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Exhibit G

Environmental Assessment

ENVIRONMENTAL ASSESSMENT

SOLAR FACILITY INSTALLATION

PAWCATUCK SOLAR CENTER

ELLA WHEELER DRIVE

NORTH STONINGTON, CONNECTICUT

NEW LONDON COUNTY

FINAL DRAFT

Prepared for:

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May 2018

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Table of Contents

Figures

Figure No. Title

Tables

Table No. Title

Appendices

1 Project Introduction

Pawcatuck Solar Center, LLC ("Pawcatuck Solar") retained All-Points Technology Corporation, P.C. ("APT") to prepare this Environmental Assessment ("EA") for the proposed installation of a ground-mounted 15-megawatt AC ("MWac") solar-based electric generating facility in Town of North Stonington, Connecticut (the "Project" or "Solar Facility"). Figure 1, *Project Location Map*, depicts the Project Site and surrounding area.

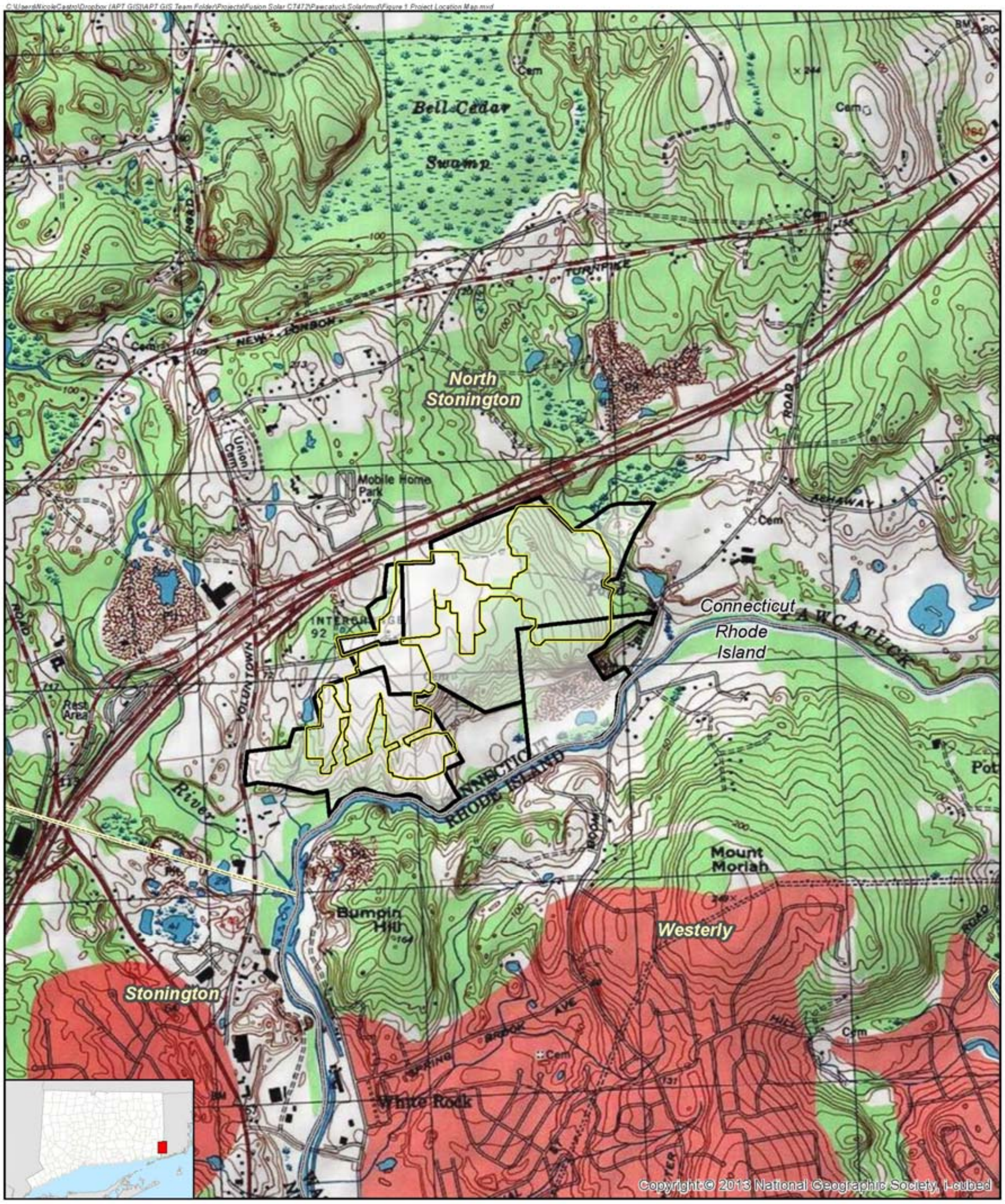
This EA has been completed to support Pawcatuck Solar's submission of a petition for declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the construction, maintenance, and operation of the Project.

The "Site", as defined herein, consists of the entirety of two parcels totaling 277.53 acres and a portion of 75.92 acres that is comprised by additional parcels located off Ella Wheeler Road in the Town of North Stonington, Connecticut. The Site is bounded partially by Pendleton Hill Road, Interstate 95 ("I-95"), Boom Bridge Road and the Pawcatuck River. Land uses adjacent to the Site and within the vicinity include open agricultural field and forest, commercial and industrial development, the I-95 transportation corridor, a gravel pit, and, to a lesser extent, open space and single-family residences.

The Solar Facility will include approximately 61,000 photovoltaic ("PV") modules and associated ground equipment, a primary access road, perimeter maintenance/access roads and electrical interconnection facilities. The Solar Facility will be surrounded by a six-foot tall chain linked fence topped with one foot of barbed wire.

- Approximately 6 utility scale inverters and transformers mounted on concrete equipment pads measuring approximately 20 feet by 40 feet.
- Pile-driven foundations and aluminum or steel single-axis tracker racking for solar module mounting.

In totality, the "Project Area", representing the limits of disturbance, would encompass approximately 144 acres to accommodate the Solar Facility, temporary construction staging areas, access and peripheral tree-free zones (to mitigate shading effects). This will require clearing of approximately 98 acres of existing forest with 14 of those acres restricted from grubbing activities to maintain the woody understory and 8 of those acres subject to selective tree removal. Upon completion, the fence-enclosed Solar Facility will comprise approximately 118 acres.



Legend
- Project Area
- Site
- Town Line
- State Line

Map Notes:
Base Map Source: USGS 7.5 Minute Topographic Quadrangle Map, Ashaway, CT (1984)
Map Scale: 1:24,000
Map Date: April 2018

1,000 500 0 1,000 Feet

Figure 1
Project Location Map

Proposed Pawcatuck Solar Center
Ella Wheeler Road
North Stonington, Connecticut

ALL-POINTS TECHNOLOGY CORPORATION

2 Existing Conditions

Figure 2, *Existing Conditions Map*, depicts current conditions on the Site, its access, abutting properties, and several key features discussed herein. The purpose of this section is to describe current conditions on the Site. A detailed discussion of the proposed Project's effects on the environment is provided in Section 3 of this document.

2.1 Project Location

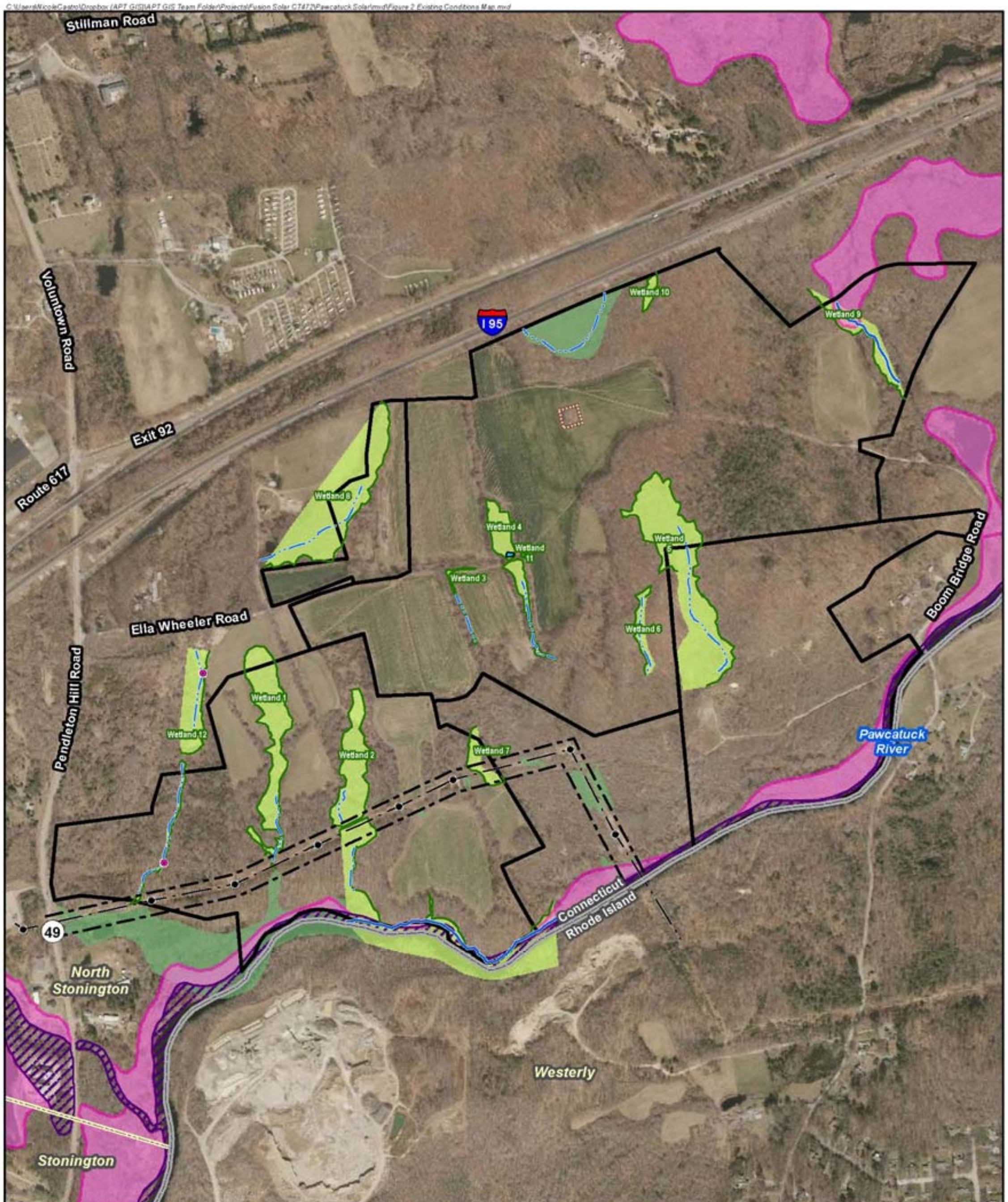
The Site is located east of Pendleton Hill Road (State Route 49), south of I-95, and north of the Pawcatuck River in North Stonington, New London County, Connecticut. The Site[1] is identified by the North Stonington Tax Assessor as four separate and abutting parcels, including:

- Parcel 123-0140 – Boombridge Road - 62.62 acres
- Parcel 123-3161 – 36 Ella Wheeler Road - 13.31 acres
- Parcel 123-3694 – Ella Wheeler Road - 180.42 acres
- Parcel 126-0006 – 36 Pendleton Hill Road - 97.11 acres

The majority of the Project Area is undeveloped, open agricultural land. Intermixed between and surrounding the open agricultural land (most recently used for growing corn) are areas of forested uplands and wetlands. Wetlands on the Site consist of a complex of broad forested wetlands, interior intermittent and perennial watercourse, and isolated depressional pocket wetlands. Forested uplands are comprised of a mix of deciduous and coniferous forest types, primarily located within the eastern extents of the Site. The Site generally drains north to south ranging from moderate to steep slopes. The far southern boundary of the Site consists of an electrical overhead transmission corridor and the Pawcatuck River. The Site is entirely undeveloped with no structures.

Land use in the area of the Site consists of large wooded tracts and agricultural fields, the Interstate transportation corridor, commercial and industrial development, a gravel pit, sparse residential development, and open space.

[1] Pawcatuck Solar currently has recorded lease options from a single property owner for the entirety of two parcels totaling 278 acres and a portion of 75 acres that is comprised by two other parcels for development of the Project.



Legend

- Site
- Transmission Line
- Aproximate Transmission Right-of-Way
- Transmission Tower
- Culvert
- Perennial Watercourse Bank
- Intermittent Watercourse
- Delineated Wetland Boundary
- Delineated Wetland Area
- Approximate Wetland Area
- Vernal Pool
- Cemetery
- 100-Year Flood Zone
- Floodway
- Town Line
- State Line

Figure 2
Existing Conditions Map

Proposed Pawcatuck Solar Center
Ella Wheeler Road
North Stonington, Connecticut

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

900 450 0 900 Feet

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Topography in the Project Area slopes down generally north to south from a height of approximately 180 feet above mean sea level ("AMSL") to 20 feet AMSL.

2.2 Site Access

Existing access can be gained via dirt/gravel drives originating off Ella Wheeler Road to the west of the Site, and Boom Bridge Road to the east of the Site. Additional maintenance access roads occur off State Highway 49 (Pendleton Hill Road) to the south along the electrical transmission corridor that runs west to east.

2.3 Wetlands and Watercourses

Twelve (12) distinct wetland areas are located within and bordering the Site. These wetlands consist of complexes of hillside seep wetlands, interior intermittent/perennial watercourses, bordering wetlands to the Pawcatuck River, isolated pocket wetlands, and hummock/hollow depressional wetlands. All of the wetlands resources identified on and proximate to the Site have experienced varying degrees of anthropogenic influence resulting from nearby heavy agricultural use. These existing impacts include edge clearing, storage of manure, stormwater discharges, and regular maintenance of the agricultural fields.

Matthew Gustafson, a Connecticut-registered Soil Scientists with APT, conducted inspections of the Site on October 18, 19, 23, 31, November 1, 4, and December 19, 2017 to determine the presence and extent of Site wetland resources proximate to the Project Area.

Soils encompassing the Site were field classified predominantly as upland soil units consisting of the following: Canton and Charlton soils, Charlton-Chatfield complex, Sutton fine sandy loam, and Woodbridge fine sandy loam. Wetland soils identified within the wetland resources consist of Ridgebury, Leicester, and Whitman soils. Soils identified at the Site were found to be generally consistent with digitally available soil survey information obtained from the Natural Resources Conservation Service ("NRCS")[2].

A copy of APT's *Wetland Inspection Report* is included as Appendix A. Wetlands 1 through 12 are summarized below and depicted on Figure 2.

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[2] NRCS Web Soil Survey, http://websoilsurvey.nrcs.usda.gov/app/, accessed on July 6, 2015.

WETLAND 1 consists of a broad hillside seep system dominated by mature forest. Northern boundaries of Wetland 1 consist of agricultural fields (corn crop) with portions of the wetland extending into these fields. As the wetland drains south boundaries consist of transitional upland forest. Interior to the wetland is a narrow intermittent watercourse. This wetland eventually drains south under a transmission utility corridor access road and into the Pawcatuck River.

WETLAND 2 consists of a broad forested hillside seep wetland system. This wetland drains south, eventually draining under a transmission corridor access road and into the Pawcatuck River. Northern extents of the wetland consist of an open grass field which transitions to mature forest as it drains south. The furthest southern extents of the wetland consist of the banks to the Pawcatuck River. Several small hillside seep areas drain south along the banks of the Pawcatuck River. In addition, portions of the bordering wetlands to the Pawcatuck River contain some backwater and floodplain wetland areas. A majority of the bank resource within the delineated extents to the Pawcatuck River consist of steeply sloping stone/sand slopes. Two intermittent watercourse features were identified within the northern limits of Wetland 2 draining south.

WETLAND 3 consists of a narrow-forested wetland system at the edge of surrounding agricultural fields (corn crop). This wetland does not extent into the corn fields to the east or west, or the dirt access road to the north. An intermittent stream does exist within southern extents of the wetland resource that drains south. As the topography shallows, the contributing hydrology of the wetland dissipates and the wetland resource terminates to the south.

WETLAND 4 consists of a large wetland complex of a forested hillside wetland seep transitioning to an intermittent watercourse with bordering wetland areas. The wetland is bisected into two areas by an existing dirt farm road that runs east to west. A majority of this wetland is forested however the wetland boundary does extend into the open agricultural field at points. This wetland, as it drains south, focuses to an intermittent stream corridor with narrow bordering wetlands. Further to the south, the topography steepens and the wetland becomes a very stony intermittent watercourse with no bordering wetlands.

Wetland 4 also contains a small isolated vernal pool (identified herein as Vernal Pool 1) in its north central extent. Vernal Pool 1 consists of a small depressional 'classic' style vernal pool confined to the south by an existing dirt/gravel farm road. This pool is entirely forested with evidence of historic manipulation including disposal of manure and anthropogenic origin (old agricultural pond). The pool is generally devoid of emergent or scrub/shrub vegetation. Details regarding Vernal Pool 1 can be found in the Appendix B, *REMA Vernal Pool Habitat Investigation* (dated May 3, 2018and prepared by REMA Ecological Services, LLC).

WETLANDS 5 and 6 have been grouped together for the purpose of this discussion. They are both homogenous in their morphology, hydrology, vegetative cover, and soil characteristics. Generally, these wetlands have areas of shallow hummock/hollow topography with large inclusions of upland 'islands'. The depressions are shallow enough to not support seasonally vernal pool breeding habitat. Each has interior intermittent watercourses that drain south via narrow (2-3 feet) sandy/stone bottom channels. These wetlands are dominated by mature forest cover with some edge areas of scrub/shrub to the south as they approach the utility transmission corridor. In particular, southern extents of Wetland 5 have been heavily altered through historic earth/topography alteration. It appears large areas have been mined for sand resulting in large fill piles and deep cuts.

WETLAND 7 consists of a broad hillside seep wetland system draining out at the bottom of a steep till slope. This wetland drains south extending out into an open agricultural field (corn crop). At the southern end of the wetland, topography rises and then steepens resulting in back-drainage. As such, the wetland ceases before crossing the transmission utility access road. A majority of the wetland is dominated by mature forest with interior pockets of emergent cover, edge areas of scrub/shrub and disturbed cover where the wetland drains into the agricultural field. This wetland extends to the west off the subject property.

WETLAND 8 consists of a large, forest dominant, hillside seep system. This wetland drains northeast to southwest within a broad forest block located west of an open agricultural field (corn crop). Interior to the wetland is a narrow intermittent stream that drains to a culvert under a residential driveway to the west. Portions of the wetland do encroach into the edge of an old field/early successional scrub/shrub area to the south.

WETLAND 9 consists of a complex of bordering forested wetlands with an interior perennial watercourse. This interior perennial stream is unnamed, but drains east and west into a large open waterbody identified as Lewis Pond. The watercourse bottom is made up of a mix of stone/cobble with well incised banks. Bordering wetlands to the watercourse consists of complex of forest and open field. Forested areas are comprised of broad hillside seep areas. The open field bordering wetlands are a result of maintained open pasture for cows. This clearing extends directly up to the banks of the watercourse.

WETLAND 10 consists of a complex of several narrow hillside seep system, an interior intermittent watercourse, and drainage along and from I-95. Wetland 10 drains from offsite to the north under I-95 via a culvert outfall and drains south and east within a shallow channel that focused to an intermittent watercourse. This feature drains back north butting up against I-95 again and draining along and under the highway to the east. A secondary hillside seep system drains north into this complex along I-95.

WETLAND 11 consists of a very small isolated wetland depressional pocket at the edge of an open agricultural field. This wetland occurs just northeast of Wetland 4 within the open agricultural field, directly adjacent to both forested portions of Wetland 4 and the existing dirt farming access road. This wetland seasonally holds ponded water due to a compacted subsurface from the farming activity. This area does not appear to retain enough water to support vernal pool breeding habitat.

WETLAND 12 consists of a large complex hillside seep wetland system that drains north to south along the western extents of the Study Area. The wetland starts along Ella Wheeler Road as a mix of scrub/shrub and emergent vegetation types. An interior intermittent watercourse occurs within Wetland 12 draining from north to south. Several culvert crossings occur within Wetland 12 from historic crossings. At one point, a large earthen berm creates a break in the wetland. At this location, hydrology is restricted resulting in an area of seasonal inundation identified as Voluntown Road Pond. Hydrology is conveyed beneath this berm via a large culvert. This wetland eventually drains south into a 'French mattress' crossing under the transmission corridor and off the Study Area. Southern extents of the wetland are dominated by forest with dense multiflora rose understory. In addition, the southern extents of the intermittent watercourse become very well incised with little to no bordering wetlands.

2.4 Vegetation and Wildlife

The Site contains four (4) plant community types (a.k.a. habitats): (1) upland forest; (2) wetland; (3) agricultural field; and (4) scrub/shrub. These habitat types are depicted on Figure 3, *Habitat Cover Map* and are described below.

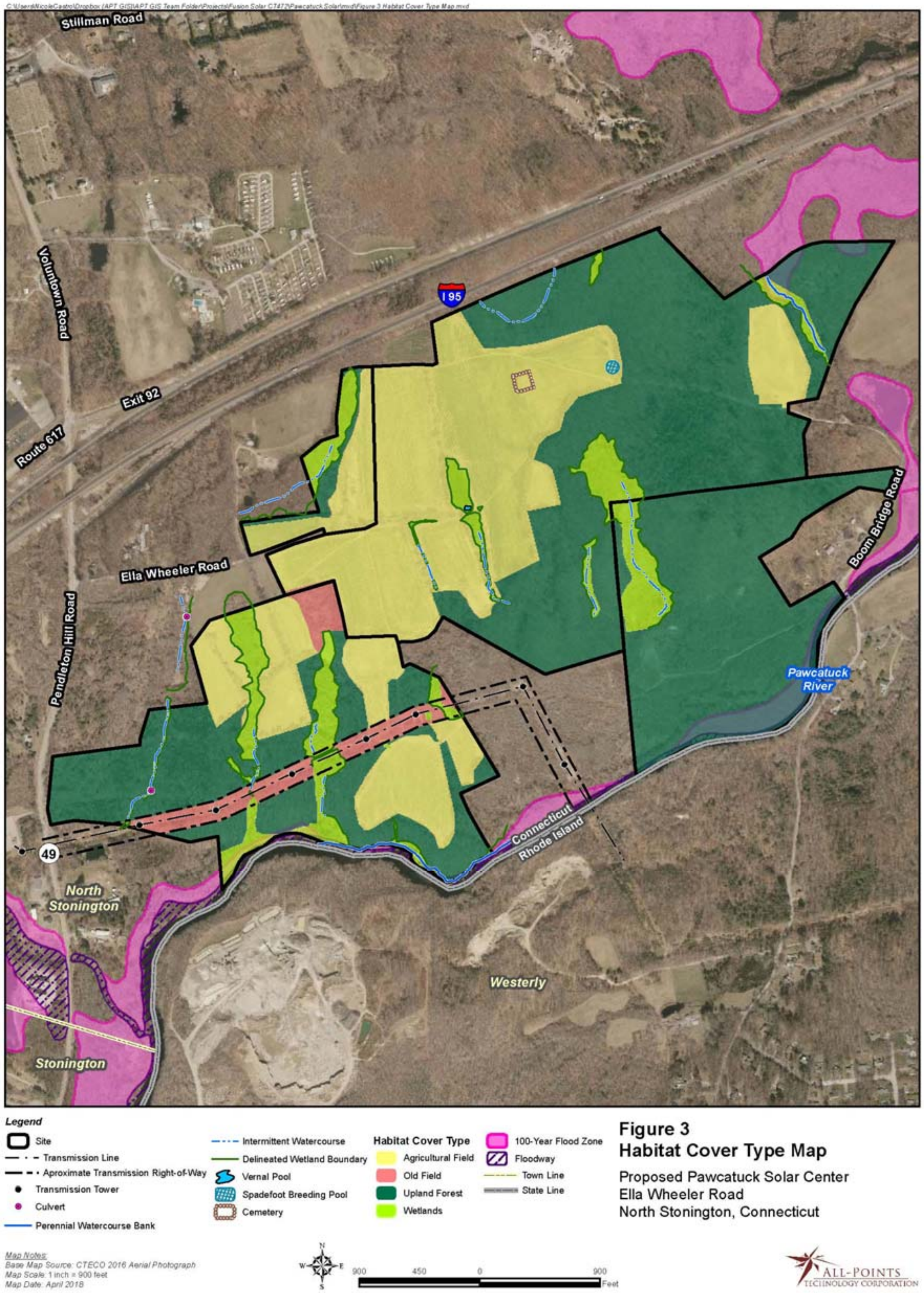

Figure 3
Habitat Cover Type Map
Proposed Pawcatuck Solar Center
Ella Wheeler Road
North Stonington, Connecticut

2.4.1 Upland (non-wetland) Cover Types

Upland Forest: Because agriculture dominates the Site, the forested areas are largely fragmented and extend offsite bordering I-95 to the north, Pendleton Hill Road to the west, Boom Bridge Road to the east, and the Pawcatuck River to the south. Despite this, upland forest habitat still occupies the largest percentage of the Site (198.75 acres). Forests on the Site are further fragmented by an electrical transmission corridor, and narrow farming roads.

The Site's upland forest is primarily composed of mature even aged forest dominated by a mix of two separate cover types: Eastern White Pine and Red Oak/White Oak/Black Birch. The Eastern White Pine block occurs in the east central portion of the Site, within an inclusion of the larger Red Oak/White Oak/Black Birch cover type and consists of Eastern White Pine dominant mature overstory with a sparse scrub/shrub growth in the understory. The remaining upland forested areas are dominated by the Red Oak/White Oak/Black Birch cover type with inclusion of American beech. Consisting of primarily closed canopy, even-aged forest this hardwood cover type includes sparse to moderate understory growth, dominated by a mix of saplings of the overstory dominant species, high-bush blueberry, and spicebush.

Forest metric data was collected for both upland forest cover types and the wetland forest cover type (See discussion below), including average tree height, species diversity, and trees per acre. Average tree height was recorded at 70 to 85 feet. The number of trees per acre was calculated at 140 trees[3] per acre averaged between both upland forest cover types and the wetland forest cover type (weighted by proportional area).

Wetland Forest: Wetlands were discussed in detail in the previous section. Although dominated by forest cover, small areas of scrub/shrub and emergent habitats do exist within the Site wetlands. A majority of the Wetland Forest exists directly adjacent to Agriculture Field resulting in 'edge' forest habitat.

Agricultural Field: This habitat comprises the second largest cover type on the Site (±86 acres) and occupies a majority of its northern and central areas. This habitat consists of large open fields regularly cultivated for corn. As such, the ground is exposed for long period of the year

[3] Trees with 6" or greater diameters at breast height.

prior to and post harvesting. In addition, these fields are plowed under on an irregular basis (i.e., not all the fields are tilled annually).

Old Field: Old field habitat occurs within the existing electrical transmission corridor located in the southern portion of the Site. This habitat consists of dense, low-lying vegetation maintained through routine mowing (totaling approximately 10.7 acres on Site). Dominant species include multiflora rose, spicebush, honeysuckle, Japanese barberry, Common Reed, Asiatic bittersweet, and foxgrape. Sparse eastern red cedar is also located within this habitat block. An existing gravel access road bisects the utility corridor and the narrow scrub/shrub habitat.

2.4.2 Wildlife

An assessment was conducted for the following wildlife groups: amphibians, reptiles, birds and fish. For certain species, detailed inventories were conducted. For birds, the inventory was developed based on the presence of suitable habitat. For fisheries, publicly available data from the Connecticut Department of Environmental Protection's Fisheries Division was utilized.

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

2.4.2.1 State-listed Species

The Connecticut Department of Energy and Environmental Protection ("CTDEEP") 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. State agencies are required to ensure that any activity authorized, funded or performed by a state agency does not threaten the continued existence of endangered or threatened species.

Maps have been developed to serve as a pre-screening tool to help applicants determine if there is a potential impact to state listed species. The NDDB maps represent approximate locations of endangered, threatened and special concern species and significant natural communities in

Connecticut. 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.

Upon initiation of the project, APT reviewed the CTDEEP NDDB mapping, which indicating that NDDB records occur on the Site. Therefore, a review request was submitted, with a response letter received on July 17, 2016 from Environmental Analyst Dawn McKay (NDDB Preliminary Assessment No.: 201607723). That response indicated that the following species may occur on or close proximity to the Site:

- Spadefoot Toad (*Scaphiopus holbrookii*), endangered
- Sparkling Jewelwing (*Calopteryx dimidiata*), threatened
- Eastern Pearlshell (*Margaritifera margaritifera*), special concern
- Red Bat (*Lasiurus borealis*), special concern

Spadefoot Toad (*Scaphiopus holbrookii*): The Eastern Spadefoot (*Scaphiopus holbrookii*), is among the rarest amphibians in the northeastern United States. It is listed as Endangered under Connecticut's Endangered Species Act and designated as Critically Imperiled in Connecticut's Wildlife Action Plan for Species of Greatest Conservation Need (CTDEEP 2015). New England populations are scattered and disjunct, and typically found in low elevation river valleys with sandy, well-drained soils. Some of these already localized populations have been extirpated, presumably related to urban/suburban development (Klemens 1993).

Because the Site is located within the known range of spadefoot toad, and suitable habitat exists on the Site, a study was initiated in May of 2017 led by Herpetologist Dennis Quinn. The species was confirmed on the Site, with breeding occurring in a small depression located within the northeast cornfield. In addition to spadefoots, adult American toad (*Anaxyrus americanus)* and gray tree frog (*Hyla versicolor*) were also observed in the breeding pool, although breeding was not confirmed. Interestingly, the spadefoot breeding pool is not a wetland, as an examination of the pool basin revealed that the soils present are moderately-well drained, and therefore do meet the wetland soil criteria based on State statute. Despite this fact, the pool holds standing water after large rain events for up to several weeks, which is a sufficient duration to support a species with rapid larval development like spadefoot toad. A detailed report on spadefoot habitat use is included as Appendix C, *A Radio-telemetric Study to Guide Project Planning, Construction Phasing and Mitigation Initiatives for the Protection of the Eastern Spadefoot (Scaphiopus holbrookii),* ("Spadefoot Report").

Sparkling Jewelwing (*Calopteryx dimidiata*): The jewelwing is an aquatic damselfly that inhabits sandy bottomed streams and rivers. The species is known to occur in the Pawcatuck River[4]. No suitable habitat exists within the interior portions of the Site, including the Project Area.

Eastern Pearlshell (*Margaritifera margaritifera*)[5]: The eastern pearlshell is listed as a species of special concern in Connecticut. Suitable habitat for this species is found in the Pawcatuck River. The eastern pearlshell is a freshwater mussel found in streams and small rivers that support trout or salmon populations and exists in a variety of substrate. This species is not found in lakes or ponds. The eastern pearlshell is found in most major watersheds in Connecticut, though it is most common in the northern and northwestern parts of the State. The scarcity and continual loss of cold water habitat in the State contribute to its rarity. It is more common in northern New England where there are more cold-water streams and rivers. Its host fish include Atlantic salmon, brook trout and brown trout.

Red Bat (Lasiurus borealis)[6]: The red bat is a tree roosting bat in summer, utilizing the dense foliage of tree crowns or shrubs. Found in forests, open cultivated rural areas, and small towns, the red bat uses a variety of hardwood and softwood habitats and features, especially still water, roads and trails. Red bats are primarily solitary roosters and can be found roosting and feeding around forest edges and clearings. Larger diameter trees (12-inch DBH and larger) are more valuable to these bats, particularly trees that have loose, rough bark such as maples, hickories, and oaks. Suitable habitat for this species, including those used for both summer roosting and feeding, occurs throughout the Site.

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[4] Wagner, D.L. and Thomas, M.C. The Odonata Fauna of Connecticut. Journal of American Odonaology. Volum 5, Number 4, 30 July 1999.

[5] Nedeau, E.J. and Victoria, J. A Field Guide to Freshwater Mussels of Connecticut. Connecticut Department of Environmental Protection, Bureau of Natural Resources, Wildlife Division.

[6] Degraaf, R.M. and Yamasaki, M. 2001. New England Wildlife: habitat, natural history and distribution.

2.4.2.2 Herpetofauna and Vernal Pools

Detailed surveys of vernal pools and spadefoot toad (*Scaphiopus holbrookii*) were conducted. Amphibian and reptiles observed on the Site are listed in Table 1. Species observed include several SGCN species as well as spadefoot toad.

