hydrologic Soil Group class by one step and results in a significant increase to the size of the stormwater management basins. To mitigate the increased stormwater runoff for the site, a series of drainage swales and grass-lined stormwater management basins with outflow control devices and overflow weirs are proposed at multiple locations on the edge of the Project Area. See Figure 3, *Proposed Conditions Map.*

For more detail regarding stormwater management, please refer to the Stormwater Management Report submitted under separate cover.

[9] Designated uses for Class A surface water bodies include habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; and water supply for industry and agriculture.

Portions of the Project Area that will be cleared and grubbed during construction will be stabilized with a low growth seed mix, New England semi-shade grass and forbs mix or equal. To safeguard water resources from potential impacts during construction, the Petitioner is committed to implementing protective measures in the form of a Stormwater Pollution Control Plan ("SWPCP") to be finalized and submitted to the Council, pending approval by DEEP Stormwater Management. The SWPCP will include monitoring of established E&S controls that will be installed and maintained in accordance with the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control*. The Petitioner will also apply for a *General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities* from DEEP. Therefore, with the incorporation of adequate protective measures, stormwater runoff from Project development will not result in an adverse impact to water quality associated with nearby surface water bodies.

3.5 Air Quality

The Site is currently undeveloped and as such, no air emissions are generated.

Due to the nature of a solar energy generating facility, no air emissions will be generated during operations and, therefore, the operation of the Facility will have no adverse effects on air quality and no permit is required.

Temporary, potential, construction-related mobile source emissions will include those associated with construction vehicles and equipment. Any potential air quality impacts related to construction activities can be considered de minimis. Such emissions will, nonetheless, be mitigated using available measures, including, inter alia, limiting idling times of equipment; proper maintenance of all vehicles and equipment; and, watering/spraying to minimize dust and particulate releases. In addition, all on-site and off-road equipment will meet the latest standards for diesel emissions, as prescribed by the United States Environmental Protection Agency and will consider reducing exhaust emissions by utilizing effective controls.

3.6 Soils and Geology

Once vegetative clearing activities are completed, grading for the proposed stormwater management basins and swales will occur. The construction of the stormwater management basins will generate a considerable amount of material that will be re-used to construct two grass berms along the southern property line. The reuse of this material will result in approximately 0

cubic yards net cut/fill for the Site and reduce the amount of truck traffic leaving the site. The grass berms will assist in directing stormwater to the proposed swales. For the locations of the proposed berms please see *Appendix A, Project Plans.*

Once the proposed stormwater best management practices are installed, minimal grading is required for construction of the remainder of the Project. Some minor grading may be required in connection with installation of the gravel access road and concrete equipment pads. See *Appendix A, Project Plans.*

All exposed soils resulting from construction activities will be properly and promptly treated in accordance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*.

Surficial materials on and within the vicinity of the Site are comprised of thin and thick deposits of glacial till while soils located on and within the vicinity of the Site are identified as Leicester fine sandy loam, Woodbridge fine sandy loam, Paxton and Montauk fine sandy loams, and Ridgebury, Leicester, and Whitman soils. Leicester fine sandy loam is a poorly drained coarse-loamy melt-out till soil derived from granite and/or schist and/or gneiss parent material. Woodbridge fine sandy loam is a moderately well drained coarse-loamy lodgment till derived soil from gneiss, granite, and/or schist parent material. Paxton and Montauk fine sandy loams are well drained coarse-loamy lodgment till derived soils from gneiss, granite, and/or schist parent material. Ridgebury, Leicester, and Whitman soils are poorly drained coarse-loamy lodgment till derived soils from gneiss, granite, and/or schist parent material.

Bedrock geology beneath the Site is identified as Bristol Gneiss. Bristol Gneiss is described as a light, medium-grained, massive to well-layered gneiss, composed of plagioclase, quartz, and biotite, also muscovite and garnet in many layers, interlayered in places with dark amphibolite.

The Petitioner does not anticipate encountering bedrock during Project development.

3.6.1 Prime Farmland Soils

In accordance with the Code of Federal Regulations, CFR Title 7, part 657, farmland soils include land that is defined as prime, unique, or farmlands of statewide or local importance based on soil type. They represent the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

According to the Connecticut Environmental Conditions Online Resource Guide,[10] the Site contains Prime Farmland Soils located primarily within the eastern portion of the Project Area (See Figure 2, *Existing Conditions Map).*

The majority of the Project Area has remained undeveloped and used as agricultural land for over 30 years. Portions of the western extent have been allowed to transition into Scrub/Shrub and Woodland Habitat while the central and eastern portions of the Project Area have continued to be used for agricultural activities. These continued activities have subjected the majority of the Project Area to compaction from equipment and vehicles; it is not evident that plowing or crop rotation has occurred for several decades.

Recognizing that the Project has a useful life and could be considered temporary in nature, the Petitioner has proposed using minimally intrusive methods for construction of the Facility. The use of a ground-mounted racking system for the installation of the solar panels and associated equipment minimizes the need for substantive grading. Beyond the Facility's fence line, the construction of a stormwater management basin in the southeast corner will require excavations within an area mapped as Prime Farmland Soils, as will the installation of the drainage swale along the eastern extent of the Project Area. These stormwater management controls allow the project to be in compliance with DEEP's Appendix I. Topsoil removed from these areas will be segregated from underlying horizons and either stockpiled or spread elsewhere as top dressing for reestablishing vegetation. No topsoil will leave the Site. The proposed implementation of these design strategies demonstrates that the Project will not materially affect Prime Farmland Soils.

In accordance with Connecticut General Statutes §16-50k(a), the Petitioner initiated consultation with the Connecticut Department of Agriculture ("DOA") in April of 2020 and met with representatives of the agency on April 27, 2020 to present the Project and discuss the presence

[10] Connecticut Environmental Conditions Online (CTECO) Resource Guide www.cteco.uconn.edu.

of Prime Farmland Soils on the Site. The Petitioner is awaiting a written response from DOA. Table 3, *Farmland Soils Assessment and Impacts Table* provided below details the amount of farmland soils located on the Site and the proposed impact from the Project.

Table 3: Farmland Soils Assessment and Impacts Table

Table 3: Farmland Soils Assessment and Impacts Table		
Farmland Soil Classification	Total Area On-Site (+/- ac.)	Area within Project Limits (+/- ac.)
Prime Farmland Soil Area	14.8	11.2

3.7 Historic and Archaeological Resources

Heritage Consultants LLC ("Heritage Consultants") of Newington, Connecticut, reviewed relevant historic and archaeological information to determine whether the Site holds potential cultural resource significance. Their review of historic maps and aerial images of the Site, examination of files maintained by the Connecticut State Historic Preservation Office ("SHPO"), and a pedestrian survey of the Site revealed that no properties or historic standing structures listed on or eligible for listing on the National Register of Historic Places ("NRHP") are located on or proximate to the Site.

In terms of archaeological potential, the Site is located within an area of low slopes and well drained soils and situated in proximity to the Pequabuck River to the south and Birge Pond Brook to the east. As a result, it was determined that a majority of the Project Area has the potential to contain intact archaeological deposits in the subsoil. At the request of the Petitioner, Heritage Consultants performed a Phase 1B Professional Cultural Resources Assessment and Reconnaissance Survey in April, 2020.

Fieldwork for the Phase 1B assessment included a pedestrian survey, photo-documentation, and the excavation of 198 shovel tests across the Project Area. Shovel testing of the southwestern corner of the Project Area was deemed not warranted due to the presence of slopes.

The survey resulted in the excavation of a single shovel test that yielded artifacts. It was determined that the materials found lack research potential and the qualities of significance as

defined by the NRHP criteria for evaluation (36 CFR 60.4 [a-d]). No additional testing prior to construction of the proposed Project is deemed necessary.

Heritage Consultants, on behalf of APT, submitted Project and Site historic/cultural information, as well as copies of the Phase 1A and 1B Cultural Resources Assessment and Reconnaissance Surveys, to the SHPO for agency review and comment in April of 2020 and is currently awaiting a response.

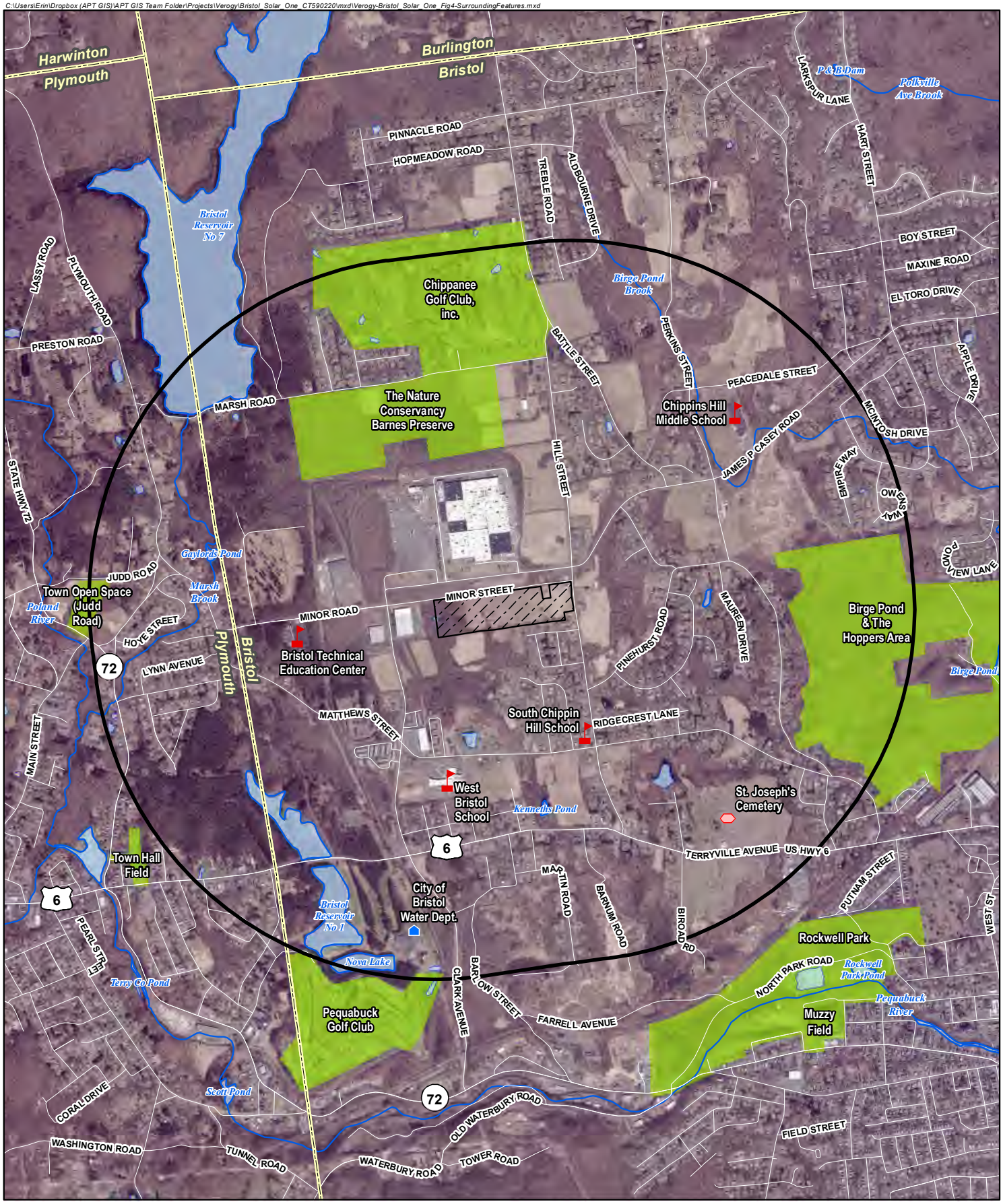
Copies of the Phase 1A/1B Cultural Resources Reconnaissance Survey Report are included in Appendix F, *Phase 1A/1B Cultural Resources Reconnaissance Survey Report.*

3.8 Scenic and Recreational Areas

No state designated scenic roads or scenic areas are located near the Site. The nearest recreational area is the Nature Conservancy Barnes Preserve located approximately 0.5 mile to the north. See Figure 4, *Surrounding Features Map,* for other resources located within one mile of the Site.

No state designated scenic roads or recreational areas will be physically or visually impacted by development of the Project.

C:\Users\Erin\Dropbox (APT GIS)\APT GIS Team Folder\Projects\Verogy\Bristol_Solar_One_CT590220\mxd\Verogy-Bristol_Solar_One_Fig4-SurroundingFeatures.mxd



Legend

- Site
- 1 Mile Radius
- Open Water
- Watercourse
- Municipal Boundary

Surrounding Features

- School
- Municipal
- Cemetery
- Municipal and Private Open Space Property

N
W E
S

2,000 1,000 0 2,000 Feet

Figure 4
Surrounding Features Map

Proposed Solar Facility - Bristol Solar One
399 Hill Street
Bristol, Connecticut

Bristol Solar One, LLC

Map Notes:
Base Map Source: CTECO 2019 Aerial Photograph
Map Scale: 1 inch = 2,000 feet
Map Date: March 2020

ALL-POINTS TECHNOLOGY CORPORATION

3.9 Noise

With the exception of the existing farmhouse and outbuildings, the majority of the Site is undeveloped; no unusual noise sources presently exist.

Construction noise is exempted under the City's Code of Ordinances, Chapter 15, Section 15-19 - Exemptions. During construction of the Facility, the temporary increase in noise would likely raise localized ambient sound levels immediately surrounding the Project Area. Standard types of construction equipment would be used for the Project. In general, the highest noise level from this type of equipment (e.g., backhoe, bulldozer, crane, trucks, etc.) is approximately 88 dBA at the source.

Once operational, noise from the Project will be minimal and meet applicable City noise standards for a Residential Daytime/Nighttime Zones.[11] The Site is located within a Residential Zone and is abutted by residential and industrial areas. Conservatively, the Facility would be considered an Industrial noise emitter to Residential receptors. As such, it is subject to noise standards of 55 dBA during the daytime and 45 dBA at night.

The only noise generating equipment planned at the Facility are the inverters and transformers. Based on the most conservative information provided by specified equipment manufacturers, the loudest piece of proposed equipment is a 2,000 kVA transformer that will generate a maximum sound level of approximately 68 dBA.

Sound reduces with distance and the inverters and transformers are inactive at night. The closest property line relative to the nearest inverter/transformer is approximately 65 feet to the north, across Minor Street. This parcel[12], zoned Residential (R-25) and currently undeveloped, abuts Minor Street to the south, James P Casey Road to the north and Industrial Park zones to the west and north. The nearest residentially developed parcel is 43 Minor Street, located approximately 472 feet to the east of the proposed equipment.

[11] City's Code of Ordinances, Chapter 15, Section 15-21 – Unlawful Noise Levels; Standards.
[12] Based on the City of Bristol Property Listing Report, this parcel is known as James P. Casey Road, Map-Block-Lot 65-2-2+2-1.

APT applied the Inverse Square Law[13] to evaluate the relative sound level of the largest transformer at the nearest property lines. Based on these calculations, nearby receptors are of sufficient distances from the proposed Project-related equipment and noise levels during Facility operation will be below 55 dBA at surrounding property lines.

Please refer to the inverter specification sheet provided in Appendix G, *Product Information Sheets*.

3.10 Lighting

The Site is undeveloped; no light sources currently exist.

No exterior lighting is planned for the Facility. There will be some small, non-intrusive lighting fixtures within the equipment to aid in maintenance.

3.11 FAA Determination

APT submitted relevant Project information to the Federal Aviation Administration ("FAA") for an aeronautical study to evaluate potential hazards to air navigation. The FAA provided a Determination of No Hazard to Air Navigation on April 9, 2020. See Appendix H, *FAA Determination*. Based on this determination, there is no need to conduct a glare analysis.

3.12 Visibility

The Facility will consist of 11,492 non-reflective solar panels measuring approximately 10 feet above final grade surrounded by a six (6) foot tall security fence. Additionally, landscape screening features consisting of forty-one (41) – ten (10) foot tall emerald green arborvitaes will be installed along a portion of the southern property line to soften views from abutting properties to the south along Clover Road (See Figure 3, *Proposed Conditions Map*). The proposed electrical interconnection to the existing electrical distribution line located on Minor Street will not require the installation of new utility poles.

[13] Inverse Square Law states that *the intensity of a force is inversely proportional to the square of the distance from that force*. With respect to sound, this means that any a noise will have a drastic drop-off in volume as it moves away from the source and then shallows out.

Year-round visibility of the proposed Facility will be confined to areas within the immediate vicinity of the Site, primarily from abutting properties to the south along Clover Road and east on Hill Street. Views from select locations along Clover Road will be minimized by the construction of a 10-15-foot-high grass berm and the installation of landscape screening features along the southeastern portion of the Project Area. Limited seasonal views, when the leaves are off of the deciduous trees, could extend as far as approximately 0.25 mile in all directions. In general, views beyond the immediate area would be minimized by a combination of the Facility's relatively low height and the presence of intervening vegetation and infrastructure.

The solar modules are designed to absorb incoming solar radiation and minimize reflectivity, such that only a small percentage of incidental light will be reflected off the panels. This incidental light is significantly less reflective than common building materials, such as steel, or the surface of smooth water. The panels will be tilted up toward the southern sky at a fixed angle of 30 degrees, thereby further reducing reflectivity. Please see Appendix I, *Photo-simulations and Viewshed Map* for visual simulations and a viewshed analysis of the proposed Project.

4 Conclusion

As demonstrated in this Environmental Assessment, the Project will comply with the DEEP air and water quality standards. Further, it will not have an undue adverse effect on the existing environment and ecology; nor will it affect the scenic, historic and recreational resources in the vicinity of the Project. Once operative, the Facility will be unstaffed and generate minimal traffic.

No core forest will be materially affected by the Project. The Project will result in the removal of approximately 4.5 acres of trees within the western portion of the property. This area is entirely located within existing "edge" upland forest, habitat that occurs elsewhere on and adjacent to the Site. The Project is not expected to result in a significant negative impact to this habitat or to wildlife.

Portions of the Project Area are located within mapped prime farmland soils. The Petitioner has designed the Project to minimize disturbances to these soils by proposing minimally intrusive methods for construction and installation of Facility components, limiting the amounts of cuts/fills and grading to the extent feasible, and ensuring that no soil will be exported from the Site. Once the Facility has reached the end of its projected useful life, the panels and equipment can be removed and the Project Area restored.

No wetlands or watercourses will be directly impacted by the Project. To promote protection of nearby wetlands and watercourses during construction, safeguards have been developed to avoid unintentional impacts to these resources in the form of a Resources Protection Plan. In addition, E&S controls will be installed and maintained throughout construction in accordance with the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control*. Implementing these management techniques will mitigate the potential for adverse impacts to wetland resources.

While two State-listed and one federally-listed species have been identified as potentially occurring within the vicinity of the site, protection measures will be implemented during construction to minimize potential impacts to these species.

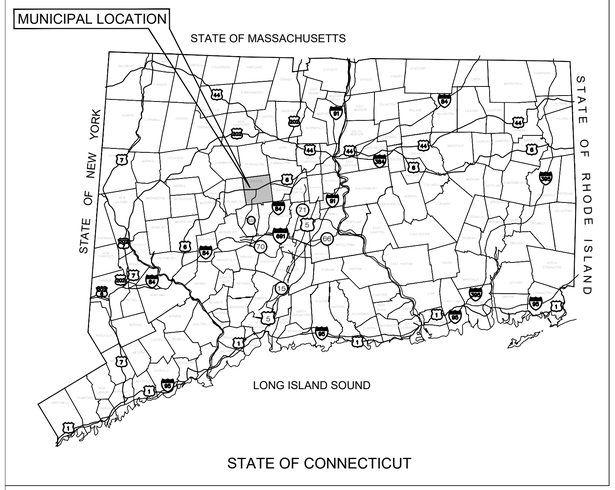
Portions of the Facility will likely be seen from surrounding areas, including adjoining residential properties and nearby public roadways. The construction of a grass berm and landscape screening features along the southeastern edge of the Project Area will help minimize views from the south.

The majority of views of the Facility would occur from locations within 500 feet (in all directions) of the Site. Views from beyond this distance would be minimized by a combination of the Facility's relatively low height and the presence of intervening vegetation and infrastructure.

Overall, the Project's design minimizes the creation of impervious surfaces. The Project has been designed to adequately handle stormwater runoff through the creation of multiple stormwater infiltration basins and drainage swales proposed at peripheral locations of the Facility. Some Site manipulation (cuts/fills) and regrading will be required to allow for stormwater management basin development, construction of two (2) grass berms and the upgrades to the Minor Street extension, but the majority of the Project Area will maintain existing grades for the installation of the solar arrays. The Project has been designed in accordance with the DEEP's *General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities*. The Petitioner will implement a SWPCP, in accordance with the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control*, that will include provisions for monitoring of development activities and the establishment of E&S controls to be installed and maintained throughout construction.

APPENDIX A

PROJECT PLANS



BRISTOL SOLAR ONE, LLC

"BRISTOL SOLAR ONE, LLC"
399 HILL STREET
BRISTOL, CT

PERMITTING PLAN SET
MAY 20, 2020

LIST OF DRAWINGS

SITE INFORMATION

SITE NAME: "BRISTOL SOLAR ONE, LLC"

LOCATION: 399 HILL STREET
BRISTOL, CT

SITE TYPE/DESCRIPTION: ADD (1) GROUND MOUNTED SOLAR PANEL ARRAY W/ ASSOCIATED EQUIPMENT, GRAVEL ACCESS ROAD, AND STORMWATER MANAGEMENT.

PROPERTY OWNER: MARK E., ANN L. & PAUL C. MINOR
399 HILL STREET
BRISTOL, CT

APPLICANT: BRISTOL SOLAR ONE, LLC
150 TRUMBULL STREET, 4TH FLOOR
HARTFORD, CT 06103

ENGINEER CONTACT: BRADLEY J. PARSONS, P.E.
(860) 663-1697 x208

LATITUDE: 41°41'27.70" N
LONGITUDE: 72°58'41.72" W
ELEVATION: 765'± AMSL

MBLU: 66-263
ZONE: R-25
EXISTING LAND USE: SINGLE FAMILY RESIDENTIAL & AGRICULTURAL
PROPOSED LAND USE: COMMUNICATIONS, TRANSPORTATION AND PUBLIC UTILITY USES
- LARGE SCALE GROUND MOUNTED SOLAR PHOTOVOLTAIC INSTALLATIONS

TOTAL SITE ACREAGE: 26.90± AC.
TOTAL DISTURBED AREA: 18.90± AC.

PROP. STORMWATER MANAGEMENT GRADING
APPROX. VOLUME OF CUT : 16,239± CY
APPROX. VOLUME OF FILL: 2,282± CY

PROP. BERM GRADING
APPROX. VOLUME OF FILL: 13,957± CY

APPROX. OVERALL NET VOLUME: 0± CY OF CUT

PROP. GRAVEL ACCESS ROAD: 425± LINEAR FEET
PROP. FILTER SOCK: 3,210± LINEAR FEET
TREE CLEARING AREA: 0.68± ACRE
IMPERVIOUS AREA: 7,707± SQUARE FEET

USGS TOPOGRAPHIC MAP

SCALE : 1" = 2000'± SOURCE: USGS 7.5 BRISTOL QUADRANGLE, CT 2012

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET
4TH FLOOR
HARTFORD, CT, 06103

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET

NO	DATE	REVISION
0	05/20/20	FOR REVIEW: BJP
1		
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD

PROF: BRADLEY J. PARSONS P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: MARK E., ANN L. & PAUL C. MINOR
ADDRESS: 399 HILL STREET BRISTOL, CT

BRISTOL SOLAR ONE, LLC

SITE ADDRESS: 399 HILL STREET BRISTOL, CT

APT FILING NUMBER: CT590220

DRAWN BY: JT

DATE: 05/20/20 CHECKED BY: BJP

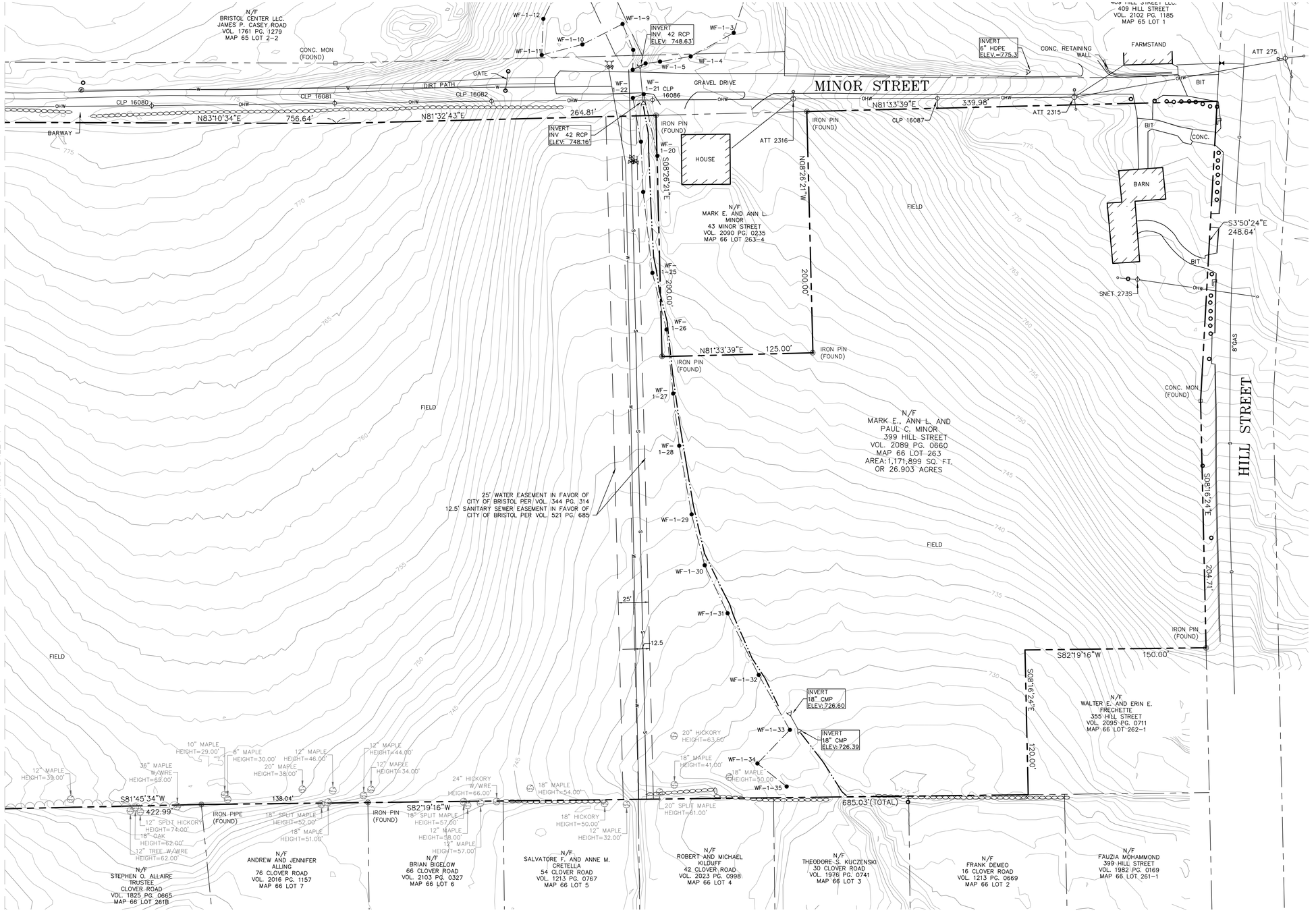
SHEET TITLE:

TITLE SHEET & INDEX

SHEET NUMBER:

T-1

STATE OF CONNECTICUT BRADLEY J. PARSONS No. 28025 LICENSED PROFESSIONAL ENGINEER



GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

LOCUS MAP
(N.T.S.)

GENERAL NOTES

SEE SHEET THREE FOR GENERAL NOTES, MAP REFERENCES, AND CERTIFICATION.

LEGEND

- CULVERT
- DRAIN MANHOLE
- GAS VALVE
- WATER MANHOLE
- WATER GATE
- FIRE HYDRANT
- UTILITY POLE
- UTILITY POLE WITH LIGHT
- UTILITY POLE W/LIGHT AND TRANSFORMER
- GUY
- CONIFEROUS TREE
- DECIDUOUS TREE
- POST
- MAILBOX
- ABUTTERS LOT LINE
- PROPERTY LINE
- EASEMENT
- CHAIN LINK FENCE
- WOOD FENCE
- METAL/WIRE FENCE
- DRAIN LINE
- WATER LINE
- GAS LINE
- UNDERGROUND ELECTRIC
- UNDERGROUND CABLE
- TELEPHONE LINE
- OVERHEAD WIRES
- STONE WALL
- TREE LINE
- INTERMEDIATE CONTOURS
- INDEX CONTOURS
- WETLAND LINE
- INTERMITTENT WATER COURSE

REVISION	
DATE	DESCRIPTION
--/--/--	---

PROPERTY AND TOPOGRAPHIC SURVEY

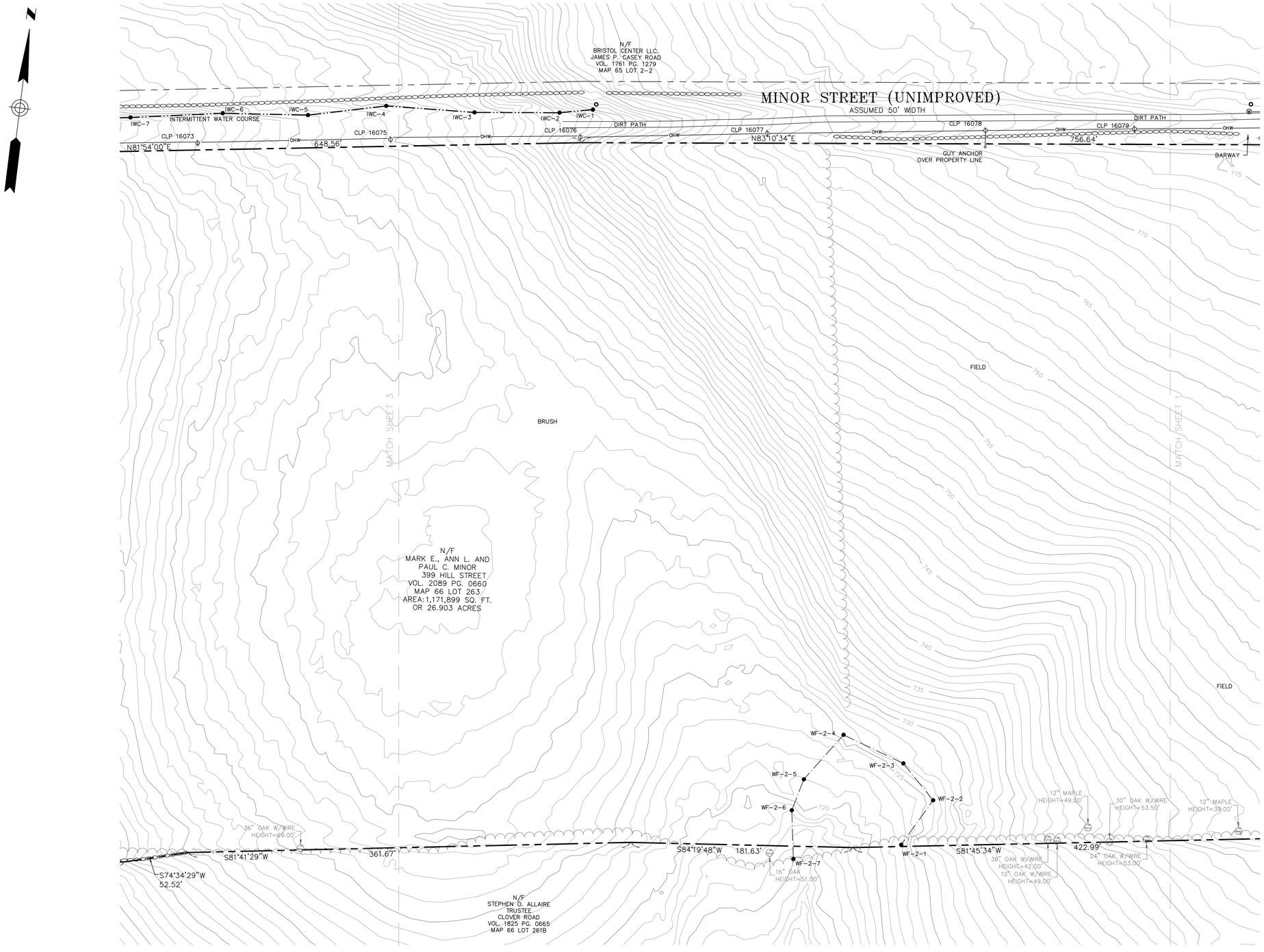
LAND OF

MARK E., ANN L. AND PAUL C. MINOR

399 HILL STREET
BRISTOL, CONNECTICUT
PREPARED FOR
BRISTOL ONE SOLAR, LLC.

WSP USA Inc.
500 Winding Brook Drive
Glastonbury, CT 06033
860-659-0444

Drawn By ZJM	Date MARCH 4, 2020	Job No. 190379A
Surveyed By ZJM / JWG		
Checked By MG	Scale 1" = 40'	Sheet No. 1 OF 3
Book No. N/A		



GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)

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LOCUS MAP
(N.T.S.)

LEGEND

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- OVERHEAD WIRES
- STONE WALL
- TREE LINE
- INTERMEDIATE CONTOURS
- INDEX CONTOURS
- WETLAND LINE
- INTERMITTENT WATER COURSE

REVISION	
DATE	DESCRIPTION
--/--/--	---

PROPERTY AND TOPOGRAPHIC SURVEY

LAND OF

MARK E., ANN L. AND PAUL C. MINOR

399 HILL STREET

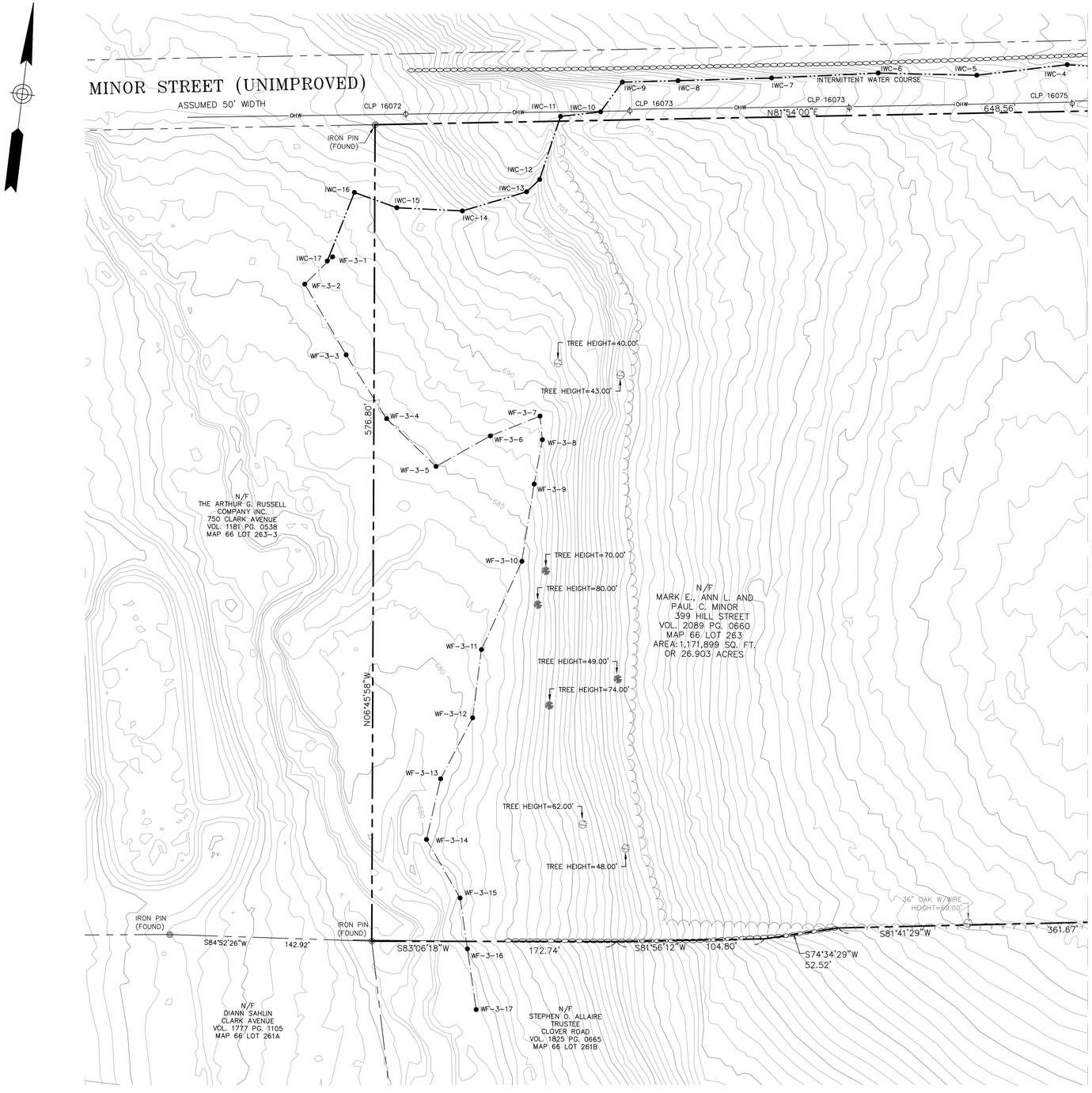
BRISTOL, CONNECTICUT

PREPARED FOR

BRISTOL ONE SOLAR, LLC.

WSP USA Inc.
500 Winding Brook Drive
Glastonbury, CT 06033
860-659-0444

Drawn By	ZJM	Date	Job No.
Surveyed By	ZJM / JWG	MARCH 4, 2020	190379A
Checked By	MG	Scale	Sheet No.
Book No.	N/A	1" = 40'	2 OF 3



GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

GENERAL NOTES

1. A) THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE REGULATIONS OF CONNECTICUT STATE AGENCIES, SECTIONS 20-300b-1 THROUGH 20-300b-20 AND THE STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS.

   B) THIS PLAN CONFORMS TO HORIZONTAL ACCURACY CLASS A-2, AND TOPOGRAPHIC ACCURACY CLASS T-2.

   C) BOUNDARY DETERMINATION IS BASED UPON A RESURVEY.

   D) THE TYPE OF SURVEY PERFORMED IS A PROPERTY AND TOPOGRAPHIC SURVEY AND IS INTENDED TO DEPICT LAND KNOWN AS 399 HILL STREET IN BRISTOL, CONNECTICUT.

2. NORTH ARROW REFERS TO THE CONNECTICUT STATE PLANE COORDINATE SYSTEM (NAD83 EPOCH2011) AND IS BASED ON GPS OBSERVATIONS PERFORMED BY WSP USA.
3. ELEVATIONS REFER TO NAVD 88.
4. UNDERGROUND UTILITIES DEPICTED HAVE BEEN PLOTTED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES DEPICTED COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES DEPICTED ARE IN THE EXACT LOCATION INDICATED, THE SURVEYOR HAS NOT PHYSICALLY EXPOSED THE UNDERGROUND UTILITIES. PER CONNECTICUT STATE LAW THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF EXCAVATION.
5. SUBJECT PARCEL IS LOCATED IN ZONE X, "AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN" AS DEPICTED ON FIRM MAP NUMBER 09003C0455F, PANEL NUMBER 455 OF 675, EFFECTIVE DATE, SEPTEMBER 26, 2008.
6. WETLANDS DELINEATED AND SURVEYED BY ALL POINTS TECHNOLOGY ON NOVEMBER 18, 2019.
7. CONTOURS DEPICTED ARE DERIVED FROM AVAILABLE PUBLIC DATA AND VERIFIED WITH GROUND SURVEY PERFORMED BY WSP, USA.

MAP REFERENCES

A. "MAP OF LAND OWNED BY PAUL J. & JANE F. MINOR TO BE CONVEYED TO ARTHUR G. RUSSELL CO., INC., CLARK AVENUE, BRISTOL, CONNECTICUT." SCALE: 1"=40'; DATE: DECEMBER, 1995; PREPARED BY NASCIMBENI & JAHNE SURVEYORS, P.C.

B. "PROPERTY SURVEY SHOWING PARCEL #263-4, LOT #263 HILL STREET, BRISTOL, CONNECTICUT, OWNED BY PAUL J. & JANE. F. MINOR" SCALE: 1"=50'; DATE: AUGUST 2, 2001; PREPARED BY LEPORE ASSOCIATES, INC.

C. "LOT LINE REVISION, PARCELS 65-1 & 66-263, PREPARED FOR PAUL C. MINOR, MARK E. MINOR, AND ANN L. MINOR, BRISTOL, CONNECTICUT" SCALE: 1"=40'; DATE: DECEMBER 31, 2018; AND PREPARED BY CLARK LAND SURVEYING, LLC.

D. "PROPERTY/BOUNDARY SURVEY MAP DEPICTING LOT 261A, PROPOSED LOT 261B, AND LOT 264-1, LAND N/F DIANN SAHLIN, CLARK AVENUE, ALSO FRONTING ON CLOVER ROAD, BRISTOL, CONNNECTICUT" SCALE: 1"=100'; DATE: NOVEMBER 20, 2009; PREPARED BY WINTERBOURNE LAND SERVICES.

E. "MAP SHOWING PROPOSED SANITARY SEWER EASEMENT OVER EXISTING CITY WATER EASEMENT, CLOVER ROAD TO MINOR STREET." SCALE 1"=60'; DATE: AUGUST, 1966; PREPARED BY CITY OF BRISTOL ENGINEERING DEPARTMENT.

F. BRISTOL WATER DEPT. MAP SHOWING RIGHT OF WAY, MARSH RD. TO CLOVER RD., BRISTOL, CONN." SCALE: 1"=200'; REVISED DATE: AUGUST 15, 1956; PREPARED BY CITY OF BRISTOL ENGINEERING DEPARTMENT.

G. MAP OF FARMSTEAD MANOR DEVELOPED BY SAL-RAY DEVELOPMENT CO., BRISTOL, CONN." SCALE: 1"=40'; DATE: JANUARY 1, 1956; PREPARED BY L.J. BARIBAULT.

H. SANITARY SEWER EASEMENT, PROPERTY OF ARGONAUT REALTY DIVISION OF GENERAL MOTORS CORP., MINOR STREET, BRISTOL, CONN." SCALE: 1"=40'; DATE: NOVEMBER 13, 1967; PREPARED BY MORTON S. FINE AND ASSOCIATES.

I. "PROPERTY OF GENERAL MOTORS CORP. TO BE DEEDED TO THE CITY OF BRISTOL FOR THE RELOCATION OF MINOR STREET, BRISTOL, CONN." SCALE: 1"=100'; DATE: AUGUST 4, 1966; PREPARED BY MORTON S. FINE AND ASSOCIATES.

J. "JAMES P. CASE ROAD STREET LINE MAP, HILL STREET TO CLARK AVENUE" SCALE 1"=50'; DATE: APRIL, 1992; PREPARED BY DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING, CITY OF BRISTOL, CONNECTICUT.

LOCUS MAP
(N.T.S.)

LEGEND

- CULVERT
- DRAIN MANHOLE
- GAS VALVE
- WATER MANHOLE
- WATER GATE
- FIRE HYDRANT
- UTILITY POLE
- UTILITY POLE WITH LIGHT
- UTILITY POLE W/LIGHT AND TRANSFORMER
- GUY
- CONIFEROUS TREE
- DECIDUOUS TREE
- POST
- MAILBOX
- ABUTTERS LOT LINE
- PROPERTY LINE
- EASEMENT
- CHAIN LINK FENCE
- WOOD FENCE
- METAL/WIRE FENCE
- DRAIN LINE
- WATER LINE
- GAS LINE
- UNDERGROUND ELECTRIC
- UNDERGROUND CABLE
- TELEPHONE LINE
- OVERHEAD WIRES
- STONE WALL
- TREE LINE
- INTERMEDIATE CONTOURS
- INDEX CONTOURS
- WETLAND LINE
- INTERMITTENT WATER COURSE

STATE OF CONNECTICUT · MICHAEL J. GARON · 70366 · LICENSED LAND SURVEYOR

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

MICHAEL J. GARON L.S. #70366

NO CERTIFICATION IS EXPRESSED OR IMPLIED UNLESS THIS MAP BEARS THE ORIGINAL SIGNATURE AND EMBOSSED SEAL OF THE ABOVE NAMED LAND SURVEYOR.

REVISION	
DATE	DESCRIPTION
--/--/--	---

PROPERTY AND TOPOGRAPHIC SURVEY

LAND OF

MARK E., ANN L. AND PAUL C. MINOR

399 HILL STREET
BRISTOL, CONNECTICUT
PREPARED FOR
BRISTOL ONE SOLAR, LLC.

WSP USA Inc.
500 Winding Brook Drive
Glastonbury, CT 06033
860-659-0444

Drawn By ZJM	Date MARCH 4, 2020	Job No. 190379A
Surveyed By ZJM / JWG		
Checked By MG	Scale 1" = 40'	Sheet No. 3 OF 3
Book No. N/A		

GENERAL NOTES

1. ALL CONSTRUCTION SHALL COMPLY WITH PROJECT DEVELOPER STANDARDS, CITY OF BRISTOL STANDARDS, CONNECTICUT DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS IN THE ABOVE REFERENCED INCREASING HIERARCHY. IF SPECIFICATIONS ARE IN CONFLICT, THE MORE STRINGENT SPECIFICATION SHALL APPLY.

2. IF NO PROJECT CONSTRUCTION SPECIFICATION PACKAGE IS PROVIDED BY THE PROJECT DEVELOPER OR THEIR REPRESENTATIVE, THE CONTRACTOR SHALL COMPLY WITH THE MANUFACTURE, CITY OF BRISTOL, OR CONNECTICUT DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND BE IN ACCORDANCE WITH ALL APPLICABLE OSHA, FEDERAL, STATE AND LOCAL REGULATIONS.

3. THE PROJECT DEVELOPER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS REQUIRED BY GOVERNMENT AGENCIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL OBTAIN ALL CITY OF BRISTOL CONSTRUCTION PERMITS. THE CONTRACTOR SHALL POST ALL BONDS, PAY ALL FEES, PROVIDE PROOF OF INSURANCE AND PROVIDE TRAFFIC CONTROL NECESSARY FOR THIS WORK.

4. REFER TO PLANS, DETAILS AND REPORTS PREPARED BY ALL-POINTS TECHNOLOGY CORPORATION FOR ADDITIONAL INFORMATION. THE CONTRACTOR SHALL VERIFY ALL SITE CONDITIONS IN THE FIELD AND CONTACT THE PROJECT DEVELOPER IF THERE ARE ANY QUESTIONS OR CONFLICTS REGARDING THE CONSTRUCTION DOCUMENTS AND/OR FIELD CONDITIONS SO THAT APPROPRIATE REVISIONS CAN BE MADE PRIOR TO BIDDING/CONSTRUCTION. ANY CONFLICT BETWEEN THE DRAWINGS AND SPECIFICATIONS SHALL BE CONFIRMED WITH THE PROJECT DEVELOPERS CONSTRUCTION MANAGER PRIOR TO CONSTRUCTION.

5. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF ALL PRODUCTS, MATERIALS PER PLANS AND SPECIFICATIONS TO THE PROJECT DEVELOPER FOR REVIEW AND APPROVAL PRIOR TO FABRICATION OR DELIVERY TO THE SITE. ALLOW A MINIMUM OF 14 WORKING DAYS FOR REVIEW.

6. SHOULD ANY UNKNOWN OR INCORRECTLY LOCATED EXISTING PIPING OR OTHER UTILITY BE UNCOVERED DURING EXCAVATION, CONSULT THE PROJECT DEVELOPER IMMEDIATELY FOR DIRECTIONS BEFORE PROCEEDING FURTHER WITH WORK IN THIS AREA.

7. DO NOT INTERRUPT EXISTING UTILITIES SERVICING FACILITIES OCCUPIED AND USED BY THE PROJECT DEVELOPER OR OTHERS DURING OCCUPIED HOURS, EXCEPT WHEN SUCH INTERRUPTIONS HAVE BEEN AUTHORIZED IN WRITING BY THE PROJECT DEVELOPER AND THE LOCAL MUNICIPALITY. INTERRUPTIONS SHALL ONLY OCCUR AFTER ACCEPTABLE TEMPORARY SERVICE HAS BEEN PROVIDED.

8. THE CONTRACT LIMIT IS THE PROPERTY LINE UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE CONTRACT DRAWINGS.

9. THE CONTRACTOR SHALL ABIDE BY ALL OSHA, FEDERAL, STATE AND LOCAL REGULATIONS WHEN OPERATING CRANES, BOOMS, HOISTS, ETC. IN CLOSE PROXIMITY TO OVERHEAD ELECTRIC LINES. IF CONTRACTOR MUST OPERATE EQUIPMENT CLOSE TO ELECTRIC LINES, CONTACT POWER COMPANY TO MAKE ARRANGEMENTS FOR PROPER SAFEGUARDS. ANY UTILITY COMPANY FEES SHALL BE PAID FOR BY THE CONTRACTOR.

10. THE CONTRACTOR SHALL COMPLY WITH OSHA CFR 29 PART 1926 FOR EXCAVATION TRENCHING AND TRENCH PROTECTION REQUIREMENTS.

11. THE ENGINEER IS NOT RESPONSIBLE FOR SITE SAFETY MEASURES TO BE EMPLOYED DURING CONSTRUCTION. THE ENGINEER HAS NO CONTRACTUAL DUTY TO CONTROL THE SAFEST METHODS OR MEANS OF THE WORK, JOB SITE RESPONSIBILITIES, SUPERVISION OF PERSONNEL OR TO SUPERVISE SAFETY AND DO NOT VOLUNTARILY ASSUME ANY SUCH DUTY OR RESPONSIBILITY.

12. THE CONTRACTOR SHALL RESTORE ANY DRAINAGE STRUCTURE, PIPE, CONDUIT, PAVEMENT, CURBING, SIDEWALKS, LANDSCAPED AREAS OR SIGNAGE DISTURBED DURING CONSTRUCTION TO THEIR ORIGINAL CONDITION OR BETTER, AS APPROVED BY THE PROJECT DEVELOPER OR CITY OF BRISTOL.

13. THE CONTRACTOR SHALL PROVIDE AS-BUILT RECORDS OF ALL CONSTRUCTION (INCLUDING UNDERGROUND UTILITIES) TO THE PROJECT DEVELOPER AT THE END OF CONSTRUCTION.

14. ALTERNATIVE METHODS AND PRODUCTS, OTHER THAN THOSE SPECIFIED, MAY BE USED IF REVIEWED AND APPROVED BY THE PROJECT DEVELOPER, ENGINEER, AND APPROPRIATE REGULATORY AGENCY PRIOR TO INSTALLATION DURING THE BIDDING/CONSTRUCTION PROCESS.

15. INFORMATION ON EXISTING UTILITIES AND STORM DRAINAGE SYSTEMS HAS BEEN COMPILED FROM AVAILABLE INFORMATION INCLUDING UTILITY PROVIDER AND MUNICIPAL RECORD MAPS AND/OR FIELD SURVEY AND IS NOT GUARANTEED CORRECT OR COMPLETE. UTILITIES AND STORM DRAINAGE SYSTEMS ARE SHOWN TO ALERT THE CONTRACTOR TO THEIR PRESENCE AND THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES AND STORM DRAINAGE SYSTEMS INCLUDING SERVICES. PRIOR TO DEMOLITION OR CONSTRUCTION, THE CONTRACTOR SHALL CONTACT "DIG SAFE" 72 HOURS BEFORE COMMENCEMENT OF WORK AT "811" AND VERIFY ALL UTILITY AND STORM DRAINAGE SYSTEM LOCATIONS.

16. NO CONSTRUCTION OR DEMOLITION SHALL BEGIN UNTIL APPROVAL OF THE FINAL PLANS IS GRANTED BY ALL GOVERNING AND REGULATORY AGENCIES.

SITE PLAN NOTES

1. THE SURVEY WAS PROVIDED BY WSP USA INC. DATED MARCH 4, 2020.

2. THERE ARE WETLAND AREAS LOCATED ON THE SITE AS INDICATED ON THE PLANS. WETLAND AREA BOUNDARIES WERE FLAGGED AND LOCATED BY ALL POINTS TECHNOLOGY, IN NOVEMBER 2019.

3. THERE WILL BE GRADING ON SITE FOR THE INSTALLATION OF STORMWATER MANAGEMENT FEATURES.

4. THE CONTRACTOR SHALL FOLLOW THE RECOMMENDED SEQUENCE OF CONSTRUCTION NOTES PROVIDED ON THE EROSION CONTROL PLAN OR SUBMIT AN ALTERNATE PLAN FOR APPROVAL BY THE ENGINEER AND/OR PERMITTING AGENCIES PRIOR TO THE START CONSTRUCTION. ALLOW A MINIMUM OF 14 WORKING DAYS FOR REVIEW.

5. PROPER CONSTRUCTION PROCEDURES SHALL BE FOLLOWED ON ALL IMPROVEMENTS WITHIN THIS PARCEL SO AS TO PREVENT THE SILTING OF ANY WATERCOURSE OR BVWS IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS. IN ADDITION, THE CONTRACTOR SHALL ADHERE TO "EROSION CONTROL PLAN" CONTAINED HEREIN. THE CONTRACTOR SHALL BE RESPONSIBLE TO POST ALL BONDS AS REQUIRED BY GOVERNMENT AGENCIES WHICH WOULD GUARANTEE THE PROPER IMPLEMENTATION OF THE PLAN.

6. ALL SITE WORK, MATERIALS OF CONSTRUCTION, AND CONSTRUCTION METHODS FOR EARTHWORK AND STORM DRAINAGE WORK, SHALL CONFORM TO THE SPECIFICATIONS AND DETAILS AND APPLICABLE SECTIONS OF THE PROJECT SPECIFICATIONS MANUAL. OTHERWISE THIS WORK SHALL CONFORM TO THE STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION AND PROJECT GEOTECHNICAL REPORT IF THERE IS NO PROJECT SPECIFICATIONS MANUAL. ALL FILL MATERIAL UNDER STRUCTURES AND PAVED AREAS SHALL BE PER THE ABOVE STATED APPLICABLE SPECIFICATIONS, AND/OR PROJECT GEOTECHNICAL REPORT, AND SHALL BE PLACED IN ACCORDANCE WITH THE APPLICABLE SPECIFICATIONS UNDER THE SUPERVISION OF A QUALIFIED PROFESSIONAL ENGINEER. MATERIAL SHALL BE COMPACTED IN 8" LIFTS TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D 1557 AT 95% PERCENT OF OPTIMUM MOISTURE CONTENT.

7. ALL DISTURBANCE INCURRED TO PUBLIC, MUNICIPAL, COUNTY, STATE PROPERTY DUE TO CONSTRUCTION SHALL BE RESTORED TO ITS PREVIOUS CONDITION OR BETTER, TO THE SATISFACTION OF THE CITY OF BRISTOL AND STATE OF CONNECTICUT.

8. IF IMPACTED OR CONTAMINATED SOIL IS ENCOUNTERED BY THE CONTRACTOR, THE CONTRACTOR SHALL SUSPEND EXCAVATION WORK OF IMPACTED SOIL AND NOTIFY THE PROJECT DEVELOPER AND/OR PROJECT DEVELOPER'S ENVIRONMENTAL CONSULTANT PRIOR TO PROCEEDING WITH FURTHER WORK IN THE IMPACTED SOIL LOCATION UNTIL FURTHER INSTRUCTED BY THE PROJECT DEVELOPER AND/OR PROJECT DEVELOPER'S ENVIRONMENTAL CONSULTANT.

UTILITY NOTES

1. CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE CITY OF BRISTOL TO SECURE CONSTRUCTION PERMITS AND FOR PAYMENT OF FEES FOR STREET CUTS AND CONNECTIONS TO EXISTING UTILITIES.

2. REFER TO DRAWINGS BY PROJECT DEVELOPER FOR THE ONSITE ELECTRICAL DRAWINGS AND INTERCONNECTION TO EXISTING ELECTRICAL GRID. SITE CONTRACTOR SHALL SUPPLY AND INSTALL PIPE ADAPTERS AS NECESSARY AT BUILDING CONNECTION POINT OR AT EXISTING UTILITY OR PIPE CONNECTION POINT. THESE DETAILS ARE NOT INCLUDED IN THESE PLANS.

3. UTILITY LOCATIONS AND PENETRATIONS ARE SHOWN FOR THE CONTRACTOR'S INFORMATION AND SHALL BE VERIFIED WITH THE ELECTRICAL ENGINEER AND THE PROJECT DEVELOPER'S CONSTRUCTION MANAGER PRIOR TO THE START OF CONSTRUCTION.

4. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY THE ELEVATION AND LOCATION OF ALL UTILITIES BY VARIOUS MEANS PRIOR TO BEGINNING ANY EXCAVATION. TEST PITS SHALL BE DUG AT ALL LOCATIONS WHERE PROP. SANITARY SEWERS AND WHERE PROP. STORM PIPING WILL CROSS EXISTING UTILITIES, AND THE HORIZONTAL AND VERTICAL LOCATIONS OF THE UTILITIES SHALL BE DETERMINED. THE CONTRACTOR SHALL CONTACT THE PROJECT DEVELOPER IN THE EVENT OF ANY DISCOVERED OR UNFORESEEN CONFLICTS BETWEEN EXISTING AND PROPOSED SANITARY SEWERS, STORM PIPING AND UTILITIES SO THAT AN APPROPRIATE MODIFICATION MAY BE MADE.

5. UTILITY CONNECTION DESIGN AS REFLECTED ON THE PLAN MAY CHANGE SUBJECT TO UTILITY PROVIDER AND GOVERNING AUTHORITY STAFF REVIEW.

6. THE CONTRACTOR SHALL ENSURE THAT ALL UTILITY PROVIDERS AND GOVERNING AUTHORITY STANDARDS FOR MATERIALS AND CONSTRUCTION METHODS ARE MET. THE CONTRACTOR SHALL PERFORM PROPER COORDINATION WITH THE RESPECTIVE UTILITY PROVIDER.

7. THE CONTRACTOR SHALL ARRANGE FOR AND COORDINATE WITH THE RESPECTIVE UTILITY PROVIDERS FOR SERVICE INSTALLATIONS AND CONNECTIONS. THE CONTRACTOR SHALL COORDINATE WORK TO BE PERFORMED BY THE VARIOUS UTILITY PROVIDERS AND SHALL PAY ALL FEES FOR CONNECTIONS, DISCONNECTIONS, RELOCATIONS, INSPECTIONS, AND DEMOLITION UNLESS OTHERWISE STATED IN THE PROJECT SPECIFICATIONS MANUAL AND/OR GENERAL CONDITIONS OF THE CONTRACT.

8. ALL EXISTING PAVEMENT WHERE UTILITY PIPING IS TO BE INSTALLED SHALL BE SAW CUT. AFTER UTILITY INSTALLATION IS COMPLETED, THE CONTRACTOR SHALL INSTALL TEMPORARY AND/OR PERMANENT PAVEMENT REPAIR AS DETAILED ON THE DRAWINGS OR AS REQUIRED BY THE CITY OF BRISTOL.

9. ALL PIPES SHALL BE LAID ON STRAIGHT ALIGNMENTS AND EVEN GRADES USING A PIPE LASER OR OTHER ACCURATE METHOD.

10. RELOCATION OF UTILITY PROVIDER FACILITIES, SUCH AS POLES, SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE UTILITY PROVIDER.

11. THE CONTRACTOR SHALL COMPACT PIPE BACKFILL IN 8" LIFTS ACCORDING TO THE PIPE BEDDING DETAILS. TRENCH BOTTOM SHALL BE STABLE IN HIGH GROUNDWATER AREAS. A PIPE FOUNDATION SHALL BE USED PER THE TRENCH DETAILS AND IN AREAS OF ROCK EXCAVATION.

12. CONTRACTOR TO PROVIDE STEEL SLEEVES AND ANNULAR SPACE SAND FILL FOR UTILITY PIPE AND CONDUIT CONNECTIONS UNDER FOOTINGS.

13. ALL UTILITY CONSTRUCTION IS SUBJECT TO INSPECTION FOR APPROVAL PRIOR TO BACKFILLING, IN ACCORDANCE WITH THE APPROPRIATE UTILITY PROVIDER REQUIREMENTS.

14. A ONE-FOOT MINIMUM VERTICAL CLEARANCE BETWEEN WATER, GAS, ELECTRICAL, AND TELEPHONE LINES AND STORM PIPING SHALL BE PROVIDED. A SIX-INCH MINIMUM CLEARANCE SHALL BE MAINTAINED BETWEEN STORM PIPING AND SANITARY SEWER. A 6-INCH TO 18-INCH VERTICAL CLEARANCE BETWEEN SANITARY SEWER PIPING AND STORM PIPING SHALL REQUIRE CONCRETE ENCASEMENT OF THE PROP. SANITARY PIPING.

15. THE CONTRACTOR SHALL RESTORE ANY UTILITY STRUCTURE, PIPE, CONDUIT, PAVEMENT, CURBING, SIDEWALKS, DRAINAGE STRUCTURE, SWALE OR LANDSCAPED AREAS DISTURBED DURING CONSTRUCTION, TO THEIR ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE PROJECT DEVELOPER AND CITY OF BRISTOL.

16. INFORMATION ON EXISTING UTILITIES AND STORM DRAINAGE HAS BEEN COMPILED FROM AVAILABLE INFORMATION INCLUDING UTILITY PROVIDER AND MUNICIPAL RECORD MAPS AND/OR FIELD SURVEY, AND IS NOT GUARANTEED CORRECT OR COMPLETE. UTILITIES AND STORM DRAINAGE ARE SHOWN TO ALERT THE CONTRACTOR TO THEIR PRESENCE. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES AND STORM DRAINAGE INCLUDING SERVICES. CONTACT "DIG SAFE" AT 811 72 HOURS PRIOR TO CONSTRUCTION AND VERIFY ALL UNDERGROUND AND OVERHEAD UTILITY AND STORM DRAINAGE LOCATIONS. THE CONTRACTOR SHALL EMPLOY THE USE OF A UTILITY LOCATING COMPANY TO PROVIDE SUBSURFACE UTILITY ENGINEERING CONSISTING OF DESIGNATING UTILITIES AND STORM PIPING ON PRIVATE PROPERTY WITHIN THE CONTRACT LIMIT AND CONSISTING OF DESIGNATING AND LOCATING WHERE PROP. UTILITIES AND STORM PIPING CROSS EXISTING UTILITIES AND STORM PIPING WITHIN THE CONTRACT LIMITS.

17. THE CONTRACTOR SHALL ARRANGE AND COORDINATE WITH UTILITY PROVIDERS FOR WORK TO BE PERFORMED BY UTILITY PROVIDERS. THE CONTRACTOR SHALL PAY ALL UTILITY FEES UNLESS OTHERWISE STATED IN THE PROJECT SPECIFICATION MANUAL AND GENERAL CONDITIONS, AND REPAIR PAVEMENTS AS NECESSARY.

18. ELECTRIC DRAWINGS AND REQUIREMENTS ARE NOT INCLUDED AS PART OF THIS DRAWING SET AND SHOULD BE OBTAINED FROM THE PROJECT DEVELOPER.

19. ALTERNATIVE METHODS AND PRODUCTS OTHER THAN THOSE SPECIFIED MAY BE USED IF REVIEWED AND APPROVED BY THE PROJECT DEVELOPER, ENGINEER, AND APPROPRIATE REGULATORY AGENCIES PRIOR TO INSTALLATION.

20. THE CONTRACTOR SHALL MAINTAIN ALL FLOWS AND UTILITY CONNECTIONS TO EXISTING BUILDINGS WITHOUT INTERRUPTION UNLESS/UNTIL AUTHORIZED TO DISCONNECT BY THE PROJECT DEVELOPER, CITY OF BRISTOL, UTILITY PROVIDERS AND GOVERNING AUTHORITIES.

GENERAL LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		
BUILDING SETBACK		
SOLAR SETBACK		
EASEMENT		
TREE LINE		
WETLAND		
WETLAND BUFFER		
VERNAL POOL		
VERNAL POOL BUFFER		
WATERCOURSE		
WATERCOURSE BUFFER		
MAJOR CONTOUR		
MINOR CONTOUR		
UNDERGROUND ELECTRIC		E E
OVERHEAD ELECTRIC		OH OH
GAS LINE		G G
WATER LINE		W W
BASIN		
SWALE		
FENCE		X X X
LIMIT OF DISTURBANCE		LOD
LIMIT OF CLEARING AND GRUBBING		LCG
FILTER SOCK		FS FS
SILT FENCE		SF SF
BAFFLE		

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET
4TH FLOOR
HARTFORD, CT, 06103

ALL-POINTS TECHNOLOGY CORPORATION

567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET

NO	DATE	REVISION
0	05/20/20	FOR REVIEW: BJP
1		
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD

PROF: BRADLEY J. PARSONS P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: MARK E., ANN L. & PAUL C. MINOR
ADDRESS: 399 HILL STREET BRISTOL, CT

BRISTOL SOLAR ONE, LLC

SITE ADDRESS: 399 HILL STREET BRISTOL, CT

APT FILING NUMBER: CT590220

DRAWN BY: JT

DATE: 05/20/20 **CHECKED BY:** BJP

SHEET TITLE:

GENERAL NOTES

SHEET NUMBER:

GN-1

STATE OF CONNECTICUT · BRADLEY J. PARSONS · No. 28025 · LICENSED PROFESSIONAL ENGINEER

ENVIRONMENTAL NOTES
RESOURCE PROTECTION MEASURES

WETLAND, EASTERN BOX TURTLE AND BOBOLINK PROTECTION PROGRAM

AS A RESULT OF THE PROJECT'S LOCATION IN THE VICINITY OF SENSITIVE WETLANDS AND WATERCOURSES AND RARE SPECIES HABITAT, THE FOLLOWING BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED BY THE CONTRACTOR TO AVOID UNINTENTIONAL IMPACTS TO THESE RESOURCES.

IT IS OF THE UTMOST IMPORTANCE THAT THE CONTRACTOR COMPLIES WITH THE REQUIREMENT FOR IMPLEMENTATION OF THESE PROTECTIVE MEASURES AND THE EDUCATION OF ITS EMPLOYEES AND SUBCONTRACTORS PERFORMING WORK ON THE PROJECT SITE. THESE WETLAND AND SPECIES PROTECTION MEASURES SHALL BE IMPLEMENTED AND MAINTAINED THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITIES AND, TO FURTHER PROTECT WETLANDS AND WATERCOURSES, UNTIL PERMANENT STABILIZATION OF SITE SOILS HAS OCCURRED.

EASTERN BOX TURTLE (*TERRAPENNE CAROLINA CAROLINA*) AND BOBOLINK (*DOLICHONYX ORYZIVORUS*), STATE-LISTED SPECIAL CONCERN SPECIES AFFORDED PROTECTION UNDER THE CONNECTICUT ENDANGERED SPECIES ACT, ARE KNOWN TO OCCUR WITHIN THE VICINITY OF THE PROJECT. THE TURTLE AND BOBOLINK PROTECTION MEASURES INCLUDED HEREIN SATISFY REQUIREMENTS FROM THE CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION ("DEEP") WILDLIFE DIVISION IN ACCORDANCE WITH THEIR NATURAL DIVERSITY DATA BASE ("NDDB") DETERMINATION LETTER (NO. 202004621) DATED FEBRUARY 27, 2020; THIS DETERMINATION IS VALID UNTIL FEBRUARY 27, 2022 PROVIDED THE SCOPE OF THE PROJECT HAS NOT CHANGED AND WORK HAS BEGUN ON THE PROJECT PRIOR TO THE EXPIRATION DATE.