Table 1: Amphibians and reptiles observed

Common Name	Scientific Name	CT WAP Status	State-listed Status
Eastern Spadefoot Toad	*Scaphiopus holbrookii*	MI	E
Spotted Salamander	*Ambystoma maculatum*	I	NL
Gray Tree Frog	*Hyla versicolor*	I	NL
American Toad	*Anaxyrus Americanus*	NL	NL
Spring Peeper	*Pseudacris crucifer*	NL	NL
Fowler's Toad	*Anaxyrus fowleri*	I	NL
Green Frog	*Lithobates clamitans*	NL	NL
Pickerel Frog	*Lithobates palustris*	NL	NL
Wood Frog	*Lithobates sylvaticus*	I	NL
Northern Black Racer	*Coluber constrictor*	I	NL
CT Wildlife Action Plan (CT WAP) Status: I = important; VI = very important; MI = most important; NL = not listed State-listed Status: E = endangered; T = threatened; SC = species of special concern; NL = not listed			

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

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

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

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

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

While wetlands are extensive on this Site, due to its landscape position on a broad slope adjacent to a major river, all these resources are headwater wetlands/drainageways. The sloping topography limits prolonged standing water capable of supporting vernal pools.

A single vernal pool was identified on the Site. It is a cryptic vernal pool embedded within Wetland 4, located in the central portion of the Site. This pool was studied in detail in 2017 by Rema Ecological Services and found to support breeding by two common vernal pool indicator species, the wood frog and spotted salamander (*Ambystoma maculatum)*. A total of six (6) wood frog egg masses and 146 spotted salamander egg masses were observed. A *Vernal Pool Habitat Investigation* report prepared by REMA Ecological Services documenting these findings is included as Appendix B.

2.4.2.3 Breeding Bird Inventory

An inventory of breeding birds potentially using the Site was developed utilizing a habitat-based catalog of known breeding birds in Connecticut. Those that could be reasonably expected to breed on the Site based on the presence of suitable habitat are listed in Table 2.

Table 2: Potential Breeding Birds

UPLAND FOREST (mixed hardwood and white pine)		WAP Status
American Redstart	*Setophaga ruticilla*	NL
American Woodcock	*Scolopax minor*	MI
Barred Owl	*Strix varia*	NL
Black-and-white Warbler	*Mniotilta varia*	I
Black-capped Chickadee	*Parus atricapillus*	NL
Blue Jay	*Cyanocitta cristata*	NL
Blue-gray Gnatcatcher	*Polioptila caerulea*	NL
Broad-winged Hawk	*Buteo platypterus*	VI
Brown Creeper	*Certhia americana*	I
Chipping Sparrow	*Spizella passerina*	NL
Downy Woodpecker	*Picoides pubescens*	NL
Eastern Wood-Pewee	*Contopus virens*	I
Great Crested Flycatcher	*Myiarchus crinitus*	NL
Great Horned Owl	*Bubo virginianus*	NL
Hairy Woodpecker	*Picoides villosus*	NL
Hermit Thrush	*Catharus guttatus*	I
Hooded Warbler	*Wilsonia citrina*	NL
Magnolia Warbler	*Dendroica magnolia*	NL
Ovenbird	*Seiurus aurocapillus*	I
Pileated Woodpecker	*Dryocopus pileatus*	NL
Pine Warbler	*Dendroica pinus*	NL
Purple Finch	*Carpodacus purpureus*	NL
Red-bellied Woodpecker	*Melanerpes carolinus*	NL
Red-eyed Vireo	*Vireo olivaceus*	NL
Red-shouldered Hawk	*Buteo lineatus*	NL
Red-tailed Hawk	*Buteo jamaicensis*	NL
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	I
Rufous-sided Towhee	*Pipilo erythrophthalmus*	MI
Scarlet Tanager	*Piranga olivacea*	VI
Tufted Titmouse	*Parus bicolor*	NL
Warbling Vireo	*Vireo gilvus*	NL
White-breasted Nuthatch	*Sitta carolinensis*	NL
Wild Turkey	*Meleagris gallopavo*	NL
Wood Thrush	*Hylocichla mustelina*	MI
Worm-eating Warbler	*Helmitheros vermivorus*	VI
Yellow-rumped Warbler	*Dendroica coronata*	NL
Yellow-throated Vireo	*Vireo flavifrons*	NL
WETLANDS		
Red-shouldered Hawk	*Buteo lineatus*	NL
Hairy Woodpecker	*Picoides villosus*	NL

Brown Creeper	*Certhia americana*	NL
Mallard	*Anas platyrhynchos*	NL
Louisiana Waterthrush	*Parkesia motacilla*	I
Alder Flycatcher	*Empidonax alnorum*	I
American Woodcock	*Scolopax minor*	MI
Gray Catbird	*Dumetella carolinensis*	NL
OLD FIELD / AGRICULTURAL FIELD EDGE HABITAT		
Rufous-sided Towhee	*Pipilo erythrophthalmus*	MI
American Goldfinch	*Carduelis tristis*	NL
American Kestrel (SC)	*Falco sparverius*	MI
Barred Owl	*Strix varia*	NL
Black-billed Cuckoo	*Coccyzus erythropthalmus*	VI
Blue-winged Warbler	*Vermivora pinus*	MI
Broad-winged Hawk	*Buteo platypterus*	NL
Brown Thrasher (SC)	*Toxostoma rufum*	VI
Brown-headed Cowbird	*Molothrus ater*	NL
Carolina Wren	*Thryothorus ludovicianus*	NL
Chestnut-sided Warbler	*Dendroica pensylvanica*	NL
Common Yellowthroat	*Geothlypis trichas*	NL
Downy Woodpecker	*Picoides pubescens*	NL
Eastern Bluebird	*Sialia sialis*	NL
Eastern Kingbird	*Tyrannus tyrannus*	NL
Field Sparrow	*Spizella pusilla*	VI
Gray Catbird	*Dumetella carolinensis*	NL
Great Crested Flycatcher	*Myiarchus crinitus*	NL
Great Horned Owl	*Bubo virginianus*	NL
Indigo Bunting	*Passerina cyanea*	VI
Northern Cardinal	*Cardinalis cardinalis*	NL
Northern Flicker	*Colaptes auratus*	I
Northern Oriole	*Icterus galbula*	I
Prairie Warbler	*Dendroica discolor*	MI
Red-tailed Hawk	*Buteo jamaicensis*	NL
Ruby-throated Hummingbird	*Archilochus colubris*	NL
Song Sparrow	*Melospiza Melodia*	NL
Warbling Vireo	*Vireo gilvus*	NL
White-eyed Vireo	*Vireo griseus*	NL
Willow Flycatcher	*Empidonax traillii*	I
Yellow Warbler	*Dendroica petechia*	NL
Yellow-billed Cuckoo	*Coccyzus americanus*	VI
Yellow-rumped Warbler	*Dendroica coronata*	NL
Tree Swallow	*Tachycineta bicolor*	NL
RIVERINE (PAWCATUCK RIVER)		
Belted Kingfisher	*Ceryle alcyon*	I

Canada Goose	*Branta canadensis*	NL
Common Merganser	*Mergus merganser*	NL
Fish Crow	*Corvus ossifragus*	NL
Green Heron	*Butorides virescens*	NL
Mallard	*Anas platyrhynchos*	NL
Red-shouldered Hawk	*Buteo lineatus*	NL
Swamp Sparrow	*Melospiza georgiana*	NL
Wood Duck	*Aix sponsa*	NL
WAP Conservation Status: IM – Important; VI – Very Important; MI – Most Important; NL -= not listed State-listed Species Status: SC – State-listed species of special concern		

The primary source utilized was *The Atlas of Breeding Birds of Connecticut* [7] which is the result of a five-year study (1982-1986) of all bird species known to breed in the State. This study is the most comprehensive review to date of Connecticut's breeding birds. Additional resources utilized include DeGraaf and Yamasaki (2001). An initial inventory of potential breeding birds was generated solely based on the presence of suitable habitat. That list was then refined by considering such factors as bio-geographical distribution, the presence or absence of critical habitat features and minimum patch size requirements. The inventory is subdivided by habitat type. A species is listed under the habitat which represents its primary breeding type. However, a species may be present within the ecotones associated with their primary habitat at any given time.

Due the active cultivation of corn throughout the growing season, the Site's agricultural lands offer little habitat for breeding birds with the exception of species adapted to such conditions, such as the killdeer (*Charadrius vociferous*). The principal use by wildlife of cornfields is as a feeding site, particularly along the margins of the field where weed seeds develop. The persistence of such weed seeds into the fall and winter also attracts migrating songbirds as well as flocks of year-round residents. Aerial insectivores, such as the tree swallow (*Tachycineta bicolor*), also feed over cornfields assuming suitable nesting habitat occurs nearby.

Many of the high-conservation priority birds likely occurring on-site are associated with old field and edge habitats, most important of which is the existing utility right-of-way. The ongoing

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

shrubland management regime within the right-of-way offers critical habitat to such species such as the prairie warble, blue-winged warbler and indigo bunting.

2.4.2.4 Fisheries

Fisheries sampling data for the Pawcatuck River was obtained from the CTDEEP for sampling year 2013 (see Table 3). The sampling location was White Rock Bridge Road, approximately one mile south of the Site. One of the species identified, the American Eel (*Anguilla rostrata*) is a "most important" species according to the WAP. The American eel is a catadromous species. Its migration cycle is contrary to other migrating fish in the Connecticut. They enter the river as juveniles, leave as adults, and most sources claim they spawn in the Sargasso Sea.

Table 3: 2013 CTDEEP Fisheries Data, Pawcatuck River

Common Name	Scientific Name	CS
American Eel	*Anguilla rostrata*	MI
Bluegill Sunfish	*Lepomis macrochirus*	NL
Chain Pickerel	*Esox niger*	NL
Golden Shiner	*Notemigonus crysoleucas*	NL
Longnose Dace	*Rhinichthys cataractae*	NL
Largemouth Bass	*Micropterus salmoides*	NL
Pumpkinseed	*Lepomis gibbosus*	NL
Redbreast Sunfish	*Lepomis auratus*	NL
Tessellated Darter	*Etheostoma olmstedi*	NL
WAP Conservation Status: I – Important; VI – Very Important; MI – Most Important; NL – not listed		

2.5 Water Supply Areas

There are no public water supply wells proximate to the Site. The subject parcel is not located within an Aquifer Protection Area. No residencies are located on the Site.

2.6 Water Quality

Groundwater beneath the Site and within the majority of the subject parcel is classified by CTDEEP as "GA". A "GA" classification indicates groundwater within the area is presumed to be suitable for human consumption without treatment. Designated uses in GA-classified areas include existing private and potential public or private supplies of drinking water and base flow for hydraulically-connected surface water bodies.

The Site is located within the Pawcatuck River Major Drainage Basin, the Pawcatuck River Main Stem Regional Basin and the Pawcatuck River Sub regional Basin. The Pawcatuck River flows west to east directly abutting the Site along the southern boundary with a series of hillside seep wetlands and intermittent stream located on the Site that drain south to the Pawcatuck River.

The Site straddles two (2) separate local drainage basins (Local Basin Numbers 1000-00 and 1000-01) including:

- The majority of the Site (central and western portions) is associated with portions of the Pawcatuck River and the contributing drainage areas including a number of the on-Site wetlands and agricultural fields. This area drains generally to the south via overland flow and hillside seeps/intermittent streams, eventually flowing south into the Pawcatuck River.
- The eastern side of the Site is bordered by an unnamed brook (within Wetland 9) which flows west to east and north to south, crossing off-Site beneath Boom Bridge Road and ultimately outletting into the Pawcatuck River. This area of the Site drains east and to the south via this unnamed brook, eventually draining into Lewis Pond, and outletting via perennial watercourse into the Pawcatuck River further off-Site to the south.

The Pawcatuck River is classified by the CTDEEP as Class B surface water bodies. Designated uses for Class Bsurface water bodies include recreational use: fish and wildlife habitat; agricultural and industrial supply and other legitimate uses including navigation.

2.7 Scenic Areas

No State or locally-designated scenic roads are located proximate to the Site, the nearest being 1.5 miles away. No recognized scenic areas or outlooks are present within 2 miles of the Site.

Further, no public hiking paths or other potential public non-vehicular trails were found to be present in the vicinity that would provide potential observation points of the Project.

2.8 Historic and Archaeological Resources

Heritage Consultants, LLC ("Heritage") of Newington, Connecticut prepared a Phase I Cultural Resources Survey Report for the Site in November 2017. The purpose of the survey was to determine whether the Site holds potential cultural, historic and/or architectural significance.

A review of historic maps and aerial images, files maintained by the Connecticut State Historic Preservation Office ("SHPO"), and pedestrian survey of the of the Site resulted in the identification of three (3) historic farmsteads (Wheeler, Stanton and Post-1868 Farmsteads), two (2) historic cemeteries (Stanton and Partlow Cemeteries), and the location of single, recorded prehistoric archaeological site.

Visual reconnaissance of the Wheeler and Stanton Farmsteads, both of which date from the nineteenth century (perhaps earlier) revealed that they were razed in the late twentieth century. Due to a lack of intact archaeological deposits and research potential, neither of these two (2) historic cultural resources rises to the level of significance as defined by the National Register of Historic Places. The Post-1868 Farmstead was identified in the southwestern portion of the Site. This area contained intact above ground features (e.g., house foundation and outbuilding footprints).

The Stanton Cemetery was noted in the southern portion of the Site. It is demarcated by a stone wall and contains the graves of approximately 10 members of the Stanton Family. The Partlow Cemetery was noted within a large cornfield located in the north-central portion of the Site. This area was used during the nineteenth century and includes head/footstones representing between 15 and 20 individuals. However, while the area is located in a small stand of trees, there is no stonewall or fence demarcating its boundaries. Thus, it is possible that additional, unmarked graves may exist within the cornfield.

The location of the previously recorded prehistoric archaeological site was identified by Heritage during its pedestrian survey. This area is known to contain prehistoric deposits and is recognized as an archaeological site by the State of Connecticut. Currently, the area is being used as pasture and appears to be largely undisturbed.

In addition to the resources introduced above, 46 and 66 acres of land respectively have been categorized as moderate and high archaeologically sensitive areas on the Site. These are areas with access to freshwater, low to moderate slopes, and well drained soils. Those portions of the Site that possess steep slopes are characterized as no/low probability areas for containing archaeological resources.

A copy of the *Heritage Phase I Cultural Resources Survey Report* is included in Appendix D.

2.9 Geology and Soils

Bedrock geology beneath the Site is identified as the Potter Hill Gneiss Formation and the Quartzite unit in Plainfield Formation. The Potter Hill Gneiss Formation is described as a light-pink to gray, tan-weathering, fine- to medium-grained, well foliated granitic gneiss. The Quartzite unit in Plainfield Formation is described as a light-gray, glassy, generally thin bedded quartzite.

Surficial materials on the majority of the Site are comprised of deposits of glacial till, coarse sands and gravels, sands overlying fines, and complexes of coarse sands and gravels and sands overlying fines. A majority of the site is mapped as glacial till with areas of sands/gravels/fines located along the southern boundary of the Site bordering the Pawcatuck River. Soils vary across the Site, with the largest areas identified as Canton and Charlton soils, Charlton-Chatfield complex, and Woodbridge fine sandy loam. Intermixed wetland soils on the site are identified as Woodbury, Liecester, and Whitman soils.

2.10 Farmland Soils

Farmland soils include land that is defined as prime, unique, or farmlands of statewide or local importance based on soil type, in accordance with the Code of Federal Regulations, CFR title 7, part 657. It identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops and is available for these uses.

According to the Connecticut Environmental Conditions Online Resource Guide[8], a large portion of the Project Area contains Prime Farmland soils. Routine cultivation of corn has subjected the area to monocropping, compaction from equipment and vehicles, applications of fertilizer and

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

animal manure and spraying of agricultural chemicals. No apparent substantive crop rotation has occurred in the Project Area for at least several decades.

2.11 Floodplain Areas

APT reviewed the United States Federal Emergency Management Agency ("FEMA") Flood Insurance Rate Map ("FIRM") for the area. 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. Based on this review, the majority of the Host Property is located in an area designated as Zone X. A Zone X area is defined as an area of minimal flood hazard (typically above the 100-year and 500-year flood levels). Extreme southern portions of the Host Property, along the Pawcatuck River, are classified as Zone AE, which is identified as a high flood risk area. The Host Property is on FIRM PANEL #09011C 0412 G, dated July 18, 2011.

2.12 Recreational Areas

The nearest recreational area to the Site is the Mystic KOA Holiday Campground, located at 118 Pendleton Hill Road, approximately 0.25 mile to the northwest.

2.13 Noise

No background noise levels have been measured at the Site. Existing sound levels in the Site vicinity are dominated by traffic on I-95. As shown in Section 3.20, data indicate that noise impacts due to the solar facility beyond the fenceline of the array are negligible. Considering the Site's location relative to nearby I-95, any additional noise emanating from the Solar Facility into adjacent habitats is expected to be negligible.

2.14 Lighting

Currently, there are no lighting facilities on the Site.

2.15 Coastal Zone Management Areas

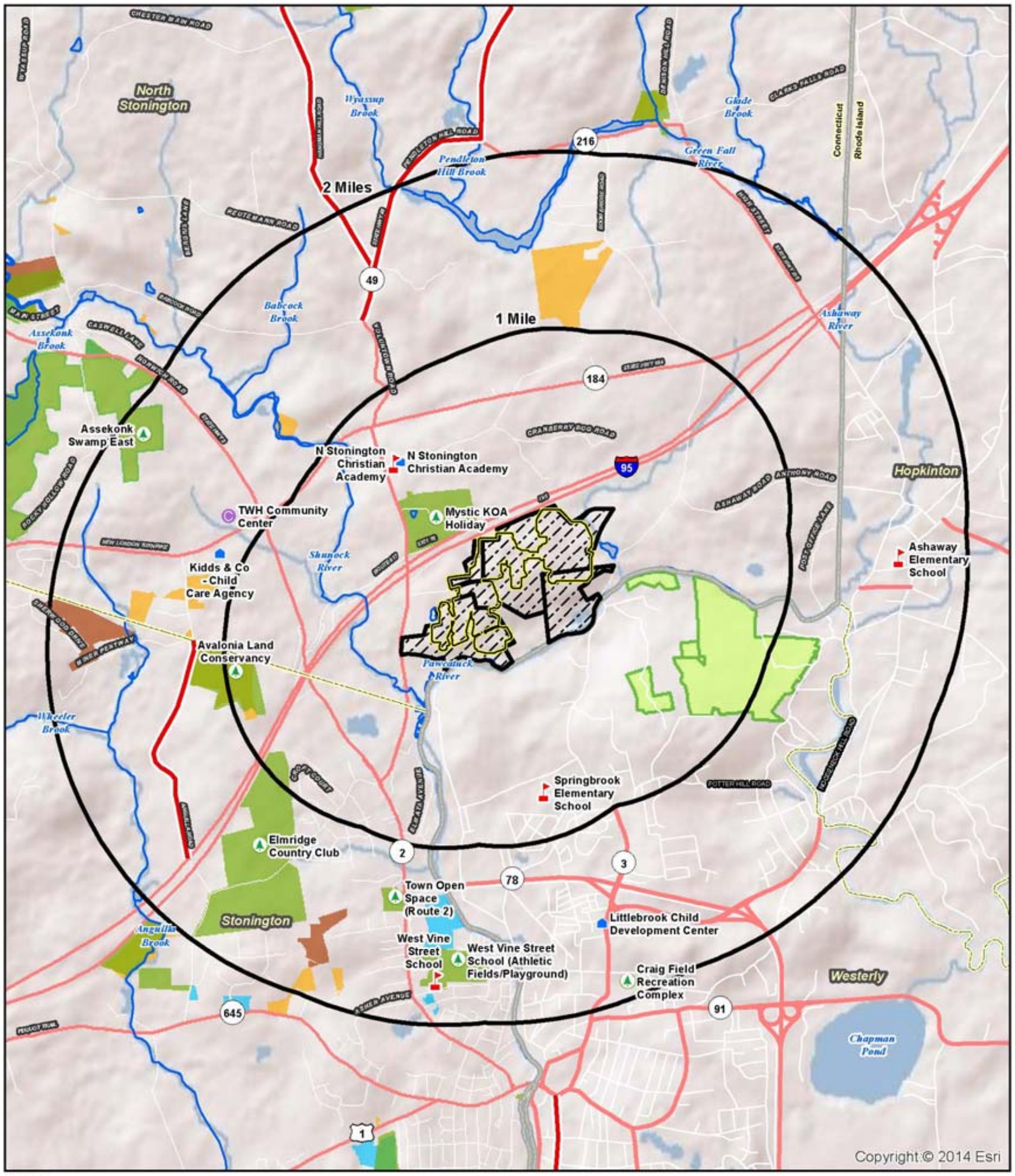
The Town of North Stonington is not located within the Coastal Area or Coastal Boundary, as defined by the Coastal Management Act, CGS § 22a-94(a).

2.16 Other Surrounding Features

The locations of non-residential development and other resources within two miles of the Site are listed in Table 4 below. Figure 4, *Surrounding Features Map* depicts these locations relative to the Site.

Table 4: Surrounding Features within Two Miles of the Site

Resource Type	Name	Address	Distance from Project Area
Daycare	Kidds & Co - Child Care Agency	172 Providence-New London Tpke., North Stonington, CT	1.14 NW
	N Stonington Christian Academy	12 Stillman Road, North Stonington, CT	0.62 NW
	Littlebrook Child Development Center	4 Brookside Road, Westerly, RI	1.54 SE
Community Center	TWH Community Center	183 Providence-New London Turnpike, North Stonington, CT	1.28 NW
Senior Facility	None located within 2 miles		
Hospital	None located within 2 miles		
School	N Stonington Christian Academy	12 Stillman Road, North Stonington, CT	0.62 NW
	Springbrook Elementary School	39 Springbrook Road, Westerly, RI	0.74 S
	Ashaway Elementary School	12 Hillside Avenue, Ashaway, RI	1.62 E
	West Vine Street School	17 West Vine St., Pawcatuck, CT	1.75 S
Recreational / Park	Mystic KOA Holiday	118 Pendleton Hill Rd, North Stonington, CT	0.25 NW
	Assekonk Swamp East	Rocky Hollow Road, North Stonington, CT	1.80 NW
	Avalonia Land Conservancy, Inc	Anguilla Road, North Stonington, CT	0.85 W
	Elmridge Golf Course	229 Elmridge Rd., Pawcatuck, CT	0.85 SW
	West Vine Street School (Athletic Fields/Playground)	17 West Vine St., Pawcatuck, CT	1.62 S
	Town Open Space (Route 2)	Route 2, Pawcatuck, CT	1.30 S
	Craig Field Recreation Complex	Mountain Avenue, Westerly, RI	1.90 S
Youth Camp	None located within 2 miles		



Legend

- Site
- Project Area
- 1-2-Mile Radii
- Scenic Highway
- Municipal Boundary
- State Boundary
- Municipal and Private Open Space Property (CTDEEP GIS)
- Protected Open Space Property (RIGIS)

Protected Open Space Property (CTDEEP GIS)

- Federal
- Land Trust
- Municipal
- Private
- State

Surrounding Features (within 2-miles)

- Daycare
- Community Center
- Park/Recreation
- School

Figure 4
Surrounding Features Map

Proposed Pawcatuck Solar Center
Ella Wheeler Road
North Stonington, Connecticut

4,000 2,000 0 4,000 Feet

Base Map Source: ESRI & CTECO Shaded Relief
Map Scale: 1 in = 4,000 ft Map Date: April 2018

ALL-POINTS TECHNOLOGY CORPORATION

3 Effects on the Environment

The Project would not have any significant adverse effects on the existing environment and ecology, nor would it affect the scenic, historic and recreational resources of the vicinity.

3.1 Proposed Project Development

Upon completion, the Project will occupy approximately 118 acres. The Solar Facility will include approximately 61,000 PV modules and associated ground equipment and access roads. It will be surrounded by a six-foot tall chain linked fence topped with one foot of barbed wire. A gravel access drive will originate off Ella Wheeler Road in the western portion of the Site and extend eastward into the Solar Facility.

A *Proposed Conditions Map* is included as Figure 5.

The solar modules will be mounted on aluminum or steel single-axis tracker racking systems and installed via pile-driven foundations. In addition to the PV modules, the Solar Facility will include approximately 6 utility scale inverters and transformers mounted on concrete equipment pads measuring approximately 20 feet by 40 feet.

The limits of disturbance (or Project Area) will encompass approximately 144 acres to develop the Solar Facility and allow for temporary construction staging areas, access, peripheral tree-free zones (to mitigate shading effects) and electrical interconnection facilities.

Construction of the Project is expected to begin in the first quarter of 2019 with mobilization of equipment and land clearing efforts. Site work and land preparation is expected to be completed by late Spring 2019 with construction and installation efforts for the array equipment completed in Fall 2019. Final site stabilization, testing, and commissioning is expected be completed by late 2019. Note that this schedule is subject to modification.

At the end of its useful life, the Project will be decommissioned in accordance with the requirements of the Property leases and decommissioning plan.

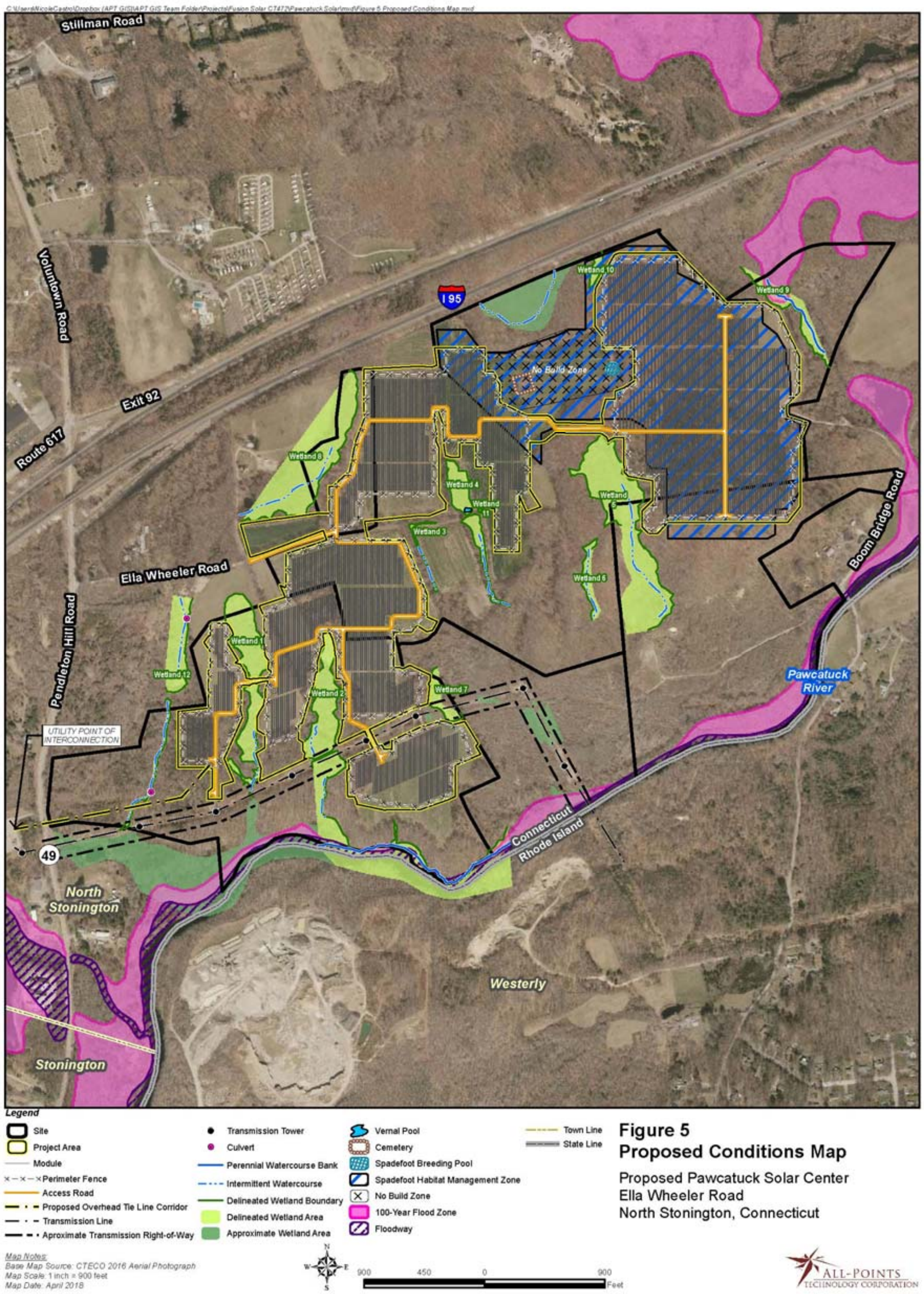


Figure 5
Proposed Conditions Map
Proposed Pawcatuck Solar Center
Ella Wheeler Road
North Stonington, Connecticut

3.2 Public Health and Safety

The Project would be designed to applicable industry, State, and local codes and standards and would not pose a safety concern or create undue hazard to the general public. The Solar Facility would not consume any raw materials, would not produce any by-products and would be unstaffed during normal operating conditions. The Solar Facility would be enclosed by a six-foot tall chain link fence topped with one foot of barbed wire. There are no plans to store fuels or hazardous materials at the Solar Facility.

Overall, the Project will meet or exceed all health and safety requirements applicable to electric power generation. Each employee working on Site will:

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

During construction, heavy equipment will be required to access the Site during normal working hours, and it is anticipated that 50 - 60 construction vehicles (average size light-duty) will make daily trips onto the Site. After construction is complete and the unstaffed Solar Facility is operable, traffic at the Site will be minimal, consisting of one trip per month on average for periodic maintenance activities.

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. In addition, a large portion of the Project will be shielded from view due to existing vegetation, proposed landscaping and topographical conditions. The panels will track the Sun from east to west across the sky, with a maximum tilt angle of 52 degrees in either direction. Since the panels will be normal to the Sun during operation, most reflected light is returned in the direction of the sun at the same approximate elevation angle.

3.3 Local, State and Federal Land Use Plans

The Project is consistent with local, State, and Federal land use plans, including the Southeast Connecticut Council of Government's 2007 Regional Plan of Conservation and Development, which outlines the need for utility infrastructure to support the region's development. The Project also supports the State's energy policy by developing a renewable energy resource while not having a substantial adverse environmental effect. Although local land use jurisdiction over the Project is preempted by the Connecticut Siting Council ("Council"), the Project has been designed to meet the intent of local land use regulations to the extent feasible.

The Site is located in an Industrial District and within the Town's Economic Development District.

3.4 Existing and Future Development

The Project would benefit the community by improving electrical service for existing and future development in the Town through enhanced capacity. Other than this Project, APT is not aware of any current or future plans to develop the Site.

3.5 Roads

The Site will be accessed off of Ella Wheeler Road. Inside the project fence line, the Petitioner will install perimeter maintenance/access roads throughout the Project area, which will be approximately 20 feet wide and approximately 11,490 linear feet long in total. A gravel staging and parking area is also planned along the north side of the access drive at the northwestern end of the Site.

3.6 Wetlands

With the exception of a proposed crossing at a narrow point in Wetland 1, the Solar Project will not result in direct wetland impacts. The proposed crossing of Wetland 1 is required to access the far western solar module and the electrical transmission interconnection facility. The wetland crossing was selected at a narrow point within this north-south oriented wetland corridor to minimize permanent wetland impacts, which only total ±1,650 square feet. A minimum of three (3) 12-inch corrugated plastic pipe culverts will be installed across the wetland crossing to convey surface flows and avoid any upstream or downstream hydraulic impacts to this wetland; a defined watercourse channel does not exist in this section of Wetland 1.

The Project involves the partial clearing and conversion of approximately 5.31 acres of wetland forest to wetland woodlands and scrub/shrub habitat. This conversion will include the selective overstory removal of any mature wetland forest. In some locations this will require removal of all tree growth resulting in a conversion to scrub/shrub cover. In other areas where the understory contains smaller sapling tree growth the cover type will be converted to wetland woodland. Trees removed within wetland areas will primarily consist of red maple. These trees will not be treated with an herbicide allowing them to naturally stump sprout.

The Project may include the placement of utility poles within wetlands to facilitate an overhead interconnection of the Solar Facility with the existing electrical grid, thus limiting the amount of direct wetland impacts. The exact location of this interconnection is pending and dependent on direction of Eversource Energy. To the extent feasible, Pawcatuck Solar intends to locate new poles outside wetland areas to minimize direct impacts.

Short term, temporary impacts will be associated with the Project's construction activities due to its proximity to wetland resources. Provided sedimentation and erosion controls are designed, installed and maintained during construction activities in accordance with the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control*, temporary impacts will be minimized. However, due to the close proximity of the proposed development to nearby wetlands, Pawcatuck Solar is committed to implementing a wetland protection plan during construction to provide additional measures to avoid temporary wetland impacts.

A proposed *Wetland and Vernal Pool Protection Plan* is included in Appendix E. Long term secondary impacts to wetland resources possibly associated with the operation of this Solar Facility are minimized by the fact the development is unstaffed, it minimizes the creation of impervious surfaces with the use of a gravel access drive with the majority of the surface treatment around the solar installation consisting of native grass/vegetation and it generates minimal traffic. A comprehensive native seeding plan is proposed to properly stabilize all disturbed soils post construction. Stormwater generated by the Project will be properly handled and treated in accordance with the 2004 *Connecticut Stormwater Quality Manual* through the implementation and maintenance of a Stormwater Pollution Control Plan to be approved by CTDEEP Stormwater Management. The Stormwater Pollution Control Plan includes a complex of temporary/permanent sediment basins, perimeter controls, temporary and permanent vegetative surface stabilization, slope stabilization, and temporary diversions. Provided the protective measures discussed herein are implemented, the Project will not result in an adverse impact to wetland or watercourse resources.

3.7 Wildlife and Habitat Impacts

In total, the Project will result in ±144 acres of land disturbance. Table 5 summarizes the impacts to each habitat. Impacts are separated into *permanent* impacts and *temporary* impacts. Permanent impacts include areas where arrays, access roads and associated infrastructure are proposed. This includes some areas that will remain vegetated or will be planted (i.e., pervious) but are located within the Solar Facility and therefore considered to be of low habitat value post-construction. Temporary impacts refer to areas of forest that will cleared solely to reduce array shading. Vegetation in these areas will be managed, but the areas will remain natural and undeveloped.

Table 5: Project Impacts by Habitat Type

Habitat Type	Total Acres Onsite	Acres of Habitat in LOD	Permanent Impacts (arrays, roads, infrastructure)	Temporary Impacts (cover type conversion)
Agricultural field	114	76.45	61.7	14.75
Upland forest	198.75	64.4	53.49	10.91
Wetland forest	30	0.05	0.04	0.03
Old field	10.7	3.1	2.79	0.31

With a Project of this scale, wildlife impacts due simply to loss of habitat are unavoidable. The largest impact to wildlife is likely to be associated with edge species currently utilizing the margins of the cornfield. To a lesser degree forest dwelling species will see some loss of habitat, particularly in the northeast corner of the Site where the largest area of contiguous forest will be converted to solar arrays.

As noted, impacts will include both permanent and temporary impacts. Areas of permanent impact will have limited wildlife value. While species may move through these areas and use them on a temporary basis, long-term use is not expected.

Areas of temporary impact will be converted to non-forested habitats (e.g., old field, young forest or scrub-shrub wetlands). While a change in the species utilizing the areas can be expected, the wildlife value of these areas post-construction is expected to be high, as conversion from fragmented forest to early-successional habitat is likely to benefit a number of high conservation priority shrubland species, including shrubland birds such as the blue-winged warbler and indigo bunting.

The largest loss in acreage will occur within cultivated agricultural fields and to a lesser degree upland forest habitat. The loss of cropland is not anticipated to have a significant negative impact on wildlife as these areas have limited wildlife value today. This fact may seem counter-intuitive, as agricultural lands, being bucolic in nature, are often considered to be friendly to wildlife. However, since cornfields are monocultures, and the soils are largely unvegetated and frequently disturbed, they offer little habitat for wildlife during the growing season. As introduced previously, their importance to wildlife lies at the margins of the field, where high value ecotone habitat often occurs. Therefore, loss of wildlife is not a significant concern when considering conversion of cornfield to solar field.

One consideration with respect to development-associated impacts is secondary effects, in particular visual and noise disturbance which can negatively affect wildlife living in the habitats that lie adjacent to a development. However, because the Solar Facility will have limited human activity and vehicular traffic, visual disturbance to wildlife is expected to be minimal with respect to noise disturbance, this impact is not expected to reach far beyond the fence line. As shown in Section 3.20, data indicate that noise impacts beyond the fenceline of the array are negligible. Considering the Site's location relative to nearby I-95 and the associated ambient noise level, any additional noise emanating from the Solar Facility into adjacent habitats is expected to have a negligible effect on wildlife.

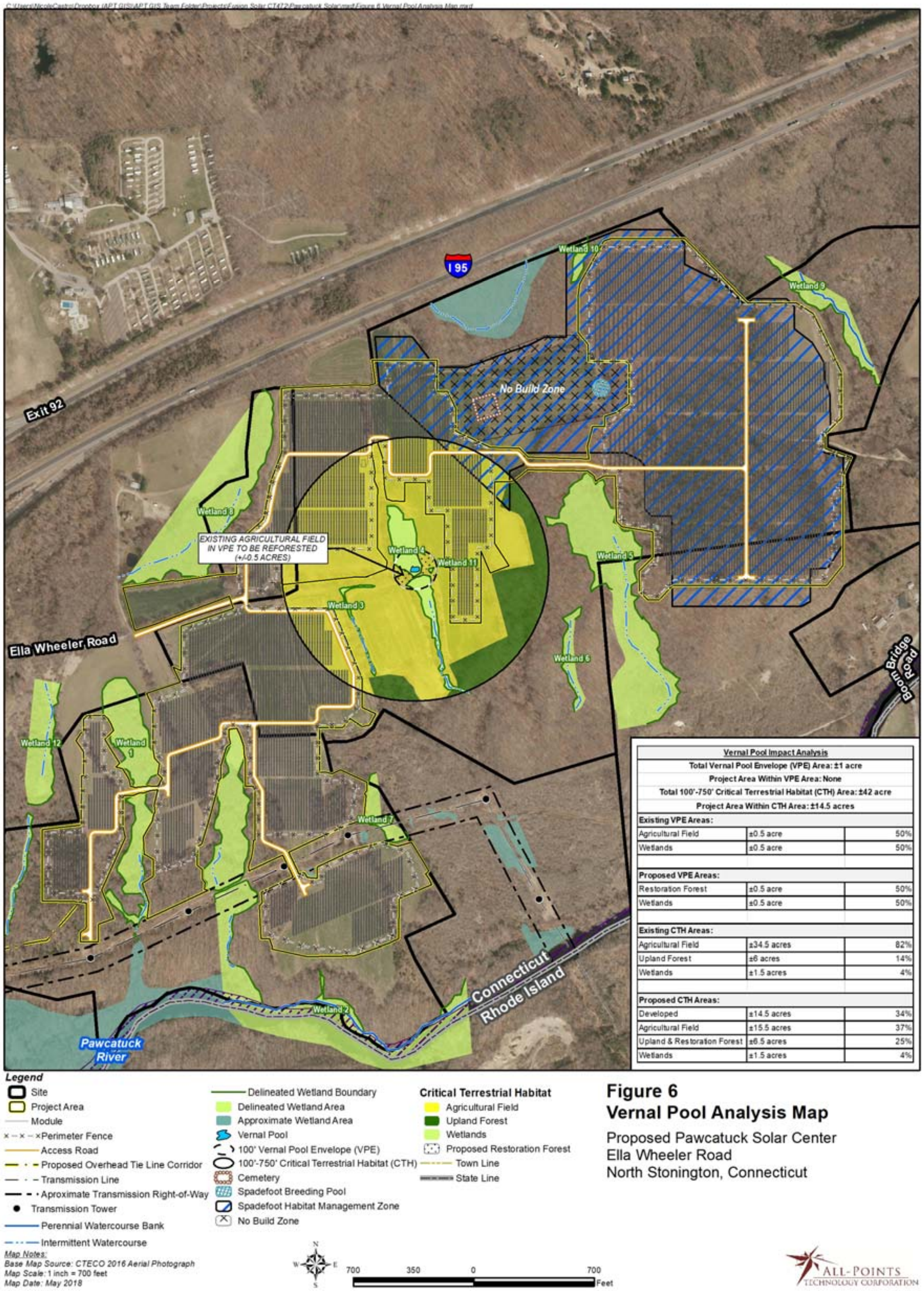
3.8 Vernal Pool Impacts

A single cryptic vernal pool is embedded within Wetland 4, referred to as Vernal Pool 1. In order to assess the quality of Vernal Pool 1, the methodology described in Best Development Practices, Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States (Calhoun and Klemens, 2002, a.k.a. the BDP) was used. This assessment methodology utilizes a three-tiered rating system, with the tier designation determined by examining the biological value of the pool in conjunction with the condition of the habitat surrounding the pool, which is the area used by vernal pool amphibians during the non-breeding season. The higher the species diversity and abundance coupled with an undeveloped and forested landscape surrounding the pool, the higher the tier rating. Tier 1 pools are considered the highest quality pools, while Tier 3 pools are the lowest.

With respect to the landscape condition of the *Vernal Pool Envelope* ("VPE", 0 to 100 feet) and the *Critical Terrestrial Habitat* ("CTH", 100 to 750 feet) conservation zones surrounding vernal pools, Vernal Pool 1 met the landscape criteria for Tier 1 pools as it had less than 25% development in the VPE and less than 50% development within the CTH. Beyond the lack of development present within the vernal pool management zones, Vernal Pool 1 is considered a Tier 1 pool based on the presence of two indicator species (wood frog and spotted salamander).

However, the landscape calculations belie that fact that significant disturbance is occurring within both conservation zones due to ongoing agricultural activities that include intensive monoculture cultivation with associated annual tillage, fertilizer applications and herbicide/pesticide spraying. At present, 50% of the VPE Zone and 82% of the CTH zone are cornfield, which offers no terrestrial habitat for indicator species. Also worth noting is the ongoing disturbance to the breeding pool itself. Chicken manure has routinely been stockpiled within and adjacent to the vernal pool, the farm road crosses the southern limits of the pool and untreated runoff from the adjacent cultivated field discharges into the pool; activities that have resulted in significant degradation of the pool's water quality and concern for the long-term sustainability of this breeding habitat.

An analysis of the post-development conditions using the BDP methodology was conducted and is illustrated on Figure 6, *Vernal Pool Analysis Map*. No direct impact to Vernal Pool 1 is proposed and no development activity is proposed within the VPE conservation zone. A total of 14.5 acres (or 34%) of development is proposed within the CTH zone primarily within the existing agricultural fields; 82% of the existing CTH is comprised of cultivated fields. To minimize shading effect, ±0.38 acre of an existing windrow that separates two fields north of Vernal Pool 1 will be selectively cut to remove trees. This area is not considered to provide optimal terrestrial forested habitat for amphibians and therefore would not have a likely adverse effect on the existing vernal pool breeding population. As mitigation, 0.5 acres (50%) of reforestation is proposed within the VPE zone and 4 acres (9.5%) reforestation is proposed within the CTH zone. Although a strict interpretation of the BDP would conclude that the proposed project would not comply with all of the BDP's conservation recommendations, given the measures proposed to restore the water



Vernal Pool Impact Analysis		
Total Vernal Pool Envelope (VPE) Area: ±1 acre		
Project Area Within VPE Area: None		
Total 100'-750' Critical Terrestrial Habitat (CTH) Area: ±42 acre		
Project Area Within CTH Area: ±14.5 acres		
Existing VPE Areas:		
Agricultural Field	±0.5 acre	50%
Wetlands	±0.5 acre	50%
Proposed VPE Areas:		
Restoration Forest	±0.5 acre	50%
Wetlands	±0.5 acre	50%
Existing CTH Areas:		
Agricultural Field	±34.5 acres	82%
Upland Forest	±6 acres	14%
Wetlands	±1.5 acres	4%
Proposed CTH Areas:		
Developed	±14.5 acres	34%
Agricultural Field	±15.5 acres	37%
Upland & Restoration Forest	±6.5 acres	25%
Wetlands	±1.5 acres	4%

Figure 6
Vernal Pool Analysis Map

Proposed Pawcatuck Solar Center
Ella Wheeler Road
North Stonington, Connecticut

quality of Vernal Pool 1, the limited loss of forest cover (as opposed to the loss of cornfield that provides suboptimal terrestrial habitat for amphibians) and the proposed restoration activities, the Project is not expected to adversely impact vernal pool indicator species. This conclusion is substantiated by the fact that the proposed condition would result in a significant improvement to the existing conditions of the breeding pool (both physical aspects and water quality) and the surrounding terrestrial conservation zones. The proposed array fields would contain permanent vegetative cover and be surrounded by raised fencing that would allow amphibians an opportunity to continue to migrate through the Site under improved vegetative cover than what the cultivated fields currently provide. In addition, no subsurface stormwater infrastructure would be located within the VPE or CTH that could act as a decoy pool.

A proposed Wetland and Vernal Pool Protection Plan is included in Appendix E to avoid temporary impacts to the vernal pool during construction activities.

3.9 Vegetation and Wildlife

The Project will consist of approximately 144 acres of ground disturbance. The resulting gravel and grass surfaces associated with the construction of the Project will alter existing habitats present on the Site, as depicted on Figure 7, *Effects on Habitat Cover Map*. An analysis of impacts to Site habitats is provided below.

3.9.1 Upland Forest Habitat Impact Analysis

A total of ±64.4 acres of forest will be impacted by the Project resulting in ±53.49 acres permanently converted to the solar array field and other developed areas. An additional ±10.91 acres will be selectively cleared of trees to reduce shading of the arrays, but those areas will remain vegetated with a woody and herbaceous understory and ultimately converted to early-successional habitat.

The forest within and adjacent to the Site was evaluated using the methodology described in the Center for Land Use Education and Research's (CLEAR) Forest Fragmentation Study[9]. The goal was to analyze the level of forest fragmentation present to determine whether the Site's forest would be considered valuable to forest-interior birds and what impact the Project might have on

[9] CLEAR's Forest Fragmentation Study can be found at: http://clear.uconn.edu/projects/landscape/forestfrag/forestfrag_public%20summary.pdf

forest habitat. Forest-interior birds favor the interior of the forest away from non-forested "edge" habitat. Such conditions are optimized in forests with a low level of habitat fragmentation.

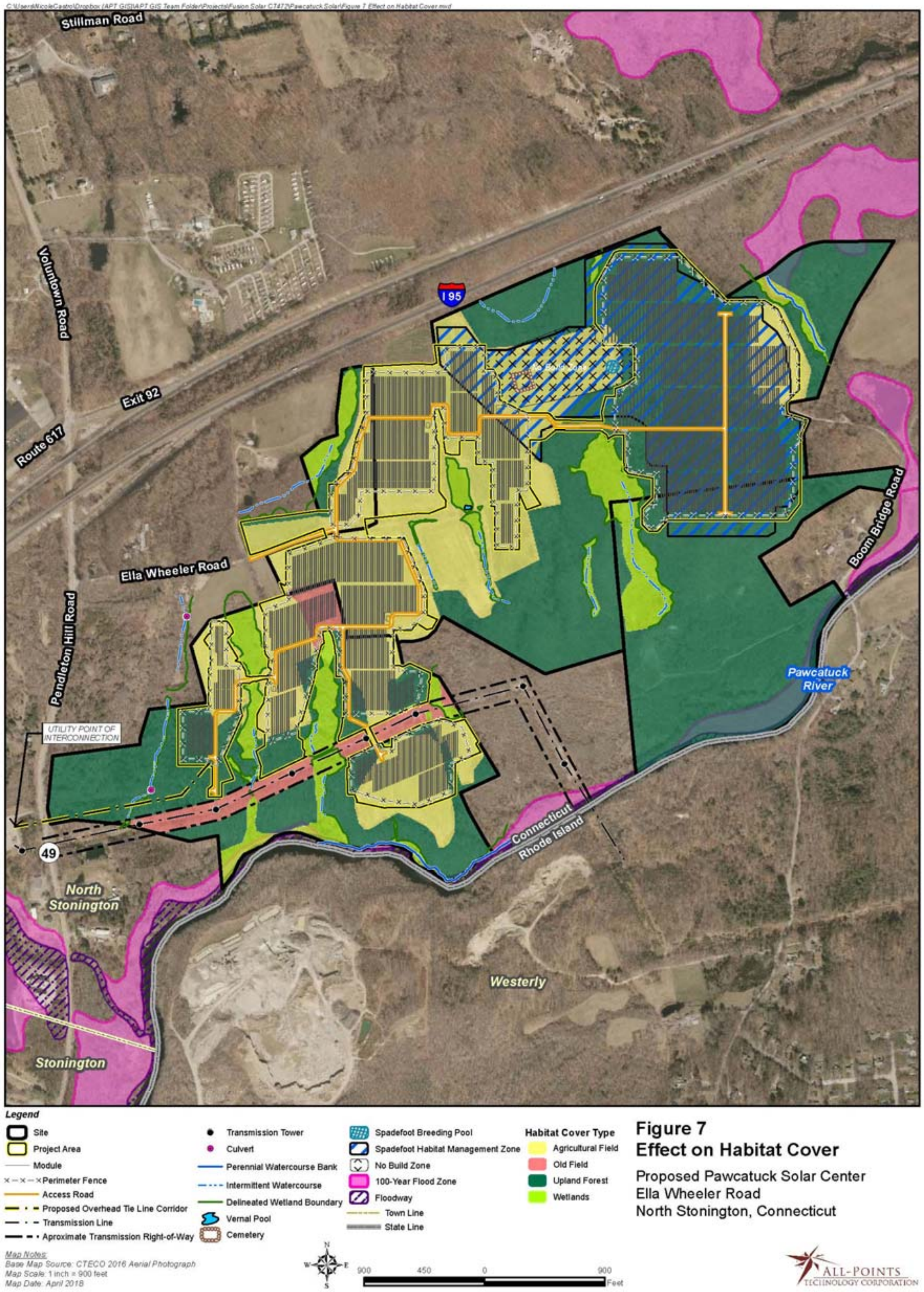


Figure 7
Effect on Habitat Cover
Proposed Pawcatuck Solar Center
Ella Wheeler Road
North Stonington, Connecticut

The CLEAR study suggests that 250 acres should be considered the *absolute minimum* forest patch size needed to support area-sensitive edge-intolerant bird species, with a recommended minimum forest patch size of 500 acres. At that scale, a forest is presumed to provide enough suitable habitat to support more diversity of interior forest species.

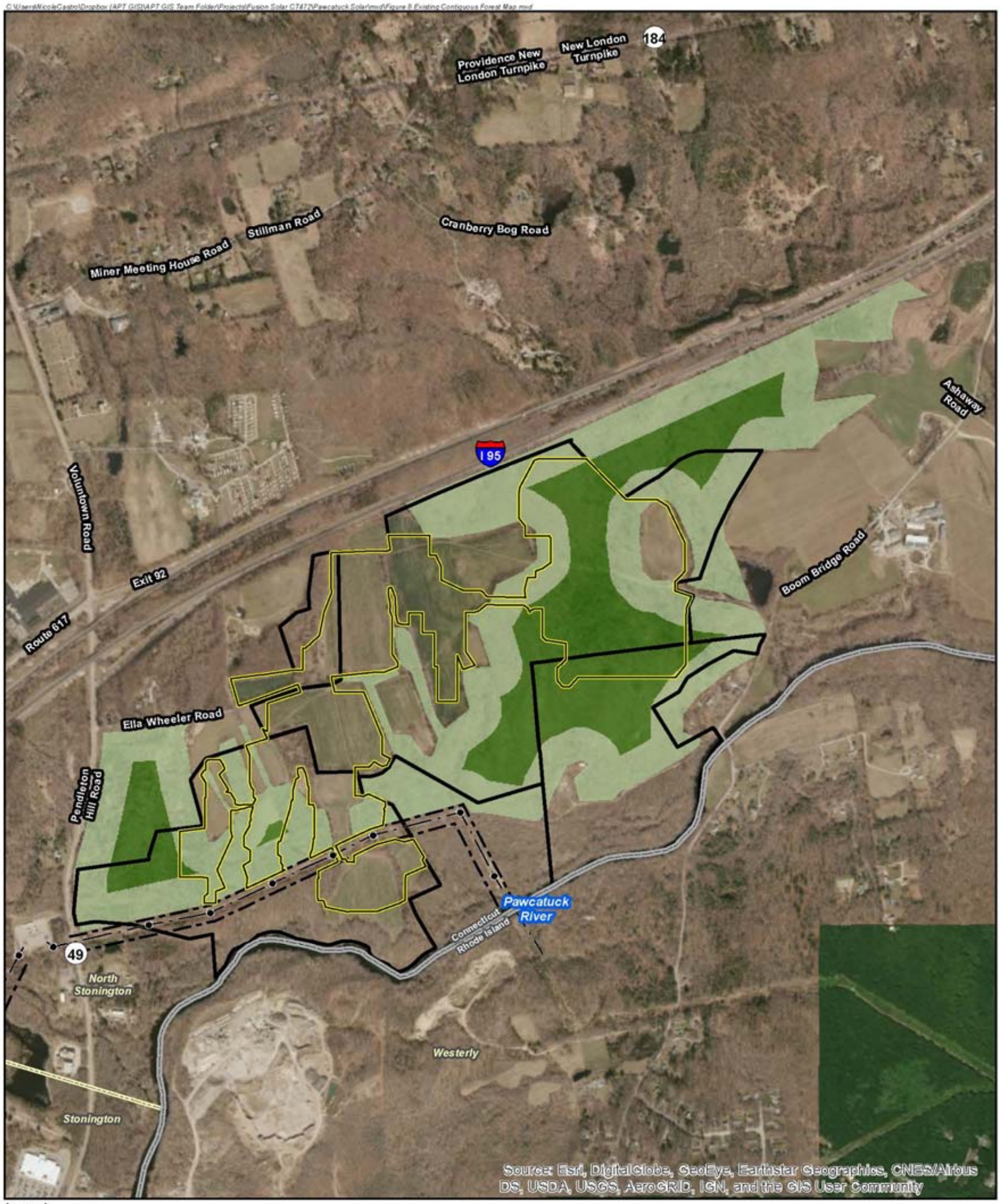
The CLEAR study has developed three categories to indicate the viability of the core patches with respect to the size of the patch. These three categories are small (< 250 acres), medium (250-500 acres), and large (>500 acres). Forest areas designated as "core" are greater than 300 feet away from non-forested areas and represent optimal breeding habitat for forest-interior birds. This 300 foot zone is referred to as the "edge width" and represents sub-optimal breeding habitat for forest-interior birds. Figure 8, Existing *Contiguous Forest Block Map*, and Figure 9, *Proposed Contiguous Forest Block Map*, illustrate this analysis using Geographic Information System (GIS) software to analyze the most recent aerial photography available (2016, source USDA). The existing contiguous forest (both on-Site and abutting) totals 197 acres. However, due to the fragmented nature of the habitat, only 90 acres would be considered "core forest" (when accounting for edge forest). The largest contiguous forest block is located in northeast corner of the Site, extending offsite to the east. This forest block totals approximately 165 acres.

The results of this analysis indicate that the Site is not part of a core forest block as it fails to reach the minimum forest patch size needed to support area-sensitive edge-intolerant bird species (i.e., >250 acres). This does not mean that forest interior birds are not likely to be present, but the implication is that this forest block is unlikely to support a significant regional population of these types of bird species and therefore the proposed forest loss will not adversely affect such species.

3.9.2 Rare Species Impacts

As noted previously, one state-listed species, the spadefoot toad, was observed on the Site, and the following three additional listed species are reported to occur in the general area according to the CTDEEP NDDB:

- Sparkling Jewelwing (*Calopteryx dimidiata*), threatened
- Eastern Pearlshell (*Margaritifera margaritifera*), special concern
- Red Bat (*Lasiurus borealis*), special concern



Legend

- Site
- Project Area*
- Transmission Line
- Aproximate Transmission Right-of-Way
- Transmission Tower

Existing Contiguous Forest Block

- Interior Core Forest (+/-90 acres)
- Edge Forest (+/-197 acres)
- Town Line
- State Line

**The Project Area contains +/-41 acres of Interior Core Forest and +/-43 acres of Edge Forest*

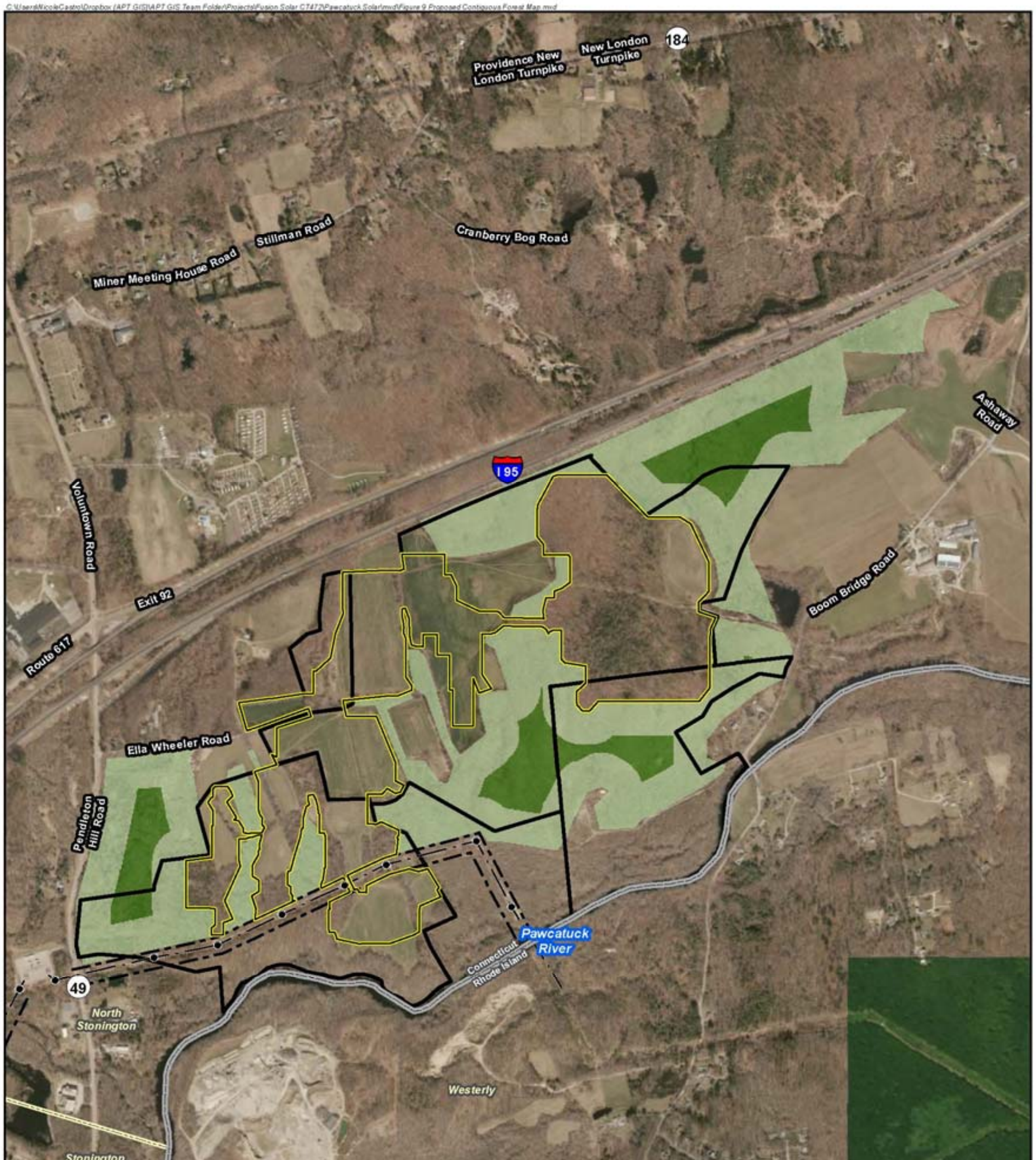
Map Notes:
Base Map Source: CTECO 2016 Aerial Photograph
Map Scale: 1 inch = 1,200 feet
Map Date: April 2018

1,200 600 0 1,200 Feet

Figure 8
Existing Contiguous Forest Block

Proposed Pawcatuck Solar Center
Ella Wheeler Road
North Stonington, Connecticut

ALL-POINTS TECHNOLOGY CORPORATION



Legend

- Site
- Project Area*
- Transmission Line
- Aproximate Transmission Right-of-Way
- Transmission Tower

Proposed Contiguous Forest Block

- Interior Core Forest (+/-36 acres)
- Edge Forest (+/-184 acres)
- Town Line
- State Line

**The Project Area development results in a loss of +/-33 acres of Interior Core Forest and +/34 acres of Edge Forest*

Map Notes:
Base Map Source: CTECO 2016 Aerial Photograph
Map Scale: 1 inch = 1,200 feet
Map Date: April 2018

1,200 600 0 1,200 Feet

Figure 9
Proposed Contiguous Forest Block

Proposed Pawcatuck Solar Center
Ella Wheeler Road
North Stonington, Connecticut

ALL-POINTS TECHNOLOGY CORPORATION

Extensive mitigation measures for the endangered spadefoot toad are outlined in Section 3.10.1. Potential impacts to red bat are proposed to be mitigated through a timing restriction for tree clearing activities being limited to the months between early fall and late spring, when roosting bats would not be present on the Site.[10]

Two riverine species are potentially present within the Pawcatuck River which lies along the southern Site boundary, the sparkling jewelwing and the eastern pearlshell mussel. To prevent impacts to these species, and to the river ecosystem as a whole, a minimum 200-foot wide buffer between the Project's limits of disturbance and the river is proposed. No clearing of the existing tree cover in this buffer area north of the river is proposed. The footprint of Project development is confined within the existing cornfield limits ±280 feet north of the river at its closest point with the limit of disturbance located ±240 from the river.

Given the proposed setback distance, the Project complies with the CTDEEP Inland Fisheries Division policy statement (12/31/91)[11] that a 100-foot-wide buffer zone should be maintained in a naturally vegetated and undisturbed condition along each side of a perennial stream.

3.10 Wildlife Impact Mitigation Measures

As previously introduced, suitable habitat for spadefoot toad exists on the Site and individuals of this species were confirmed to be breeding in a small depression located within the northeast cornfield. As a result, Pawcatuck Solar has committed to implementing the following mitigation strategy to protect this species should the Project receive approval from the Council and other State agencies.

3.10.1 Spadefoot Toad Impact Mitigation Measures

The most significant aspect of the mitigation plan is habitat enhancement and long-term monitoring of spadefoot toad. This effort includes restoration of the breeding pool; re-planting native vegetation within a ±10.5 acre "no build zone" centered on the primary spadefoot toad use areas; habitat management measures (i.e., plantings) within an ±105-acre "Spadefoot Management Zone"; and, monitoring.

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[10] tree cutting should be conducted from August 16th through April 30, during the Red Bat's non-roosting and hibernation periods

[11] *Department of Environmental Protection, Inland Fisheries Division, Policy Statement: Riparian Corridor Protection*. December 13, 1991.

The breeding pool restoration activities will include the following:

1. The breeding pool will be regraded to remove accumulated organics (i.e., manure deposits[12]) and recontour the pool basin to prepare for planting. This work will be done under the supervision of Dennis Quinn and/or the supervising wetland scientist.

2. Between April and October of the construction year, the breeding pool will be planted with low growing herbaceous plants that tolerate full sun and soils that range from moist to temporarily inundated (up to four weeks). The native soils present are moderately-well drained. The proposed plantings will include plants with an indicator status of Facultative ("FAC") to Facultative Wetland (FACW)[13].

3. If a breeding event occurs prior to planting, a temporary structure for egg mass attachment will be placed in the pool and plantings will be delayed until after larval emergence.

4. The size of the breeding pool based on field mapping prepared in the spring of 2017 was ±3,887 square feet. Two-inch plugs are proposed to be planted to revegetate the newly recreated breeding pool. The total estimate of plantings proposed is approximately 600. The locations of the plantings will be field determined by Dennis Quinn and/or the supervising wetland scientist.

5. Plant species may be adjusted as needed by Dennis Quinn or the supervising wetland scientist. Planting locations will be field determined under the supervision of Dennis Quinn and/or the supervising wetland scientist.

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[12] Refer to Spadefoot Report, pgs. 6 & 7 regarding the existing degraded condition of the breeding pool.