IT IS RECOMMENDED THAT WORK, PARTICULARLY TREE REMOVAL/LAND CLEARING ACTIVITIES, SHOULD OCCUR WHEN THESE TURTLES ARE ACTIVE (APRIL 1 THROUGH NOVEMBER 1). CONDUCTING LAND CLEARING WHILE TURTLES ARE ACTIVE WILL ALLOW THE ANIMAL TO MOVE OUT OF HARM'S WAY AND MINIMIZE MORTALITY TO HIBERNATING INDIVIDUALS; HIBERNATION HABITAT TYPICALLY INCLUDES WOODLANDS, WOODLAND EDGES AND FORESTED WETLANDS.

TO AVOID IMPACT TO BOBOLINK, IT IS RECOMMENDED THAT WORK BE PERFORMED OUTSIDE OF THIS BIRD'S BREEDING SEASON (MAY 20 THROUGH AUGUST 20).

ALL-POINTS TECHNOLOGY CORPORATION, P.C. ("APT") WILL SERVE AS THE ENVIRONMENTAL MONITOR FOR THIS PROJECT TO ENSURE THAT THESE PROTECTION MEASURES ARE IMPLEMENTED PROPERLY. APT WILL PROVIDE AN EDUCATION SESSION FOR THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION ACTIVITIES ON EASTERN BOX TURTLE, BOBOLINK AND NEARBY SENSITIVE WETLAND RESOURCES THAT MAY BE ENCOUNTERED DUE TO THE PROJECT'S LOCATION WITHIN AND ADJACENT TO POTENTIALLY SENSITIVE HABITAT. THE CONTRACTOR SHALL CONTACT DEAN GUSTAFSON, SENIOR BIOLOGIST AT APT, AT LEAST 5 BUSINESS DAYS PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES. MR. GUSTAFSON CAN BE REACHED BY PHONE AT (860) 552-2033 OR VIA EMAIL AT DGUSTAFSON@ALLPOINTSTECH.COM.

THIS PROTECTION PROGRAM CONSISTS OF SEVERAL COMPONENTS: EDUCATION OF ALL CONTRACTORS AND SUB-CONTRACTORS PRIOR TO INITIATION OF WORK ON THE SITE; PROTECTIVE MEASURES; PERIODIC INSPECTION OF THE CONSTRUCTION PROJECT; AND, REPORTING.

1. ISOLATION MEASURES & SEDIMENTATION AND EROSION CONTROLS

a. PLASTIC NETTING USED IN A VARIETY OF EROSION CONTROL PRODUCTS (I.E., EROSION CONTROL BLANKETS, FIBER ROLLS [WATTLES], REINFORCED SILT FENCE) HAS BEEN FOUND TO ENTANGLE WILDLIFE, INCLUDING REPTILES, AMPHIBIANS, BIRDS AND SMALL MAMMALS, BUT PARTICULARLY SNAKES. NO PERMANENT EROSION CONTROL PRODUCTS OR REINFORCED SILT FENCE WILL BE USED ON THE PROJECT. TEMPORARY EROSION CONTROL PRODUCTS WILL USE EITHER EROSION CONTROL BLANKETS AND FIBER ROLLS COMPOSED OF PROCESSED FIBERS MECHANICALLY BOUND TOGETHER TO FORM A CONTINUOUS MATRIX (NETLESS) OR NETTING COMPOSED OF PLANAR WOVEN NATURAL BIODEGRADABLE FIBER TO AVOID/MINIMIZE WILDLIFE ENTANGLEMENT.

b. INSTALLATION OF SEDIMENTATION AND EROSION CONTROLS, REQUIRED FOR EROSION CONTROL COMPLIANCE AND CREATION OF A BARRIER TO POSSIBLE MIGRATING/DISPERSING TURTLES, SHALL BE PERFORMED BY THE CONTRACTOR FOLLOWING CLEARING ACTIVITIES AND PRIOR TO ANY EARTHWORK. THE ENVIRONMENTAL MONITOR WILL INSPECT THE WORK ZONE AREA PRIOR TO AND FOLLOWING EROSION CONTROL BARRIER INSTALLATION TO ENSURE THE AREA IS FREE OF EASTERN BOX TURTLE AND DOCUMENT BARRIERS HAVE BEEN SATISFACTORILY INSTALLED. THE INTENT OF THE BARRIER IS TO SEGREGATE THE MAJORITY OF THE WORK ZONE AND ISOLATE IT FROM FORAGING/MIGRATING/DISPERSING TURTLES, SNAKES AND OTHER HERPETOFAUNA. OFTENTIMES COMPLETE ISOLATION OF A WORK ZONE IS NOT FEASIBLE DUE TO ACCESSIBILITY NEEDS AND LOCATIONS OF STAGING/MATERIAL STORAGE AREAS, ETC. ALTHOUGH THE BARRIERS MAY NOT COMPLETELY ISOLATE THE WORK ZONE, THEY WILL BE POSITIONED TO DEFLECT MIGRATING/DISPERSAL ROUTES AWAY FROM THE WORK ZONE TO MINIMIZE POTENTIAL ENCOUNTERS WITH TURTLES, SNAKES AND OTHER HERPETOFAUNA.

c. THE CONTRACTOR IS RESPONSIBLE FOR DAILY INSPECTIONS OF THE SEDIMENTATION AND EROSION CONTROLS FOR TEARS OR BREECHES AND ACCUMULATION LEVELS OF SEDIMENT, PARTICULARLY FOLLOWING STORM EVENTS THAT GENERATE A DISCHARGE. APT WILL PROVIDE PERIODIC INSPECTIONS OF THE SEDIMENTATION AND EROSION CONTROLS THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITIES ONLY AS IT PERTAINS TO THEIR FUNCTION AS ISOLATION MEASURES FOR THE PROTECTION OF RARE SPECIES. THIRD PARTY MONITORING OF SEDIMENTATION AND EROSION CONTROLS WILL BE PERFORMED BY OTHER PARTIES, AS NECESSARY, UNDER APPLICABLE LOCAL, STATE AND/OR FEDERAL REGULATIONS.

d. THE EXTENT OF THE SEDIMENTATION AND EROSION CONTROLS WILL BE AS SHOWN ON THE SITE PLANS. THE CONTRACTOR SHALL HAVE ADDITIONAL SEDIMENTATION AND EROSION CONTROLS STOCKPILED ON SITE SHOULD FIELD OR CONSTRUCTION CONDITIONS WARRANT EXTENDING THE CONTROLS AS DIRECTED BY APT OR OTHER REGULATORY AGENCIES.

e. NO EQUIPMENT, VEHICLES OR CONSTRUCTION MATERIALS SHALL BE STORED OUTSIDE OF THE SEDIMENTATION AND EROSION CONTROLS WITHIN 100 FEET OF WETLANDS OR WATERCOURSES.

f. ALL SEDIMENTATION AND EROSION CONTROLS SHALL BE REMOVED WITHIN 30 DAYS OF COMPLETION OF WORK AND PERMANENT STABILIZATION OF SITE SOILS SO THAT REPTILE AND AMPHIBIAN MOVEMENT BETWEEN UPLANDS AND WETLANDS IS NOT RESTRICTED.

ENVIRONMENTAL NOTES
RESOURCE PROTECTION MEASURES (CONT.)

2. CONTRACTOR EDUCATION

a. PRIOR TO WORK ON SITE, THE CONTRACTOR SHALL ATTEND AN EDUCATIONAL SESSION AT THE PRE-CONSTRUCTION MEETING WITH APT. THIS ORIENTATION AND EDUCATIONAL SESSION WILL CONSIST OF AN INTRODUCTORY MEETING WITH APT PROVIDING PHOTOS OF EASTERN BOX TURTLE EMPHASIZING THE NON-AGGRESSIVE NATURE OF THESE SPECIES AND PHOTOS OF BOBOLINK, THE IMPORTANCE OF PROTECTING THESE ANIMALS IF THEY ARE ENCOUNTERED AND THE NEED TO FOLLOW PROTECTIVE MEASURES AS DESCRIBED IN SECTION 4 BELOW. WORKERS WILL ALSO BE PROVIDED INFORMATION REGARDING THE IDENTIFICATION OF OTHER TURTLES, SNAKES AND COMMON HERPETOFAUNA SPECIES THAT COULD BE ENCOUNTERED. THE IMPORTANCE OF PROTECTING NEARBY WETLAND RESOURCES WILL BE STRESSED AS PART OF THIS EDUCATIONAL SESSION.

b. THE EDUCATION SESSION WILL ALSO FOCUS ON MEANS TO DISCRIMINATE BETWEEN THE SPECIES OF CONCERN AND OTHER NATIVE SPECIES TO AVOID UNNECESSARY "FALSE ALARMS". ENCOUNTERS WITH ANY SPECIES OF TURTLES OR SNAKES WILL BE DOCUMENTED.

c. THE CONTRACTOR WILL BE PROVIDED WITH CELL PHONE AND EMAIL CONTACTS FOR APT PERSONNEL TO IMMEDIATELY REPORT ANY ENCOUNTERS WITH EASTERN BOX TURTLE, BOBOLINK OR OTHER SPECIES. EDUCATIONAL POSTER MATERIALS WILL BE PROVIDED BY APT AND DISPLAYED ON THE JOB SITE TO MAINTAIN WORKER AWARENESS AS THE PROJECT PROGRESSES.

d. IF AN EASTERN BOX TURTLE OR BOBOLINK IS ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR SHALL IMMEDIATELY CEASE ALL WORK, AVOID DISTURBANCE OF THE ANIMAL AND CONTACT APT.

3. PETROLEUM MATERIALS STORAGE AND SPILL PREVENTION

a. CERTAIN PRECAUTIONS ARE NECESSARY TO STORE PETROLEUM MATERIALS, REFUEL AND CONTAIN AND PROPERLY CLEAN UP ANY INADVERTENT FUEL OR PETROLEUM (I.E., OIL, HYDRAULIC FLUID, ETC.) SPILL TO AVOID POSSIBLE IMPACT TO NEARBY HABITATS.

b. A SPILL CONTAINMENT KIT CONSISTING OF A SUFFICIENT SUPPLY OF ABSORBENT PADS AND ABSORBENT MATERIAL WILL BE MAINTAINED BY THE CONTRACTOR AT THE CONSTRUCTION SITE THROUGHOUT THE DURATION OF THE PROJECT. IN ADDITION, A WASTE DRUM WILL BE KEPT ON SITE TO CONTAIN ANY USED ABSORBENT PADS/MATERIAL FOR PROPER AND TIMELY DISPOSAL OFF SITE IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL LAWS.

c. THE FOLLOWING PETROLEUM AND HAZARDOUS MATERIALS STORAGE AND REFUELING RESTRICTIONS AND SPILL RESPONSE PROCEDURES WILL BE ADHERED TO BY THE CONTRACTOR.

c.1. PETROLEUM AND HAZARDOUS MATERIALS STORAGE AND REFUELING

c.1.1. REFUELING OF VEHICLES OR MACHINERY SHALL OCCUR A MINIMUM OF 100 FEET FROM WETLANDS OR WATERCOURSES AND SHALL TAKE PLACE ON AN IMPERVIOUS PAD WITH SECONDARY CONTAINMENT DESIGNED TO CONTAIN FUELS.

c.1.2. ANY FUEL OR HAZARDOUS MATERIALS THAT MUST BE KEPT ON SITE SHALL BE STORED ON AN IMPERVIOUS SURFACE UTILIZING SECONDARY CONTAINMENT A MINIMUM OF 100 FEET FROM WETLANDS OR WATERCOURSES.

c.2. INITIAL SPILL RESPONSE PROCEDURES

c.2.1. STOP OPERATIONS AND SHUT OFF EQUIPMENT.

c.2.2. REMOVE ANY SOURCES OF SPARK OR FLAME.

c.2.3. CONTAIN THE SOURCE OF THE SPILL.

c.2.4. DETERMINE THE APPROXIMATE VOLUME OF THE SPILL.

c.2.5. IDENTIFY THE LOCATION OF NATURAL FLOW PATHS TO PREVENT THE RELEASE OF THE SPILL TO SENSITIVE NEARBY WATERWAYS OR WETLANDS.

c.2.6. ENSURE THAT FELLOW WORKERS ARE NOTIFIED OF THE SPILL.

c.3. SPILL CLEAN UP & CONTAINMENT

c.3.1. OBTAIN SPILL RESPONSE MATERIALS FROM THE ON-SITE SPILL RESPONSE KIT. PLACE ABSORBENT MATERIALS DIRECTLY ON THE RELEASE AREA.

c.3.2. LIMIT THE SPREAD OF THE SPILL BY PLACING ABSORBENT MATERIALS AROUND THE PERIMETER OF THE SPILL.

c.3.3. ISOLATE AND ELIMINATE THE SPILL SOURCE.

c.3.4. CONTACT THE APPROPRIATE LOCAL, STATE AND/OR FEDERAL AGENCIES, AS NECESSARY.

c.3.5. CONTACT A DISPOSAL COMPANY TO PROPERLY DISPOSE OF CONTAMINATED MATERIALS IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.

c.4. REPORTING

c.4.1. COMPLETE AN INCIDENT REPORT.

c.4.2. SUBMIT A COMPLETED INCIDENT REPORT TO THE APPROPRIATE MUNICIPAL OFFICIAL, CONNECTICUT SITING COUNCIL AND OTHER APPLICABLE LOCAL, STATE AND FEDERAL OFFICIALS.

4. HERBICIDE AND PESTICIDE RESTRICTIONS

a. THE USE OF HERBICIDES AND PESTICIDES SHALL BE AVOIDED WHEN POSSIBLE. IN THE EVENT HERBICIDES AND/OR PESTICIDES ARE REQUIRED AT THE FACILITY, THEIR USE WILL BE USED IN ACCORDANCE WITH INTEGRATED PEST MANAGEMENT ("IPM") PRINCIPLES WITH PARTICULAR ATTENTION TO MINIMIZE APPLICATIONS WITHIN 100 FEET OF WETLAND OR WATERCOURSE RESOURCES. NO APPLICATIONS OF HERBICIDES OR PESTICIDES ARE ALLOWED WITHIN ACTUAL WETLAND OR WATERCOURSE RESOURCES.

ENVIRONMENTAL NOTES
RESOURCE PROTECTION MEASURES (CONT.)

5. EASTERN BOX TURTLE PROTECTIVE MEASURES

a. LIMIT TREE REMOVAL/LAND CLEARING ACTIVITIES TO THE TURTLE'S ACTIVE SEASON (APRIL 1ST TO NOVEMBER 1ST) TO ALLOW THE ANIMAL TO MOVE OUT OF HARM'S WAY AND MINIMIZE MORTALITY TO HIBERNATING INDIVIDUALS.

b. INSTALL ISOLATION BARRIERS (E.G., SILT FENCE, ANIMAL EXCLUSIONARY FENCING, ETC.) PRIOR TO THE START OF TREE REMOVAL OPERATIONS.

c. APT WILL SWEEP THE TREE REMOVAL AREA FOR TURTLES PRIOR TO TREES BEING REMOVED.

d. DURING THE TURTLE ACTIVE PERIOD AND PRIOR TO THE START OF CONSTRUCTION EACH DAY, THE CONTRACTOR SHALL SEARCH THE ENTIRE WORK AREA FOR TURTLES.

e. IF A TURTLE IS FOUND DURING THE ACTIVE PERIOD, IT SHALL BE IMMEDIATELY MOVED, UNHARMED, BY CAREFULLY GRASPED IN BOTH HANDS, ONE ON EACH SIDE OF THE SHELL, BETWEEN THE TURTLE'S FORELIMBS AND THE HIND LIMBS, AND PLACED JUST OUTSIDE OF THE ISOLATION BARRIER IN THE SAME APPROXIMATE DIRECTION IT WAS WALKING.

f. DURING THE ACTIVE TURTLE PERIOD, SPECIAL CARE SHALL BE TAKEN BY THE CONTRACTOR DURING EARLY MORNING AND EVENING HOURS SO THAT POSSIBLE BASKING OR FORAGING TURTLES ARE NOT HARMED BY CONSTRUCTION ACTIVITIES.

g. THE CONTRACTOR SHALL BE PARTICULARLY DILIGENT DURING THE MONTH OF JUNE WHEN TURTLES ARE ACTIVELY SELECTING NESTING SITES WHICH RESULTS IN AN INCREASE IN TURTLE MOVEMENT ACTIVITY.

6. BOBOLINK PROTECTIVE MEASURES

a. RESTRICT CONSTRUCTION ACTIVITIES OUTSIDE OF THE BOBOLINK'S BREEDING SEASON (MAY 20 TO AUGUST 20). BRISTOL SOLAR ONE, LLC CURRENTLY ANTICIPATES THAT CONSTRUCTION WILL START AFTER AUGUST 20, 2020 BUT DURING THE LATE SUMMER/FALL 2020 SEASON, WHICH WOULD AVOID ANY POTENTIAL BOBOLINK CONFLICTS.

b. IF CONSTRUCTION STARTS BEFORE, BUT IS ANTICIPATED TO EXTEND BEYOND, MAY 20TH (INTO THE BOBOLINK BREEDING SEASON), APT WILL PERFORM A BREEDING BIRD SURVEY STARTING IN LATE MAY WITH PERIODIC SURVEYS THROUGHOUT THE DURATION OF CONSTRUCTION TO DOCUMENT NO BOBOLINK NESTS ARE BEING ESTABLISHED. IF AN ACTIVE NEST IS IDENTIFIED, A 400-FOOT BUFFER RESTRICTING ANY DISTURBANCE WOULD BE ESTABLISHED AROUND THE NEST UNTIL THE JUVENILE BIRDS HAVE FLEDGED.

c. IF CONSTRUCTION IS PROPOSED TO START AFTER MAY 20TH BUT BEFORE AUGUST 20TH, A BOBOLINK BREEDING SURVEY WOULD BE PERFORMED BY APT PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES. IF AN ACTIVE NEST IS IDENTIFIED, A 400-FOOT BUFFER RESTRICTING ANY DISTURBANCE WOULD BE ESTABLISHED AROUND THE NEST UNTIL THE JUVENILE BIRDS HAVE FLEDGED. IF NO NEST IS FOUND, THE RULES NOTED IN B. ABOVE WOULD APPLY.

d. FOR MAINTENANCE OF THE FACILITY, MOWING ACTIVITIES SHOULD BE RESTRICTED OUTSIDE OF THE ACTIVE BOBOLINK BREEDING SEASON (MAY 20 TO AUGUST 20).

7. REPORTING

a. DAILY COMPLIANCE MONITORING REPORTS (BRIEF NARRATIVE AND APPLICABLE PHOTOS) DOCUMENTING EACH APT INSPECTION WILL BE SUBMITTED BY APT TO BRISTOL SOLAR ONE, LLC FOR COMPLIANCE VERIFICATION. ANY OBSERVATIONS OF TURTLES, BOBOLINK, WETLAND IMPACTS, OR CORRECTIVE ACTIONS WILL BE INCLUDED IN THE REPORTS. THE REPORTS WILL DOCUMENT IMPLEMENTATION OF THIS WETLAND, EASTERN BOX TURTLE AND BOBOLINK PROTECTION PROGRAM, MONITORING OBSERVATIONS AND ANY SPECIES OBSERVATIONS. BRISTOL SOLAR ONE, LLC WILL PROVIDE COPIES OF THE COMPLIANCE MONITORING REPORTS TO THE CONNECTICUT SITING COUNCIL FOR COMPLIANCE VERIFICATION.

b. ANY OBSERVATIONS OF EASTERN BOX TURTLE, BOBOLINK OR ANY OTHER RARE SPECIES WILL BE REPORTED TO CTDEEP BY APT ON THE APPROPRIATE SPECIAL ANIMAL REPORTING FORM, WITH PHOTO-DOCUMENTATION (IF POSSIBLE) AND SPECIFIC INFORMATION ON THE LOCATION AND DISPOSITION OF THE ANIMAL.

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET
4TH FLOOR
HARTFORD, CT, 06103

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET

NO	DATE	REVISION
0	05/20/20	FOR REVIEW: BJP
1		
2		
3		
4		
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6		

DESIGN PROFESSIONAL OF RECORD

PROF: BRADLEY J. PARSONS P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: MARK E., ANN L. & PAUL C. MINOR
ADDRESS: 399 HILL STREET BRISTOL, CT

BRISTOL SOLAR ONE, LLC

SITE ADDRESS: 399 HILL STREET BRISTOL, CT

APT FILING NUMBER: CT590220

DRAWN BY: JT

DATE: 05/20/20 CHECKED BY: BJP

SHEET TITLE:

GENERAL NOTES

SHEET NUMBER:

GN-2

STATE OF CONNECTICUT BRADLEY J. PARSONS No. 28025 LICENSED PROFESSIONAL ENGINEER

1 OP-1 **OVERALL LOCUS MAP**
SCALE : 1" = 100'-0"

100 0 50 100 200
(IN FEET) 1 inch = 100 ft.

BRISTOL SOLAR ONE, LLC

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DRAWN BY: JT
DATE: 05/20/20 **CHECKED BY:** BJP

SHEET TITLE:

OVERALL SITE PLAN

SHEET NUMBER:

OP-1

STATE OF CONNECTICUT · BRADLEY J. PARSONS · No. 28025 · LICENSED PROFESSIONAL ENGINEER

EROSION CONTROL NOTES

EROSION AND SEDIMENT CONTROL PLAN NOTES

1. THE CONTRACTOR SHALL CONSTRUCT ALL SEDIMENT AND EROSION CONTROLS IN ACCORDANCE WITH THE 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL, LATEST EDITION, IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, AND AS DIRECTED BY THE CITY OF BRISTOL, PERMITTEE, AND/OR SWPCP MONITOR. ALL PERIMETER SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE START OF CLEARING AND GRUBBING AND DEMOLITION OPERATIONS.

2. THESE DRAWINGS ARE ONLY INTENDED TO DESCRIBE THE SEDIMENT AND EROSION CONTROL MEASURES FOR THIS SITE. SEE CONSTRUCTION SEQUENCE FOR ADDITIONAL INFORMATION. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THE EROSION & SEDIMENT CONTROL PLAN ARE SHOWN AS REQUIRED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL EROSION CONTROL MEASURES ARE CONFIGURED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION OF SOILS AND PREVENT THE TRANSPORT OF SEDIMENTS AND OTHER POLLUTANTS TO STORM DRAINAGE SYSTEMS AND/OR WATERCOURSES. ACTUAL SITE CONDITIONS OR SEASONAL AND CLIMATIC CONDITIONS MAY WARRANT ADDITIONAL CONTROLS OR CONFIGURATIONS, AS REQUIRED, AND AS DIRECTED BY THE PERMITTEE AND/OR SWPCP MONITOR. REFER TO SITE PLAN FOR GENERAL INFORMATION AND OTHER CONTRACT PLANS FOR APPROPRIATE INFORMATION.

3. A BOND OR LETTER OF CREDIT MAY BE REQUIRED TO BE POSTED WITH THE GOVERNING AUTHORITY FOR THE EROSION CONTROL INSTALLATION AND MAINTENANCE.

4. THE CONTRACTOR SHALL APPLY THE MINIMUM EROSION & SEDIMENT CONTROL MEASURES SHOWN ON THE PLAN IN CONJUNCTION WITH CONSTRUCTION SEQUENCING, SUCH THAT ALL ACTIVE WORK ZONES ARE PROTECTED. ADDITIONAL AND/OR ALTERNATIVE SEDIMENT AND EROSION CONTROL MEASURES MAY BE INSTALLED DURING THE CONSTRUCTION PERIOD IF FOUND NECESSARY BY THE CONTRACTOR, OWNER, SITE ENGINEER, MUNICIPAL OFFICIALS, OR ANY GOVERNING AGENCY. THE CONTRACTOR SHALL CONTACT THE OWNER AND APPROPRIATE GOVERNING AGENCIES FOR APPROVAL IF ALTERNATIVE CONTROLS OTHER THAN THOSE SHOWN ON THE PLANS ARE PROPOSED BY THE CONTRACTOR.

5. THE CONTRACTOR SHALL TAKE EXTREME CARE DURING CONSTRUCTION SO AS NOT TO DISTURB UNPROTECTED WETLAND AREAS OR INSTALLED SEDIMENTATION AND EROSION CONTROL MEASURES. THE CONTRACTOR SHALL INSPECT ALL SEDIMENT AND EROSION CONTROLS WEEKLY AND WITHIN 24 HOURS OF A STORM WITH A RAINFALL AMOUNT OF 0.25 INCHES OR GREATER TO VERIFY THAT THE CONTROLS ARE OPERATING PROPERLY AND MAKE REPAIRS AS NECESSARY IN A TIMELY MANOR.

6. THE CONTRACTOR SHALL KEEP A SUPPLY OF EROSION CONTROL MATERIAL (SILT FENCE, COMPOST FILTER SOCK, EROSION CONTROL BLANKET, ETC.) ON-SITE FOR PERIODIC MAINTENANCE AND EMERGENCY REPAIRS.

7. ALL FILL MATERIAL PLACED ADJACENT TO ANY WETLAND AREA SHALL BE GOOD QUALITY, WITH LESS THAN 5% FINES PASSING THROUGH A #200 SIEVE (BANK RUN), SHALL BE PLACED IN MAXIMUM ONE FOOT LIFTS, AND SHALL BE COMPACTED TO 95% MAX. DRY DENSITY MODIFIED PROCTOR OR AS SPECIFIED IN THE CONTRACT SPECIFICATIONS.

8. PROTECT EXISTING TREES THAT ARE TO BE SAVED BY FENCING, ORANGE SAFETY FENCE, CONSTRUCTION TAPE, OR EQUIVALENT FENCING/TAPE. ANY LIMB TRIMMING SHOULD BE DONE AFTER CONSULTATION WITH AN ARBORIST AND BEFORE CONSTRUCTION BEGINS IN THAT AREA; FENCING SHALL BE MAINTAINED AND REPAIRED DURING CONSTRUCTION.

9. CONSTRUCTION ENTRANCES (ANTI-TRACKING PADS) SHALL BE INSTALLED PRIOR TO ANY SITE EXCAVATION OR CONSTRUCTION ACTIVITY AND SHALL BE MAINTAINED THROUGHOUT THE DURATION OF ALL CONSTRUCTION IF REQUIRED. THE LOCATION OF THE TRACKING PADS MAY CHANGE AS VARIOUS PHASES OF CONSTRUCTION ARE COMPLETED. CONTRACTOR SHALL ENSURE THAT ALL VEHICLES EXITING THE SITE ARE PASSING OVER THE ANTI-TRACKING PADS PRIOR TO EXISTING.

10. ALL CONSTRUCTION SHALL BE CONTAINED WITHIN THE LIMIT OF DISTURBANCE, WHICH SHALL BE MARKED WITH SILT FENCE, SAFETY FENCE, HAY BALES, RIBBONS, OR OTHER MEANS PRIOR TO CLEARING. CONSTRUCTION ACTIVITY SHALL REMAIN ON THE UPHILL SIDE OF THE SEDIMENT BARRIER UNLESS WORK IS SPECIFICALLY CALLED FOR ON THE DOWNHILL SIDE OF THE BARRIER.

11. NO CUT OR FILL SLOPES SHALL EXCEED 2:1 EXCEPT WHERE STABILIZED BY ROCK FACED EMBANKMENTS OR EROSION CONTROL BLANKETS. ALL SLOPES SHALL BE SEEDED AND BANKS WILL BE STABILIZED IMMEDIATELY UPON COMPLETION OF FINAL GRADING UNTIL TURF IS ESTABLISHED.

12. DIRECT ALL DEWATERING PUMP DISCHARGE TO A SEDIMENT CONTROL DEVICE CONFORMING TO THE GUIDELINES WITHIN THE APPROVED LIMIT OF DISTURBANCE IF REQUIRED. DISCHARGE TO STORM DRAINS OR SURFACE WATERS FROM SEDIMENT CONTROLS SHALL BE CLEAR AND APPROVED BY THE PERMITTEE OR MUNICIPALITY.

13. THE CONTRACTOR SHALL MAINTAIN A CLEAN CONSTRUCTION SITE AND SHALL NOT ALLOW THE ACCUMULATION OF RUBBISH OR CONSTRUCTION DEBRIS ON THE SITE. PROPER SANITARY DEVICES SHALL BE MAINTAINED ON-SITE AT ALL TIMES AND SECURED APPROPRIATELY. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID THE SPILLAGE OF FUEL OR OTHER POLLUTANTS ON THE CONSTRUCTION SITE AND SHALL ADHERE TO ALL APPLICABLE POLICIES AND REGULATIONS RELATED TO SPILL PREVENTION AND RESPONSE/CONTAINMENT.

14. MINIMIZE LAND DISTURBANCES. SEED AND MULCH DISTURBED AREAS WITH TEMPORARY MIX AS SOON AS PRACTICABLE (2 WEEK MAXIMUM UNSTABILIZED PERIOD) USING PERENNIAL RYEGRASS AT 40 LBS PER ACRE. MULCH ALL CUT AND FILL SLOPES AND SWALES WITH LOOSE HAY AT A RATE OF 2 TONS PER ACRE. IF NECESSARY, REPLACE LOOSE HAY ON SLOPES WITH EROSION CONTROL BLANKETS OR JUTE CLOTH. MODERATELY GRADED AREAS, ISLANDS, AND TEMPORARY CONSTRUCTION STAGING AREAS MAY BE HYDROSEEDED WITH TACKIFIER.

15. SWEEP AFFECTED PORTIONS OF OFF SITE ROADS ONE OR MORE TIMES A DAY (OR LESS FREQUENTLY IF TRACKING IS NOT A PROBLEM) DURING CONSTRUCTION. FOR DUST CONTROL, PERIODICALLY MOISTEN EXPOSED SOIL SURFACES WITH WATER ON UNPAVED TRAVELWAYS TO KEEP THE TRAVELWAYS DAMP. CALCIUM CHLORIDE MAY ALSO BE APPLIED TO ACCESS ROADS. DUMP TRUCK LOADS EXITING THE SITE SHALL BE COVERED.

16. VEGETATIVE ESTABLISHMENT SHALL OCCUR ON ALL DISTURBED SOIL, UNLESS THE AREA IS UNDER ACTIVE CONSTRUCTION, IT IS COVERED IN STONE OR SCHEDULED FOR PAVING WITHIN 30 DAYS. TEMPORARY SEEDING OR NON-LIVING SOIL PROTECTION OF ALL EXPOSED SOILS AND SLOPES SHALL BE INITIATED WITHIN THE FIRST 7 DAYS OF SUSPENDING WORK IN AREAS TO BE LEFT LONGER THAN 30 DAYS.

17. MAINTAIN ALL PERMANENT AND TEMPORARY SEDIMENT CONTROL DEVICES IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD. UPON COMPLETION OF WORK SWEEP CONCRETE PADS, CLEAN THE STORMWATER MANAGEMENT SYSTEMS AND REMOVE ALL TEMPORARY SEDIMENT CONTROLS ONCE THE SITE IS FULLY STABILIZED AND APPROVAL HAS BEEN RECEIVED FROM PERMITTEE OR THE MUNICIPALITY.

18. SEEDING MIXTURES SHALL BE NEW ENGLAND SEMI-SHADE GRASS AND FORBS MIX (SEE SITE DETAILS SHEET DN-1), OR APPROVED EQUAL BY OWNER. as noted in my other markups I think more clarity is needed on seed mixes, their zones, and application rates

CONSTRUCTION OPERATION AND MAINTENANCE PLAN - BY CONTRACTOR

E&S MEASURE	INSPECTION SCHEDULE	MAINTENANCE REQUIRED
CONSTRUCTION ENTRANCE	DAILY	PLACE ADDITIONAL STONE, EXTEND THE LENGTH OR REMOVE AND REPLACE THE STONE. CLEAN PAVED SURFACES OF TRACKED SEDIMENT.
COMPOST FILTER SOCK	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR/REPLACE WHEN FAILURE OR DETERIORATION IS OBSERVED.
SILT FENCE	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR/REPLACE WHEN FAILURE OR DETERIORATION IS OBSERVED. REMOVE SILT WHEN IT REACHES 1/2 THE HEIGHT OF THE FENCE.
TOPSOIL/BORROW STOCKPILES	DAILY	REPAIR/REPLACE SEDIMENT BARRIERS AS NECESSARY.
TEMPORARY SEDIMENT BASIN (W/ BAFFLES)	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.5"	REMOVE SEDIMENT ONCE IT HAS ACCUMULATED TO ONE HALF OF MINIMUM REQUIRED VOLUME OF THE WET STORAGE, DEWATERING AS NEEDED. RESTORE TRAP TO ORIGINAL DIMENSIONS. REPAIR/REPLACE BAFFLES WHEN FAILURE OR DETERIORATION IS OBSERVED.
TEMPORARY SEDIMENT TRAP (W/ BAFFLES)	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.5"	REMOVE SEDIMENT ONCE IT HAS ACCUMULATED TO ONE HALF OF MINIMUM REQUIRED VOLUME OF THE WET STORAGE, DEWATERING AS NEEDED. RESTORE TRAP TO ORIGINAL DIMENSIONS. REPAIR/REPLACE BAFFLES WHEN FAILURE OR DETERIORATION IS OBSERVED.
TEMPORARY SOIL PROTECTION	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR ERODED OR BARE AREAS IMMEDIATELY. RESEED AND MULCH.

SEDIMENT & EROSION CONTROL NARRATIVE

1. THE PROJECT INVOLVES THE CONSTRUCTION OF A GROUND MOUNTED SOLAR PANEL FACILITY WITH ASSOCIATED EQUIPMENT, INCLUDING THE CLEARING, GRUBBING AND GRADING OF APPROXIMATELY 18.90± ACRES OF EXISTING LOT.

THE PROPOSED PROJECT INVOLVES THE FOLLOWING CONSTRUCTION:

A. CLEARING, GRUBBING, AND GRADING OF EXISTING LOT.
B. CONSTRUCTION OF 11,492 GROUND MOUNTED SOLAR PANELS AND ASSOCIATED EQUIPMENT.
B. THE STABILIZATION OF DISTURBED AREAS WITH PERMANENT VEGETATIVE TREATMENTS.

2. FOR THIS PROJECT, THERE ARE APPROXIMATELY 18.90± ACRE OF THE SITE BEING DISTURBED WITH NEGLIGIBLE INCREASE IN THE IMPERVIOUS AREA OF THE SITE, AS ALL ACCESS THOUGH THE SITE WILL BE GRAVEL. IMPERVIOUS AREAS ARE LIMITED TO THE CONCRETE PADS FOR ELECTRICAL EQUIPMENT.

3. THE PROJECT SITE, AS MAPPED IN THE SOIL SURVEY OF STATE OF CONNECTICUT (NRCS, VERSION 18, DEC 6, 2018), CONTAINS TYPE 4 (HYDROLOGIC SOIL GROUP B), 45B, 84B, AND 84C (HYDROLOGIC SOIL GROUP C), AND 3 (HYDROLOGIC SOIL GROUP D) SOILS. A GEOTECHNICAL ENGINEERING REPORT HAS NOT BEEN COMPLETED.

4. IT IS ANTICIPATED THAT CONSTRUCTION WILL BE COMPLETED IN APPROXIMATELY 3-4 MONTHS.

5. REFER TO THE CONSTRUCTION SEQUENCING AND EROSION AND SEDIMENTATION NOTES FOR INFORMATION REGARDING SEQUENCING OF MAJOR OPERATIONS IN THE ON-SITE CONSTRUCTION PHASES.

6. STORMWATER MANAGEMENT DESIGN CRITERIA UTILIZES THE APPLICABLE SECTIONS OF THE 2004 CONNECTICUT STORMWATER QUALITY MANUAL AND THE CITY OF BRISTOL STANDARDS, TO THE EXTENT POSSIBLE AND PRACTICABLE FOR THIS PROJECT ON THIS SITE. EROSION AND SEDIMENTATION MEASURES ARE BASED UPON ENGINEERING PRACTICE, JUDGEMENT AND THE APPLICABLE SECTIONS OF THE CONNECTICUT EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, LATEST EDITION.

7. DETAILS FOR THE TYPICAL STORMWATER MANAGEMENT AND EROSION AND SEDIMENTATION MEASURES ARE SHOWN ON THE PLAN SHEETS OR PROVIDED AS SEPARATE SUPPORT DOCUMENTATION FOR REVIEW IN THIS PLAN.

8. CONSERVATION PRACTICES TO BE USED DURING CONSTRUCTION:
   A. STAGED CONSTRUCTION;
   B. MINIMIZE THE DISTURBED AREAS TO THE EXTENT PRACTICABLE DURING CONSTRUCTION;
   C. STABILIZE DISTURBED AREAS WITH TEMPORARY OR PERMANENT MEASURES AS SOON AS POSSIBLE, BUT NO LATER THAN 7-DAYS FOLLOWING DISTURBANCE;
   D. MINIMIZE IMPERVIOUS AREAS;
   E. UTILIZE APPROPRIATE CONSTRUCTION EROSION AND SEDIMENTATION MEASURES.

9. THE FOLLOWING SEPARATE DOCUMENTS ARE TO BE CONSIDERED A PART OF THE EROSION AND SEDIMENTATION PLAN:
   A. STORMWATER MANAGEMENT REPORT DATED MAY 2020.
   B. SWPCP DATED MAY 2020

SUGGESTED CONSTRUCTION SEQUENCE

THE FOLLOWING SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES IS PROJECTED BASED UPON ENGINEERING JUDGEMENT AND BEST MANAGEMENT PRACTICES. THE CONTRACTOR MAY ELECT TO ALTER THE SEQUENCING TO BEST MEET THE CONSTRUCTION SCHEDULE, THE EXISTING SITE ACTIVITIES AND WEATHER CONDITIONS. SHOULD THE CONTRACTOR ALTER THE CONSTRUCTION SEQUENCE OR ANY EROSION AND SEDIMENTATION CONTROL MEASURES THEY SHALL MODIFY THE STORMWATER POLLUTION CONTROL PLAN ("SWPCP") AS REQUIRED BY THE GENERAL PERMIT. MAJOR CHANGES IN SEQUENCING AND/OR METHODS MAY REQUIRE REGULATORY APPROVAL PRIOR TO IMPLEMENTATION.

1. THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING. PHYSICALLY FLAG THE LIMITS OF DISTURBANCE IN THE FIELD AS NECESSARY TO FACILITATE THE PRE-CONSTRUCTION MEETING.

2. CONDUCT A PRE-CONSTRUCTION MEETING TO DISCUSS THE PROPOSED WORK AND EROSION AND SEDIMENTATION CONTROL MEASURES. THE MEETING SHOULD BE ATTENDED BY THE OWNER, THE OWNER'S REPRESENTATIVE(S), THE GENERAL CONTRACTOR, DESIGNATED SUB-CONTRACTORS AND THE PERSON, OR PERSONS, RESPONSIBLE FOR THE IMPLEMENTATION, OPERATION, MONITORING AND MAINTENANCE OF THE EROSION AND SEDIMENTATION MEASURES. THE CONSTRUCTION PROCEDURES FOR THE ENTIRE PROJECT SHALL BE REVIEWED AT THIS MEETING.

3. NOTIFY CALL BEFORE YOU DIG AT 1-800-922-4455, AS REQUIRED, PRIOR TO THE START OF CONSTRUCTION.

PHASE 1

4. REMOVE EXISTING IMPEDIMENTS AS NECESSARY AND PROVIDE MINIMAL CLEARING AND GRUBBING TO INSTALL THE REQUIRED CONSTRUCTION ENTRANCE/S.

5. CLEAR ONLY AS NEEDED TO INSTALL THE PERIMETER EROSION AND SEDIMENTATION CONTROL MEASURES AND, IF APPLICABLE, TREE PROTECTION. ALL WETLAND AREAS SHALL BE PROTECTED BEFORE MAJOR CONSTRUCTION BEGINS.

6. INSTALL PERIMETER EROSION CONTROL.

7. INSTALL EROSION CONTROL BELOW EQUIPMENT AREA AND INSTALL CONCRETE EQUIPMENT PADS AND CONDUITS PROTECTED BY THESE CONTROLS.

8A. INSTALL TEMPORARY SEDIMENT BASIN 3 AND ASSOCIATED SWALES. UPON COMPLETION OF THE INSTALLATION AND STABILIZATION OF THE BASIN AND SWALES, PHASE 2 WORK UP GRADIENT CAN PROCEED.

8B. INSTALL TEMPORARY SEDIMENT BASIN 2 AND ASSOCIATED SWALES. UPON COMPLETION OF THE INSTALLATION AND STABILIZATION OF THE BASIN AND SWALES, PHASE 2 WORK UP GRADIENT CAN PROCEED.

8C. INSTALL TEMPORARY SEDIMENT BASIN 1A, 1B, AND ASSOCIATED SWALES. UPON COMPLETION OF THE INSTALLATION AND STABILIZATION OF THE BASIN AND SWALES, PHASE 2 WORK UP GRADIENT CAN PROCEED.

PHASE 2

9. UPON COMPLETION OF THE INSTALLATION OF EACH OF THE TEMPORARY SEDIMENT BASINS; THE AREA ABOVE THE BASIN CAN HAVE THE REMAINING ARRAY AREA CLEARING AND GRUBBING COMPLETED AS REQUIRED. REMOVE CUT WOOD AND STOCKPILE FOR FUTURE USE OR REMOVE OFF-SITE. REMOVE AND DISPOSE OF DEMOLITION DEBRIS OFF-SITE IN ACCORDANCE WITH APPLICABLE LAWS.

10. TEMPORARILY SEED DISTURBED AREAS NOT UNDER CONSTRUCTION FOR THIRTY (30) DAYS OR MORE.

11. INSTALL REMAINING ELECTRICAL CONDUIT.

12. INSTALL RACKING POSTS FOR GROUND MOUNTED SOLAR PANELS.

13. INSTALL GROUND MOUNTED SOLAR PANELS AND COMPLETE ELECTRICAL INSTALLATION.

14. AFTER SUBSTANTIAL COMPLETION OF THE INSTALLATION OF THE SOLAR PANELS, COMPLETE REMAINING SITE WORK, INCLUDING ANY REQUIRED LANDSCAPE SCREENING, AND STABILIZE ALL DISTURBED AREAS.

15. FINE GRADE, RAKE, SEED AND MULCH ALL REMAINING DISTURBED AREAS.

16. AFTER THE SITE IS STABILIZED AND WITH THE APPROVAL OF THE PERMITTEE AND CITY OF BRISTOL AGENT, REMOVE PERIMETER EROSION AND SEDIMENTATION CONTROLS.

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET
4TH FLOOR
HARTFORD, CT, 06103

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

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DESIGN PROFESSIONAL OF RECORD

PROF: BRADLEY J. PARSONS P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: MARK E., ANN L. & PAUL C. MINOR
ADDRESS: 399 HILL STREET BRISTOL, CT

BRISTOL SOLAR ONE, LLC

SITE ADDRESS: 399 HILL STREET BRISTOL, CT

APT FILING NUMBER: CT590220

DRAWN BY: JT

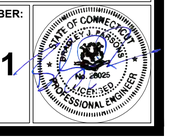
DATE: 05/20/20 CHECKED BY: BJP

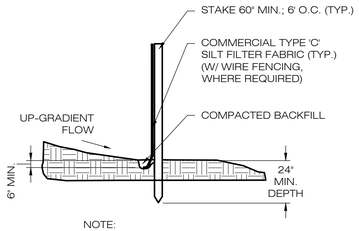
SHEET TITLE:

SEDIMENTATION & EROSION CONTROL NOTES

SHEET NUMBER:

EC-1

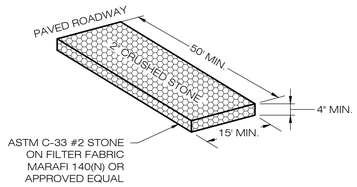




NOTE:
SILT FENCE SHALL BE LAPPED ONLY WHEN NECESSARY PER THE MANUFACTURER RECOMMENDATIONS.

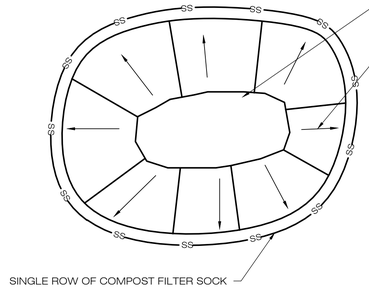
1 EC-2 SILT FENCE DETAIL

SCALE : N.T.S.



2 EC-2 CONSTRUCTION ENTRANCE DETAIL

SCALE : N.T.S.



NOTES:
1. ALL EXISTING EXCAVATED MATERIAL THAT IS NOT TO BE REUSED IN THE WORK IS TO BE IMMEDIATELY REMOVED FROM THE SITE AND PROPERLY DISPOSED OF.

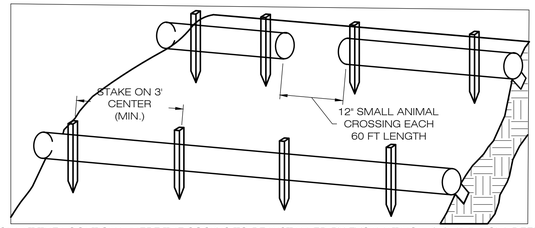
2. SOIL/AGGREGATE STOCKPILE SITES TO BE WHERE SHOWN ON THE DRAWINGS.

3. RESTORE STOCKPILE SITES TO PRE-EXISTING PROJECT CONDITION AND RESEED AS REQUIRED.

4. STOCKPILE HEIGHTS MUST NOT EXCEED 35'. STOCKPILE SLOPES MUST BE 2:1 OR FLATTER.

3 EC-2 MATERIALS STOCKPILE DETAIL

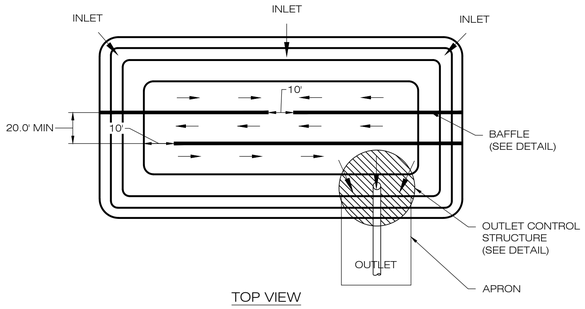
SCALE : N.T.S.



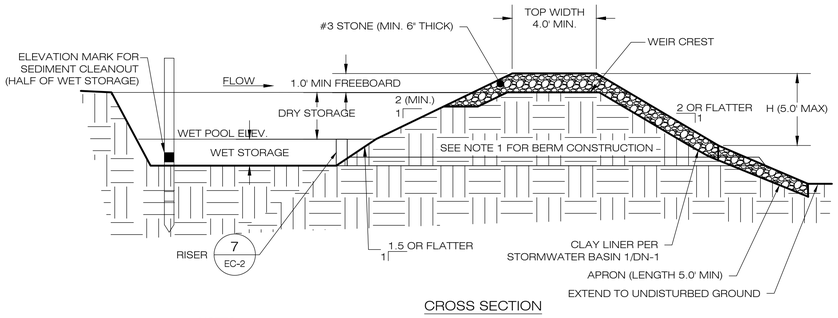
1. BEGIN AT THE LOCATION WHERE THE SOCK IS TO BE INSTALLED BY EXCAVATING A 2-3" (5-7.5 CM) DEEP X 9" (22.9 CM) WIDE TRENCH ALONG THE CONTOUR OF THE SLOPE. EXCAVATED SOIL SHOULD BE PLACED UP SLOPE FROM THE ANCHOR TRENCH.
2. PLACE THE SOCK IN THE TRENCH SO THAT IT CONTOURS TO THE SOIL SURFACE. COMPACT SOIL FROM THE EXCAVATED TRENCH AGAINST THE SOCK ON THE UPHILL SIDE. SOCKS SHALL BE INSTALLED IN 60 FT CONTINUOUS LENGTHS WITH ADJACENT SOCKS TIGHTLY ABUT. EVERY 60 FT THE SOCK ROW SHALL BE SPACED 12 INCHES CLEAR, END TO END, FOR AMPHIBIAN AND REPTILE TRAVEL. THE OPEN SPACES SHALL BE STAGGERED MID LENGTH OF THE NEXT DOWN GRADIENT SOCK.
3. SECURE THE SOCK WITH 18-24" (45.7-61 CM) STAKES EVERY 3-4' (0.9 -1.2 M) AND WITH A STAKE ON EACH END. STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE SOCK LEAVING AT LEAST 2-3" (5-7.5 CM) OF STAKE EXTENDING ABOVE THE SOCK. STAKES SHOULD BE DRIVEN PERPENDICULAR TO THE SLOPE FACE.

4 EC-2 COMPOST FILTER SOCK SEDIMENTATION CONTROL BARRIER

SCALE : N.T.S.



TOP VIEW



CROSS SECTION

NOTES:
1. CONSTRUCT TEMPORARY SEDIMENT BASIN BERMS AND SIDEWALLS PER THE GRASS LINED BASIN DETAIL.
2. SEDIMENT BAFFLES SHALL BE INSTALLED AS SHOWN ON EC-1.
3. SEE TSB SIZING TABLE FOR WET AND DRY STORAGE VOLUMES.

5 EC-2 TEMPORARY SEDIMENT BASIN

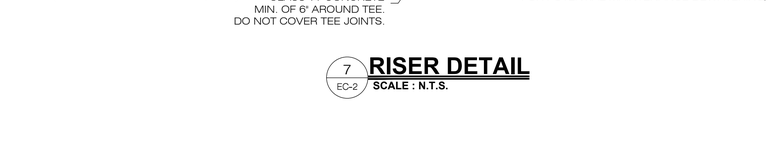
SCALE : N.T.S.

TEMPORARY SEDIMENT BASIN SIZING TABLE

NAME	DRAINAGE AREA (AC)	REQ. DRY VOLUME (CF)	REQ. WET VOLUME (CF)	PROP. BTM. ELEV. (FT)	PROP. OUTLET RIM ELEV. (FT)	PROP. WEIR CREST ELEV. (FT)	PROP. TOP ELEV. (FT)	WET VOL. PROVIDED (CF)	DRY VOL. PROVIDED (CF)	TOTAL VOL. PROVIDED (CF)
TSB-1A	3.64	2,909	5,818	697.00	698.55	699.50	701.00	5,994	4,638	10,632
TSB-1B	2.47	1,977	3,954	698.00	699.40	700.90	702.00	8,704	13,300	22,004
TSB-2	6.82	5,458	10,916	721.00	721.95	723.00	724.00	11,215	13,910	25,125
TSB-3	4.27	3,415	6,831	735.00	736.25	737.00	739.00	6,848	4,833	11,681

6 EC-2 SEDIMENT TRAP BAFFLE

SCALE : N.T.S.



7 EC-2 RISER DETAIL

SCALE : N.T.S.

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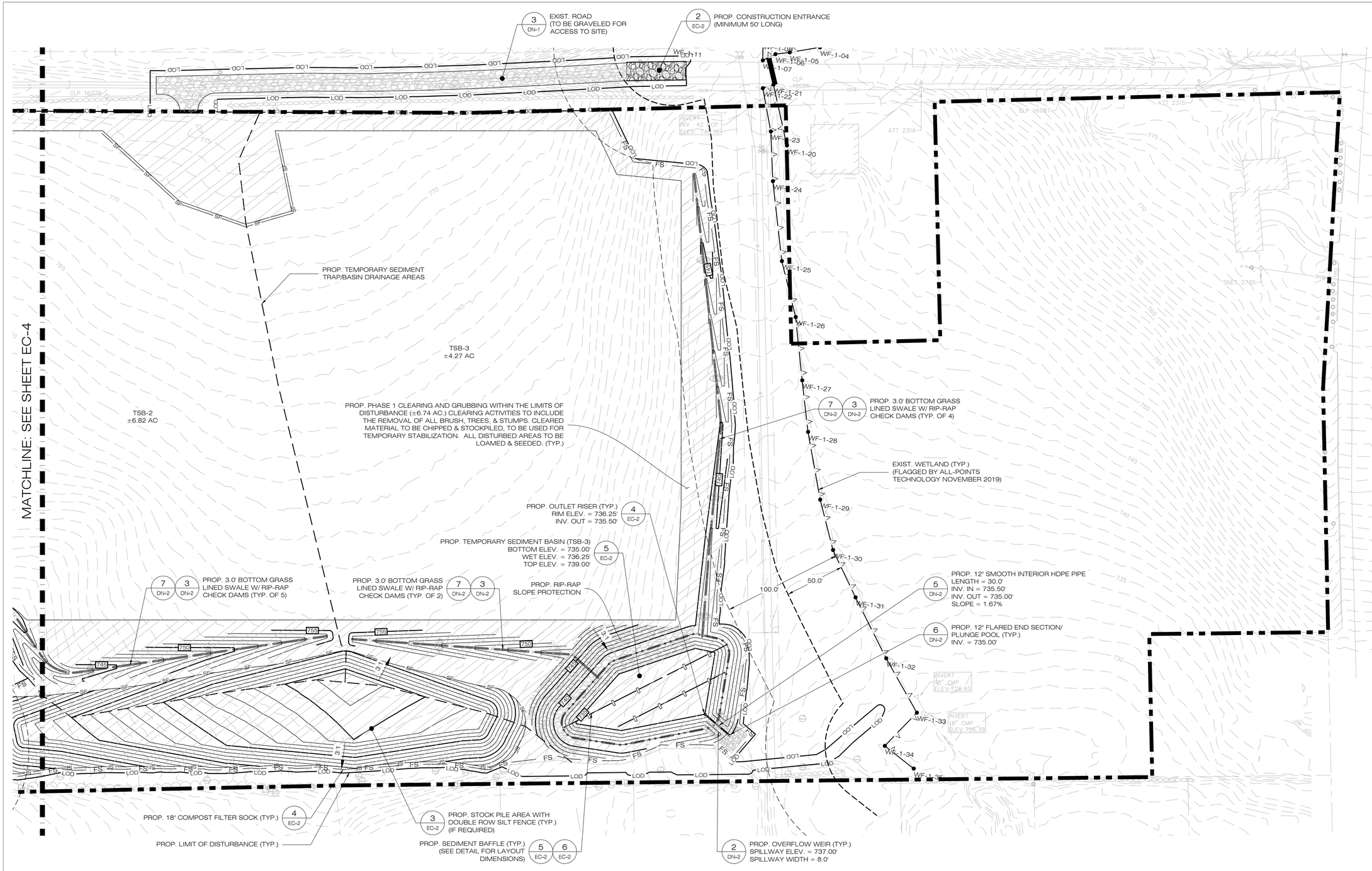
SHEET TITLE:

SEDIMENTATION & EROSION CONTROL DETAILS

SHEET NUMBER:

EC-2

STATE OF CONNECTICUT BRADLEY J. PARSONS No. 28025 LICENSED PROFESSIONAL ENGINEER



1 EC-3 **PHASE 1 - SEDIMENTATION & EROSION CONTROL PLAN**

SCALE : 1" = 40'-0"

40 0 20 40 80

(IN FEET) 1 inch = 40 ft.

BRISTOL SOLAR ONE, LLC

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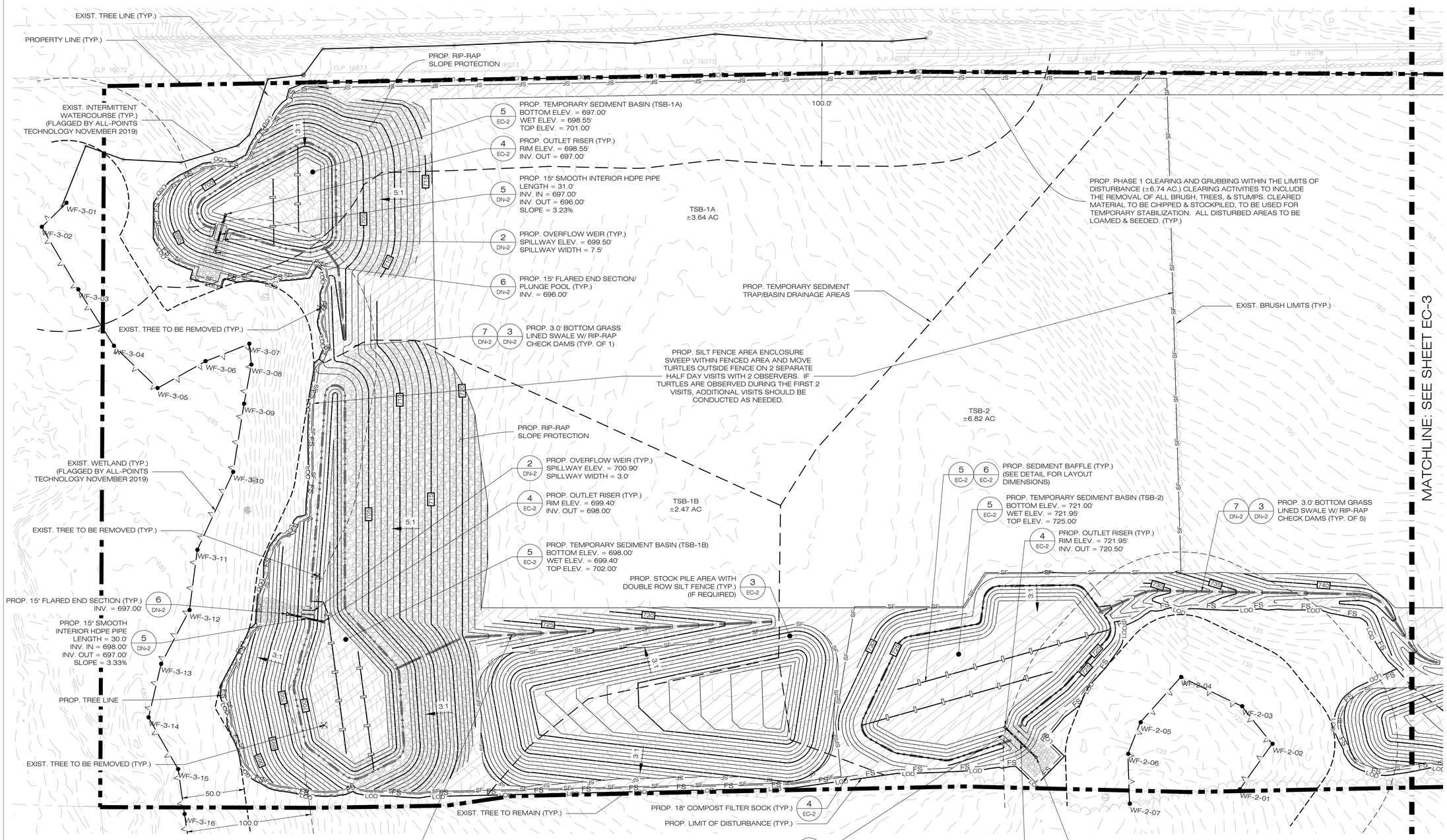
SHEET TITLE:

PHASE 1 SEDIMENTATION & EROSION CONTROL PLAN

SHEET NUMBER:

EC-3

STATE OF CONNECTICUT BRADLEY J. PARSONS No. 26025 LICENSED PROFESSIONAL ENGINEER



1 EC-4 PHASE 1 - SEDIMENTATION & EROSION CONTROL PLAN

SCALE : 1" = 40'-0"

40 0 20 40 80
(IN FEET) 1 inch = 40 ft.

BRISTOL SOLAR ONE, LLC

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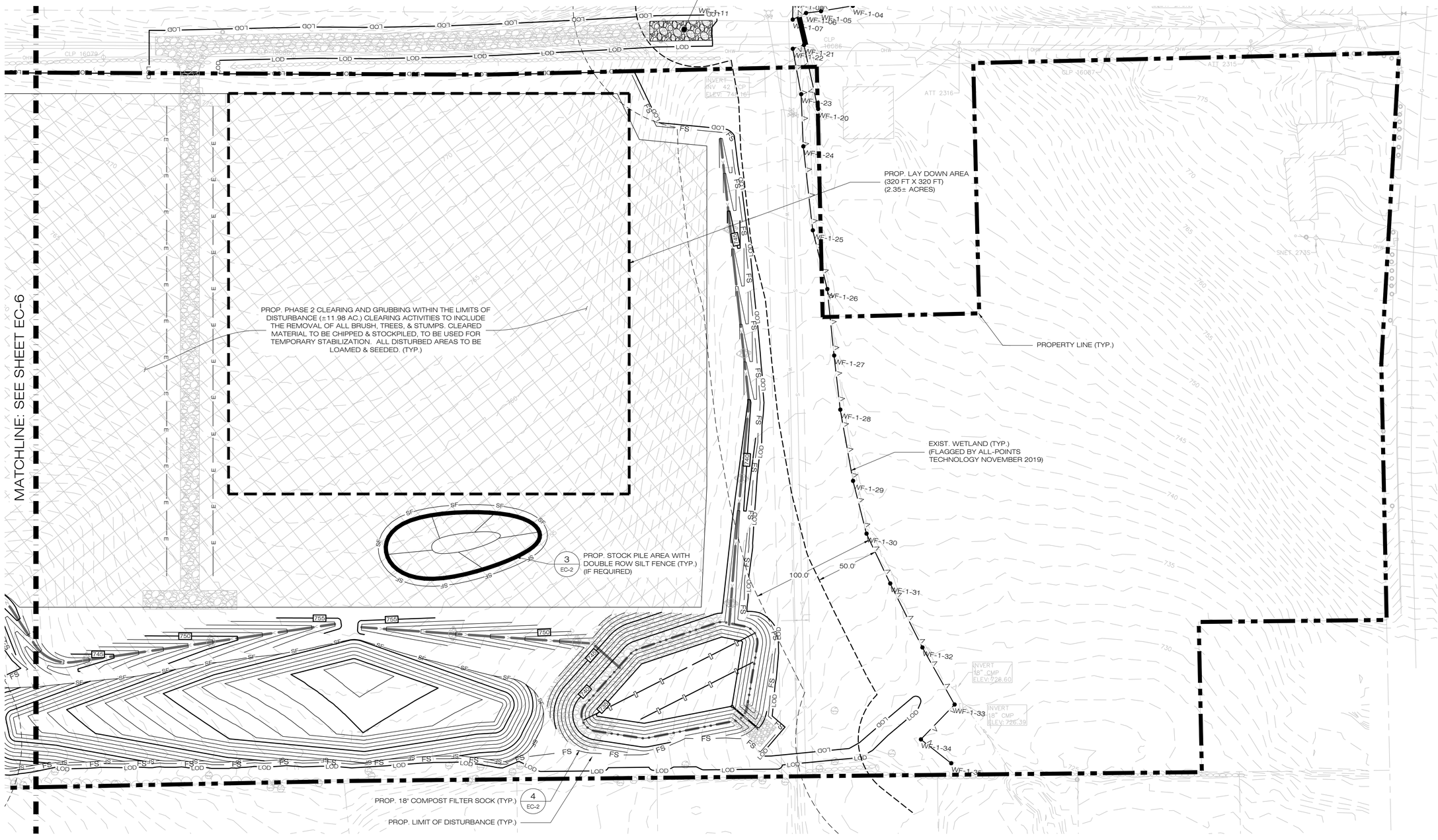
SHEET TITLE:
PHASE 1 SEDIMENTATION & EROSION CONTROL PLAN

SHEET NUMBER:
EC-4

STATE OF CONNECTICUT BRADLEY J. PARSONS No. 28025 LICENSED PROFESSIONAL ENGINEER



1 EC-5 **PHASE 2 - SEDIMENTATION & EROSION CONTROL PLAN**
SCALE : 1" = 40'-0"

40 0 20 40 80
(IN FEET) 1 inch = 40 ft.

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET
4TH FLOOR
HARTFORD, CT, 06103

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OWNER: MARK E., ANN L. & PAUL C. MINOR
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BRISTOL SOLAR ONE, LLC

SITE ADDRESS: 399 HILL STREET BRISTOL, CT

APT FILING NUMBER: CT590220

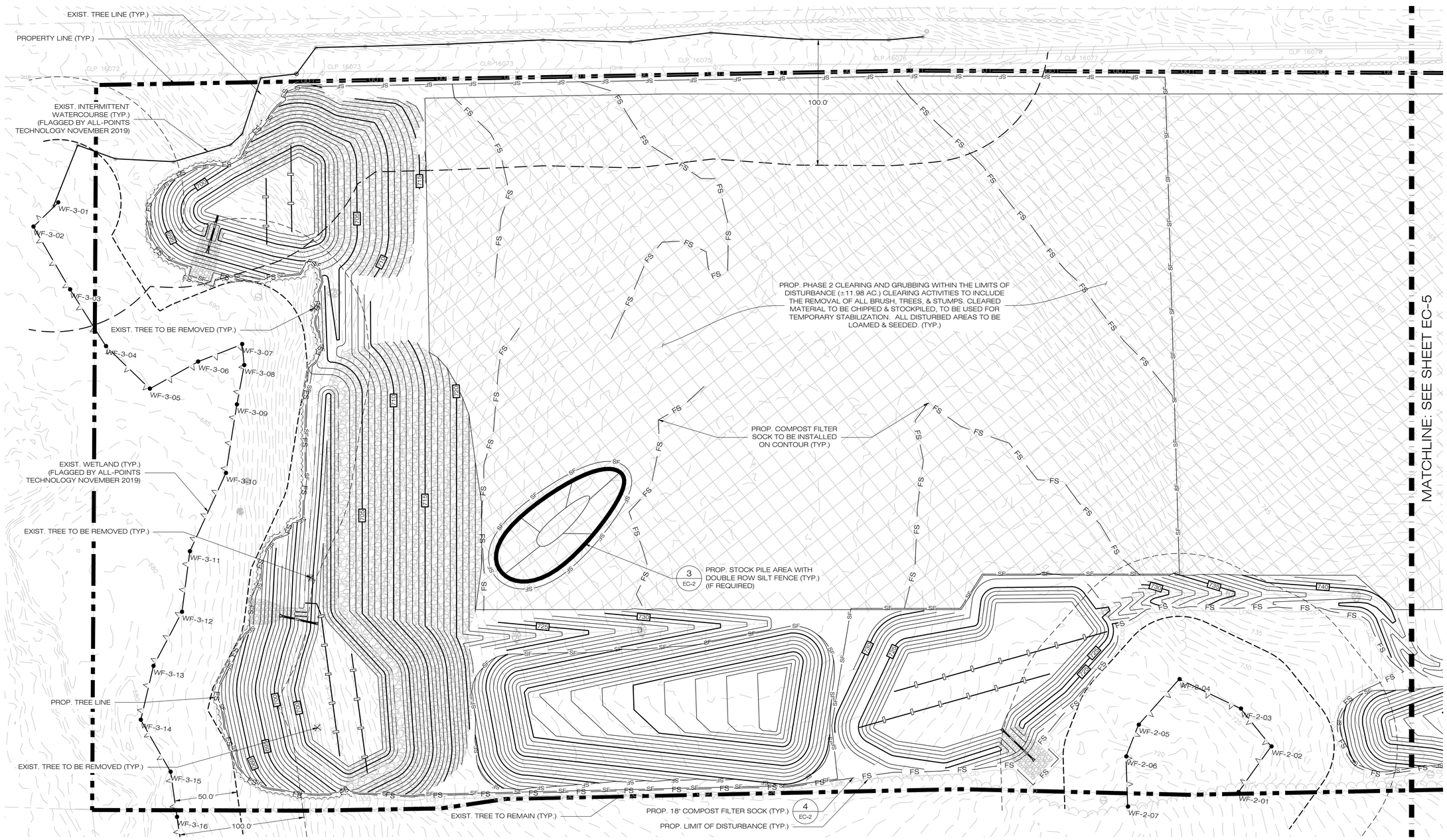
DRAWN BY: JT

DATE: 05/20/20 CHECKED BY: BJP

SHEET TITLE:
PHASE 2 SEDIMENTATION & EROSION CONTROL PLAN

SHEET NUMBER:
EC-5

STATE OF CONNECTICUT · BRADLEY J. PARSONS · No. 25025 · LICENSED PROFESSIONAL ENGINEER



1 EC-6 **PHASE 2 - SEDIMENTATION & EROSION CONTROL PLAN**

SCALE : 1" = 40'-0"

40 0 20 40 80

(IN FEET) 1 inch = 40 ft.