[13] Indicator Status Definitions - Facultative Wetland (FACW) - Usually occur in wetlands but occasionally found in non-wetlands; Facultative (FAC) - Equally likely to occur in wetlands and non-wetlands; Upland (UPL)-Occur in wetlands in another region but occur almost always under natural conditions in non-wetlands in the region specified.

Table 6: Spadefoot Breeding Pool Plantings

Spadefoot Breeding Pool Plantings Total 600 Live Plugs			
Common Name	**Scientific Name**	**Plant Size**	**Ind. Status**
New England Aster	*Aster novae-angliae*	2” plug	FACW-
Soft Rush	*Juncus effuses*	2” plug	FACW+
Blue Vervain	*Verbena hastata*	2” plug	FACW
Hop Sedge	*Carex lupulina*	2” plug	FACW+
Grass-leaved Goldenrod	*Euthamia graminifolia*	2” plug	FAC
Path Rush	*Juncus tenuis*	2” plug	FAC-
Three Square Bulrush	*Schoenoplectus pungens*	2” plug	FACW

The Spadefoot Habitat Management Zone will consist of early old field habitat (herbaceous cover with scattered shrubs) and be established as follows:

1. Plants with an indicator status of Upland (UPL) to FAC will be utilized. Herbaceous plants will consist of grasses and wildflowers. Clump-forming warm season grasses have been selected to promote areas of bare soil. Wildflowers include species intended to attract Lepidoptera and other insects. Shrub species will be low-growing.
2. Herbaceous cover will be established using seed mixes. A custom seed mix will be developed in consultation with New England Wetland Plants, Inc. based on the planting palette. In some areas the stock *New England Native Warm Season Grass Mix* and *New England Wildflower Mix*, a product of New England Wetland Plants, Inc. will be utilized.
3. No Build Zone: The “no build zone” covers ±10.5 acres. The proposed plant community is early old field. Total cover should generally consist of 15% aerial coverage by shrub species, 60% herbaceous cover, and the remaining 25% maintained as bare ground.
4. Within the “no build zone”, discrete areas (approximately 2,000-3,000 total square feet) of the existing agriculturally enriched topsoil/manure should be stripped to reveal the underlying coarse-textured friable nutrient-poor soils to promote areas of unvegetated bare ground.

Should the total desired bare ground be unachievable, additional clump-forming herbaceous cover will be planted as an alternative.

5. Within the "no build zone", shrubs will be planted in clusters rather than uniformly placed across the planting zone as directed by Dennis Quinn and the supervising wetland scientist. A total estimate of ±800 live or dormant live stake shrubs will be planted in order to establish immediate cover. Additionally, a shrub-inclusive seed mix, *New England Roadside Matrix Upland Seed Mix*, will be planted. The ultimate goal is to achieve the desired 15% total shrub cover within the no build zone.
6. Solar Facility: the solar arrays located within the Spadefoot Habitat Management Zone will be undersown only with non-woody native grasses and wildflowers.
7. No topsoil amendments or fertilizers will be utilized.
8. Plant species, locations and density may be adjusted in the field by the supervising wetland scientist.
9. To facilitate wildlife movement across the Site, fencing will be raised above the ground to a height of 6" to allow wildlife passage into/out of the Solar Facility.
10. To prevent the proposed stormwater basins from functioning as decoy breeding pools for spadefoot toads, the stormwater management system has been intentionally designed to minimize the hydroperiod of basins. However, as additional protection for spadefoot toads, the basin hydroperiods will be monitored during the spadefoot toad post-construction monitoring period to assess the potential for decoy breeding. If that potential is found to exist within any of the basins, a permanent toad exclusion fence such as Animex brand fencing (model #AMX24/610, 24" tall, or approved equivalent) shall be installed around the perimeter of the basins to prevent toad access. This fencing would allow for conveyance of stormwater but restrict toad access.

A detailed monitoring plan will be implemented during and after construction to promote the establishment and maintenance of the Spadefoot Management Zone. Please refer to Appendix C, Spadefoot Report, for those details.

Table 7: Spadefoot Habitat Management Zone

Spadefoot Habitat Management Zone		
Common Name	**Scientific Name**	**Ind. Status**
Custom Seed Mix (to be determined)		
Little Bluestem	*Schizachyrium scoparium*	FACU
Big Bluestem	*Andropogon gerardii*	FAC
Indian Grass	*Sorghastrum nutans*	FAC
Butterfly Milkweed	*Asclepias tuberosa*	FACU
Wild Blue Lupine	*Lupinus perennis*	UPL
Golden Alexanders	*Zizia Aurea*	FAC
Grey Goldenrod	*Solidago nemoralis*	UPL
Marsh Blazing Star	*Liatris spicata*	FAC+
Broomsedge Bluestem	*Andropogon vignicus*	FACU
Blue Wood Aster	*Aster cordifolius*	UPL
Grass-leaved Goldenrod	*Euthamia graminifolia*	FAC
Shrub		
Bearberry	*Arctostaphylos uva-ursi*	UPL
New Jersey Tea	*Ceanothus americanus*	FACU-
Sweet Fern	*Comptonia peregrina*	UPL
Common Juniper	*Juniperus communis*	FAC
Lowbush Blueberry	*Vaccinium angustifolium*	FACU-
Stock Seed Mixes (source: New England Wetland Plants, Inc.)		
New England Wildflower Mix		
New England Native Warm Season Grass Mix		
New England Roadside Matrix Upland Seed Mix		

3.10.2 Vernal Pool Impact Mitigation Measures

Vernal Pool 1 has been adversely impacted by farming activities. As part of the Project, this resource and the surrounding terrestrial conservations zones will be enhanced through the following measures:

VPE Conservation Zone: The sections of field to the east and southwest that fall within the VPE, as well as the existing farm road that falls within the VPE, will be planted with an herbaceous-shrub seed mix (*New England Roadside Matrix Upland Seed Mix*). Once established, this area will have old field habitat structure, and will then be allowed to naturally succeed to forest. Prior to planting, soils within the proposed planting areas will be assessed, and will be prepared or amended with topsoil as needed[14].

3.10.3 Red Bat Impact Mitigation Measures

Tree clearing work should be conducted in the months between early fall and late spring when the bats are not in the area, specifically work should not be conducted between May 1st and August 15th prevent impact to summer roosting bats.

3.11 Water Supply Areas

There are no public water supply wells located in the vicinity of the Site. No liquid fuels are associated with the operations of the Project. Therefore, the Project would have no adverse environmental effect on water supply resources.

3.12 Water Quality

The Solar Facility will be unstaffed and no potable water uses or sanitary discharges are planned.

No liquid fuels are associated with the operations of the Project. Once operative, the stormwater generated by the proposed development will be properly handled and treated in accordance with the 2004 *Connecticut Stormwater Quality Manual*. Therefore, upon its completion the Project will have no adverse environmental effect on wetlands, watercourses or other water resources.

[14] This could be sourced from the discrete areas of stripped agriculturally enriched topsoil/manure that are proposed to be removed from the spadefoot "no build zone"

The nearest Project activities to the Pawcatuck River will occur approximately 240 feet away. The existing vegetated (wooded) buffer between the Project Area and the river will remain. The Solar Facility and areas generally within 30 feet of the fence line will be revegetated with native grasses and vegetation. Because the solar arrays will be installed on driven foundations, impervious areas are substantially minimized.

To safeguard these resources from potential impacts during construction, Pawcatuck Solar is committed to implementing protective measures in the form of a Stormwater Pollution Control Plan to be finalized and submitted pending approval by CTDEEP Stormwater Management. This Plan will include monitoring of established sedimentation and erosion controls that will be installed and maintained in accordance with the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control*, 2004 *Connecticut Stormwater Quality Manual*, and the CTDEEP *Stormwater Management at Solar Farm Construction Projects*, dated September 8, 2017.

Pawcatuck Solar will also apply for a *General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities* from CTDEEP. Therefore, with the incorporation of adequate protective measures, stormwater runoff from the Project development will not result in an adverse impact to water quality associated with nearby surface water bodies.

3.13 Air Quality

Overall, the Project will have minor emissions of regulated air pollutants and greenhouse gases during construction and no air permit will be required. During construction of the Project, any air emission effects will be temporary and will be controlled by enacting appropriate mitigation measures (e.g., water for dust control, avoid mass early morning vehicle startups, etc.). Accordingly, any potential air effects as a result of the Project construction activities will be de-minimus.

During operation, the Project will not produce air emissions of regulated air pollutants or greenhouse gases (e.g., PM10, PM2.5, VOCs, GHG or Ozone). Thus, no air permit will be required. Moreover, over 20 years, the Project will result in the elimination of approximately 460,000 metric tons of CO2 equivalent, which is equal to taking 100,000 vehicles off the road and the amount of carbon sequestered by 550,000 acres of U.S. forests in one year.[15]

[15] U.S. EPA Greenhouse Gas Equivalencies Calculator

3.14 Scenic Areas

No scenic areas would be physically or visually impacted by development of the solar Project.

3.15 Historic and Archaeological Resources

The results of Heritage's historical research, previous investigations literature review, and pedestrian survey revealed that the Project Area contains areas of no/low, moderate, and high archaeological potential. Heritage concluded that the areas of no/low archaeological potential were characterized by steep slopes, wetlands, and/or previous disturbances. No additional archaeological investigation of these areas was recommended prior to construction of the Pawcatuck Solar Center. In addition, Heritage identified ±25 acres considered to possess a moderate sensitivity for containing archaeological resources and ±43.7 acres perceived to retain a high sensitivity for producing archaeological resources. Heritage recommended that these areas be subjected to subsurface testing using shovel tests placed at 20-meter (65.6-foot) intervals along parallel survey transects spaced 20 meters (65.6 feet) apart in the moderate sensitivity areas, as well as at 15-meter (49.2-foot) intervals along parallel survey transects spaced 15 meters (49.2 feet) apart in high archaeologically sensitive areas. In addition, a single previously identified archaeological site was identified in the northeastern corner of the Project Area in a perceived high sensitivity area. This area will be subjected to subsurface testing using shovel tests situated at 15-meter (49.2-foot) intervals along parallel survey transects spaced 15 meters (49.2 feet) apart. Heritage also identified two (2) areas within the Site where surficial expressions of cultural resources exist. These include: 1) the Post-1868 Farmstead in the southwest portion of the Site; and, 2) the Partlow Cemetery in the north-central portion of the Site. These areas do not fall within the Project Area (limit of disturbance); therefore, Heritage did not recommend any additional archaeological examination of these two resources. Finally, Heritage has submitted a copy of the above-referenced Phase I Cultural Resource Survey Report to the SHPO and consulted with the agency regarding the scope of additional investigations as presented herein.

3.16 Geology and Soils

No adverse effects are anticipated on natural resources occurring at and/or nearby the subject parcel. Vegetative clearing and earthwork is required for construction of the Project. However, no impacts to wetlands, water courses or significant habitat would occur. Any temporary impacts to Site soils will be minimized through the implementation and maintenance of a Stormwater Pollution Control Plan approved through CTDEEP Stormwater Management.

3.17 Farmland Soils

As previously introduced, the Project Area contains Prime Farmland soils and has been managed primarily as corn field over the past several decades.

Recognizing that development of the Project has a useful life and could be considered temporary in nature, Pawcatuck Solar has proposed using a minimally intrusive method for construction of the Solar Facility to maintain the arable integrity of these farmland soils.

3.18 Floodplain Areas

The Site is located entirely outside of the 100-year and 500-year floodplains. Therefore, no special design elements are necessary with respect to flooding concerns. In addition, no impacts to floodplains are associated with the proposed Project.

3.19 Recreational Areas

No recreational areas would be impacted by the Project.

3.20 Noise

Most noise generated from the electrical equipment at the Project will be from the transformers and inverters at each pad. Subject to final design, the inverters specified for this plant are Toshiba Mitsubishi Electric Industrial Controls ("TMEIC") Samurai series inverters, which represent a typical inverter model for use in utility-scale solar installations. TMEIC provided an operational noise level of 73 dBA as measured from a distance of 1.5 meters (4' 11"). Applying the inverse square law of sound attenuation, the expected total sound level at a distance of 100 feet is 46.8 dBA. Note that this value only applies during daytime operation, as the inverter enters standby mode during nighttime hours.

While final equipment selections for the inverter transformers have not been made, the units for this Project will be rated between a maximum of 2501 and 3000 kVA, and compliant with NEMA TR-1 standards. Accordingly, they are expected to have an average unshielded sound decibel level of approximately 63 dBA, as measured at a distance of five feet. Using the inverse square law of sound attenuation, the expected sound level at 50 feet from the unit will be approximately 42.9 dBA. When the Solar Facility is not producing power at night, operational noise from the transformer will generally subside.

Using the most conservative daytime noise level criterion at a residential property of 55 dBA, the Project noise levels beyond the perimeter fence will be negligible. The intent is to locate inverters and transformers as close to the interior of the solar array as is feasible. This will allow the panels themselves to provide shielding and further mitigate equipment noise.

3.21 Lighting

No lighting is planned for the facility.

3.22 Coastal Zone Management Areas

No Coastal Zone Management Areas would be affected by the Project.

3.23 Other Surrounding Features

No adverse effects are anticipated to the facilities identified in Figure 4, primarily because of their sufficient distance from the Project.

4 Conclusion

As demonstrated in this EA, the Project will comply with CTDEEP air and water quality standards and will not have a substantial adverse effect on the environment.

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APPENDIX A

Wetland Inspection Report

WETLAND INSPECTION

December 1, 2017 **APT Project No.: CT472112**

Prepared For: Pawcatuck Solar Center, LLC
PO Box 2055
Charlottesville, VA 22902

Project Name: Pawcatuck Solar Center

Site Address: Ella Wheeler Drive
North Stonington, Connecticut

Date(s) of Investigation: 10/18/2017, 10/19/17, 10/23/17, 10/31/187 11/01/17, 11/04/17 & 11/19/17

Field Conditions: **Weather:** sunny, high 60's – cloudy, low 50's
Soil Moisture: dry to moist

Wetland/Watercourse Delineation Methodology*:

☒Connecticut Inland Wetlands and Watercourses
☐Connecticut Tidal 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 100 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.

* *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 Pawcatuck Solar Center regarding the proposed subject property for defining the study area within which wetlands and/or watercourses are to be identified.*

Attachments

- Wetland Delineation Field Forms
- Wetland Inspection Map

Wetland Delineation Field Form

Wetland I.D.:	Wetland 1	
Flag #'s:	WF 1-01 to 1-99Z AND 1-100 to 1-104	
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 a broad hillside seep system draining south.		

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: None		

WATERCOURSE TYPE:

Perennial ☐	Intermittent ☒	Tidal ☐
Watercourse Name: Unnamed		
Comments: Narrow channel consisting of dirt/stone bottom (1-3 ft. wide)		

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 ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Sphagnum moss (Sphagnum spp.)	Joe Pye Weed (Eupatorium maculatum)
Multiflora Rose* (Rosa multiflora)	Sensitive Fern (Onoclea sensibilis)
Silky Dogwood (Cornus amomum)	Reed Canarygrass* (Phalaris arundinacea)
American Elm (Ulmus americana)	Bebb Willow (Salix bebbiana)
Green Ash (Fraxinus pennsylvanica)	Red Maple (Acer rubrum)
Spicebush (Lindera benzoin)	Winterberry (Ilex verticillata)
Jewelweed (Impatiens capensis)	

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 1 consist of a broad hillside seep system dominated by mature forest. Northern boundaries of Wetland 1 consist of agricultural fields (corn crop) with portions of the wetland extending into these fields. As the wetland drains south boundaries consist of transitional upland forest. Interior to the wetland is a narrow intermittent watercourse. This wetland eventually drains south under a transmission utility corridor access road and into the Pawcatuck River.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 2	
Flag #'s:	WF 2-01 to 2-61 AND 2-100 to 2-190	
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: Complex of the Pawcatuck River (south) and feeder hillside seep system (north) with backwater/floodplain wetlands adjacent to the river.		

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:		

WATERCOURSE TYPE:

Perennial ☒	Intermittent ☒	Tidal ☐
Watercourse Name: Pawcatuck River (perennial)		
Comments: Two intermittent watercourses (north) feed the delineated portions of the Pawcatuck River (south). Intermittent watercourses consist of narrow channels with sandy/stone bottoms. The Pawcatuck River is a broad open water river that drains east with muck/stone /sandy banks (steeply sloping in some areas)..		

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 ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Common Reed* (Phragmites australis)	Joe Pye Weed (Eupatorium maculatum)
Multiflora Rose* (Rosa multiflora)	Sensitive Fern (Onoclea sensibilis)
Silky Dogwood (Cornus amomum)	Reed Canarygrass* (Phalaris arundinacea)
American Elm (Ulmus americana)	Bebb Willow (Salix bebbiana)
Green Ash (Fraxinus pennsylvanica)	Red Maple (Acer rubrum)
Spicebush (Lindera benzoin)	Winterberry (Ilex verticillata)
Jewelweed (Impatiens capensis)	Sphagnum moss (Sphagnum spp.)
Sweet Pepperbush (Clethera alnifolia)	Greenbrier (Smilax rotundifolia)

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 2 consists of a broad forested hillside seep wetland system. This wetland drains south, eventually draining under a transmission corridor access road and into the Pawcatuck River. Northern extents of the wetland consist of an open grass field which transitions to mature forest as it drains south. The furthest southern extents of the wetland consist of the banks to the Pawcatuck River. Several small hillside seep areas drain along south along the banks of the Pawcatuck River. In addition, portions of the bordering wetlands to the Pawcatuck River contain some backwater and floodplain wetland areas. A majority of the bank resource within the delineated extents to the Pawcatuck River consist of steeply sloping stone/sand slopes. Two intermittent watercourse features were identified within the northern limits of Wetland 2 draining south.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 3	
Flag #'s:	WF 3-01 to 3-58	
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 narrow seep at the edge of open corn fields within small isolated forest edge which drains south.		

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: None		

WATERCOURSE TYPE:

Perennial ☐	Intermittent ☒	Tidal ☐
Watercourse Name: Unnamed		
Comments: Very narrow stream (1-2 feet) with shallow banks and a sandy/organic bottom.		

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 ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Northern Arrow-wood (Viburnum recognitum)	Silky Dogwood (Cornus amomum)
Multiflora Rose* (Rosa multiflora)	Sphagnum moss (Sphagnum spp.)
American Elm (Ulmus americana)	Red Maple (Acer rubrum)
Green Ash (Fraxinus pennsylvanica)	Winterberry (Ilex verticillata)

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 3 consists of a narrow-forested wetland system at the edge of surrounding agricultural fields (corn crop). This wetland does not extent into the corn fields to the east or west, or the dirt access road to the north. An intermittent stream does exist within southern extents of the wetland resource that drains south. As the wetland feature extends to the south, the contributing hydrology of the wetland dissipates and the wetland resource terminates.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 4	
Flag #'s:	WF 4-01 to 4-30; 4-50 to 4-129; AND 4-80 to 4-100	
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 4 is a large seep wetland system draining south bisected by an existing dirt farm road.		

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: None		

WATERCOURSE TYPE:

Perennial ☐	Intermittent ☒	Tidal ☐
Watercourse Name: None		
Comments: Narrow intermittent watercourse channel (2 – 3 feet wide) draining south with a stone/cobble bottom.		

Wetland Delineation Field Form (Cont.)

SPECIAL AQUATIC HABITAT:

Vernal Pool Yes ☒ No ☐ Potential ☐	Other ☐
Vernal Pool Habitat Type: 'Classic'	
Comments: Isolated depression located at the southern end of the northern wetland area directly abutting the existing dirt access road. This area has historically been used periodically as a manure dumping area.	

SOILS:

Are field identified soils consistent with NRCS mapped soils?	Yes ☒	No ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Poison Ivy (Toxicodendron radicans)	Greenbrier (Smilax rotundifolia)
Multiflora Rose* (Rosa multiflora)	Sphagnum moss (Sphagnum spp.)
Sweet Pepperbush (Clethera alnifolia)	Spicebush (Lindera benzoin)
American Elm (Ulmus americana)	Winterberry (Ilex verticillata)
Red Maple (Acer rubrum)	

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 4 consists of a large wetland complex of a forested hillside wetland seep transitioning to an intermittent watercourse with bordering wetland areas. Wetland 4 also contains a small isolated vernal pool in the northern central extents of the resource. The wetland is bisected into two areas by an existing dirt farm road that runs east to west. A majority of the wetland is forested; however, the wetland boundary does extend into the open agricultural field at points. This wetland, as it drains south, focuses to an intermittent stream corridor with narrow bordering wetlands. Further to the south, the topography steepens and the wetland becomes a very stony intermittent watercourse with no bordering wetlands.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 5 and Wetland 6	
Flag #'s:	WF 5-01 to 5-20 AND 5-50 to 5-135; WF 6-01 to 6-25	
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 5 and 6 are very broad hillside seep wetland systems with interior intermittent watercourses that drain south.		

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: None		

WATERCOURSE TYPE:

Perennial ☐	Intermittent ☒	Tidal ☐
Watercourse Name: Unnamed		
Comments: Two intermittent watercourses with very stony bottom and deeply incised banks.		

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 ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Red Maple (Acer rubrum)	Green Ash (Fraxinus pennsylvanica)
American Elm (Ulmus americana)	Spicebush (Lindera benzoin)
Silky Dogwood (Cornus amomum)	Winterberry (Ilex verticillata)
Sphagnum moss (Sphagnum spp.)	Multiflora Rose* (Rosa multiflora)
Asiatic Bittersweet* (Celastrus orbiculatus)	Japanese Barberry* (Berberis thunbergii)
Greenbrier (Smilax rotundifolia)	

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetlands 5 and 6 have been grouped together for the purpose of this discussion since they are both homogenous in their morphology, hydrology, vegetative cover, and soil characteristics. Generally, these wetlands have areas of shallow hummock/hollow topography with large inclusions of upland 'islands'. The depressions are shallow enough to not support seasonally vernal pool breeding habitat. Each has interior intermittent watercourses that drain south via narrow (2-3 feet) sandy/stone bottom channels. These wetlands are dominated by mature forest cover with some edge areas of scrub/shrub to the south as they approach the utility transmission corridor. In particular, southern extents of Wetland 5 have been heavily altered through historic earth/topography alteration. It appears large areas have been mined for sand and gravel resulting in large fill piles and deep cuts.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 7	
Flag #'s:	WF 7-01 to 7-25	
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 7 is a broad forested seep system.		

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: None		

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 ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Red Maple (Acer rubrum)	Sphagnum moss (Sphagnum spp.)
Soft Rush (Juncus effuses)	Spicebush (Lindera benzoin)
Common Reed* (Phragmites australis)	Asiatic Bittersweet* (Celastrus orbiculatus)
Spicebush (Lindera benzoin)	Winterberry (Ilex verticillata)
Bebb Willow (Salix bebbiana)	Silky Dogwood (Cornus amomum)
Brambles (Rubus spp.)	

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 7 consists of a broad hillside seep wetland system draining out at the bottom of a steep till slope. This wetland drains south extending out into an open agricultural field (corn crop). At the southern end of the wetland, topography rises and then steepens resulting in back-drainage. As such, the wetland ceases before crossing the transmission utility access road. A majority of the wetland is dominated by mature forest with interior pockets of emergent cover, edge areas of scrub/shrub and disturbed cover where the wetland drains into the agricultural field. This wetland extends to the west off the subject property.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 8	
Flag #'s:	WF 8-01 to 8-54	
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 8 is a broad seep system with an interior intermittent watercourse.		

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: None		

WATERCOURSE TYPE:

Perennial ☐	Intermittent ☒	Tidal ☐
Watercourse Name: Unnamed		
Comments: Intermittent watercourse consists of a narrow channel with a dirt/cobble bottom (1 - 3 feet wide).		

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 ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Multiflora Rose* (Rosa multiflora)	Sweet Pepperbush (Clethera alnifolia)
Winterberry (Ilex verticillata)	Spicebush (Lindera benzoin)
Northern Arrow-wood (Viburnum recognitum)	American Elm (Ulmus americana)
Red Maple (Acer rubrum)	Greenbrier (Smilax rotundifolia)

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 8 consists of a large, forest dominant, hillside seep system. This wetland drains northeast to southwest within a broad forest block located west of an open agricultural field (corn crop). Interior to the wetland is a narrow intermittent stream that drains to a culvert under a residential driveway to the west. Portions of the wetland do encroach into the edge of an old field/early successional scrub/shrub area to the south.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 9	
Flag #'s:	WF 9-01 to 9-35	
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: None		

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: None		

WATERCOURSE TYPE:

Perennial ☒	Intermittent ☐	Tidal ☐
Watercourse Name: Unnamed tributary to Lewis Pond		
Comments: broad perennial watercourse channel (2 to 4 feet wide) draining east and south		

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 ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Red Maple (Acer rubrum)	American Elm (Ulmus americana)
Sphagnum moss (Sphagnum spp.)	Spicebush (Lindera benzoin)
Sweet Pepperbush (Clethera alnifolia)	Greenbrier (Smilax rotundifolia)
Winterberry (Ilex verticillata)	

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 9 consists of a complex of bordering forested wetlands with an interior perennial watercourse. This interior perennial stream is unnamed but drains east and west into a large open waterbody identified as Lewis Pond, located off the subject property. The watercourse bottom is made up of a mix of stone/cobble with well incised banks. Bordering wetlands to the watercourse consists of complex of forest and open field. Forested areas are comprised of broad hillside seep areas. The open field bordering wetlands are a result of maintained open pasture for cows. This clearing extends directly up to the banks of the watercourse.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 10	
Flag #'s:	WF 10-01 to 1-17	
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 10 drains from a culvert under Interstate 95 as an intermittent watercourse and hillside seep system.		

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: None		

WATERCOURSE TYPE:

Perennial ☐	Intermittent ☒	Tidal ☐
Watercourse Name: Unnamed		
Comments: Bottom consists of a very stony, narrow watercourse feature (1 - 2 feet wide) draining from under Interstate 95.		

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 ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Red Maple (Acer rubrum)	Spicebush (Lindera benzoin)
Sweet Pepperbush (Clethera alnifolia)	Sphagnum moss (Sphagnum spp.)
Sensitive Fern (Onoclea sensibilis)	Greenbrier (Smilax rotundifolia)
American Elm (Ulmus americana)	

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 10 consists of a complex of several narrow hillside seep system, an interior intermittent watercourse, and drainage along and from Interstate 95. Wetland 10 drains from offsite to the north under Interstate 95 via a culvert outfall and drains south and east within a shallow channel that focused to an intermittent watercourse. This feature drains back north butting up against Interstate 94 again and draining along and under the highway to the east. A secondary hillside seep system drains north into this complex along Interstate 95.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 11	
Flag #'s:	WF 11-01 to 1-05	
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 11 is a small isolated depressional pocket at the edge of an open field with artificial compaction that is artificially creating wetland hydrology.		

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: None		

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 ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Broad-Leaf Cattail (Typha latifolia)	

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 11 consists of a very small isolated wetland depressional pocket at the edge of an open agricultural field. This wetland occurs just northeast of Wetland 4 within the open agricultural field, directly adjacent to both forested portions of Wetland 4 and the existing dirt farming access road. This wetland seasonally holds ponded water due to a compacted subsurface from the farming activity. This area does not appear to retain sufficient inundation to support vernal pool breeding habitat.

Wetland Delineation Field Form

Wetland I.D.:	Wetland 12	
Flag #'s:	WF 12-01 to 12-26 AND 12-50 to 12-103	
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: Broad seep system with an earthen dam that restricts flows south resulting in seasonal ponding.		

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: Complexes of emergent areas to the north, edge and transitional scrub/shrub areas throughout, and forested areas to the south with altered edges from varying degrees of historic agricultural activities.		

WATERCOURSE TYPE:

Perennial ☐	Intermittent ☒	Tidal ☐
Watercourse Name: Unnamed		
Comments: Bank consists of 8-10 wide with a sandy/cobble bottom.		

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 ☐
If no, describe field identified soils		

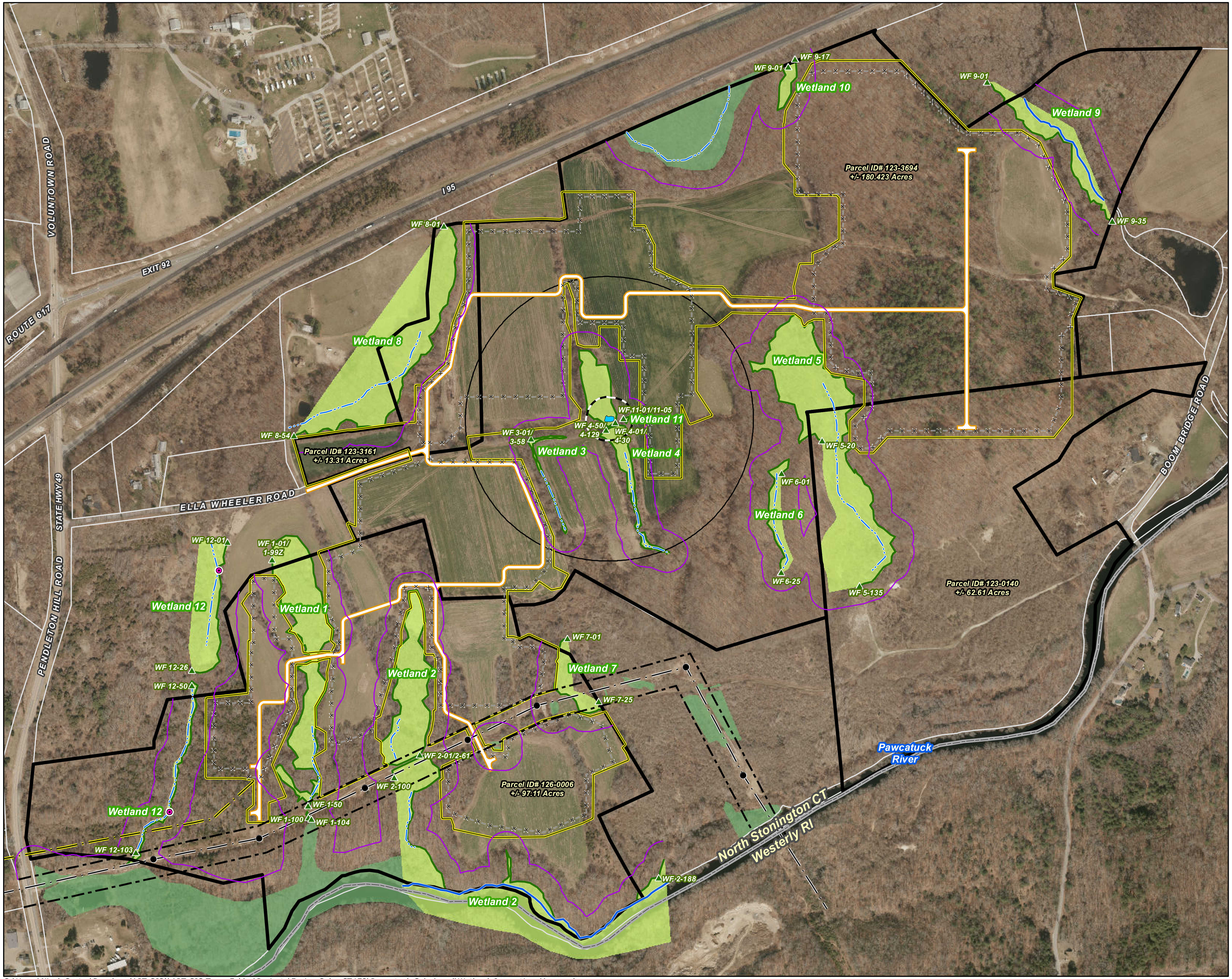
DOMINANT PLANTS:

Multiflora Rose* (Rosa multiflora)	Red Maple (Acer rubrum)
Reed Canarygrass* (Phalaris arundinacea)	Soft Rush (Juncus effuses)
Spicebush (Lindera benzoin)	Winterberry (Ilex verticillata)
Sweet Pepperbush (Clethera alnifolia)	American Elm (Ulmus americana)
Silky Dogwood (Cornus amomum)	Greenbrier (Smilax rotundifolia)
Sphagnum moss (Sphagnum spp.)	

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 12 consist of a large complex hillside seep wetland system that drains north to south along the western extents of the Study Area. The wetland starts along Ella Wheeler Road as a mix of scrub/shrub and emergent vegetation types. An interior intermittent watercourse occurs within Wetland 12 draining from north to south. Several culvert crossings occur within Wetland 12 from historic crossings. At one point, a large earthen berm creates a break in the wetland. At this location, hydrology is restricted resulting in an area of seasonal inundation identified as Voluntown Road Pond. Hydrology is conveyed beneath this berm via a large culvert. This wetland eventually drains south into a 'French mattress' crossing under the transmission corridor and off the Study Area. Southern extents of the wetland are dominated by forest with dense multiflora rose understory. In addition, the southern extents of the intermittent watercourse become very well incised with little to no bordering wetlands.



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Wetland Inspection Map
Proposed Pawcatuck Solar Center
Ella Wheeler Road
North Stonington, Connecticut

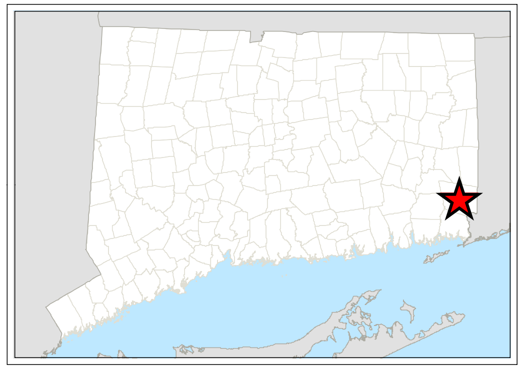
Legend

- Site
- Perimeter Fence
- Project Area
- Access Road
- Proposed Overhead Tie Line Corridor
- Transmission Tower
- Transmission Line
- Aproximate Transmission Right-of-Way
- Wetland Flag
- Delineated Wetland Boundary
- 100' Wetland Buffer
- Delineated Wetland Area
- Approximate Wetland Area
- Perennial Watercourse Bank
- Intermittent Watercourse
- Vernal Pool
- 100' Vernal Pool Envelope
- 750' Critical Terrestrial Habitat
- Approximate Parcel Boundary (CTDEEP)
- Town Line
- State Line

N W E S

500 250 0 500 Feet

1 in = 500 ft



ALL-POINTS TECHNOLOGY CORPORATION

Map Sources:

Ortho Base Map: CTECO 2016 Aerial Imagery

Elevation contours derived from 2000 LiDAR data provided by CTECO

Map Date: April 2018

APPENDIX B

REMA Vernal Pool Habitat Investigation

REMA

- Ecology
- Soil & Wetland Studies
- Water Quality Monitoring • GPS
- Environmental Planning & Management
- Ecological Restoration & Habitat Mitigation
- Aquatic, Wildlife and Listed Species Surveys
- Application Reviews • Permitting & Compliance

May 3, 2018

Pawcatuck Solar Center, LLC
PO Box 2055
Charlottesville, VA 22902

ATTN: Ben Combs, Director, Development Engineering

RE: **VERNAL POOL HABITAT INVESTIGATIONS**
Pawcatuck Solar Center, Ella Wheeler Road, North Stonington, CT
REMA Job No.: 17-1966-NST3

Dear Mr. Combs:

At your request, Rema Ecological Services, LLC (REMA), conducted investigations at a vernal pool habitat, associated with the above-referenced energy proposal. Our first, pre-breeding season investigation took place on January 19th, 2017, while the breeding season investigation was conducted on April 12th and 13th, 2017.

1.0 INTRODUCTION

The amphibian breeding pool is located within a relatively narrow wooded strip bordered by active agricultural fields, just northerly of an established farm road, and southerly of a wooded swamp (see Figure 1, attached). Access to the pool was gained from Ella Wheeler Road, and an existing unpaved farm road. The amphibian breeding pool is roughly 1,000 feet easterly of the eastern terminus of Ella Wheeler Road. The pool, which is located in the central portion of the overall development site, encompasses approximately 277 acres. It is an abandoned, man-made agricultural pond, which served the original farm homestead, based on archived aerial photographs (e.g. 1934, 1951, and 1965).

2.0 PRE-SEASON INVESTIGATION

On January 19th, 2017, the vernal pool habitat was roughly 40' by 70' in size (i.e. 2,800 sq. ft.). It was filled to capacity and overflowing over the farm road, flowing southerly to an intermittent watercourse and narrow forested wetland corridor immediately to the south (see attached annotated photographs Photos 1 to 14). The overflow at the time was due to snowmelt during the previous 48 hours, as temperatures were above normal for the season, even during evening hours.

Approximately 80% of the pool was covered with ice, 2 to 3 inches thick. Depth of inundation averaged 22 to 24 inches, with a maximum depth of 28 inches, near the geographical center of the pool. Probing of the pond substrate revealed a minimum of 3.5 feet of loose to somewhat firm silty organics. This indicates that the pond was deeper in the past, but it has gradually filled in with decaying plant and algal material, and sediment bearing runoff from the agricultural fields within its watershed (see Figure 2).

The input of turbid, silt laden water was observed entering the pool from the field immediately to the northwest (see attached photos), as snowmelt runoff bypassed the wooded swamp to the north of the pool. It is highly likely that fine sediment discharges to this pond take place on a seasonal basis, especially when the fields have been recently plowed, and before a cover crop has been established. Other likely inputs to this pool are excess pesticides and herbicides, particularly from crops such as corn, grown in the fields during the 2016 season[1]. It should be noted that the watershed to the pool is approximately 20.5 acres, of which the great majority is in active agriculture (see Figure 2).

No macroinvertebrates (e.g. larvae of aquatic insects, snails, fingernail clams, etc.) or amphibian larvae (e.g. green frog tadpoles) were collected during 15-20 sweeps with an aquatic net. Much of the pool contained dense mats of filamentous green alga, and remnants of emergent vegetation from the end of the previous growing season. This included perennials, such as false nettle (*Boehmeria cylindrica*) and willow-herbs (*Epilobium* spp.), and annuals such as sticktights (*Bidens frondosa*), and smartweeds (*Polygonum* spp.). The presence of such plant materials throughout the pool would indicate that standing water is not maintained past mid-summer of a normal precipitation year.

As mentioned above, this old agricultural pond is associated with a wooded swamp and, therefore, a wooded and scrub shrub fringe surrounds the pool on three sides, except to the south where the unimproved agricultural road is located. Dominant overstory vegetation observed during the pre-season visit included red maple (*Acer rubrum*), green ash (*Fraxinus pensylvanica*), and American elm (*Ulmus americana*). The woody understory is locally dense and includes such species a multiflora rose (*Rosa multiflora*) (invasive), northern arrowwood (*Viburnum recognitum*), silky dogwood (*Cornus amomum*), Morrow's honeysuckle (*Lonicera morrowii*) (invasive), and Japanese honeysuckle (*Lonicera*

[1] Based on aerial photography row crops, including corn, have been cultivated in the surrounding fields since at least 2011. A corn crop was verified only for 2016.

japonica) (invasive liana). Herbaceous species observed at the pool perimeter, in addition to those mentioned from the pool proper, included soft rush (*Juncus effusus*), goldenrods (*Solidago* spp.), sedges (*Carex* spp.), grasses (*Poa* spp.), and asters (*Symphyotrichum* spp.), to name a few.

Wildlife observed directly or through sign on January 19th, 2017 at the pool, or immediate surroundings, included American robin (*Turdus migratorius*), willow flycatcher (*Empidonax traillii*), Carolina wren (*Thryothorus ludovicianus*), tufted titmouse (*Baeolophus bicolor*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), and white-tailed deer (*Odocoileus virginianus*).

3.0 BREEDING SEASON INVESTIGATION

3.1 Results

The site's vernal pool habitat was visited in the mornings of April 12th and 13th, 2017. The undersigned was accompanied by REMA natural resources specialist Tony Ianello. As observed during the pre-season investigation, the pool was filled to capacity and overflowing southerly over the farm road (see attached annotated photographs; Photos 15 to 26). The overflow at the time was due to recent rainstorms[2].

We methodically searched the pool, first from its perimeter, then by entering it. Traversing the pool would result in turbidity due to the significant accumulated silt associated with agricultural runoff.

On April 12th, ***146 spotted salamander*** (*Ambystoma maculatum*) egg masses and ***6 wood frog*** (*Lithobates sylvaticus*) egg masses were counted at the pool (one small raft). Other amphibian observations included 2 sets of eastern toads (*Anaxyrus americanus*) in amplexus (see Photo 24), 2 adult spotted salamanders (both male) (see Photo 23), and at least two spring peepers (*Pseudacris crucifer*) based on vocalizations. The wood frog egg masses had hatched within the last day or two, and the larvae were located within or near the gelatinous remnants of the egg masses.

A sizeable sediment delta was observed at the northwestern edge of the pool (see Photo 17). The overflow from the pool was not turbid at the beginning of the survey but was somewhat turbid once the pool was entered. Before entering the pool several water quality parameters were measured using a pre-calibrated YSI 556 MPS electronic meter. The temperature was 12.5 Celsius, pH was 7.32, conductivity was 193 µS/cm, dissolved oxygen was 12.36 mg/l, and oxygen reduction potential (ORP) was +116.8 mV. Compared to other

[2] Approximately 3.01 inches of rainfall had fallen in the general vicinity of the site within the 10 day period before the pool investigations.

vernal pools in the region, both the pH and conductivity were somewhat elevated, likely the result of the agricultural runoff.

Five (5) un-baited minnow traps were set in the pool overnight (see Photo 25) and were collected the following morning (April 13th). Additional sweeps with an aquatic net did not reveal any additional amphibian species. One more spotted salamander adult was netted. With the exception of several aquatic invertebrates, such as water boatmen, and predaceous diving beetles, no amphibians or amphibian larvae were captured in the traps. Several strings of eastern toad eggs were observed within the pool.

No additional plant observations were made during the breeding season survey. Wildlife observed during the survey included cowbird (Photo 26), tufted titmouse, red-bellied woodpecker, wood pewee, blue jay, catbird, American robin, and chipping sparrow.

3.2 Discussion

The relative scarcity of wood frog compared spotted salamander egg masses at the subject pool during the 2017 breeding season survey, is in all probability due to the agricultural runoff, which likely includes residues and the breakdown products of pesticides and herbicides used in the adjacent corn fields or other row crops. While wood frogs can develop some resistance to agricultural chemicals it may take several generations and a more robust population than observed at the site (Robinson et al. 2017[3]).

Spotted salamanders may also be susceptible to agro-chemicals entering breeding pools, but being significantly longer-lived than wood frogs have a competitive advantage. If reproduction is adversely affected for a few years, when row crops such as corn is grown in the fields within the watershed of the breeding pool, recovery can take place during years the land is left fallow or just hayed.

Figure A shows the "vernal pool envelope" (VPE) and the "critical terrestrial habitat" (CTH) per the methodology described in *"Best Development Practices, Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States"* (Calhoun and Klemens, 2002; a.k.a. BDP). According to the BDP this is a Tier 1 pool, that is, of the highest rank, due to the fact that the pool had two indicator species present, and/or at least 25 egg masses of either species.

With regards to the VPE, which is the first 100 feet from the edge of a breeding pool, for this pool it includes the existing farm road and portions of agricultural fields both to the

[3] Stacey A. Robinson, Sarah D. Richardson, Rebecca L. Dalton, France Maisonneuve, Vance L. Trudeau, Bruce D. Pauli, Stacey S.Y. Lee-Jenkins. Sublethal effects on wood frogs chronically exposed to environmentally relevant concentrations of two neonicotinoid insecticides. Environmental Toxicology and Chemistry, 2017; DOI: 10.1002/etc.3739

southwest and to the east. We estimate that ±***0.5 acres*** or 50% of the ±***1 acre*** VPE is in agricultural field.

With regards to the CTH, which is the next 650-foot wide zone past the VPE, out to 750 feet from the edge of the pool, of its ***42 acres*** only ±***6 acres*** or 14% is forested or scrub shrub. Roughly ±***34.5 acres*** or 82% of the CTH is agricultural fields.

Given the high proportion of unsuitable terrestrial habitat within the CTH, which the obligate amphibians will readily traverse given the right conditions, it appears likely that the bulk of the spotted salamanders use terrestrial wooded habitat that is further away than 750 feet from the pool.

As seen in Figure A, potentially suitable forested habitat within the CTH occurs immediately to the north and south of the breeding pool, and is associated with a forested wetland (north) and its outlet intermittent stream wooded corridor (south). However, optimal forested habitat for the terrestrial phase of both obligate amphibians, but particularly for the spotted salamanders, occurs to the east, southeast, and south of the pool. In fact, a substantial, contiguous forest block occurs outside of the CTH, both within the development site and off-site, at the same compass directions. It is this forest that in all likelihood contributes the bulk of breeding spotted salamanders.

4.0 POTENTIAL IMPACTS TO VERNAL POOL AMPHIBIANS & MITIGATION

Most often the Calhoun and Klemens (2002) (i.e. the BDP) is used to assess potential post-development impacts to vernal pool amphibians, in this case from the development the Pawcatuck Solar Center, and to plan for vernal pool conservation. However, given the abundance of spotted salamanders and the relative shortage of suitable terrestrial habitat within the 650-foot wide "critical terrestrial habitat" zone (CTH), the BDP, while a useful planning tool, is not entirely applicable to the subject breeding pool.

Based on our surveys and analysis, REMA has developed a strategy that will ensure that the amphibian breeding pool will be *conserved* in the post-development phase. The elements of this strategy includes: (1) *avoidance* and *minimization* of forested terrestrial habitat taking, (2) *restoration* of the VPE, (3) *preservation* and *enhancement* of pool hydrology and water quality, (4) *timing* of development activities, and (5) post-development *management*.

Figure B (attached) shows the optimal forested and scrub shrub habitat to be preserved, post-development, both with the CTH as well as within the development site, proximal to the breeding pool (also see previous section). Pre-development there are ±6 acres of forested and scrub/shrub habitat within the CTH, which is maintained in the post-development condition. Note that a small area of the windrow north of the Vernal Pool, but outside of the associated forested wetland, will be selectively cleared for shading purposes (approximately 0.4 acres). This area is not considered to provide optimal terrestrial forested habitat for amphibians, in part due to past-disturbance associated with agriculture and, therefore, would not likely have an adverse effect on the existing vernal pool breeding population.

Within the subject property itself, a substantial acreage of contiguous forested habitat, including within the CTH, will be left intact post-development, to continue providing suitable terrestrial habitat for vernal pool amphibians (also see Environmental Assessment prepared by All Points Technology Corp. for contiguous forest block details). The above discussion details the *avoidance* and *minimization* strategy.

The *restoration* of VPE entails two elements. First, the sections of field to the east and southwest that fall within the VPE will be planted using the New England Roadside Matrix Seed Mixes (Upland & Wetland, depending on location). Second, the section of the existing farm road that falls within the VPE will similarly be planted using the New England Roadside Matrix Seed Mixes[4].

The *preservation* and *enhancement* of pool hydrology focuses on the existing outlet of the breeding pool over the farm road. REMA recommends that a stable channel be provided measuring 2.5 feet in width and 1.0 in depth, lined with natural stone and boulders. The "invert" of the outlet channel should be set 3 to 4 inches higher than the existing low spot on the farm road. This will allow the pond level to be slightly higher than presently without any adverse impacts to vegetation. This work should be done during the low flow period of the summer season. Additionally, also in the late summer season, the sediment delta that has formed at the discharge to the pool from the agricultural fields to the west and northwest should be removed using hand tools. This is a roughly 10' x 10' area, and sediment can be removed to approximately 2 feet for a total of about 7.4 yards.

The *enhancement* of pool water quality will take place mostly by virtue of cessation of agricultural activities within the pool's watershed, which have been contributing sediment and agri-chemicals to the pool. Additionally, following development and stabilization of this area, field conditions will be evaluated to determine if one of the temporary stormwater basins should be converted to a permanent basin in the event that there continue to be any water quality concerns that may affect the vernal pool. Note that in order to prevent the

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[4] Use the New England Conservation/Wildlife Mix (New England Wetland Plants, Inc., Amherst, MA), at a rate of 35 lbs per acre.

proposed stormwater basins from functioning as "decoy" vernal pools, the stormwater management system has been intentionally designed to minimize the hydroperiod of basins and this would be maintained for any permanent basin conversion, such as through the use of a basin underdrain.

The *timing* of construction activities can have a detrimental effect upon the amphibian population. Therefore, we recommend that no construction activities take place within the CTH during the immigrating period for spotted salamanders, that is, between March 15th and April 30th. While some mortality of emerging neomorphs would be expected July through September, mortality to the adult breeding population would be greatly minimized.

Post-construction *management* would be limited to the timing of grass cover mowing associated with the solar arrays. First, we would recommend that a "low-mow" grass seed mix be utilized such as those with creeping red fescues[5]. Second, we would recommend that mowing not take place, within the CTH, during the peak of immigrating and emigrating movements of amphibians to and from the breeding pool: March 15th to April 30th, and July 1st to September 15th.

5.0 CONCLUSION

It is our professional opinion that with the implementation of the mitigation strategies detailed above, including diligent management during the operation of the energy facility, the breeding population of obligate amphibians utilizing the site's vernal pool habitat will be *conserved* in the post-construction phase.

Please feel free to contact us with any questions on the above.

Respectfully submitted,

REMA ECOLOGICAL SERVICES, LLC

George T. Logan, MS, PWS, CSE
Registered Soil Scientist/Professional Wetland Scientist
Certified Senior Ecologist

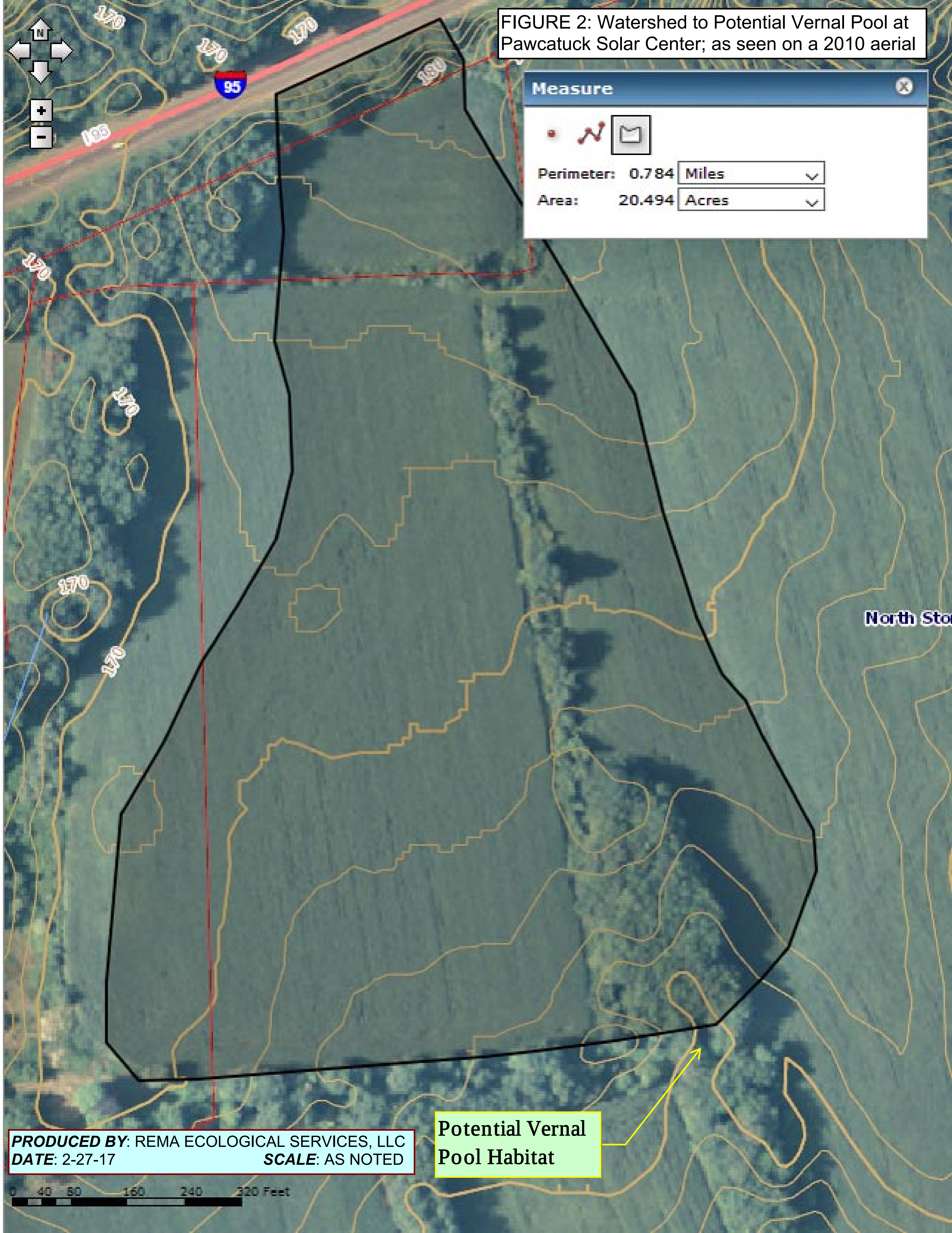
Attachments: Figures 1, 2, A, and B; Annotated Photos (1-26); Professional Resume

[5] Annual rye grass can be used with a "low-mow" seed mixture for quick establishment and stabilization.

FIGURE 1: Potential Vernal Pool at Pawcatuck Solar Center; as seen on a 4-7-13 aerial photograph (Google Earth)

PRODUCED BY: REMA ECOLOGICAL SERVICES, LLC
DATE: 2-27-17 ***SCALE***: NTS

FIGURE 2: Watershed to Potential Vernal Pool at Pawcatuck Solar Center; as seen on a 2010 aerial



PRODUCED BY: REMA ECOLOGICAL SERVICES, LLC
DATE: 2-27-17 **_SCALE_**: AS NOTED

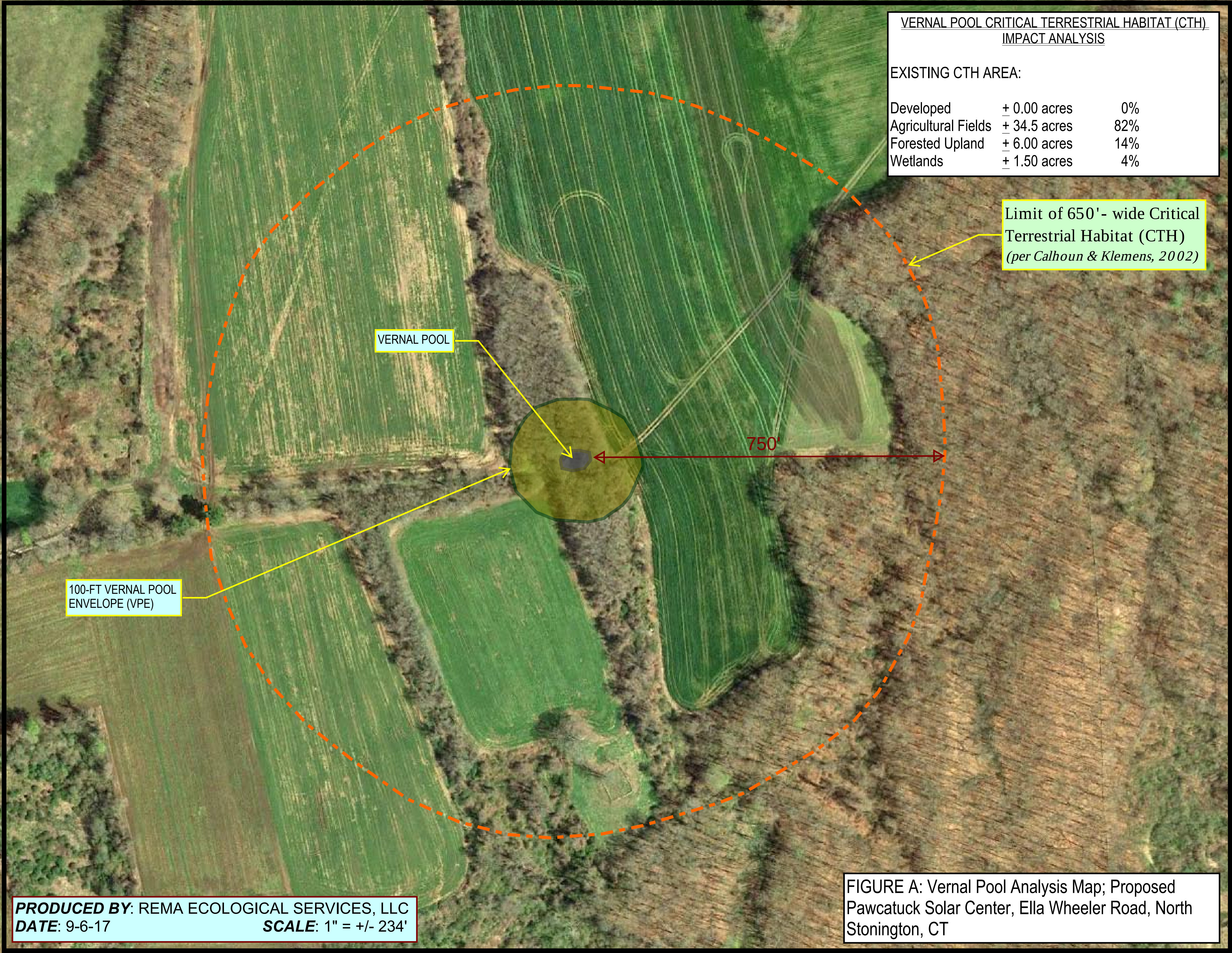


FIGURE A: Vernal Pool Analysis Map; Proposed Pawcatuck Solar Center, Ella Wheeler Road, North Stonington, CT

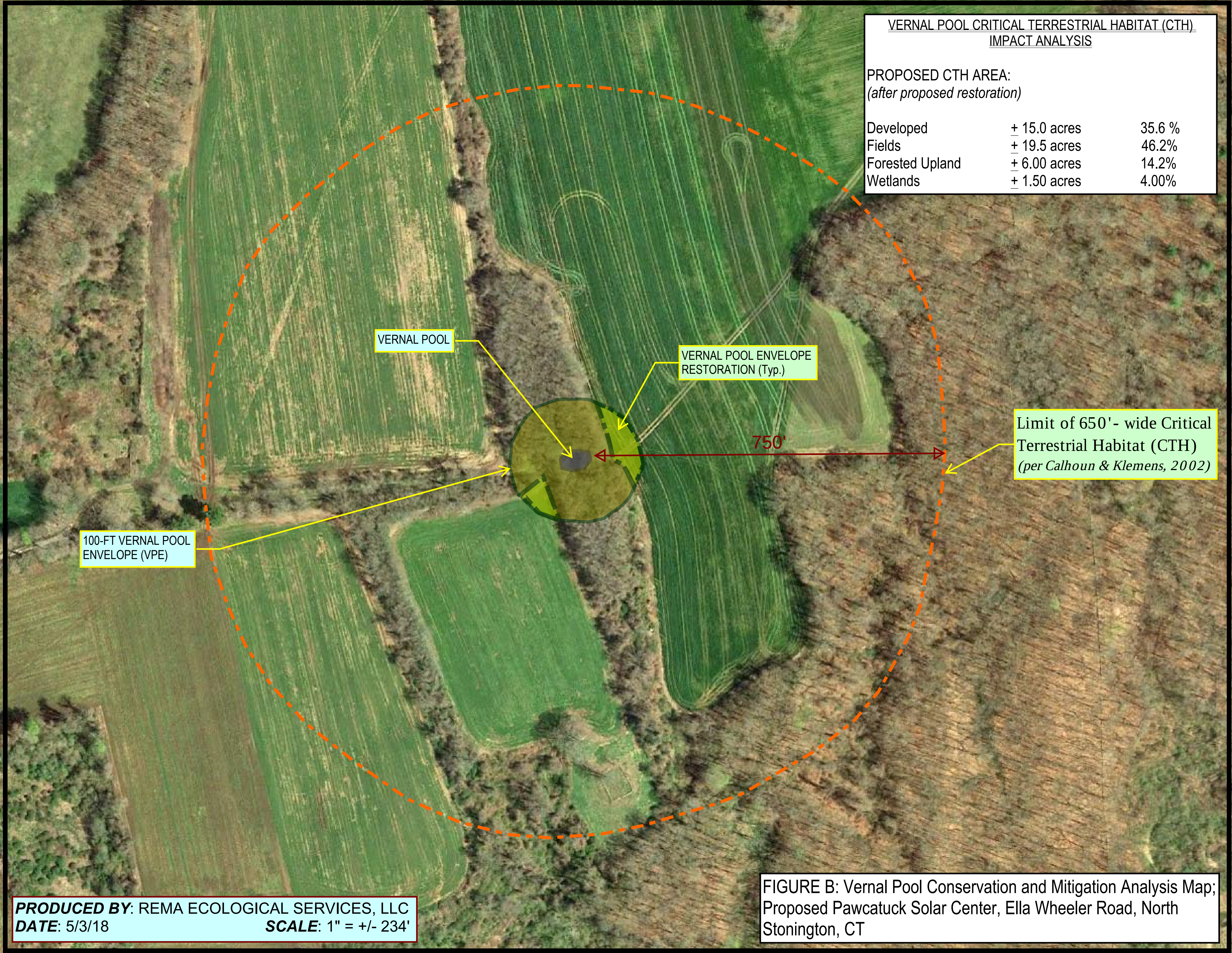


FIGURE B: Vernal Pool Conservation and Mitigation Analysis Map; Proposed Pawcatuck Solar Center, Ella Wheeler Road, North Stonington, CT

Pawcatuck Solar Center, Ella Wheeler Road, North Stonington, CT
Photos taken February 19th, 2017, by REMA Ecological Services, LLC

Photo 1: Old Farm Pond by farm road; facing northeasterly

Photo 2: Farm Pond; facing northerly

Photo 3: Filamentous alga and stems of emergent plants dominate pond

Photo 4: Farm Pond; deepest area: 26 to 28 inches; facing northwesterly

Photo 5: Pond overflow over farm road (snow melt); facing easterly

Photo 6: Intermittent watercourse forms just below farm road; facing southerly

Photo 7: Dip-netting only brought up alga and plant stems, such as sticktights and false nettle.

Photo 8: Silty snow melt entering pond from western field; facing southerly

Photo 9: Close-up of silty snow melt runoff entering farm pond

Photo 10: Forested wetland just above farm pond; facing southwesterly

Photo 11: Forested wetland above (north; upstream) of Farm Pond; facing northwesterly

Photo 12: Corn field in the watershed of farm pond and forested wetland; facing northerly

Pawcatuck Solar Center, Ella Wheeler Road, North Stonington, CT
Photos taken February 19th, 2017, by REMA Ecological Services, LLC

Photo 13: Corn field to the west of farm pond and forested wetland; the bear soil area is where silty water enters the tree line and flows to farm pond; facing northerly

Photo 14: A roughly 120 degree panoramic of the western field, most of which is within the watershed to farm pond; facing northwesterly to easterly

Photo 15: Old Farm Pond vernal pool habitat, just north of farm road; facing easterly

Photo 16: Vernal pool habitat was full and overflowing over the farm road during the field inspection; facing southeasterly

Photo 17: A large sediment delta, up to two feet thick, has impacted the vernal pool habitat; facing southeasterly

Photo 18: Vernal pool habitat overflows to intermittent stream wooded corridor just below farm road; facing southerly

Photo 19: Small wood frog egg mass raft; recently hatched

Photo 20: Wood frog larvae; recently hatched

Photo 21: Spotted salamander egg masses; eastern section of pool

Photo 22: Attached spotted salamander egg mass

Photo 23: One of several adult spotted salamanders observed on 4-12 and 4-13-17 within the vernal pool habitat

Photo 24: Eastern toads in amplexus at vernal pool habitat

Photo 25: Several minnow traps were set up in the pool overnight on 4-12-17

Photo 26: Cowbird on pool perimeter; one of several other vertebrates recorded at the pool on April 12, 2017

PROFESSIONAL RESUME

George T. Logan, MS, PWS, CSE

Principal Environmental Scientist/Senior Ecologist

EDUCATION:

M.S. Natural Resources, *Wildlife Management & Conservation Biology*, University of Rhode Island, Kingston, R.I., 1989.

B.S. Natural Resources, *Wildlife Management & Wetlands Ecology*, University of Rhode Island, Kingston, R.I., 1986.