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET
4TH FLOOR
HARTFORD, CT, 06103

ALL-POINTS TECHNOLOGY CORPORATION

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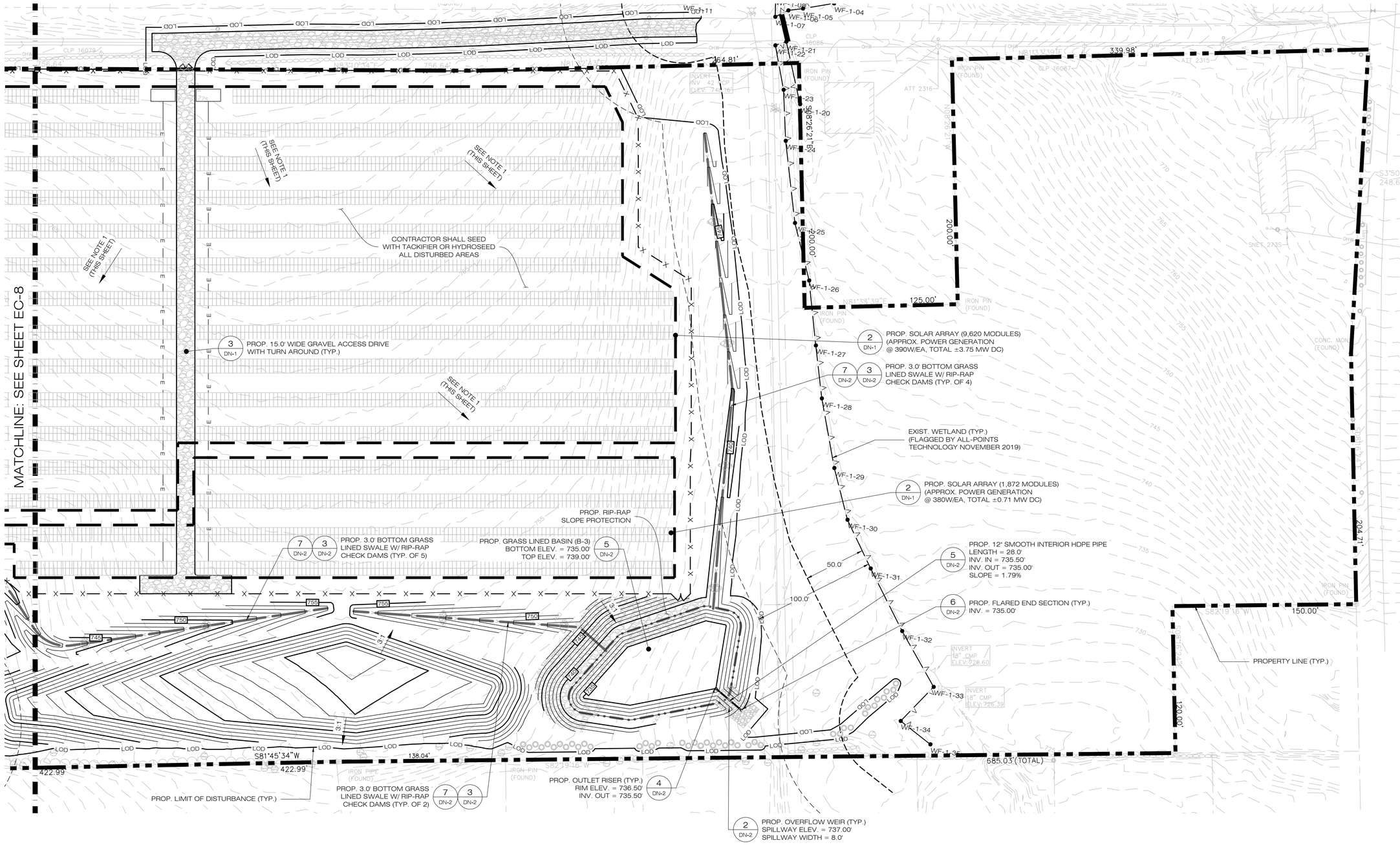
SHEET TITLE:

PHASE 2 SEDIMENTATION & EROSION CONTROL PLAN

SHEET NUMBER:

EC-6

STATE OF CONNECTICUT BRADLEY J. PARSONS No. 28025 LICENSED PROFESSIONAL ENGINEER



NOTES:
1. GRADE/SHAPE AREA TO MAINTAIN EXIST. DRAINAGE PATTERNS.
2. CONTRACTOR SHALL REMOVE ALL BAFFLES AND SEDIMENT BASINS AND SWALES.
3. CONTRACTOR SHALL REPLACE TEMPORARY SEDIMENT BASIN OUTLET WITH GRAVEL OVERFLOW WEIR UPON THE SITE OR DRAINAGE AREA BEING DEEMED STABILIZED PER THE SWPCP.
4. CONTRACTOR SHALL MODIFY/REPLACE THE TEMPORARY SEDIMENT BASIN RISER AS NEEDED UPON THE SITE OR DRAINAGE AREA BEING DEEMED STABILIZED PER THE SWPCP.

1 EC-7 **PHASE 3 - FINAL GRADING & DRAINAGE PLAN**
SCALE : 1" = 40'-0"

40 0 20 40 80
(IN FEET) 1 inch = 40 ft.

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET
4TH FLOOR
HARTFORD, CT, 06103

ALL-POINTS TECHNOLOGY CORPORATION
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PROF: BRADLEY J. PARSONS P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: MARK E., ANN L. & PAUL C. MINOR
ADDRESS: 399 HILL STREET BRISTOL, CT

BRISTOL SOLAR ONE, LLC

SITE ADDRESS: 399 HILL STREET BRISTOL, CT

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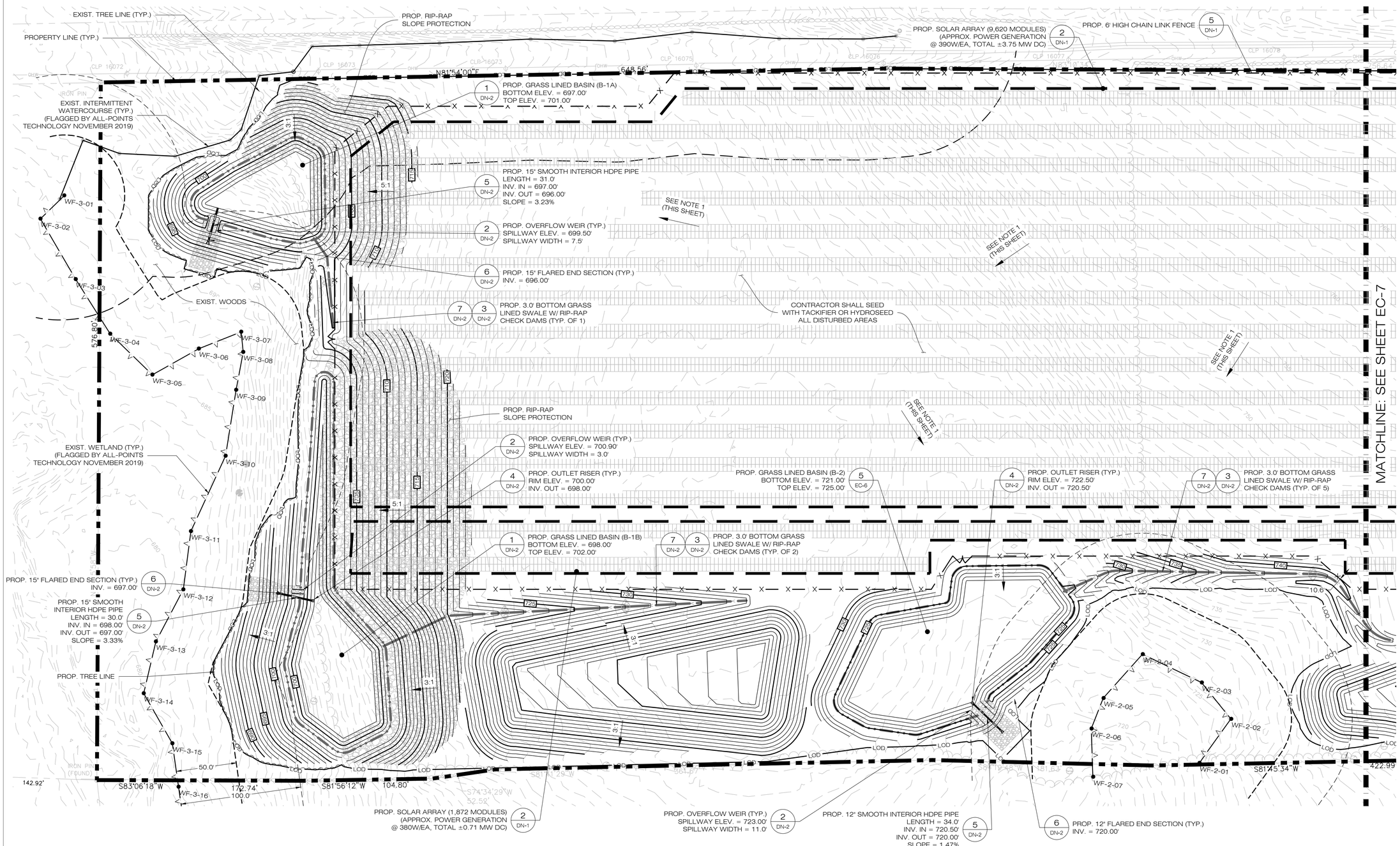
SHEET TITLE:
PHASE 3 FINAL GRADING & DRAINAGE PLAN

SHEET NUMBER:
EC-7

STATE OF CONNECTICUT BRADLEY J. PARSONS No. 28025 LICENSED PROFESSIONAL ENGINEER



NOTES:
1. GRADE/SHAPE AREA TO MAINTAIN EXIST. DRAINAGE PATTERNS.
2. CONTRACTOR SHALL REMOVE ALL BAFFLES AND SEDIMENT BASINS AND SWALES.
3. CONTRACTOR SHALL REPLACE TEMPORARY SEDIMENT BASIN OUTLET WITH GRAVEL OVERFLOW WEIR UPON THE SITE OR DRAINAGE AREA BEING DEEMED STABILIZED PER THE SWPCP.
4. CONTRACTOR SHALL MODIFY/REPLACE THE TEMPORARY SEDIMENT BASIN RISER AS NEEDED UPON THE SITE OR DRAINAGE AREA BEING DEEMED STABILIZED PER THE SWPCP.

1 EC-8 **PHASE 3 - FINAL GRADING & DRAINAGE PLAN**
SCALE : 1" = 40'-0"

40 0 20 40 80
(IN FEET) 1 inch = 40 ft.

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET 4TH FLOOR HARTFORD, CT, 06103

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET

NO	DATE	REVISION
0	05/20/20	FOR REVIEW: BJP
1		
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3		
4		
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DESIGN PROFESSIONAL OF RECORD

PROF: BRADLEY J. PARSONS P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION
ADD: 567 VAUXHAUL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: MARK E., ANN L. & PAUL C. MINOR
ADDRESS: 399 HILL STREET BRISTOL, CT

BRISTOL SOLAR ONE, LLC

SITE ADDRESS: 399 HILL STREET BRISTOL, CT

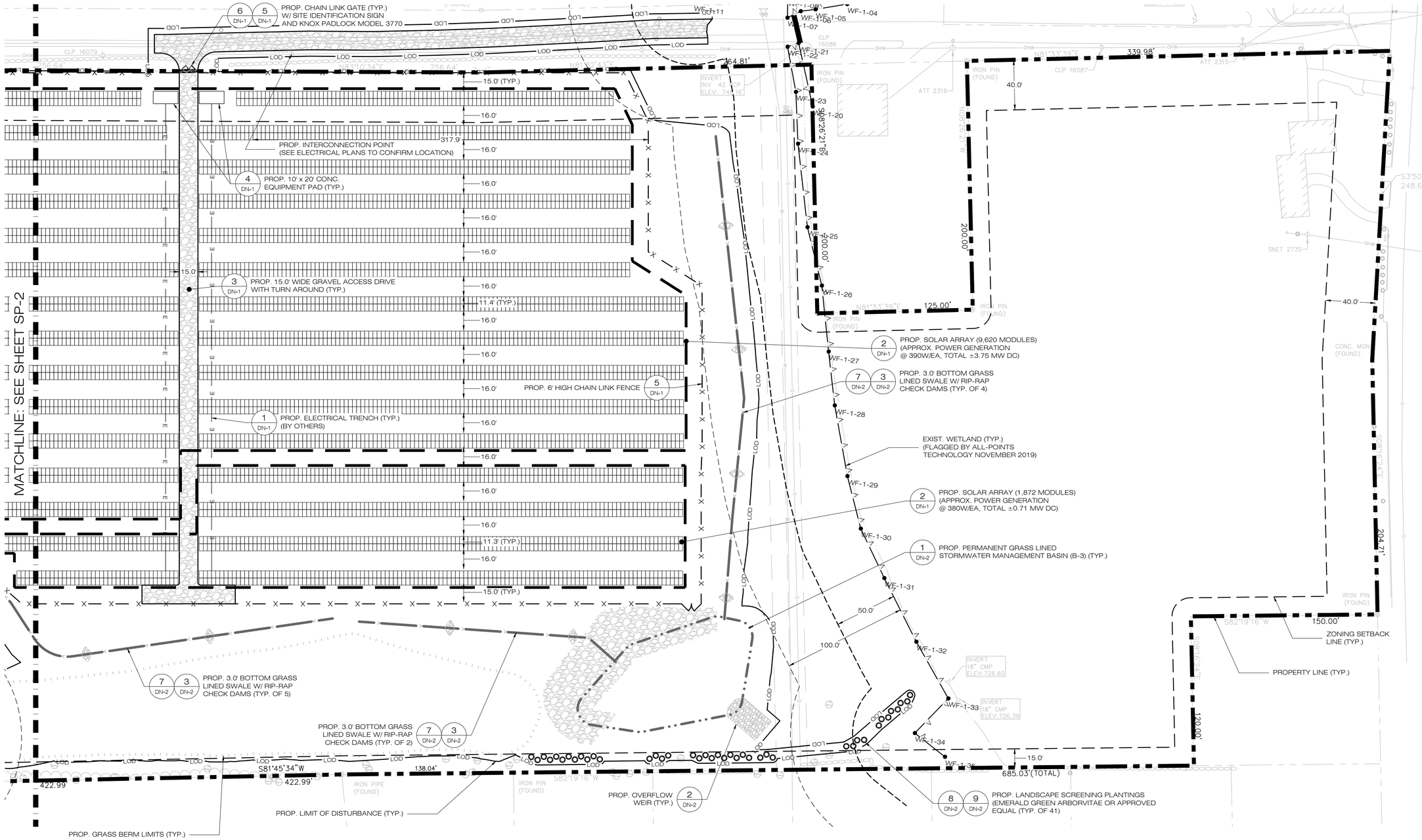
APT FILING NUMBER: CT590220

DRAWN BY: JT
DATE: 05/20/20 CHECKED BY: BJP

SHEET TITLE:
PHASE 3 FINAL GRADING & DRAINAGE PLAN

SHEET NUMBER:
EC-8

STATE OF CONNECTICUT BRADLEY J. PARSONS No. 28025 LICENSED PROFESSIONAL ENGINEER



1 SITE & UTILITY PLAN
SP-1 SCALE : 1" = 40'-0"

(IN FEET) 1 inch = 40 ft.

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET
4TH FLOOR
HARTFORD, CT, 06103

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SHEET TITLE:
SITE & UTILITY PLAN

SHEET NUMBER:
SP-1

STATE OF CONNECTICUT BRADLEY J. PARSONS 24025 LICENSED PROFESSIONAL ENGINEER

EXIST. TREE LINE (TYP.)
PROPERTY LINE (TYP.)
ZONING SETBACK LINE (TYP.)
IRON PIN
EXIST. INTERMITTENT WATERCOURSE (TYP.) (FLAGGED BY ALL-POINTS TECHNOLOGY NOVEMBER 2019)
EXIST. WETLAND (TYP.) (FLAGGED BY ALL-POINTS TECHNOLOGY NOVEMBER 2019)
PROP. TREE LINE
IRON PIN (FOUND)
PROP. GRASS BERM LIMITS (TYP.)
PROP. SOLAR ARRAY (9,620 MODULES) (APPROX. POWER GENERATION @ 390W/EA, TOTAL ±3.75 MW DC)
PROP. 6' HIGH CHAIN LINK FENCE
PROP. PERMANENT GRASS LINED STORMWATER MANAGEMENT BASIN (B-1A) (TYP.)
PROP. 3.0' BOTTOM GRASS LINED SWALE W/ RIP-RAP CHECK DAMS (TYP. OF 1)
PROP. PERMANENT GRASS LINED STORMWATER MANAGEMENT BASIN (B-1B) (TYP.)
PROP. 3.0' BOTTOM GRASS LINED SWALE W/ RIP-RAP CHECK DAMS (TYP. OF 2)
PROP. SOLAR ARRAY (1,872 MODULES) (APPROX. POWER GENERATION @ 380W/EA, TOTAL ±0.71 MW DC)
PROP. PERMANENT GRASS LINED STORMWATER MANAGEMENT BASIN (B-2) (TYP.)
PROP. OVERFLOW WEIR (TYP.)
PROP. 3.0' BOTTOM GRASS LINED SWALE W/ RIP-RAP CHECK DAMS (TYP. OF 5)
MATCHLINE: SEE SHEET SP-1
MATCHLINE: SEE SHEET SP-3
N81°54'00"E 648.56'
N83°01'34"E
S83°06'18"W 142.92'
S81°56'12"W 104.80'
S74°34'29"W 52.52'
S84°41'29"W 58.67'
S84°19'48"W 181.63'
S81°45'34"W 422.99'
40.0'
15.0' (TYP.)
16.0'
11.4' (TYP.)
11.3' (TYP.)
10.6'
50.0'
172.74'
100.0'
LOD
WF-3-01 WF-3-02 WF-3-03 WF-3-04 WF-3-05 WF-3-06 WF-3-07 WF-3-08 WF-3-09 WF-3-10 WF-3-11 WF-3-12 WF-3-13 WF-3-14 WF-3-15 WF-3-16
WF-2-01 WF-2-02 WF-2-03 WF-2-04 WF-2-05 WF-2-06 WF-2-07

1 SP-2 **SITE & UTILITY PLAN**
SCALE : 1" = 40'-0"

40 0 20 40 80
(IN FEET) 1 inch = 40 ft.

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET 4TH FLOOR HARTFORD, CT, 06103

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SITE & UTILITY PLAN

SHEET NUMBER:
SP-2

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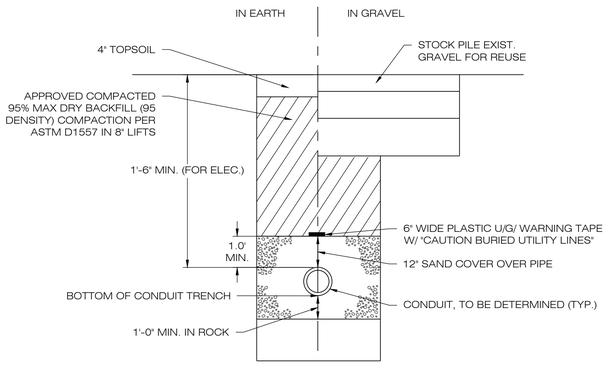
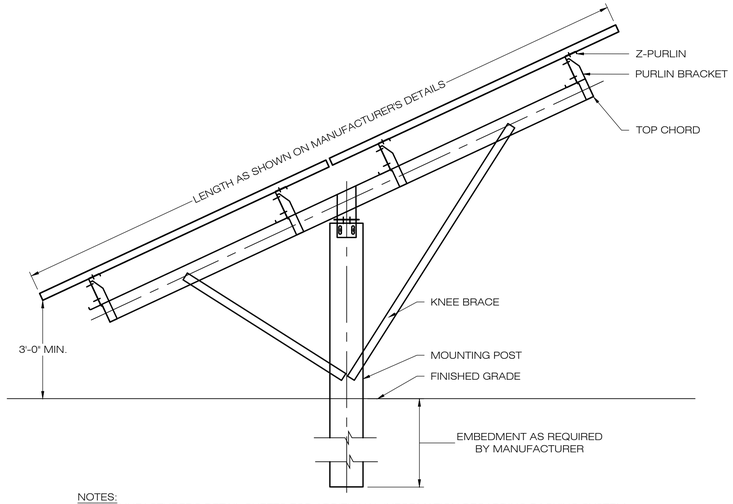
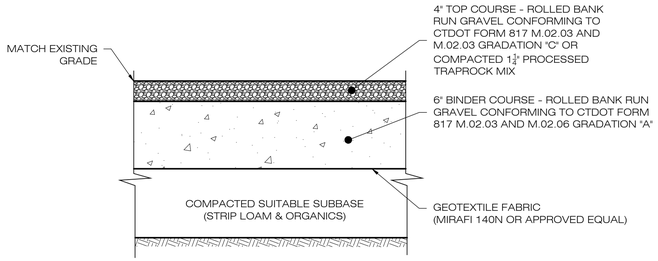


1 DN-1 **ELECTRICAL TRENCH DETAIL**
SCALE : N.T.S.



NOTES:
SEE MANUFACTURER'S DETAIL SHEETS FOR ADDITIONAL INFORMATION REGARDING RACKING SYSTEM REQUIREMENTS AND INSTALLATION PROCEDURES. RACKING SYSTEM TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.

2 DN-1 **TYPICAL POST MOUNTED RACKING SYSTEM**
SCALE : N.T.S.



NOTES:
1. SUBBASE MAY CONSIST OF NATIVE MATERIALS IF FOUND ACCEPTABLE BY THE ENGINEER. SUBBASE TO BE COMPACTED TO 95% MAX DRY DENSITY.
2. SUBBASE IS TO BE FREE FROM DEBRIS AND UNSUITABLE MATERIALS.

3 DN-1 **GRAVEL ACCESS DRIVE SECTION**
SCALE : N.T.S.

4 DN-1 **CONCRETE EQUIPMENT PAD**
SCALE : N.T.S.

5 DN-1 **CHAIN-LINK FENCE & GATE DETAIL**
SCALE : N.T.S.

BRISTOL SOLAR ONE, LLC

IN CASE OF EMERGENCY
CALL T.B.D.

NOTES:
EMERGENCY CALL NUMBER TO BE PROVIDED ONCE DETERMINED.

6 DN-1 **NOTIFICATION SIGN DETAIL**
SCALE : N.T.S.

NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002
PHONE: 413-548-8000 FAX 413-549-4000
EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Semi-Shade Grass and Forbs Mix

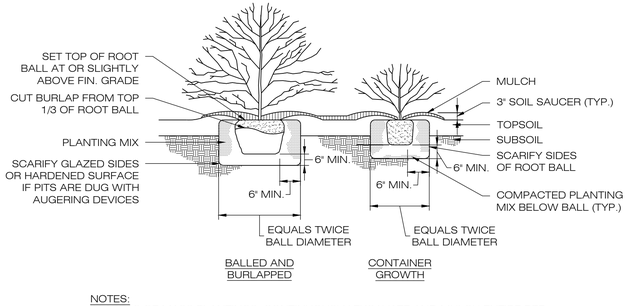
Botanical Name	Common Name	Indicator
Elymus virginicus	Virginia Wild Rye	FACW-
Elymus canadensis	Canada Wild Rye	FACU+
Festuca rubra	Red Fescue	FACU
Chamaecrista fasciculata	Partridge Pea	FACU
Liatris spicata	Spiked Gayfeather/Marsh Blazing Star	FAC+
Onoclea sensibilis	Sensitive Fern	FACW
Aster prenanthoides (Symphyotrichum prenanthoide	Zigzag Aster	FAC
Eupatorium fistulosum (Eutrochium fistulosum)	Hollow-Stem Joe Pye Weed	FACW
Eupatorium perfoliatum	Boneset	FACW
Juncus tenuis	Path Rush	FAC

PRICE PER LB. $87.00 MIN. QUANITY 1 LBS. **TOTAL:** $87.00 APPLY: 30 LBS/ACRE :1450 sq ft/lb

The New England Semi Shade Grass & Forb Mix contains a broad spectrum of native grasses and forbs that will tolerate semi-shade and edge conditions. Always apply on clean bare soil. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper seed to soil contact. Best results are obtained with a Spring seeding. Late Spring and early Summer seeding will benefit with a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering will be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free seed bed is necessary for optimal results.

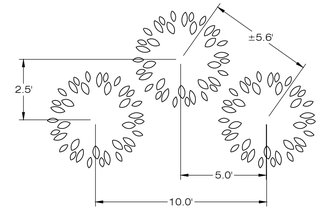
New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is $/bulk pound, FOB warehouse, Plus SH and applicable taxes.

7 DN-1 **SEMI-SHADE MIX**
SCALE : N.T.S.



NOTES:
IN AREAS OF MASS PLANTINGS, CONTINUOUSLY EXCAVATE AND MULCH ENTIRE BED..

8 DN-1 **TYPICAL PLANTING DETAIL**
SCALE : N.T.S.



9 DN-1 **SCREENING TREE SPACING**
SCALE : N.T.S.

BRISTOL SOLAR ONE, LLC

150 TRUMBULL STREET
4TH FLOOR
HARTFORD, CT, 06103

ALL-POINTS TECHNOLOGY CORPORATION

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WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET

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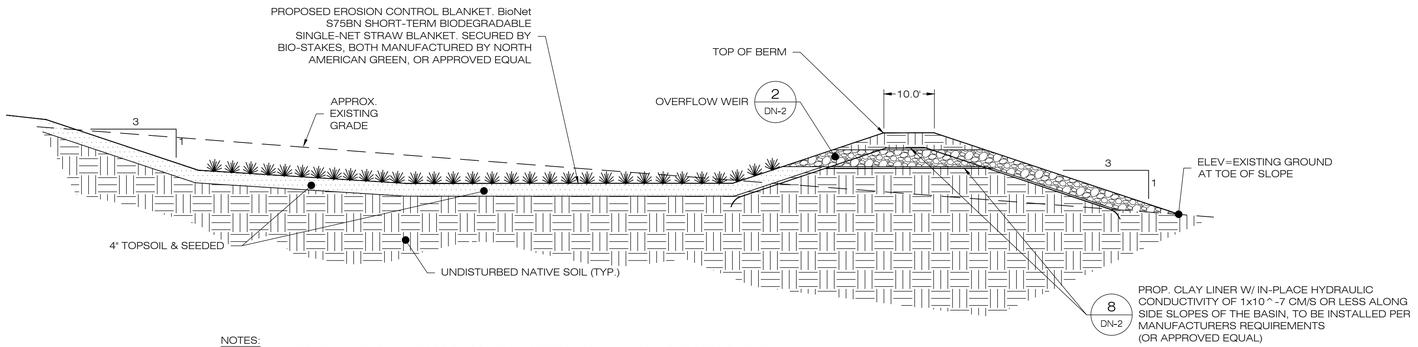
SHEET TITLE:

SITE DETAILS

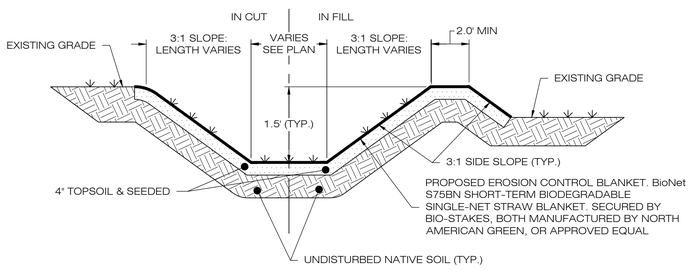
SHEET NUMBER:

DN-1



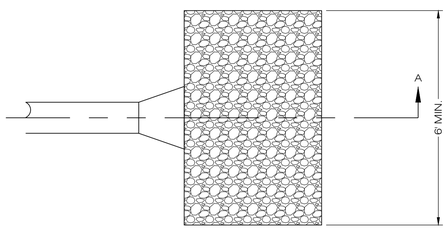
NOTES:
- SEED MIX TO BE NEW ENGLAND EROSION CONTROL/ RESTORATION MIX FOR MOIST SITES ON THE BOTTOM OF THE BASIN AND NEW ENGLAND EROSION/RESTORATION MIX FOR DRY SITES ON THE SIDE SLOPES.
- FOR CONVERTING TEMPORARY SEDIMENT BASIN TO INFILTRATION BASIN, REMOVE BAFFLES, CLEAN OUT SEDIMENT, RESHAPE AS REQUIRED. SEE PLANS FOR BASIN DEPTHS AND ELEVATIONS.
- INSPECT AND CLEAN PIPES.

1 DN-2 GRASS LINED BASIN
SCALE : N.T.S.

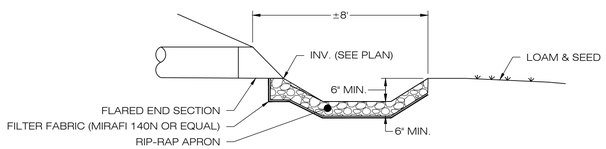


NOTES:
1. SEED MIX TO BE NEW ENGLAND EROSION CONTROL/ RESTORATION MIX FOR MOIST SITES ON THE BOTTOM OF THE BASIN AND NEW ENGLAND EROSION/RESTORATION MIX FOR DRY SITES ON THE SIDE SLOPES.
2. IF DEPTH VARIES FROM 1.5', SEE PLAN CALLOUTS.

3 DN-2 GRASS LINED SWALE
SCALE : N.T.S.



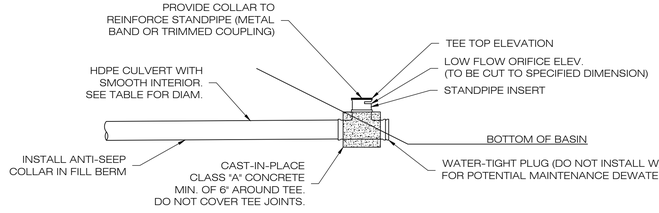
PLAN VIEW



SECTION A-A

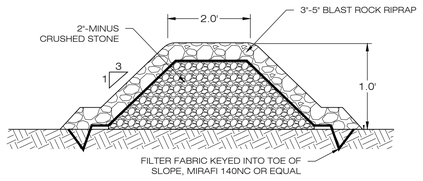
6 DN-2 FLARED END SECTION/PLUNGE POOL
SCALE : N.T.S.

HDPE OUTLET RISER SIZING TABLE								
BASIN	TEE TOP ELEV. (FT)	LOW FLOW ORIFICE ELEV. (FT)	LOW FLOW ORIFICE DIMENSION (FT)	OUTLET PIPE SIZE (IN.)	OUTLET PIPE LENGTH (FT)	OUTLET PIPE SLOPE (%)	OUTLET PIPE INV. ELEV. AT STRUCTURE (FT)	OUTLET PIPE INV. AT OUTFALL (FT)
B-1A	N/A	N/A	N/A	15	31.0	3.23	697.00	696.00
B-1B	700.00	699.40	WIDTH =12.0" HEIGHT = 3.0"	15	30.0	3.33	698.00	697.00
B-2	722.50	721.85	WIDTH =12.0" HEIGHT = 3.0"	12	34.0	1.47	720.50	720.00
B-3	736.50	736.05	WIDTH =12.0" HEIGHT = 3.0"	12	28.0	1.79	735.50	735.00



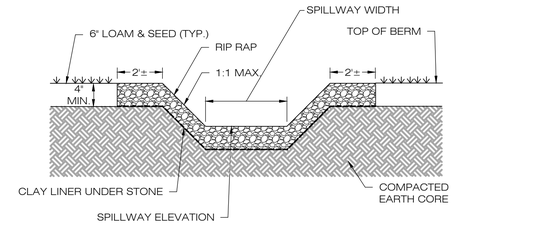
NOTES:
1. TEE TO BE ADS ADVANEDGE (TM) FABRICATED TEE OR APPROVED EQUAL. CONTRACTOR TO MODIFY TEE AS NEEDED.
2. ANTI-SEEP COLLARS TO BE INSTALLED PER MANUFACTURE RECOMMENDATIONS.
3. CONVERT TEMPORARY SEDIMENT BASIN RISER TO FINAL BASIN OUTLET RISER.

4 DN-2 OUTLET RISER
SCALE : N.T.S.

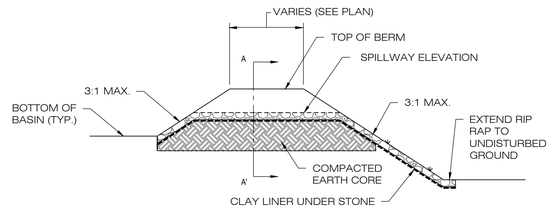


NOTES:
1. STONE SHALL BE PLACED MECHANICALLY OR BY HAND. STONE SHALL NOT BE DUMPED DIRECTLY INTO SWALE.
2. SEE GRADING AND DRAINAGE PLAN.

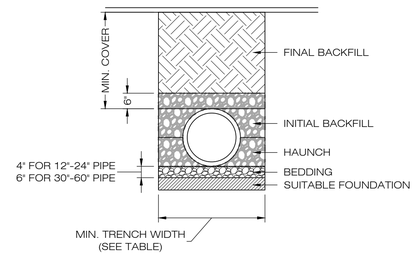
7 DN-2 STONE CHECK DAM
SCALE : N.T.S.



SECTION A-A' THROUGH SPILLWAY



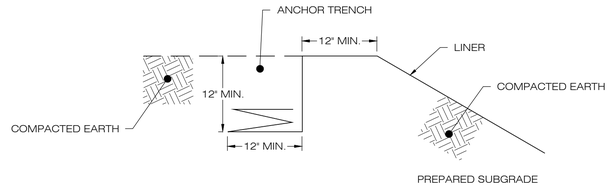
2 DN-2 OVERFLOW WEIR DETAIL
SCALE : N.T.S.



RECOMMENDED MIN. TRENCH WIDTH	
PIPE DIA.	MIN. TRENCH WIDTH
6"	23"
8"	26"
10"	28"
12"	30"
15"	34"
18"	39"
24"	48"
30"	56"
36"	64"
48"	80"
60"	96"

NOTES:
1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321 , "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST ADDITION.
2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.
3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm), 6" (150mm) FOR 30"-60" (7S0mm-900mm).
5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOTATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS 12" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR 54"-60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

5 DN-2 HDPE STORM DRAINAGE TRENCH DETAIL
SCALE : N.T.S.



8 DN-2 LINER ANCHOR DETAIL
SCALE : N.T.S.

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SHEET TITLE:
SITE DETAILS

SHEET NUMBER:
DN-2

STATE OF CONNECTICUT BRADLEY J. PARSONS No. 28025 LICENSED PROFESSIONAL ENGINEER

APPENDIX B

WETLAND INSPECTION REPORT

WETLAND INSPECTION

December 5, 2019 **APT Project No.: CT590220**

Prepared For: Verogy
150 Trumbull Street, 4th Floor
Hartford, CT 06103
Attn: Steven DeNino, COO

Site Name: Briston Solar One

Site Address: 399 Hill Street, Bristol, Connecticut

Date(s) of Investigation: 11/8/2019

Field Conditions: **Weather:** cloudy**,** low 50's
Soil Moisture: moist

Wetland/Watercourse Delineation Methodology*:

☒Connecticut Inland Wetlands and Watercourses
☐Connecticut Tidal Wetlands
☐Massachusetts Wetlands
☐U.S. Army Corps of Engineers

Municipal Upland Review Area/Buffer Zone:
Wetlands: 100 feet
Watercourses: 100 feet

The wetlands inspection was performed by†:

Matthew Gustafson, Registered Soil Scientist

Enclosures: Wetland Delineation Field Forms & Wetland Inspection Map

This report is provided as a brief summary of findings from APT's wetland investigation of the referenced Study Area that consists of proposed development activities and areas generally within 200 feet.‡ If applicable, APT is available to provide a more comprehensive wetland impact analysis upon receipt of site plans depicting the proposed development activities and surveyed location of identified wetland and watercourse resources.

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* *Wetlands and watercourses were delineated in accordance with applicable local, state and federal statutes, regulations and guidance.*

† *All established wetlands boundary lines are subject to change until officially adopted by local, state, or federal regulatory agencies.*

‡ *APT has relied upon the accuracy of information provided by Verogy and its contractors regarding proposed solar facility and access road/utility easement locations for identifying wetlands and watercourses within the study area.*

Attachments

- Wetland Delineation Field Forms
- Wetland Inspection Map

Wetland Delineation Field Form

Wetland I.D.:	Wetland 1	
Flag #'s:	WF 1-01 to 1-13 and 1-20 to 1-35	
Flag Location Method:	Site Sketch ☒	GPS (sub-meter) located ☒

WETLAND HYDROLOGY:

NONTIDAL ☒

Intermittently Flooded ☒	Artificially Flooded ☒	Permanently Flooded ☐
Semipermanently Flooded ☐	Seasonally Flooded ☐	Temporarily Flooded ☐
Permanently Saturated ☐	Seasonally Saturated – seepage ☒	Seasonally Saturated - perched ☐
Comments: Wetland 1 is an altered seep system confined by an existing access road that results in a mix of hydrological patterns including seasonal saturation from seepage, artificial flooding due to a restricted outfall, and intermittent flooding from stormwater inputs.		

TIDAL ☐

Subtidal ☐	Regularly Flooded ☐	Irregularly Flooded ☐
Irregularly Flooded ☐		
Comments: None		

WETLAND TYPE:

SYSTEM:

Estuarine ☐	Riverine ☐	Palustrine ☒
Lacustrine ☐	Marine ☐	
Comments: None		

CLASS:

Emergent ☒	Scrub-shrub ☒	Forested ☒
Open Water ☐	Disturbed ☒	Wet Meadow ☐
Comments: As a result of historic alterations to this resource, vegetation classes range from interior emergent vegetation to edge scrub/shrub and forested vegetation. Banks to the intermittent watercourse generally consist of open field with sparse areas of scrub/shrub growth.		

WATERCOURSE TYPE:

Perennial ☐	Intermittent ☒	Tidal ☐
Watercourse Name: Unnamed		
Comments: The unnamed south-flowing intermittent watercourse consists of a 3- to 5-foot wide channel with a sandy bottom within a well confined channel.		

Wetland Delineation Field Form (Cont.)

SPECIAL AQUATIC HABITAT:

Vernal Pool Yes ☐ No ☒ Potential ☐	Other ☐
Vernal Pool Habitat Type: None	
Comments: None	

SOILS:

Are field identified soils consistent with NRCS mapped soils?	Yes ☒	No ☐

DOMINANT PLANTS:

Red Maple (Acer rubrum)	Common Reed* (Phragmites australis)
Fox Grape (Vitis labrusca)	Multiflora Rose* (Rosa multiflora)
Silky Dogwood (Cornus amomum)	Sensitive Fern (Onoclea sensibilis)
Bush Honeysuckles* (Lonicera spp.)	

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Verogy is proposing the construction of a solar energy generation facility to be generally located within the extents of an existing open field off Hill Street in Bristol, CT. Three wetland resources have been identified within proximity to the proposed development area including the use of an existing gravel access road that currently crosses Wetland 1. Similarly, Wetlands 2 and 3 occur in proximity to the open field proposed for development. As such, it is recommended that a wetland impact analysis be performed under separate cover once the site plan for the proposed development has been finalized in order to evaluate possible impacts to these nearby wetland resources.

Wetland 1 consists of a complex of hillside seep wetland, emergent swamp, and intermittent watercourse. Wetland 1 receives road drainage via a 36-inch reinforced concrete pipe from under James P. Casey Road. A small depressional emergent marsh area with edge forested/scrub/shrub habitat receives these flows. This depressional wetland drains south to a 36-inch reinforced concrete pipe that conveys flows under an existing gravel road that provides access into the open field. A well confined intermittent watercourse is formed after this outfall and continues its southerly drainage until the far southern property boundary.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 2	
Flag #'s:	WF 2-01 to 2-07	
Flag Location Method:	Site Sketch ☒	GPS (sub-meter) located ☒

WETLAND HYDROLOGY:

NONTIDAL ☒

Intermittently Flooded ☐	Artificially Flooded ☐	Permanently Flooded ☐
Semipermanently Flooded ☐	Seasonally Flooded ☐	Temporarily Flooded ☐
Permanently Saturated ☐	Seasonally Saturated – seepage ☒	Seasonally Saturated - perched ☐
Comments: Wetland 2 consists of a headwater seep system with seasonal saturation.		

TIDAL ☐

Subtidal ☐	Regularly Flooded ☐	Irregularly Flooded ☐
Irregularly Flooded ☐		
Comments: None		

WETLAND TYPE:

SYSTEM:

Estuarine ☐	Riverine ☐	Palustrine ☒
Lacustrine ☐	Marine ☐	
Comments: None		

CLASS:

Emergent ☒	Scrub-shrub ☒	Forested ☒
Open Water ☐	Disturbed ☐	Wet Meadow ☐
Comments: As this feature is located along the edges of the maintained open field areas, portions of the wetland are dominated by emergent vegetation with transitional scrub/shrub areas into forested cover.		

WATERCOURSE TYPE:

Perennial ☐	Intermittent ☐	Tidal ☐
Watercourse Name: None		
Comments: None		

Wetland Delineation Field Form (Cont.)

SPECIAL AQUATIC HABITAT:

Vernal Pool Yes ☐ No ☒ Potential ☐	Other ☐
Vernal Pool Habitat Type: None	
Comments: None	

SOILS:

Are field identified soils consistent with NRCS mapped soils?	Yes ☒	No ☐

DOMINANT PLANTS:

Red Maple (Acer rubrum)	Reed Canarygrass* (Phalaris arundinacea)
Fox Grape (Vitis labrusca)	Multiflora Rose* (Rosa multiflora)
Silky Dogwood (Cornus amomum)	Sensitive Fern (Onoclea sensibilis)
Bebb Willow (Salix bebbiana)	

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Verogy is proposing the construction of a solar energy generation facility to be generally located within the extents of an existing open field off Hill Street in Bristol, CT. Three wetland resources have been identified within proximity to the proposed development area including the use of an existing gravel access road that currently crosses Wetland 1. Similarly, Wetlands 2 and 3 occur in proximity to the open field proposed for development. As such, it is recommended that a wetland impact analysis be performed under separate cover once the site plan for the proposed development has been finalized in order to evaluate possible impacts to these nearby wetland resources.

Wetland 2 consists of a headwater wetland seep located at the topographic low-point of the edge of the existing open field. This system drains south with a narrow natural spring seep at a slope break within the wetland. Portions of the wetland are dominated by emergent vegetation resulting from historic clearing.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 3	
Flag #'s:	WF 3-01 to 3-17 and IWC 1 to 17	
Flag Location Method:	Site Sketch ☒	GPS (sub-meter) located ☒

WETLAND HYDROLOGY:

NONTIDAL ☒

Intermittently Flooded ☐	Artificially Flooded ☒	Permanently Flooded ☐
Semipermanently Flooded ☐	Seasonally Flooded ☒	Temporarily Flooded ☐
Permanently Saturated ☐	Seasonally Saturated – seepage ☒	Seasonally Saturated - perched ☐
Comments: Wetland 3 is a complex of hillside seep wetlands, an interior perennial watercourse, and a feeder intermittent watercourse formed within a drainage swale. As a result, this feature contains a complex of hydrological conditions ranging from seasonal saturation (hillside seeps), seasonal flooding (bordering areas to the perennial watercourse), and artificial flooding (areas associated with the drainage swale).		

TIDAL ☐

Subtidal ☐	Regularly Flooded ☐	Irregularly Flooded ☐
Irregularly Flooded ☐		
Comments:		

WETLAND TYPE:

SYSTEM:

Estuarine ☐	Riverine ☐	Palustrine ☒
Lacustrine ☐	Marine ☐	
Comments: None		

CLASS:

Emergent ☒	Scrub-shrub ☒	Forested ☒
Open Water ☐	Disturbed ☒	Wet Meadow ☐
Comments: As a result of the complexity of hydrological conditions and historic and regular vegetation maintenance, vegetation classes range from interior and edge emergent areas with transitional scrub/shrub habitats to forested wetland habitats.		

WATERCOURSE TYPE:

Perennial ☒	Intermittent ☒	Tidal ☐
Watercourse Name: Unnamed		
Comments: Two watercourses were identified in association with Wetland 3, consisting of an intermittent watercourse delineated as part of a historically constructed drainage swale that feeds Wetland 3, and an interior perennial watercourse. The intermittent watercourse generally drains west while the perennial watercourse drains south. No direct conveyances were noted between these two features with the defined bank and channel being lost as it discharged into bordering wetlands to the perennial watercourse. The intermittent watercourse is characterized by a 2-3 foot wide channel formed in sandy/gravelly material. A hard-bottom crossing was noted where the existing access road crosses the drainage swale. The perennial watercourse is characterized by an approximately 6-foot wide channel with sandy/cobble bottom and flows ranging from 2 to 4-inches deep.		

Wetland Delineation Field Form (Cont.)

SPECIAL AQUATIC HABITAT:

Vernal Pool Yes ☐ No ☒ Potential ☐	Other ☐
Vernal Pool Habitat Type: None	
Comments: None	

SOILS:

Are field identified soils consistent with NRCS mapped soils?	Yes ☒	No ☐

DOMINANT PLANTS:

Red Maple (Acer rubrum)	Sphagnum moss (Sphagnum spp.)
Bush Honeysuckles* (Lonicera spp.)	Multiflora Rose* (Rosa multiflora)
Silky Dogwood (Cornus amomum)	Skunk Cabbage (Symplocarpus foetidus)
Highbush Blueberry (Vaccinium corymbosum)	Fox Grape (Vitis labrusca)

* denotes Connecticut Invasive Species Council invasive plant species

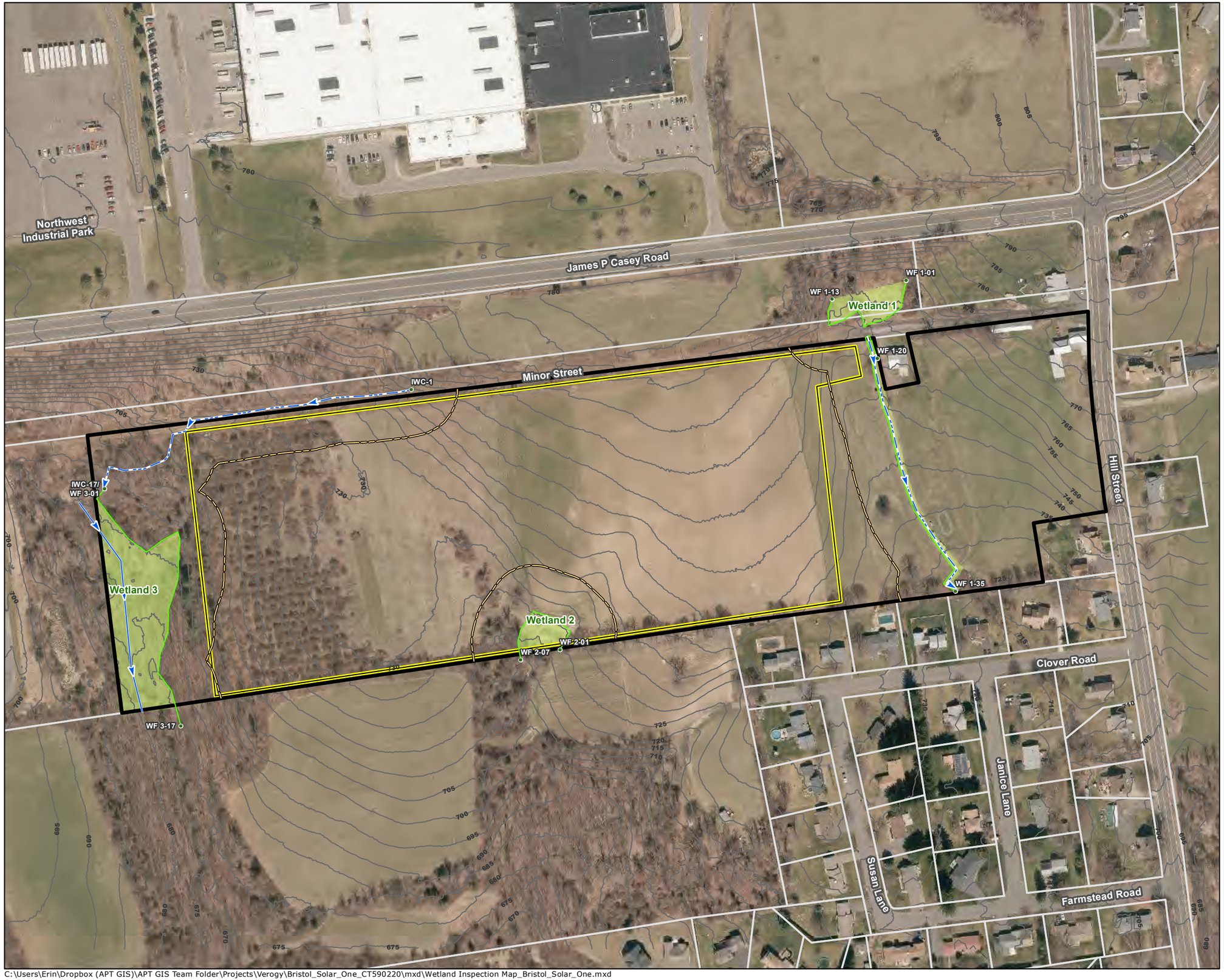
GENERAL COMMENTS:

Verogy is proposing the construction of a solar energy generation facility to be generally located within the extents of an existing open field off Hill Street in Bristol, CT. Three wetland resources have been identified within proximity to the proposed development area including the use of an existing gravel access road that currently crosses Wetland 1. Similarly, Wetlands 2 and 3 occur in proximity to the open field proposed for development. As such, it is recommended that a wetland impact analysis be performed under separate cover once the site plan for the proposed development has been finalized in order to evaluate possible impacts to these nearby wetland resources.

Wetland 3 is a complex of hillside seep wetlands, an interior perennial watercourse, and a feeder intermittent watercourse formed within a drainage swale. This feature is located in the far western extents of the subject property draining north to south. Bordering areas to the interior perennial watercourse consist of broad forested floodplain wetlands with complexes of edge hillside seep systems. A secondary intermittent watercourse that was historically formed as part of a drainage swale along the existing gravel access road drains into Wetland 3.

Wetland Inspection Map
Proposed Solar Facility - Bristol Solar One
399 Hill Street
Bristol, Connecticut

VERGY



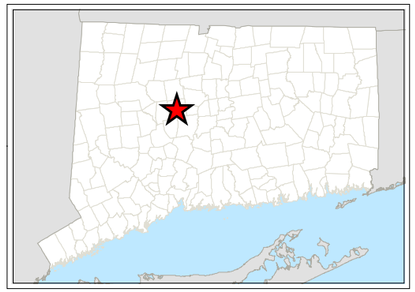
Legend

- Site
- Project Location
- Approximate Parcel Boundary (CTDEEP)
- Delineated Wetland/Watercourse Flag
- Delineated Wetland Boundary
- Intermittent Watercourse
- Perennial Watercourse
- 100' Upland Review Area

N
W E
S

200 100 0 200 Feet

1 in = 200 ft



ALL-POINTS TECHNOLOGY CORPORATION

Map Sources:

Ortho Base Map: CT ECO 2016 Aerial Imagery

Wetlands field delineated by:
Matthew Gustafson, Registered Soil Scientist, APT, 11/08/2019

Elevation contours derived from 2016 LiDAR data provided by CTECO

CTDEEP's data library (http://www.ct.gov/deep)
Data layers are maintained and updated by CTDEEP and represent the most recent publications.

Map Date: November 2019

C:\Users\Erin\Dropbox (APT GIS)\APT GIS Team Folder\Projects\Verogy\Bristol_Solar_One_CT590220\mxd\Wetland Inspection Map_Bristol_Solar_One.mxd

APPENDIX C

RESOURCES PROTECTION PLAN

ENVIRONMENTAL NOTES - RESOURCES PROTECTION MEASURES

WETLAND, EASTERN BOX TURTLE AND BOBOLINK PROTECION PROGRAM

As a result of the project's location in the vicinity of sensitive wetlands and watercourses and rare species habitat, the following Best Management Practices shall be implemented by the Contractor to avoid unintentional impacts to these resources.

It is of the utmost importance that the Contractor complies with the requirement for implementation of these protective measures and the education of its employees and subcontractors performing work on the project site. These wetland and species protection measures shall be implemented and maintained throughout the duration of construction activities and, to further protect wetlands and watercourses, until permanent stabilization of site soils has occurred.

Eastern Box Turtle (*Terrapenne carolina carolina*) and Bobolink (*Dolichonyx oryzivorus*), State-listed Special Concern species afforded protection under the Connecticut Endangered Species Act, are known to occur within the vicinity of the project. The turtle and Bobolink protection measures included herein satisfy requirements from the Connecticut Department of Energy and Environmental Protection ("DEEP") Wildlife Division in accordance with their Natural Diversity Data Base ("NDDB") determination letter (No. 202004621) dated February 27, 2020; this determination is valid until February 27, 2022 provided the scope of the project has not changed and work has begun on the project prior to the expiration date.

It is recommended that work, particularly tree removal/land clearing activities, should occur when these turtles are active (April 1 through November 1). Conducting land clearing while turtles are active will allow the animal to move out of harm's way and minimize mortality to hibernating individuals; hibernation habitat typically includes woodlands, woodland edges and forested wetlands.

To avoid impact to Bobolink, it is recommended that work be performed outside of this bird's breeding season (May 20 through August 20).

All-Points Technology Corporation, P.C. ("APT") will serve as the Environmental Monitor for this project to ensure that these protection measures are implemented properly. APT will provide an education session for the Contractor prior to the start of construction activities on Eastern Box Turtle, Bobolink and nearby sensitive wetland resources that may be encountered due to the project's location within and adjacent to potentially sensitive habitat. The Contractor shall contact Dean Gustafson, Senior Biologist at APT, at least 5 business days prior to the start of any construction activities. Mr. Gustafson can be reached by phone at (860) 552-2033 or via email at dgustafson@allpointstech.com.

This protection program consists of several components: education of all contractors and sub-contractors prior to initiation of work on the site; protective measures; periodic inspection of the construction project; and, reporting.

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

    a. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals, but particularly snakes. No permanent erosion control products or reinforced silt fence will be used on the project. Temporary erosion control products will use either erosion control blankets and fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (netless) or netting composed of planar woven natural biodegradable fiber to avoid/minimize wildlife entanglement.

    b. Installation of sedimentation and erosion controls, required for erosion control compliance and creation of a barrier to possible migrating/dispersing turtles, shall be

performed by the Contractor following clearing activities and prior to any earthwork. The Environmental Monitor will inspect the work zone area prior to and following erosion control barrier installation to ensure the area is free of Eastern Box Turtle and document barriers have been satisfactorily installed. The intent of the barrier is to segregate the majority of the work zone and isolate it from foraging/migrating/dispersing turtles, snakes and other herpetofauna. Oftentimes complete isolation of a work zone is not feasible due to accessibility needs and locations of staging/material storage areas, etc. Although the barriers may not completely isolate the work zone, they will be positioned to deflect migrating/dispersal routes away from the work zone to minimize potential encounters with turtles, snakes and other herpetofauna.

c. The Contractor is responsible for daily inspections of the sedimentation and erosion controls for tears or breeches and accumulation levels of sediment, particularly following storm events that generate a discharge. APT will provide periodic inspections of the sedimentation and erosion controls throughout the duration of construction activities only as it pertains to their function as isolation measures for the protection of rare species. Third party monitoring of sedimentation and erosion controls will be performed by other parties, as necessary, under applicable local, state and/or federal regulations.

d. The extent of the sedimentation and erosion controls will be as shown on the site plans. The Contractor shall have additional sedimentation and erosion controls stockpiled on site should field or construction conditions warrant extending the controls as directed by APT or other regulatory agencies.

e. No equipment, vehicles or construction materials shall be stored outside of the sedimentation and erosion controls within 100 feet of wetlands or watercourses.

f. All sedimentation and erosion controls shall be removed within 30 days of completion of work and permanent stabilization of site soils so that reptile and amphibian movement between uplands and wetlands is not restricted.

2. Contractor Education

a. Prior to work on site, the Contractor shall attend an educational session at the pre-construction meeting with APT. This orientation and educational session will consist of an introductory meeting with APT providing photos of Eastern Box Turtle emphasizing the non-aggressive nature of these species and photos of Bobolink, the importance of protecting these animals if they are encountered and the need to follow Protective Measures as described in Section 4 below. Workers will also be provided information regarding the identification of other turtles, snakes and common herpetofauna species that could be encountered. The importance of protecting nearby wetland resources will be stressed as part of this educational session.

b. The education session will also focus on means to discriminate between the species of concern and other native species to avoid unnecessary "false alarms". Encounters with any species of turtles or snakes will be documented.

c. The Contractor will be provided with cell phone and email contacts for APT personnel to immediately report any encounters with Eastern Box Turtle, Bobolink or other species. Educational poster materials will be provided by APT and displayed on the job site to maintain worker awareness as the project progresses.

d. If an Eastern Box Turtle or Bobolink is encountered during construction, the Contractor shall immediately cease all work, avoid disturbance of the animal and contact APT.

3. Petroleum Materials Storage and Spill Prevention

a. Certain precautions are necessary to store petroleum materials, refuel and contain and properly clean up any inadvertent fuel or petroleum (i.e., oil, hydraulic fluid, etc.) spill to avoid possible impact to nearby habitats.

b. A spill containment kit consisting of a sufficient supply of absorbent pads and absorbent material will be maintained by the Contractor at the construction site throughout the duration of the project. In addition, a waste drum will be kept on site to contain any used absorbent pads/material for proper and timely disposal off site in accordance with applicable local, state and federal laws.

c. The following petroleum and hazardous materials storage and refueling restrictions and spill response procedures will be adhered to by the Contractor.

i. Petroleum and Hazardous Materials Storage and Refueling

1. Refueling of vehicles or machinery shall occur a minimum of 100 feet from wetlands or watercourses and shall take place on an impervious pad with secondary containment designed to contain fuels.

2. Any fuel or hazardous materials that must be kept on site shall be stored on an impervious surface utilizing secondary containment a minimum of 100 feet from wetlands or watercourses.

ii. Initial Spill Response Procedures

1. Stop operations and shut off equipment.

2. Remove any sources of spark or flame.

3. Contain the source of the spill.

4. Determine the approximate volume of the spill.

5. Identify the location of natural flow paths to prevent the release of the spill to sensitive nearby waterways or wetlands.

6. Ensure that fellow workers are notified of the spill.

iii. Spill Clean Up & Containment

1. Obtain spill response materials from the on-site spill response kit. Place absorbent materials directly on the release area.

2. Limit the spread of the spill by placing absorbent materials around the perimeter of the spill.

3. Isolate and eliminate the spill source.

4. Contact the appropriate local, state and/or federal agencies, as necessary.

5. Contact a disposal company to properly dispose of contaminated materials in accordance with all local, state and federal regulations.

iv. Reporting

1. Complete an incident report.

2. Submit a completed incident report to the appropriate Municipal Official, Connecticut Siting Council and other applicable local, state and federal officials.

4. Herbicide and Pesticide Restrictions

a. The use of herbicides and pesticides shall be avoided when possible. In the event herbicides and/or pesticides are required at the facility, their use will be used in accordance with Integrated Pest Management ("IPM") principles with particular attention to minimize applications within 100 feet of wetland or watercourse resources. No applications of herbicides or pesticides are allowed within actual wetland or watercourse resources.

5. Eastern Box Turtle Protective Measures

a. Limit tree removal/land clearing activities to the turtle's active season (April 1st to November 1st) to allow the animal to move out of harm's way and minimize mortality to hibernating individuals.

b. Install isolation barriers (e.g., silt fence, animal exclusionary fencing, etc.) prior to the start of tree removal operations.

c. APT will sweep the tree removal area for turtles prior to trees being removed.

d. During the turtle active period and prior to the start of construction each day, the Contractor shall search the entire work area for turtles.

e. If a turtle is found during the active period, it shall be immediately moved, unharmed, by carefully grasped in both hands, one on each side of the shell, between the turtle's forelimbs and the hind limbs, and placed just outside of the isolation barrier in the same approximate direction it was walking.

f. During the active turtle period, special care shall be taken by the Contractor during early morning and evening hours so that possible basking or foraging turtles are not harmed by construction activities.

g. The Contractor shall be particularly diligent during the month of June when turtles are actively selecting nesting sites which results in an increase in turtle movement activity.

6. Bobolink Protective Measures

a. Restrict construction activities outside of the Bobolink's breeding season (May 20 to August 20). Verogy currently anticipates that construction will start after August 20, 2020 but during the late summer/fall 2020 season, which would avoid any potential Bobolink conflicts.

b. If construction starts before, but is anticipated to extend beyond, May 20th (into the Bobolink breeding season), APT will perform a breeding bird survey starting in late May with periodic surveys throughout the duration of construction to document no Bobolink nests are being established. If an active nest is identified, a 400-foot buffer restricting any disturbance would be established around the nest until the juvenile birds have fledged.

c. If construction is proposed to start after May 20th but before August 20th, a bobolink breeding survey would be performed by APT prior to the start of any construction activities. If an active nest is identified, a 400-foot buffer restricting any disturbance

would be established around the nest until the juvenile birds have fledged. If no nest is found, the rules noted in b. above would apply.

d. For maintenance of the facility, mowing activities should be restricted outside of the active Bobolink breeding season (May 20 to August 20).

7. Reporting

e. Daily Compliance Monitoring Reports (brief narrative and applicable photos) documenting each APT inspection will be submitted by APT to Verogy for compliance verification. Any observations of turtles, Bobolink, wetland impacts, or corrective actions will be included in the reports. The reports will document implementation of this Wetland, Eastern Box Turtle and Bobolink protection program, monitoring observations and any species observations. Verogy will provide copies of the Compliance Monitoring Reports to the Connecticut Siting Council for compliance verification.

f. Any observations of Eastern Box Turtle, Bobolink or any other rare species will be reported to CTDEEP by APT on the appropriate special animal reporting form, with photo-documentation (if possible) and specific information on the location and disposition of the animal.

APPENDIX D

DEEP NDDB CORRESPONDENCE

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

March 27, 2020

Dean Gustafson
All-Points Technology Corporation, P.C.
567 Vauxhall Street Extension – Suite 311
Waterford, CT 06385
dgustafson@allpointstech.com

Project: Commercial-scale PV Solar Facility, Bristol Solar One, 399 Hill Street, Bristol
NDDB Determination No.: 202004621

Dear Mr. Gustafson,

I have reviewed Natural Diversity Database (NDDB) maps and files regarding the area of work provided for the proposed Commercial-scale PV Solar Facility, Bristol Solar One, 399 Hill Street, Bristol, Connecticut. According to our records we have known extant populations of State Special Concern Bobolink (*Dolichonyx oryzivorus*) and Eastern box turtle (*Terrapene carolina carolina*) in the vicinity of the project site.

Bobolink: Bobolinks require open grassy areas to forage, breed and nest. Unlike other grassland birds that require large tracts of grassland habitat, the bobolink can successfully breed in grasslands as small as five acres. Its breeding season is approximately May through August and it is during this period that this species is most susceptible to disturbances in its habitat. Minimizing impacts to open fields, meadows and other grassy areas during this time period will likewise minimize impacts to this species. I recommend restricting mowing to either before May 20 or after August 20.

Eastern Box Turtle: Eastern box turtles inhabit old fields and deciduous forests, which can include power lines and logged woodlands. They are often found near small streams and ponds. The adults are completely terrestrial but the young may be semiaquatic, and hibernate on land by digging down in the soil from October to April. They have an extremely small home range and can usually be found in the same area year after year. Eastern box turtles have been negatively impacted by the loss of suitable habitat. Some turtles may be killed directly by construction activities, but many more are lost when important habitat areas for shelter, feeding, hibernation, or nesting are destroyed. As remaining habitat is fragmented into smaller pieces, turtle populations can become small and isolated. Reducing the frequency that motorized vehicles enter box turtle habitat would be beneficial in minimizing direct mortality of adults.

Recommended Protection Strategies for Eastern Box Turtles:

- Limiting tree removal/land clearing to the turtle's active season, April 1 to November 1. Conducting land clearing while the turtle is active will allow the animal to move out of harm's way and minimize mortality to hibernating individuals.
- The clearing crew should be provided a description of the species and alerted to its possible presence in the project area.
- The immediate area to be harvested/cleared each day should be searched for turtles prior to work starting.
- The immediate area around staged equipment (located in box turtle habitat) should be searched each day prior to work starting to ensure that turtles are not run over.

- Any turtles encountered during construction should be moved out of the way, just outside of the work area. This animal is protected by law and should never be taken off site.
- Work conducted during the early morning and evening hours should occur with special care not to harm basking or foraging individuals.

If these protection strategies are followed then the proposed activities will lessen the potential impact on these state-listed species. This determination is good for two years. Please re-submit a new NDDB Request for Review if the scope of work changes or if work has not begun on this project by March 27, 2022.

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, cooperating units of DEEP, landowners, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the NDDB should not be substitutes for on-site surveys necessary for a thorough environmental impact assessment. 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 database as it becomes available.

Please contact me if you have further questions at (860) 424-3090, or DEEP.Nddbrequest@ct.gov. Thank you for consulting the Natural Diversity Database.

Sincerely,

/s/ Geoffrey Krukar
Wildlife Biologist

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

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

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

Please complete this form in accordance with the instructions (DEEP-INST-007) to ensure proper handling of your request.
There are no fees associated with NDDB Reviews.

Part I: Preliminary Screening & Request Type

Before submitting this request, you must review the most current Natural Diversity Data Base "State and Federal Listed Species and Significant Natural Communities Maps" found on the DEEP website. These maps are updated twice a year, usually in June and December.

Does your site, including all affected areas, fall in an NDDB Area according to the map instructions:

☒ Yes ☐ No **Enter the date** of the map reviewed for pre-screening: **December 2019**

This form is being submitted for a :

☒ *New* NDDB request ☐ *Renewal/Extension* of a NDDB Request, ***without*** *modifications and within* ***two years*** *of issued NDDB determination* (no attachments required) [*CPPU Use Only - NDDB-Listed Species Determination* # 1736]	☐ *New* **Safe Harbor Determination** (optional) must be associated with an application for a GP for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities ☐ *Renewal/Extension* of an existing Safe Harbor Determination ☐ With modifications ☐ Without modifications (no attachments required) [*CPPU Use Only - NDDB-Safe Harbor Determination* # 1736]
Enter NDDB Determination Number for Renewal/Extension:	Enter Safe Harbor Determination Number for Renewal/Extension:

Part II: Requester Information

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

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

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

1. Requester*

Company Name: **Verogy, LLC**

Contact Name: **Steven DeNino, COO**

Address: **150 Trumbull Street, 4th Floor**

City/Town: **Hartford** State: **CT** Zip Code: **06103**

Business Phone: **(860) 288-7215** ext. **702**

E-mail: **sdenino@verogy.com

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

a) Requester can best be described as:

☐ Individual ☐ Federal Agency ☐ State agency ☐ Municipality ☐ Tribal

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

i) Check type ☐ corporation ☒ limited liability company ☐ limited partnership ☐ limited liability partnership ☐ statutory trust ☐ Other:

ii) Provide Secretary of the State Business ID #: 1323955 This information can be accessed at the Secretary of the State's database (CONCORD). (www.concord-sots.ct.gov/CONCORD/index.jsp)

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

b) Acting as (Affiliation), pick one:

☐ Property owner ☐ Consultant ☐ Engineer ☐ Facility owner ☒ Applicant

☐ Biologist ☐ Pesticide Applicator ☐ Other representative:

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

Company Name: **All-Points Technology Corporation, P.C.**

Contact Person: **Dean Gustafson** Title: **Senior Biologist**

Mailing Address: **567 Vauxhall Street Extension – Suite 311**

City/Town: **Waterford** State: **CT** Zip Code: **06385**

Business Phone: **(860) 552-2033** ext.

E-mail: **dgustafson@allpointstech.com

Part III: Site Information

This request can only be completed for one site. A separate request must be filed for each additional site.

1. SITE NAME AND LOCATION

Site Name or Project Name: **Bristol Solar One**

Town(s): **Bristol**

Street Address or Location Description:
399 Hill Street

Size in acres, or site dimensions: **Property: ±28 acres; Project Area: ±13 acres**

Latitude and longitude of the center of the site in decimal degrees (e.g., 41.23456 -71.68574):

Latitude: **41.69089°** Longitude: **-72.97909°**

Method of coordinate determination (check one):

☐ GPS ☒ Photo interpolation using CTECO map viewer ☐ Other (specify):

2a. Describe the current land use and land cover of the site.

The site is currently in agricultural use which consists of cultivated fields, hay field and fallow old fields areas. Successional forested/scrub/shrub transitional areas are located along the west and south sides of the site. Wetland areas are located in the western end of the site along with the headwaters to a narrow wetland feature that extends to the south off site and a seasonal intermittent watercourse in the eastern portion of the property.

b. Check all that apply and enter the size in acres or % of area in the space after each checked category.

☐ Industrial/Commercial _____ ☐ Residential _____ ☒ Forest 10%

☒ Wetland 15% ☒ Field/grassland 80% ☒ Agricultural 100%

☐ Water _____ ☐ Utility Right-of-way _____

☐ Transportation Right-of-way _____ ☒ Other (specify): **10% scrub/shrub**

Part IV: Project Information

1. PROJECT TYPE:

Choose Project Type: Other , If other describe: **Commercial-scale PV Solar Facility**

2. Is the subject activity limited to the maintenance, repair, or improvement of an existing structure within the existing footprint? ☐ Yes ☒ No If yes, explain.

Part IV: Project Information (continued)

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

   Verogy is proposing the construction of a 370W Solar Energy Generation Facility to be generally located within an existing open field located in the central portion of the subject property. Access to the facility will use an existing paved and gravel road located along the north property boundary from Hill Street.

   Typical equipment anticipated to be used include trucks of varying sizes, excavators, bulldozers, forklifts, and other equipment necessary for the clearing of vegetation, installation of gravel access drive, movement of materials, installation of racking foundation system and solar panels, electrical conduits and limited grading for the solar array development footprint.

   Erosion control measures will follow the CTDEEP 2002 Connecticut Guidelines for Soil Erosion and Sediment Control and stormwater will be treated in accordance with the CTDEEP 2004 Connecticut Stormwater Quality Manual.

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

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

   Name:

   Phone:

   E-mail:

Part V: Request Requirements and Associated Application Types

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

Group 1. If you check one of these boxes, complete Parts I – VII of this form and submit the required attachments A and B.

- ☐ Preliminary screening was negative but an NDDB review is still requested
- ☐ Request regards a municipally regulated or unregulated activity (no state permit/certificate needed)
- ☐ Request regards a preliminary site assessment or project feasibility study
- ☐ Request relates to land acquisition or protection
- ☐ Request is associated with a *renewal* of an existing permit or authorization, with no modifications

Group 2. If you check one of these boxes, complete Parts I – VII of this form and submit required attachments A, B, *and* C.

- ☒ Request is associated with a *new* state or federal permit or authorization application or registration
- ☐ Request is associated with modification of an existing permit or other authorization
- ☐ Request is associated with a permit enforcement action
- ☐ Request regards site management or planning, requiring detailed species recommendations
- ☐ Request regards a state funded project, state agency activity, or CEPA request

☐ **Group 3.** If you are requesting a **Safe Harbor Determination**, complete Parts I-VII and submit required attachments A, B, and D. Safe Harbor determinations can only be requested if you are applying for a GP for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities

If you are filing this request as part of a state or federal permit application(s) enter the application information below.

Permitting Agency and Application Name(s):
Connecticut Siting Council, Petition for a Declaratory Ruling & CTDEEP Construction Stormwater General Permit

Related State DEEP Permit Number(s), if applicable: **N/A**

State DEEP Enforcement Action Number, if applicable: **N/A**

State DEEP Permit Analyst(s)/Engineer(s), if known: **N/A**

Is this request related to a previously submitted NDDB request? ☐ Yes ☒ No

If yes, provide the previous NDDB Determination Number(s), if known: _____

Part VI: Supporting Documents

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

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

Part VII: Requester Certification

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

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief."

Dean Gustafson Signature of Requester (a typed name will substitute for a handwritten signature)	**February 24, 2020** Date
Dean Gustafson, APT, Agent for Verogy, LLC Name of Requester (print or type)	Title (if applicable)
Dean Gustafson Signature of Preparer (if different than above)	**February 24, 2020** Date
Dean Gustafson, All-Points Technology Corp. Name of Preparer (print or type)	**Senior Biologist** Title (if applicable)

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

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

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

Attachment C: Supplemental Information, Group 2 requirement

Section i: Supplemental Site Information

1. Existing Conditions

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

The proposed solar facility would be located within an existing open field, comprised of a cultivated field, a hayfield and an overgrown fallow field, that will require minimial grading and vegetation removal. No wetlands or watercourses will be permanently impacted by the proposed solar facility and generally a minimum 100-foot buffer would be provided from the fenced facility and nearest wetland resource.

☒ **Site Photographs (optional) attached**

☒ **Site Plan/sketch of existing conditions attached**

2. Biological Surveys

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

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

Biologist(s) name: _____

Habitat and/or species targeted by survey: _____

Dates when surveys were conducted: _____

☐ **Reports of biological surveys attached**

☐ **Documentation of biologist's qualifications attached**

☐ **NDDB Survey forms for any listed species observations attached**

Section ii: Supplemental Project Information

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

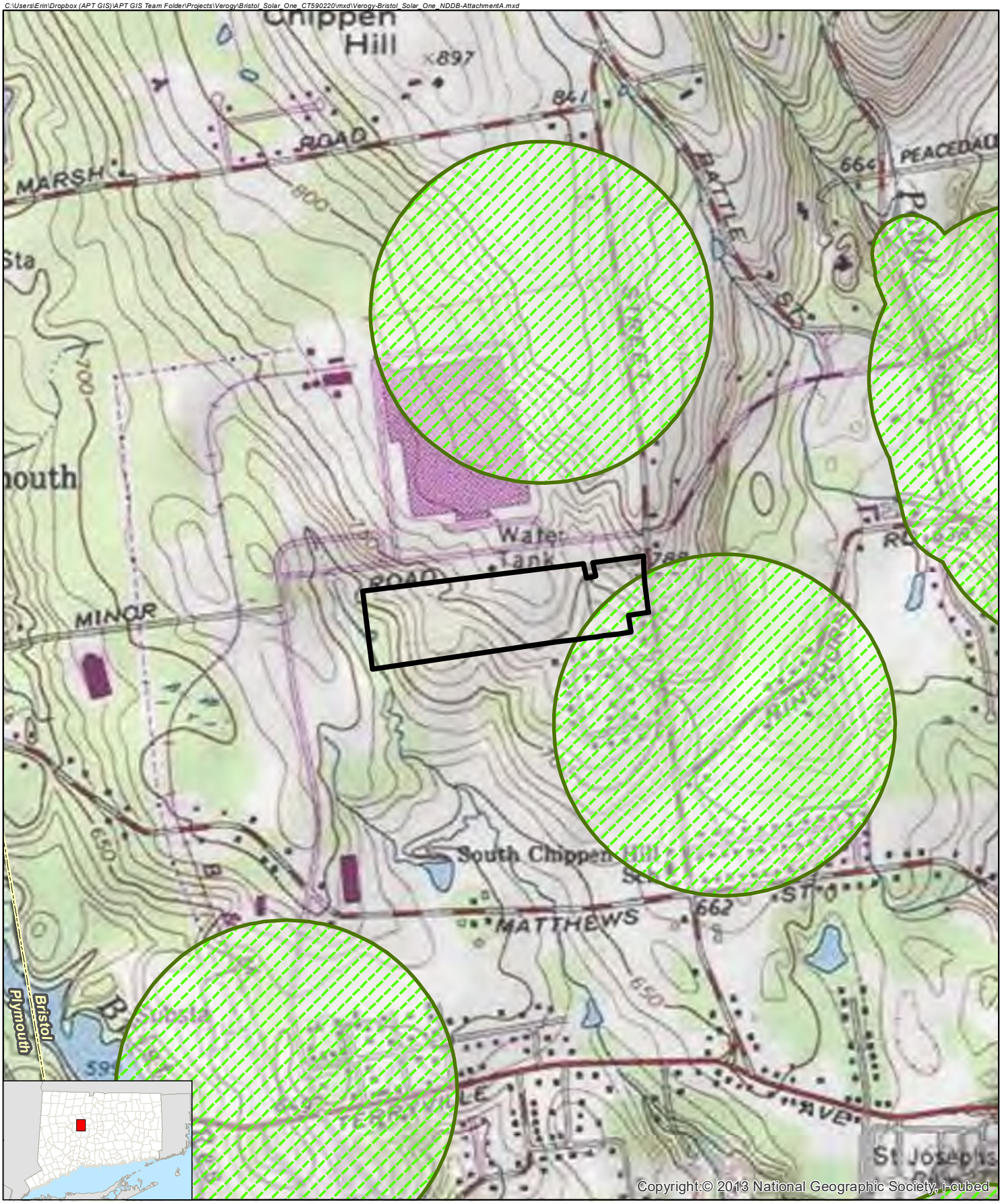
   The proposed construction project is anticipated to extend over a period of 6 to 9 months. Construction would start once approval is granted by the Connecticut Siting Council, DEEP and other reviewing agencies.

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

   With the proposed solar facility being located within an open field, minimal grading and vegetation clearing is anticipated with most of the clearing associated with scrub/shrub and early successional forest in the western portion of the site.

☒ **Annotated Site Plan attached**

C:\Users\Erin\Dropbox (APT GIS)\APT GIS Team Folder\Projects\Verogy\Bristol_Solar_One_CT590220\mxd\Verogy-Bristol_Solar_One_NDDB-AttachmentA.mxd



Legend

- Site
- Natural Diversity Database Area (Dec. 2019)

NDDB Attachment A
Overview Map

Proposed Solar Facility - Bristol Solar One
399 Hill Street
Bristol, Connecticut

N
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Feet

VERO GY

ALL-POINTS TECHNOLOGY CORPORATION

Map Notes:
Base Map Source: USGS 7.5 Minute Topographic Quadrangle Maps: Bristol (1984), CT
Map Scale: 1:24,000
Map Date: January 2020

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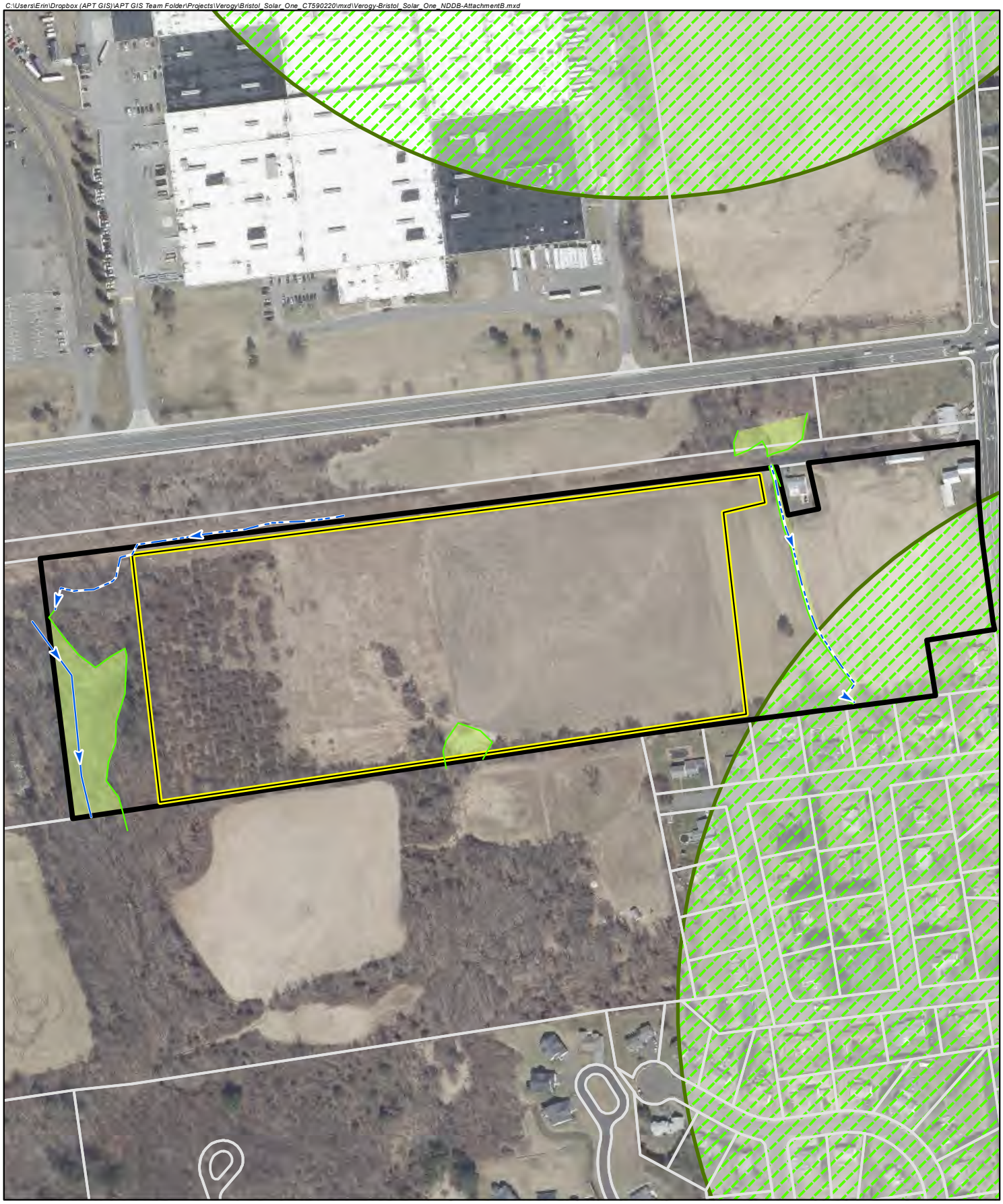

Legend

- Site
- Approximate Parcel Boundary (CTDEEP)
- Project Location
- Natural Diversity Database Area (Dec. 2019)
- Delineated Wetland Boundary
- Delineated Wetland Area
- Intermittent Watercourse
- Perennial Watercourse

N
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300 150 0 300
Feet

Map Notes:
Base Map Source: CTECO 2019 Aerial Photograph
Map Scale: 1 inch = 300 feet
Map Date: January 2020

NDDB Attachment B
Detailed Site Map

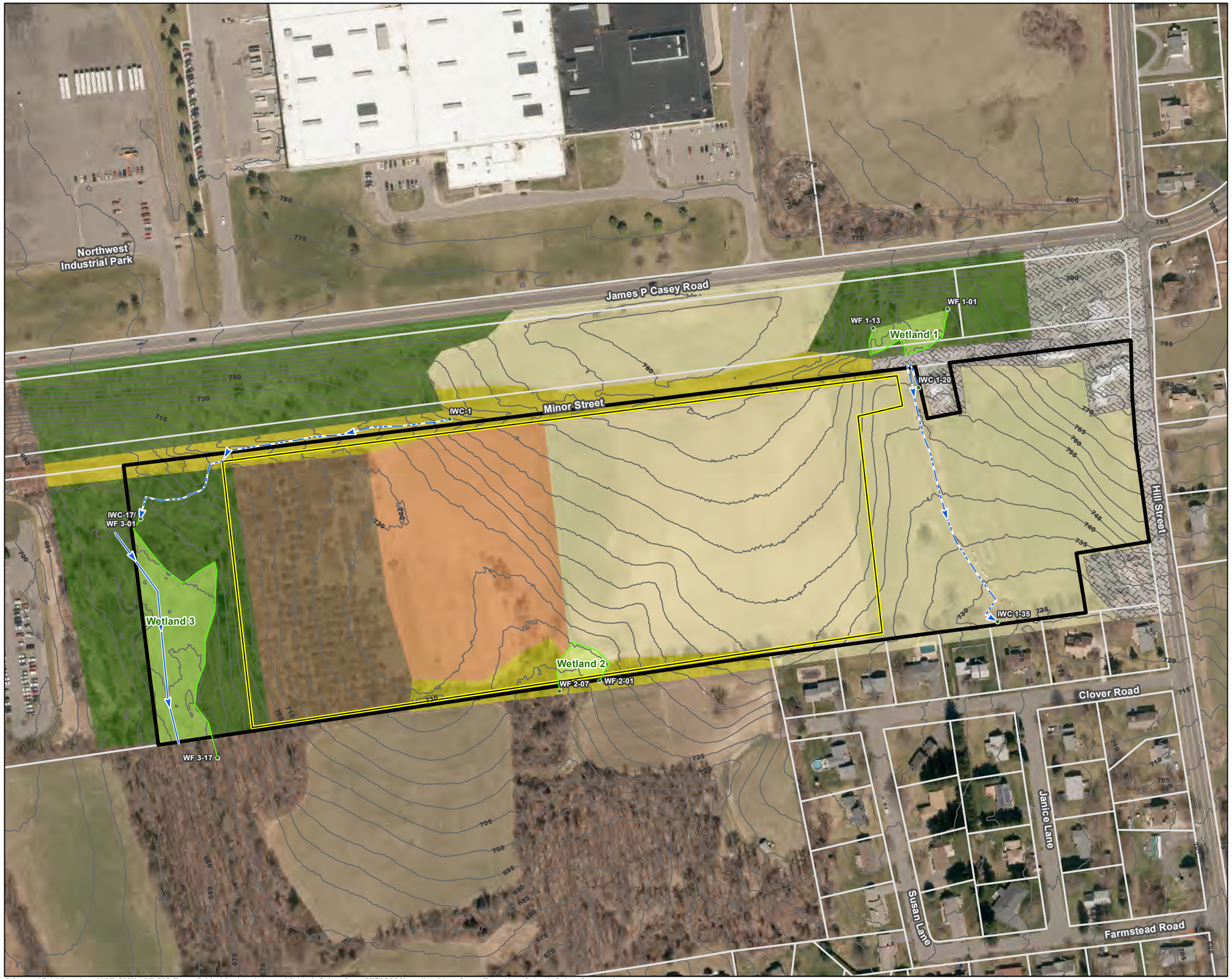
Proposed Solar Facility - Bristol Solar One
399 Hill Street
Bristol, Connecticut

VEROGY

ALL-POINTS TECHNOLOGY CORPORATION

Habitat Cover Type Map
Proposed Solar Facility - Bristol Solar One
399 Hill Street
Bristol, Connecticut

VERGY



Legend

- Site
- Project Location
- Approximate Parcel Boundary (CTDEEP)
- Delineated Wetland/Watercourse Flag
- Delineated Wetland Boundary
- Intermittent Watercourse
- Perennial Watercourse

Habitat Cover Type

- Developed
- Forested/Wetland Forest
- Old Field
- Open Field
- Transitional Scrub/Shrub
- Woodland
- Delineated Wetland Area

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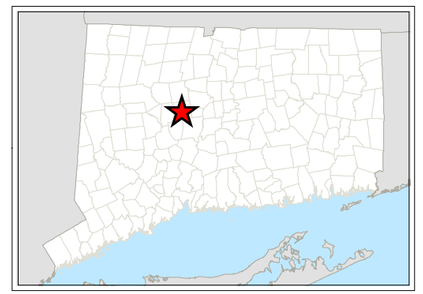
200 100 0 200 Feet

1 in = 200 ft



ALL-POINTS TECHNOLOGY CORPORATION

Map Sources:

Ortho Base Map: CT ECO 2016 Aerial Imagery

Wetlands field delineated by:
Matthew Gustafson, Registered Soil Scientist, APT, 11/08/2019

Elevation contours derived from 2016 LiDAR data provided by CTECO

Map Date: November 2019

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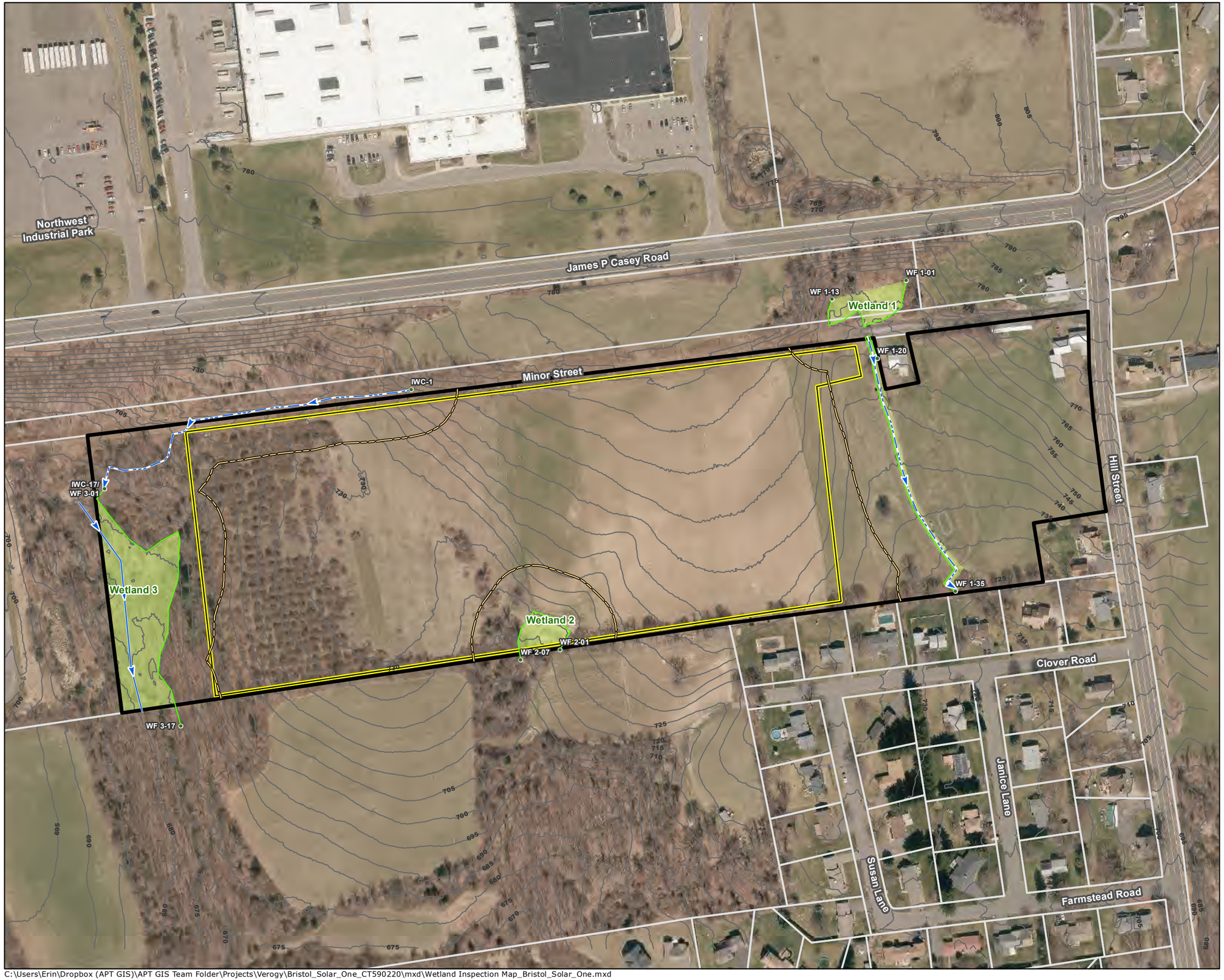
Wetland Inspection Map
Proposed Solar Facility - Bristol Solar One
399 Hill Street
Bristol, Connecticut

VERGY



Legend

- Site
- Project Location
- Approximate Parcel Boundary (CTDEEP)
- Delineated Wetland/Watercourse Flag
- Delineated Wetland Boundary
- Intermittent Watercourse
- Perennial Watercourse
- 100' Upland Review Area

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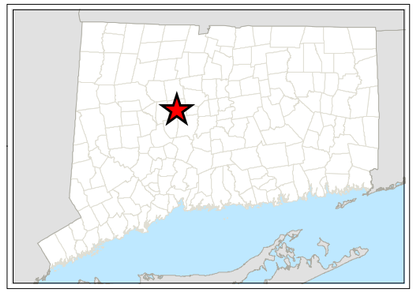
1 in = 200 ft



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Data layers are maintained and updated by CTDEEP and represent the most recent publications.

Map Date: November 2019

C:\Users\Erin\Dropbox (APT GIS)\APT GIS Team Folder\Projects\Verogy\Bristol_Solar_One_CT590220\mxd\Wetland Inspection Map_Bristol_Solar_One.mxd

DESIGN TABLE:

MODULE MODEL - EAGLE 72HM G2

MODULE WATTAGE - 370W

PROP. TILT - 25 DEGREES

INTER-ROW SPACING - 12 FEET

PROP. AZIMUTH - ±7 DEGREES

1 / CP-1 **CONCEPT PLAN**

SCALE : 1" = 80'-0"

80 0 40 80 160

(IN FEET) 1 inch = 80 ft.

VEROGY

ALL-POINTS TECHNOLOGY CORPORATION

567 VAUXHAUL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CONCEPT

NO	DATE	REVISION
0	11/13/19	FOR REVIEW: BJP
1	01/23/20	FOR REVIEW: BJP
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD

PROF: BRADLEY J. PARSONS P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION
ADD: 3 SADDLEBROOK DRIVE KILLINGWORTH, CT 06419

OWNER: ----

ADDRESS: ----

BRISTOL SOLAR ONE

SITE ADDRESS: 399 HILL STREET BRISTOL, CT

APT FILING NUMBER: CT590220

DRAWN BY: JT

DATE: 11/13/19 CHECKED BY: BJP

SHEET TITLE:

CONCEPT PLAN

SHEET NUMBER:

CP-1

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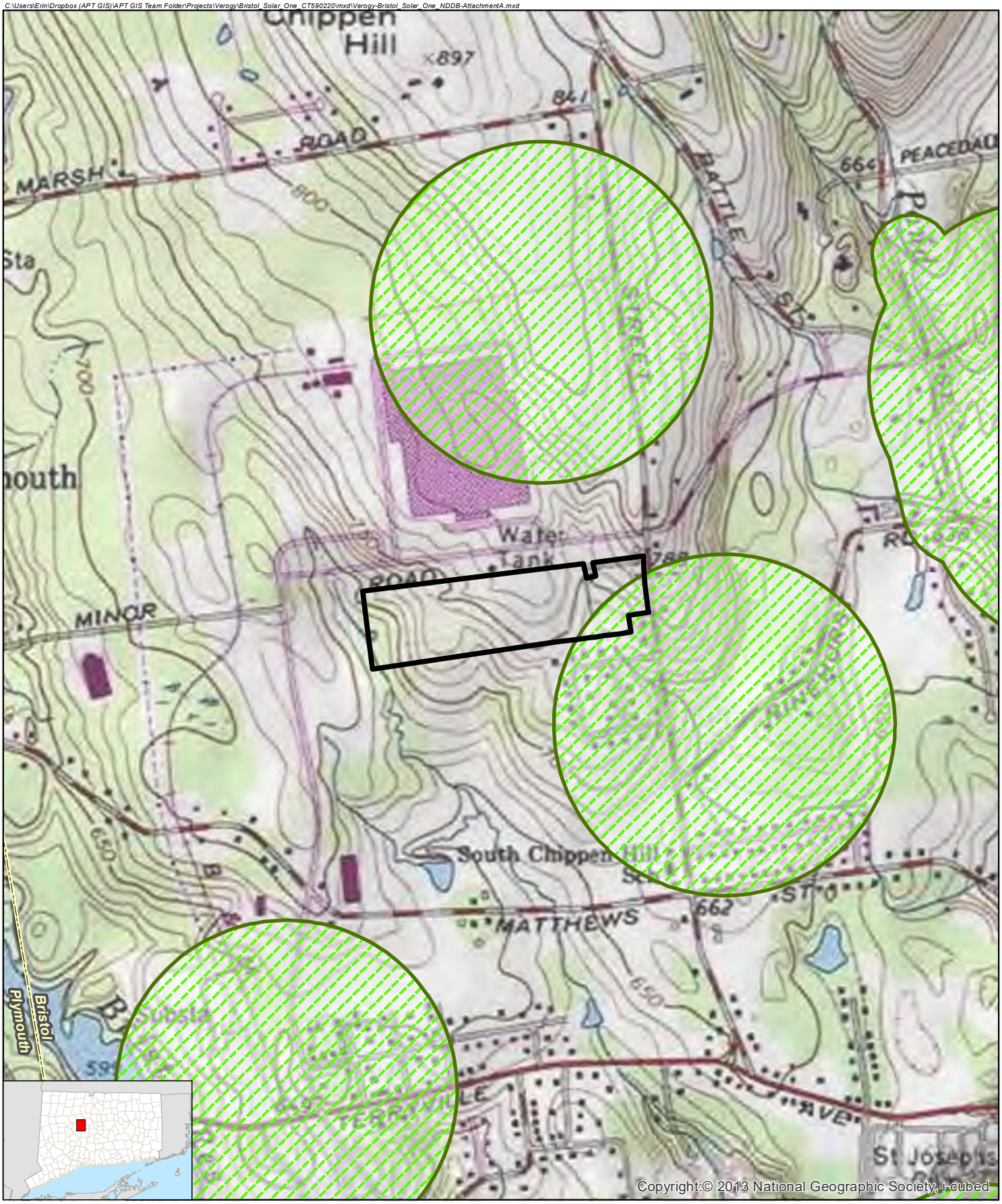

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VERO GY
ALL-POINTS TECHNOLOGY CORPORATION

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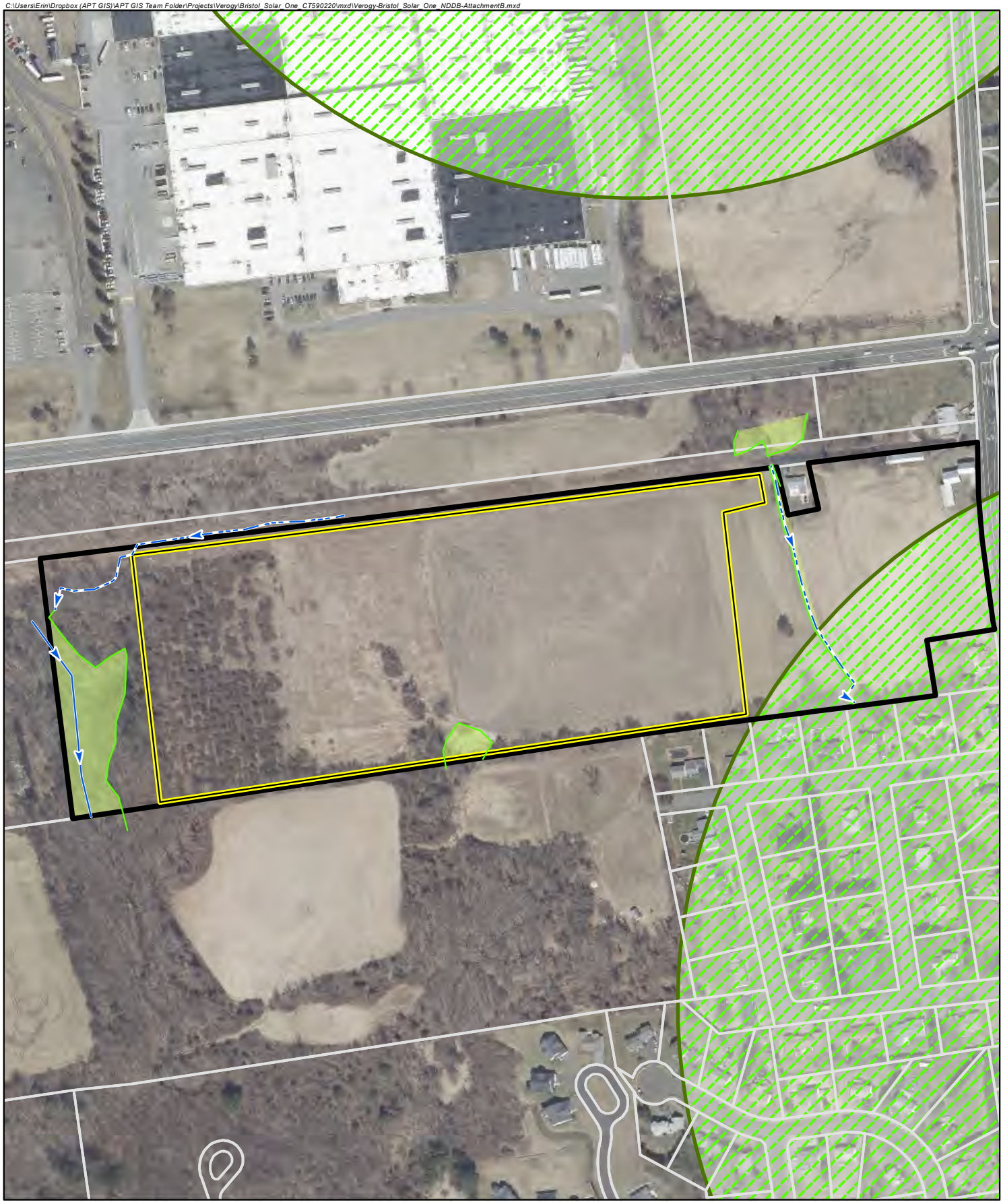

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Detailed Site Map

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399 Hill Street
Bristol, Connecticut

VEROGY

ALL-POINTS TECHNOLOGY CORPORATION

Habitat Cover Type Map
Proposed Solar Facility - Bristol Solar One
399 Hill Street
Bristol, Connecticut

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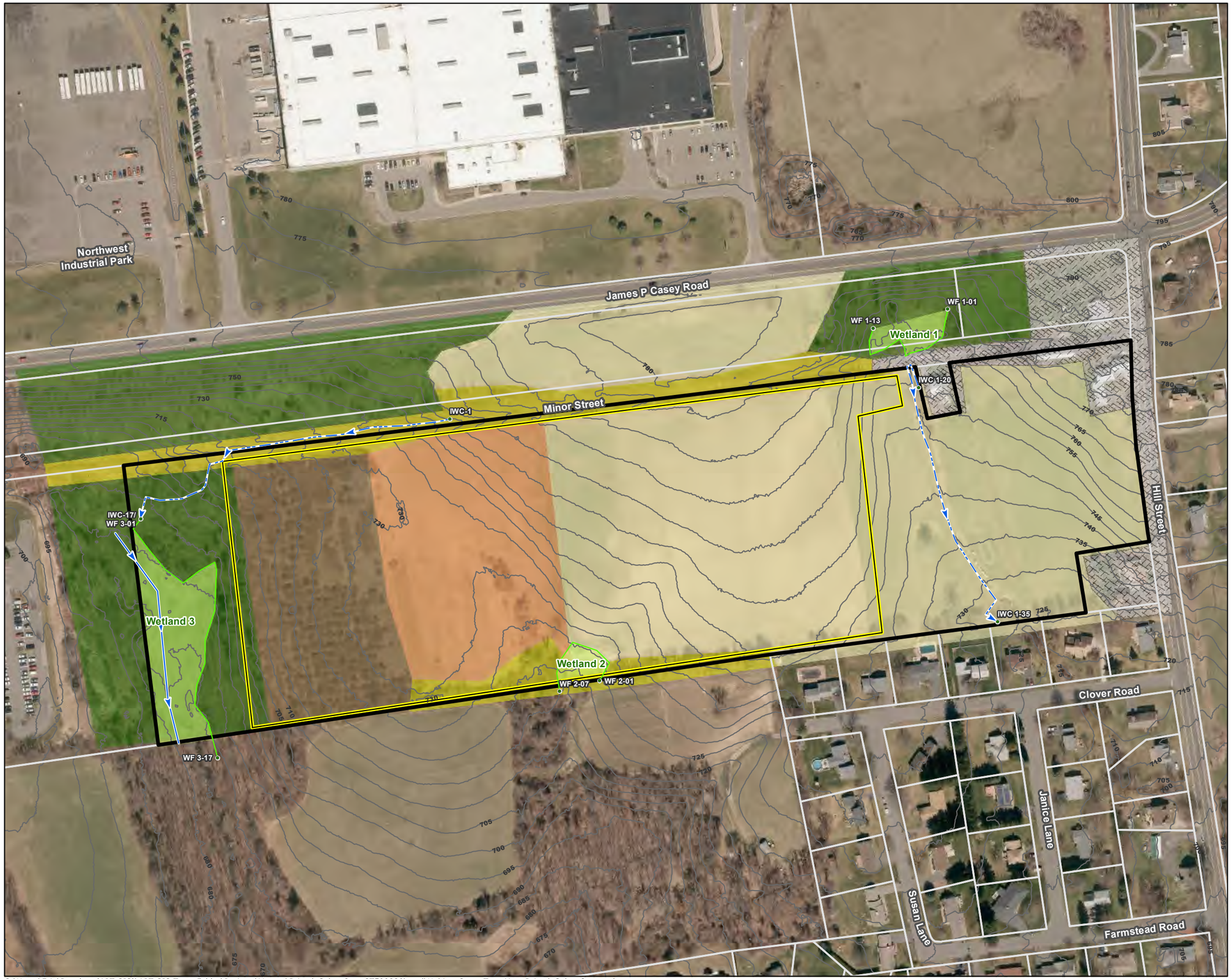

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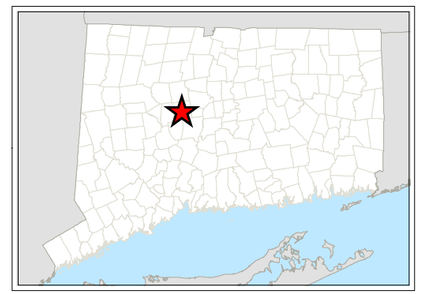

ALL-POINTS TECHNOLOGY CORPORATION

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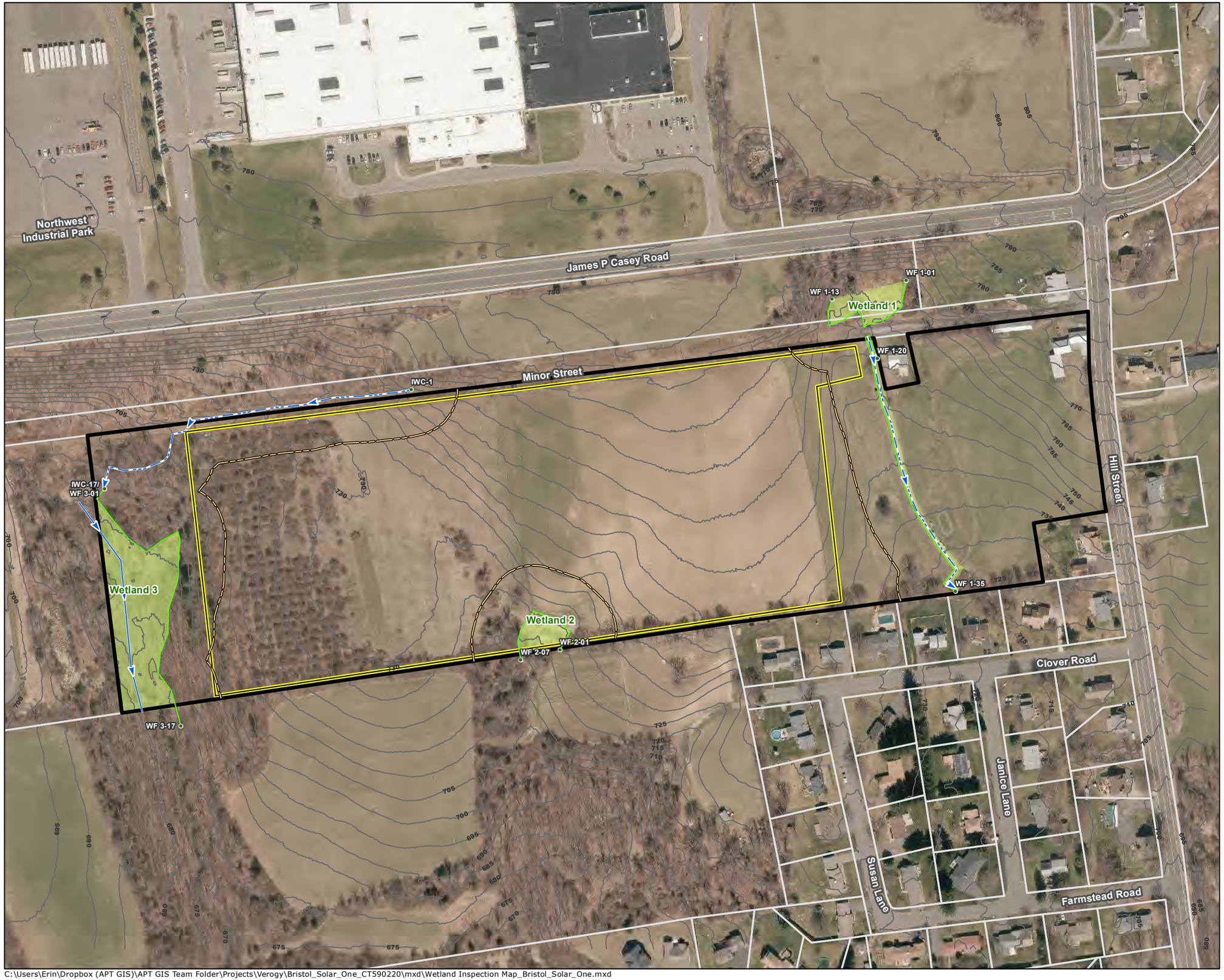

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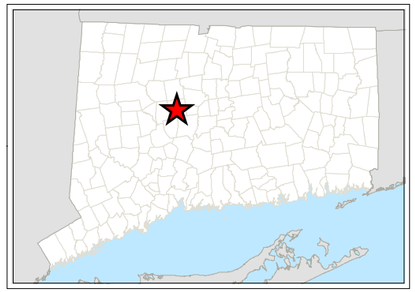

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WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CONCEPT

NO	DATE	REVISION
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DESIGN PROFESSIONAL OF RECORD

PROF: BRADLEY J. PARSONS P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION
ADD: 3 SADDLEBROOK DRIVE KILLINGWORTH, CT 06419

OWNER: ----

ADDRESS: ----

BRISTOL SOLAR ONE

SITE ADDRESS: 399 HILL STREET BRISTOL, CT

APT FILING NUMBER: CT590220

DRAWN BY: JT

DATE: 11/13/19 CHECKED BY: BJP

SHEET TITLE:

CONCEPT PLAN

SHEET NUMBER:

CP-1

PHOTO DOCUMENTATION
Verogy, LLC Bristol Solar One Facility
399 Hill Street, Bristol, CT
Photos taken on May 29, 2019

Photo 1: Overview of hayfield and proposed solar facility area looking northeast.

Photo 2: View of east end hayfield and proposed solar facility area looking northeast at existing access road on north side of residence.

Photo 3: View of Wetland 1 (channelized intermittent watercourse) looking south with hay field and proposed solar facility in right side of photo.

Photo 4: View of Wetland 2 (reed canary grass area) looking north with hayfield and proposed solar facility area in background.

Photo 5: View of Wetland 3 looking east.

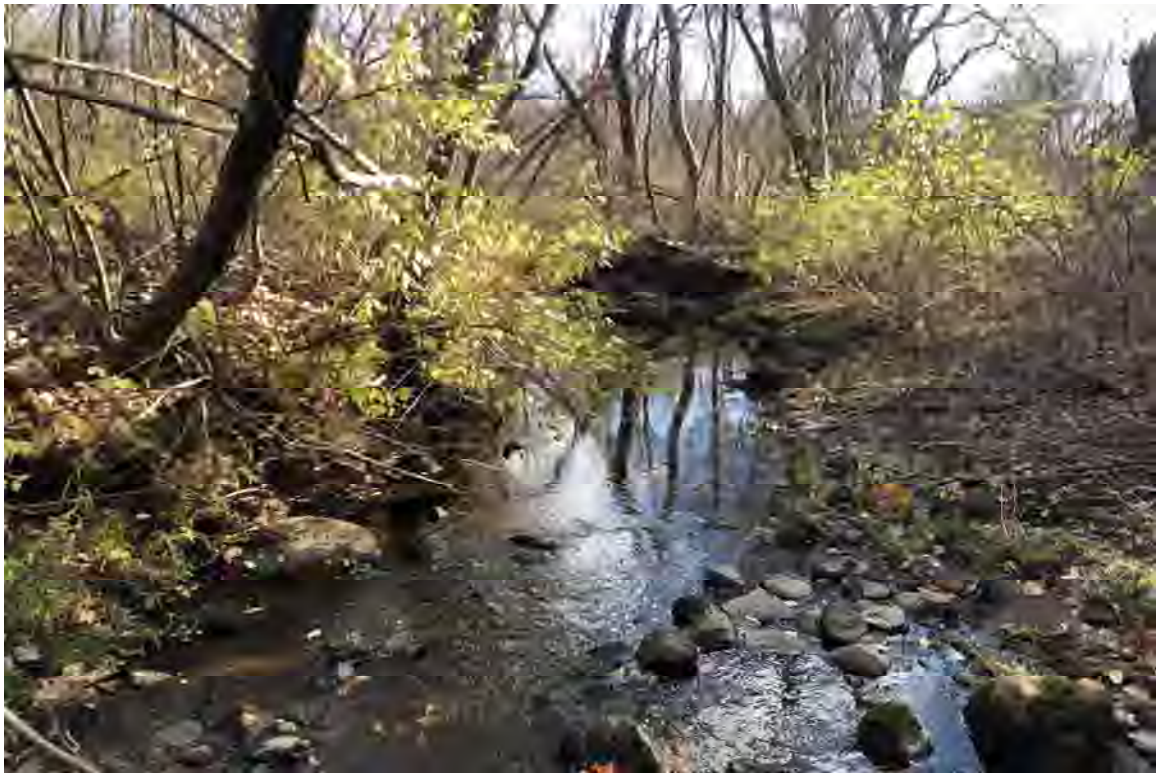

Photo 6: View of stream interior to Wetland 3 looking south.

APPENDIX E

USFWS/NDDB COMPLIANCE STATEMENT

USFWS & NDDB Compliance Determination

March 24, 2020

Mr. Steven DeNino, COO
Verogy
150 Trumbull Street, 4th Floor
Hartford, CT 06103

Re: Bristol Solar One, 399 Hill Street, Bristol, CT
APT Job No: CT590220

On behalf of Verogy, All-Points Technology Corporation, P.C. ("APT") performed an evaluation with respect to possible federally- and state-listed, threatened, endangered or special concern species in order to determine if the proposed referenced solar energy generation facility ("Facility") would result in a potential adverse effect to listed species.

APT understands that Verogy proposes the construction of a solar energy generation facility to be generally located on a rectangularly shaped parcel that consists of ±26.9 acres of mostly undeveloped agricultural land, with a small portion of the western extent of the site being wooded located at 399 Hill Street in Bristol, Connecticut ("Subject Property").

USFWS

The federal consultation was completed in accordance with Section 7 of the Endangered Species Act through the U.S. Fish and Wildlife Service's ("USFWS") Information, Planning, and Conservation System ("IPaC"). Based on the results of the IPaC review, one federally listed[1] threatened species is known to occur in the vicinity of the subject property documented as the northern long-eared bat ("NLEB"; *Myotis septentrionalis*). As a result of this preliminary finding, APT performed an evaluation to determine if the proposed referenced Facility would result in a likely adverse effect to NLEB.

The proposed Facility would be located within mostly undeveloped agricultural land, with a small portion of the western extent of the site being wooded and will require some forest clearing that could potentially impact NLEB habitat. A review of the Connecticut Department of Energy & Environmental Protection ("CTDEEP") Wildlife Division Natural Diversity Data Base ("NDDB") NLEB habitat map[2] revealed that the proposed Facility is not within 150 feet of a known occupied NLEB maternity roost tree and is not within 0.25 mile of a known NLEB hibernaculum. The nearest NLEB habitat resource to the proposed Facility is located ±8.3 miles to the northwest in Litchfield.

[1] Listing under the federal Endangered Species Act

[2] *Northern long-eared bat areas of concern in Connecticut to assist with Federal Endangered Species Act Compliance* map. February 1, 2016.

APT submitted the effects determination using the NLEB key within the IPaC system for the proposed Facility (the "Action"). This IPaC key assists users in determining whether a Federal action is consistent with the activities analyzed in the USFWS's January 5, 2016, intra-Service Programmatic Biological Opinion ("PBO") on the Final 4(d) Rule for the NLEB for Section 7(a)(2) compliance.

Based upon the IPaC submission, the Action is consistent with activities analyzed in the PBO; please refer to the enclosed February 10, 2020 USFWS letter. The Action may affect NLEB; however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). If the USFWS does not respond within 30 days from the date of the letter (February 10, 2020), one may presume that the IPaC-assisted determination was correct and that the PBO satisfies and concludes Verogy's responsibilities for this Action under ESA Section 7(a)(2) with respect to NLEB. No response was received from USFWS; therefore, the Action complies with ESA Section 7(a)(2) with respect to NLEB.

In addition, Verogy would consider the following additional recommended voluntary measures for NLEB conservation, as encouraged in the April 29, 2016 FCC Public Notice[3], where applicable and as the project schedule allows.

- Conduct tree removal activities outside of the NLEB pup season (June 1-July 31) and active season (April 1-October 31) to minimize impacts to pups at roosts not yet identified.
- Avoid clearing suitable spring staging and fall swarming habitat within a five-mile radius of known or assumed NLEB hibernacula during the staging and swarming seasons (April 1-May 15 and August 15-November 14, respectively). *Not applicable: site is located > 5 miles from the nearest hibernacula.*
- Maintain dead trees (snags) and large trees when possible.
- Use herbicides and pesticides only if unavoidable. If necessary, spot treatment is preferred over aerial application.
- Minimize exterior lighting, opting for down-shielded, motion-sensor security lights instead of constant illumination.

NDDB

No known areas of state-listed species are currently depicted on the most recent DEEP NDDB Maps in the location of the proposed Facility. However, the southeastern corner of the Subject Property is located within a NDDB buffer area. Since the NDDB buffer area is located less than a 0.25-mile away, DEEP NDDB was consulted in accordance with the Connecticut Siting Council's review policy.

DEEP issued a March 27, 2020 determination letter indicating that two State-listed Special Concern Species are known to occur in the vicinity of the Facility: Eastern Box Turtle (*Terrapene carolina carolina*) and Bobolink (*Dolichonyx oryzivorus*). DEEP recommended protection strategies for Eastern Box Turtle and time of year restriction for Bobolink (May 20 through August 20); please refer to the enclosed letter. Verogy is committed to protecting these species during construction that is consistent with the recommendations to avoid potential impact to these State-listed species. Details of these protection measures are provided in a Resources Protection Plan and included as environmental notes on the project's construction drawings, provided under separate cover.

[3] Federal Communications Commission. *Tower Construction Guidance for Protection of Northern Long-Eared Bat Under the Endangered Species Act*. Public Notice DA 16-476. April 29, 2016.

Therefore, with implementation of these protective measures the proposed Facility is not anticipated to adversely impact any federal or state threatened, endangered or species of special concern.

Sincerely,
All-Points Technology Corporation, P.C.

Dean Gustafson
Senior Biologist

Enclosures

USFWS NLEB Letter

United States Department of the Interior

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

IPaC Record Locator: 523-20207256 February 10, 2020

Subject: Consistency letter for the 'Verogy Bristol Solar One' project indicating that any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).

Dear Deborah Gustafson:

The U.S. Fish and Wildlife Service (Service) received on February 10, 2020 your effects determination for the 'Verogy Bristol Solar One' (the Action) using the northern long-eared bat (*Myotis septentrionalis*) key within the Information for Planning and Consultation (IPaC) system. You indicated that no Federal agencies are involved in funding or authorizing this Action. This IPaC key assists users in determining whether a non-Federal action may cause "take"[1] of the northern long-eared bat that is prohibited under the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based upon your IPaC submission, any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the Action is not likely to result in unauthorized take of the northern long-eared bat.

Please report to our office any changes to the information about the Action that you entered into IPaC, the results of any bat surveys conducted in the Action area, and any dead, injured, or sick northern long-eared bats that are found during Action implementation.

If your Action proceeds as described and no additional information about the Action's effects on species protected under the ESA becomes available, no further coordination with the Service is required with respect to the northern long-eared bat.

---

[1]Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct [ESA Section 3(19)].

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Verogy Bristol Solar One

2. Description

The following description was provided for the project 'Verogy Bristol Solar One':

> Verogy is proposing the construction of a solar energy generation facility to be generally located within the extents of an existing open field off Hill Street in Bristol, CT. Access to the facility will be along an existing gravel access road.

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/41.690961234648896N72.97848431239149W

Determination Key Result

This non-Federal Action may affect the northern long-eared bat; however, any take of this species that may occur incidental to this Action is not prohibited under the final 4(d) rule at 50 CFR §17.40(o).

Determination Key Description: Northern Long-eared Bat 4(d) Rule
This key was last updated in IPaC on **May 15, 2017**. Keys are subject to periodic revision.

This key is intended for actions that may affect the threatened northern long-eared bat.

The purpose of the key for non-Federal actions is to assist determinations as to whether proposed actions are excepted from take prohibitions under the northern long-eared bat 4(d) rule.

If a non-Federal action may cause prohibited take of northern long-eared bats or other ESA-listed animal species, we recommend that you coordinate with the Service.

Determination Key Result

Based upon your IPaC submission, any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).

Qualification Interview

1. Is the action authorized, funded, or being carried out by a Federal agency?

   No

2. Will your activity purposefully **Take** northern long-eared bats?

   No

3. Is the project action area located wholly outside the White-nose Syndrome Zone?

   Automatically answered
   No

4. Have you contacted the appropriate agency to determine if your project is near a known hibernaculum or maternity roost tree?

   Location information for northern long-eared bat hibernacula is generally kept in state Natural Heritage Inventory databases – the availability of this data varies state-by-state. Many states provide online access to their data, either directly by providing maps or by providing the opportunity to make a data request. In some cases, to protect those resources, access to the information may be limited. A web page with links to state Natural Heritage Inventory databases and other sources of information on the locations of northern long-eared bat roost trees and hibernacula is available at www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html.

   Yes

5. Will the action affect a cave or mine where northern long-eared bats are known to hibernate (i.e., hibernaculum) or could it alter the entrance or the environment (physical or other alteration) of a hibernaculum?

   No

6. Will the action involve Tree Removal?

   Yes

7. Will the action only remove hazardous trees for the protection of human life or property?

   No

8. Will the action remove trees within 0.25 miles of a known northern long-eared bat hibernaculum at any time of year?

   No

9. Will the action remove a known occupied northern long-eared bat maternity roost tree or any trees within 150 feet of a known occupied maternity roost tree from June 1 through July 31?

   No

Project Questionnaire

If the project includes forest conversion, report the appropriate acreages below. Otherwise, type '0' in questions 1-3.

1. Estimated total acres of forest conversion:

2.89

2. If known, estimated acres of forest conversion from April 1 to October 31

2.89

3. If known, estimated acres of forest conversion from June 1 to July 31

2.89

If the project includes timber harvest, report the appropriate acreages below. Otherwise, type '0' in questions 4-6.

4. Estimated total acres of timber harvest

0

5. If known, estimated acres of timber harvest from April 1 to October 31

0

6. If known, estimated acres of timber harvest from June 1 to July 31

0

If the project includes prescribed fire, report the appropriate acreages below. Otherwise, type '0' in questions 7-9.

7. Estimated total acres of prescribed fire

0

8. If known, estimated acres of prescribed fire from April 1 to October 31

0

9. If known, estimated acres of prescribed fire from June 1 to July 31

0

If the project includes new wind turbines, report the megawatts of wind capacity below. Otherwise, type '0' in question 10.

10. What is the estimated wind capacity (in megawatts) of the new turbine(s)?
0

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

March 27, 2020

Dean Gustafson
All-Points Technology Corporation, P.C.
567 Vauxhall Street Extension – Suite 311
Waterford, CT 06385
dgustafson@allpointstech.com

Project: Commercial-scale PV Solar Facility, Bristol Solar One, 399 Hill Street, Bristol
NDDB Determination No.: 202004621

Dear Mr. Gustafson,

I have reviewed Natural Diversity Database (NDDB) maps and files regarding the area of work provided for the proposed Commercial-scale PV Solar Facility, Bristol Solar One, 399 Hill Street, Bristol, Connecticut. According to our records we have known extant populations of State Special Concern Bobolink (*Dolichonyx oryzivorus*) and Eastern box turtle (*Terrapene carolina carolina*) in the vicinity of the project site.

Bobolink: Bobolinks require open grassy areas to forage, breed and nest. Unlike other grassland birds that require large tracts of grassland habitat, the bobolink can successfully breed in grasslands as small as five acres. Its breeding season is approximately May through August and it is during this period that this species is most susceptible to disturbances in its habitat. Minimizing impacts to open fields, meadows and other grassy areas during this time period will likewise minimize impacts to this species. I recommend restricting mowing to either before May 20 or after August 20.

Eastern Box Turtle: Eastern box turtles inhabit old fields and deciduous forests, which can include power lines and logged woodlands. They are often found near small streams and ponds. The adults are completely terrestrial but the young may be semiaquatic, and hibernate on land by digging down in the soil from October to April. They have an extremely small home range and can usually be found in the same area year after year. Eastern box turtles have been negatively impacted by the loss of suitable habitat. Some turtles may be killed directly by construction activities, but many more are lost when important habitat areas for shelter, feeding, hibernation, or nesting are destroyed. As remaining habitat is fragmented into smaller pieces, turtle populations can become small and isolated. Reducing the frequency that motorized vehicles enter box turtle habitat would be beneficial in minimizing direct mortality of adults.

Recommended Protection Strategies for Eastern Box Turtles:

- Limiting tree removal/land clearing to the turtle's active season, April 1 to November 1. Conducting land clearing while the turtle is active will allow the animal to move out of harm's way and minimize mortality to hibernating individuals.
- The clearing crew should be provided a description of the species and alerted to its possible presence in the project area.
- The immediate area to be harvested/cleared each day should be searched for turtles prior to work starting.
- The immediate area around staged equipment (located in box turtle habitat) should be searched each day prior to work starting to ensure that turtles are not run over.

- Any turtles encountered during construction should be moved out of the way, just outside of the work area. This animal is protected by law and should never be taken off site.
- Work conducted during the early morning and evening hours should occur with special care not to harm basking or foraging individuals.

If these protection strategies are followed then the proposed activities will lessen the potential impact on these state-listed species. This determination is good for two years. Please re-submit a new NDDB Request for Review if the scope of work changes or if work has not begun on this project by March 27, 2022.

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, cooperating units of DEEP, landowners, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the NDDB should not be substitutes for on-site surveys necessary for a thorough environmental impact assessment. 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 database as it becomes available.

Please contact me if you have further questions at (860) 424-3090, or DEEP.Nddbrequest@ct.gov. Thank you for consulting the Natural Diversity Database.

Sincerely,

/s/ Geoffrey Krukar
Wildlife Biologist

APPENDIX F

PHASE 1A/1B CULTURAL RESOURCES RECONNAISSANCE SURVEY REPORT

FEBRUARY 2020

PHASE IA CULTURAL RESOURCES ASSESSMENT SURVEY OF THE PROPOSED BRISTOL SOLAR ONE, LLC IN BRISTOL, CONNECTICUT

PREPARED FOR:

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHALL STREET EXTENSION, SUITE 311
WATERFORD, CONNECTICUT 06385

PREPARED BY:

HERITAGE CONSULTANTS
55 EAST CEDAR STREET
NEWINGTON, CONNECTICUT 06111

ABSTRACT

This report presents the results of a Phase IA cultural resources assessment survey for the proposed Bristol Solar One, LLC Project in Bristol, Connecticut. The project area associated with this solar center encompasses approximately 17.4 acres of land situated within a larger 28.6 acre parcel; it will be accessed from Minor Road. The current investigation consisted of: 1) preparation of an overview of the region's prehistory, history, and natural setting; 2) a literature search to identify and discuss previously recorded cultural resources in the region; 3) a review of readily available historic maps and aerial imagery depicting the project area to identify potential historic resources and/or areas of past disturbance; 4) pedestrian survey and photo-documentation of the project area to determine their archaeological sensitivity; and 5) preparation of the current Phase IA cultural resources assessment survey report. The results of the survey indicate that all 17.4 acres of the project area retain moderate/high sensitivity for intact archaeological deposits.

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CHAPTER I
INTRODUCTION

This report presents the results of a Phase IA cultural resources assessment survey for the proposed Bristol Solar One, LLC Project in Bristol, Connecticut (Figure 1). All-Points Technology Corporation (All-Points) requested that Heritage Consultants, LLC (Heritage) complete the assessment survey as part of the planning process for the proposed solar center, which will occupy approximately 17.4 acres of land. The proposed development area is hereafter referred to as the project area. The project area is situated in the central portion of a larger 28.6 acre parcel of land located at 399 Hill Street. The project area consists of an open agricultural field surrounded by wooded areas and industrial/commercial facilities to the north and west, as well as agricultural fields, wooded areas and a residential community to the south. An electric distribution utility easement borders the north side of the project parcel. A farmhouse and several farm buildings are located toward the northeast end of the project parcel adjacent to Hill Street. Heritage completed this investigation on behalf of All-Points in February of 2020. All work associated with this project was performed in accordance with the *Environmental Review Primer for Connecticut's Archaeological Resources* (Poirier 1987) promulgated by the Connecticut State Historic Preservation Office (CT-SHPO).

Project Description and Methods Overview

The proposed project will consist of a 370-watt solar center that will include the installation of rows of solar panels spaced 3.65 m (12 ft) apart across the entirety of the above-referenced project area. The solar array will interconnect with an existing powerline corridor that extends from east to west adjacent to the northern edge of the project area. This Phase IA cultural resources assessment survey consisted of the completion of the following tasks: 1) a contextual overview of the region's prehistory, history, and natural setting (e.g., soils, ecology, hydrology, etc.); 2) a literature search to identify and discuss previously completed cultural resources surveys and previously recorded cultural resources in the region encompassing the project area; 3) a review of readily available historic maps and aerial imagery depicting the project area in order to identify potential historic resources and/or areas of past disturbance; 4) pedestrian survey and photo-documentation of the project area in order to determine their archaeological sensitivity; and 5) preparation of the current Phase IA cultural resources assessment survey report.

Project Results and Management Recommendations Overview

The review of historic maps and aerial images of the project area, files maintained by the CT-SHPO, as well as pedestrian survey of the development area, failed to detect any previously identified archaeological sites or National/State Register of Historic Places properties within 1.6 km (1 mi) of the project area. However, this is more likely due to a lack of professional surveys having been conducted in the area rather than an actual absence of cultural resources.

In addition to the cultural resources overview discussed above, Heritage combined data from the historic map and aerial image analysis, and the pedestrian survey to stratify the project area into zones of no/low and/or moderate/high archaeological sensitivity. Upon completion of the above-referenced analysis and pedestrian survey, it was determined that all 17.4 acres of the project area contain low slopes and well-drained soils in proximity to the Pequabuck River and the Birge Pond Brook. As a result, it was determined that the entirety of the project area has the potential to contain intact archaeological

deposits. Thus, a Phase IB survey of the project area is recommended prior to construction of the proposed solar center.

Project Personnel

Key personnel for this project included Mr. David R. George, M.A., R.P.A, who served as Principal Investigator for this effort; he was assisted by Ms. Kelsey Tuller, M.A., and Mr. Matthew Denno, B.A., who completed the field work portion of the project. Dr. Kristen Keegan completed this historic background research of the project and contributed to the final report, while Mr. Stephen Anderson, B.A., completed all GIS tasks associated with the project. Finally, Ms. Elizabeth Correia, M.A., helped to compile the report and the associated figures.

Organization of the Report

The natural setting of the region encompassing the project area is presented in Chapter II; it includes a brief overview of the geology, hydrology, and soils of the project region. The prehistory of the project region is outlined briefly in Chapter III. The history of the region encompassing the project region and project area is chronicled in Chapter IV, while a discussion of previous archaeological investigations in the vicinity of the project area is presented in Chapter V. The methods used to complete this investigation are discussed in Chapter VI. Finally, the results of this investigation and management recommendations for the project area and the identified cultural resources are presented in Chapter VII.

CHAPTER II
NATURAL SETTING

Introduction

This chapter provides a brief overview of the natural setting of the region containing the project area. Previous archaeological research has documented that a few specific environmental factors can be associated with both prehistoric and historic period site selection. These include general ecological conditions, as well as types of fresh water sources and soils present. The remainder of this section provides a brief overview of the ecology, hydrological resources, and soils present within the project area, access roads, and the larger region in general.

Ecoregions of Connecticut

Throughout the Pleistocene and Holocene Periods, Connecticut has undergone numerous environmental changes. Variations in climate, geology, and physiography have led to the "regionalization" of Connecticut's modern environment. It is clear, for example, that the northwestern portion of the state has very different natural characteristics than the coastline. Recognizing this fact, Dowhan and Craig (1976), as part of their study of the distribution of rare and endangered species in Connecticut, subdivided the state into various ecoregions. Dowhan and Craig (1976:27) defined an ecoregion as:

> "an area characterized by a distinctive pattern of landscapes and regional climate as expressed by the vegetation composition and pattern, and the presence or absence of certain indicator species and species groups. Each ecoregion has a similar interrelationship between landforms, local climate, soil profiles, and plant and animal communities. Furthermore, the pattern of development of plant communities (chronosequences and toposequences) and of soil profile is similar in similar physiographic sites. Ecoregions are thus natural divisions of land, climate, and biota."

Dowhan and Craig defined nine major ecoregions for the State of Connecticut. They are based on regional diversity in plant and animal indicator species (Dowhan and Craig 1976). Only one of the ecoregions is germane to the current investigation: Northwest Hills ecoregion. A brief summary of this ecoregion is presented below. It is followed by a discussion of the hydrology and soils found in and adjacent to the project area.

<u>Northwest Hills Ecoregion</u>

The Northwest Hills ecoregion consists of a hilly upland terrain characterized by "a moderately hilly landscape of intermediate elevation, with narrow valleys and local areas of steep and rugged topography" (Dowhan and Craig 1976:31). Elevations in the Northwest Hills ecoregion range from 228.6 to 304.8 m (750 to 1,000 ft) above sea level. The bedrock of the region is composed of schists and gneisses deposited during the Paleozoic (Dowhan and Craig 1976; Bell 1985). Soils in these uplands areas have developed on top of glacial till in upland locales, and on top of stratified deposits of sand, gravel, and silt in the local valleys (Dowhan and Craig 1976).

Hydrology in the Vicinity of the Project area

The project area is situated within a region that contains several sources of freshwater, including the Pequabuck River, Birge Pond Brook, Birge Pond, Marsh Brook, and Old Marsh Pond, as well as numerous unnamed streams, ponds, and wetlands. These freshwater sources may have served as resource extraction

areas for Native American and historic populations alike. Previously completed archaeological investigations in Connecticut have demonstrated that streams, rivers, and wetlands were focal points for prehistoric occupations because they provided access to transportation routes, sources of freshwater, and abundant faunal and floral resources.