Continuing Education

The Transportation Project Development Process: Training in the PennDOT Environmental Impact Statement Handbook, Harrisburg, PA, January 1994

Rapid Bioassessment Protocols of Aquatic Systems (EPA Protocols), Wetland Training Institute, Williamsport, PA, August 3-6, 1993

CERTIFICICATIONS: *(current)*

Certified Senior Ecologist *(2005, 2014)* - Ecological Society of America

Certified Professional Wetland Scientist (No. 581) *(1994)* - Society of Wetland Scientists

Registered Soil Scientist *(1989)* - Society of Soil Scientists of Southern New England

Certified Associate Wildlife Biologist *(1989)* – The Wildlife Society

EXPERIENCE:

Mr. Logan is the Co-Owner and *Principal Environmental Scientist* and *Senior Ecologist* for Rema Ecological Services, LLC. He specializes in tidal and inland wetland delineations and evaluation, permitting, wetland mitigation design, implementation and monitoring, and the preparation of environmental compliance documents in accordance with national (NEPA), state (e.g., CEPA, MEPA), and local criteria and guidelines. He also provides design, construction supervision and implementation for a wide variety of habitat restoration and enhancement projects. Mr. Logan performs watershed-wide and surface water quality evaluations and provides guidance in the design of stormwater Best Management Practices (BMPs), including stormwater wetlands and bioretention basins, as well as for LID (low impact development) practices.

Mr. Logan has over 29 years of experience as a wildlife biologist/ecologist conducting wildlife habitat evaluations and focused avian, mammalian, invertebrate, and herpetofaunal surveys using both active and passive methods. He frequently conducts targeted surveys for sensitive, rare, and "listed" species (i.e. endangered, threatened, special concern), and aquatic biosurveys to assess the biodiversity and biotic health of ponds, lakes, vernal pools, rivers, and streams. Mr. Logan has extensive experience in performing herpetological surveys, including over 230 vernal pool investigations and evaluations.

Mr. Logan has participated in over 2,400 individual projects in New England and the Mid-Atlantic States and in 159 of 169 municipalities in Connecticut.

Professional Resume: *(continued)*

George T. Logan, MS, PWS, CSE

PROFESSIONAL AFFILIATIONS:

Society of Soil Scientists of Southern New England
Society of Wetland Scientists
Association of Massachusetts Wetland Scientists
Ecological Society of America
The American Birding Association
The Wildlife Society
Soil & Water Conservation Society
Connecticut Association of Wetland Scientists (CAWS) *(Past-President, Charter member)*

PUBLICATIONS: *(selected)*

Logan, G.T. & S.N. Gadwa. 1999. Quinnipiac River Watershed Association Stream Study. Water Quality in the Quinnipiac River. Proceedings of a Symposium on the Impact of Nonpoint Source Pollution in the Quinnipiac River Watershed, pp. 66-70.

Logan, G.T. & S.N. Gadwa. 1998. Stream Biosurveys: *A Primer.* Quinnipiac River Watershed Association Educational Series for the Adopt-the-River Programs.

Pawlak, E.M. & G.T. Logan. 1996. Town of Cromwell Wetland Evaluation Project. Connecticut Association of Conservation and Inland Wetlands Commissions. The Habitat, Vol. 10:1

Logan, G.T., F.B. Titlow & D.G. Schall. 1995. The Scientific Basis for Protecting Buffer Zones. Proceedings of the 16th Annual Meeting of the Society of Wetland Scientists.

Pawlak, E.M. & G.T. Logan. 1995. Town of Cromwell Wetland Buffer Zone Designation Methodology. Proceedings of the 16th Annual Meeting of the Society of Wetland Scientists.

Logan, G.T., J.H. Brown, Jr., T.P. Husband & M.C. Nicholson. 1994. Conservation Biology of the Cretan Agrimi (*Capra aegagrus cretensis*). Biologia Gallo-Hellenica, Vol. 21, pp. 51-57.

Nicholson, M.C., T.P. Husband, J.H. Brown, Jr. and G.T. Logan. 1994. Implications of behavior on the management of the Cretan Agrimi (*Capra aegagrus cretensis*). Biologia Gallo-Hellenica, Vol. 21, pp. 45-50.

WORKSHOPS & CONFERENCES: *(selected)*

Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region. Corps Training Workshop. May 2011. *(sponsor, participant)*

Vernal Pools: *The Jewels of the Forest.* Technical Workshop for the Town of Southwick Conservation Commission. January 2005. *(Guest Lecturer)*

George T. Logan, MS, PWS, CSE

WORKSHOPS & CONFERENCES:
(selected)

The Importance of Habitat Edges. Riverside Landscaping Conference. The Rivers Alliance of Connecticut. June 1998. (*Guest Lecturer*)

Riparian Buffer Function, Performance & Limitations. Urban Riparian Buffers Conference & Technical Training Session. April 1999. *(Guest Lecturer)*

Sedimentation and Erosion Control Review Session. USDA. Natural Resource Conservation Service and CPESC (Certified Professionals in Erosion Control), Concord, NH. September 2001.

Buffer Strips as Storm Water Quality Controls. EnviroExpo, Boston. May 1999. *(Guest Speaker)*

Identifying Wetland Soils, Fauna and Flora. Municipal Inland Wetland Staff Technical Workshops. June 1999. *(Guest Speaker)*

Water Quality in the Quinnipiac River: A Symposium on the Impact of Non Point Source Pollution in the Quinnipiac River Watershed. November 1998. *(Presenter)*

Our Hidden Wetlands: Vernal Pools in Connecticut. Co-sponsored by CT DEP and the Center for Coastal and Watershed Systems. November 1997 and January 1998 *(Workshop Leader)*

Aquatic Invertebrate & Stream Ecology Workshop. Quinnipiac River Watershed Association Workshop Series. September 1997, May 1998, June 1999, January 2000 (*Workshop Leader*)

The Massachusetts Association of Conservation Commissions Third Annual Conference: Wetland Buffer Zones, March 1996 (*Guest Lecturer*)

16th Annual Conference of the Society of Wetland Scientists: Wetland Understanding, Wetland Education, May 1995 (*Presenter*)

Quinnipiac River Watershed Association Forum on Non-Point Pollution: Significance of Wetlands and Wetland Buffers, October 1992 (*Guest Lecturer*)

The Massachusetts Association of Conservation Commissions Second Annual Conference, April 1995 (*Guest Lecturer*)

The Society of Soil Scientists of Southern New England Riparian Buffer Zone Conference, November 1994 (*Presenter*)

Professional Resume: *(continued)*

George T. Logan, MS, PWS, CSE

SUPPLEMENTARY INFORMATION:

1996 to present

Rema Ecological Services, LLC
Principal Environmental Scientist/Ecologist, Co-Owner

- Founded the company to provide natural resources management, environmental planning, compliance and permitting services, and client advocacy throughout the Northeast.
- Has participated in nearly 2,000 individual projects since the company's inception, including six gas-fired, combined-cycle power plant projects, numerous municipal projects, including over 20 new schools, several higher education projects, numerous wetland replacement projects, several new golf courses, and many large residential, industrial and commercial endeavors.
- Was the Interim Environmental Planner for the Town of Waterford, Connecticut, during a ten-month tenure. Responsibilities included providing procedural and technical support to the town's Conservation Commission (a.k.a. Inland Wetlands and Watercourses Agency), and working closely with Planning Department staff.

1994 to 1996

Fugro East, Inc. *(Currently AECOM)*
Senior Project Manager/Environmental Scientist

- Office Manager for the firm's Connecticut office, responsible for day-to-day operations, marketing, and business development.
- Wetland delineations in accordance with state and federal criteria.
- Natural resource inventories of upland, wetland and aquatic ecosystems, specializing in wildlife habitat assessments.
- Preparation of environmental compliance documentation for over 100 projects including large-scale commercial development.

1993 to 1994

A.D. Marble & Company, Inc.
Senior Environmental Planner/Wildlife Biologist

- Participated in the management of major transportation improvement projects and in the preparation of environmental documents in accordance with the National Environmental Policy Act (NEPA) while continuing involvement in the collection of baseline field data.
- Application of the Pennsylvania Department of Environmental Resources (PADER) hierarchical methodology for the selection of suitable wetland replacement sites.
- Field verification of Threatened, Endangered or Special Concern species listed by the Pennsylvania Game Commission.
- Wetland boundary identification in accordance with the unified PADER and U.S. Army Corps of Engineers (USACOE) methodology.
- Participated in nearly 30 projects, mostly for major transportation corridors, such as the rehabilitation of the I-95 corridor in PA.

George T. Logan, MS, PWS, CSE

SUPPLEMENTARY INFORMATION *(continued)*:

1989 to 1993

Soil Science & Environmental Services, Inc.
Wildlife Biologist-Ecologist & Soil Scientist

- Project Manager responsible for field operations and report preparation for nearly 300 individual projects in over 75 towns in New England, including one town-wide wetland mapping, inventory and evaluation project (Town of Cromwell).
- Wetland boundary delineation according to state and federal criteria (e.g., Connecticut and Massachusetts Statutes, U.S. Army Corps of Engineers methodologies).
- Ecosystem analyses and biological inventories of upland areas, tidal and inland wetlands, estuaries, streams, rivers, ponds and lakes.
- Environmental impact evaluations, including site plan review, analyses of proposed impacts and design of mitigation strategies.
- Local, state and federal permitting for impacts to natural resources, including wetlands.
- Implementation of water quality monitoring programs for streams and rivers.
- Design, construction supervision, and monitoring of wetland enhancement, restoration and creation.
- Aquatic biosurveys of streams and rivers utilizing standardized methods (e.g. EPA Rapid Bioassessment Protocols).
- Detailed faunal surveys and censuses using both active and passive methods (e.g. direct and indirect observation, live-trapping, point count avian censuses, pellet counts, etc.).
- Expert witness testimony for court and administrative proceedings.

1988 to 1989

Independent Contracts
Soil & Wetland Scientist

- Summer of 1988: Was hired by the Town of Canton, CT to identify, inventory, and evaluate wetlands and watercourses within the entire municipality. Was responsible for amending the municipality's *Official Wetland and Watercourses Map*.
- Spring of 1988: Was hired by the Connecticut Chapter of the Nature Conservancy to determine and report on the historic expansion of invasive plants (*Phragmites australis*, *Lythrum salicaria*) on eight TWC preserves. Scope included site visits, remote sensing using archived aerial photographs, and report.

TECHNICAL REPORTS:

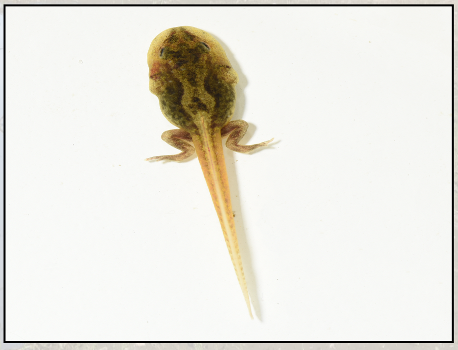
Mr. Logan has completed several hundred comprehensive studies (e.g. Wetlands Assessments, Ecological Evaluations, Environmental Impact Analyses/Statements, Vernal Pool Investigations, Listed-Species Surveys & Management Plans, aquatic vegetation surveys, and a variety of other specialized studies. A representative list of these technical reports can be provided upon request.

APPENDIX C

A Radio-telemetric Study to Guide Project Planning, Construction Phasing and Mitigation Initiatives for the Protection of the Eastern Spadefoot (Scaphiopus holbrookii)

Pawcatuck Solar Center

A Radio-telemetric Study to Guide Project Planning, Construction Phasing and Mitigation Initiatives for the Protection of the Eastern Spadefoot (*Scaphiopus holbrookii*)



Final Report 2017 Field Season

North Stonington, CT

Prepared for:
Davison Environmental, LLC

Prepared by:
Dennis P. Quinn
CTHerpConsultant, LLC

Table of Contents

FIGURES REFERENCED IN ENVIRONMENTAL ASSESSMENT DOCUMENT

Introduction

The Eastern Spadefoot (*Scaphiopus holbrookii*), the only member of the spadefoot family (Scaphiopodidae) east of the Mississippi River, is among the rarest amphibians in the northeastern United States. It is listed as Endangered under Connecticut's Endangered Species Act and designated as Most Important in Connecticut's Wildlife Action Plan for Species of Greatest Conservation Need (CT DEEP 2015). New England populations are scattered and disjunct, and typically found in low elevation river valleys with sandy, well-drained soils. Some of these already localized populations have been extirpated, presumably related to urban/suburban development (Klemens 1993). These extirpations likely resulted from impacts to their breeding pools, which are often not afforded wetland protection status due to their highly ephemeral nature and difficulty in detecting breeding activity of spadefoots. In eastern Connecticut spadefoot locations coincided with Hinckley Soils and elevations below 200 feet with two notable exception in the towns of Lisbon and Griswold where elevations are greater than 300 feet (Moran and Button 2011, Klemens 1993, D. Quinn, observations, 2016). Hinckley soils are sandy, gravelly, and well drained (NRCS, 2008), characteristics that are consistent with reports of soil types preferred by spadefoots.

Data on the movement patterns and habitat use/selection of spadefoots in the Northeast are sparse with a few exceptions, most notably Ryan *et al*. (*in preparation) and* Timm *et al*. (2014). Timm *et al*. (2014), found individuals selecting areas closer to deciduous shrub edges and areas with greater percent cover of low growing shrub species. Similar trends in habitat selection were found by Ryan *et al*. (*in prep)*, with burrow locations in, or at the edge of, open-canopy cover types with open soils and nearby patches of dense vegetation having soil temperatures warmer than those of randomly selected locations nearby. Timm *et al*. (2014), attributes habitat preferences to individuals seeking out locations that provide suitable burrowing substrates, cool and moist subterranean conditions, ample prey availability and protection from predators during nighttime foraging forays. Burrowing observed by Ryan *et al*. (*in prep)*, was consistent with Jansen *et al*. (2001) experimental selection of substrates, where spadefoots burrowed primarily in bare, sandy soils avoiding grassy areas all together presumably due to dense root systems prohibiting burrow excavation. Timm and Ryan documented similar trends in burrow use where on average 3.6 (range 1 to 8) and 3 (range 1 to 7) unique burrows were selected by individual spadefoots during the course of their studies. In addition, both studies showed similarities in duration of burrow use with many spadefoots using a single burrow for greater than 30 consecutive days and occasionally returning to previously used burrow locations. The selection of new burrow locations were often associated with nocturnal rain events (Timm *et al*., 2014 and Ryan *et al*., (in prep)). Timm *et al*. (2014), documented burrow depths up to 0.96 meters below the surface prior to November, no data on burrow depths were reported during winter months. Maximum Convex Polygon (MCP) home-range sizes for individuals were reported from 45–21,108 m^2 (mean = 4,729 m^2, max 61,391 m^2) with home-range lengths of 22.0–455.9 m (mean = 157.6 m) reported by Timm *et al*. (2014). Ryan *et al*. (*in prep)*, observed mean maximum straight-line distances of 155 ± 29 m (range 1–724 m) from the original point of release. Timm *et* *al*. (2014) reports average migratory distances from the closest breeding wetland of 130.4m. Timm *et al*. (2014) and Paton *et al*. (2003) report these migratory distances from wetlands as critical in the protection of amphibian populations, stating that the closer breeding pools are to roads, the greater the likelihood populations and metapopulations will be impacted by road mortality. Timm *et al*. (2014) associates the lack of breeding in wetlands within close proximity to park roads within his study site to be a result of past mortality events reducing spadefoot population size and the primary cause of local metapopulation extirpation at his site.

Background

Pawcatuck Solar Center, LLC ("Pawcatuck Solar") retained All-Points Technology Corporation, P.C. ("APT") to prepare an Environmental Assessment ("EA") for the proposed installation of a ground-mounted 15-megawatt AC ("MWac") solar-based electric generating facility in the Town of North Stonington, Connecticut. Due to the potential presence of eastern spadefoots within the proposed project area, APT contracted with Dennis Quinn of CTHerpConsultant, LLC to perform a study of this population to help guide the design, layout and mitigation initiatives to reduce any potential impacts resulting from this solar generating facility during and after the completion of construction. The Solar Facility will include approximately 61,000 photovoltaic ("PV") modules and associated ground equipment, a primary access road, perimeter maintenance/access roads and electrical interconnection facilities.

Due to the fossorial nature, cryptic habits and nocturnal activities of spadefoots we proposed a study with three primary objectives: 1) confirm spadefoot presence; 2) determine population movement patterns and site specific habitat use and; 3) track long-term population demographic trends. These three objectives will provide guidance for project planning of solar field layout, construction phasing and mitigation initiatives. Additionally, these objectives will achieve baseline pre-construction population data for comparison with post-construction data to evaluate the overall success of the projects conservation and management initiatives.

Methods

Presence/Absence was determined through Visual Encounter Surveys (VES) using eye-shine methodologies conducted over eleven days during optimal surveying conditions (rainy evenings with temperatures at about a minimum of 50 degrees Fahrenheit). All surveys and activities associated with the study were performed under Permit No. 1317004, unless otherwise noted. A team of three to four individuals conducted VES's using 1,000 lumen high-output LED headlamps in habitats optimal for locating spadefoots, focusing primarily along ecological edges, within agricultural fields and in forested habitat with sparsely vegetated understory. Although surveys were focused within optimal habitats, surveys were also conducted in habitats not often associated with spadefoot activity (i.e. forested wetlands). Visual encounter surveys typically began 15 minutes prior to sunset and continued until a drop-off in spadefoots activity was determined through a reduction in detection rates.

To determine population movement patterns and site specific habitat use all adult spadefoots captured were contained and implanted with radio-transmitters and Passive Integrated Transponder tags (PIT-tags). Population monitoring was conducted on 11 adults, with each spadefoot being re-located weekly during daytime hours by radio-tracking individuals to their burrows. At each re-location point a GPS coordinate was recorded along with general habitat data to create seasonal activity maps for guiding mitigation and management efforts for the Pawcatuck Solar Center. To track population demographics, a general age class was assigned to all encountered spadefoots as metamorph, juvenile, sub-adult or adult. Spadefoots masses were recorded to the nearest tenth of a grams and a snout-to-vent measurement in millimeters was recorded. The sex of all adult spadefoots was determined in the field an reconfirmed during the surgical implant procedure.

Surgical methods follow those of Ryan *et al*., (in prep). During the first season of this study (2009) performed in cooperation with the University of Maine, CTDEEP and CTHerpConsultant, LLC, Dennis Quinn was trained by Dr. Brad Timm to perform these surgical procedures.

The anesthetic was prepared by combining 0.40g of Tricaine mesylate (MS-222) with 500ml of deionized/distilled water and stirred until dissolved, using a 1000ml beaker placed in a container of ice. Sodium hydroxide (NaOH) was added to stabilize pH between 6.0 and 9.0. For sedation, spadefoots were placed in the anesthetic solution and observed for approximately 5 minutes until the spadefoot was completely anaesthetized (no response to any external stimuli). Once the no response stage was reached the spadefoot remained in the solution for an additional 1 to 1.5 minutes and monitored closely. Prior to surgical procedures, spadefoots were rinsed in distilled water and placed on a sterile surgical pad and the ventral surface was disinfected with 10% Povidone-iodine Topical Solution for animals. Using surgical scissors, a 1 to 2 cm incision on the ventral surface slightly lateral toward the posterior of the animal was made. During this time the transmitter (ATS model No. A2455 1.2g, 216 day life) was placed into an ethanol rinse along with the passive integrated transponder (PIT-tag: Biomark MiniHPT8 8.4mm) and sutures (PDS II, RB-1 taper, Size 5-0). Once the incision was ready to receive the transmitter and PIT-tag, they were removed from the ethanol rinse, washed in distilled water and implanted. Incisions were closed with 3-5 sutures. Once the surgical implantation procedures were complete, individuals were rinsed well with distilled water and a topical betadine solution was administered at the incision/sutured area. All individuals implanted with transmitters were isolated in Tupperware containers for a period of 12 to 24 hours to monitor their post-surgical condition, prior to their release at their original point of capture.

Results

Current Site Conditions

The ±225-acre Site is located east of Pendleton Hill Road (State Route 49), south of I-95, and north of the Pawcatuck River in North Stonington, New London County, Connecticut. The Site is identified by the North Stonington Tax Assessor as four separate and abutting parcels, including:

- Parcel 123-0140 – Boombridge Road - 62.62 acres
- Parcel 123-3161 – 36 Ella Wheeler Road - 13.31 acres
- Parcel 123-3694 – Ella Wheeler Road - 180.42 acres
- Parcel 126-0006 – 36 Pendleton Hill Road - 97.11 acres

The majority of the Project Area is undeveloped, open agricultural land. Intermixed between and surrounding the open agricultural land (most recently used for growing corn) are areas of forested uplands and wetlands. Wetlands on the Site consist of a complex of broad forested wetlands, interior intermittent and perennial watercourses, and isolated depressional pocket wetlands. Forested uplands are comprised of a mix of deciduous and coniferous forest types, primarily located within the eastern extents of the Site. The Site generally drains north to south ranging from moderate to steep slopes. The far southern boundary of the Site consists of an electrical overhead transmission corridor and the Pawcatuck River. The Site is entirely undeveloped with no structures (see Environmental Assessment: Figure 1. Existing Conditions Map).

Land use in the area of the Site consists of large wooded tracts and agricultural fields, the Interstate transportation corridor, commercial and industrial development, a gravel pit, sparse residential development, and open space.

Visual Encounter Survey Results

Night-time visual encounter eye-shine surveys were conducted on 11 nights starting May 22nd and ending October 29th, 2017, totaling a combined 60 survey hours (198 person hours). A total of 31 eastern spadefoots were encountered during nighttime surveys: 11 adults (8 females and 3 males); 2 sub-adults; 17 juveniles and; 1 metamorph toadlet (Table 1). One sub-adult was collected and submitted to the American Museum of Natural History as a site voucher specimen (MWK No. 20034 under Permit No. 0120004). One breeding pool was identified on May 22, although no adults were actively breeding many spadefoot tadpoles were observed. Toadlets were observed emerging from this pool on June 20th. Based on the developmental stage of the tadpoles observed on May 22, time to metamorphosis on June 20th and cumulative rainfall amount of 1.64 inches it is estimated that this breeding event took place between April 25th - 26th, 2017.

Adult spadefoots had an average mass of 20.7g (min 15/max 27.5g) and average STV length of 55.5mm (min 50.5/max 61.1mm)(Figures 1 and 2). The two sub-adults weighted 10.1g and 9.3g and measured 45.11mm and 43.12mm STV respectively. Juveniles had an average mass of 2.84g (min 1.30/max 5.30g) and STV length of 28.11mm (min 22.70/max 34.80mm). The metamorph toadlet weighed 0.5g and measured 14.53mm STV (Figures 3 and 4). Based on the biometrics of the 14 juveniles observed on August 8th, we were able to distinguish two distinct cohorts, one from the breeding on April 25th/26th, 2017 and one from a breeding during the fall of 2016 presumable in September based on historical weather data. The masses and STV lengths of the 2017 cohort were on average significantly less (2.32g and 26.58mm STV) than the 2016 cohort (4.77 and 33.70mm STV) (Figures 3 and 4). Additionally, documentation of emergence from the breeding pool (June 20th) and subsequent capture of the metamorph on July 20th, enabled us to calculate a rudimentary growth rate for the 2017 cohort, using the average of biometrics recorded on July 20th, August 7th and October 29th, which showed an increase in mass of 4.07g and STV length of 19.07mm during this four month period (Figures 5 and 6).

Radio-telemetry Results

Monitoring of adult spadefoots began on Many 22nd (date of first capture) and continued through October 29th, 2017. Of the 11 radio-tracked adults, 9 were successfully tracked to hibernation. One individual (PIT ID 1815) was confirmed dead, the cause of death is unknown but is likely attributable to either surgical complications or agricultural activities. The second individual (PIT ID 9141) could not be located past September 1st, the disposition of this individual is unknown, it could have had transmitter failure and still be alive or predated with the transmitter displaced outside of signal-reception distance. The remaining 9 spadefoots were re-located a total of 132 times, with individuals being re-located on average 14.6 times (min 8, max 20) depending on their initial date of capture (Table 1).

Population Range Results

The population range covered an area within a Minimum Convex Polygon (MCP) of 24 acres with individual MCP home-ranges averaging 0.87 acres (min 0.04, max 2.97) (Figure 7). Although individual home-ranges were variable in both this study and those reported by Timm *et al*. (2014), the average home-range size in both studies were similar. Hibernacula locations were on average 172.7 meters, straight line distance, from the breeding pool (min 76.8 m, max 269.2 m) and located within edge habitats, with the exception of one location within the forest. This average distance is slightly greater than that reported by Timm *et al*. (2014), although it is not clear if Timm measured the maximum distance from the breeding pool to hibernacula locations or just the furthest distance spadefoots were documented from the edge of the breeding wetland. Ryan *et al*. (*in prep)*, observed mean maximum straight-line distances of 155 ± 29 m (range 1–724 m) from the original point of release, which are similar to those observed in this study.

Habitats Use Results

The use of four primary upland habitats were documented between May 22nd and October 29th: agricultural, forest, agricultural/forest edge and forest/access road edge (Figure 8). During this period, 7.8% agricultural, 19.86% forest, 56.03% agricultural/forest edge and 16.31% forest/access road edge habitat use was observed from a total of 132 re-locations points (Figure 9). Spadefoots were documented in edge habitat at a much greater extent than any other available habitat, with a combined edge habitat use of 72.34%. Habitat use trends were similar to those reported by both Timm *et al*. (2014) and Ryan *et al*. (in prep). Because spadefoot activity is driven primarily by daily weather patterns and not seasonal changes in habitat structure or climate, we did not calculate season movement trends.

Spadefoot Management Plan

It may seem counter intuitive to suggest human altered lands present opportunity for conservation and management, especially for one of Connecticut's rarest amphibian species. This however, does not seem to be the case for the eastern spadefoot. For example, most spadefoots tracked in this study and in a similar study conducted by Ryan *et al*. (in prep), in Connecticut, found human-created habitat use within agriculture, gravel mining, detention basins and even residential development; including an artificially created breeding pool located in a suburban-style development. These data would suggest, under certain conditions, human altered landscapes may serve as important habitat for spadefoots and may bolster populations rather than hinder them especially when land owners are mindful of spadefoot presence and implement conservation and management strategies for their protection.

This project presents a unique opportunity to improve current land use practices that are posing significant threats to the long-term survivorship of this spadefoot population. During the 2017 field season the study team identified many agricultural activities including the application of herbicidal sprays, stockpiling of manure and site grading that impacted all life-stages of the spadefoot, but most significantly reproduction and larval development. These impacts first presented themselves during the late spring when the low-growing cover crop within the 100 acres of agricultural land was sprayed with herbicide prior to the June 29th sowing of corn. Additionally, chicken manure stockpiled at various locations across the site was broadcast over the fields prior to this planting. One of these stockpiles was located just west of the breeding pool and up until it's removal, leeched into the breeding pool already occupied by developing spadefoot tadpoles (Figure 10). Although the 2017 breeding was somewhat successful, the over-all water quality was compromised, resulting in a lower than expected survival rates of developing tadpoles. Many tadpoles were observed dead on the fringes of the breeding pool prior to metamorphosis. Further impacts to the breeding pool were observed on September 1st, when additional stockpiling of chicken manure began. The majority of this manure was stockpiled just north of the breeding pool between the active agricultural field and the forest. In the process of stockpiling this manure, the breeding pool was compromised by repeated traffic from agricultural equipment, leaving tire ruts within the pool depression. Additionally, the depression of the pool was inadvertently filled with chicken manure during this process. Although the manure was immediately removed from the breeding pool on September 29th and again in March prior to the 2018 breeding season, this impact coupled with the tire ruts, left the breeding pool hydrologically compromised and marginally suitable for reproduction. The study team will continue close monitoring of this pool in 2018 prior to its full restoration as part of the mitigation package during the construction phase of the project. To prevent further impacts during the 2018 field season the pool boundaries were marked with flags in and the farmer was notified to avoid activities within this area. In addition to the breeding pool documented during the 2017 field season, evaluation of the historic aerial imagery revealed at least two potential breeding areas that no longer occur on the landscape. When searching for these pools, it became apparent to the study team that they were at some stage inadvertently graded and are no longer hydrologically suitable to function as breeding pools for spadefoots.

It is the position of the study team that by improving current site conditions, through less impactful land use practices, creation and enhancement of available suitable habitats, protection of the breeding pool and surrounding upland, the solar facility being proposed by Pawcatuck Solar Center, LLC will likely reduce the current direct impacts on spadefoots and enhance the overall habitat quality for this species in the long-term. In order for this project to be successful the following restoration and protection measures must be implemented:

1. *Breeding Pool Restoration;*
2. *Enhancement of edge habitat areas;*
3. *Maintain solar array spacing of 20 feet between panel rows in limited area east of the breeding pool;*
4. *Habitat creation inside the No Build Zone;*
5. *Habitat Enhancement outside the No Build Zone;*
6. *Implementation of protective phasing measures during project construction;*
7. *Population monitoring post-construction to evaluate the success of mitigation and conservation initiatives*

For a detailed discussion of the mitigation package refer to section 3.10.1 Spadefoot Toad Impact Mitigation and Figure 5: Proposed Conditions Map in the Environmental Assessment report. These proposed mitigation initiatives were derived over the course of the study in close coordination with Dennis Quinn, Davison Environmental, LLC, All Points Technology Corporation and Pawcatuck Solar Center.

Implementation of Spadefoot Management Plan

All dates are based off currently proposed construction time-lines and subject to change. No changes in construction timing will impact the Spadefoot Toad Impact Mitigation Plan.

Pre-construction Population Monitoring (2018)

2018 Monitoring: During the 2018 field season continued visual encounter surveys will be conducted over the course of 10 optimal survey nights. For the remainder of the study all encountered spadefoots will either receive a PIT-tag or VIE-tag (Visible Implant Elastomer - Northwest Marine Technology) for future identification. Passive integrated transponders have size limitations and will only be implanted in sub-adult and adult individuals, all younger age classes will receive VIE-tags for future identification of cohorts. Radio-tracking of no more than 10 individuals will occur during 2018 monitoring. Only spadefoots that have not previously been tracked will receive transmitters. Monitoring during the 2018 field season is designed to gain additional pre-construction movement, habitat use and demographic data on the population for comparison with the construction and post-construction population data. Monitoring of breeding activity will continue through night-time surveys during optimal breeding conditions and day-time dip-net surveys following periods of heavy rain when breeding may have occurred. If a breeding event is documented, hydrological monitoring of the restored breeding pool, concurrent with larval development, will be conducted to ensure the restoration has achieved the anticipated hydrological conditions required for successful development of larval spadefoots.

The study team is recommending that portions of the NBZ be enclosed with exclusionary silt fencing (areas of refuge) late in the 2018 field season. Since the success of this project hinges greatly on conserving spadefoots during the construction phase of the project, the additional time to relocate spadefoots prior to construction activities is critically important. Once refuge fencing is in place, the study team will begin capturing and relocating spadefoot's from the proposed construction area into areas of refuge. Areas of refuge will be constructed in documented areas with high use.

Construction Phasing and Monitoring (2019)

Prior to construction the study team will continue night time surveys to relocate spadefoots into refuge areas. Depending on the total number of spadefoots relocated, pitfall arrays may be installed and monitored daily to increase capture rates prior to the commencement of construction. Pitfall arrays will be installed in currently known areas with high activity. Additionally, one direction pitfall arrays may be installed along the outer edges of the refuge areas, with specific areas to be determined prior to installation. All pitfalls will be monitored daily for the presence of spadefoots. Any spadefoots captured within pitfalls will be processed and released into the refuge areas. To monitor the health of spadefoot's contained within refuge areas, night time surveys within these areas will be conducted throughout the construction period. All spadefoot's encountered during surveys will be weighed to ensure they are maintaining masses similar to those at the time of their release into the refuge areas; masses will also be compared to those documented during the 2017 and 2018 pre-construction monitoring seasons. To limit the amount of time spadefoots are restricted to refuge areas, an accelerated construction plan should be implemented for the spadefoot habitat management zone. Construction activities within this zone should be completed no later than September 1st, 2019, allowing ample time for spadefoots to select overwintering locations post-construction. At the completion of construction, the spadefoot habitat management zone should be cordoned off from all other construction areas with exclusionary silt fence prior to the opening of refuge areas. The study team does not anticipate any detrimental impacts to the population while restricted to the refuge areas since currently 85% of the known population activity occurs within these areas, monitoring of spadefoot health is strictly a precautionary measure. The timing of all spadefoot relocations into refuge areas will be based on actual construction start dates. If construction begins during the active season, a one to one and a half month period prior to construction (during the spadefoots active season) will be dedicated to relocation surveys. If construction is scheduled to start during the inactive season for spadefoots, relocation efforts will take place during the late-summer and fall of the previous active season.