Soils Comprising the Project area

Soil formation is the direct result of the interaction of a number of variables, including climate, vegetation, parent material, time, and organisms present (Gerrard 1981). Once archaeological deposits are buried within the soil, they are subject to a number of diagenic processes. Different classes of artifacts may be preferentially protected, or unaffected by these processes, whereas others may deteriorate rapidly. Cyclical wetting and drying, freezing and thawing, and compression can accelerate chemically and mechanically the decay processes for animal bones, shells, lithics, ceramics, and plant remains. Lithic and ceramic artifacts are largely unaffected by soil pH, whereas animal bones and shells decay more quickly in acidic soils such as those that are present in the current project area. In contrast, acidic soils enhance the preservation of charred plant remains.

A review of the soils within the project area is presented below. The project area is characterized by the presence of three major soil types: Woodbridge, Paxton/Montauk, and Leicester soils (Figure 2). A review of these soils shows that the majority of them consist of well drained loams; they are the types of soils that are typically correlated with prehistoric and historic use and occupation. Descriptive profiles for each soil type are presented below; they were gathered from the National Resources Conservation Service.

Woodbridge Soils:

A typical profile associated with Woodbridge soils is as follows: **Ap**--0 to 18 cm; very dark grayish brown (10YR 3/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine and medium roots; few very dark brown (10YR 2/2) earthworm casts; 5 percent gravel; moderately acid; abrupt wavy boundary; **Bw1**--18 to 46 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; few very dark brown (10YR 2/2) earthworm casts; 10 percent gravel; moderately acid; gradual wavy boundary. **Bw2**--46 to 66 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; few very dark brown (10YR 2/2) earthworm casts; 10 percent gravel; few medium prominent strong brown (7.5YR 5/6) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; gradual wavy boundary; **Bw3**--66 to 76 cm; light olive brown (2.5Y 5/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; 10 percent gravel; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; clear wavy boundary; **Cd1**--76 to 109 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; weak thick plates of geogenic origin; very firm, brittle; 20 percent gravel; many medium prominent strong brown (7.5YR 5/8) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; gradual wavy boundary; and **Cd2**--109 to 165 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; weak thick plates of geogenic origin; very firm, brittle; few fine prominent very dark brown (10YR 2/2) coatings on plates; 25 percent gravel; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation; moderately acid.

Paxton/Montauk Soils:

A typical profile for Paxton and Montauk soils is described as follows: **Ap**--0 to 20 cm; dark brown (10YR 3/3) fine sandy loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable;

many fine roots; 5 percent gravel; strongly acid; abrupt smooth boundary. **Bw1**--20 to 38 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; 5 percent gravel; few earthworm casts; strongly acid; gradual wavy boundary; **Bw2**--38 to 66 cm; olive brown (2.5Y 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; 10 percent gravel; strongly acid; clear wavy boundary; and **Cd**--66 to 165 cm; olive (5Y 5/3) gravelly fine sandy loam; medium plate-like divisions; massive; very firm, brittle; 25 percent gravel; many dark coatings on plates; strongly acid.

Leicester Soils:

A typical profile associated with Leicester soils is as follows: **Oe**--0 to 3 cm; black (10YR 2/1) moderately decomposed plant material; **A**--3 to 18 cm; black (10YR 2/1) fine sandy loam; moderate medium granular structure; friable; common fine and medium roots; 10 percent gravel and cobbles; strongly acid; clear wavy boundary; **Bg1**--18 to 25 cm; grayish brown (2.5Y 5/2) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 10 percent gravel and cobbles; common medium prominent yellowish red (5YR 5/6) masses of iron accumulation; strongly acid; gradual wavy boundary; **Bg2**--25 to 46 cm; light brownish gray (2.5Y 6/2) fine sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; 10 percent gravel and cobbles; common fine prominent yellowish brown (10YR 5/6) masses of iron accumulation; strongly acid; gradual wavy boundary; **BC**--46 to 61 cm; pale brown (10YR 6/3) fine sandy loam; massive; friable; few fine roots; 10 percent gravel and cobbles; many medium distinct yellowish brown (10YR 5/6) and yellowish red (5YR 4/6) masses of iron accumulation; strongly acid; clear wavy boundary. (0 to 20 cm thick). **C1**--61 to 84 cm; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; massive; friable; 15 percent gravel and cobbles; many medium distinct yellowish brown (10YR 5/6) masses of iron accumulation and prominent pinkish gray (7.5YR 6/2) iron depletions; strongly acid; gradual wavy boundary; **C2**--84 to 155 cm; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; massive; friable; 15 percent gravel and cobbles; few fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; strongly acid. This is a minor soil type on the project parcel and it does not extend into the area planned for solar center construction.

Summary

The natural setting of the area containing the proposed Bristol Solar One, LLC Project is common throughout the Northwest Hills ecoregion. Streams and rivers of this area empty into the Naugatuck or Farmington Rivers, which in turn, drain into the Long Island Sound. Further, the landscape in general is dominated by loamy soil types with some wetland soils intermixed. In addition, low slopes dominate the region. Thus, in general, the project region was well suited to Native American occupation throughout the prehistoric era. As a result, archaeological sites have been documented in the larger project region, and additional prehistoric cultural deposits may be expected within the undisturbed portions of the proposed project area. This portion of Bristol was also used throughout the historic era, as evidenced by the presence of numerous historic residences and agricultural fields throughout the region; thus, archaeological deposits dating from the last 350 years or so may also be expected near or within the proposed project area.

CHAPTER III
PREHISTORIC SETTING

Introduction

Prior to the late 1970s and early 1980s, very few systematic archaeological surveys of large portions of the state of Connecticut had been undertaken. Rather, the prehistory of the region was studied at the site level. Sites chosen for excavation were highly visible and they were located in such areas as the coastal zone, e.g., shell middens, and Connecticut River Valley. As a result, a skewed interpretation of the prehistory of Connecticut was developed. It was suggested that the upland portions of the state, i.e., the northeastern and northwestern hills ecoregions, were little used and rarely occupied by prehistoric Native Americans, while the coastal zone, i.e., the eastern and western coastal and the southeastern and southwestern hills ecoregions, were the focus of settlements and exploitation in the prehistoric era. This interpretation remained unchallenged until the 1970s and 1980s when several town-wide and regional archaeological studies were completed. These investigations led to the creation of several archaeological phases that subsequently were applied to understand the prehistory of Connecticut. The remainder of this chapter provides an overview of the prehistoric setting of the region encompassing the project area.

Paleo-Indian Period (12,000 to 10,000 Before Present [B.P.])

The earliest inhabitants of the area encompassing the State of Connecticut, who have been referred to as Paleo-Indians, arrived in the area by ca., 12,000 B.P. (Gramly and Funk 1990; Snow 1980). Due to the presence of large Pleistocene mammals at that time and the ubiquity of large fluted projectile points in archaeological deposits of this age, Paleo-Indians often have been described as big-game hunters (Ritchie and Funk 1973; Snow 1980); however, as discussed below, it is more likely that they hunted a broad spectrum of animals.

While there have been numerous surface finds of Paleo-Indian projectile points throughout the State of Connecticut, only two sites, the Templeton Site (6-LF-21) in Washington, Connecticut and the Hidden Creek Site (72-163) in Ledyard, Connecticut, have been studied in detail and dated using the radiocarbon method (Jones 1997; Moeller 1980). The Templeton Site (6-LF-21) is located in Washington, Connecticut and was occupied between 10,490 and 9,890 years ago (Moeller 1980). In addition to a single large and two small fluted points, the Templeton Site produced a stone tool assemblage consisting of gravers, drills, core fragments, scrapers, and channel flakes, which indicates that the full range of stone tool production and maintenance took place at the site (Moeller 1980). Moreover, the use of both local and non-local raw materials was documented in the recovered tool assemblage, suggesting that not only did the site's occupants spend some time in the area, but they also had access to distant stone sources, the use of which likely occurred during movement from region to region.

The only other Paleo-Indian site studied in detail in Connecticut is the Hidden Creek Site (72-163) (Jones 1997). The Hidden Creek Site is situated on the southeastern margin of the Great Cedar Swamp on the Mashantucket Pequot Reservation in Ledyard, Connecticut. While excavation of the Hidden Creek Site produced evidence of Terminal Archaic and Woodland Period components (see below) in the upper soil horizons, the lower levels of the site yielded artifacts dating from the Paleo-Indian era. Recovered Paleo-Indian artifacts included broken bifaces, side-scrapers, a fluted preform, gravers, and end-scrapers. Based on the types and number of tools present, Jones (1997:77) has hypothesized that the Hidden

Creek Site represented a short-term occupation, and that separate stone tool reduction and rejuvenation areas were present.

While archaeological evidence for Paleo-Indian occupation is scarce in Connecticut, it, combined with data from the West Athens Road and King's Road Site in the Hudson drainage and the Davis and Potts Sites in northern New York, supports the hypothesis that there was human occupation of the area not long after ca. 12,000 B.P. (Snow 1980). Further, site types currently known suggest that the Paleo-Indian settlement pattern was characterized by a high degree of mobility, with groups moving from region to region in search of seasonally abundant food resources, as well as for the procurement of high-quality raw materials from which to fashion stone tools.

Archaic Period (10,000 to 2,700 B.P.)

The Archaic Period, which succeeded the Paleo-Indian Period, began by ca., 10,000 B.P. (Ritchie and Funk 1973; Snow 1980), and it has been divided into three subperiods: Early Archaic (10,000 to 8,000 B.P.), Middle Archaic (8,000 to 6,000 B.P.), and Late Archaic (6,000 to 3,400 B.P.). These periods were devised to describe all non-farming, non-ceramic producing populations in the area. Regional archeologists recently have recognized a final "transitional" Archaic Period, the Terminal Archaic Period (3,400-2,700 B.P.), which was meant to describe those groups that existed just prior to the onset of the Woodland Period and the widespread adoption of ceramics into the toolkit (Snow 1980; McBride 1984; Pfeiffer 1984, 1990; Witthoft 1949, 1953).

Early Archaic Period (10,000 to 8,000 B.P.)

To date, very few Early Archaic sites have been identified in southern New England. As a result, researchers such as Fitting (1968) and Ritchie (1969), have suggested a lack of these sites likely is tied to cultural discontinuity between the Early Archaic and preceding Paleo-Indian Period, as well as a population decrease from earlier times. However, with continued identification of Early Archaic sites in the region, and the recognition of the problems of preservation, it is difficult to maintain the discontinuity hypothesis (Curran and Dincauze 1977; Snow 1980).

Like their Paleo-Indian predecessors, Early Archaic sites tend to be very small and produce few artifacts, most of which are not temporally diagnostic. While Early Archaic sites in other portions of the United States are represented by projectile points of the Kirk series (Ritchie and Funk 1973) and by Kanawha types (Coe 1964), sites of this age in southern New England are identified on the basis of a series of ill-defined bifurcate-based projectile points. These projectile points are identified by the presence of their characteristic bifurcated base, and they generally are made from high quality raw materials. Moreover, finds of these projectile points have rarely been in stratified contexts. Rather, they occur commonly either as surface expressions or intermixed with artifacts representative of later periods. Early Archaic occupations, such as the Dill Farm Site and Sites 6LF64 and 6LF70 in Litchfield County, are represented by camps that were relocated periodically to take advantage of seasonally available resources (McBride 1984; Pfeiffer 1986). In this sense, a foraging type of settlement pattern was employed during the Early Archaic Period.

Middle Archaic Period (8,000 to 6,000 B.P.)

By the onset of the Middle Archaic Period, essentially modern deciduous forests had developed in the region (Davis 1969). It is at this time that increased numbers and types of sites are noted in Connecticut (McBride 1984). The most well-known Middle Archaic site in New England is the Neville Site, which is located in Manchester, New Hampshire and studied by Dincauze (1976). Careful analysis of the Neville Site indicated that the Middle Archaic occupation dated from between ca., 7,700 and 6,000 years ago. In

fact, Dincauze (1976) obtained several radiocarbon dates from the Middle Archaic component of the Neville Site. The dates, associated with the then-newly named Neville type projectile point, ranged from 7,740±280 and 7,015±160 B.P. (Dincauze 1976).

In addition to Neville points, Dincauze (1976) described two other projectile points styles that are attributed to the Middle Archaic Period: Stark and Merrimac projectile points. While no absolute dates were recovered from deposits that yielded Stark points, the Merrimac type dated from 5,910±180 B.P. Dincauze argued that both the Neville and later Merrimac and Stark occupations were established to take advantage of the excellent fishing that the falls situated adjacent to the site area would have afforded Native American groups. Thus, based on the available archaeological evidence, the Middle Archaic Period is characterized by continued increases in diversification of tool types and resources exploited, as well as by sophisticated changes in the settlement pattern to include different site types, including both base camps and task-specific sites (McBride 1984:96)

Late Archaic Period (6,000 to 3,700 B.P.)

The Late Archaic Period in southern New England is divided into two major cultural traditions that appear to have coexisted. They include the Laurentian and Narrow-Stemmed Traditions (Funk 1976; McBride 1984; Ritchie 1969a and b). Artifacts assigned to the Laurentian Tradition include ground stone axes, adzes, gouges, ulus (semi-lunar knives), pestles, atlatl weights, and scrapers. The diagnostic projectile point forms of this time period in southern New England include the Brewerton Eared-Notched, Brewerton Eared and Brewerton Side-Notched varieties (McBride 1984; Ritchie 1969a; Thompson 1969). In general, the stone tool assemblage of the Laurentian Tradition is characterized by flint, felsite, rhyolite and quartzite, while quartz was largely avoided for stone tool production.

In terms of settlement and subsistence patterns, archaeological evidence in southern New England suggests that Laurentian Tradition populations consisted of groups of mobile hunter-gatherers. While a few large Laurentian Tradition occupations have been studied, sites of this age generally encompass less than 500 m^2 (5,383 ft^2). These base camps reflect frequent movements by small groups of people in search of seasonally abundant resources. The overall settlement pattern of the Laurentian Tradition was dispersed in nature, with base camps located in a wide range of microenvironments, including riverine as well as upland zones (McBride 1978, 1984:252). Finally, subsistence strategies of Laurentian Tradition focused on hunting and gathering of wild plants and animals from multiple ecozones.

The second Late Archaic tradition, known as the Narrow-Stemmed Tradition, is unlike the Laurentian Tradition, and it likely represents a different cultural adaptation. The Narrow-Stemmed tradition is recognized by the presence of quartz and quartzite narrow stemmed projectile points, triangular quartz Squibnocket projectile points, and a bipolar lithic reduction strategy (McBride 1984). Other tools found in Narrow-Stemmed Tradition artifact assemblages include choppers, adzes, pestles, antler and bone projectile points, harpoons, awls, and notched atlatl weights. Many of these tools, notably the projectile points and pestles, indicate a subsistence pattern dominated by hunting and fishing, as well the collection of a wide range of plant foods (McBride 1984; Snow 1980:228).

The Terminal Archaic Period (3,700 to 2,700 B.P.)

The Terminal Archaic Period, which lasted from ca., 3,700 to 2,700 BP, is perhaps the most interesting, yet confusing of the Archaic Periods in southern New England prehistory. Originally termed the "Transitional Archaic" by Witthoft (1953) and recognized by the introduction of technological innovations, e.g., broadspear projectile points and soapstone bowls, the Terminal Archaic has long posed problems for regional archeologists. While the Narrow-Stemmed Tradition persisted through the

Terminal Archaic and into the Early Woodland Period, the Terminal Archaic is coeval with what appears to be a different technological adaptation, the Susquehanna Tradition (McBride 1984; Ritchie 1969b). The Susquehanna Tradition is recognized in southern New England by the presence of a new stone tool industry that was based on the use of high-quality raw materials for stone tool production and a settlement pattern different from the "coeval" Narrow-Stemmed Tradition.

The Susquehanna Tradition is based on the classification of several Broadspear projectile point types and associated artifacts. There are several local sequences within the tradition, and they are based on projectile point type chronology. Temporally diagnostic projectile points of these sequences include the Snook Kill, Susquehanna Broadspear, Mansion Inn, and Orient Fishtail types (Lavin 1984; McBride 1984; Pfeiffer 1984). The initial portion of the Terminal Archaic Period (ca., 3,700-3,200 BP) is characterized by the presence of Snook Kill and Susquehanna Broadspear projectile points, while the latter Terminal Archaic (3,200-2,700 BP) is distinguished by the use of Orient Fishtail projectile points (McBride 1984:119; Ritchie 1971).

In addition, it was during the late Terminal Archaic Period that interior cord marked, grit tempered, thick walled ceramics with conoidal (pointed) bases made their initial appearance in the Native American toolkit. These are the first ceramics in the region, and they are named Vinette I (Ritchie 1969a; Snow 1980:242); this type of ceramic vessel appears with much more frequency during the ensuing Early Woodland Period. In addition, the adoption and widespread use of soapstone bowls, as well as the implementation of subterranean storage, suggests that Terminal Archaic groups were characterized by reduced mobility and longer-term use of established occupation sites (Snow 1980:250).

Finally, while settlement patterns appeared to have changed, Terminal Archaic subsistence patterns were analogous to earlier patterns. The subsistence pattern still was diffuse in nature, and it was scheduled carefully. Typical food remains recovered from sites of this period consist of fragments of white-tailed deer, beaver, turtle, fish and various small mammals. Botanical remains recovered from the site area consisted of *Chenopodium* sp., hickory, butternut and walnut (Pagoulatos 1988:81). Such diversity in food remains suggests at least minimal use of a wide range of microenvironments for subsistence purposes.

Woodland Period (2,700 to 350 B.P.)

Traditionally, the advent of the Woodland Period in southern New England has been associated with the introduction of pottery; however, as mentioned above, early dates associated with pottery now suggest the presence of Vinette I ceramics appeared toward the end of the preceding Terminal Archaic Period (Ritchie 1969a; McBride 1984). Like the Archaic Period, the Woodland Period has been divided into three subperiods: Early, Middle, and Late Woodland. The various subperiods are discussed below.

<u>Early Woodland Period (ca., 2,700 to 2,000 B.P.)</u>

The Early Woodland Period of the northeastern United States dates from ca., 2,700 to 2,000 B.P., and it has been thought to have been characterized by the advent of farming, the initial use of ceramic vessels, and increasingly complex burial ceremonialism (Griffin 1967; Ritchie 1969a and 1969b; Snow 1980). In the Northeast, the earliest ceramics of the Early Woodland Period are thick walled, cord marked on both the interior and exterior, and possess grit temper.

Careful archaeological investigations of Early Woodland sites in southern New England have resulted in the recovery of narrow stemmed projectile points in association with ceramic sherds and subsistence remains, including specimens of white-tailed deer, soft and hard-shell clams, and oyster shells (Lavin and

Salwen: 1983; McBride 1984:296-297; Pope 1952). McBride (1984) has argued that the combination of the subsistence remains and the recognition of multiple superimposed cultural features at various sites indicates that Early Woodland Period settlement patterns were characterized by multiple re-use of the same sites on a seasonal basis by small co-residential groups.

Middle Woodland Period (2,000 to 1,200 B.P.)

The Middle Woodland Period is marked by an increase in the number of ceramic types and forms utilized (Lizee 1994a), as well as an increase in the amount of exotic lithic raw material used in stone tool manufacture (McBride 1984). The latter suggests that regional exchange networks were established, and that they were used to supply local populations with necessary raw materials (McBride 1984; Snow 1980). The Middle Woodland Period is represented archaeologically by narrow stemmed and Jack's Reef projectile points; increased amounts of exotic raw materials in recovered lithic assemblages, including chert, argillite, jasper, and hornfels; and conoidal ceramic vessels decorated with dentate stamping. Ceramic types indicative of the Middle Woodland Period include Linear Dentate, Rocker Dentate, Windsor Cord Marked, Windsor Brushed, Windsor Plain, and Hollister Stamped (Lizee 1994a:200).

In terms of settlement patterns, the Middle Woodland Period is characterized by the occupation of village sites by large co-residential groups that utilized native plant and animal species for food and raw materials in tool making (George 1997). These sites were the principal place of occupation, and they were positioned close to major river valleys, tidal marshes, estuaries, and the coastline, all of which would have supplied an abundance of plant and animal resources (McBride 1984:309). In addition to villages, numerous temporary and task-specific sites were utilized in the surrounding upland areas, as well as in closer ecozones such as wetlands, estuaries, and floodplains. The use of temporary and task-specific sites to support large village populations indicates that the Middle Woodland Period was characterized by a resource acquisition strategy that can best be termed as logistical collection (McBride 1984:310).

Late Woodland Period (ca., 1,200 to 350 B.P.)

The Late Woodland Period in southern New England dates from ca., 1,200 to 350 B.P., and it is characterized by the earliest evidence for the use of corn in the lower Connecticut River Valley (Bendremer 1993; Bendremer and Dewar 1993; Bendremer et al. 1991; George 1997; McBride 1984); an increase in the frequency of exchange of non-local lithics (Feder 1984; George and Tryon 1996; McBride 1984; Lavin 1984); increased variability in ceramic form, function, surface treatment, and decoration (Lavin 1980, 1986, 1987; Lizee 1994a, 1994b); and a continuation of a trend towards larger, more permanent settlements in riverine, estuarine, and coastal ecozones (Dincauze 1974; McBride 1984; Snow 1980).

Stone tool assemblages associated with Late Woodland occupations, especially village-sized sites, are functionally variable and they reflect plant and animal resource processing and consumption on a large scale. Finished stone tools recovered from Late Woodland sites include Levanna and Madison projectile points; drills; side-, end-, and thumbnail scrapers; mortars and pestles; nutting stones; netsinkers; and celts, adzes, axes, and digging tools. These tools were used in activities ranging from hide preparation to plant processing to the manufacture of canoes, bowls, and utensils, as well as other settlement and subsistence-related items (McBride 1984; Snow 1980). Finally, ceramic assemblages recovered from Late Woodland sites are as variable as the lithic assemblages. Ceramic types identified include Windsor Fabric Impressed, Windsor Brushed, Windsor Cord Marked, Windsor Plain, Clearview Stamped, Sebonac Stamped, Selden Island, Hollister Plain, Hollister Stamped, and Shantok Cove Incised (Lavin 1980, 1988a,

1988b; Lizee 1994a; Pope 1953; Rouse 1947; Salwen and Ottesen 1972; Smith 1947). These types are more diverse stylistically than their predecessors, with incision, shell stamping, punctation, single point, linear dentate, rocker dentate stamping, and stamp and drag impressions common (Lizee 1994a:216).

Summary of Connecticut Prehistory

In sum, the prehistory of Connecticut spans from ca., 12,000 to 350 B.P., and it is characterized by numerous changes in tool types, subsistence patterns, and land use strategies. For the majority of the prehistoric era, local Native American groups practiced a subsistence pattern based on a mixed economy of hunting and gathering wild plant and animal resources. It is not until the Late Woodland Period that incontrovertible evidence for the use of domesticated species is available. Further, settlement patterns throughout the prehistoric era shifted from seasonal occupations of small co-residential groups to large aggregations of people in riverine, estuarine, and coastal ecozones. In terms of the region containing the proposed project area, a variety of prehistoric site types may be expected. These range from seasonal camps utilized by Archaic populations to temporary and task-specific sites of the Woodland era.

CHAPTER IV
HISTORIC OVERVIEW

Introduction

As stated in Chapter 1, the project area consists of a 17.4 acre area within a larger 28.6 acre parcel of land in the town of Bristol in Hartford County, Connecticut. The parcel is in the northwestern quarter of Bristol, on the west side of Hill Street and a short distance to the south of James P. Casey Road. As discussed below, however, older maps and aerial photographs indicate that the northern boundary of the parcel was formerly defined by a now-abandoned section of Minor Road. This chapter presents an overview history of the larger region, as well as historical data specific to the project area.

History of the Town of Bristol

Hartford County was the site of one of the two earliest loci of colonial settlement in Connecticut, with three of its towns dating to the 1630s. It extends southward from the Massachusetts border and flanks the Connecticut River. The earliest colonial development of the region depended on the agricultural and transportation advantages of the river and its valley; areas further from the Connecticut River Valley were colonized later and usually grew more slowly through the early nineteenth century. Thereafter, the main source of differentiation in Hartford County towns' development was, first, whether they had significant levels of industrialization, and, later, whether they had significant levels of suburbanization. Bristol, being located at the western edge of the county, was later-colonized and slow to develop. During the nineteenth century, however, the Pequabuck River provided waterpower that allowed the development of a steadily growing amount of industry in the town, especially in the later part of the century and the early twentieth century. After the 1930s, suburbanization caused an additional population boom. The following discussion outlines the history of Bristol in more detail and discusses the presence or absence of historical resources in the vicinity of the project area.

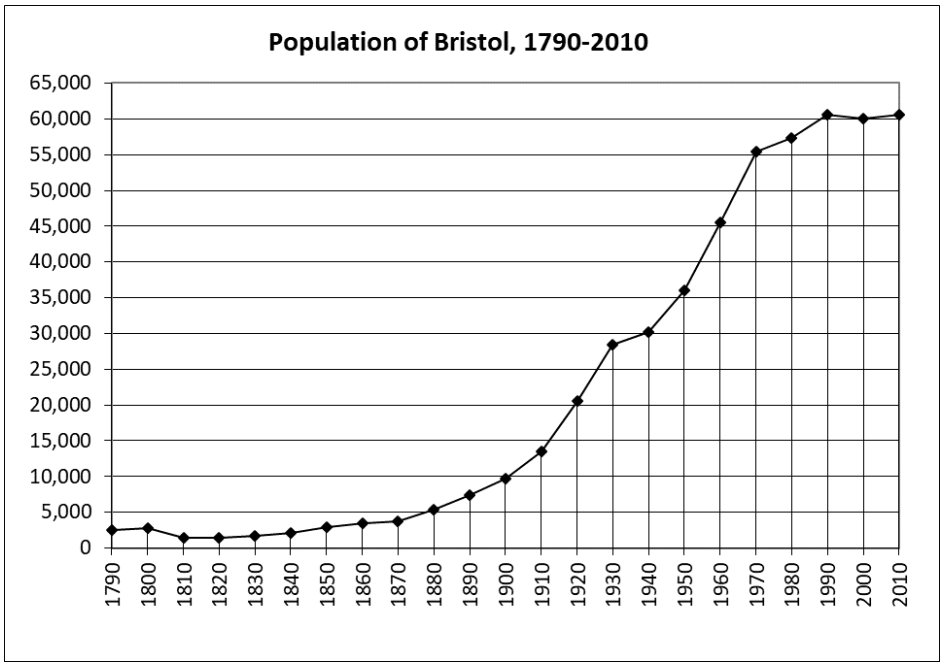
<u>Colonial Era (to 1790)</u>

The town of Bristol was created out of the town of Farmington in 1785. Farmington, in turn, can be considered the first daughter town of Hartford; it was established by Hartford colonists in 1645. Both legal and historical tradition holds that when the Hartford colonists purchased land from an Indian sachem known as Sequassen in 1636, they bought a very large area extending westward to the Mohawk territory (Bickford 1982). The description of the purchase was so vague that it could be, and sometimes was, argued to extend to the Housatonic River, although it is very doubtful that whatever authority Sequassen had really extended so far. As with many other purchases from Native American, the Sequassen document imagined, quite unrealistically, that Native American leaders had the same kind of ownership of their territory as the British monarchs did. Notwithstanding such assertions of sovereignty by or on behalf of Sequassen, once the newly constituted General Court decided, in 1640, to permit a new settlement at "Tunxis Sepus," the governor secured an additional deed from the Tunxis Native American community there. This deed was confirmed by another deed in 1650, in which it was claimed that the land had already been purchased from Sequassen; however, it once again included a new agreement with the actual Native American residents of the region. A group of Native Americans remained on a reservation in Farmington for many years, but over time most departed for regions less subject to encroachments by the colonists, leaving only a few holdouts who eventually passed away (Bickford 1982).

The new colonial settlement at Tunxis received the official name of Farmington in 1645. In addition to the initial purchases, the town was granted additional areas of land by the legislature between 1645 and 1677, so that its final size measured approximately 15 miles (24 km) from north to south and 11 miles (18 km) from east to west. The future site of Bristol was situate in the middle-western part of this large area. It was not until 1721 that the Farmington-based colonial owners of the area that would become Bristol and Burlington divided it into five tiers of lots to be distributed among themselves. These lots were considered part of the New Cambridge Society, an ecclesiastical subdivision of Farmington, until Bristol was incorporated and named in 1785. The northern part had developed a further ecclesiastical subdivision, known as West Britain, in 1774. It became known as Burlington when that town separated from Bristol in 1806 (Crofut 1937). During the Revolutionary War, some 92 men from Bristol (then known as New Cambridge) saw military service. The town also produced the noted Loyalist Moses Dunbar, who became a captain in British service and who was executed in Hartford in 1777 for treason (Clouette and Roth 1984).

Early National and Industrializing Eras (1790-1930)

In the first federal census, which was recorded in 1790, Bristol reported 2,642 residents (see the population chart below; Keegan 2012). A gazetteer of the state published in 1819 reported that it was "uneven and hilly," the soil was good for growing grain, grass, and fruit. More notably, many of its residents were "engaged in manufacturing employments and pursuits," especially tinware and clocks. The town already had five tinware factories, one firm making brass clocks, and several making wooden clocks, along with two button factories, two textile mills, eight cider distilleries, and six tanneries, in addition to the usual grist mills and sawmills. The town's cultural needs were met by one Congregational and one Baptist church, common schools, "one small Academy for Misses," and three public membership libraries (Pease and Niles 1819:58-59). In 1837, Bristol received only a short description from John Warner Barber, who repeated the agricultural information from the earlier source. By the 1830s, however, Bristol had 16 clock factories and button manufacturing, and had added a Methodist church (Barber 1837:69).



Bristol's first clockmaking boom lasted from 1820 to 1837, and was due to the efforts of local merchants who convinced Chauncey Jerome, a clockmaker trained by Eli Terry of Plymouth, to move there. Jerome was far from the only clockmaker in Bristol, but he was more famous than most of the rest (Clouette and Roth 1984). The population figures shown in the population chart above, however, do not indicate any precipitous change over the first 40 years of the century, but rather a slow and steady growth from a low point of 1,362 residents in 1820. The decline between 1800 and 1810 was due to the loss of territory to the new town of Burlington (Keegan 2012). These numbers indicate that the town's industrial firms remained small during this period. The Panic of 1837 brought the enterprises of Bristol, as well as many other places, to a temporary halt. Jerome switched production from wooden to brass clocks, and by 1850 Bristol factories were producing large numbers of clocks. Jerome moved his works to New Haven in 1843, but the town's industries included other clockmakers, as well as foundries, textile mills, saws, and machinery, so the town was more than ready to take advantage of the arrival of the railroad in 1850 (Clouette and Roth 1984). At that time, the town's population had been growing steadily for decades and reached 2,884 residents (see the population chart above; Keegan 2012). In towns that, unlike Bristol, did not have an industrial base, the population trend across the nineteenth century was often stagnation or decline.

The railroad was only one of several efforts to improve transportation in Bristol and the region. In 1803, the East Middle-West Middle turnpike was chartered by the state, and eventually passed on an east-west course across the center of Bristol. The road remained in operation, with some changes, through the 1840s (Wood 1919). Prominent men of Bristol also were involved in the chartering and construction of the Farmington Canal, which opened in 1828 and gave Bristol manufacturers and merchants relatively easy access to a more efficient means of transporting goods, until the railroads displaced the canal (Clouette and Roth 1984). The initial railroad company that served Bristol was chartered in 1845, then merged with a pre-existing firm to create the Hartford, Providence, & Fishkill Railroad, whose goal was to complete a line between Providence, Rhode Island and Fishkill, New York through Hartford. In 1850 service began between Hartford and Bristol, and after various vicissitudes the road did reach New York (Turner and Jacobus 1989). The 1850 census of manufactures reported 11 clock manufacturers in Bristol, all but two of which had fewer than 50 employees; in fact, the largest employer in Bristol was the Bristol Mining Co., which was engaged in mining copper in the northeastern part of town and employed 100 men. In total, there were approximately 600 people employed in manufacturing (U.S. Census 1850c).

During the Civil War, loss of southern markets caused a slowdown in Bristol's clock industry. However, the local economy recovered in the postwar years, and various other industries arrived and flourished. These included the making of toys, musical instruments, steel tools, springs, and brass products. As for the war itself, many Bristol men saw service in the Sixteenth Regiment, and their Company K was captured at Plymouth, North Carolina in 1864. The troops were sent to prison camps, including the infamous Andersonville, Georgia camp (Clouette and Roth 1984). The increase in business is reflected in the steadily increasing population after 1870; by 1900, it was approaching 10,000, which made Bristol the nineteenth largest town in the state at that time (although the four largest municipalities each held over 50,000 people) (See population chart above; Keegan 2012).

According to nineteenth-century maps, the project area was well outside the developing industrial centers. In 1852, a map of the town showed the "Centre" and the "South Village" areas as more densely settled, with the railroad looping through them and extending eastward to the smaller village of Forestville (Figure 3). Another village, Polkville, was located in the northeastern part of town. The project area and its vicinity were sparsely settled at the time, indicating that the local economy was agricultural in nature. This map, unlike most others of the period, sought to depict all the buildings of

each farmstead. Thus, it showed the house of D. Hills on the east side of Hill Road, opposite the project area parcel, and a cluster of farm buildings on the west side of Hill Road, within the larger parcel. The project area proper, being set back from Hill Road, does not incorporate these buildings, although they were within 152 m (500 ft) of it. The other nearby farmsteads were those of S. H. Carrington, to the north and on the east side of the road (note, however, that the same name was attached to two other farmsteads to the south of this area), and C. L. Tuttle, to the south and on the west side of the road (Figure 3; Woodford 1852). The 1869 map of the town did not portray the farms' outbuildings, and the names of the nearby farmers had changed to Bill Gaylord, M. Minor, and Calvin Blanchard (Figure 4; Baker & Tilden 1869).

Although it is not certain which, if any, of these neighbors owned the larger parcel during the nineteenth century, information concerning them provides information about the neighborhood and its economic activities. According to the 1850 federal census, Daniel Hill, Silas H. Carrington, and Constant L. Tuttle were all farmers; it is possible that the farmstead to the north of Hill's was occupied by Julius Carrington, who may have been a brother to Silas. Hill and Tuttle were both older men, aged 64 and 75, and each claimed a farm worth $5,000. Their wives were both younger (Betsey Hill was 50 years old, and Hymenia Tuttle was 64). The Tuttles had an unmarried adult daughter living with them, and the Hills had an unmarried adult son, and each had a young, probably unrelated teenager in the household (a 13-year-old-boy for the Tuttles and an 11-year-old Irish girl for the Hills). In contrast, neither Carrington family gave a value for their farm, and both households were younger couples; Julius and Betsey had young children, while Silas H. and Jane C. had his probable mother and sister, plus an unrelated teenaged boy, in their household. Compared to most other farms in the area, those of Hills and the Tuttles were more valuable than usual for the neighborhood. Most of the heads of household were middle-aged or older, and all but a few were born in Connecticut (United States Census 1850a). Only the Tuttle and Hill farms' details were reported in the agricultural census for that year. There were few variations in the farming activities listed on the entire page of this agricultural census, however. The Tuttles had 110 improved acres and 40 unimproved, while the Hills had 135 improved acres and 15 unimproved; these numbers seem to have been above the median. Like their neighbors, these farmers had one horse, fewer than 10 milk cows (for butter and cheese production), one or two yokes of oxen, a handful of other cattle, and a few swine. Some farmers had up to 30 sheep, though not these two. For crops, they grew rye, corn, oats, potatoes, and buckwheat. The Hills and Tuttles, like some others, also produced tree fruit (United States Census 1850b).

The 1870 federal census recorded Calvin and Anna Blanchard (whose house was shown to the south of the project area in the 1869 map) as a couple in their twenties with no children; their farm was worth $6,000 and they had $1,175 in personal property as well. Calvin had been born in Massachusetts. Marcus Miner, located across Hill Road from the project area, was a 78-year-old farmer who owned $9,000 in real estate and $3,500 in personal estate; he shared his house with Edson and Josephine L. Downes, their small daughter, what are presumed to be Edson's teenaged siblings (the boy worked on the farm like his brother), and an older woman named Marcia Mills. Next door to them, possibly the household to the north of the project area, were Ira (not Billy) and Chloe M. Gaylord, whose farm was valued at $5,000 and who owned $1,000 in personal estate. They were in their thirties and had two young children, and a schoolteacher boarded with them (United States Census 1870a). There was more variety in the agricultural efforts of the farmers in the 1870 census than in 1850. This began with the size of the farms; the Blanchards had 64 improved acres and 10 acres of woodland, the Miner/Downes farm had 140 acres of improved land and 40 acres of woodland, and the Gaylords had 75 acres of improved land. Other farms in the area ranged from eight acres to 415 acres of improved land. Some farmers in the area were clearly specializing in dairy production, though not these three. As in 1850, most farms

had one or two horses, fewer than 10 milk cows, some oxen, some other cattle, and some swine. The Miner/Downes farm was among the few who kept sheep (14 of them). The Blanchards grew no grains, while the other two, and most other farms, grew rye and corn; far fewer grew oats and buckwheat. At least two farms in the town were growing tobacco. The three families near the project area also grew potatoes and orchard products – the Blanchards seemed to be specializing in that, with a much larger dollar value ($265) than other farms. A few farmers were apparently engaged in market gardening (United States Census 1870b). The presence of young farm families in this area in 1870 suggests that at least in parts of Bristol, farming was still considered a viable way to make a living, even as industrial employment in the town and elsewhere continued to increase.

Modern Era (1930-Present)

At the beginning of the twentieth century, Bristol's industry continued to be a strong component of the economy, adding products such as bicycles and (briefly) the original "yellow cabs." World War I produced another industrial boom for the town, and unlike in many textile-dependent manufacturing towns in Connecticut, most of these industries did not decline due to southern competition (Clouette and Roth 1984). According to a 1932 description of all the towns' vital statistics, businesses in town manufactured thirty-one different types of articles, ranging from clocks and related items (especially brass) to grain elevators, wood boxes, fishing rods, and knit underwear; agriculture was also mentioned, and there were tramway cars running every twenty minutes (Connecticut 1932). The 1934 aerial photography shows that the project area and its vicinity were, as expected, in an agricultural area with large expanses of cleared fields, as well as nearby areas that appear to have been in the process of reforestation. A cluster of connected barns stood within the larger project area parcel, at the corner of Hill Road and Minor Road, as was suggested by the 1852 map. More houses than just the old farmsteads were present along both sides of Hill Road. The project area proper included areas that might have been pasture, and also a section with regular dots suggesting an orchard (Figure 5; Fairchild 1934). The Great Depression affected Bristol's industries and finances as severely as it did every other town. World War II brought recovery, but it was short-lived in Bristol, as it was throughout the Northeast region. Industrial activity in town was reduced, though not entirely eliminated, while suburbanization slowly took root as elsewhere in the state (Clouette and Roth 1984). As the population chart above shows, the number of residents in Bristol rose steeply during the twentieth century to nearly 30,000 people in 1930, then leveled off during the Depression before beginning an even steeper climb to nearly 55,000 people by 1970. Growth was slower after that, so that by 1990 the increase had only just passed 60,000 residents and essentially stopped there through 2010 (Keegan 2012). The 1952 aerial photograph shows that the population increases had not yet had major effects on the area, although another house had been built in a piece cut out from the larger project area parcel, on the south side of Minor Road. There were still large areas of cleared fields and also large areas of forest in the vicinity. Part of the project area proper was taken up by a large orchard, while another part was a cleared field (Figure 6; USDA 1951).

The late-twentieth-century population figures reflect both a combination of Bristol's continuing business activity, and an influx of commuting householders who left the urban centers of Hartford and New Britain for suburban life. According to a 2015 economic survey of the city, 13 percent of the 22,307 jobs in Bristol were provided by 135 manufacturing firms, although the modern economy was also represented in the 19 percent of jobs in 17 firms in the category "Information," with a similar number in health care and social assistance; retail, interestingly, offered a smaller proportion of jobs than any of these three. In 2014, the three largest employers were ESPN (an "Information" firm), the local hospital, and the city itself (CERC 2017). The city's plan of conservation and development, adopted in 2015, stressed preservation of open space and enhancement of the community's character; the latter included farms, open space, historic resources, and sustainability (Bristol 2018). The 2019 aerial photograph

shows that the project area was still partly a cleared field, although the western end of the area had begun to reforest, and that several barns still stood inside the northeastern corner of the larger parcel. The project area was surrounded by a mix of the land uses that was very representative of Bristol's economy: other surviving cleared fields in most directions, housing developments representing several periods of suburban housing styles to the east and south, and industrial or commercial buildings to the north and west (Figure 7; CT ECO 2019).

Conclusions

The documentary record indicates that it is unlikely that the proposed development will impact any inventoried historical resources. The project area was farmed at least as far back as 1934, and no doubt for many years before that, but there is no indication that farm buildings were located anywhere but near the road to the east, outside the project area. Other evidence of historic farming activity, such as stone walls and fences, may be present, but such remains are not considered to be historically significant.

CHAPTER V
PREVIOUS INVESTIGATIONS

Introduction

This chapter presents an overview of previous archaeological research completed within the vicinity of the project area in Bristol, Connecticut. This discussion provides the comparative data necessary for assessing the results of the current Phase IA cultural resources assessment survey, and it ensures that the potential impacts to all previously recorded cultural resources located within and adjacent to the project area are taken into consideration. Specifically, this chapter reviews previously identified archaeological sites and National/State Register of Historic Places properties situated in the project region (Figures 8 and 9). The discussions presented below are based on information currently on file at the Connecticut State Historic Preservation Office in Hartford, Connecticut. In addition, the electronic site files maintained by Heritage also were examined during the course of this investigation. Both the quantity and quality of the information contained in the original cultural resources survey reports and State of Connecticut archaeological site forms are reflected below.

Previously Recorded Archaeological Sites and National/State Register of Historic Places Properties/Districts in the Vicinity of the Project Area and Interpretations

A review of data currently on file at the Connecticut State Historic Preservation Office, as well as the electronic site files maintained by Heritage failed to detect any previously identified archaeological sites or National/State Register of Historic Places properties situated within 1.6 km (1 mi) of the project area (Figures 8 and 9). Though no archaeological sites have been previously identified in the area, the natural setting discussed in Chapter II suggests Native Americans may have once inhabited the area, and sites may yet be discovered. In addition, the larger project region has been in use as agricultural land since Bristol's settlement and there may be evidence of this historic occupation in the project area.

CHAPTER VI
METHODS

Introduction

This chapter describes the research design and field methodology used to complete the Phase IA cultural resources assessment survey of the project area in Bristol, Connecticut. The following tasks were completed during this investigation: 1) study of the region's prehistory, history, and natural setting, as presented in Chapters II through IV; 2) a literature search to identify and discuss previously recorded cultural resources in the project region; 3) a review of historic maps, topographic quadrangles, and aerial imagery depicting the project area in order to identify potential historic resources and/or areas of past disturbance; and 4) pedestrian survey and photo-documentation of the project area in order to determine their archaeological sensitivity. These methods are in keeping with those required by the Connecticut State Historic Preservation Office in the document entitled: *Environmental Review Primer for Connecticut's Archaeological Resources* (Poirier 1987).

Research Framework

The current Phase IA cultural resources assessment survey was designed to assess the archaeological sensitivity of the project area, as well as to visually examine the development area for any previously unidentified cultural resources during pedestrian survey. The undertaking was comprehensive in nature, and project planning considered the distribution of previously recorded cultural resources located within the project region, as well as a visual assessment of the project area. The methods used to complete this investigation were designed to provide coverage of all portions of the project area. The fieldwork portion of this undertaking entailed pedestrian survey, photo-documentation, and mapping (see below).

Archival Research & Literature Review

Background research for this project included a review of a variety of historic maps depicting the proposed project area; an examination of USGS 7.5' series topographic quadrangles; an examination of aerial images dating from 1934 through 2019; and a review of all archaeological sites and National and State Register of Historic Places on file with the CT-SHPO, as well as electronic cultural resources data maintained by Heritage. The intent of this review was to identify all previously recorded cultural resources situated within and immediately adjacent to the project area, and to provide a natural and cultural context for the project region. This information then was used to develop the archaeological context of the project area, and to assess its sensitivity with respect to the potential for producing intact cultural resources.

Background research materials, including historic maps, aerial imagery, and information related to previous archaeological investigations, were gathered from the CT-SHPO. Finally, electronic databases and Geographic Information System files maintained by Heritage were employed during the course of this project, and they provided valuable data related to the project region, as well as data concerning previously identified archaeological sites and National and State Register of Historic Places properties within the general vicinity of the project area.

Field Methodology and Data Synthesis

Heritage also performed fieldwork for the Phase IA cultural resources assessment survey of the project area associated with the solar project in Bristol, Connecticut. This included pedestrian survey, photo-documentation, and mapping of the areas containing the proposed development area. During the completion of the pedestrian survey, representatives from Heritage photo-documented all potential areas of impact using digital media.

CHAPTER VII
RESULTS OF THE INVESTIGATION & MANAGEMENT RECOMMENDATIONS

Introduction

This chapter presents the results of the Phase IA cultural resources assessment survey of the project area in Bristol, Connecticut. As stated in the introductory section of this report, the goals of the investigation included completion of the following tasks: 1) a contextual overview of the region's prehistory, history, and natural setting (e.g., soils, ecology, hydrology, etc.); 2) a literature search to identify and discuss previously completed cultural resources surveys and previously recorded cultural resources in the project region; 3) a review of readily available historic maps and aerial imagery depicting the project area in order to identify potential historic resources and/or areas of past disturbance; 4) pedestrian survey and photo-documentation of the project items in order to determine their archaeological sensitivity; and 5) preparation of the current Phase IA cultural resources assessment survey report.

Results of Phase IA survey

The project area measures approximately 402 m (1,320 ft) in length from east to west by 134 m (440 ft) in width from north to south and is bordered on its north side by a dirt access road known as "Minor Road." An electrical distribution line located along this road will serve as the interconnect for the proposed 370 watt AC solar facility (Figures 1, 7 and 14). At the time of survey, the project area was characterized by open farmland (Figures 7, and 10 through 17). It is situated at elevations ranging from approximately 210 m (690 ft) NGVD in the west to 234 m (770 ft) NGVD in the east, and contains a total of 17.4 acres of land. The predominant soil types located throughout the project area are Woodbridge and Paxton/Montauk loams, which are found on slopes of 3 to 15 percent. As discussed in Chapter II of this report, these soil types are well-drained.

Heritage personnel conducted a pedestrian survey of the project area on February 14, 2020. During the pedestrian survey, a gated, two-track dirt road was identified running along the northern border of the project area, which has a distribution line paralleling it (Figure 14). The project area sits on a flat terrace that slopes down to the south and west. Overall the project area appeared dry at the time of survey and consisted mainly of open fields (Figures 10 through 17). Besides its agricultural use, there were no signs of previous disturbance.

Overall Sensitivity of the Proposed Project area

The field data associated with soils, slopes, aspect, distance to water, and previous disturbance collected during the pedestrian survey and presented above was used in conjunction with the analysis of historic maps, aerial images, and data regarding previously identified archaeological sites, and National and State Register of Historic Places properties to stratify the project items into zones of no/low and/or moderate/high archaeological sensitivity. In general, historic period archaeological sites are relatively easy to identify on the current landscape because the features associated with them tend to be relatively permanent constructions that extend above the ground surface (i.e., stone foundations, pens, wells, privies, etc.). Archaeological sites dating from the prehistoric era, on the other hand, are less often identified during pedestrian survey because they are buried, and predicting their locations relies

more on the analysis and interpretation of environmental factors that would have informed Native American site choices.

With respect to the potential for identifying prehistoric archaeological sites, the project area was divided into areas of no/low and/or moderate/high archaeological potential by analyzing the landform types, slope, aspect, soils contained within them, and their distance to water. In general, areas located less than 300 m (1,000 ft) from a freshwater source and that contain slopes of less than 8 percent and well-drained soils possess a high potential for producing prehistoric archaeological deposits. Those areas located between 300 and 600 m (1,000 and 2,000 ft) from a freshwater source and well drained soils are considered moderate probability areas. This is in keeping with broadly based interpretations of prehistoric settlement and subsistence models that are supported by decades of previous archaeological research throughout the region. It is also expected that there may be variability of prehistoric site types found in the moderate/high sensitivity zones. For example, large Woodland period village sites and Archaic period seasonal camps may be expected along large river floodplains and near stream/river confluences, while smaller temporary or task specific sites may be expected on level areas with well-drained soils that are situated more than 300 m (1,000 ft) but less than 600 m (2,000 ft) from a water source. Finally, steeply sloping areas, poorly drained soils, or areas of previous disturbance are generally deemed to retain a no/low archaeological sensitivity with respect to their potential to contain prehistoric archaeological sites.

In addition, the potential for a given area to yield evidence of historic period archaeological deposits is based not only the above-defined landscape features but also on the presence or absence of previously identified historic period archaeological resources as identified during previous archaeological surveys, recorded on historic period maps, or captured in aerial images of the region under study. In this case, proposed project items that are situated within 100 m (328 ft) of a previously identified historic period archaeological site or a National or State Register of Historic Places district/individually listed property also may be deemed to retain a moderate/high archaeological sensitivity. In contrast, those areas situated over 100 m (328 ft) from any of the above-referenced properties would be considered to retain a no/low historic period archaeological sensitivity.

The combined review of historic maps, aerial images, land deeds, and pedestrian survey indicates that the 17.4 acre project area contains low slopes and well drained soils situated in proximity to the Pequabuck River, which is located immediately to the west. Soils found throughout the project area are mainly attributed to the Woodbridge and Paxton/Montauk series, which consist of well drained loams that generally extend to ca., 165 cm (65 in) below surface. In addition, this area has been relatively undisturbed over the years. Based on the landscape type, proximity to freshwater, and the presence of well-drained loamy soils, the entire project area appears to retain a moderate/high sensitivity for yielding archaeological deposits. Thus, it is recommended that a Phase IB cultural resources reconnaissance survey of the project area be completed prior to construction of the proposed solar center.

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Figure 1. Excerpt from a USGS 7.5' series topographic quadrangle image showing the location of the project area in Bristol, Connecticut.

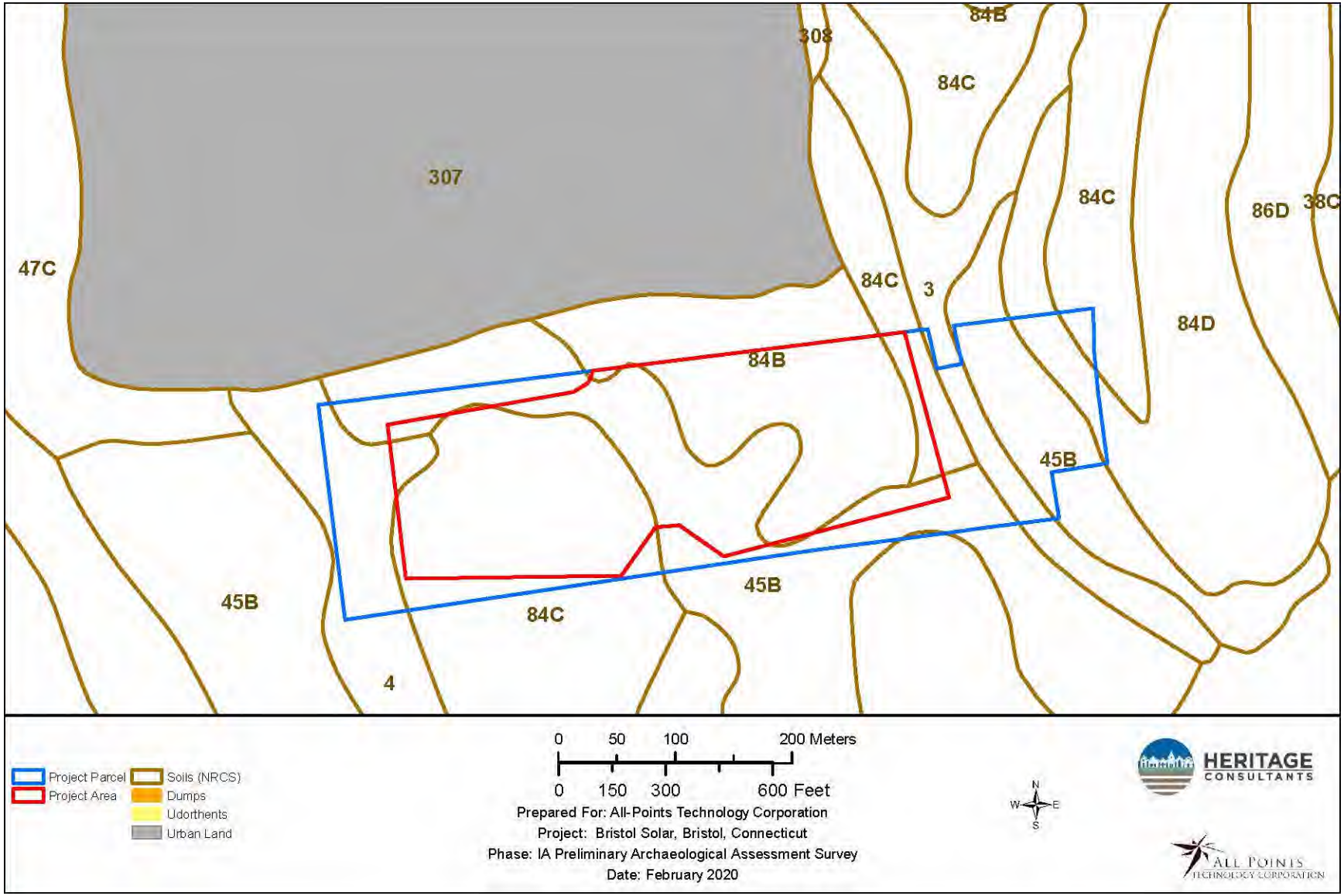


Figure 2. Map of soils located in the vicinity of the project area in Bristol, Connecticut.

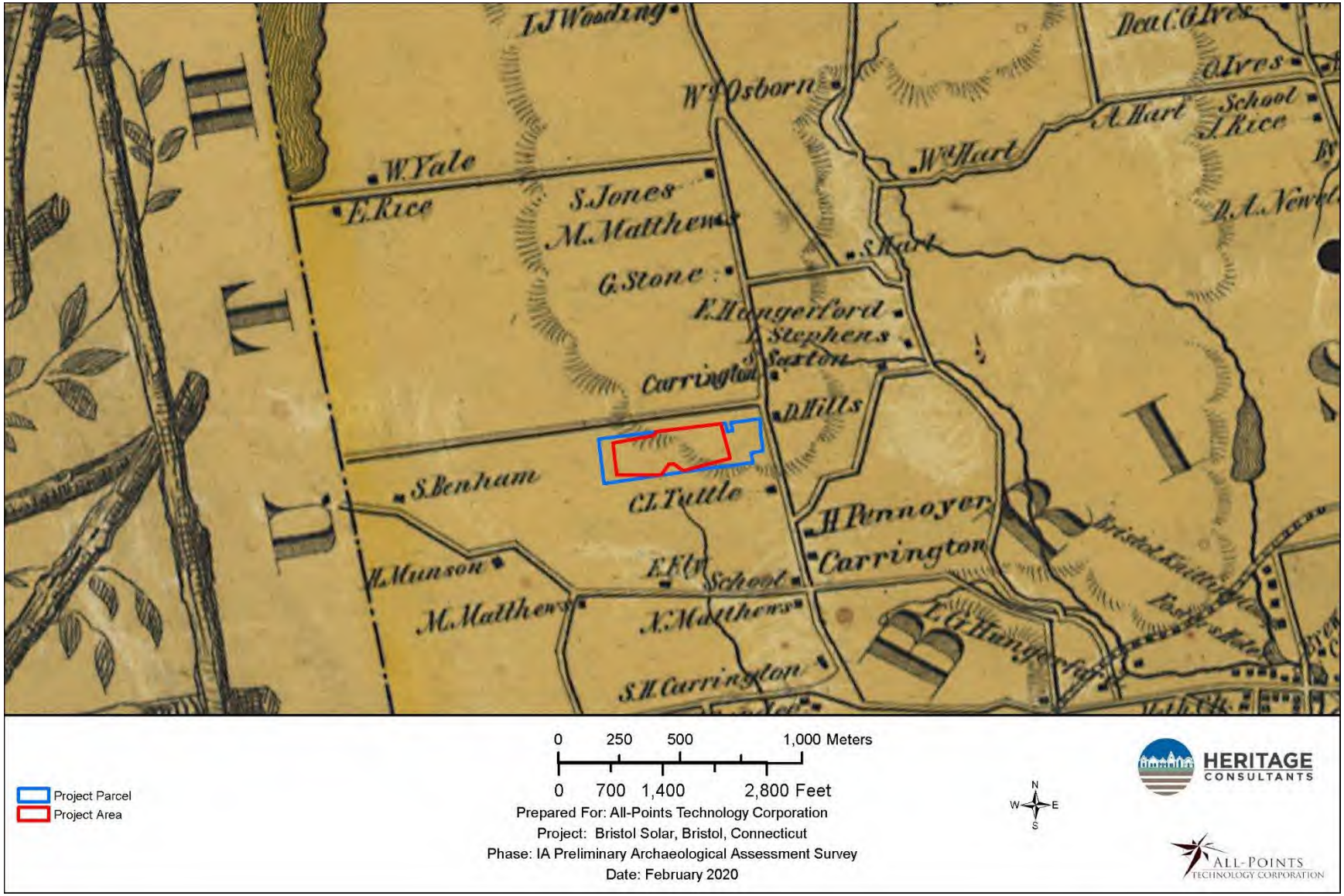


Figure 3. Excerpt from an 1852 historic map showing the location of the project area in Bristol, Connecticut.

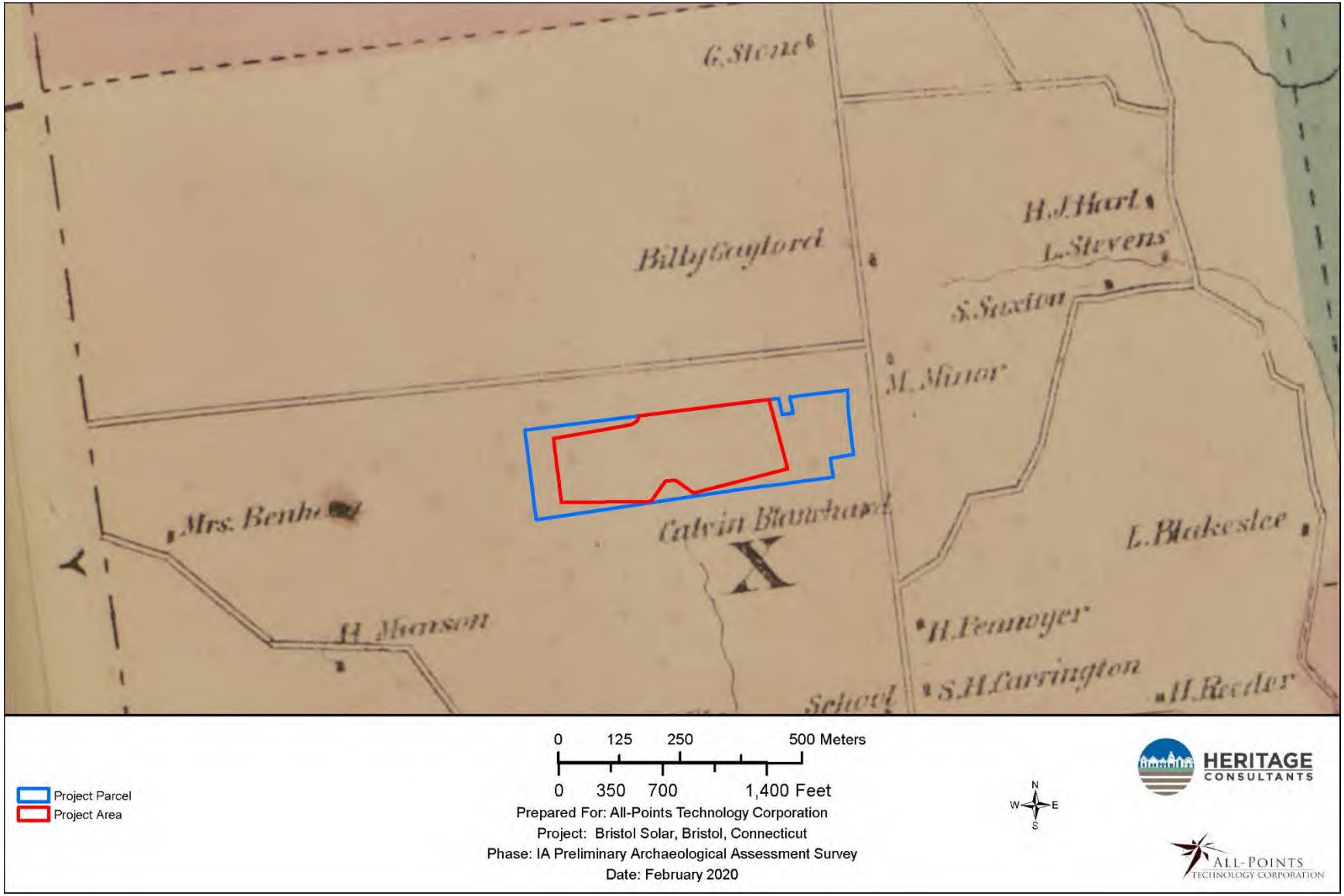


Figure 4. Excerpt from an 1869 historic map showing the location of the project area in Bristol, Connecticut.

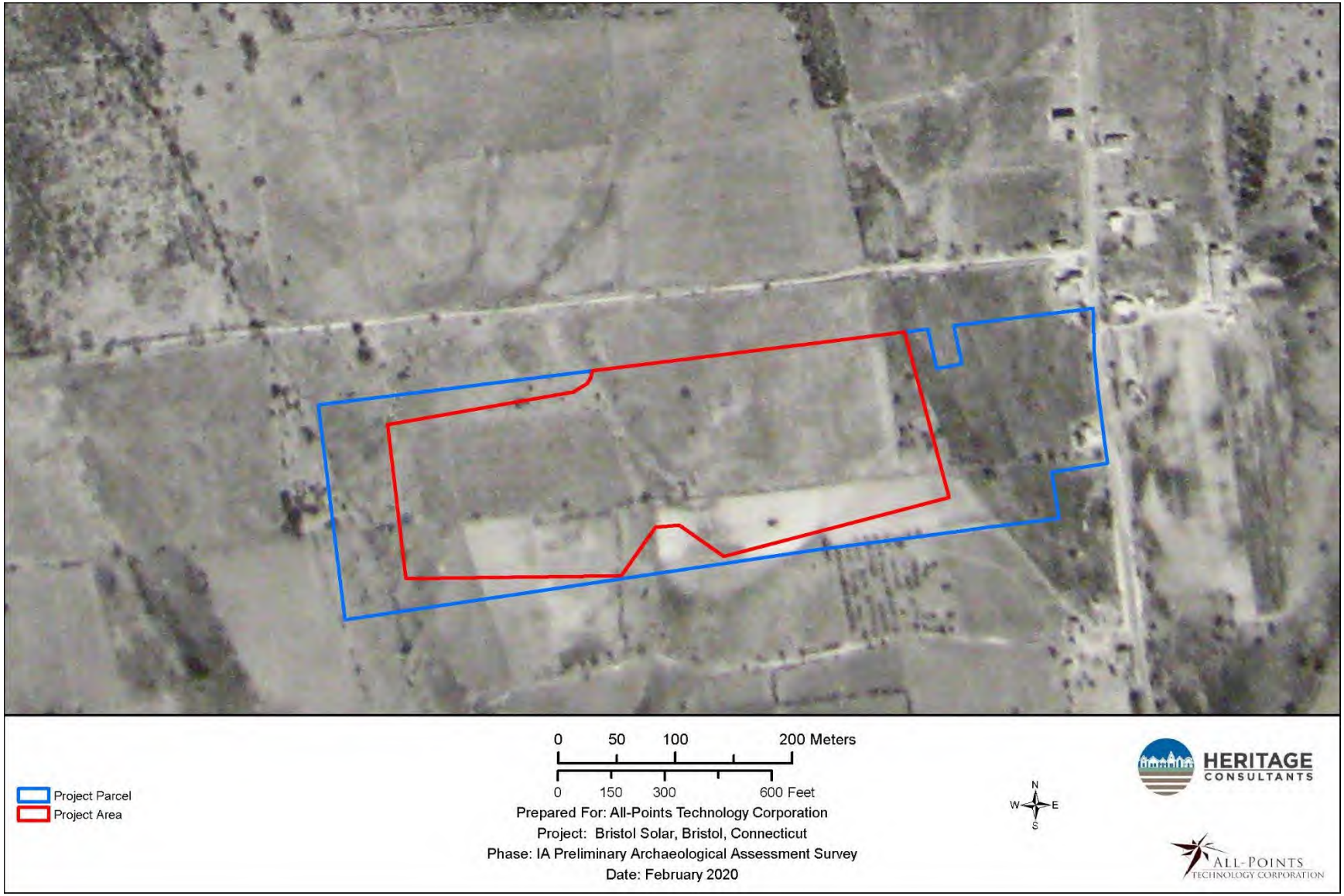
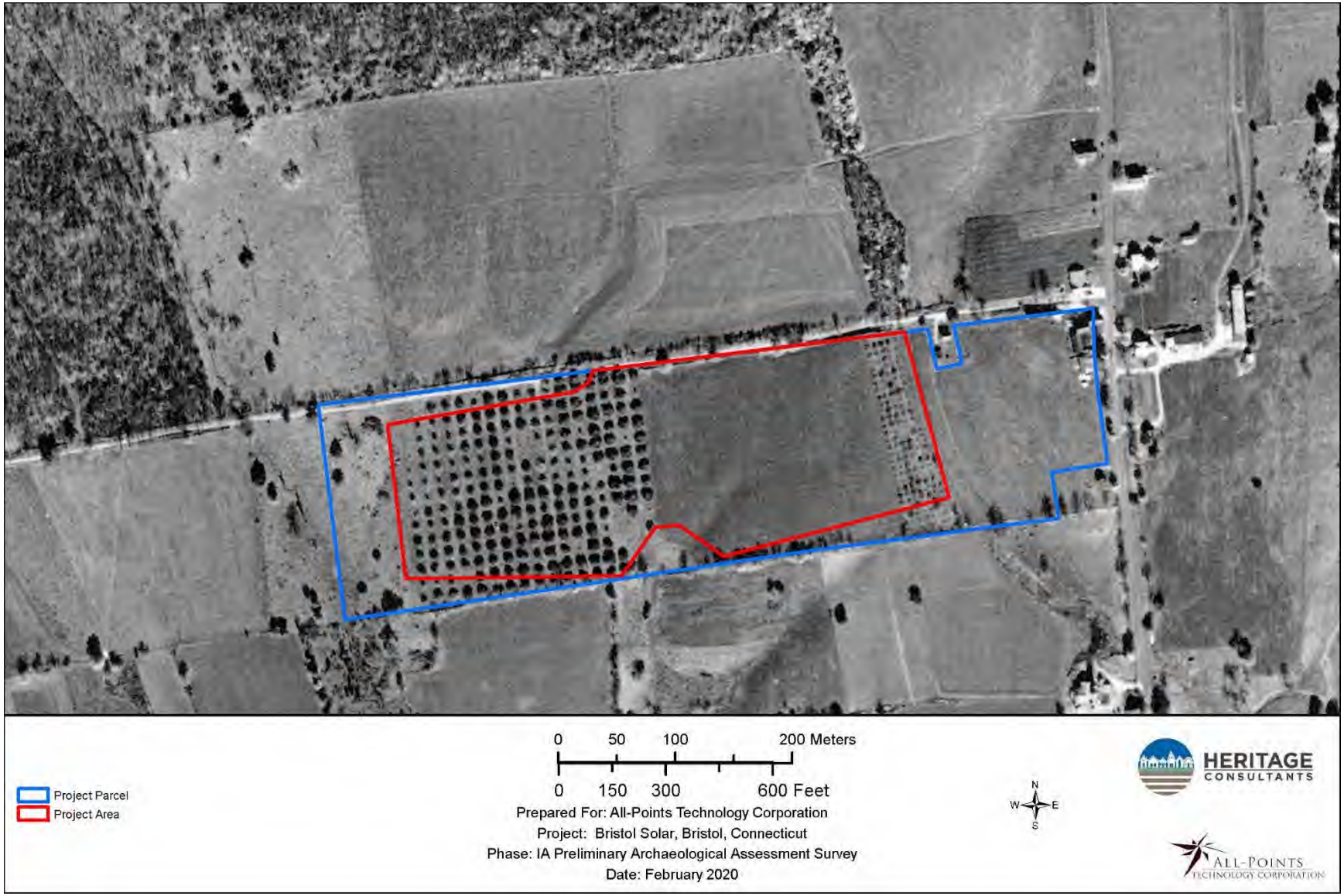


Figure 5. Excerpt from a 1934 aerial photograph showing the location of the project area in Bristol, Connecticut.