Post-construction Population Monitoring (2020 through 2025)

To evaluate the overall success of the mitigation efforts, a five year post construction monitoring program has been developed. Active population monitoring within this five-year period will take place during the 2020, 2021, 2023 and 2025 field seasons.

2020 Monitoring: First season post-construction. During the 2020 field season continued visual encounter surveys will be conducted over the course of 10 optimal survey nights. No radio-tracking will occur during 2020 monitoring season, allowing the population to re-establish within the spadefoot habitat management zone without any additional outside stressors. Monitoring of breeding activity will continue through night-time surveys during optimal breeding conditions and day-time dip-net surveys following periods where breeding may have occurred. If a breeding event is documented, hydrological monitoring of the breeding pool, concurrent with larval development, will be conducted to ensure the construction of the solar facility did not disrupt the hydrological conditions of the breeding pool for larval spadefoot development. If hydrological issues are identified, additional pool restoration will take place to ensure suitable breeding conditions are established post-construction.

2021 Monitoring: Second season post-construction. During the 2021 field season continued visual encounter surveys will be conducted over the course of 10 optimal survey nights. Population monitoring through radio-telemetric methodologies will be reinstated during this season, radio-tracking no more than fifteen individuals. Monitoring of breeding activity will continue following the same methodologies outlined in the 2020 monitoring season. Monitoring during the 2021 field season is designed to gain post-construction movement, habitat use and demographic data on the population to compare with previously collected pre-construction data to evaluate any changes or shifts in population structure and habitat use.

2023 and 2025 Monitoring: Follow-up post-construction monitoring. During the 2023 and 2025 field seasons continued visual encounter surveys will be conducted over the course of 5 optimal survey nights during each season (total 10). Monitoring during this period is designed to document continued site activity and breeding. Data collected during this period will be compared to capture rates recorded during the pre-construction phase of this study to determine post-construction trends in the population demographics to evaluate the overall success of mitigation and management initiatives.

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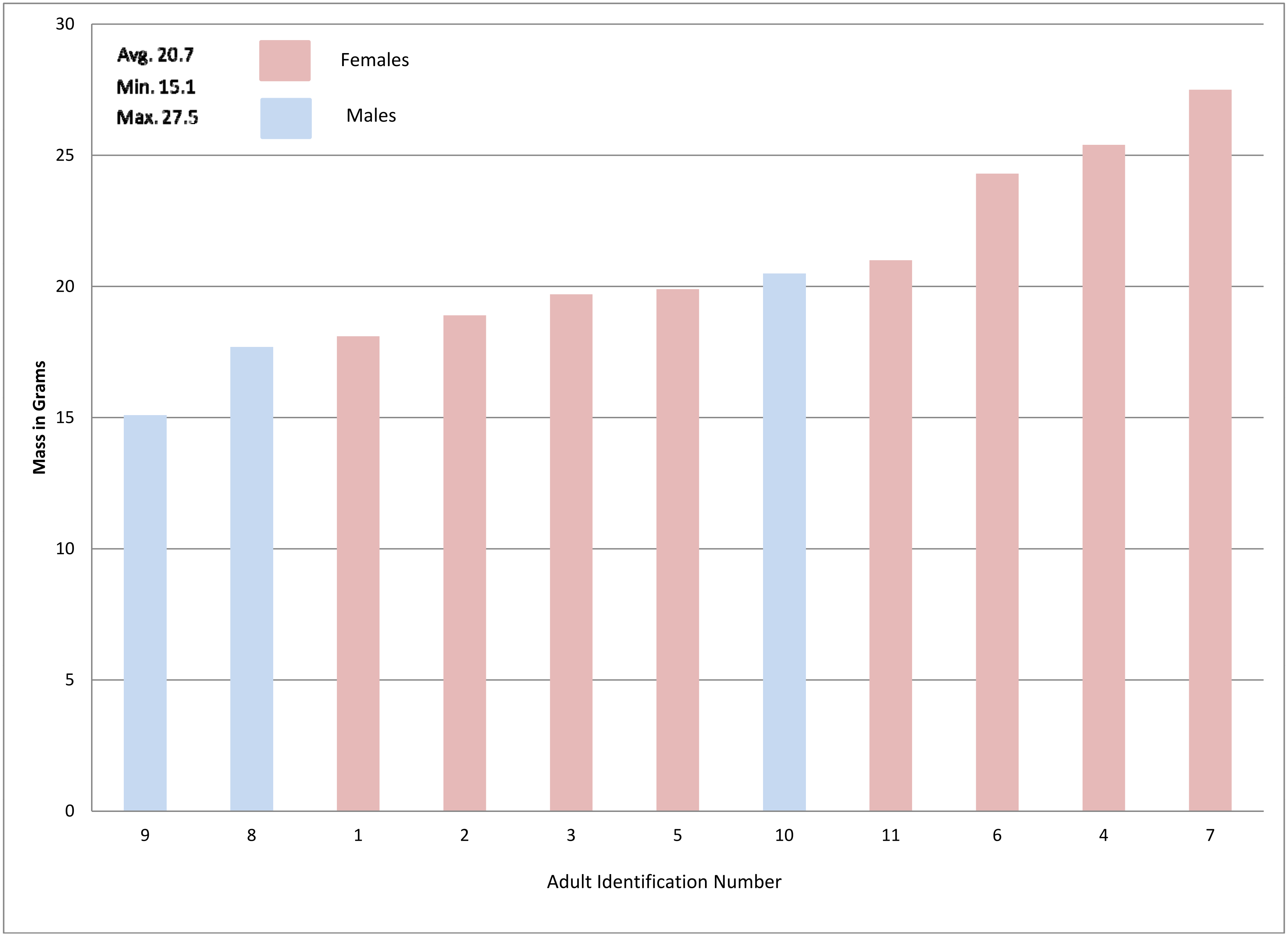
Table 1. Comprehensive Data Table for all Encountered Spadefoots

Date Captured	ID	Sex	Age Class	Latitude	Longitiude	Transmitter	PIT tag	Mass (g)	STV (mm)	Total Relocations	Disposition	Home-range (MCP)	Max Dist. From Breeding Pool (m)
5/22/2017	No_1	Female	Adult	41.421380	-71.827120	150.162	n/a	18.10	54.35	20	Hibernating	0.1	269.2
6/16/2017	No_2	Female	Adult	41.421970	-71.830290	150.302	985120031253524	18.90	56.93	15	Hibernating	0.48	76.8
6/16/2017	No_3	Female	Adult	41.422120	-71.830580	150.322	985120031256538	19.70	53.35	16	Hibernating	0.91	128.1
6/16/2017	No_4	Female	Adult	41.422160	-71.830440	150.182	985120031277444	25.40	59.83	15	Hibernating	2.97	137.2
6/16/2017	No_5	Female	Adult	41.423040	-71.830950	150.262	985120031273199	19.90	53.94	15	Hibernating	1.12	122.3
6/19/2017	No. 8	Male	Adult	41.422380	-71.830480	150.221	985120031281815	17.70	51.30	2	Confirmed Dead	n/a	49.2
6/19/2017	No_7	Female	Adult	41.422270	-71.830530	150.102	985120031267477	27.50	61.10	15	Hibernating	1.89	206.5
6/19/2017	No_6	Female	Adult	41.422170	-71.831240	150.242	985120031257480	24.30	56.12	15	Hibernating	0.36	204.5
7/7/2017	n/a	n/a	Metamorph	41.421189	-71.829760	n/a	n/a	0.50	14.53	n/a	Presumed Alive	n/a	31.8
7/7/2017	Sub 1	n/a	Sub-adult	41.423080	-71.829720	n/a	n/a	10.10	45.11	n/a	Presumed Alive	n/a	84.0
7/7/2017	Sub 2	n/a	Sub-adult	41.423810	-71.830160	n/a	n/a	11.45	46.85	n/a	Collected Voucher	n/a	167.2
7/7/2017	No_9	Male	Adult	41.422700	-71.832270	150.122	985120031281194	15.10	50.46	13	Hibernating	0.09	202.3
7/17/2017	No_10	Male	Adult	41.422720	-71.832180	150.282	985120031269141	20.50	57.46	7	Unknown:Signal Lost	0.72	196.6
8/7/2017	No_11	Female	Adult	41.422059	-71.832374	150.382	985121007656915	21.00	55.02	8	Hibernating	0.04	207.4
8/7/2017	Juv 1	n/a	Juvenile	41.422690	-71.832640	n/a	n/a	2.60	27.70	n/a	Presumed Alive	n/a	31.8
8/7/2017	Juv 10	n/a	Juvenile	41.422710	-71.832290	n/a	n/a	4.90	34.40	n/a	Presumed Alive	n/a	203.6
8/7/2017	Juv 11	n/a	Juvenile	41.422850	-71.831790	n/a	n/a	2.30	26.90	n/a	Presumed Alive	n/a	179.6
8/7/2017	Juv 12	n/a	Juvenile	41.422550	-71.830350	n/a	n/a	2.50	26.50	n/a	Presumed Alive	n/a	55.4
8/7/2017	Juv 13	n/a	Juvenile	41.422460	-71.830170	n/a	n/a	1.30	22.70	n/a	Presumed Alive	n/a	37.1
8/7/2017	Juv 14	n/a	Juvenile	41.423300	-71.829850	n/a	n/a	4.10	31.90	n/a	Presumed Alive	n/a	109.1
8/7/2017	Juv 2	n/a	Juvenile	41.422350	-71.831960	n/a	n/a	2.60	27.10	n/a	Presumed Alive	n/a	184.0
8/7/2017	Juv 3	n/a	Juvenile	41.422910	-71.831160	n/a	n/a	2.80	28.50	n/a	Presumed Alive	n/a	123.8
8/7/2017	Juv 4	n/a	Juvenile	41.421800	-71.829910	n/a	n/a	1.70	23.20	n/a	Presumed Alive	n/a	72.0
8/7/2017	Juv 5	n/a	Juvenile	41.422300	-71.831160	n/a	n/a	2.70	27.90	n/a	Presumed Alive	n/a	116.6
8/7/2017	Juv 6	n/a	Juvenile	41.422750	-71.832140	n/a	n/a	2.70	29.40	n/a	Presumed Alive	n/a	192.2
8/7/2017	Juv 7	n/a	Juvenile	41.422450	-71.832450	n/a	n/a	2.40	27.30	n/a	Presumed Alive	n/a	224.7
8/7/2017	Juv 8	n/a	Juvenile	41.422910	-71.831400	n/a	n/a	1.90	25.20	n/a	Presumed Alive	n/a	142.4
8/7/2017	Juv 9	n/a	Juvenile	41.422090	-71.832760	n/a	n/a	5.30	34.80	n/a	Presumed Alive	n/a	251.2
10/29/2017	Juv 15	n/a	Juvenile	41.422712	-71.831584	n/a	n/a	4.60	33.40	n/a	Presumed Alive	n/a	146.6
10/29/2017	Juv 16	n/a	Juvenile	41.421988	-71.832070	n/a	n/a	5.20	36.50	n/a	Presumed Alive	n/a	185.7
10/29/2017	Juv 17	n/a	Juvenile	41.422951	-71.830592	n/a	n/a	3.90	32.30	n/a	Presumed Alive	n/a	91.5



Figures 1: Adult mass chart

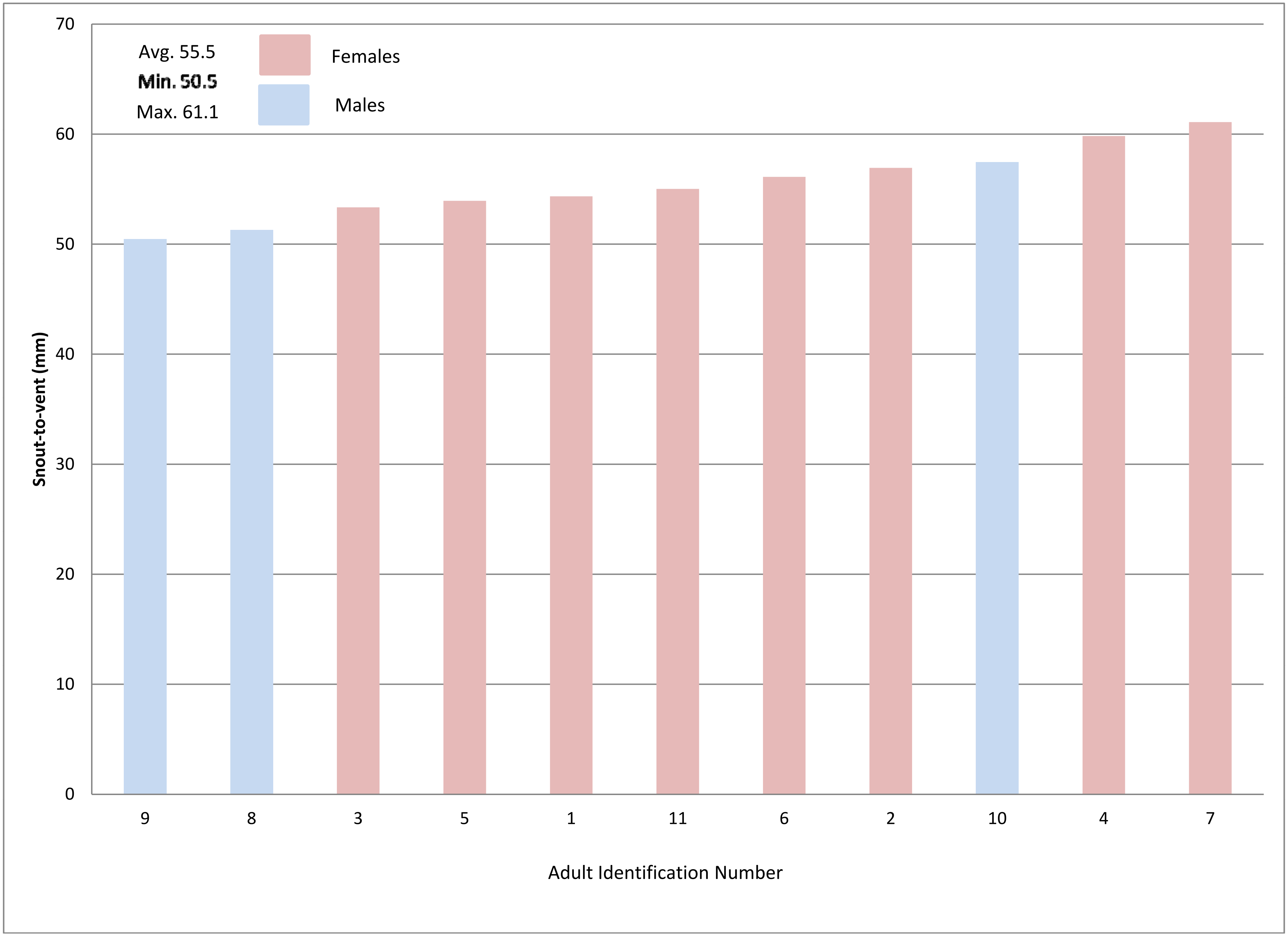
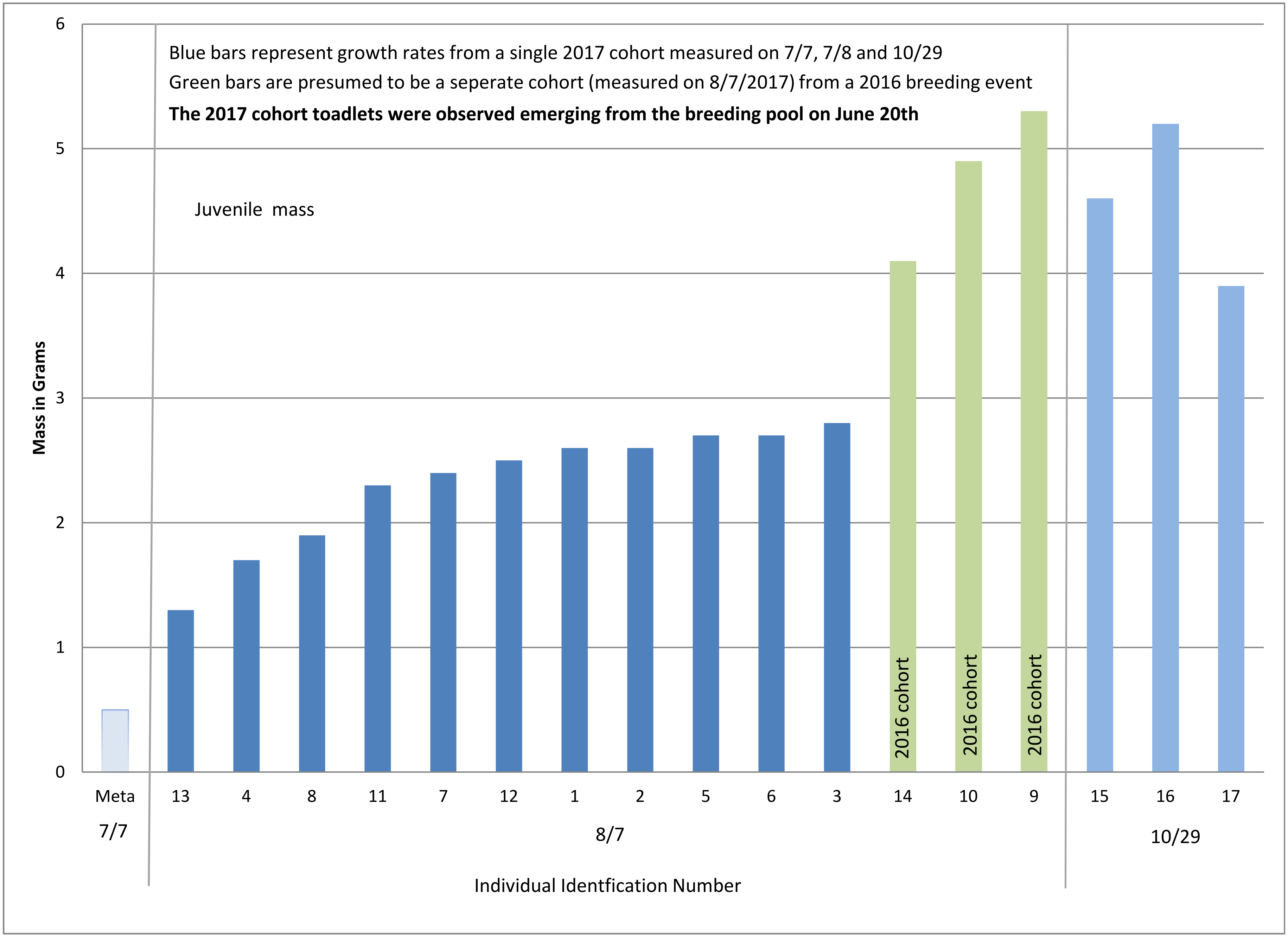


Figure 2: Adult snout-to-vent chart



Figures 3: Juvenile and metamorph toadlet mass chart

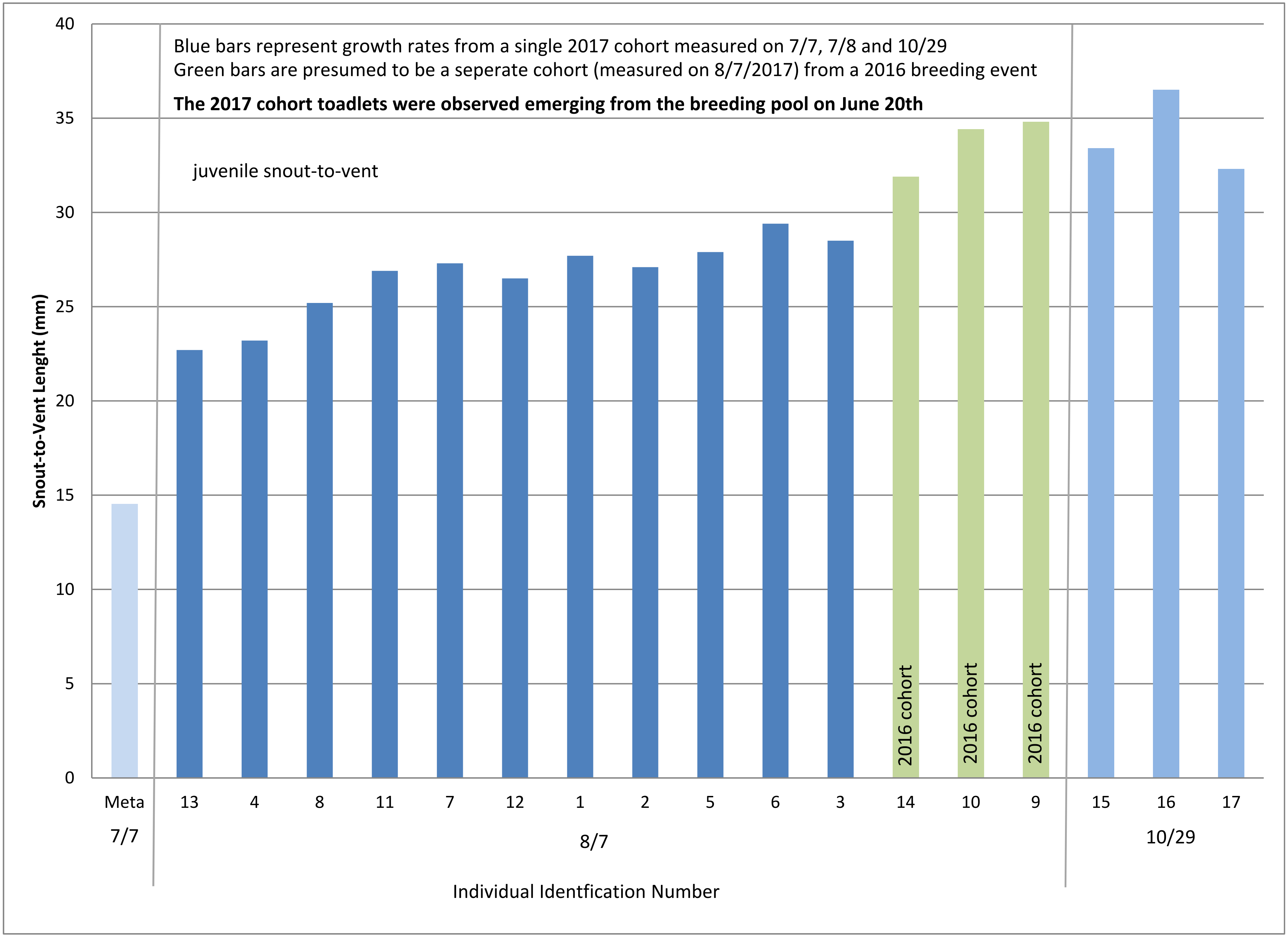
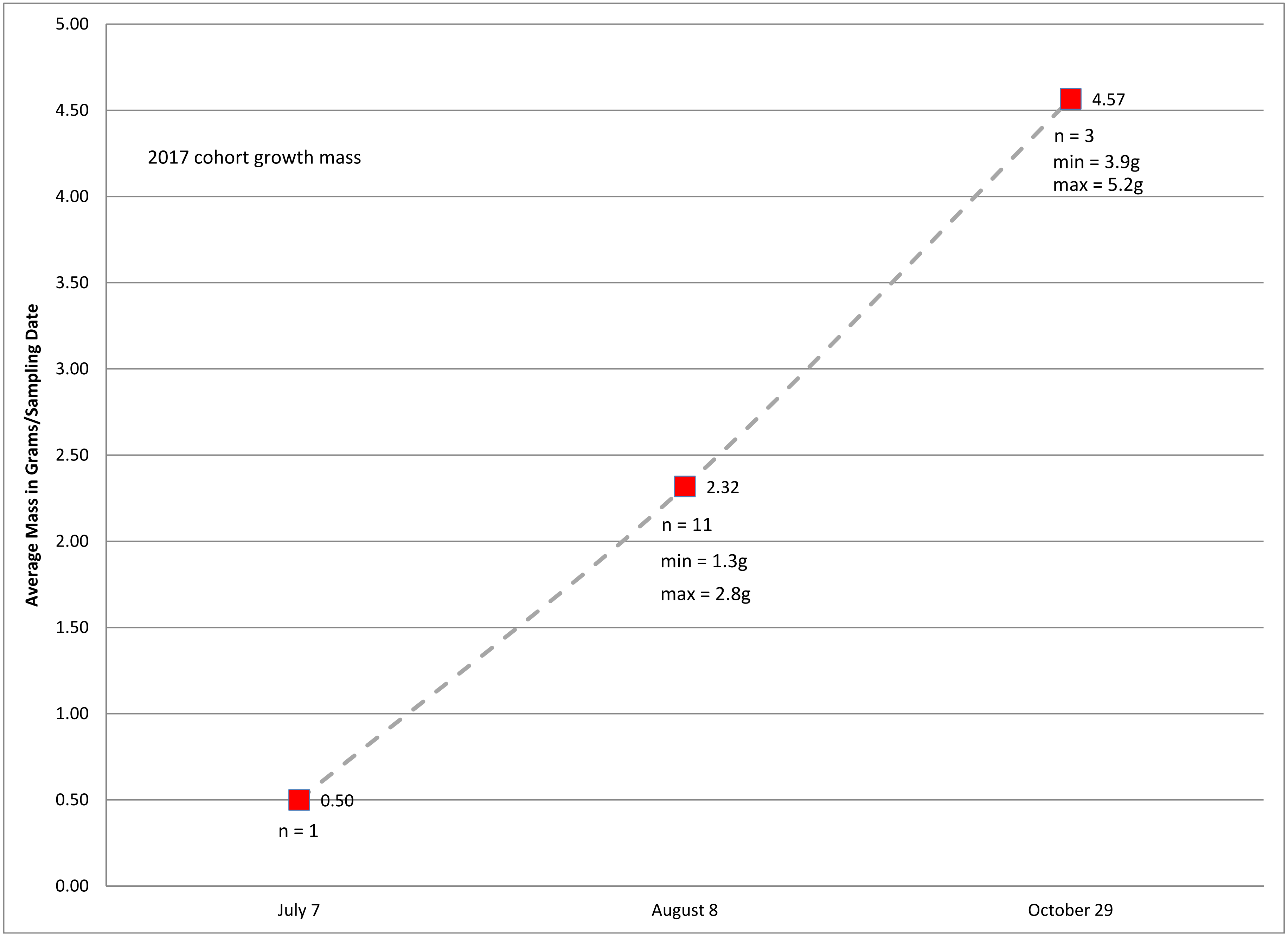