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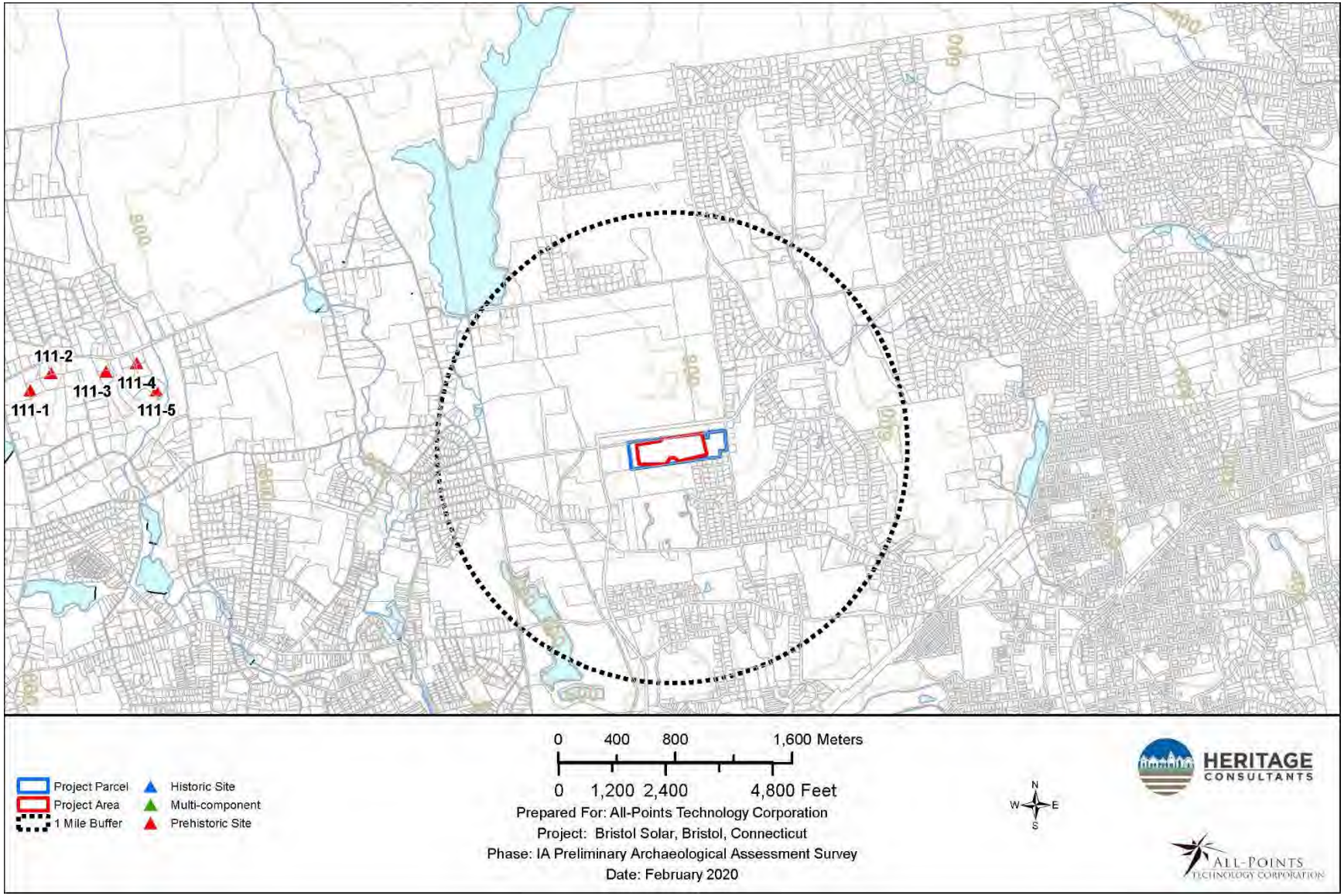
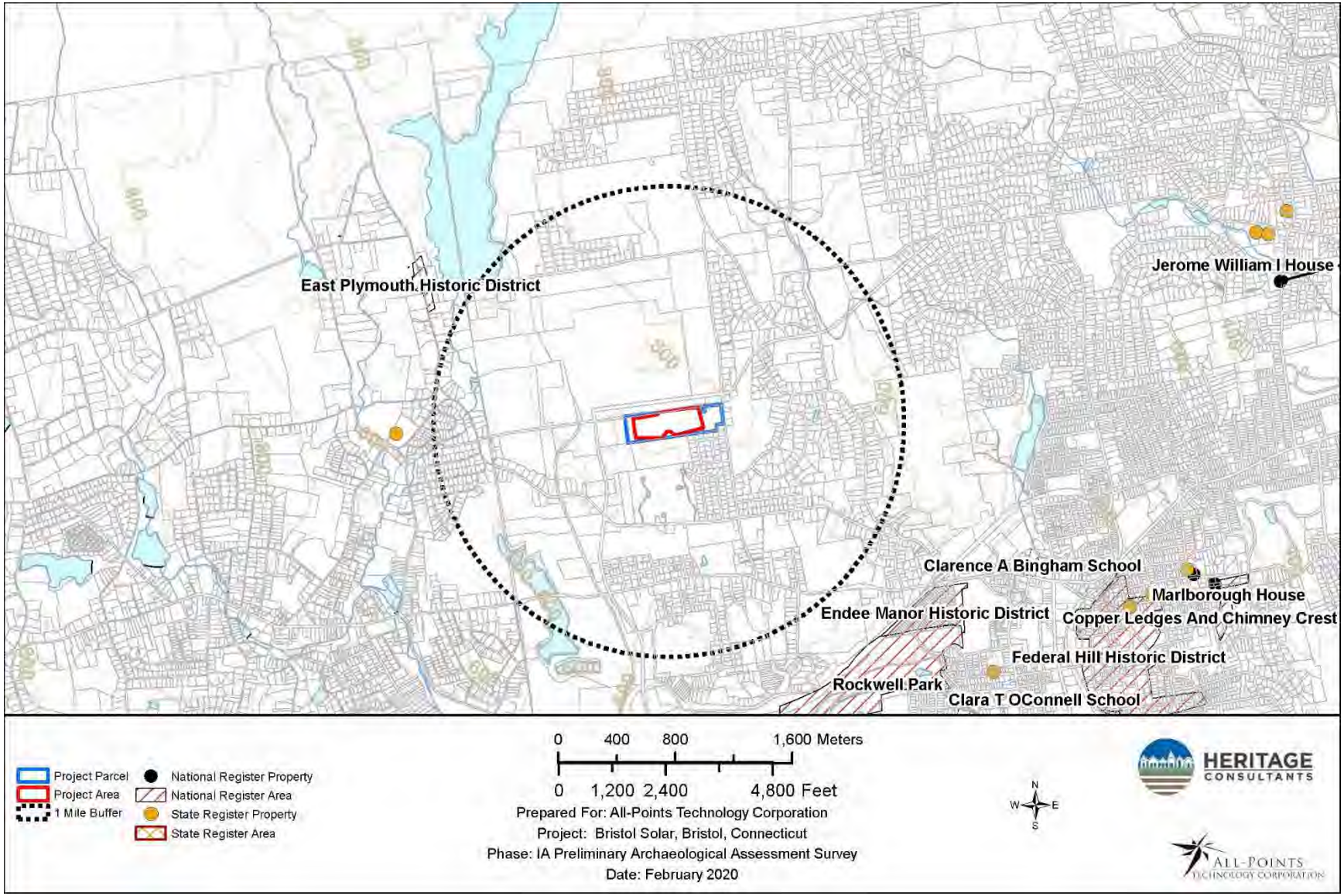


Figure 8. Digital map showing the location of previously identified archaeological sites in the vicinity of the project area in Bristol, Connecticut.



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APRIL 2020

PHASE IB CULTURAL RESOURCES RECONNAISSANCE SURVEY OF A PROPOSED SOLAR CENTER IN BRISTOL, CONNECTICUT

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ABSTRACT

This report presents the results of a Phase IB cultural resources reconnaissance survey of a proposed solar center in Bristol, Connecticut. The project area encompasses approximately 17.4 ac of land retaining a moderate/high sensitivity for archaeological resources as determined during a previously completed Phase IA cultural resources assessment survey. A total of 197 of 198 (100 percent) planned shovel tests were excavated across the project parcel apart from the southwestern corner. The southwestern corner was characterized by slopes and not examined archaeologically. Only a single shovel test yielded archaeological materials. The recovered artifacts were historic in age and consisted of a small number of glass shards and ceramic sherds. This area was designated as Locus 1, and it represented typical field scatter. Due to the lack of a significant number of artifacts, cultural features, and research potential, Locus 1 was determined not eligible for listing to the National Register of Historic Places applying the criteria for evaluation (36 CFR 60.4 [a-d]). No additional examination of Locus 1 or the remainder of the project parcel is recommended prior to construction of the proposed solar center.

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CHAPTER I
INTRODUCTION

This report presents the results of a Phase IB cultural resources reconnaissance survey of a proposed solar center in Bristol, Connecticut (Figure 1). All-Points Technology Corporation (All-Points), operating on behalf of Bristol Solar One, LLC, requested that Heritage Consultants, LLC (Heritage) complete the archaeological reconnaissance survey as part of the planning process for the proposed solar center, which will occupy approximately 17.4 ac of land. The proposed development area is hereafter referred to as the project area. The project area is situated in the central portion of a larger 28.6 ac parcel of land located at 399 Hill Street in Bristol. It consists of an open agricultural field surrounded by wooded areas and industrial/commercial facilities to the north and west, and agricultural fields, wooded areas, and a residential community to the south. A powerline easement borders the north side of the project parcel. A farmhouse and several farm buildings are also located near the northeast end of the project parcel, which is adjacent to Hill Street. Heritage completed this investigation on behalf of All-Points in April of 2020. All work associated with this project was performed in accordance with the *Environmental Review Primer for Connecticut's Archaeological Resources* (Poirier 1987) promulgated by the Connecticut State Historic Preservation Office (CT-SHPO).

Project Description and Methods Overview

The proposed project will consist of a 370-watt solar center that will include the installation of rows of solar panels spaced 3.65 m (12 ft) apart across the central and western portions of the project area. The eastern part of the larger parcel will not be developed. The solar array will interconnect with an existing powerline corridor that extends from east to west and is adjacent to the northern edge of the project area. Finally, the project area will contain four stormwater basins, three to the south of the proposed solar array and one on the northwestern border of the array (Figure 2). The project area rests at approximate elevations ranging from 210 m (690 ft) NGVD in the west to 234 m (770 ft) NGVD in the east. At the time of survey, the project area consisted of a fallow agricultural field that had been allowed to grow over with long grass and weeds. Field methods employed during the current investigation consisted of pedestrian survey, mapping, photo-documentation, and subsurface testing throughout the array area. Subsurface testing was also conducted in the locations of the proposed stormwater basins, which also contained low slopes and apparently undisturbed soil deposits. The details of the field methods used, as well as the results of this field effort, are reviewed briefly below.

Project Results and Management Recommendations Overview

The review of historic maps and aerial images of the project area and files maintained by the CT-SHPO, as well as pedestrian survey of the project area, failed to detect any previously identified archaeological sites or National/State Register of Historic Places properties within 1.6 km (1 mi) of the proposed solar center. This is likely due to a lack of professional cultural resources surveys in the area rather than an actual absence of cultural resources. Despite the above-referenced results, the project area contained landscape conditions that were considered conducive to containing archaeological deposits, including generally low slopes, well drained soils, and proximity to freshwater sources.

Due to the potentially favorable conditions of the project area, a Phase IB cultural resources reconnaissance survey was conducted. This survey included pedestrian survey, photo-documentation, and subsurface testing. A total of 197 of 198 (99 percent) planned survey shovel tests were excavated

along nine northeast to southwest transects. The single unexcavated shovel test fell within an area of standing water. The southwestern corner of the project area was not examined archaeologically due to the presence of slopes. A single shard of window glass and one historic ceramic sherd were recovered from one of the shovel tests. This area was designated as Locus 1. Locus 1 lacked substantial numbers of artifacts, evidence of cultural features, and research potential. It was assessed as not eligible for listing on the National Register of Historic Places applying the criteria for evaluation (36 CFR 60.4 [-d]). No addition testing of Locus 1 or the remainder of the project area is recommended, and construction of the solar center will not adversely affect any cultural resources.

Project Personnel

Key personnel for this project included Mr. David R. George, M.A., R.P.A, who served as Principal Investigator for this effort; he was assisted by Ms. Kelsey Tuller, M.A., (Field Director); who supervised the field work portion of the project. Dr. Kristen Keegan completed this historic background research of the project and contributed to the final report, while Mr. Stephen Anderson, B.A., completed all GIS tasks associated with the project. Finally, Ms. Elizabeth Correia, M.A., completed the analysis of the recovered archaeological materials.

Organization of the Report

The natural setting of the region, which encompasses the project area, is presented in Chapter II; it includes a brief overview of the geology, hydrology, and soils of the project region. The prehistory of the project region is outlined briefly in Chapter III. The history of the region encompassing the project region and project area is chronicled in Chapter IV, while a discussion of previous archaeological investigations in the vicinity of the project area is presented in Chapter V. The methods used to complete this investigation are discussed in Chapter VI. Finally, the results of this investigation and management recommendations for the project area and the identified cultural resources are presented in Chapter VII.

CHAPTER II
NATURAL SETTING

Introduction

This chapter provides an overview of the natural setting of the region containing the project area. Previous archaeological research has documented that some specific environmental factors can be associated with both prehistoric and historic period site selection. These include general ecological conditions, as well as types of fresh water sources and soils present.

Ecoregions of Connecticut

Throughout the Pleistocene and Holocene Periods, Connecticut has undergone numerous environmental changes. Variations in climate, geology, and physiography have led to the "regionalization" of Connecticut's modern environment. It is clear, for example, that the northwestern portion of the state has different natural characteristics than the coastline. Recognizing this fact, Dowhan and Craig (1976), as part of their study of the distribution of rare and endangered species in Connecticut, subdivided the state into various ecoregions. Dowhan and Craig (1976:27) defined an ecoregion as:

> "an area characterized by a distinctive pattern of landscapes and regional climate as expressed by the vegetation composition and pattern, and the presence or absence of certain indicator species and species groups. Each ecoregion has a similar interrelationship between landforms, local climate, soil profiles, and plant and animal communities. Furthermore, the pattern of development of plant communities (chronosequences and toposequences) and of soil profile is similar in similar physiographic sites. Ecoregions are thus natural divisions of land, climate, and biota."

Dowhan and Craig defined nine major ecoregions for the State of Connecticut. They are based on regional diversity in plant and animal indicator species (Dowhan and Craig 1976). Only one of the ecoregions is germane to the current investigation: Northwest Hills ecoregion. A brief summary of this ecoregion is presented below. It is followed by a discussion of the hydrology and soils found in and adjacent to the project area.

Northwest Hills Ecoregion

The Northwest Hills ecoregion consists of a hilly upland terrain characterized by "a moderately hilly landscape of intermediate elevation, with narrow valleys and local areas of steep and rugged topography" (Dowhan and Craig 1976:31). Elevations in the Northwest Hills ecoregion range from 228.6 to 304.8 m (750 to 1,000 ft) above sea level. The bedrock of the region is composed of schists and gneisses deposited during the Paleozoic (Dowhan and Craig 1976; Bell 1985). Soils in these upland areas have developed on top of glacial till in upland locales, and on top of stratified deposits of sand, gravel, and silt in the local valleys (Dowhan and Craig 1976).

Hydrology in the Vicinity of the Project Area

The project area is situated within a region that contains several sources of freshwater, including the Pequabuck River, Birge Pond Brook, Birge Pond, Marsh Brook, and Old Marsh Pond, as well as numerous unnamed streams, ponds, and wetlands. These freshwater sources may have served as resource extraction areas for Native American and historic populations alike. Previously completed archaeological investigations in Connecticut have demonstrated that streams, rivers, and wetlands were focal points for prehistoric occupations because they served as transportation routes, sources of freshwater, and abundant faunal and floral resources.

Soils Comprising the Project Area

Soil formation is the direct result of the interaction of many variables, including climate, vegetation, parent material, time, and organisms present (Gerrard 1981). Once archaeological deposits are buried within the soil, they are subject to diagenic and taphonomic processes. Different classes of artifacts may be preferentially protected, or unaffected by these processes, whereas others may deteriorate rapidly. Cyclical wetting and drying, freezing, and thawing, and compression can chemically and mechanically accelerate the decay processes for animal bones, shells, lithics, ceramics, and plant remains. Lithic and ceramic artifacts are largely unaffected by soil pH, whereas animal bones and shells decay more quickly in acidic soils such as those that are present in the current project area. In contrast, acidic soils enhance the preservation of charred plant remains.

A review of the soils within the project area is presented below. The project area is characterized by the presence of three major soil types: Woodbridge, Paxton/Montauk, and Leicester soils (Figure 3). A review of these soils shows that most of them consist of well drained loams; they are the types of soils that are typically correlated with prehistoric and historic use and occupation. Descriptive profiles for each soil type are presented below; they were gathered from the National Resources Conservation Service.

Woodbridge Soils:

A typical profile associated with Woodbridge soils is as follows: **Ap**--0 to 18 cm; very dark grayish brown (10YR 3/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine and medium roots; few very dark brown (10YR 2/2) earthworm casts; 5 percent gravel; moderately acid; abrupt wavy boundary; **Bw1**--18 to 46 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; few very dark brown (10YR 2/2) earthworm casts; 10 percent gravel; moderately acid; gradual wavy boundary. **Bw2**--46 to 66 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; few very dark brown (10YR 2/2) earthworm casts; 10 percent gravel; few medium prominent strong brown (7.5YR 5/6) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; gradual wavy boundary; **Bw3**--66 to 76 cm; light olive brown (2.5Y 5/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; 10 percent gravel; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; clear wavy boundary; **Cd1**--76 to 109 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; weak thick plates of geogenic origin; very firm, brittle; 20 percent gravel; many medium prominent strong brown (7.5YR 5/8) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; gradual wavy boundary; and **Cd2**--109 to 165 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; weak thick plates of geogenic origin; very firm, brittle; few fine prominent very dark brown (10YR 2/2) coatings on plates; 25 percent gravel; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation; moderately acid.

Paxton/Montauk Soils:

A typical profile for Paxton and Montauk soils is described as follows: **Ap**--0 to 20 cm; dark brown (10YR 3/3) fine sandy loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; 5 percent gravel; strongly acid; abrupt smooth boundary. **Bw1**--20 to 38 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; 5 percent gravel; few earthworm casts; strongly acid; gradual wavy boundary; **Bw2**--38 to 66 cm; olive brown (2.5Y 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; 10 percent gravel; strongly acid; clear wavy boundary; and **Cd**--66 to 165 cm; olive (5Y 5/3) gravelly fine sandy loam; medium plate-like divisions; massive; very firm, brittle; 25 percent gravel; many dark coatings on plates; strongly acid.

Leicester Soils:

A typical profile associated with Leicester soils is as follows: **Oe**--0 to 3 cm; black (10YR 2/1) moderately decomposed plant material; **A**--3 to 18 cm; black (10YR 2/1) fine sandy loam; moderate medium granular structure; friable; common fine and medium roots; 10 percent gravel and cobbles; strongly acid; clear wavy boundary; **Bg1**--18 to 25 cm; grayish brown (2.5Y 5/2) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 10 percent gravel and cobbles; common medium prominent yellowish red (5YR 5/6) masses of iron accumulation; strongly acid; gradual wavy boundary; **Bg2**--25 to 46 cm; light brownish gray (2.5Y 6/2) fine sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; 10 percent gravel and cobbles; common fine prominent yellowish brown (10YR 5/6) masses of iron accumulation; strongly acid; gradual wavy boundary; **BC**--46 to 61 cm; pale brown (10YR 6/3) fine sandy loam; massive; friable; few fine roots; 10 percent gravel and cobbles; many medium distinct yellowish brown (10YR 5/6) and yellowish red (5YR 4/6) masses of iron accumulation; strongly acid; clear wavy boundary. (0 to 20 cm thick). **C1**--61 to 84 cm; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; massive; friable; 15 percent gravel and cobbles; many medium distinct yellowish brown (10YR 5/6) masses of iron accumulation and prominent pinkish gray (7.5YR 6/2) iron depletions; strongly acid; gradual wavy boundary; **C2**--84 to 155 cm; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; massive; friable; 15 percent gravel and cobbles; few fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; strongly acid. This is a minor soil type on the project parcel, and it does not extend into the area planned for solar center construction.

Summary

The natural setting of the area containing the project area is common throughout the Northwest Hills ecoregion. Streams and rivers of this area empty into the Naugatuck or Farmington Rivers, which in turn, drain into the Long Island Sound. The landscape is dominated by loamy soil types with some wetland soils intermixed. In addition, low slopes dominate the region. Due to these characteristics, the project region was well suited to Native American occupation throughout the prehistoric era, and archaeological sites have been documented in the larger project region. Additional prehistoric cultural deposits may be expected within the undisturbed portions of the proposed project area. This portion of Bristol was also used throughout the historic era, as evidenced by the presence of numerous historic residences and agricultural fields throughout the region. It is possible that archaeological deposits dating from the last 350 years or so may be present near or within the proposed project area.

CHAPTER III
PREHISTORIC SETTING

Introduction

Prior to the late 1970s and early 1980s, few systematic archaeological surveys of large portions of the state of Connecticut had been undertaken. Rather, the prehistory of the region was studied at the site level. Sites chosen for excavation were highly visible and were located in the coastal zone, e.g., shell middens, and Connecticut River Valley. As a result, a skewed interpretation of the prehistory of Connecticut was developed. It was suggested that the upland portions of the state, i.e., the northeastern and northwestern hills ecoregions, were little used and rarely occupied by prehistoric Native Americans, while the coastal zone, i.e., the eastern and western coastal and the southeastern and southwestern hills ecoregions, were the focus of settlements and exploitation in the prehistoric era. This interpretation remained unchallenged until the 1970s and 1980s when several town-wide and regional archaeological studies were completed. These investigations led to the creation of several archaeological phases that subsequently were applied to understand the prehistory of Connecticut. The remainder of this chapter provides an overview of the prehistoric setting of the region encompassing the project area.

Paleo-Indian Period (12,000 to 10,000 Before Present [B.P.])

The earliest inhabitants of the area encompassing the State of Connecticut, who have been referred to as Paleo-Indians, arrived in the area by ca., 12,000 B.P. (Gramly and Funk 1990; Snow 1980). Due to the presence of large Pleistocene mammals at that time and the ubiquity of large fluted projectile points in archaeological deposits of this age, Paleo-Indians often have been described as big-game hunters (Ritchie and Funk 1973; Snow 1980); however, as discussed below, it is more likely that they hunted a broad spectrum of animals.

While there have been numerous surface finds of Paleo-Indian projectile points throughout the State of Connecticut, only two sites, the Templeton Site (6-LF-21) in Washington, Connecticut and the Hidden Creek Site (72-163) in Ledyard, Connecticut, have been studied in detail and dated using the radiocarbon method (Jones 1997; Moeller 1980). The Templeton Site (6-LF-21) is located in Washington, Connecticut and was occupied between 10,490 and 9,890 years ago (Moeller 1980). In addition to a single large and two small fluted points, the Templeton Site produced a stone tool assemblage consisting of gravers, drills, core fragments, scrapers, and channel flakes, which indicates that the full range of stone tool production and maintenance took place at the site (Moeller 1980). Moreover, the use of both local and non-local raw materials was documented in the recovered tool assemblage, suggesting that not only did the site's occupants spend some time in the area, but they also had access to distant stone sources, the use of which likely occurred during movement from region to region.

The only other Paleo-Indian site studied in detail in Connecticut is the Hidden Creek Site (72-163) (Jones 1997). The Hidden Creek Site is situated on the southeastern margin of the Great Cedar Swamp on the Mashantucket Pequot Reservation in Ledyard, Connecticut. While excavation of the Hidden Creek Site produced evidence of Terminal Archaic and Woodland Period components (see below) in the upper soil horizons, the lower levels of the site yielded artifacts dating from the Paleo-Indian era. Recovered Paleo-Indian artifacts included broken bifaces, side-scrapers, a fluted preform, gravers, and end-scrapers. Based on the types and number of tools present, Jones (1997:77) has hypothesized that the Hidden Creek Site represented a short-term occupation, and that stone tool reduction and rejuvenation areas were present.

While archaeological evidence for Paleo-Indian occupation is scarce in Connecticut, it, combined with data from the West Athens Road and King's Road Site in the Hudson drainage and the Davis and Potts Sites in northern New York, supports the hypothesis that there was human occupation of the area not long after ca. 12,000 B.P. (Snow 1980). Further, site types currently known suggest that the Paleo-Indian settlement pattern was characterized by a high degree of mobility, with groups moving from region to region in search of seasonally abundant food resources, as well as for the procurement of high-quality raw materials from which to fashion stone tools.

Archaic Period (10,000 to 2,700 B.P.)

The Archaic Period, which succeeded the Paleo-Indian Period, began by ca., 10,000 B.P. (Ritchie and Funk 1973; Snow 1980), and it has been divided into three subperiods: Early Archaic (10,000 to 8,000 B.P.), Middle Archaic (8,000 to 6,000 B.P.), and Late Archaic (6,000 to 3,400 B.P.). These periods were devised to describe all non-farming, non-ceramic producing populations in the area. Regional archeologists recently have recognized a final "transitional" Archaic Period, the Terminal Archaic Period (3,400-2,700 B.P.), which was meant to describe those groups that existed just prior to the onset of the Woodland Period and the widespread adoption of ceramics into the toolkit (Snow 1980; McBride 1984; Pfeiffer 1984, 1990; Witthoft 1949, 1953).

Early Archaic Period (10,000 to 8,000 B.P.)

To date, few Early Archaic sites have been identified in southern New England. As a result, researchers such as Fitting (1968) and Ritchie (1969), have suggested a lack of these sites likely is tied to cultural discontinuity between the Early Archaic and preceding Paleo-Indian Period, as well as a population decrease from earlier times. However, with continued identification of Early Archaic sites in the region, and the recognition of the problems of preservation, it is difficult to maintain the discontinuity hypothesis (Curran and Dincauze 1977; Snow 1980).

Like their Paleo-Indian predecessors, Early Archaic sites tend to be small and produce few artifacts, most of which are not temporally diagnostic. While Early Archaic sites in other portions of the United States are represented by projectile points of the Kirk series (Ritchie and Funk 1973) and by Kanawha types (Coe 1964), sites of this age in southern New England are identified on the basis of a series of ill-defined bifurcate-based projectile points. These projectile points are identified by the presence of their characteristic bifurcated base, and they generally are made from high quality raw materials. Moreover, finds of these projectile points have rarely been in stratified contexts. Rather, they occur commonly either as surface expressions or intermixed with artifacts representative of later periods. Early Archaic occupations, such as the Dill Farm Site and Sites 6LF64 and 6LF70 in Litchfield County, are represented by camps that were relocated periodically to take advantage of seasonally available resources (McBride 1984; Pfeiffer 1986). In this sense, a foraging type of settlement pattern was employed during the Early Archaic Period.

Middle Archaic Period (8,000 to 6,000 B.P.)

By the onset of the Middle Archaic Period, essentially modern deciduous forests had developed in the region (Davis 1969). It is at this time that increased numbers and types of sites are noted in Connecticut (McBride 1984). The most well-known Middle Archaic site in New England is the Neville Site, which is located in Manchester, New Hampshire and studied by Dincauze (1976). Careful analysis of the Neville Site indicated that the Middle Archaic occupation dated from between ca., 7,700 and 6,000 years ago. In fact, Dincauze (1976) obtained several radiocarbon dates from the Middle Archaic component of the Neville Site. The dates, associated with the then-newly named Neville type projectile point, ranged from 7,740±280 and 7,015±160 B.P. (Dincauze 1976).

In addition to Neville points, Dincauze (1976) described two other projectile points styles that are attributed to the Middle Archaic Period: Stark and Merrimac projectile points. While no absolute dates were recovered from deposits that yielded Stark points, the Merrimac type dated from 5,910±180 B.P. Dincauze argued that both the Neville and later Merrimac and Stark occupations were established to take advantage of the excellent fishing that the falls situated adjacent to the site area would have afforded Native American groups. Thus, based on the available archaeological evidence, the Middle Archaic Period is characterized by continued increases in diversification of tool types and resources exploited, as well as by sophisticated changes in the settlement pattern to include different site types, including both base camps and task-specific sites (McBride 1984:96)

Late Archaic Period (6,000 to 3,700 B.P.)

The Late Archaic Period in southern New England is divided into two major cultural traditions that appear to have coexisted. They include the Laurentian and Narrow-Stemmed Traditions (Funk 1976; McBride 1984; Ritchie 1969a and b). Artifacts assigned to the Laurentian Tradition include ground stone axes, adzes, gouges, ulus (semi-lunar knives), pestles, atlatl weights, and scrapers. The diagnostic projectile point forms of this time period in southern New England include the Brewerton Eared-Notched, Brewerton Eared and Brewerton Side-Notched varieties (McBride 1984; Ritchie 1969a; Thompson 1969). In general, the stone tool assemblage of the Laurentian Tradition is characterized by flint, felsite, rhyolite, and quartzite, while quartz was largely avoided for stone tool production.

In terms of settlement and subsistence patterns, archaeological evidence in southern New England suggests that Laurentian Tradition populations consisted of groups of mobile hunter-gatherers. While a few large Laurentian Tradition occupations have been studied, sites of this age generally encompass less than 500 m^2 (5,383 ft^2). These base camps reflect frequent movements by small groups of people in search of seasonally abundant resources. The overall settlement pattern of the Laurentian Tradition was dispersed in nature, with base camps located in a wide range of microenvironments, including riverine as well as upland zones (McBride 1978, 1984:252). Finally, subsistence strategies of Laurentian Tradition focused on hunting and gathering of wild plants and animals from multiple ecozones.

The second Late Archaic tradition, known as the Narrow-Stemmed Tradition, is unlike the Laurentian Tradition, and it likely represents a different cultural adaptation. The Narrow-Stemmed tradition is recognized by the presence of quartz and quartzite narrow stemmed projectile points, triangular quartz Squibnocket projectile points, and a bipolar lithic reduction strategy (McBride 1984). Other tools found in Narrow-Stemmed Tradition artifact assemblages include choppers, adzes, pestles, antler and bone projectile points, harpoons, awls, and notched atlatl weights. Many of these tools, notably the projectile points and pestles, indicate a subsistence pattern dominated by hunting and fishing, as well the collection of a wide range of plant foods (McBride 1984; Snow 1980:228).

The Terminal Archaic Period (3,700 to 2,700 B.P.)

The Terminal Archaic Period, which lasted from ca., 3,700 to 2,700 BP, is perhaps the most interesting, yet confusing of the Archaic Periods in southern New England prehistory. Originally termed the "Transitional Archaic" by Witthoft (1953) and recognized by the introduction of technological innovations, e.g., broadspear projectile points and soapstone bowls, the Terminal Archaic has long posed problems for regional archeologists. While the Narrow-Stemmed Tradition persisted through the Terminal Archaic and into the Early Woodland Period, the Terminal Archaic is coeval with what appears to be a different technological adaptation, the Susquehanna Tradition (McBride 1984; Ritchie 1969b). The Susquehanna Tradition is recognized in southern New England by the presence of a new stone tool industry that was based on the use of high-quality raw materials for stone tool production and a settlement pattern

different from the “coeval” Narrow-Stemmed Tradition.

The Susquehanna Tradition is based on the classification of several Broadspear projectile point types and associated artifacts. There are several local sequences within the tradition, and they are based on projectile point type chronology. Temporally diagnostic projectile points of these sequences include the Snook Kill, Susquehanna Broadspear, Mansion Inn, and Orient Fishtail types (Lavin 1984; McBride 1984; Pfeiffer 1984). The initial portion of the Terminal Archaic Period (ca., 3,700-3,200 BP) is characterized by the presence of Snook Kill and Susquehanna Broadspear projectile points, while the latter Terminal Archaic (3,200-2,700 BP) is distinguished by the use of Orient Fishtail projectile points (McBride 1984:119; Ritchie 1971).

In addition, it was during the late Terminal Archaic Period that interior cord marked, grit tempered, thick walled ceramics with conoidal (pointed) bases made their initial appearance in the Native American toolkit. These are the first ceramics in the region, and they are named Vinette I (Ritchie 1969a; Snow 1980:242); this type of ceramic vessel appears with much more frequency during the ensuing Early Woodland Period. In addition, the adoption and widespread use of soapstone bowls, as well as the implementation of subterranean storage, suggests that Terminal Archaic groups were characterized by reduced mobility and longer-term use of established occupation sites (Snow 1980:250).

Finally, while settlement patterns appeared to have changed, Terminal Archaic subsistence patterns were analogous to earlier patterns. The subsistence pattern still was diffuse in nature, and it was scheduled carefully. Typical food remains recovered from sites of this period consist of fragments of white-tailed deer, beaver, turtle, fish, and various small mammals. Botanical remains recovered from the site area consisted of *Chenopodium* sp., hickory, butternut, and walnut (Pagoulatos 1988:81). Such diversity in food remains suggests at least minimal use of a wide range of microenvironments for subsistence purposes.

Woodland Period (2,700 to 350 B.P.)

Traditionally, the advent of the Woodland Period in southern New England has been associated with the introduction of pottery; however, as mentioned above, early dates associated with pottery now suggest the presence of Vinette I ceramics appeared toward the end of the preceding Terminal Archaic Period (Ritchie 1969a; McBride 1984). Like the Archaic Period, the Woodland Period has been divided into three subperiods: Early, Middle, and Late Woodland. The various subperiods are discussed below.

<u>Early Woodland Period (ca., 2,700 to 2,000 B.P.)</u>

The Early Woodland Period of the northeastern United States dates from ca., 2,700 to 2,000 B.P., and it has been thought to have been characterized by the advent of farming, the initial use of ceramic vessels, and increasingly complex burial ceremonialism (Griffin 1967; Ritchie 1969a and 1969b; Snow 1980). In the Northeast, the earliest ceramics of the Early Woodland Period are thick walled, cord marked on both the interior and exterior, and possess grit temper.

Careful archaeological investigations of Early Woodland sites in southern New England have resulted in the recovery of narrow stemmed projectile points in association with ceramic sherds and subsistence remains, including specimens of white-tailed deer, soft and hard-shell clams, and oyster shells (Lavin and Salwen: 1983; McBride 1984:296-297; Pope 1952). McBride (1984) has argued that the combination of the subsistence remains and the recognition of multiple superimposed cultural features at various sites indicates that Early Woodland Period settlement patterns were characterized by multiple re-use of the same sites on a seasonal basis by small co-residential groups.

Middle Woodland Period (2,000 to 1,200 B.P.)

The Middle Woodland Period is marked by an increase in the number of ceramic types and forms utilized (Lizee 1994a), as well as an increase in the amount of exotic lithic raw material used in stone tool manufacture (McBride 1984). The latter suggests that regional exchange networks were established, and that they were used to supply local populations with necessary raw materials (McBride 1984; Snow 1980). The Middle Woodland Period is represented archaeologically by narrow stemmed and Jack's Reef projectile points; increased amounts of exotic raw materials in recovered lithic assemblages, including chert, argillite, jasper, and hornfels; and conoidal ceramic vessels decorated with dentate stamping. Ceramic types indicative of the Middle Woodland Period include Linear Dentate, Rocker Dentate, Windsor Cord Marked, Windsor Brushed, Windsor Plain, and Hollister Stamped (Lizee 1994a:200).

In terms of settlement patterns, the Middle Woodland Period is characterized by the occupation of village sites by large co-residential groups that utilized native plant and animal species for food and raw materials in tool making (George 1997). These sites were the principal place of occupation, and they were positioned close to major river valleys, tidal marshes, estuaries, and the coastline, all of which would have supplied an abundance of plant and animal resources (McBride 1984:309). In addition to villages, numerous temporary and task-specific sites were utilized in the surrounding upland areas, as well as in closer ecozones such as wetlands, estuaries, and floodplains. The use of temporary and task-specific sites to support large village populations indicates that the Middle Woodland Period was characterized by a resource acquisition strategy that can best be termed as logistical collection (McBride 1984:310).

Late Woodland Period (ca., 1,200 to 350 B.P.)

The Late Woodland Period in southern New England dates from ca., 1,200 to 350 B.P., and it is characterized by the earliest evidence for the use of corn in the lower Connecticut River Valley (Bendremer 1993; Bendremer and Dewar 1993; Bendremer et al. 1991; George 1997; McBride 1984); an increase in the frequency of exchange of non-local lithics (Feder 1984; George and Tryon 1996; McBride 1984; Lavin 1984); increased variability in ceramic form, function, surface treatment, and decoration (Lavin 1980, 1986, 1987; Lizee 1994a, 1994b); and a continuation of a trend towards larger, more permanent settlements in riverine, estuarine, and coastal ecozones (Dincauze 1974; McBride 1984; Snow 1980).

Stone tool assemblages associated with Late Woodland occupations, especially village-sized sites, are functionally variable and they reflect plant and animal resource processing and consumption on a large scale. Finished stone tools recovered from Late Woodland sites include Levanna and Madison projectile points; drills; side-, end-, and thumbnail scrapers; mortars and pestles; nutting stones; netsinkers; and celts, adzes, axes, and digging tools. These tools were used in activities ranging from hide preparation to plant processing to the manufacture of canoes, bowls, and utensils, as well as other settlement and subsistence-related items (McBride 1984; Snow 1980). Finally, ceramic assemblages recovered from Late Woodland sites are as variable as the lithic assemblages. Ceramic types identified include Windsor Fabric Impressed, Windsor Brushed, Windsor Cord Marked, Windsor Plain, Clearview Stamped, Sebonac Stamped, Selden Island, Hollister Plain, Hollister Stamped, and Shantok Cove Incised (Lavin 1980, 1988a, 1988b; Lizee 1994a; Pope 1953; Rouse 1947; Salwen and Ottesen 1972; Smith 1947). These types are more diverse stylistically than their predecessors, with incision, shell stamping, punctation, single point, linear dentate, rocker dentate stamping, and stamp and drag impressions common (Lizee 1994a:216).

Summary of Connecticut Prehistory

In sum, the prehistory of Connecticut spans from ca., 12,000 to 350 B.P., and it is characterized by numerous changes in tool types, subsistence patterns, and land use strategies. For much of the prehistoric era, local Native American groups practiced a subsistence pattern based on a mixed economy of hunting

and gathering wild plant and animal resources. It is not until the Late Woodland Period that incontrovertible evidence for the use of domesticated species is available. Further, settlement patterns throughout the prehistoric era shifted from seasonal occupations of small co-residential groups to large aggregations of people in riverine, estuarine, and coastal ecozones. In terms of the region containing the proposed project area, a variety of prehistoric site types may be expected. These range from seasonal camps utilized by Archaic populations to temporary and task-specific sites of the Woodland era.

CHAPTER IV
HISTORIC OVERVIEW

Introduction

As stated in Chapter 1, the project area consists of a 17.4 ac area in the town of Bristol, which is in Hartford County, Connecticut. The project area is situated in the northwestern quarter of Bristol, on the west side of Hill Street and a short distance to the south of James P. Casey Road. Historic maps and aerial photographs indicate that the northern boundary of the parcel was formerly defined by a now-abandoned section of Minor Road. This chapter presents an overview of the history of the larger region, as well as historical data specific to the project area.

History of the Town of Bristol

Hartford County was the site of one of the two earliest loci of colonial settlement in Connecticut, with three of its towns dating to the 1630s. It extends south from the Massachusetts border and flanks the Connecticut River. The earliest economic development of the region depended on agriculture and transportation advantages of the river and its valley. Areas further from the Connecticut River Valley were colonized later and usually grew more slowly through the early nineteenth century., The main source of differentiation in Hartford County towns' development was, first, whether they had significant levels of industrialization, and, later, whether they had significant levels of suburbanization. Bristol, which was located at the western edge of the county, was slower to develop than other neighboring towns. During the nineteenth century, however, the Pequabuck River provided waterpower that allowed the development of a steadily growing amount of industry in the town, especially in the later part of the century and the early twentieth century. After the 1930s, suburbanization caused a population boom. The following discussion outlines the history of Bristol in more detail and discusses the presence and absence of historical resources in the vicinity of the project area.

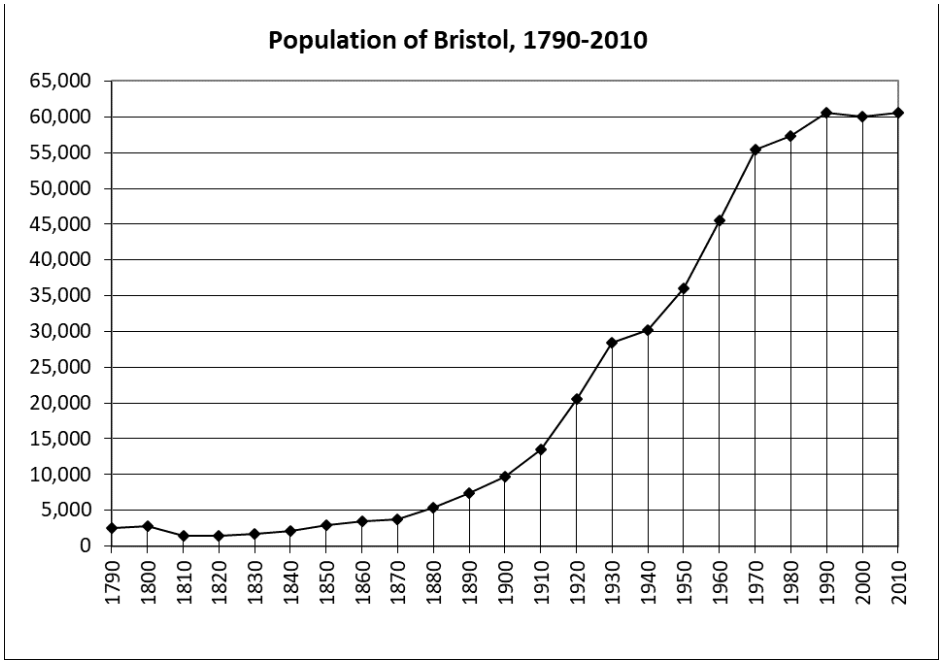
<u>Colonial Era (to 1790)</u>

The town of Bristol was created out of the town of Farmington in 1785. Farmington is considered the first daughter town of Hartford and was established by Hartford colonists in 1645. Both legal and historical tradition holds that when the Hartford colonists purchased land from an Indian sachem known as Sequassen in 1636, they bought a large area extending westward to the Mohawk territory (Bickford 1982). The description of the purchase was so vague that it could be, and sometimes was, argued to extend to the Housatonic River, although it is doubtful that whatever authority Sequassen had really extended so far. As with many other purchases from Native American, the Sequassen document imagined, quite unrealistically, that Native American leaders had the same kind of ownership of their territory as the British monarchs did. Notwithstanding such assertions of sovereignty by or on behalf of Sequassen, once the newly constituted General Court decided, in 1640, to permit a new settlement at "Tunxis Sepus," the governor secured an additional deed from the Tunxis Native American community there. This deed was confirmed by another deed in 1650, in which it was claimed that the land had already been purchased from Sequassen; however, it once again included a new agreement with the actual Native American residents of the region. A group of Native Americans remained on a reservation in Farmington for many years, but over time most departed for regions less subject to encroachments by the colonists, leaving only a few holdouts who eventually passed away (Bickford 1982).

The new colonial settlement at Tunxis received the official name of Farmington in 1645. In addition to the initial purchases, the town was granted additional areas of land by the legislature between 1645 and 1677, so that its final size measured approximately 15 miles (24 km) from north to south and 11 miles (18 km) from east to west. The future site of Bristol was situated in the middle-western part of this large area. It was not until 1721 that the Farmington-based colonial owners of the area that would become Bristol and Burlington divided it into five tiers of lots to be distributed among themselves. These lots were considered part of the New Cambridge Society, an ecclesiastical subdivision of Farmington, until Bristol was incorporated and named in 1785. The northern part had developed a further ecclesiastical subdivision, known as West Britain, in 1774. It became known as Burlington when that town separated from Bristol in 1806 (Crofut 1937). During the Revolutionary War, some 92 men from Bristol (then known as New Cambridge) saw military service. The town also produced the noted Loyalist Moses Dunbar, who became a captain in British service and who was executed in Hartford in 1777 for treason (Clouette and Roth 1984).

Early National and Industrializing Eras (1790-1930)

In the first federal census, which was recorded in 1790, Bristol reported 2,642 residents (see the population chart below; Keegan 2012). A gazetteer of the state published in 1819 reported that it was "uneven and hilly," the soil was good for growing grain, grass, and fruit. More notably, many of its residents were "engaged in manufacturing employments and pursuits," especially tinware and clocks. The town already had five tinware factories, one firm making brass clocks, and several making wooden clocks, along with two button factories, two textile mills, eight cider distilleries, and six tanneries, in addition to the usual grist mills and sawmills. The town's cultural needs were met by one Congregational and one Baptist church, common schools, "one small Academy for Misses," and three public membership libraries (Pease and Niles 1819:58-59). In 1837, Bristol received only a short description from John Warner Barber, who repeated the agricultural information from the earlier source. By the 1830s, however, Bristol had 16 clock factories and button manufacturing, and had added a Methodist church (Barber 1837:69).



Bristol's first clockmaking boom lasted from 1820 to 1837 and was due to the efforts of local merchants who convinced Chauncey Jerome, a clockmaker trained by Eli Terry of Plymouth, to move there. Jerome

was far from the only clockmaker in Bristol, but he was more famous than most of the rest (Clouette and Roth 1984). The population figures shown in the population chart above, however, do not indicate any precipitous change over the first 40 years of the century, but rather a slow and steady growth from a low point of 1,362 residents in 1820. The decline between 1800 and 1810 was due to the loss of territory to the new town of Burlington (Keegan 2012). These numbers indicate that the town's industrial firms remained small during this period. The Panic of 1837 brought the enterprises of Bristol, as well as many other places, to a temporary halt. Jerome switched production from wooden to brass clocks, and by 1850 Bristol factories were producing large numbers of clocks. Jerome moved his works to New Haven in 1843, but the town's industries included other clockmakers, as well as foundries, textile mills, saws, and machinery, so the town was more than ready to take advantage of the arrival of the railroad in 1850 (Clouette and Roth 1984). At that time, the town's population had been growing steadily for decades and reached 2,884 residents (see the population chart above; Keegan 2012). In towns that, unlike Bristol, did not have an industrial base, the population trend across the nineteenth century was often stagnation or decline.

The railroad was only one of several efforts to improve transportation in Bristol and the region. In 1803, the East Middle-West Middle turnpike was chartered by the state, and eventually passed on an east-west course across the center of Bristol. The road remained in operation, with some changes, through the 1840s (Wood 1919). Prominent men of Bristol also were involved in the chartering and construction of the Farmington Canal, which opened in 1828 and gave Bristol manufacturers and merchants relatively easy access to a more efficient means of transporting goods, until the railroads displaced the canal (Clouette and Roth 1984). The initial railroad company that served Bristol was chartered in 1845, then merged with a pre-existing firm to create the Hartford, Providence, & Fishkill Railroad, whose goal was to complete a line between Providence, Rhode Island and Fishkill, New York through Hartford. In 1850 service began between Hartford and Bristol, and after various vicissitudes the road did reach New York (Turner and Jacobus 1989). The 1850 census of manufactures reported 11 clock manufacturers in Bristol, all but two of which had fewer than 50 employees; in fact, the largest employer in Bristol was the Bristol Mining Co., which was engaged in mining copper in the northeastern part of town and employed 100 men. In total, there were approximately 600 people employed in manufacturing (U.S. Census 1850c).

During the Civil War, loss of southern markets caused a slowdown in Bristol's clock industry. However, the local economy recovered in the postwar years, and various other industries arrived and flourished. These included the making of toys, musical instruments, steel tools, springs, and brass products. As for the war itself, many Bristol men saw service in the Sixteenth Regiment, and their Company K was captured at Plymouth, North Carolina in 1864. The troops were sent to prison camps, including the infamous Andersonville, Georgia camp (Clouette and Roth 1984). The increase in business is reflected in the steadily increasing population after 1870; by 1900, it was approaching 10,000, which made Bristol the nineteenth largest town in the state at that time (although the four largest municipalities each held over 50,000 people) (See population chart above; Keegan 2012).

According to nineteenth-century maps, the project area was well outside the developing industrial centers. In 1852, a map of the town showed the "Centre" and the "South Village" areas as more densely settled, with the railroad looping through them and extending eastward to the smaller village of Forestville (Figure 4). Another village, Polkville, was located in the northeastern part of town. The project area and its vicinity were sparsely settled at the time, indicating that the local economy was agricultural in nature. This map, unlike most others of the period, sought to depict all the buildings of each farmstead. Thus, it showed the house of D. Hills on the east side of Hill Road, opposite the project area parcel, and a cluster of farm buildings on the west side of Hill Road, within the larger parcel. The project area proper, being set

back from Hill Road, does not incorporate these buildings, although they were within 152 m (500 ft) of it. The other nearby farmsteads were those of S. H. Carrington, to the north and on the east side of the road (note, however, that the same name was attached to two other farmsteads to the south of this area), and C. L. Tuttle, to the south and on the west side of the road (Figure 4; Woodford 1852). The 1869 map of the town did not portray the farms' outbuildings, and the names of the nearby farmers had changed to Bill Gaylord, M. Minor, and Calvin Blanchard (Figure 5; Baker & Tilden 1869).

Although it is not certain which, if any, of these neighbors owned the larger parcel during the nineteenth century, information concerning them provides information about the neighborhood and its economic activities. According to the 1850 federal census, Daniel Hill, Silas H. Carrington, and Constant L. Tuttle were all farmers; it is possible that the farmstead to the north of Hill's was occupied by Julius Carrington, who may have been a brother to Silas. Hill and Tuttle were both older men, aged 64 and 75, and each claimed a farm worth $5,000. Their wives were both younger (Betsey Hill was 50 years old, and Hymenia Tuttle was 64). The Tuttles had an unmarried adult daughter living with them, and the Hills had an unmarried adult son, and each had a young, probably unrelated teenager in the household (a 13-year-old-boy for the Tuttles and an 11-year-old Irish girl for the Hills). In contrast, neither Carrington family gave a value for their farm, and both households were younger couples; Julius and Betsey had young children, while Silas H. and Jane C. had his probable mother and sister, plus an unrelated teenaged boy, in their household. Compared to most other farms in the area, those of Hills and the Tuttles were more valuable than usual for the neighborhood. Most of the heads of household were middle-aged or older, and all but a few were born in Connecticut (United States Census 1850a). Only the Tuttle and Hill farms' details were reported in the agricultural census for that year. There were few variations in the farming activities listed on the entire page of this agricultural census, however. The Tuttles had 110 improved acres and 40 unimproved, while the Hills had 135 improved acres and 15 unimproved; these numbers seem to have been above the median. Like their neighbors, these farmers had one horse, fewer than 10 milk cows (for butter and cheese production), one or two yokes of oxen, a handful of other cattle, and a few swine. Some farmers had up to 30 sheep, though not these two. For crops, they grew rye, corn, oats, potatoes, and buckwheat. The Hills and Tuttles, like some others, also produced tree fruit (United States Census 1850b).

The 1870 federal census recorded Calvin and Anna Blanchard (whose house was shown to the south of the project area in the 1869 map) as a couple in their twenties with no children; their farm was worth $6,000 and they had $1,175 in personal property as well. Calvin had been born in Massachusetts. Marcus Miner, located across Hill Road from the project area, was a 78-year-old farmer who owned $9,000 in real estate and $3,500 in personal estate; he shared his house with Edson and Josephine L. Downes, their small daughter, what are presumed to be Edson's teenaged siblings (the boy worked on the farm like his brother), and an older woman named Marcia Mills. Next door to them, possibly the household to the north of the project area, were Ira (not Billy) and Chloe M. Gaylord, whose farm was valued at $5,000 and who owned $1,000 in personal estate. They were in their thirties and had two young children, and a schoolteacher boarded with them (United States Census 1870a). There was more variety in the agricultural efforts of the farmers in the 1870 census than in 1850. This began with the size of the farms; the Blanchards had 64 improved acres and 10 acres of woodland, the Miner/Downes farm had 140 acres of improved land and 40 acres of woodland, and the Gaylords had 75 acres of improved land. Other farms in the area ranged from eight acres to 415 acres of improved land. Some farmers in the area were clearly specializing in dairy production, though not these three. As in 1850, most farms had one or two horses, fewer than 10 milk cows, some oxen, some other cattle, and some swine. The Miner/Downes farm was among the few who kept sheep (14 of them). The Blanchards grew no grains, while the other two, and most other farms, grew rye and corn; far fewer grew oats and buckwheat. At least two farms in the town were growing tobacco. The three families near the project area also grew potatoes and orchard products

– the Blanchards seemed to be specializing in that, with a much larger dollar value ($265) than other farms. A few farmers were apparently engaged in market gardening (United States Census 1870b). The presence of young farm families in this area in 1870 suggests that at least in parts of Bristol, farming was still considered a viable way to make a living, even as industrial employment in the town and elsewhere continued to increase.

Modern Era (1930-Present)

At the beginning of the twentieth century, Bristol's industry continued to be a strong component of the economy, adding products such as bicycles and (briefly) the original "yellow cabs." World War I produced another industrial boom for the town, and unlike in many textile-dependent manufacturing towns in Connecticut, most of these industries did not decline due to southern competition (Clouette and Roth 1984). According to a 1932 description of all the towns' vital statistics, businesses in town manufactured thirty-one different types of articles, ranging from clocks and related items (especially brass) to grain elevators, wood boxes, fishing rods, and knit underwear; agriculture was also mentioned, and there were tramway cars running every twenty minutes (Connecticut 1932). The 1934 aerial photography shows that the project area and its vicinity were, as expected, in an agricultural area with large expanses of cleared fields, as well as nearby areas that appear to have been in the process of reforestation. A cluster of connected barns stood within the larger project area parcel, at the corner of Hill Road and Minor Road, as was suggested by the 1852 map. More houses than just the old farmsteads were present along both sides of Hill Road. The project area proper included areas that might have been pasture, and also a section with regular dots suggesting an orchard (Figure 6; Fairchild 1934). The Great Depression affected Bristol's industries and finances as severely as it did every other town. World War II brought recovery, but it was short-lived in Bristol, as it was throughout the Northeast region. Industrial activity in town was reduced, though not entirely eliminated, while suburbanization slowly took root as elsewhere in the state (Clouette and Roth 1984). As the population chart above shows, the number of residents in Bristol rose steeply during the twentieth century to nearly 30,000 people in 1930, then leveled off during the Depression before beginning an even steeper climb to nearly 55,000 people by 1970. Growth was slower after that, so that by 1990 the increase had only just passed 60,000 residents and essentially stopped there through 2010 (Keegan 2012). The 1952 aerial photograph shows that the population increases had not yet had major effects on the area, although another house had been built in a piece cut out from the larger project area parcel, on the south side of Minor Road. There were still large areas of cleared fields and also large areas of forest in the vicinity. Part of the project area proper was taken up by a large orchard, while another part was a cleared field (Figure 7; USDA 1951).

The late-twentieth-century population figures reflect both a combination of Bristol's continuing business activity, and an influx of commuting householders who left the urban centers of Hartford and New Britain for suburban life. According to a 2015 economic survey of the city, 13 percent of the 22,307 jobs in Bristol were provided by 135 manufacturing firms, although the modern economy was also represented in the 19 percent of jobs in 17 firms in the category "Information," with a similar number in health care and social assistance; retail, interestingly, offered a smaller proportion of jobs than any of these three. In 2014, the three largest employers were ESPN (an "Information" firm), the local hospital, and the city itself (CERC 2017). The city's plan of conservation and development, adopted in 2015, stressed preservation of open space and enhancement of the community's character; the latter included farms, open space, historic resources, and sustainability (Bristol 2018). The 2019 aerial photograph shows that the project area was still partly a cleared field, although the western end of the area had begun to reforest, and that several barns still stood inside the northeastern corner of the larger parcel. The project area was surrounded by a mix of the land uses that was representative of Bristol's economy: other surviving cleared fields in most

directions, housing developments representing several periods of suburban housing styles to the east and south, and industrial or commercial buildings to the north and west (Figure 8; CT ECO 2019).

Conclusions

The historical record indicates that it is unlikely that the proposed development will impact any inventoried historical resources. The project area was farmed at least as far back as 1934, and no doubt for many years before that, but there is no indication that farm buildings were located anywhere but near the road to the east, outside the project area. Other evidence of historic farming activity, such as stone walls and fences, may be present, but such remains are not considered to be historically significant.

CHAPTER V
PREVIOUS INVESTIGATIONS

Introduction

This chapter presents an overview of previous archaeological research completed within the vicinity of the project area in Bristol, Connecticut. This discussion provides the comparative data necessary for assessing the results of the current Phase IB cultural resources assessment survey, and it ensures that the potential impacts to all previously recorded cultural resources located within and adjacent to the project area are taken into consideration. Specifically, this chapter reviews previously identified archaeological sites and National/State Register of Historic Places properties situated in the project region (Figures 9 and 10). The discussions presented below are based on information currently on file at the Connecticut State Historic Preservation Office in Hartford, Connecticut. In addition, the electronic site files maintained by Heritage also were examined during this investigation. Both the quantity and quality of the information contained in the original cultural resources survey reports and State of Connecticut archaeological site forms are presented below.

Previously Recorded Archaeological Sites and National/State Register of Historic Places Properties/Districts in the Vicinity of the Project Area

A review of data currently on file at the Connecticut State Historic Preservation Office, as well as the electronic site files maintained by Heritage failed to detect any previously identified archaeological sites or National/State Register of Historic Places properties situated within 1.6 km (1 mi) of the project area (Figures 9 and 10). Though no archaeological sites have been previously identified in the area, the natural setting discussed in Chapter II suggests Native Americans may have once inhabited the area, and prehistoric sites may yet be discovered. In addition, the larger project region has been in use as agricultural land since Bristol's settlement and there may be evidence of this historic occupation in the project area.

CHAPTER VI
METHODS

Introduction

This chapter describes the research design and field methods used to complete the current Phase IB cultural resources reconnaissance survey of the moderate/high sensitivity areas associated with the proposed solar center in Bristol, Connecticut. In addition, the location and point-of-contact for the facility at which all cultural material, drawings, maps, photographs, and field notes generated during survey will be curated is provided below.

Research Design

The current Phase IB cultural resources reconnaissance survey was designed to identify all prehistoric and historic cultural resources located within the proposed project area. Fieldwork for the project was comprehensive in nature and project planning considered the distribution of previously recorded archaeological sites in the region containing the project parcel, as well as an assessment of the natural qualities of the project area. The methods used to complete this investigation were designed to provide complete and thorough coverage of all portions of the moderate/high sensitivity areas within the project parcel. This undertaking entailed pedestrian survey, systematic subsurface testing, detailed mapping, GPS recordation, and photo-documentation.

Field Methods

Following the completion of all background research, the moderate/high sensitivity areas identified during a previously completed Phase IA cultural resources assessment survey were subjected to a Phase IB cultural resources reconnaissance survey utilizing pedestrian survey, photo-documentation, mapping, GPS recordation, and systematic shovel testing. The field strategy was designed such that the entirety of the moderate/high sensitivity areas were examined visually and photographed. The pedestrian survey portion of this investigation included visual reconnaissance of the moderate/high sensitivity areas scheduled for impacts by the proposed solar project, including the solar array and stormwater basins. The field methods also included subsurface testing of the moderate/high sensitivity areas, during which shovel tests were excavated at 20 m (65.6 ft) intervals along parallel survey transects spaced 20 m (65.6 ft) apart.

During survey, each shovel test measured 50 x 50 cm (19.7 x 19.7 in) in size and each was excavated until the glacially derived C-Horizon was encountered or until large buried objects (e.g., boulders) prevented further excavation. Each shovel test was excavated in 10 cm (3.9 in) arbitrary levels within natural strata, and the fill from each level was screened separately. All shovel test fill was screened through 0.635 cm (0.25 in) hardware cloth and examined visually for cultural material. Soil characteristics were recorded in the field using Munsell Soil Color Charts and standard soils nomenclature. Finally, each shovel test was backfilled immediately upon completion of the archaeological recordation process.

Curation

Following the completion and acceptance of the Final Report of Investigations, all cultural material, drawings, maps, photographs, and field notes will be curated with:

Dr. Sarah Sportman
Connecticut State Archaeologist

Office of Connecticut State Archaeology
Box U-1023
University of Connecticut
Storrs, Connecticut 06269

CHAPTER VII
RESULTS OF THE INVESTIGATION & MANAGEMENT RECOMMENDATIONS

Introduction

This chapter presents the results of the Phase IB cultural resources reconnaissance survey of the moderate/high archaeologically sensitive areas associated with the proposed solar facility in Bristol, Connecticut. The goals of the investigation included completion of the following tasks: 1) a contextual overview of the region's prehistory, history, and natural setting (e.g., soils, ecology, hydrology, etc.); 2) a literature search to identify and discuss previously recorded cultural resources in the region encompassing the project area; 3) a review of readily available historic maps and aerial imagery depicting the project area in order to identify potential historic resources and/or areas of past disturbance; 4) pedestrian survey and photo-documentation of the project parcel; and 5) subsurface examination of the moderate/high archaeologically sensitive areas identified during the previously completed Phase IA cultural resources assessment survey (Heritage Consultants, LLC 2020).

As depicted in Figures 1 and 2, the proposed project will consist of a 370-watt solar center on 17.4 ac of land. The project will include the installation of rows of solar panels across the central and western portions project parcel that will interconnect with an existing powerline corridor along the northern edge of the project area. The facility also will contain four stormwater basins along the southern and western limits of the array (Figure 2). The project area is situated at approximate elevations ranging from 210 to 234 m (690 to 770 ft) NGVD and was characterized by a fallow agricultural field at the time of survey (Figures 11 through 18). As discussed in Chapter VI, the field methods employed during survey consisted of pedestrian survey, mapping, photo-documentation, and subsurface testing throughout the array area and associated stormwater basins that contained low slopes and apparently undisturbed soil deposits. The results of the fieldwork are presented below.

Results of the Phase IB Cultural Resources Reconnaissance Survey of the Project Parcel

The Phase IB cultural resources reconnaissance survey resulted in the excavation of 197 of 198 (99 percent) planned survey shovel tests excavated along nine northeast to southwest trending survey transects (Figure 19). The single planned but unexcavated shovel test fell within an area of standing water. The southwest corner of the project area was not examined archaeologically due to the presence of slopes. Of the excavated shovel tests, one yielded cultural material dating from the historic area. This area was designated as Locus 1 and it is described below.

<u>Locus 1</u>

Locus 1 which measured approximately 1 x 1 m (3.3 x 3.3 ft) in size, was identified in the southeastern portion of the project area. This locus was identified in a fallow agricultural field at the time of survey (Figures 19 through 21). As described above, cultural material associated with this locus was recovered from a single Phase IB survey shovel test (Figure 19). This shovel test yielded cultural material representative of a historic period use of the property. A typical positive shovel test situated within the Locus 1 area was excavated to depth of 50 cmbs (19.7 inbs) and it exhibited three soil horizons in profile. The uppermost soil horizon, the plow zone (Ap-Horizon), extended from 0 to 24 cmbs (0 to 9.6 inbs) and was classified as a layer of dark brown (10YR 3/3) silty medium sand. It was underlain by the B-Horizon, a subsoil deposit (B-Horizon) of yellowish brown (10YR 5/6) silty medium sand that ranged in depth from

24 to 38 cmbs (9.6 to 14 inbs). Finally, the glacially derived C-Horizon, was classified as a layer of dark brown (10YR 3/3) medium sand mixed with gravel it extended to a maximum excavated depth of 50 cmbs (19.7 inbs).

The cultural material collected from the Locus 1 area was confined to historic period objects collected from the disturbed plow zone. The artifacts collected consisted of a single shard of clear window glass and 1 brown glazed redware sherd. Neither artifact was temporally diagnostic as both types may date from the eighteenth century to the present day. Examination of the Locus 1 area failed to recover substantial numbers of artifacts and/or any evidence of cultural features. As a result, Locus 1 lacked research potential and the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional archaeological examination of Locus 1 is recommended prior to construction.

Management Recommendations

As mentioned above, none of the archaeological deposits identified within Locus 1 retain research potential or the qualities of significance as defined by the National Register of Historic Places (36 CFR 60.4 [a-d]). Thus, no additional testing of Locus 1, or the remainder of the project parcel, is recommended prior to construction of the proposed solar center. In sum, no impacts to significant cultural resources are anticipated by construction of the proposed solar center in Bristol, Connecticut.

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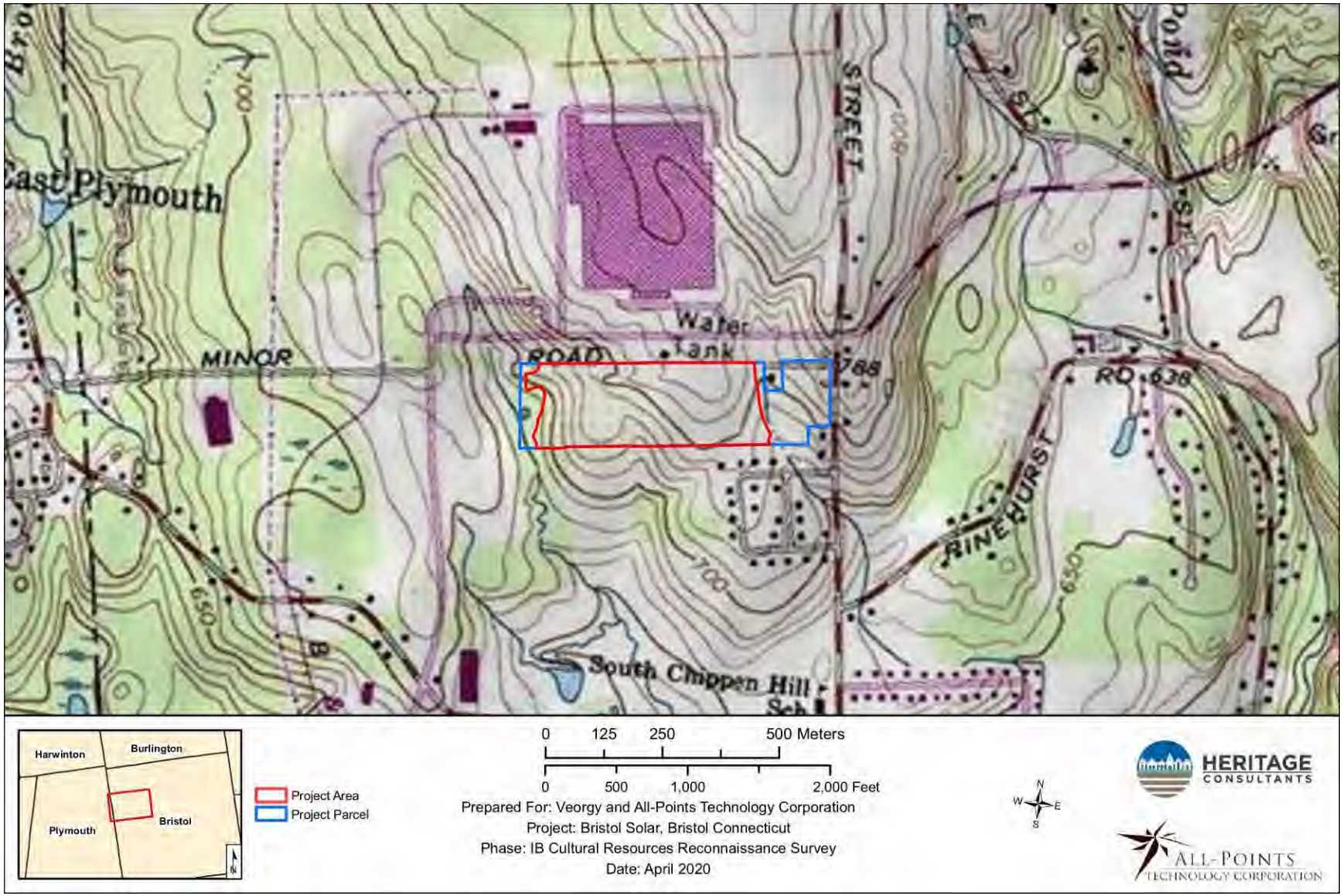


Figure 1. Excerpt from a USGS 7.5' series topographic quadrangle image showing the location of the project area in Bristol, Connecticut.

Figure 2. Design plans for the proposed solar center in Bristol, Connecticut.

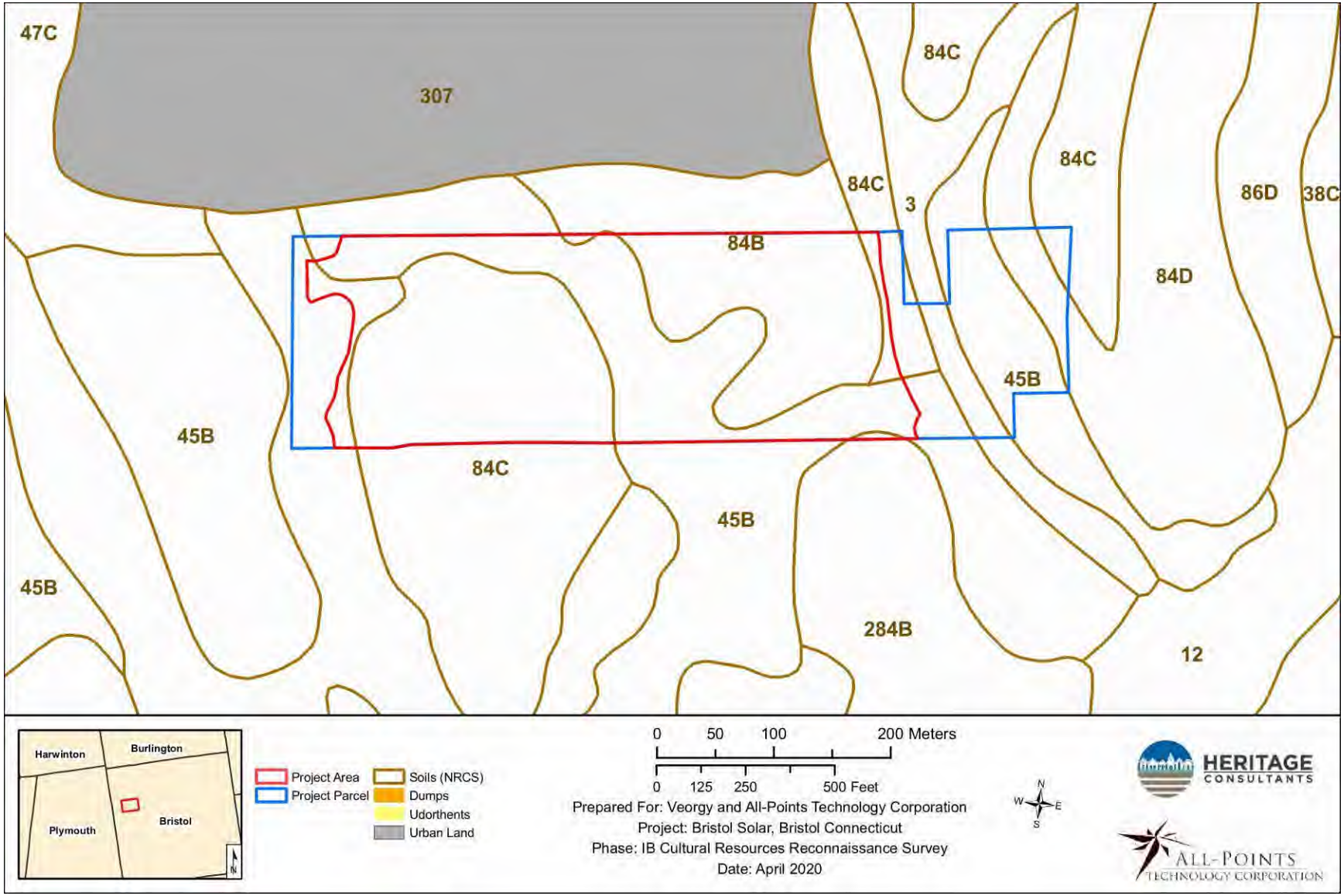


Figure 3. Map of soils located in the vicinity of the project area in Bristol, Connecticut.

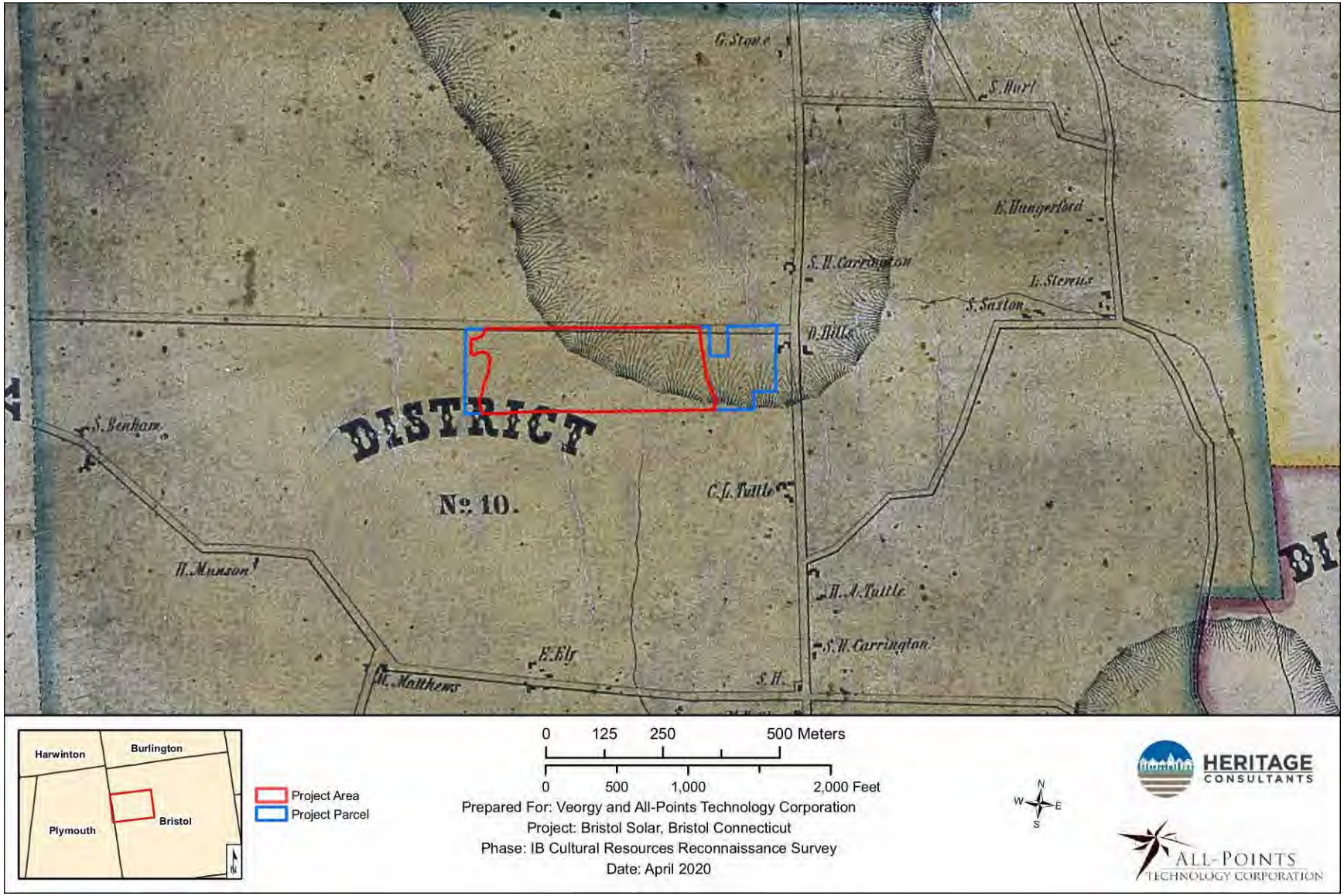


Figure 4. Excerpt from an 1852 historic map showing the location of the project area in Bristol, Connecticut.

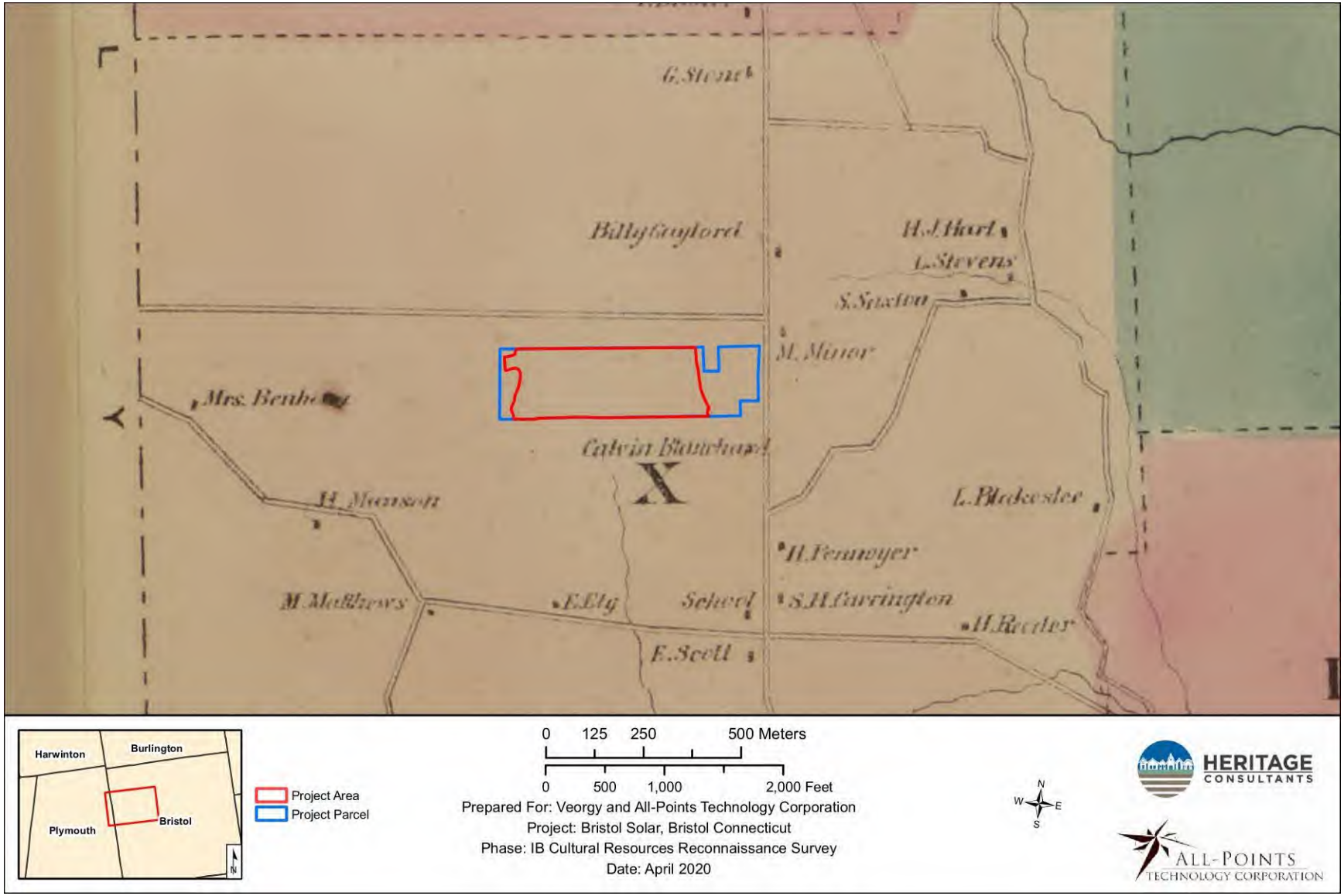


Figure 5. Excerpt from an 1869 historic map showing the location of the project area in Bristol, Connecticut.

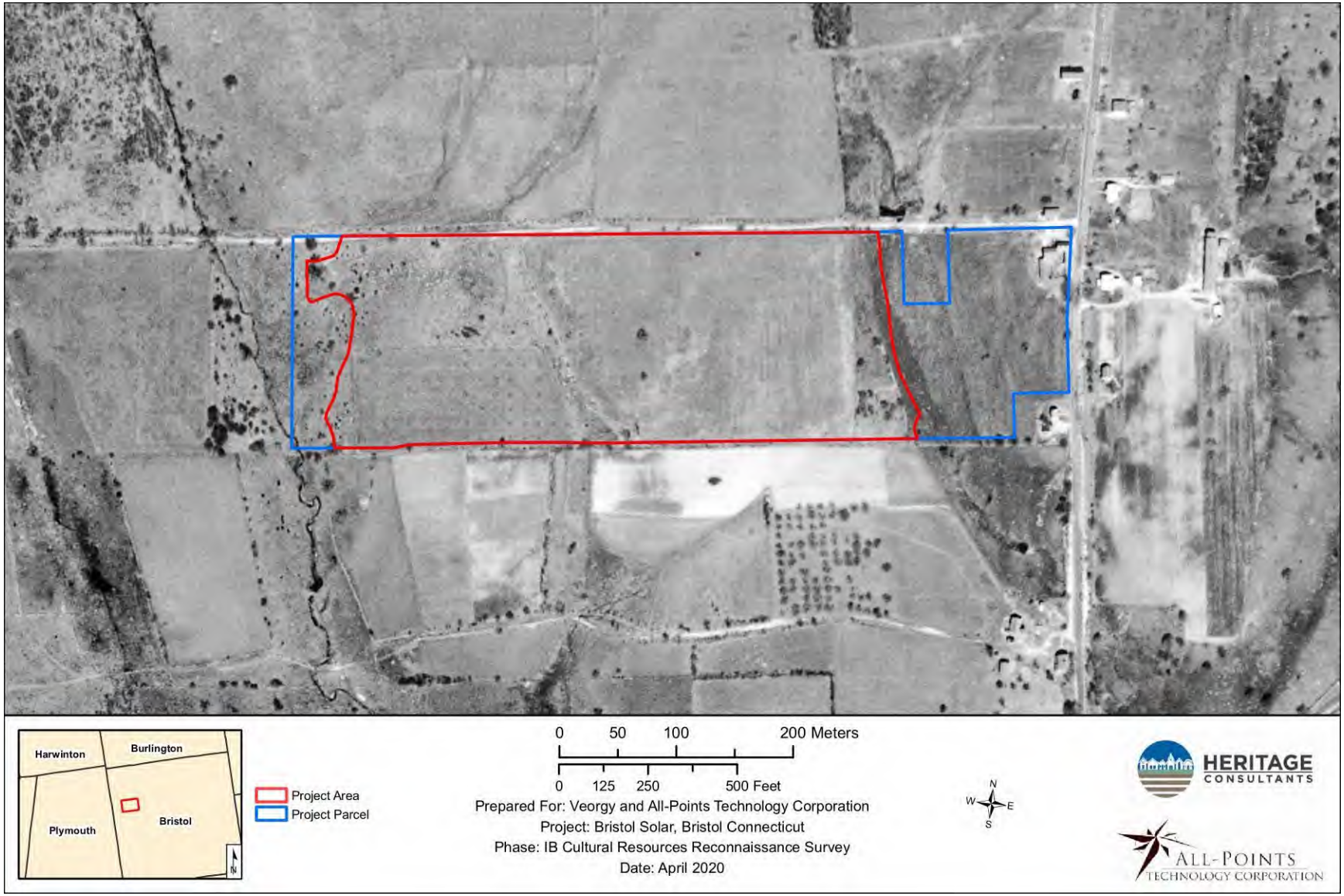


Figure 6. Excerpt from a 1934 aerial photograph showing the location of the project area in Bristol, Connecticut.

Figure 7. Excerpt from a 1951 aerial photograph showing the location of the project area in Bristol, Connecticut.

Figure 8. Excerpt from a 2019 aerial photograph showing the location of the project area in Bristol, Connecticut.

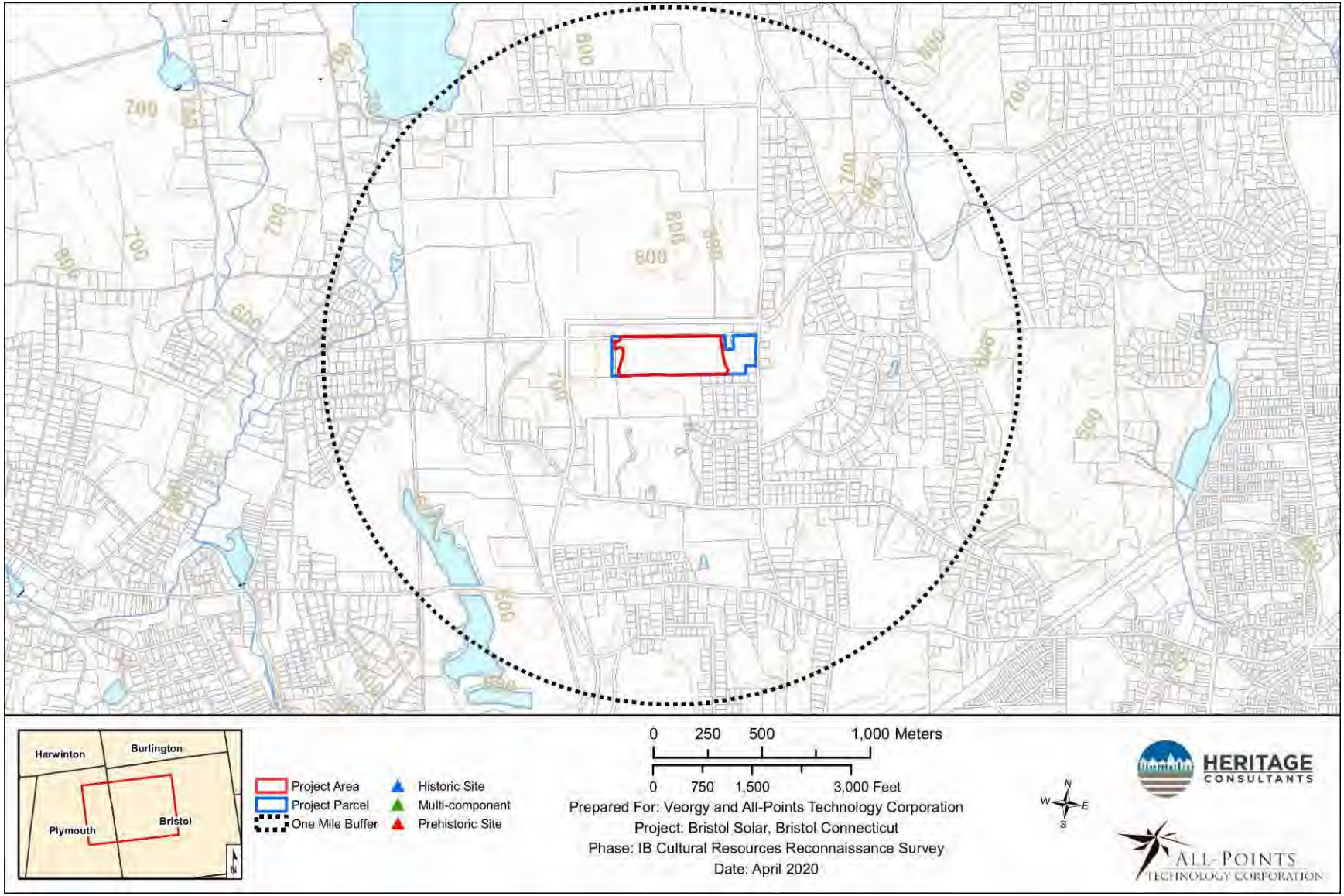


Figure 9. Digital map showing the location of previously identified archaeological sites in the vicinity of the project area in Bristol, Connecticut.

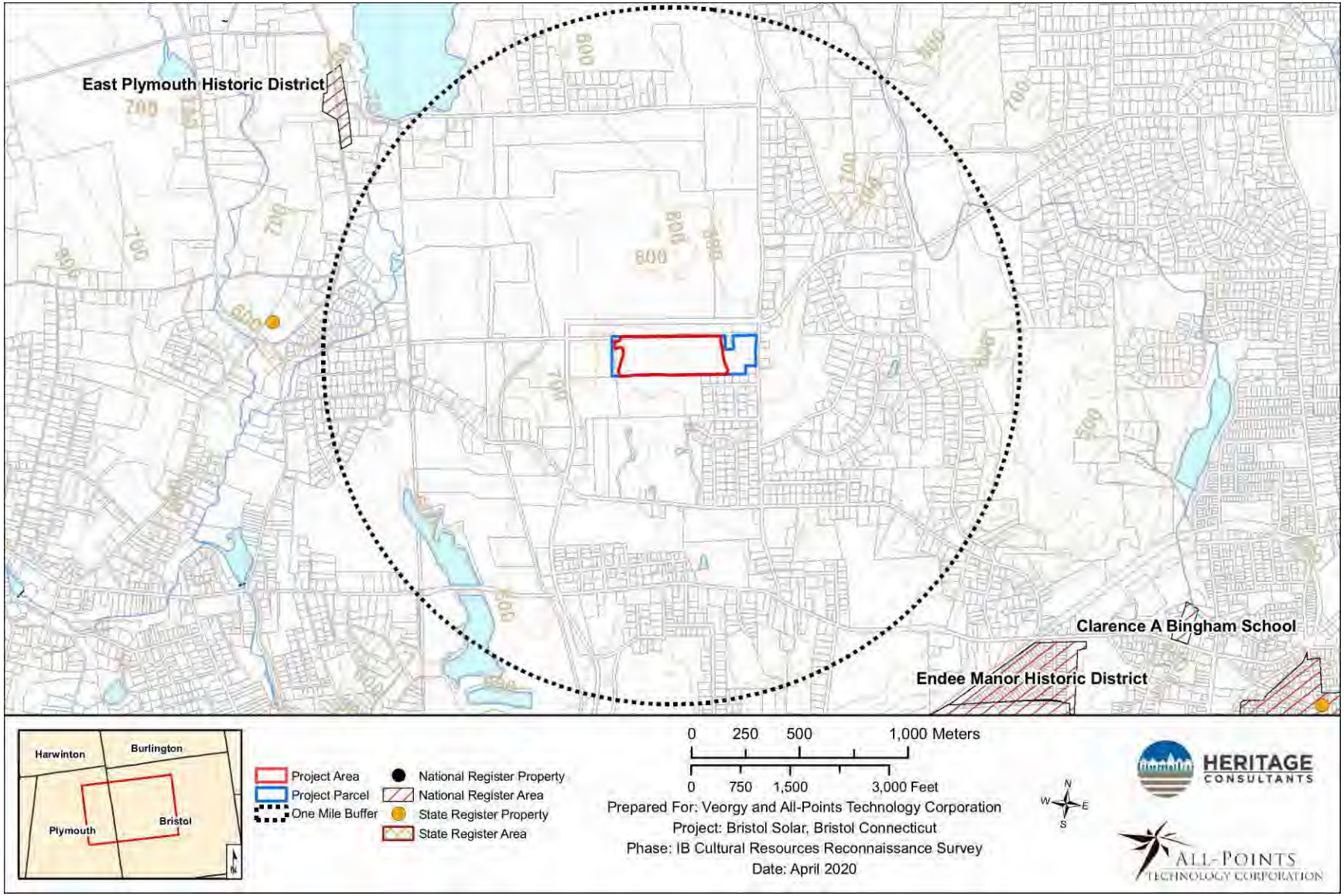


Figure 10. Digital map depicting the locations of previously identified National/State Register of Historic Places properties in the vicinity of the project area in Bristol, Connecticut.

Figure 11. Overview photo of the northeast corner of the project area facing southwest.

Figure 12. Overview photo of the southeast corner of the project area and Locus 1 facing northwest.

Figure 13. Overview photo of the southwest corner of the project area facing northeast.

Figure 14. Overview photo of the northwest corner of the project area facing southeast.

Figure 15. Overview photo of the central portion of the project area facing north with powerline visible in the background.

Figure 16. Overview photo of the central portion of the project area facing east.

Figure 17. Overview photo of the central portion of the project area facing south.

Figure 18. Overview photo of the central portion of the project area facing west.

Figure 19. Excerpt from a 2019 aerial image showing the proposed project area, landscape conditions, shovel test locations, and Locus 1.

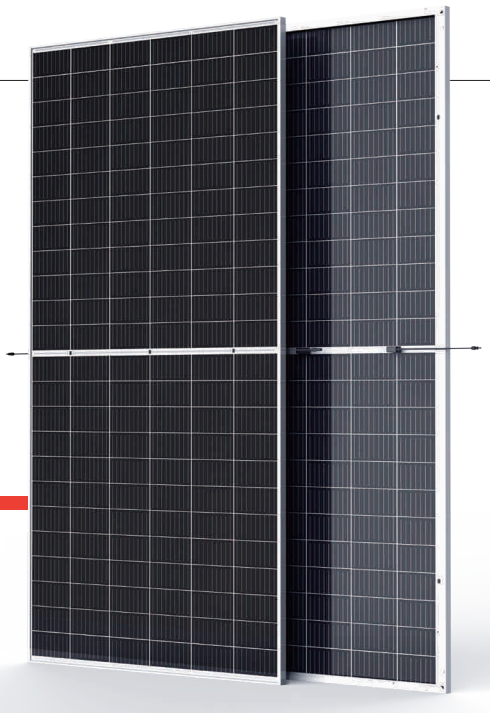
APPENDIX G

PRODUCT INFORMATION SHEETS

THE

DUOMAX twin

BIFACIAL DUAL GLASS 144 CELL MULTI BUSBAR MODULE



PRODUCTS TSM-DEG15MC.20(II)

POWER RANGE 390-410W

144-Cell
MONOCRYSTALLINE MODULE

390-410W
POWER OUTPUT RANGE

20.2%
MAXIMUM EFFICIENCY

0~+5W
POSITIVE POWER TOLERANCE

Founded in 1997, Trina Solar is the world's leading total solution provider for solar energy. With local presence around the globe, Trina Solar is able to provide exceptional service to each customer in each market and deliver our innovative, reliable products with the backing of Trina as a strong, bankable brand. Trina Solar now distributes its PV products to over 100 countries all over the world. We are committed to building strategic, mutually beneÿcial collaborations with installers, developers, distributors and other partners in driving smart energy together.

Comprehensive Products and System Certificates

IEC61215/IEC61730/IEC61701/IEC62716
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO14064: Greenhouse Gases Emissions Veriÿcation
OHSAS 18001: Occupation Health and Safety Management System

High power output

- Up to 410W front power and 20.2% module efficiency with half-cut and MBB (Multi Busbar) technology enabling higher BOS savings
- Lower resistance of half-cut cells ensures higher power

Certified to perform in highly challenging environments

- High PID resistance through cell process and module material control
- Resistant to salt, acid, sand, and ammonia
- Proven to be reliable in high temperature and humidity areas
- Certified to the best fire class A
- Minimizes micro-crack and snail trails
- Certified to 5400 Pa positive load and 2400 Pa negative load

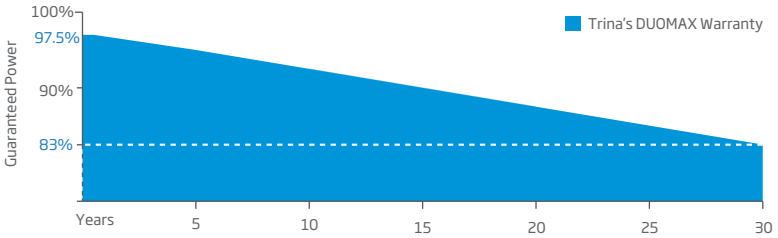
High energy generation, low LCOE

- Up to 25% additional power gain from back side, depending on the albedo
- Excellent 3rd party validated IAM and low light performance with cell process and module material optimization
- Low temp coefficient (-0.35%) and NMOT increases energy production
- Better anti-shading performance and lower operating temperature
- Higher power from same installation footprint as standard modules

Easy to install, wide application

- Frame design enables compatibility with standard installation methods
- Deployable for ground mounted utility, carports, and agricultural projects
- Safe and easy to transport, handle, and install like normal framed modules

Trina Solar's DUOMAX Performance Warranty



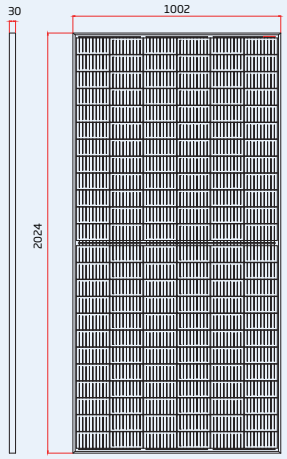
From the 2nd year to the 30th year, the average annual power decline will be no more than 0.5%.

Trinasolar

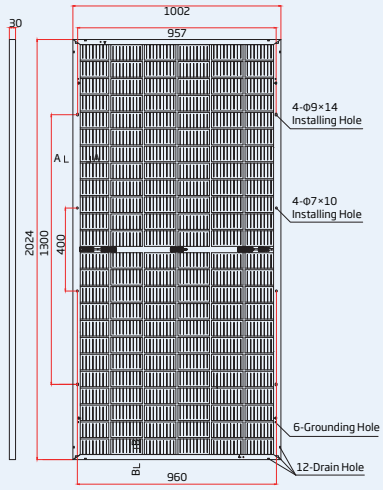
DUOMAX twin

BIFACIAL DUAL GLASS 144 HALF-CELL MBB MODULE

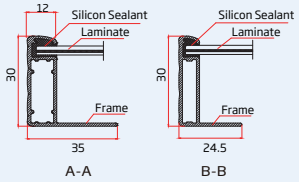
DIMENSIONS OF PV MODULE (mm)



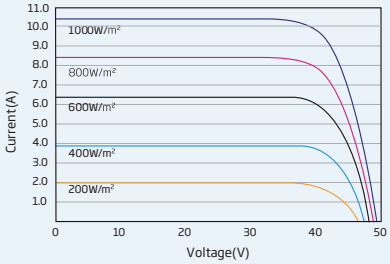
Front View



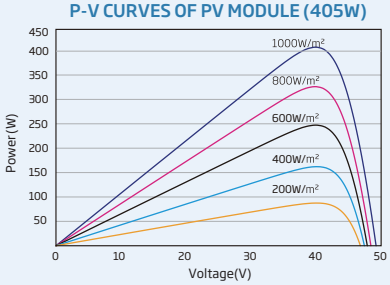
Back View



I-V CURVES OF PV MODULE (405 W)



P-V CURVES OF PV MODULE (405W)



ELECTRICAL DATA (STC)

Peak Power Watts-P_{MAX} (Wp)*	390	395	400	405	410
Power Output Tolerance-P_{MAX} (W)	0 ~ +5				
Maximum Power Voltage-V_{MPP} (V)	40.2	40.5	40.8	41.1	41.4
Maximum Power Current-I_{MPP} (A)	9.71	9.76	9.81	9.86	9.91
Open Circuit Voltage-V_{OC} (V)	48.5	48.7	48.9	49.1	49.3
Short Circuit Current-I_{SC} (A)	10.25	10.29	10.33	10.37	10.41
Module Efficiency η_m (%)	19.2	19.5	19.7	20.0	20.2

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5.
*Measuring tolerance: ±3%.

ELECTRICAL DATA (NMOT)

Maximum Power-P_{MAX} (Wp)	295	299	302	306	310
Maximum Power Voltage-V_{MPP} (V)	37.7	38.0	38.3	38.6	38.9
Maximum Power Current-I_{MPP} (A)	7.82	7.86	7.90	7.93	7.97
Open Circuit Voltage-V_{OC} (V)	45.7	45.9	46.1	46.3	46.5
Short Circuit Current-I_{SC} (A)	8.26	8.29	8.33	8.36	8.39

NMOT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

Electrical characteristics with different rear side power gains (referenced specifically to 405 Wp front)**

Maximum Power-P_{MAX} (Wp)	425	446	466	486	506
Maximum Power Voltage-V_{MPP} (V)	41.1	41.1	41.1	41.1	41.1
Maximum Power Current-I_{MPP} (A)	10.35	10.85	11.34	11.83	12.33
Open Circuit Voltage-V_{OC} (V)	49.2	49.3	49.4	49.5	49.6
Short Circuit Current-I_{SC} (A)	10.89	11.41	11.93	12.44	12.96
P_{max} gain	5%	10%	15%	20%	25%

Power Bifaciality:70±5%.

MECHANICAL DATA

Solar Cells	Monocrystalline
Cell Orientation	144 cells (6 × 24)
Module Dimensions	2024 × 1002 × 30 mm (79.69 × 39.45 × 1.18 inches)
Weight	26.0 kg (57.3 lb)
Front Glass	2.0 mm (0.08 inches), High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	POE/EVA
Back Glass	2.0 mm (0.08 inches), Heat Strengthened Glass (White Grid Glass)
Frame	30mm (1.18 inches) Anodized Aluminium Alloy
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0 mm² (0.006 inches²) Portrait: 280/280 mm (11.02/11.02 inches) Landscape: 1900/1900 mm (74.80/74.80 inches)
Connector	Trina TS4

TEMPERATURE RATINGS

NMOT (Nominal Moudule Operating Temperature)	41°C (±3°C)
Temperature Coefficient of P_{MAX}	- 0.35%/°C
Temperature Coefficient of V_{OC}	- 0.25%/°C
Temperature Coefficient of I_{SC}	0.04%/°C

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum SystemVoltage	1500V DC (IEC)
	1500V DC (UL)
Max Series Fuse Rating	20A

(Do not connect Fuse in Combiner Box with two or more strings in parallel connection)

WARRANTY

12 year Product Workmanship Warranty

30 year Power Warranty

(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box: 35 pieces

Modules per 40' container: 665 pieces

** Back-side power gain varies depending upon the specific project albedo

Trinasolar

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

Version number: TSM_DEG15MC20_EN_2020_RED

www.trinasolar.com

HIGH PERFORMANCE
BIFACIAL PERC MONOCRYSTALLINE MODULE

RSM144-6-370BMDG-390BMDG

144 CELL MONOCRYSTALLINE MODULE

370-390Wp POWER OUTPUT RANGE

1500VDC MAXIMUM SYSTEM VOLTAGE

19.5% MAXIMUM EFFICIENCY

risen solar technology

About Risen Energy

Risen Energy is a leading, global tier 1 manufacturer of high-performance solar photovoltaic products and provider of total business solutions for residential, commercial and utility-scale power generation. The company, founded in 1986, and publicly listed in 2010, compels value generation for its chosen global customers. Techno-commercial innovation, underpinned by consummate quality and support, encircle Risen Energy's total Solar PV business solutions which are among the most powerful and cost-effective in the industry. With local market presence and strong financial bankability status, we are committed, and able, to building strategic, mutually beneficial collaborations with our partners, as together we capitalise on the rising value of green energy.

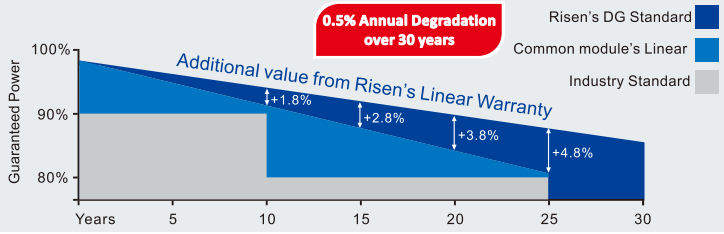
ISO9001
ISO14001
OHSAS18001

KEY SALIENT FEATURES

- Global, Tier 1 bankable brand, with independently certified state-of-the-art automated manufacturing
- Bifacial technology enables additional energy harvesting from rear side (up to 25%)
- Industry leading lowest thermal co-efficient of power
- Industry leading 12 years product warranty
- Excellent low irradiance performance
- Excellent PID resistance
- Positive tight power tolerance
- Dual stage 100% EL Inspection warranting defect-free product
- Module Imp binning radically reduces string mismatch losses
- Warranted reliability and stringent quality assurances well beyond certified requirements
- Certified to withstand severe environmental conditions
  - Anti-reflective & anti-soiling surface minimise power loss from dirt and dust
  - Severe salt mist, ammonia & blown sand resistance, for seaside, farm and desert environments
  - Excellent mechanical load 2400Pa & snow load 5400Pa resistance

LINEAR PERFORMANCE WARRANTY

12 year Product Warranty / 30 year Linear Power Warranty



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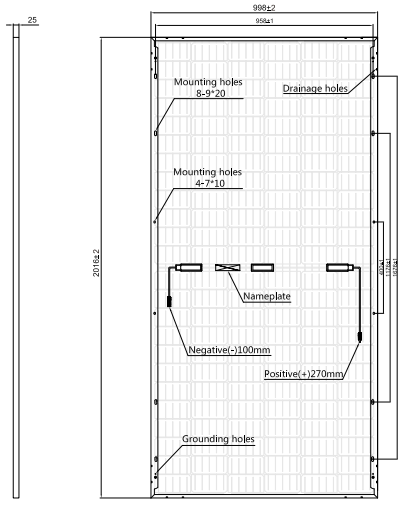
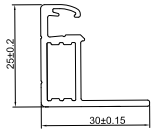
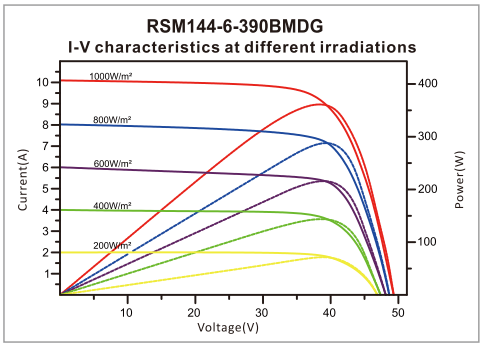
THE POWER OF RISING VALUE

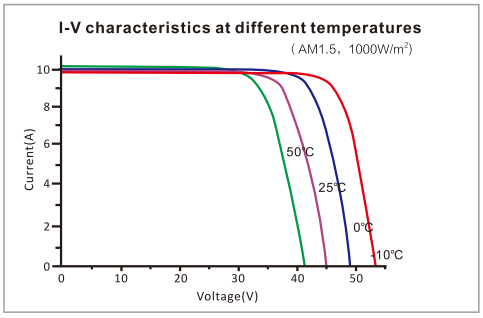
Dimensions of PV Module

Unit: mm









Our Partners:

ELECTRICAL DATA (STC)

Model Number	RSM144-6-370BMDG	RSM144-6-375BMDG	RSM144-6-380BMDG	RSM144-6-385BMDG	RSM144-6-390BMDG
Rated Power in Watts-Pmax(Wp)	**370**	**375**	**380**	**385**	**390**
Open Circuit Voltage-Voc(V)	47.60	47.75	48.00	48.15	48.30
Short Circuit Current-Isc(A)	9.90	10.00	10.10	10.20	10.30
Maximum Power Voltage-Vmpp(V)	39.80	39.90	40.05	40.15	40.25
Maximum Power Current-Impp(A)	9.30	9.40	9.50	9.60	9.70
Module Efficiency (%)	18.5	18.8	19.0	19.3	19.5
Encapsulated Cell Efficiency (%)	20.8	21.1	21.4	21.6	21.9

STC: Irradiance 1000 W/m², Cell Temperature 25°C, Air Mass AM1.5 according to EN 60904-3.
Power production tolerance: 0~+3%

REARSIDE POWER GAIN BIFACIAL FACTOR:75%±5

Model Number		RSM144-6-370BMDG	RSM144-6-375BMDG	RSM144-6-380BMDG	RSM144-6-385BMDG	RSM144-6-390BMDG
10%	Power Output(Wp)	407	413	418	424	429
15%	Power Output(Wp)	426	431	437	443	449
20%	Power Output(Wp)	444	450	456	462	468
25%	Power Output(Wp)	463	469	475	481	488

ELECTRICAL DATA (NMOT)

Model Number	RSM144-6-370BMDG	RSM144-6-375BMDG	RSM144-6-380BMDG	RSM144-6-385BMDG	RSM144-6-390BMDG
Maximum Power-Pmax (Wp)	276.7	280.3	284.4	288.1	291.8
Open Circuit Voltage-Voc (V)	43.8	43.9	44.2	44.3	44.4
Short Circuit Current-Isc (A)	8.12	8.20	8.28	8.36	8.45
Maximum Power Voltage-Vmpp (V)	36.5	36.6	36.7	36.8	36.9
Maximum Power Current-Impp (A)	7.59	7.67	7.75	7.83	7.92

NMOT: Irradiance at 800 W/m², Ambient Temperature 20°C, Wind Speed 1 m/s.

MECHANICAL DATA

Solar cells	Monocrystalline, 6" half cell
Cell configuration	144 cells (6×12+6×12)
Module dimensions	2016×998×25mm
Weight	26kg
Superstrate	2.0 mm, ARC Glass
Substrate	2.0 mm, Glazed Glass
Frame	Anodized Aluminium Alloy type 6063T5, Silver Color
J-Box	Potted, IP68, 1500VDC, 3 Schottky bypass diodes
Cables	4.0mm² (12AWG), positive 270mm length, negative 100mm length
Connector	Risen Twinsel PV-SY02, IP68

TEMPERATURE & MAXIMUM RATINGS

Nominal Module Operating Temperature (NMOT)	45°C±2°C
Temperature Coefficient of Voc	-0.29%/°C
Temperature Coefficient of Isc	0.06%/°C
Temperature Coefficient of Pmax	-0.37%/°C
Operational Temperature	-40°C~+85°C
Maximum System Voltage	1500VDC
Max Series Fuse Rating	20A
Limiting Reverse Current	20A

PACKAGING CONFIGURATION

	40ft	20ft
Number of modules per container	880	400
Number of modules per pallet	40	40
Number of pallets per container	22	10
Packaging box dimensions (LxWxH) in mm	2110×1130×1140	2110×1130×1140
Box gross weight[kg]	1100	1100

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

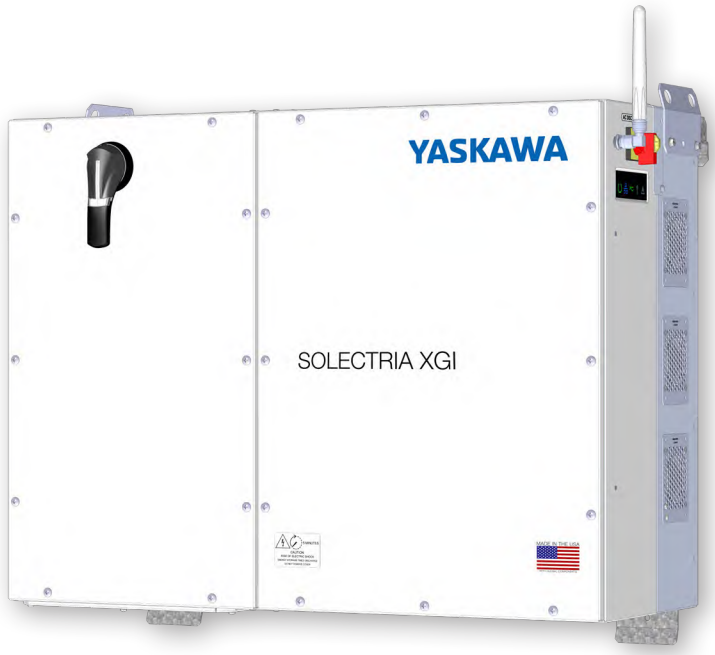
THE POWER OF RISING VALUE

REM144-BMDG-EN-BVC-Q3.2019-5BB

YASKAWA

SOLECTRIA XGI™ 1500

Premium 3-Phase Transformerless Utility-Scale Inverters



Features

- Made in the USA with global components
- Buy American Act (BAA) compliant
- Four models: 125kW/125kVA, 125kW/150kVA, 150kW/166kVA, 166kW/166kVA
- 99.0% peak efficiency
- Flexible solution for distributed and centralized system architecture
- Advanced grid-support functionality Rule 21/UL1741SA
- Robust, dependable and built to last
- Lowest O&M and installation costs
- Access all inverters on site via WiFi from one location
- Remote diagnostics and firmware upgrades
- SunSpec Modbus Certified

Options

- String combiners for distributed and centralized systems
- Web-based monitoring
- Extended warranty

MADE IN THE USA

With U.S. and Global Components

Yaskawa Solectria Solar's XGI 1500 utility-scale string inverters are designed for high reliability and built of the highest quality components that were selected, tested and proven to last beyond their warranty. The XGI 1500 inverters provide advanced grid-support functionality and meet the latest IEEE 1547 and UL 1741 standards for safety. The XGI 1500 inverters are the most powerful 1500VDC string inverters in the PV market and have been engineered for both distributed and centralized system architecture. Designed and engineered in Lawrence, MA, the new SOLECTRIA XGI inverters are assembled and tested at Yaskawa America's facilities in Buffalo Grove, IL. The XGI 1500 inverters are Made in the USA with global components and are compliant with the Buy American Act.

SOLECTRIA SOLAR

SOLECTRIA XGI 1500

Specifications

	XGI 1500-125/125	XGI 1500-125/150	XGI 1500-150/166	XGI 1500-166/166
DC Input				
Absolute Maximum Input Voltage	1500 VDC	1500 VDC	1500 VDC	1500 VDC
Maximum Power Input Voltage Range (MPPT)	860-1250 VDC	860-1250 VDC	860-1250 VDC	860-1250 VDC
Operating Voltage Range (MPPT)	860-1450 VDC	860-1450 VDC	860-1450 VDC	860-1450 VDC
Number of MPP Trackers	1 MPPT	1 MPPT	1 MPPT	1 MPPT
Maximum Operating Input Current	148.3 A	148.3 A	178.0 A	197.7 A
Maximum Operating PV Power	128 kW	128 kW	153 kW	170 kW
Maximum DC/AC Ratio | Max Rated PV Power	2.0 | 250 kW	2.0 | 250 kW	1.66 | 250 kW	1.5 | 250 kW
Max Rated PV Short-Circuit Current (∑Isc x 1.25)	320 A	320 A	320 A	320 A
AC Output				
Nominal Output Voltage	600 VAC, 3-Ph	600 VAC, 3-Ph	600 VAC, 3-Ph	600 VAC, 3-Ph
AC Voltage Range	-12% to +10%	-12% to +10%	-12% to +10%	-12% to +10%
Continuous Real Output Power	125 kW	125 kW	150 kW	166 kW
Continuous Apparent Output Power	125 kVA	150 kVA	166 kVA	166 kVA
Maximum Output Current	120 A	144 A	160 A	160 A
Nominal Output Frequency	60 Hz	60 Hz	60 Hz	60 Hz
Power Factor (Unity default)	+/- 0.80 Adjustable	+/- 0.80 Adjustable	+/- 0.80 Adjustable	+/- 0.80 Adjustable
Total Harmonic Distortion (THD) @ Rated Load	<3%	<3%	<3%	<3%
Grid Connection Type	3-Ph + N/GND	3-Ph + N/GND	3-Ph + N/GND	3-Ph + N/GND
Fault Current Contribution (1 cycle RMS)	144 A	173 A	192 A	192 A
Efficiency				
Peak Efficiency	98.9%	98.9%	99.0%	99.0%
CEC Average Efficiency	98.5%	98.5%	98.5%	98.5%
Tare Loss	<1 W	<1 W	<1 W	<1 W
Temperature				
Ambient Temperature Range	-40°F to 140°F (-40C to 60C)		-40°F to 140°F (-40C to 60C)	
De-Rating Temperature	122°F (50C)		113°F (45C)	
Storage Temperature Range	-40°F to 167°F (-40C to 75C)		-40°F to 167°F (-40C to 75C)	
Relative Humidity (non-condensing)	0 - 95%		0 - 95%	
Operating Altitude	9,840 ft (3 km)		9,840 ft (3 km)	
Communications				
Advanced Graphical User Interface	WiFi			
Communication Interface	Ethernet			
Third-Party Monitoring Protocol	SunSpec Modbus TCP/IP			
Web-Based Monitoring	Optional			
Firmware Updates	Remote and Local			
Testing & Certifications				
Safety Listings & Certifications	UL 1741, IEEE 1547, UL 1998			
Advanced Grid Support Functionality	Rule 21, UL 1741SA			
Testing Agency	ETL			
FCC Compliance	FCC Part 15, Class A			
Warranty				
Standard and Options	5 Years Standard; Option for 10 Years			
Enclosure				
Acoustic Noise Rating	56 dBA @ 3 m			
DC Disconnect	Integrated 2-Pole 250 A DC Disconnect			
Mounting Angle	Vertical only			
Dimensions	Height: 29.5 in. (750 mm) | Width: 39.4 in. (1000 mm) | Depth: 15.1 in. (380 mm)			Specifications subject to change.
Weight	270 lbs (122 kg)			
Enclosure Rating and Finish	Type 4X, Polyester Powder-Coated Aluminum			

SOLECTRIA SOLAR

Yaskawa Solectria Solar
360 Merrimack Street
Lawrence, MA 01843
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Document FL.XGI1500.01
2/6/2020

YASKAWA

YASKAWA

XGI 1500 COMBINERS

Increased Design Flexibility for SOLECTRIA XGI 1500

Features

- Made in the USA with global components
- Buy American Act (BAA) compliant
- Designed exclusively for use with XGI 1500 inverters
- Both poles fused and switched
- 16, 20, 24, 26, and 28 fuse positions
- 15 and 20 A fuse options for all models; 25 and 30 A fuse options for select models only
- Connection plates for compression terminals
- 90C terminal rating

Option

- Surge arrestor, both polarities

Yaskawa Solectria Solar offers two 1500V string combiners, Attachable & Remote, each designed to pair exclusively with SOLECTRIA XGI 1500 inverters. The 1500V Attachable Combiner is designed to mate directly to the XGI 1500 inverter for use in distributed PV systems where the combiner and inverter are located together throughout the array field. The 1500V Remote Combiner has similar features, but is designed for a centralized or clustered deployment of multiple XGI 1500 inverters where the combiners are distributed throughout the PV array field. Both combiner lines feature the highest quality and durability in the industry today.

Choose from models with 16 to 28 fused positions and either 15 or 20 A fuses. Specific models also available with 25 A fuses (20 positions) and 30 A fuses (16 positions). The combiners match the XGI 1500 in quality and appearance. Both models satisfy the National Electrical Code for systems with ungrounded PV source circuits. All Yaskawa Solectria Solar XGI inverters and combiners are Made in the USA with global components and are compliant with the Buy American Act.

MADE IN THE USA

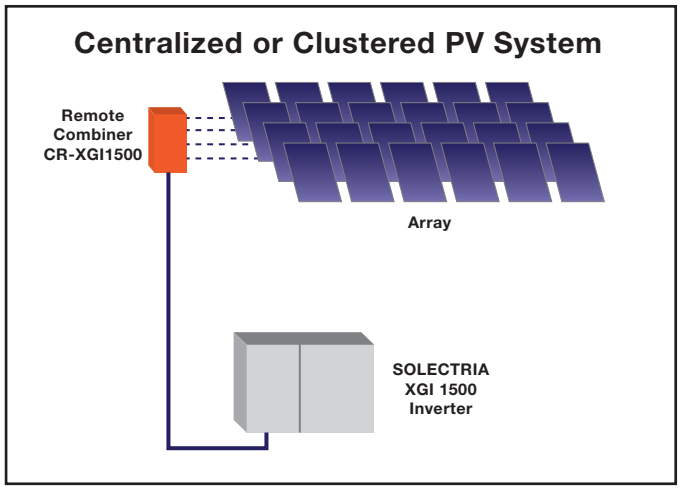
With U.S. and Global Components

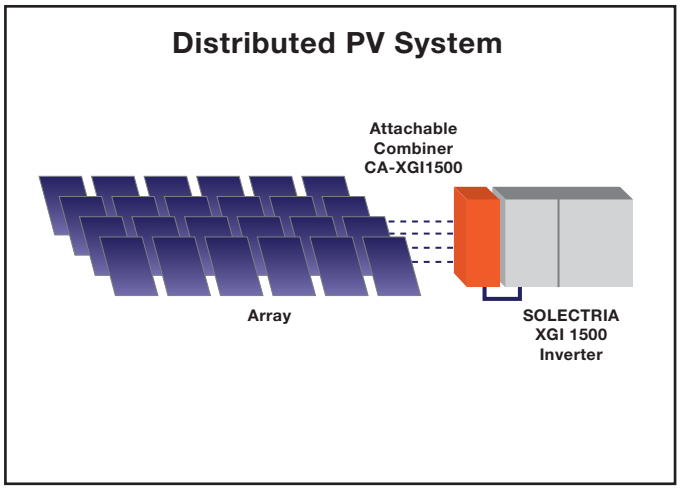
SOLECTRIA SOLAR

XGI 1500 COMBINERS

Specifications

	1500V Remote Combiner			1500V Attachable Combiner		
1500V String Combiners exclusively for use with SOLECTRIA XGI 1500						
Input Wire Compatibility	14-4 AWG			14-4 AWG		
Output Wire Compatibility	Compression Terminal: 1 conductor, 1/0 - 500 kcmil | 2 conductors, 1/0 - 500 kcmil			Compression Terminal: 1 conductor, 1/0 - 500 kcmil | 2 conductors, 1/0 - 500 kcmil		
Maximum Voltage	1500 VDC			1500 VDC		
Fuse Rating Options	15 A or 20 A (fuses included)	25 A	30 A	15 A or 20 A (fuses included)	25 A	30 A
Number of Fused Positions	16 / 20 / 24 / 26 / 28	20	16	16 / 20 / 24 / 26 / 28	20	16
Input PV Source Circuit Configurations	Ungrounded PV Source Circuits			Ungrounded PV Source Circuits		
Fuse Configurations	Both positive and negative polarities fused			Both positive and negative polarities fused		
DC Disconnect	2-pole integrated DC disconnect, positive and negative poles switched			DC Disconnect located on XGI 1500 inverter		
DC Disconnect Current Rating	250 A			250 A (located on XGI 1500)		
Temperature Range	-40°F to 122°F (-40°C to 50°C)			-40°F to 122°F (-40°C to 50°C)		
Mounting Positions	Indoor, Outdoor, Wall, Array - Vertical, Horizontal or Angled			Mechanically attaches to structure		
Safety Certification & Listing	UL 1741			UL 1741		
Standard Warranty	5 Years			5 Years		
Enclosure Material Options & Rating	Polyester Powder Coated Aluminum, NEMA Type 4X			Polyester Powder Coated Aluminum, NEMA Type 4X		
Option						
Surge Protection	Both positive and negative polarities			Both positive and negative polarities		





SOLECTRIA SOLAR

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DOCR-071001-C | February 2019

YASKAWA

power to conserve

HPS Millennium™ E
Medium Voltage Distribution Transformer
- up to 34.5kV

power to perform

HPS Hammond Power Solutions

HPS Millennium™ E
Medium Voltage Transformer

HPS MILLENNIUM™ E

Hammond Power Solutions (HPS) is the industry leading manufacturer of standard and custom dry-type transformers in North America. Every HPS product is built with the quality and dependability you count on.

HPS Millennium™ medium voltage distribution transformers are designed for many demanding and diverse applications, while minimizing both installation and maintenance costs. Coils are precision wound with copper or aluminum conductors using either barrel or comb wound designs with a full vacuum-pressure impregnation (VPI) insulation system.

With three phase ratings up to 15MVA, 34.5kV, 175kV BIL and single phase to 5MVA, they feature the newest technology and manufacturing processes.

To service all of your medium voltage needs, HPS Millennium™ G is also available for applications requiring voltages up to 5kV. For more information on HPS Millennium™ G (catalog no. MILGMED), please contact us or visit the HPS Website.

SUPPORT & RESOURCES

No other transformer company can offer our service and quality in a full range of products:

- **Current Calculator:** Calculate the Amps, Volts, or kVA of a transformer. Visit the "Online Tools" area of the HPS website.
- **Fast On-Site Response:** On-site technicians are available to assist with any technical problems or issues that cannot be resolved over the phone.
- **Live Telephone Technical Support:** Our inside sales team is available to quickly answer your questions. They are technically trained and able to answer most questions right over the phone.
- **Easy-To-Access Installation Manuals:** All transformer installation manuals are conveniently located on our website so you can access them anywhere, anytime.
- **Online Technical Support:** Get answers to frequently asked questions, troubleshooting tips and instruction sheets by visiting the "Technical Support" area of the HPS website.

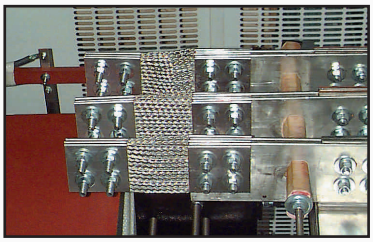
APPLICATIONS

HPS Millennium™ E is suitable for any commercial, industrial, manufacturing or production process application. They can be offered for a variety of environmental conditions and built to meet the most onerous duty.

- Industrial
- Commercial
- Data Centers
- Renewable Energy

Built-in enclosure fork lift capability


Low voltage bus bar


Flexible connectors

Hammond Power Solutions

FEATURES

Core & Coil Construction:

- Manufactured from quality non-aging, cold rolled, silicon steel laminations
- Cores are precision cut to close tolerances to eliminate gaps and improve performance
- Core is coated to prevent the ingress of moisture
- Precision wound with copper or aluminum conductors that are electrically balanced to minimize axial forces during short-circuit conditions
- Wire or foil conductors for optimum performance for the application
- Robust interface between core & coils for better short circuit performance
- Utilize both barrel or comb wound construction techniques
- Available with multiple termination configurations: stubs-up, coordinated bus-to-end
- Vibration isolation pads to minimize noise

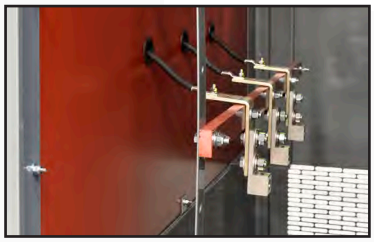
BENEFITS

- Meets the minimum efficiency standards mandated in DOE 10 CFR Part 431 (levels as of Jan. 1st 2016), NRCan 2019 SOR/2018-201 Amd. 14, ON Reg. 404/12 (effective Jan. 1st, 2018) and exceeds CSA C802.2-12 resulting in increased dollar savings and positive societal/ environmental payback
- Designed for indoor or outdoor applications
- VPI windings are mechanically durable for the most demanding environments typically found in mining, crane and other difficult mechanical applications.
- Minimal maintenance required beyond removing surface contaminants, such as dirt
- Can be energized immediately after installation
- Excellent resistance to short circuits
- Self-extinguishing in the unlikely event of fire
- Environmentally friendly

power to conserve


Lift off hinged doors


Lifting eyes for core & coil assembly


Air terminal chamber (ATC)

HPS Millennium™ E
Medium Voltage Transformer

Specifications - Copper or Aluminum

kVA: 225-2500kVA (DOE16)
225-7500kVA (NRCan 2019) others available upon request

High Voltage (Primary): Up to 34.5 kV Class, up to 175 kV BIL
Up to 150 kV BIL (BIL per CSA and IEEE/ANSI standards)
Standard taps +/- 2.5%, +/- 5%
Other options available upon request

Low Voltage (Secondary): 208Y/120V to 600Y/347V & 2.4-5kV up to 60kV BIL
Higher BIL available upon request

Frequency: 60 Hz, others available upon request

Insulation System: 220°C (200°C for some lower kVA ratings)

Enclosure Type: Type 1, 2, 3/3R, 4/4X or 12 available (others available upon request).
Enhanced Type 3R option available for improved outdoor performance.
Lift off hinged doors for easy accessibility and quick removal if required.
Built-in enclosure fork lift capability.

Enclosure Finish: ANSI 61 Grey
Compliant with UL 50

Neutral: Neutral terminal for field connection (on applicable units)

Temperature Rise: 150°C typical temperature rise, (optional 115°C & 80°C rise available)

Termination: Front accessible separate high and low voltage terminals; connectors suitable for aluminum and copper are provided for easy cable installation.

Impedance: 3-7%, typically 5.75%

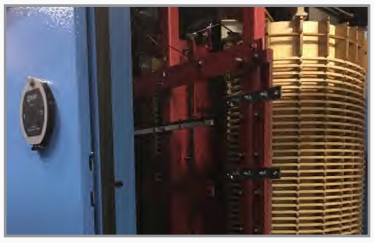
Seismic: Seismically qualified according to the International Building Code (IBC) 2018, and the American Society of Civil Engineers ASCE 7-16 specifications, with the following design parameters:
Spectral acceleration: $S_{DS} \leq 2.0$ g
Importance factor: $I_p = 1.5$
Attachment/height ratio: z/h = 0
OSHPD compliance available upon request

Sound Level: Meets IEEE C57.12.01
(other sound level performance available)

Altitude: Standard up to 1000 meters (de-rated above 1000 meters)

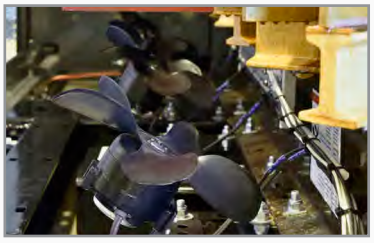
Ambient: -20°C to 40°C (with de-rating possible from 40°C to 60°C, consult HPS)

Duty: Special duty available upon request.



Infrared viewing window & custom enclosure finish

Lightning arrestors



Cooling fans

OPTIONAL ACCESSORIES

- Forced air-cooling (or provisions for later)
- Heat exchanger/cooling for TENV units
- Lightning arrestors rated for system voltage (Station, Intermediate or Distribution)
- Grounding resistor
- Neutral Ground Monitor
- Thermal sensing & indication
- - Thermocouples
- - Thermometers (analog/digital)
- - Thermostat alarm / trip (N.O. /N.C. contacts)
- Current transformers
- Potential transformers
- Key interlock to prevent unauthorized access
- Electrostatic shielding
- Rated to handle non-linear loads
- Strip heater (powered from separate source)
- Surge protection devices
- Air terminal chamber
- Low voltage panel
- Coordinated bus-to-end
- Primary fused disconnects
- Infrared viewing windows

Comparison of Enclosures for Indoor and Outdoor Non-Hazardous Locations

		Indoor						Indoor/Outdoor								Submersible	
CSA C22.2 No. 94.2 Enclosure Type		**1[a]**	**2[a]**	**5**	**12**	**12K**	**13**	**3**	**-**	**3R[a]**	**-**	**3S**	**-**	**4**	**4X**	**6**	**6P**
NEMA 250 Enclosure Type		**1[a]**	**2[a]**	**5**	**12**	**12K**	**13**	**3**	**3X**	**3R[a]**	**3RX[a]**	**3S**	**3SX**	**4**	**4X**	**6**	**6P**
Equivalent IEC 60529 IP designation [e]		**IP20**	**IP22**	**IP53**	**IP54**	**IP54**	**IP54**	**IP55**	**IP55**	**IP24**	**IP24**	**IP55**	**IP55**	**IP66**	**IP66**	**IP67**	**IP68**
Provides a degree of protection against these environmental conditions	Accidental contact with live parts	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Falling dirt	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Dripping and light splashing of non-corrosive liquids		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Circulating dust, lint, fibres and flyings [d]				X	X	X	X	X			X	X	X	X	X	X
	Settling dust, lint, fibres and flyings [d]			X	X	X	X	X	X			X	X	X	X	X	X
	Wind-blown dust							X	X			X	X	X	X	X	X
	Rain, snow and external formation of ice or sleet [b]							X	X	X	X	X	X	X	X	X	X
	External formation of ice or sleet											X	X				
	Hose down and splashing water													X	X	X	X
	Corrosion												X		X		X
	Occasional temporary submersion															X	X
	Occasional prolonged submersion																X
	Oil and coolant seepage				X	X	X										
	Oil and coolant seepage, spraying and splashing						X										

Notes:
a. - These enclosures may be ventilated
b. - External operating mechanism(s) is not required to operate when the enclosure is ice covered
c. - External operating mechanism(s) shall be operable when the enclosure is ice covered
d. - These fibres and flyings are non-hazardous and are not considered Class III type ignitable fibres or combustible flyings
e. - Since IEC 60529 does not specify degrees of protection for many conditions considered CSA C22.2 No. 94.2, the IEC classifications cannot be exactly equated to North American Type numbers. The North American Type numbers meet or exceed the test requirements for the associated IP classifications.
This table cannot be used to convert from IEC classifications to North American Type designations.

References: CSA C22.2 No. 94, CSA C22.1 (CEC), NEMA 250, NEMA document - NEMA Enclosure Types
Disclaimer: This table is for quick comparison only. Please refer to appropriate standard for enclosure selection to your needs.

TESTING

All VPI Power transformers are tested at HPS prior to shipment. They must meet specific criteria to be certified acceptable for release. The following tests are performed on each power transformer:

- Resistance Measurement*
- Voltage Ratio
- Polarity & Phase-Relation Test
- No-Load Loss and Excitation Current Test
- Induced Voltage
- Impedance, Voltage & Load Loss Test*
- Power frequency voltage-withstand each winding
- Other testing available upon customer request

* typically not performed for units ≤ 500kVA

COMPLIANCE & APPROVALS

HPS Millennium™ E is CSA Certified and UL Listed to the following standards:

- CSA C22.2 No. 47
- CSA C9-02
- U.L. 1562

Compliant to the following industry standards:

- IEEE-C57.12.01
- IEEE-C57.12.51
- IEEE-C57.12.70
- IEEE-C57.12.91
- CSA 802.2-12
- DOE 10 CFR Part 431: 2010 or 2016
- NRCan SOR/2018-201 Amd. 14
- ON Reg. 404/12 (2018)
- IEC 60076 (upon request)
- IBC 2018/OSHPD for seismic conditions

Selection Tables

ALUMINUM WOUND

kVA	Voltage Class kV	BIL	Enclosure with Stubs Up Fig. 1				Enclosure with Bus-To-End Fig. 2			
			Width (W)	Depth (D)	Height (H)	Weight (Lbs.)	Width (W)	Depth (D)	Height (H)	Weight (Lbs.)
225	5	30	49	42	64	2000	60	50	82	2300
	15	60	54	47	72	2400	60	50	82	2700
	15	95	60	50	82	3000	72	54	91.5	3700
	25	110	72	54	91.5	4100	72	60	91.5	4400
	25	125	72	60	91.5	4500	72	60	91.5	4900
	34.5	150	90	72	91.5	5500	90	72	91.5	5900
300	5	30	49	42	64	2100	68	50	72	2400
	15	60	68	50	72	2900	68	50	72	3200
	15	95	72	54	91.5	4000	84	54	91.5	4400
	25	110	72	54	91.5	4200	84	60	91.5	4800
	25	125	84	60	91.5	4800	84	60	91.5	5200
	34.5	150	90	72	91.5	5700	90	72	91.5	6100
500	5	30	54	47	72	3100	78	48	78	3600
	15	60	68	50	72	3900	78	48	78	4400
	15	95	84	54	91.5	5300	84	54	91.5	5800
	25	110	84	54	91.5	5700	84	60	91.5	6400
	25	125	90	60	91.5	6400	96	72	91.5	7200
	34.5	150	96	72	91.5	7800	96	72	91.5	8400
750	5	30	68	50	72	5000	84	54	91.5	6100
	15	60	78	48	78	5300	90	54	91.5	6400
	15	95	84	54	91.5	6700	96	60	91.5	7600
	25	110	84	60	91.5	7000	90	60	91.5	7600
	25	125	90	60	91.5	7100	96	72	91.5	8000
	34.5	150	96	72	91.5	9000	102	72	91.5	9900
1000	5	30	78	48	78	6100	90	54	91.5	7300
	15	60	84	54	91.5	7200	96	54	91.5	8000
	15	95	90	60	91.5	8400	102	60	91.5	9400
	25	110	90	60	91.5	8500	96	60	91.5	9300
	25	125	96	60	91.5	8700	102	72	91.5	9800
	34.5	150	96	72	110	10000	102	72	110	11000
1500	5	30	78	48	78	8100	96	54	91.5	9500
	15	60	90	54	91.5	9600	102	60	91.5	10800
	15	95	96	60	91.5	10800	108	60	91.5	12100
	25	110	96	60	91.5	10900	108	72	91.5	12500
	25	125	102	72	110	11800	108	72	110	13000
	34.5	150	108	72	110	13900	120	72	110	15400
2000	5	30	90	54	91.5	10800	108	60	91.5	12400
	15	60	96	54	91.5	11500	108	60	91.5	13000
	15	95	102	60	91.5	13400	120	72	91.5	15300
	25	110	102	72	91.5	13800	120	72	91.5	15500
	25	125	108	72	110	15000	120	72	110	16600
	34.5	150	120	72	110	16200	120	72	110	17600
2500	5	30	90	54	91.5	13000	120	60	91.5	15100
	15	60	96	60	91.5	13700	120	72	91.5	15800
	15	95	108	60	91.5	15800	132	72	110	18400
	25	110	108	72	110	14900	120	72	110	16500
	25	125	108	72	110	15900	120	72	110	17600
	34.5	150	108	72	110	16900	132	72	110	19000

Weight and dimensions are typical for 150ºC Average Winding Rise.
Weights and dimensions are for DOE 2016/NRCan 2019 compliant product.
All dimensions are in inches.
For Type 2 enclosure styles, add 4 inches to the enclosure depth and 20 lbs to the total weight.
Not for construction purposes. Approval drawings can be provided as needed.

Add 20 inch for ATC up to 110kV BIL designs and 24 inch for ATC with 125/150kV BIL designs.
Add approx. 400 lbs. per ATC.

kVA	Voltage Class kV	BIL	Enclosure with Stubs Up Fig. 1				Enclosure with Bus-To-End Fig. 2			
			Width (W)	Depth (D)	Height (H)	Weight (Lbs.)	Width (W)	Depth (D)	Height (H)	Weight (Lbs.)
3000	5	30	90	60	110	15700	120	60	110	17900
	15	60	96	60	110	17300	120	72	110	19800
	15	95	102	60	110	19000	132	72	110	21700
	25	110	102	72	110	20700	120	72	110	23100
	25	125	108	72	110	22900	132	72	110	25600
	34.5	150	Consult HPS				Consult HPS			
3750	5	30	Consult HPS				Consult HPS			
	15	60	96	60	110	17800	120	72	110	20300
	15	95	102	60	110	19500	132	72	135	22800
	25	110	108	72	110	21400	132	72	135	24400
	25	125	108	72	110	23900	Consult HPS			
	34.5	150	Consult HPS				Consult HPS			
5000	5	30	Consult HPS				Consult HPS			
	15	60	102	60	110	19000	120	72	110	21400
	15	95	108	72	135	21400	132	72	135	23900
	25	110	120	72	135	23200	132	72	135	25500
	25	125	120	72	135	25700	Consult HPS			
	34.5	150	Consult HPS				Consult HPS			
7500	5	30	Consult HPS				Consult HPS			
	15	60	120	72	135	21700	132	72	135	23900
	15	95	120	72	135	23200	Consult HPS			
	25	110	120	72	135	24700	Consult HPS			
	25	125	Consult HPS				Consult HPS			
	34.5	150	Consult HPS				Consult HPS			

Weight and dimensions are typical for 150ºC Average Winding Rise.
Weights and dimensions are for NRCan 2019 compliant product.
All dimensions are in inches.
For Type 2 enclosure styles, add 4 inches to the enclosure depth and 20 lbs to the total weight.
Not for construction purposes. Approval drawings can be provided as needed.

Add 20 inch for ATC up to 110kV BIL designs and 24 inch for ATC with 125/150kV BIL designs.
Add approx. 400 lbs. per ATC.

Selection Tables

COPPER WOUND

kVA	Voltage Class kV	BIL	Enclosure with Stubs Up Fig. 1				Enclosure with Bus-To-End Fig. 2			
			Width (W)	Depth (D)	Height (H)	Weight (Lbs.)	Width (W)	Depth (D)	Height (H)	Weight (Lbs.)
225	5	30	49	42	64	2000	60	50	82	2300
	15	60	60	50	82	2700	68	50	72	2900
	15	95	68	50	72	3100	72	54	91.5	3900
	25	110	68	50	72	3300	72	54	91.5	4100
	25	125	72	54	91.5	3900	72	60	91.5	4200
	34.5	150	90	72	91.5	4800	90	72	91.5	5100
300	5	30	49	42	64	2100	60	50	82	2400
	15	60	60	50	82	3100	68	50	72	3400
	15	95	68	50	72	3700	72	54	91.5	4500
	25	110	72	54	91.5	4400	84	54	91.5	4900
	25	125	84	54	91.5	4600	84	60	91.5	5200
	34.5	150	90	72	91.5	5200	90	72	91.5	5600
500	5	30	49	42	64	2800	68	50	72	3200
	15	60	78	48	78	4400	78	48	78	4800
	15	95	84	54	91.5	5700	84	54	91.5	6200
	25	110	84	54	91.5	5800	84	60	91.5	6500
	25	125	84	60	91.5	6100	84	60	91.5	6600
	34.5	150	90	72	91.5	6400	96	72	91.5	7000
750	5	30	60	50	82	4800	78	48	78	5300
	15	60	78	48	78	5500	84	54	91.5	6500
	15	95	84	54	91.5	6500	90	60	91.5	7200
	25	110	90	54	91.5	6800	96	60	91.5	7600
	25	125	90	60	91.5	7000	96	72	91.5	7900
	34.5	150	96	72	91.5	7500	102	72	91.5	8300
1000	5	30	68	50	72	5800	84	54	91.5	7000
	15	60	78	48	78	6500	90	54	91.5	7700
	15	95	90	54	91.5	8400	96	60	91.5	9300
	25	110	90	60	91.5	8600	96	60	91.5	9400
	25	125	90	60	91.5	8700	96	72	91.5	9700
	34.5	150	96	72	91.5	9200	102	72	91.5	10200
1500	5	30	78	48	78	7900	90	54	91.5	9200
	15	60	84	54	91.5	8500	96	54	91.5	9400
	15	95	90	54	91.5	10400	102	60	91.5	11700
	25	110	96	60	91.5	10800	102	72	91.5	12100
	25	125	102	72	91.5	12200	108	72	91.5	13400
	34.5	150	102	72	91.5	13800	108	72	91.5	15200
2000	5	30	78	48	78	9700	96	54	91.5	11300
	15	60	84	54	91.5	11100	102	60	91.5	12600
	15	95	96	54	91.5	12200	108	60	91.5	13800
	25	110	96	60	91.5	12900	108	72	91.5	14700
	25	125	102	72	91.5	13900	120	72	91.5	15600
	34.5	150	108	72	110	17400	120	72	110	19200
2500	5	30	84	54	91.5	11300	102	60	91.5	12800
	15	60	90	54	91.5	12100	108	60	91.5	13800
	15	95	96	54	91.5	14100	120	72	91.5	16400
	25	110	96	72	91.5	15100	120	72	91.5	17200
	25	125	102	72	110	16600	120	72	110	18500
	34.5	150	108	72	110	18400	Consult HPS			

Weight and dimensions are typical for 150ºC Average Winding Rise.
Weights and dimensions are for DOE 2016/NRCan 2019 compliant product.
All dimensions are in inches.
For Type 2 enclosure styles, add 4 inches to the enclosure depth and 20 lbs to the total weight.
Not for construction purposes. Approval drawings can be provided as needed.

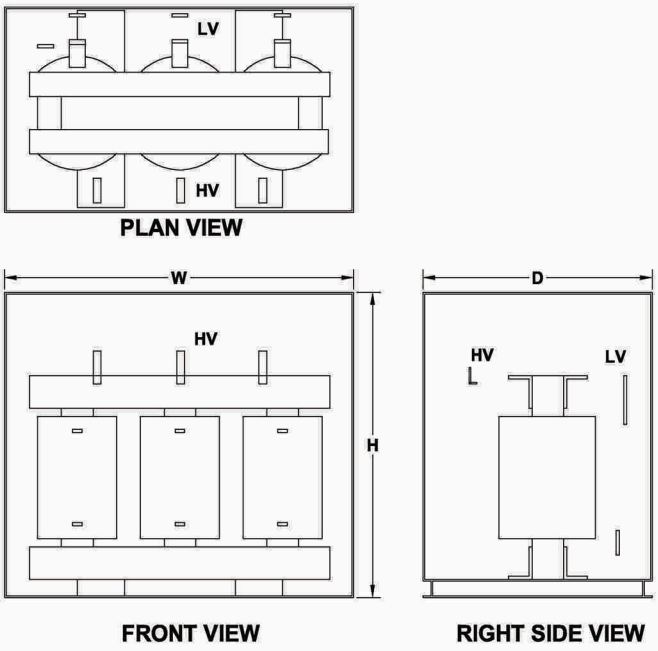
Add 20 inch for ATC up to 110kV BIL designs and 24 inch for ATC with 125/150kV BIL designs.
Add approx. 400 lbs. per ATC.

kVA	Voltage Class kV	BIL	Enclosure with Stubs Up Fig. 1				Enclosure with Bus-To-End Fig. 2			
			Width (W)	Depth (D)	Height (H)	Weight (Lbs.)	Width (W)	Depth (D)	Height (H)	Weight (Lbs.)
3000	5	30	90	54	91.5	15200	120	60	91.5	17500
	15	60	96	54	91.5	17300	120	60	91.5	19700
	15	95	102	54	91.5	19500	120	72	91.5	22100
	25	110	102	72	91.5	21800	120	72	91.5	24300
	25	125	102	72	110	23700	120	72	110	26400
	34.5	150	Consult HPS				Consult HPS			
3750	5	30	Consult HPS				Consult HPS			
	15	60	96	60	110.0	19800	120	60	110	22300
	15	95	102	60	110.0	22300	120	72	110.0	25000
	25	110	102	60	110	23000	120	72	110.0	25800
	25	125	108	72	110	24900	132	72	110.0	27800
	34.5	150	120	72	110	26700	Consult HPS			
5000	5	30	Consult HPS				Consult HPS			
	15	60	96	60	110	20800	108	60	110	23100
	15	95	102	60	110	23000	120	60	110.0	25600
	25	110	108	72	135	25400	120	72	135.0	28000
	25	125	108	72	135	25900	120	72	135.0	28500
	34.5	150	Consult HPS				Consult HPS			
7500	5	30	Consult HPS				Consult HPS			
	15	60	102	72	135	23700	120	72	135	26300
	15	95	108	72	135	25600	132	72	135.0	28500
	25	110	120	72	135	26400	132	72	135.0	29000
	25	125	120	72	135	27700	132	72	135.0	30500
	34.5	150	Consult HPS				Consult HPS			

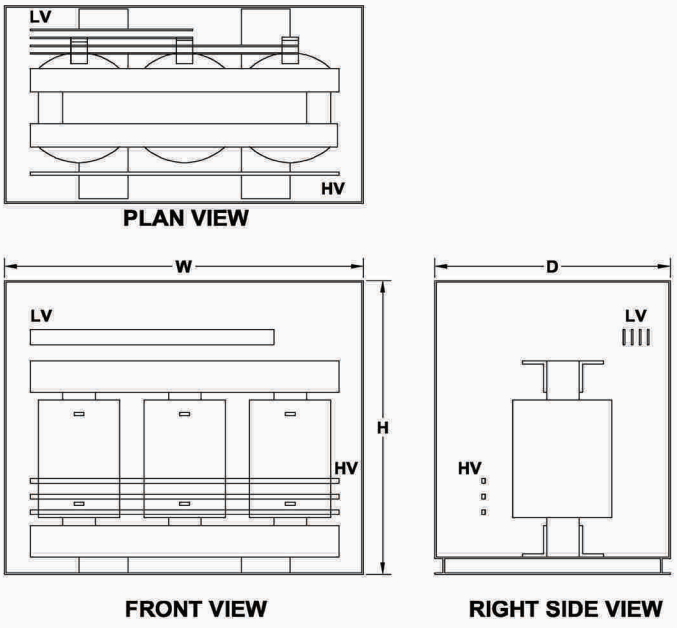
Weight and dimensions are typical for 150ºC Average Winding Rise.
Weights and dimensions are for NRCan 2019 compliant product.
All dimensions are in inches.
For Type 2 enclosure styles, add 4 inches to the enclosure depth and 20 lbs to the total weight.
Not for construction purposes. Approval drawings can be provided as needed.

Add 20 inch for ATC up to 110kV BIL designs and 24 inch for ATC with 125/150kV BIL designs.
Add approx. 400 lbs. per ATC.

Drawings



ENCLOSURE WITH STUBS UP FIG. 1



ENCLOSURE WITH BUS-TO-END FIG. 2

Anti-Vibration Pad & Vibration Isolator Kits

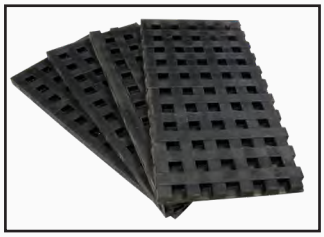
Hammond Power Solutions

ANTI-VIBRATION PAD AND VIBRATION ISOLATOR KITS

All standard transformers come with installed internal vibration absorbing pads to minimize noise during operation. Optional external "anti-vibration" pad and "vibration isolator" (for higher noise dampening) kits can be used to reduce operating noise even further. All are resistant to industrial contaminants like oil, acids and alkalines.

Anti-Vibration Pad Kits

Part No.	Description
PD1	Set of four (4) rubber anti-vibration pads which replace the standard steel enclosure washers.
PD2	



All anti-vibration pad kits contain a set of four (4) pads or isolators. Therefore only one kit is required per transformer.

Vibration Isolator Kits

Part No.	Transformer Weight (Lbs)	Description
NMP1	Up to 340 lbs	Set of four (4) molded neoprene and steel plate assemblies that virtually eliminate vibration noise between the transformer and the mounting surface.
NMP2	341 to 680 lbs	
NMP3	681 to 1040 lbs	
NMP4	1041 to 1740 lbs	
NMP5	1741 to 2330 lbs	
NMP6	2331 to 3450 lbs	
NMP7	3451 to 4690 lbs	

All vibration isolator kits and anti-vibration pad kits contain a set of four (4) pads or isolators. Therefore only one kit is required per transformer.

Typical Performance Data

5 kV, 30kV BIL - Aluminum

75ºC, 4160V Delta (30 kV BIL) -
480Y/277V, 600Y/347V (10kV BIL), 60 Hz

kVA	No Load Loss (W)	Load Loss (W)	Impedance	Resistance	Reactance	X/R Ratio	Regulation				% Efficiency at different loads			
							at 50% load		at 100% load					
							pf = 1	pf = 0.8	pf = 1	pf = 0.8	25%	50%*	75%	100%
225	630	2770	5.7%	1.2%	5.6%	4.64	0.65%	2.18%	1.38%	4.40%	98.56%	98.82%	98.71%	98.50%
300	735	3420	5.7%	1.1%	5.6%	5.10	0.63%	2.16%	1.33%	4.37%	98.72%	98.93%	98.80%	98.60%
500	1020	4925	5.7%	1.0%	5.7%	5.66	0.54%	2.12%	1.17%	4.27%	98.93%	99.09%	98.98%	98.80%
750	1500	6010	5.8%	0.8%	5.7%	7.13	0.44%	2.05%	0.96%	4.15%	99.01%	99.21%	99.14%	99.01%
1000	1790	7145	5.8%	0.7%	5.7%	8.18	0.41%	2.03%	0.90%	4.11%	99.10%	99.28%	99.21%	99.09%
1500	2150	10235	5.8%	0.7%	5.7%	8.19	0.39%	2.02%	0.86%	4.08%	99.26%	99.37%	99.29%	99.17%
2000	2595	12440	5.8%	0.6%	5.7%	9.57	0.35%	1.99%	0.79%	4.03%	99.33%	99.43%	99.36%	99.25%
2500	2785	15460	5.8%	0.6%	5.7%	9.58	0.35%	1.99%	0.78%	4.03%	99.40%	99.47%	99.39%	99.28%

*Meets DOE 10 CFR Part 431 - 2016 & NRCan 2019/ON Reg. 404/12 Energy Efficiency Regulations for MVDT Transformers

5 kV, 30kV BIL - Copper

75ºC, 4160V Delta (30 kV BIL) -
480Y/277V, 600Y/347V (10kV BIL), 60 Hz

kVA	No Load Loss (W)	Load Loss* (W)	Impedance	Resistance	Reactance	X/R Ratio	Regulation				% Efficiency at different loads			
							at 50% load		at 100% load					
							pf = 1	pf = 0.8	pf = 1	pf = 0.8	25%	50%*	75%	100%
225	575	3070	5.6%	1.3%	5.4%	4.17	0.72%	2.19%	1.51%	4.40%	98.65%	98.82%	98.65%	98.41%
300	690	3720	5.6%	1.2%	5.5%	4.56	0.66%	2.15%	1.39%	4.34%	98.79%	98.93%	98.78%	98.55%
500	900	5550	5.6%	1.1%	5.5%	5.01	0.59%	2.12%	1.26%	4.27%	99.01%	99.09%	98.94%	98.73%
750	1475	6050	5.7%	0.8%	5.6%	7.00	0.44%	2.02%	0.96%	4.09%	99.02%	99.21%	99.14%	99.01%
1000	1650	7840	5.7%	0.8%	5.6%	7.01	0.43%	2.02%	0.94%	4.07%	99.15%	99.28%	99.20%	99.06%
1500	1910	11240	5.7%	0.7%	5.6%	8.02	0.41%	2.01%	0.91%	4.05%	99.31%	99.37%	99.27%	99.13%
2000	2265	13750	5.7%	0.7%	5.6%	8.05	0.38%	1.99%	0.85%	4.01%	99.38%	99.43%	99.34%	99.21%
2500	2570	16310	5.7%	0.6%	5.6%	9.40	0.37%	1.97%	0.81%	3.99%	99.43%	99.47%	99.38%	99.25%

*Meets DOE 10 CFR Part 431 - 2016 & NRCan 2019/ON Reg. 404/12 Energy Efficiency Regulations for MVDT Transformers

15 kV, 60kV BIL - Aluminum

75°C, 12470V Delta (60 kV BIL) -
480Y/277V, 600Y/347V (10kV BIL), 60 Hz

kVA	No Load Loss (W)	Load Loss (W)	Impedance	Resistance	Reactance	X/R Ratio	Regulation				% Efficiency at different loads			
							at 50% load		at 100% load					
							pf = 1	pf = 0.8	pf = 1	pf = 0.8	25%	50%*	75%	100%
225	915	2300	5.7%	1.0%	5.6%	5.64	0.55%	2.12%	1.18%	4.28%	98.15%	98.69%	98.71%	98.59%
300	1025	3135	5.7%	1.0%	5.6%	5.64	0.56%	2.13%	1.20%	4.29%	98.40%	98.81%	98.78%	98.63%
500	1275	5085	5.7%	1.0%	5.6%	5.65	0.55%	2.12%	1.18%	4.28%	98.74%	98.99%	98.91%	98.74%
750	1700	6510	5.8%	0.9%	5.7%	6.32	0.47%	2.07%	1.03%	4.19%	98.89%	99.12%	99.06%	98.92%
1000	2075	7585	5.8%	0.8%	5.7%	7.14	0.42%	2.04%	0.92%	4.12%	98.99%	99.21%	99.16%	99.04%
1500	2775	9950	5.8%	0.7%	5.7%	8.19	0.37%	2.01%	0.83%	4.06%	99.10%	99.30%	99.26%	99.16%
2000	3285	12850	5.8%	0.6%	5.7%	9.57	0.36%	2.00%	0.81%	4.05%	99.19%	99.35%	99.30%	99.20%
2500	3825	14710	5.8%	0.6%	5.8%	9.59	0.34%	1.98%	0.75%	4.01%	99.25%	99.40%	99.36%	99.26%

*Meets DOE 10 CFR Part 431 - 2016 & NRCan 2019/ON Reg. 404/12 Energy Efficiency Regulations for MVDT Transformers

15 kV, 60kV BIL - Copper

75°C, 12470V Delta (60 kV BIL) -
480Y/277V, 600Y/347V (10kV BIL), 60 Hz

kVA	No Load Loss (W)	Load Loss (W)	Impedance	Resistance	Reactance	X/R Ratio	Regulation				% Efficiency at different loads			
							at 50% load		at 100% load					
							pf = 1	pf = 0.8	pf = 1	pf = 0.8	25%	50%*	75%	100%
225	750	2725	5.6%	1.2%	5.5%	4.55	0.64%	2.14%	1.36%	4.32%	98.29%	98.69%	98.63%	98.45%
300	950	3425	5.6%	1.0%	5.5%	5.54	0.61%	2.13%	1.29%	4.29%	98.47%	98.81%	98.74%	98.56%
500	1240	5215	5.6%	1.0%	5.5%	5.54	0.56%	2.10%	1.20%	4.23%	98.76%	98.99%	98.90%	98.73%
750	1540	7115	5.6%	0.9%	5.6%	6.18	0.51%	2.07%	1.10%	4.17%	98.95%	99.12%	99.02%	98.86%
1000	1800	8980	5.7%	0.9%	5.6%	6.20	0.49%	2.05%	1.05%	4.14%	99.08%	99.21%	99.10%	98.94%
1500	2485	11215	5.7%	0.8%	5.6%	7.02	0.41%	2.00%	0.91%	4.05%	99.16%	99.30%	99.22%	99.09%
2000	2860	14695	5.7%	0.7%	5.6%	8.03	0.41%	2.00%	0.89%	4.04%	99.25%	99.35%	99.26%	99.13%
2500	3015	18025	5.7%	0.7%	5.6%	8.04	0.40%	2.00%	0.88%	4.04%	99.34%	99.40%	99.30%	99.17%

*Meets DOE 10 CFR Part 431 - 2016 & NRCan 2019/ON Reg. 404/12 Energy Efficiency Regulations for MVDT Transformers

Typical Performance Data

15 kV, 95kV BIL - Aluminum

75ºC, 12470V Delta (95 kV BIL) -
480Y/277V, 600Y/347V (10kV BIL), 60 Hz

kVA	No Load Loss (W)	Load Loss (W)	Impedance	Resistance	Reactance	X/R Ratio	Regulation				% Efficiency at different loads			
							at 50% load		at 100% load					
							pf = 1	pf = 0.8	pf = 1	pf = 0.8	25%	50%*	75%	100%
225	930	2240	5.7%	1.0%	5.7%	5.65	0.51%	1.28%	1.04%	2.57%	98.13%	98.69%	98.72%	98.61%
300	1050	3005	5.7%	1.0%	5.7%	5.65	0.51%	1.28%	1.04%	2.57%	98.38%	98.81%	98.80%	98.67%
500	1350	4820	5.7%	1.0%	5.7%	5.66	0.53%	1.32%	1.09%	2.65%	98.75%	98.99%	98.90%	98.72%
750	1750	6280	5.8%	0.8%	5.7%	7.12	0.45%	1.57%	0.94%	3.15%	98.89%	99.12%	99.06%	98.92%
1000	2275	7050	5.8%	0.7%	5.7%	8.18	0.37%	1.52%	0.78%	3.06%	98.93%	99.20%	99.18%	99.09%
1500	2850	9620	5.8%	0.6%	5.7%	9.57	0.35%	1.60%	0.74%	3.22%	99.09%	99.30%	99.27%	99.18%
2000	3350	12465	5.8%	0.6%	5.7%	9.57	0.37%	1.70%	0.79%	3.43%	99.23%	99.36%	99.29%	99.17%
2500	3900	14235	5.8%	0.5%	5.8%	11.51	0.33%	1.68%	0.72%	3.39%	99.26%	99.41%	99.35%	99.25%

*Meets DOE 10 CFR Part 431 - 2016 & NRCan 2019/ON Reg. 404/12 Energy Efficiency Regulations for MVDT Transformers

15 kV, 95kV BIL - Copper

75ºC, 12470V Delta (95 kV BIL) -
480Y/277V, 600Y/347V (10kV BIL), 60 Hz

kVA	No Load Loss (W)	Load Loss* (W)	Impedance	Resistance	Reactance	X/R Ratio	Regulation				% Efficiency at different loads			
							at 50% load		at 100% load					
							pf = 1	pf = 0.8	pf = 1	pf = 0.8	25%	50%*	75%	100%
225	850	2570	5.6%	1.1%	5.5%	4.83	0.60%	2.02%	1.28%	4.06%	98.23%	98.69%	98.66%	98.50%
300	1000	3235	5.6%	1.1%	5.5%	4.98	0.58%	2.11%	1.23%	4.25%	98.42%	98.81%	98.76%	98.61%
500	1425	4450	5.7%	0.9%	5.6%	6.27	0.49%	2.08%	1.05%	4.21%	98.66%	98.99%	98.96%	98.84%
750	1725	6400	5.7%	0.9%	5.6%	6.58	0.47%	2.23%	1.05%	4.50%	98.88%	99.12%	99.06%	98.93%
1000	2040	7890	5.7%	0.8%	5.6%	7.19	0.44%	2.21%	0.98%	4.46%	99.00%	99.20%	99.14%	99.02%
1500	2610	10700	5.7%	0.7%	5.6%	7.92	0.41%	2.18%	0.91%	4.41%	99.13%	99.30%	99.24%	99.12%
2000	3070	13550	5.7%	0.7%	5.6%	8.41	0.39%	2.17%	0.87%	4.39%	99.22%	99.36%	99.29%	99.18%
2500	3600	15480	5.7%	0.6%	5.6%	9.11	0.36%	2.15%	0.81%	4.35%	99.27%	99.41%	99.35%	99.24%

*Meets DOE 10 CFR Part 431 - 2016 & NRCan 2019/ON Reg. 404/12 Energy Efficiency Regulations for MVDT Transformers

25 kV, 125kV BIL - Aluminum

75°C, 24940V Delta (125 kV BIL) -
480Y/277V, 600Y/347V (10kV BIL), 60 Hz

kVA	No Load Loss (W)	Load Loss (W)	Impedance	Resistance	Reactance	X/R Ratio	Regulation				% Efficiency at different loads			
							at 50% load		at 100% load					
							pf = 1	pf = 0.8	pf = 1	pf = 0.8	25%	50%*	75%	100%
225	950	2714	5.7%	1.2%	5.6%	4.65	0.64%	2.17%	1.36%	4.38%	98.05%	98.57%	98.55%	98.40%
300	1165	3280	5.7%	1.1%	5.6%	5.11	0.59%	2.14%	1.25%	4.32%	98.21%	98.69%	98.68%	98.54%
500	1535	5038	5.7%	1.0%	5.6%	5.65	0.54%	2.12%	1.17%	4.27%	98.54%	98.89%	98.85%	98.70%
750	2000	6868	5.7%	0.9%	5.7%	6.31	0.50%	2.09%	1.08%	4.22%	98.72%	99.02%	98.97%	98.83%
1000	2460	8045	5.8%	0.8%	5.7%	7.13	0.44%	2.05%	0.97%	4.15%	98.83%	99.11%	99.08%	98.96%
1500	3115	11312	5.8%	0.7%	5.7%	8.17	0.42%	2.04%	0.92%	4.12%	98.99%	99.21%	99.16%	99.05%
2000	4015	12822	5.8%	0.7%	5.7%	8.20	0.36%	2.00%	0.81%	4.05%	99.05%	99.28%	99.26%	99.17%
2500	4200	17000	5.8%	0.7%	5.7%	8.19	0.38%	2.01%	0.84%	4.07%	99.17%	99.33%	99.27%	99.16%

*Meets DOE 10 CFR Part 431 - 2016 & NRCan 2019/ON Reg. 404/12 Energy Efficiency Regulations for MVDT Transformers

25 kV, 125kV BIL - Copper

75°C, 24940V Delta (125 kV BIL) -
480Y/277V, 600Y/347V (10kV BIL), 60 Hz

kVA	No Load Loss (W)	Load Loss (W)	Impedance	Resistance	Reactance	X/R Ratio	Regulation				% Efficiency at different loads			
							at 50% load		at 100% load					
							pf = 1	pf = 0.8	pf = 1	pf = 0.8	25%	50%*	75%	100%
225	900	2920	5.6%	1.3%	5.4%	4.14	0.69%	2.17%	1.45%	4.37%	98.11%	98.57%	98.52%	98.33%
300	1115	3500	5.6%	1.2%	5.5%	4.58	0.62%	2.13%	1.32%	4.30%	98.25%	98.69%	98.65%	98.48%
500	1525	5085	5.6%	1.0%	5.5%	5.55	0.55%	2.09%	1.17%	4.21%	98.55%	98.89%	98.84%	98.70%
750	1955	7100	5.6%	0.9%	5.6%	6.18	0.51%	2.07%	1.10%	4.17%	98.74%	99.02%	98.95%	98.81%
1000	2340	8520	5.6%	0.8%	5.6%	6.99	0.47%	2.04%	1.01%	4.12%	98.86%	99.11%	99.06%	98.93%
1500	3280	10730	5.7%	0.7%	5.6%	8.04	0.40%	1.99%	0.87%	4.03%	98.96%	99.21%	99.18%	99.07%
2000	3650	14600	5.7%	0.7%	5.6%	8.03	0.40%	2.00%	0.89%	4.04%	99.10%	99.28%	99.22%	99.10%
2500	4050	17740	5.7%	0.7%	5.6%	8.04	0.39%	1.99%	0.87%	4.03%	99.18%	99.33%	99.26%	99.14%

*Meets DOE 10 CFR Part 431 - 2016 & NRCan 2019/ON Reg. 404/12 Energy Efficiency Regulations for MVDT Transformers

Technical Information

The following information is provided for reference only:

Average Audible Sound Levels

Self-Cooled		Ventilated Forced Air Cooled	
Equivalent Two-Winding (kVA)	Ventilated (Class AA Rating)	Equivalent Two-Winding (kVA)	Class FA and AFA Rating
0-9	40	0-1167	67
10-50	45	1168-1667	68
51-150	50	1668-2000	69
151-300	55	2001-3333	71
301-500	60	3334-5000	73
501-700	62	5001-6667	74
701-1000	64	6668-8333	75
1001-1500	65	8334-10000	78
1501-2000	66		
2001-3000	68		
3001-4000	70		
4001-5000	71		
5001-6000	72		
6001-7500	75		

System Voltage and Transformer BIL Ratings

Nominal L-L System Voltage	Low Frequency Voltage Insulation Level	Basic lightning impulse insulation levels (BIL ratings) in common use kV crest[a,b] (1.2 x 50 µs)												
(kV)	(kV rms)	10	20	30	45	60	95	110	125	150	200	250	300	350
0.25	2.5	None												
0.6	3	S	1	1										
1.2	4	S	1	1										
2.5	10		S	1	1									
5.0	12			S	1	1								
8.7	20				S	1	1							
15.0	34					S	1	1						
18.0	40						S	1	1					
25.0	50						2	S	1	1				
34.5	70								2	S	1			
46.0	95										S	1	1	
69.0	140											S	1	1
Chopped wave[c,d] minimum time to flashover µs		1.0	1.0	1.0	1.25	1.5	1.6	1.8	2.0	2.25	2.7	3.0	3.0	3.0

When performing an impulse test on the low voltage windings, the high voltage windings may experience higher test voltage than the rated BIL level.
Note - The latest edition of IEEE Std. C62.22™ [B3] should be consulted for information coordination with available surge arrester protection levels.
S = Standard values
1 = Optional higher levels where exposure to overvoltages occurs and improved protective margins are required.
2 = Optional lower levels where protective characteristics of applied surge arresters have been evaluated and found to provide appropriate surge protection.
a = Low-impedance low-side windings may be tested with a much faster 0.5 x 1.5 µs impulse wave on BIL ratings less than or equal to 30 kV.
b = A positive impulse wave shall be used.
c = The voltage crest of the chopped wave should be approximately the same as the full wave magnitude.
d = No chopped waves are required on 0.6 kV systems and below.

Standard Transformer Ratings, Primary Voltage Class 2.3-46 kV

kVA 3 Phase			Secondary Voltage			
Self-Cooled	Fan-Cooled Ventilated Dry	Fan-Cooled Weather Resistant Ventilated	208Y/120 V 240 V Delta	480Y/277 V 480V Delta	4160Y/2400 V 4160 V Delta 2400 V Delta	600Y/277 V 600V Delta
225			X	X		X
300	400	400	X	X		X
500	667	667	X	X	X	X
750	1000	1000	X	X	X	X
1000	1333	1333	X	X	X	X
1500	2000	2000	X	X	X	X
2000	2666	2666		X	X	X
2500	3333	3333		X	X	X
3750	5000	5000			X	
5000	6650	6650			X	
7500	10000	10000			X	

The above combinations are based on standard designs. Other than standard designs may place further restrictions on the availablilty of voltage and kVA combinations. Consult factory for final determination.

Altitude Derating Factor

Altitude (FT)	kVA Correction	BIL Correction
3300	1.00	1.00
4000	0.994	0.98
5000	0.985	0.95
6000	0.975	0.92
7000	0.966	0.89
8000	0.957	0.86
9000	0.948	0.83
10,000	0.939	0.80
11,000	0.930	0.77
12,000	0.921	0.75
13,000	0.912	0.72
14,000	0.903	0.70
15,000	0.894	0.67

Per IEEE 100m = 330 ft

Other HPS Energy Efficient Products

ENERGY EFFICIENT GENERAL PURPOSE DISTRIBUTION TRANSFORMERS

Generally used for supplying appliance, lighting, heating, motorized machine and power loads from electrical distribution systems.

Standard features include:

HPS Sentinel®

- Meets C802.2 (2012) efficiencies per Canadian Energy Efficiency Regulations SOR/94-651

HPS Sentinel® G

- Meets new DOE 2016/NRCan 2019 & ON Reg. 404/12 efficiency standards
- 10kV BIL on all transformers

ENERGY EFFICIENT K-FACTOR TRANSFORMERS

The use of K-factor distribution transformers has become a popular means of supplying power for non-linear loads such as electronic ballasts, drives, personal computers, telecommunications equipment, broadcasting equipment and other similar power electronics. These non-linear loads generate harmonic currents which can substantially increase transformer losses. Our K-rated transformers have been specifically designed to prevent failure due to overheating.

Standard features include:

HPS Synergy®

- K-Factor ratings of K4, K9, K13 and K20
- Meets C802.2 (2012) efficiencies per Canadian Energy Efficiency Regulations SOR/94-651

HPS Sentinel® K

- K-Factor ratings of K4, K9, K13 and K20
- Meets new DOE 2016/NRCan 2019 & ON Reg. 404/12 efficiency standards
- 10kV BIL on all transformers

ENERGY EFFICIENT HARMONIC MITIGATING TRANSFORMERS

HPS Harmonic Mitigating transformers reduce voltage distortion (flat-topping) and power losses due to current harmonics created by single-phase, non-linear loads such as computer equipment. They treat sequence harmonics (3rd, 9th and 15th) within the secondary windings and 5th and 7th harmonics upstream with appropriate phase shifting. Typical applications of severe non-linear loading conditions include data centers, internet-service providers, telecom sites, call centers, broadcast centers, etc.

Standard features include:

HPS Centurion®

- Meets C802.2 (2012) efficiencies per Canadian Energy Efficiency Regulations SOR/94-651

HPS Sentinel® H

- K-Factor rating of K13 (others available on request)
- Meets new DOE 2016/NRCan 2019 & ON Reg. 404/12 efficiency standards
- 10kV BIL on all transformers

Hammond Power Solutions

ENERGY EFFICIENT DRIVE ISOLATION TRANSFORMERS

HPS drive isolation transformers are suitable for both AC and DC variable speed drives. They are sized to match standard motor horsepower and voltage ratings.

Standard features include:

- Three phase ratings from 7 kVA to 660 kVA
- Copper and aluminum available
- Optional shield available
- UL Listed and CSA Certified
- Type 3R enclosure (optional type 4, 12 or stainless)

HPS Tribune™

- Meets TP1 and C802.2-12 efficiencies

HPS Tribune™ E

- Meets NRCan 2019 & ON Reg. 404/12 efficiency standards

HPS ENDURACOIL™ CAST RESIN TRANSFORMERS

HPS EnduraCoil™ is a high-performance cast resin product designed for many demanding and diverse applications. Coils are precision wound with copper or aluminum conductors that are electrically balanced to minimize axial forces during short-circuit conditions.

Standard features include:

- kVA ratings from 300 to 3000 ANN, 4000 AFN, up to 34.5 kV Class
- Enclosure options (Type 1, 2, 3R, 3RE, 4, 12; other paint colors or stainless steel)
- Multiple standard options
- UL listed and CSA certified

HPS EnduraCoil™

- Meets Canadian Energy Efficiency Regulations SOR/94-651 efficiency levels at 50% of rated load

HPS EnduraCoil™ E

- Meets new DOE 2016/NRCan 2019 & ON Reg. 404/12 efficiency standards

power to conserve

HPS MILLENNIUM™ ENERGY EFFICIENT MEDIUM VOLTAGE DISTRIBUTION TRANSFORMERS

5 kV class transformers are designed to step down incoming high voltage power to utilize voltages for commercial, institutional or industrial applications.

Standard features include:

- Large variety of standard and custom single phase and three phase voltages and kVA ratings
- Standard primary voltages of 2400 and 4160 volts
- UL Listed and CSA Certified
- Type 3R and ANSI 61 enclosure (optional Type 4, 12; other paint colors or stainless steel)

power to conserve

HPS Millennium™

- Meets CSA C802.2-12 efficiency standards at 50% of rated load

HPS Millennium™ G

- Meets new DOE 2016/NRCan 2019 & ON Reg. 404/12 efficiency standards

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APPENDIX H

FAA DETERMINATION

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

Aeronautical Study No.
2020-ANE-1590-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

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

Structure:	Crane Point 1
Location:	Bristol, CT
Latitude:	41-41-31.01N NAD 83
Longitude:	72-58-35.07W
Heights:	752 feet site elevation (SE) 22 feet above ground level (AGL) 774 feet above mean sea level (AMSL)

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

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

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

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

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

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Airman (NOTAM).

If you have any questions, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1590-OE

Signature Control No: 433553546-435976128 (TMP)
David Maddox
Specialist

Additional Condition(s) or Information for ASN 2020-ANE-1590-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 774 feet above mean sea level.

Location: The structure will be located 4.73 nautical miles northeast of N41 Airport reference point.

Case Description for ASN 2020-ANE-1590-OE

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Preliminary FAA study indicates that the above mentioned structure would:
have no effect on any existing or proposed arrival, departure, or en route instrument flight rules (IFR) operations or procedures.
have no effect on any existing or proposed arrival, departure, or en route visual flight rules (VFR) operations.
have no effect on any existing or proposed arrival, departure, or en route instrument/visual flight rules (IFR/VFR) minimum flight altitudes.
not exceed traffic pattern airspace
have no physical or electromagnetic effect on the operation of air navigation and communications facilities.
have no effect on any airspace and routes used by the military.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 L Change 2, Obstruction Marking and Lighting, flag marker - Chapters 3(Marked)&12.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 10/09/2021 unless extended, revised, or terminated by the issuing office.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed within 5 days after the temporary structure is dismantled.

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

Sectional Map for ASN 2020-ANE-1590-OE

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

Aeronautical Study No.
2020-ANE-1591-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

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

Structure:	Crane Point 2
Location:	Bristol, CT
Latitude:	41-41-29.14N NAD 83
Longitude:	72-58-54.25W
Heights:	714 feet site elevation (SE) 22 feet above ground level (AGL) 736 feet above mean sea level (AMSL)

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

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

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

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

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

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Airman (NOTAM).

If you have any questions, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1591-OE

Signature Control No: 433553548-435976131 (TMP)
David Maddox
Specialist

Additional Condition(s) or Information for ASN 2020-ANE-1591-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 774 feet above mean sea level.

Location: The structure will be located 4.73 nautical miles northeast of N41 Airport reference point.

Case Description for ASN 2020-ANE-1591-OE

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Preliminary FAA study indicates that the above mentioned structure would:
have no effect on any existing or proposed arrival, departure, or en route instrument flight rules (IFR) operations or procedures.
have no effect on any existing or proposed arrival, departure, or en route visual flight rules (VFR) operations.
have no effect on any existing or proposed arrival, departure, or en route instrument/visual flight rules (IFR/VFR) minimum flight altitudes.
not exceed traffic pattern airspace
have no physical or electromagnetic effect on the operation of air navigation and communications facilities.
have no effect on any airspace and routes used by the military.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 L Change 2, Obstruction Marking and Lighting, flag marker - Chapters 3(Marked)&12.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 10/09/2021 unless extended, revised, or terminated by the issuing office.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed within 5 days after the temporary structure is dismantled.

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

Sectional Map for ASN 2020-ANE-1591-OE

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

Aeronautical Study No.
2020-ANE-1592-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

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

Structure:	Crane Point 3
Location:	Bristol, CT
Latitude:	41-41-23.49N NAD 83
Longitude:	72-58-53.38W
Heights:	694 feet site elevation (SE)
	22 feet above ground level (AGL)
	716 feet above mean sea level (AMSL)

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

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

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

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

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

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Airman (NOTAM).

If you have any questions, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1592-OE

Signature Control No: 433553550-435976126 (TMP)
David Maddox
Specialist

Additional Condition(s) or Information for ASN 2020-ANE-1592-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 774 feet above mean sea level.

Location: The structure will be located 4.73 nautical miles northeast of N41 Airport reference point.

Case Description for ASN 2020-ANE-1592-OE

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Preliminary FAA study indicates that the above mentioned structure would:
have no effect on any existing or proposed arrival, departure, or en route instrument flight rules (IFR) operations or procedures.
have no effect on any existing or proposed arrival, departure, or en route visual flight rules (VFR) operations.
have no effect on any existing or proposed arrival, departure, or en route instrument/visual flight rules (IFR/VFR) minimum flight altitudes.
not exceed traffic pattern airspace
have no physical or electromagnetic effect on the operation of air navigation and communications facilities.
have no effect on any airspace and routes used by the military.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

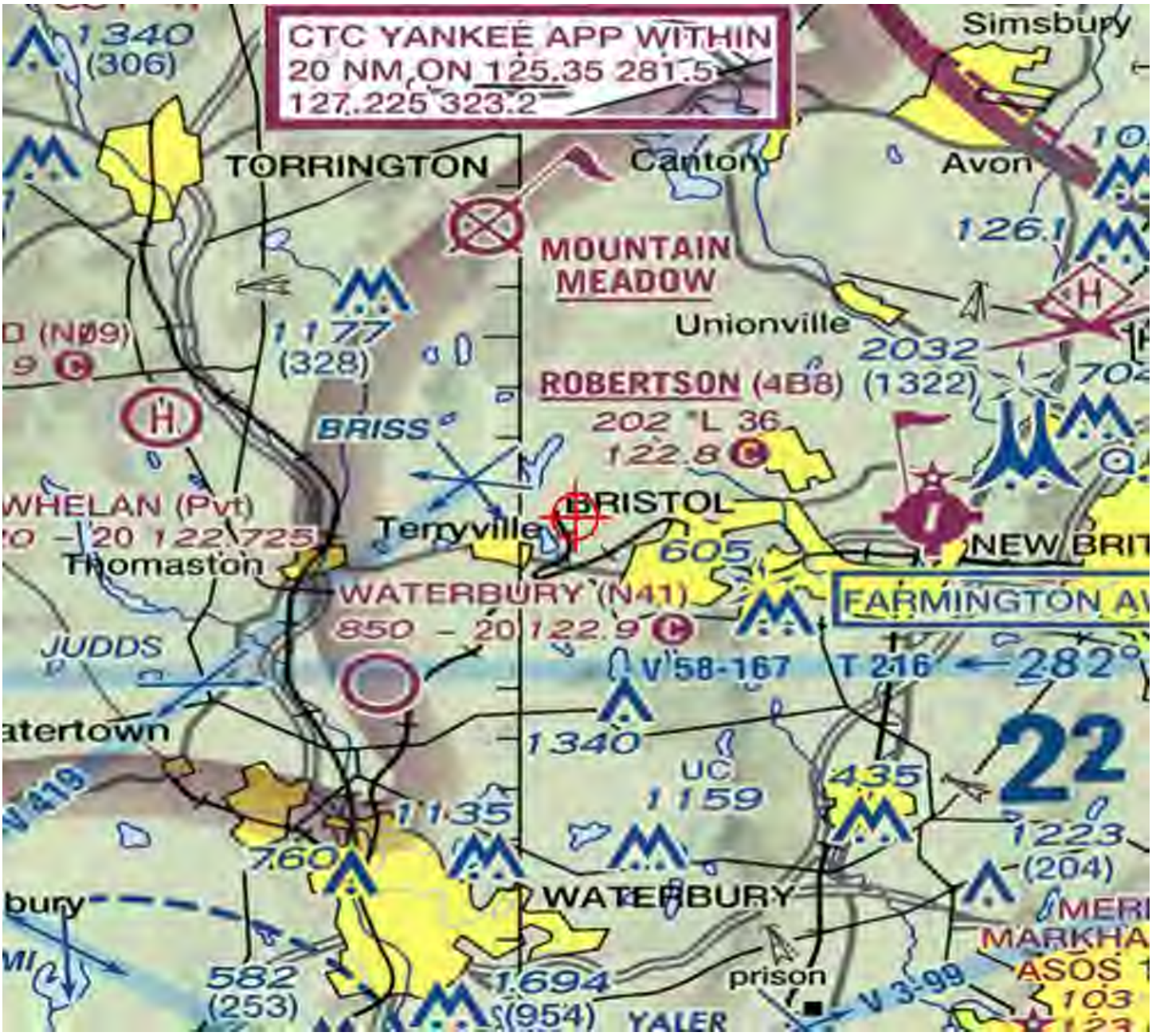
As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 L Change 2, Obstruction Marking and Lighting, flag marker - Chapters 3(Marked)&12.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 10/09/2021 unless extended, revised, or terminated by the issuing office.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed within 5 days after the temporary structure is dismantled.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.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Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2020-ANE-1593-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

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

Structure:	Crane Point 4
Location:	Bristol, CT
Latitude:	41-41-25.53N NAD 83
Longitude:	72-58-35.48W
Heights:	742 feet site elevation (SE) 22 feet above ground level (AGL) 764 feet above mean sea level (AMSL)

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

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

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

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

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

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Airman (NOTAM).

If you have any questions, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1593-OE

Signature Control No: 433553551-435976130 (TMP)
David Maddox
Specialist

Additional Condition(s) or Information for ASN 2020-ANE-1593-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 774 feet above mean sea level.

Location: The structure will be located 4.73 nautical miles northeast of N41 Airport reference point.

Case Description for ASN 2020-ANE-1593-OE

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Preliminary FAA study indicates that the above mentioned structure would:
have no effect on any existing or proposed arrival, departure, or en route instrument flight rules (IFR) operations or procedures.
have no effect on any existing or proposed arrival, departure, or en route visual flight rules (VFR) operations.
have no effect on any existing or proposed arrival, departure, or en route instrument/visual flight rules (IFR/VFR) minimum flight altitudes.
not exceed traffic pattern airspace
have no physical or electromagnetic effect on the operation of air navigation and communications facilities.
have no effect on any airspace and routes used by the military.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 L Change 2, Obstruction Marking and Lighting, flag marker - Chapters 3(Marked)&12.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 10/09/2021 unless extended, revised, or terminated by the issuing office.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed within 5 days after the temporary structure is dismantled.

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

Sectional Map for ASN 2020-ANE-1593-OE

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

Aeronautical Study No.
2020-ANE-1594-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

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

Structure:	Crane Point 5
Location:	Bristol, CT
Latitude:	41-41-30.13N NAD 83
Longitude:	72-58-36.17W
Heights:	756 feet site elevation (SE) 22 feet above ground level (AGL) 778 feet above mean sea level (AMSL)

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

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

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

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

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

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Airman (NOTAM).

If you have any questions, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1594-OE

Signature Control No: 433553552-435976127 (TMP)
David Maddox
Specialist

Additional Condition(s) or Information for ASN 2020-ANE-1594-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 774 feet above mean sea level.

Location: The structure will be located 4.73 nautical miles northeast of N41 Airport reference point.

Case Description for ASN 2020-ANE-1594-OE

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Preliminary FAA study indicates that the above mentioned structure would:
have no effect on any existing or proposed arrival, departure, or en route instrument flight rules (IFR) operations or procedures.
have no effect on any existing or proposed arrival, departure, or en route visual flight rules (VFR) operations.
have no effect on any existing or proposed arrival, departure, or en route instrument/visual flight rules (IFR/VFR) minimum flight altitudes.
not exceed traffic pattern airspace
have no physical or electromagnetic effect on the operation of air navigation and communications facilities.
have no effect on any airspace and routes used by the military.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 L Change 2, Obstruction Marking and Lighting, flag marker - Chapters 3(Marked)&12.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 10/09/2021 unless extended, revised, or terminated by the issuing office.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed within 5 days after the temporary structure is dismantled.

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

Sectional Map for ASN 2020-ANE-1594-OE

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

Aeronautical Study No.
2020-ANE-1595-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

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

Structure:	Crane Point 6
Location:	Bristol, CT
Latitude:	41-41-30.36N NAD 83
Longitude:	72-58-34.91W
Heights:	748 feet site elevation (SE) 22 feet above ground level (AGL) 770 feet above mean sea level (AMSL)

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

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

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

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

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

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Airman (NOTAM).

If you have any questions, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1595-OE

Signature Control No: 433553553-435976135 (TMP)
David Maddox
Specialist

Additional Condition(s) or Information for ASN 2020-ANE-1595-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 774 feet above mean sea level.

Location: The structure will be located 4.73 nautical miles northeast of N41 Airport reference point.

Case Description for ASN 2020-ANE-1595-OE

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Preliminary FAA study indicates that the above mentioned structure would:
have no effect on any existing or proposed arrival, departure, or en route instrument flight rules (IFR) operations or procedures.
have no effect on any existing or proposed arrival, departure, or en route visual flight rules (VFR) operations.
have no effect on any existing or proposed arrival, departure, or en route instrument/visual flight rules (IFR/VFR) minimum flight altitudes.
not exceed traffic pattern airspace
have no physical or electromagnetic effect on the operation of air navigation and communications facilities.
have no effect on any airspace and routes used by the military.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 L Change 2, Obstruction Marking and Lighting, flag marker - Chapters 3(Marked)&12.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 10/09/2021 unless extended, revised, or terminated by the issuing office.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed within 5 days after the temporary structure is dismantled.

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

Sectional Map for ASN 2020-ANE-1595-OE

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

Aeronautical Study No.
2020-ANE-1596-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

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

Structure:	Crane HP
Location:	Bristol, CT
Latitude:	41-41-30.52N NAD 83
Longitude:	72-58-40.03W
Heights:	778 feet site elevation (SE) 22 feet above ground level (AGL) 800 feet above mean sea level (AMSL)

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

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

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

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

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

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Airman (NOTAM).

If you have any questions, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1596-OE

Signature Control No: 433553554-435976129 (TMP)
David Maddox
Specialist

Additional Condition(s) or Information for ASN 2020-ANE-1596-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 774 feet above mean sea level.

Location: The structure will be located 4.73 nautical miles northeast of N41 Airport reference point.

Case Description for ASN 2020-ANE-1596-OE

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Preliminary FAA study indicates that the above mentioned structure would:
have no effect on any existing or proposed arrival, departure, or en route instrument flight rules (IFR) operations or procedures.
have no effect on any existing or proposed arrival, departure, or en route visual flight rules (VFR) operations.
have no effect on any existing or proposed arrival, departure, or en route instrument/visual flight rules (IFR/VFR) minimum flight altitudes.
not exceed traffic pattern airspace
have no physical or electromagnetic effect on the operation of air navigation and communications facilities.
have no effect on any airspace and routes used by the military.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 L Change 2, Obstruction Marking and Lighting, flag marker - Chapters 3(Marked)&12.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 10/09/2021 unless extended, revised, or terminated by the issuing office.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed within 5 days after the temporary structure is dismantled.

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


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ASOS

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Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2020-ANE-1597-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

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

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

Structure:	Solar Panel Point 1
Location:	Bristol, CT
Latitude:	41-41-31.01N NAD 83
Longitude:	72-58-35.07W
Heights:	752 feet site elevation (SE) 10 feet above ground level (AGL) 762 feet above mean sea level (AMSL)

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

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

This determination expires on 10/09/2021 unless:

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

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

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

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

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

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

If we can be of further assistance, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1597-OE.

Signature Control No: 433556354-435977241 (DNE)
David Maddox
Specialist

Attachment(s)
Case Description
Map(s)

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.


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Obstruction Evaluation Group
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Fort Worth, TX 76177

Aeronautical Study No.
2020-ANE-1598-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

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

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

Structure:	Solar Panel Point 2
Location:	Bristol, CT
Latitude:	41-41-29.14N NAD 83
Longitude:	72-58-54.25W
Heights:	714 feet site elevation (SE) 10 feet above ground level (AGL) 724 feet above mean sea level (AMSL)

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

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

This determination expires on 10/09/2021 unless:

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

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

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

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

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

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

If we can be of further assistance, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1598-OE.

Signature Control No: 433556355-435977246 (DNE)
David Maddox
Specialist

Attachment(s)
Case Description
Map(s)

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.

Sectional Map for ASN 2020-ANE-1598-OE

Mail Processing Center
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Aeronautical Study No.
2020-ANE-1599-OE

Issued Date: 04/09/2020

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

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

Structure:	Solar Panel Point 3
Location:	Bristol, CT
Latitude:	41-41-23.49N NAD 83
Longitude:	72-58-53.38W
Heights:	694 feet site elevation (SE) 10 feet above ground level (AGL) 704 feet above mean sea level (AMSL)

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

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

This determination expires on 10/09/2021 unless:

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

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

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

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

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

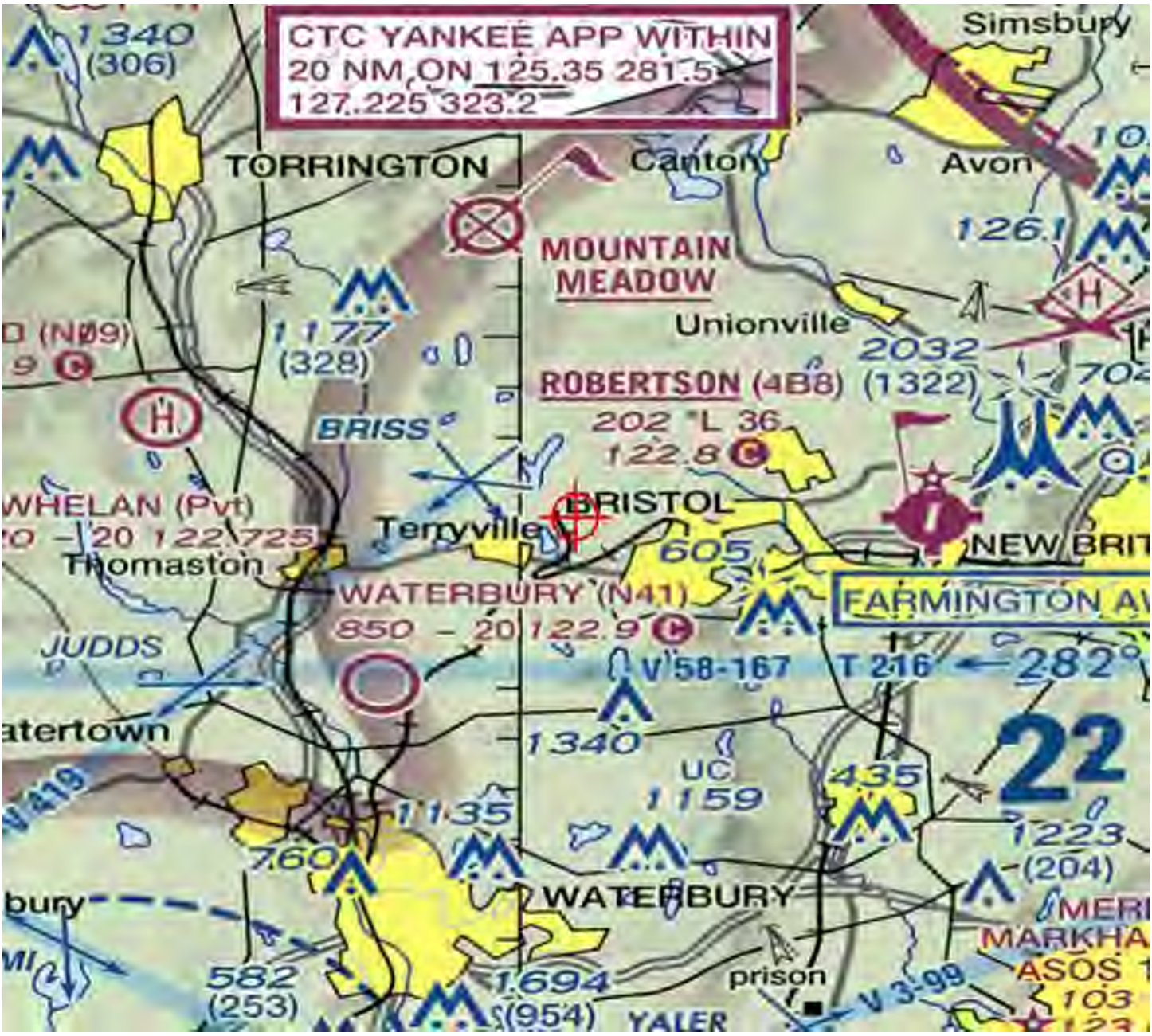
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1599-OE.

Signature Control No: 433556356-435977244 (DNE)
David Maddox
Specialist

Attachment(s)
Case Description
Map(s)

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.


CTC YANKEE APP WITHIN
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Aeronautical Study No.
2020-ANE-1600-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

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

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

Structure:	Solar Panel Point 4
Location:	Bristol, CT
Latitude:	41-41-25.53N NAD 83
Longitude:	72-58-35.48W
Heights:	742 feet site elevation (SE) 10 feet above ground level (AGL) 752 feet above mean sea level (AMSL)

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

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

This determination expires on 10/09/2021 unless:

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

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

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

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

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

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

If we can be of further assistance, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1600-OE.

Signature Control No: 433556358-435977245 (DNE)
David Maddox
Specialist

Attachment(s)
Case Description
Map(s)

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.

Sectional Map for ASN 2020-ANE-1600-OE

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

Aeronautical Study No.
2020-ANE-1601-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

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

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

Structure:	Solar Panel Point 5
Location:	Bristol, CT
Latitude:	41-41-30.13N NAD 83
Longitude:	72-58-36.17W
Heights:	756 feet site elevation (SE) 10 feet above ground level (AGL) 766 feet above mean sea level (AMSL)

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

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

This determination expires on 10/09/2021 unless:

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

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

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

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

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

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

If we can be of further assistance, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1601-OE.

Signature Control No: 433556359-435977242 (DNE)
David Maddox
Specialist

Attachment(s)
Case Description
Map(s)

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.


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10101 Hillwood Parkway
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Aeronautical Study No.
2020-ANE-1602-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
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**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

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

Structure:	Solar Panel Point 6
Location:	Bristol, CT
Latitude:	41-41-30.36N NAD 83
Longitude:	72-58-34.91W
Heights:	748 feet site elevation (SE) 10 feet above ground level (AGL) 758 feet above mean sea level (AMSL)

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

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

This determination expires on 10/09/2021 unless:

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

If we can be of further assistance, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1602-OE.

Signature Control No: 433556360-435977243 (DNE)
David Maddox
Specialist

Attachment(s)
Case Description
Map(s)

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Aeronautical Study No.
2020-ANE-1603-OE

Issued Date: 04/09/2020

Bradley J. Parsons, PE, PMP
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

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

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

Structure:	Solar Panel HP
Location:	Bristol, CT
Latitude:	41-41-30.52N NAD 83
Longitude:	72-58-40.03W
Heights:	778 feet site elevation (SE) 10 feet above ground level (AGL) 788 feet above mean sea level (AMSL)

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

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

This determination expires on 10/09/2021 unless:

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

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

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

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

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

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

If we can be of further assistance, please contact our office at (202) 267-4525, or david.maddox@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1603-OE.

Signature Control No: 433556361-435977240 (DNE)
David Maddox
Specialist

Attachment(s)
Case Description
Map(s)

Study is being requested in connection w/ a proposed solar facility consisting of solar panels and associated ground equipment. Please see uploaded PDF file for site layout and point locations.

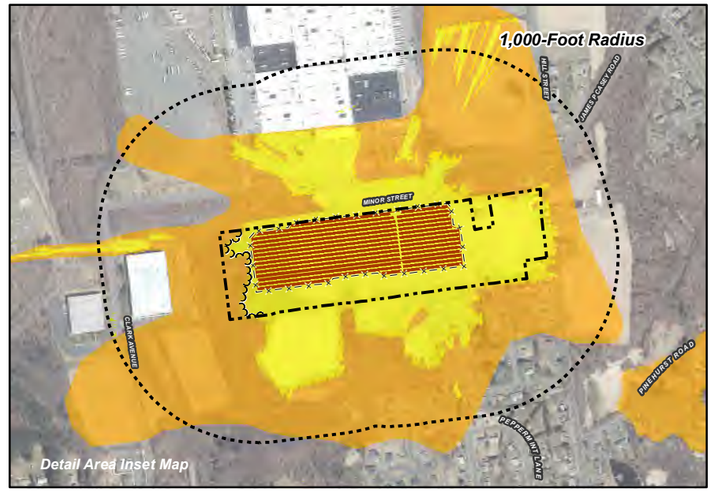

CTC YANKEE APP WITHIN
20 NM ON 125.35 281.5
127.225 323.2
TORRINGTON
Canton
Simsbury
Avon
MOUNTAIN
MEADOW
Unionville
ROBERTSON (4B8) (1322)
202 L 36
122.8
BRISS
BRISTOL
Terryville
Thomaston
WATERBURY (N41)
850 – 20 122.9
FARMINGTON AV
NEW BRIT
JUDDS
V 58-167
T 216
282°
1340
(306)
1177
(328)
2032
1261
605
435
1159
1135
760
1223
(204)
WATERBURY
582
(253)
1694
(954)
prison
V 3-99
ASOS
22

APPENDIX I

PHOTO SIMULATIONS AND
VIEWSHED MAP

C:\Users\mkopel\Dropbox (APT GIS)\APT GIS Team Folder\Projects\Verogy\Bristol_Solar_One_CT590220\mxd\Viewshed_Aerial.mxd

Statewide and Regional Overview Map



Detail Area Inset Map

Viewshed Analysis Map

Proposed Solar Facility
Bristol Solar One
399 Hill Street
Bristol, Connecticut

Proposed solar panels to be mounted on approximate 10' AGL support structures.
Forest canopy height and topographic contours are derived from LiDAR data.
Study area encompasses a 1-mile radius and includes 2,447 acres.
Base Map Source: 2019 Aerial Photograph (CTECO)
Map Date: April 2020

Legend

- Site
- Study Area (1-Mile Radius)
- Proposed Perimeter Fence
- Proposed Solar Panel
- Proposed Treeline
- Predicted Year-Round Visibility (55 Acres)
- Areas of Potential Seasonal Visibility (109 Acres)
- Municipal Boundary
- Photographic Locations (Taken on March 27, 2020)
- Trail
- Scenic Highway
- DEEP Boat Launches
- Municipal and Private Open Space Property
- State Forest/Park

Protected Open Space Property

- Federal
- Land Trust
- Municipal
- Private
- State

Data Sources:

Physical Geography / Background Data

A digital surface model (DSM) was created from the State of Connecticut 2016 LiDAR LAS data points. The first return LiDAR LAS values, associated with the highest feature in the landscape (such as a treetop or top of building), were used to capture the natural and built features on the Earth's surface beyond the approximate limits of clearing associated with the proposed solar facility. The "bare-earth" return values were utilized to reflect proposed conditions where vegetative clearing associated with the proposed solar facility would occur.

Municipal Open Space, State Recreation Areas, Trails, County Recreation Areas, and Town Boundary data obtained from CT DEEP.
Scenic Roads: CTDOT State Scenic Highways (2015); Municipal Scenic Roads (compiled by APT)

Dedicated Open Space & Recreation Areas

Connecticut Department of Energy and Environmental Protection (DEEP): DEEP Property (May 2007; Federal Open Space (1997); Municipal and Private Open Space (1997); DEEP Boat Launches (1994)

Connecticut Forest & Parks Association, Connecticut Walk Books East & West

Other

CTDOT Scenic Strips (based on Department of Transportation data)

Notes

***Not all the sources listed above appear on the Viewshed Maps. Only those features within the scale of the graphic are shown.*

Limitations

This map depicts areas where the proposed Facility may potentially be visible to the human eye without the aid of magnification based on a viewer eye-height of 5 feet above the ground and intervening topography, tree canopy and structures. This analysis may not account for all visible locations, as it is based on the combination of computer modeling, incorporating the DSM and 2019 digital aerial photographs only. No in-field verification has been completed. This analysis does not claim to depict the only areas, or all locations, where visibility may occur; it is intended to provide a representation of those areas where the Facility is likely to be seen.

Bristol Solar One, LLC

ALL-POINTS TECHNOLOGY CORPORATION

PHOTOGRAPHED ON 3/27/2020

EXISTING

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE
1	**CLOVER ROAD**	**NORTHWEST**	**+/- 366 FEET**

PROPOSED

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE
1	**CLOVER ROAD**	**NORTHWEST**	**+/- 366 FEET**

PHOTOGRAPHED ON 3/27/2020

EXISTING

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE
2	**HILL STREET**	**WEST**	**+/- 0.12 MILE**

PROPOSED

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE
2	**HILL STREET**	**WEST**	**+/- 0.12 MILE**