Figure 4: Juvenile and metamorph toadlet snout-to-vent chart



Figures 5: Juvenile mass growth rate chart

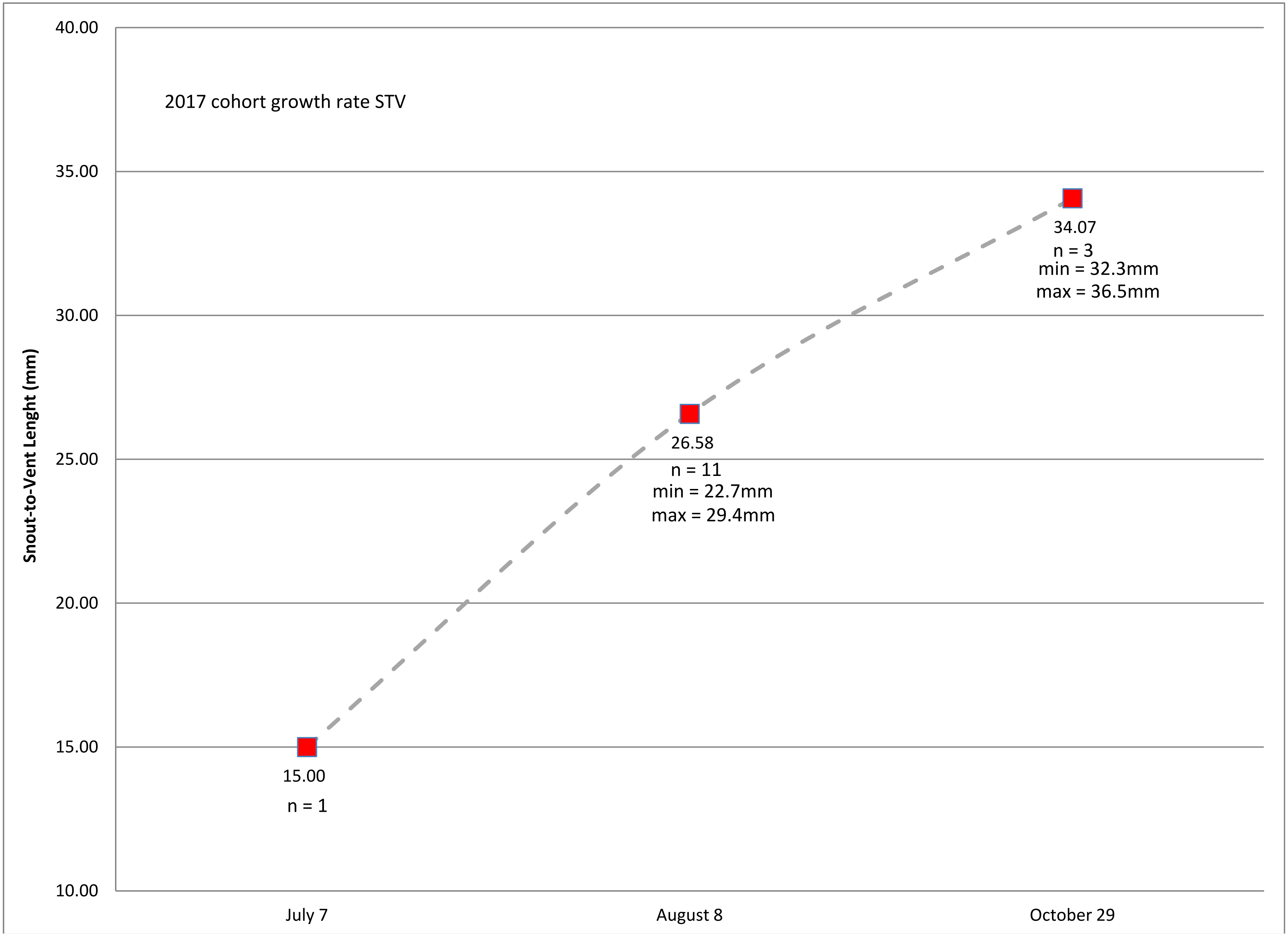


Figure 6: Juvenile snout-to-vent growth rate chart

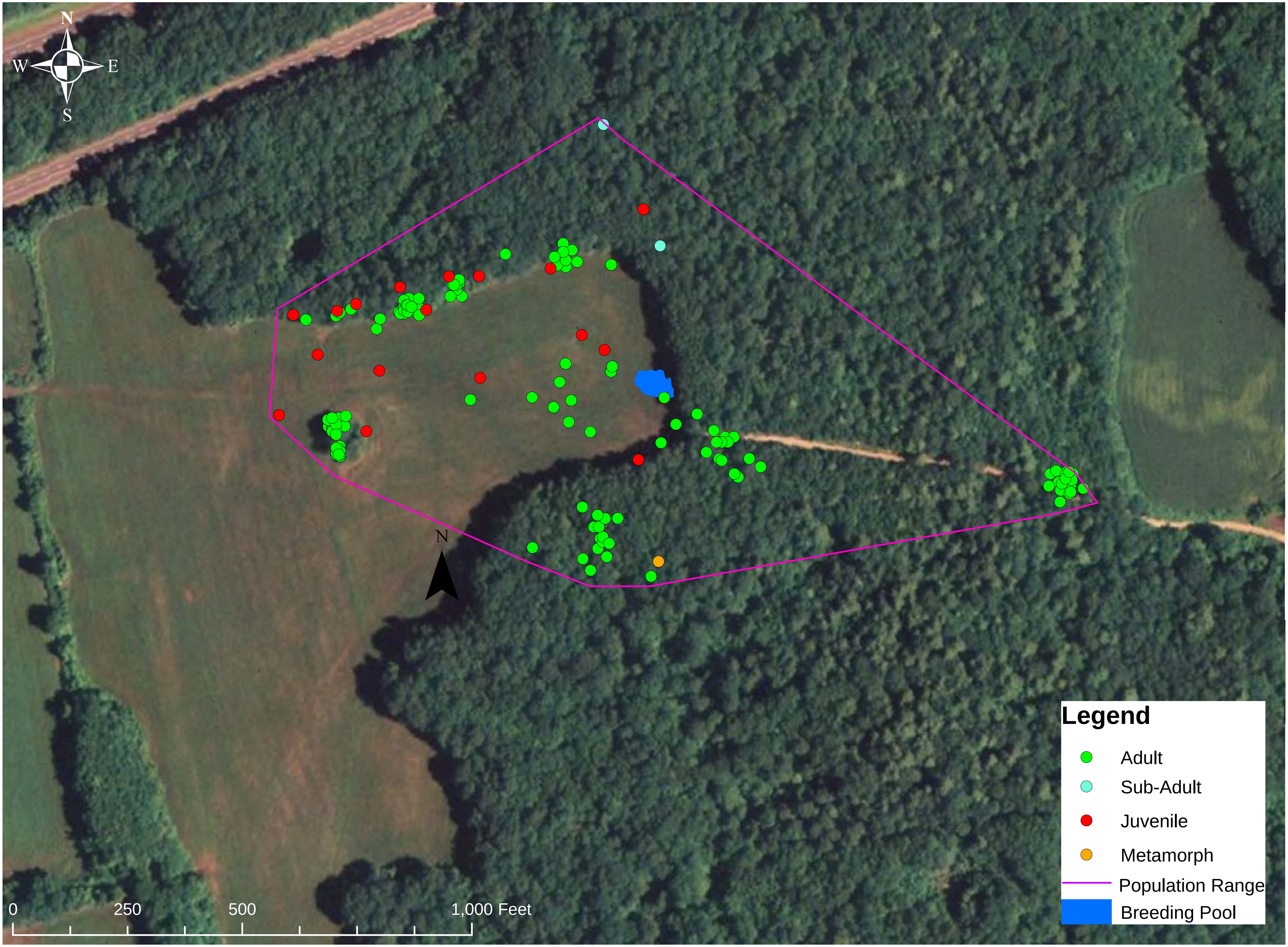


Figure 7. Population Range Map

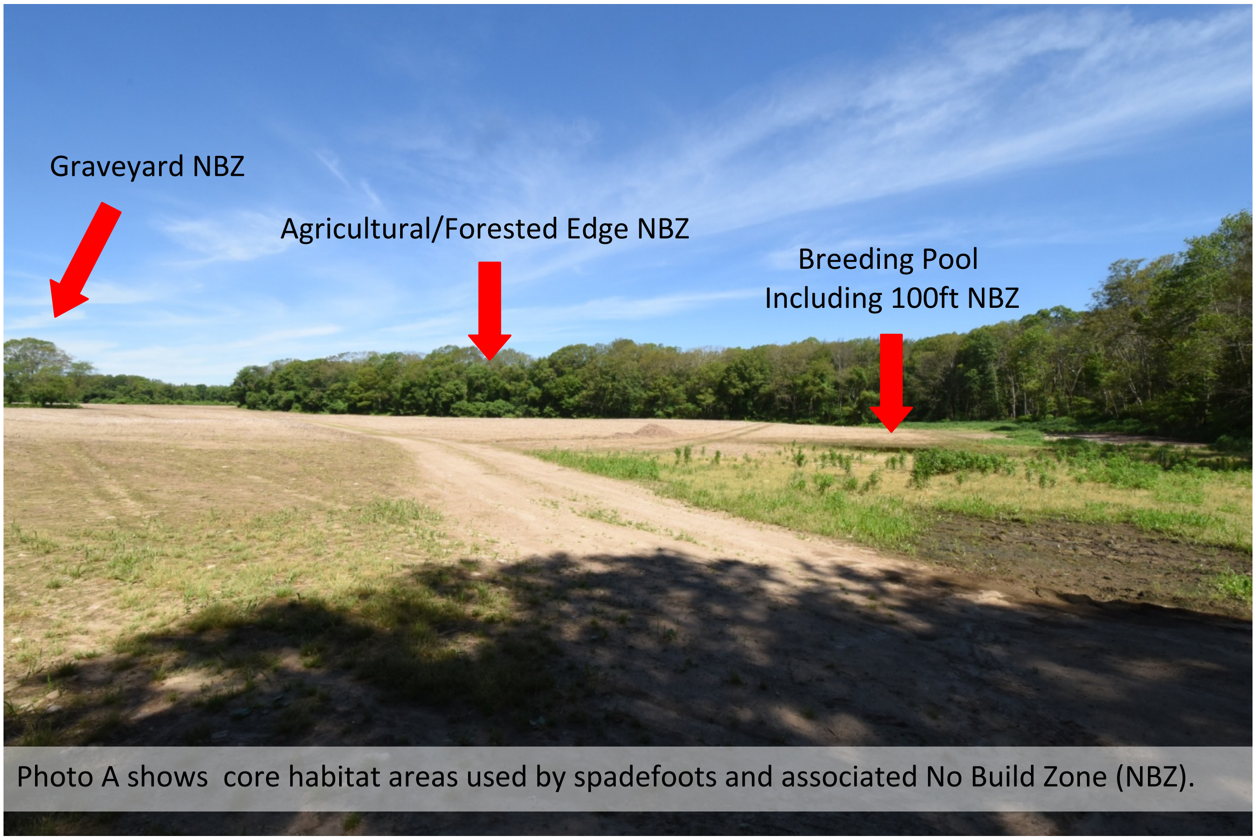


Photo A shows core habitat areas used by spadefoots and associated No Build Zone (NBZ).


Photo B shows forested habitat with sparsely vegetated understory.

Photo C shows the access road with forest edge that connects to Boom Bridge Road

Photo D shows the breeding pool documented during the 2017 field season

Figure 8: Site photos showing core habitats used by spadefoots

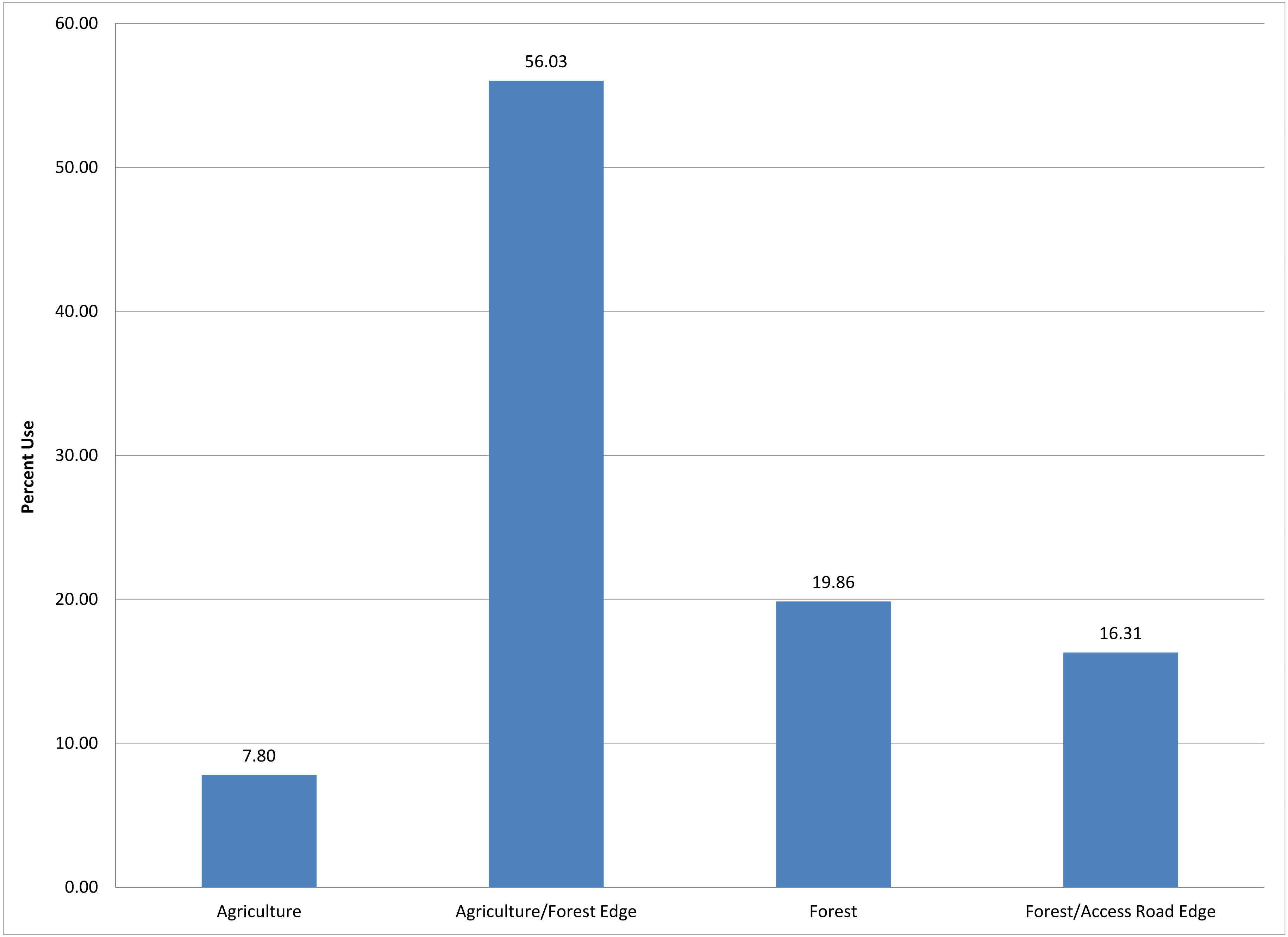


Figure 9: Habitat use chart

Photos 1a and 1b: Showing breeding pool, stockpiled manure and murky water resulting from agricultural run-off.

Photo 2: Showing tire ruts though breeding pool and stockpiled manure in breeding pool.
Figure 10. Breeding pool impacts.

APPENDIX D

Heritage Phase I Cultural Resources Survey Report

NOVEMBER 2017

PHASE IA CULTURAL RESOURCES ASSESSMENT SURVEY OF THE PROPOSED PAWCATUCK SOLAR CENTER IN NORTH STONINGTON, CONNECTICUT

PREPARED FOR:

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ABSTRACT

Heritage Consultants, LLC completed this Phase IA cultural resources assessment of the proposed Pawcatuck Solar Center in North Stonington, Connecticut on behalf of All-Points Technology Corporation, P.C. during November of 2017. A review of historic maps and aerial images of the project area, files maintained by the Connecticut State Historic Preservation Office, and pedestrian survey of the proposed Pawcatuck Solar Center resulted in the identification of three historic farmsteads (Wheeler, Stanton and Post 1868 Farmsteads), two historic cemeteries (Stanton and Partlow Cemeteries), and the location of single prehistoric archaeological site (102-8). Visual reconnaissance of the Wheeler and Stanton Farmsteads, both of which date from the nineteenth century and perhaps earlier, revealed that they have been disturbed in the past due to bulldozing. This occurred when these farmsteads were razed in the late twentieth century. Due to a lack of intact archaeological deposits and research potential, neither of these two historic cultural resources rise to the level of significance as defined by the National Register of Historic Places, and no additional archaeological examination of them is required prior to construction of the proposed solar facility. The third historic farmstead, known as the Post 1868 Farmstead was identified in the southwestern portion of the proposed project area in the vicinity of where the solar center will interconnect with Eversource Energy's power grid. This area contained intact above ground features (e.g., house foundation and outbuilding footprints). If, as the project plan develop further, this area is to be disturbed, then Phase IB cultural resources reconnaissance survey of the Post 1868 Farmstead would be recommended.

The pedestrian survey of the project area also resulted in the identification and recordation of the Stanton and Partlow Cemeteries. The Stanton Cemetery was noted outside of the southern limits of the proposed project area. It is demarcated by a stone wall and contains the graves of approximately 10 members of the Stanton Family. Currently, no impacts to this historic resource are anticipated as the project boundary lies approximately ca. 75 m (250 ft) to the west of the proposed project boundary. As long as the proposed project area does not increase to include the burial ground, no other recordation of the Stanton Cemetery is required ; however, if the project plans change such that the cemetery will be in or near the project limits, it is recommended that no construction occur within 15 m (50 ft) the stone walls demarcating the cemetery. The Partlow Cemetery was noted in the north-central portion of the proposed project area within a large cornfield. This area is associated with the Partlow Family and it was used during the nineteenth century. There are currently head and footstones there representing between 15 and 20 individuals. However, while the area is located in a small stand of trees, there is no stonewall or fence demarcating its boundaries. Thus, it is possible that additional, unmarked graves may exist within the cornfield. As a result, the project sponsor should take particular care when developing plans for this area so that the cemetery is not inadvertently impacted. It is recommended that no construction occur within 15 m (50 ft) of the area around the small stand of trees where graves are known to exist.

The location of Site 102-8 also was reidentified during pedestrian survey. This area is known to contain prehistoric deposits and is recognized as an archaeological site by the State of Connecticut. Currently, the area is being used as a cow pasture and appears to be largely undisturbed. This area should be subjected to Phase IB cultural resource reconnaissance survey if it is to be impacted by the proposed project. Finally, 46 and 66 acres of land, respectively have been categorized as moderate and high archaeologically sensitive areas. These are areas with access to freshwater, low to moderate slopes, and well drained soils. These areas should be subjected to Phase IB cultural resources reconnaissance survey prior to disturbance associated with construction of the proposed solar center. Those portions of the solar facility area that possess steep slopes are characterized as no/low probability areas and need not be examined further prior to construction. The field methods for the recommended Phase IB cultural resources reconnaissance survey should be developed in consultation with the Connecticut State Historic Preservation Office.

TABLE OF CONTENTS

LIST OF FIGURES

List of Photos

Photo 18. Overview photo of a typical moderate sensitivity zone in the project area (note moderate slopes in this area).

Photo 19. Overview photo of a typical moderate sensitivity zone in the project area (note moderate slopes in this area).

Photo 20. Overview photo of a typical high sensitivity zone in the project area (note low slopes and sandy well drained soils in this area).

Photo 21. Overview photo of a typical high sensitivity zone in the project area (note low slopes and sandy well drained soils in this area).

Photo 22. Overview photo of a typical high sensitivity zone in the project area (note low slopes and sandy well drained soils in this area).

CHAPTER I

INTRODUCTION

This report presents the results of a Phase IA cultural resources assessment survey for the proposed Pawcatuck Solar Center in North Stonington, Connecticut (Figures 1 and 2). Pawcatuck Solar Center, LLC (Pawcatuck Solar), working through its contractor, All-Points Technology Corporation, P.C. (Allpoints), has requested that Heritage Consultants, LLC (Heritage) complete the assessment survey as part of the planning process for a proposed 15.0 Megawatt (MWac) solar energy facility. Heritage completed this investigation in November of 2017. All work associated with this assessment survey was performed in accordance with National Historic Preservation Act of 1966, as amended; the National Environmental Policy Act of 1969, as amended, and; the *Environmental Review Primer for Connecticut's Archaeological Resources* (Poirier 1987) promulgated by the Connecticut Historic Commission, State Historic Preservation Office.

Project Description and Methods Overview

Pawcatuck Solar is proposing to install a 15.0 MWac solar photovoltaic (PV) facility (the Pawcatuck Solar Center) in North Stonington, Connecticut. While the details of the construction plan are still under development, the facility will interconnect with the Eversource Energy electrical grid at the adjacent Shunock Substation via a new 13.2kV feeder running to the west across Pendleton Hill Road. The main entrance for the facility will be located along Ella Wheeler Road and there will be power centers located in the interior of the six-foot high facility fence line, each of which will consist of an inverter and medium-voltage transformer where PV module strings are aggregated. The PV modules will be mounted on single-axis tracker racking designed to optimize energy production for this location. The facility will require aggregate, compacted soil, or equivalent, roads for access to the power centers, and other critical equipment.

This Phase IA cultural resources assessment survey consisted of the completion of the following tasks: 1) a contextual overview of the area's prehistory, history, and natural setting (e.g., soils, ecology, hydrology, etc.); 2) a literature search to identify and discuss previously recorded archaeological sites, National and State Register of Historic Places properties/districts, and historic standing structures more than 50 years in age within and close to the region encompassing the project area; 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 its archaeological sensitivity, as well as to record any historic built resources; and 5) preparation of the current Phase IA 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 Connecticut State Historic Preservation Office, and pedestrian survey of the proposed Pawcatuck Solar Center resulted in the identification of three historic farmsteads, two historic cemeteries, and the location of single prehistoric archaeological site (102-8). Visual reconnaissance of the Wheeler and Stanton Farmsteads, both of which date from the nineteenth century and perhaps earlier, revealed that they have been massively disturbed in the past due to bulldozing. This occurred when these farmsteads were razed in the late twentieth century. Due to a lack of intact archaeological deposits and research potential, neither of these two historic cultural resources rises to the level of significance as defined by the National Register of Historic Places, and no additional archaeological examination of them is required prior to construction of the proposed solar facility. The third historic farmstead, known as the Post 1868 Farmstead was identified in the southwestern portion of the proposed project area near where the solar center will interconnect with Eversource's power grid. These areas contained intact above ground features (e.g., house foundation and outbuilding footprints). If, as the project plans develop further, this area is to be disturbed, then Phase IB cultural resources reconnaissance survey of the Post 1868 Farmstead would appear warranted.

The pedestrian survey of the project area also resulted in the identification and recordation of two historic cemeteries and the location of a single previously identified prehistoric archaeological sites. The Stanton Cemetery was noted outside of the southern limits of the proposed project area. It is clearly demarcated by a stone wall and contains the graves of approximately 10 members of the Stanton Family. Currently, no impacts to this historic resource are anticipated as the project boundary lies approximately ca. 75 m (250 ft) to the west of this resource. If the proposed project area does not increase to include the burial ground, no other recordation of the Stanton Cemetery is required; however, if the project plans change such that the cemetery will be in or near the project limits, it is recommended that no construction occur within 15 m (50 ft) the stone walls demarcating the cemetery.

The second cemetery was noted in the north-central portion of the proposed project area within a large cornfield. This area is associated with the Partlow Family and it was used during the nineteenth century. There are currently head and footstones there representing between 15 and 20 individuals. However, while the area is in a small stand of trees, there is no stonewall or fence demarcating its boundaries. Thus, it is possible that additional, unmarked graves may exist within the cornfield. As a result, the project sponsor should take particular care when developing plans for this area so that the cemetery is not inadvertently impacted. It is recommended that no construction occur within 15 m (50 ft) of the area around the small stand of trees where graves are known to exist.

In addition, the location of Site 102-8 was reidentified during pedestrian survey. This area is known to contain prehistoric deposits and is officially recognized as an archaeological site by the State of Connecticut. Currently, the area is being used as a cow pasture and appears to be largely undisturbed. A Phase IB cultural resource reconnaissance survey appears warranted for this area if it is to be impacted by the proposed project.

Finally, 46 and 66 acres of land have been categorized as moderate and high archaeologically sensitive areas, respectively. These are areas with access to freshwater, low to moderate slopes, and well drained soils. These areas also appear to be likely candidates for Phase IB cultural resources reconnaissance survey prior to disturbance associated with construction of the proposed solar center. Those portions of the solar facility area that possess steep slopes are characterized as no/low probability areas and need not be examined further prior to construction.

We recommend the field methods for the Phase IB cultural resources reconnaissance survey be developed in consultation with the Connecticut State Historic Preservation Office.

Project Personnel
Key personnel for this project included Mr. David R. George, M.A., R.P.A, who acted as Principal Investigator. He was assisted by Mr. Antonio Medina, B.A., who assisted in the field review portion of the project. Mr. George also was assisted by Mr. William Keegan, B.A., who provided GIS support services and project mapping. Finally, Ms. Kristen Keegan completed this historic background research of the project and contributed to the final report.

Organization of the Report

The natural setting of the region encompassing the project area is presented in Chapter II; it includes a review of the geology, hydrology, and soils, of the project region. The prehistory of the project region is outlined in Chapter III. The history of the region encompassing the project area is discussed in Chapter IV, while previously identified cultural resources near the project area are reviewed in Chapter V. The methods used to complete this investigation are discussed in Chapter VI. Finally, the results of this investigation are presented in Chapter VII, and management recommendations are contained in Chapter VIII.

CHAPTER II

NATURAL SETTING

Introduction

This chapter provides a brief overview of the natural setting of the region containing the proposed solar project. 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, soils, and slopes present in the area. The remainder of this section provides a brief overview of the ecology, hydrological resources, and soils present within the project area 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: Eastern Coastal ecoregion. A 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.

Eastern Coastal Ecoregion

The Eastern Coastal ecoregion region consists of a hilly upland terrain located between approximately 5 to 7 mi to the north of Long Island Sound (Dowhan and Craig 1976). It is characterized by "coastlands, including extensive tidal marshes, estuary areas, and sand beaches, by relatively level but rolling near-shore lands, and by protrusions of rugged and rocky upland extending to the coastline" (Dowhan and Craig 1976:29). Elevations in the Eastern Coastal ecoregion range from sea level to 122 m (400 ft) above sea level (Bell 1985). The bedrock of the region is composed of schists, gneisses, and granite deposited during the Paleozoic (Bell 1985). Soils in the region 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 and coastal areas (Dowhan and Craig 1976).

Hydrology of the Study Region

The project region contains several sources of freshwater, including Shunock River, Anguilla Brook, Lewis Pond, Wheeler Brook, and the Pawcatuck River, as well as several unnamed wetlands. The brooks, ponds, rivers, and wetlands 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. These water sources also may have provided the impetus for the construction of water powered mills facilities during the eighteenth and nineteenth centuries.

Soils Comprising the Project area

Soil formation is the direct result of the interaction of several variables, including climate, vegetation, parent material, time, and organisms present (Gerrard 1981). Once archaeological deposits are buried within the soil, they are subject to many 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 within 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 five major soil types (Figure 3). They include Woodbridge; Canton and Charlton; Charlton and Chatfield; Sutton, and Ridgebury, Whitman, and Leicester soils. The first four of these types, when found on low slopes in proximity to fresh water and in an undisturbed state, are well correlated with both historic and prehistoric archaeological site locations. Ridgebury, Whitman, and Leicester soils, in contrast, typically are wet and do not correlate with prehistoric or historic period occupation sites. Descriptive profiles for each soil type in the project area, which were gathered from the National Resources Conservation Service, are presented below.

<u>Woodbridge Soils:</u>

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;

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.

Canton and Charlton Soils:
Oi-- 0 to 5 cm; slightly decomposed plant material;

A-- 5 to 13 cm; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable; common fine roots; 5 percent gravel; very strongly acid (pH 4.6); abrupt smooth boundary;

Bw1-- 13 to 30 cm; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 5 percent gravel; very strongly acid (pH 4.6); clear smooth boundary;

Bw2-- 30 to 41 cm; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 5 percent gravel; strongly acid (pH 5.1); clear smooth boundary.

Bw3-- 41 to 56 cm; yellowish brown (10YR 5/4) gravelly fine sandy loam; weak medium subangular blocky; friable; common fine and medium roots; 15 percent gravel; strongly acid (pH 5.1); abrupt smooth boundary;

2C-- 56 to 170 cm; grayish brown (2.5Y 5/2) gravelly loamy sand; massive; friable; 25 percent gravel; moderately acid (pH 5.6).

Charlton-Chatfield Soils:
Oe -- 0 to 4 cm; black (10YR 2/1) moderately decomposed forest plant material;

A -- 4 to 10 cm; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; 5 percent gravel; very strongly acid; abrupt smooth boundary;

Bw1 -- 10 to 18 cm; brown (7.5YR 4/4) fine sandy loam; weak coarse granular structure; very friable; many fine and medium roots; 5 percent gravel; very strongly acid; clear wavy boundary;

Bw2 -- 18 to 48 cm; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; 10 percent gravel and cobbles; very strongly acid; clear wavy boundary.

Bw3 -- 48 to 69 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; massive; very friable; few medium roots; 15 percent gravel and cobbles; very strongly acid; abrupt wavy boundary;

C -- 69 to 165 cm; grayish brown (2.5Y 5/2) gravelly fine sandy loam with thin lenses of loamy sand; massive; friable, some lenses firm; few medium roots; 25 percent gravel and cobbles; strongly acid.

Sutton Soils:
Oe--0 to 2 cm; black (10YR 2/1) moderately decomposed forest plant material. (0 to 8 cm thick)

A--2 to 15 cm; very dark brown (10YR 2/2) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; 5 percent gravel; strongly acid; clear wavy boundary;

Bw1--15 to 30 cm; brown (7.5YR 4/4) fine sandy loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; 10 percent gravel and cobbles; moderately acid; gradual wavy boundary;

Bw2--30 to 61 cm; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; few medium roots; 10 percent gravel and cobbles; common fine and medium prominent light brownish gray (2.5Y 6/2) iron depletions and yellowish red (5YR 5/6) masses of iron accumulation; moderately acid; gradual wavy boundary;

Bw3--61 to 71 cm; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; 10 percent gravel and cobbles; common medium prominent light brownish gray (2.5Y 6/2) iron depletions and reddish brown (5YR 4/4) and strong brown (7.5YR 5/6) masses of iron accumulation; moderately acid; gradual wavy boundary;

C1--71 to 91 cm; brown (10YR 5/3) gravelly fine sandy loam; weak thick platy structure; firm; 15 percent gravel and cobbles; common medium distinct light brownish gray (2.5Y 6/2) iron depletions and common medium prominent strong brown (7.5YR 5/6) masses of iron concentrations; moderately acid; gradual wavy boundary;

C2--91 to 165 cm; light olive brown (2.5Y 5/4) gravelly sandy loam; massive; friable; 25 percent gravel and cobbles; moderately acid;

<u>Ridgebury, Leicester, and Whitman Soils:</u>
Ap--0 to 25 cm; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak medium granular structure; friable; 10 percent rock fragments; common medium distinct red (2.5YR 4/8) masses of iron accumulation lining pores; moderately acid; abrupt wavy boundary;

Bg--25 to 46 cm; gray (5Y 5/1) fine sandy loam; massive; friable; 10 percent rock fragments, few medium distinct pale olive (5Y 6/4) and light olive brown (2.5Y 5/4) masses of iron accumulation; strongly acid; abrupt wavy boundary;

Cdg--46 to 79 cm; gray (5Y 6/1) fine sandy loam; moderate medium plates; firm; 10 percent rock fragments; many medium distinct light olive brown (2.5Y 5/4) masses of iron accumulation; moderately acid; clear wavy boundary;

Cd1--79 to 122 cm; olive (5Y 4/3) fine sandy loam; massive; firm; 10 percent rock fragments; few medium prominent dark reddish brown (2.5YR 3/4) masses of iron accumulation; moderately acid; gradual wavy boundary;

Cd2--122 to 165 cm; olive (5Y 5/3) fine sandy loam; massive; firm; 10 percent rock fragments; moderately acid.

Summary
A review of mapping, geological data, ecological conditions, soils, slopes, and proximity to freshwater, suggests that portions of the proposed project area appear to be favorable to both prehistoric and historic period occupations and land use. This includes areas of low to moderate slopes with well drained soils located near freshwater sources. Other portions of the project area contain steeper slopes and/or poorly drained soils; these areas would not have been amenable to prehistoric and/or historic period occupations.

This information is combined with the results of a pedestrian survey and is discussed in greater detail in Chapter VII regarding how the project area was divided into areas of no/low, moderate, and high archaeological sensitivity.

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 in such as 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 Area of Potential Effect.

Paleo-Indian Period (12,000-10,000 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 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).

<u>Early Archaic Period (10,000 to 8,000 B.P.)</u>
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 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 recognized 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, and 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.

<u>Middle Archaic Period (8,000 to 6,000 B.P.)</u>
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 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 point 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; Wiegand 1978, 1980).

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

The Terminal Archaic, 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 Orient Fishtail projectile points (McBride 1984:119; Ritchie 1971).

In addition, it was during the late Terminal Archaic 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 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 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 includes 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; Wiegand 1983).

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 most 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

The proposed project area is in the southeastern corner of the Town of North Stonington, Connecticut. This area was formerly a part of the Town of Stonington, and it rests on a predominantly level landform north of the Pawcatuck River and south of Interstate 95. The State of Rhode Island border is east of the project area. As discussed below, the present appearance of the project area belies its intensive historic use and occupation.

Native American History

The Town of North Stonington lies within the region conquered from the Pequot Indians in 1636-1637, during the war waged against them by Massachusetts Bay Colony, the Connecticut Colony, and the Narragansett Indians. The main settlements of the Pequot tribe at that time were in the territory that would later become Groton: one fort on the heights "a little southeast of Fort Friswold [*sic*]," where the sachem Sassacus resided, and the other near the Mystic River. The latter is the location of the famous battle at which hundreds of Pequots were massacred in an assault led by Captain John Mason in 1637 (Barber 1837:311). According to historical reports, Sassacus and his people destroyed their other fort and fled after the attack at Mystic. Barber also described Sassacus's seat as being on Fort Hill, "four miles east from New London," and not on the Thames River as the prior description suggests, although the location marked as Fort Hill on historic maps might reasonably be said to be "a little" southeast of Fort Griswold. In general, although it can be assumed that the Stonington territory was used by historic Native American groups, it may also have served as a buffer zone between the Pequots and their more eastern rivals, the Narragansetts. Sometime after the war, two dispersed groups of Pequots reconstituted themselves and maintained populations in the towns of northwestern North Stonington and Ledyard; the Narragansett tribe remained in Rhode Island, particularly in Charlestown.

Seventeenth and Eighteenth Century History

As a result of the joint nature of the Pequot War, the question of which colony would have jurisdiction over the conquered area was a problem. It was resolved in 1658 by dividing the land between the two colonies at the Mystic River, with the Connecticut Colony keeping the west side and Massachusetts Bay Colony the east side; the latter section would become the Town of Stonington (parent town of North Stonington). Before that resolution, the conquered land had been surveyed by Connecticut in 1641, and several grants of land to individuals were made in the future Stonington, including one to William Chesebrough in 1652 that is now the borough of Stonington (incorporated 1801). The royal Charter granted to Connecticut in 1662 extended the colony's boundary eastward to the Pawcatuck River, bringing the section east of the Mystic River back within that colony's control. Before then, the area between the Mystic River and the Pawcatuck River was known as Southerton, a town of the Massachusetts Bay colony. In 1665, the General Court of Connecticut changed its name to Mistick, and in 1666 changed it again, to Stonington (Crofut 1937). The Billings family, after whom Billings Lake was named, were among the original colonists who settled there; the first head of family, William Billings, married in Dorchester, Massachusetts in 1658 and died in Stonington in 1713 (Wheeler 1900).

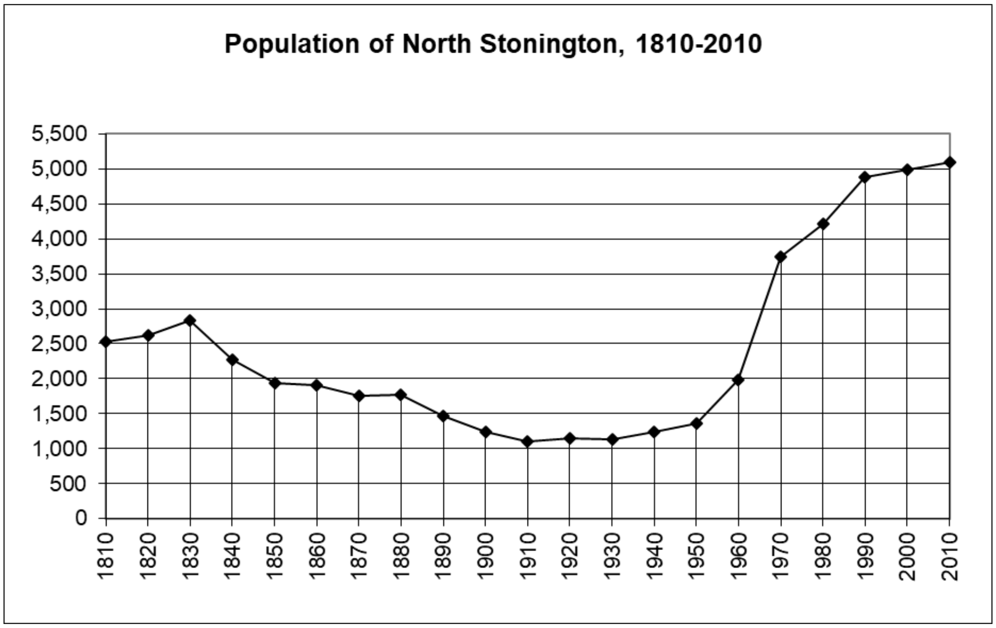
The village at the head of Mystic began to form after 1660, when Robert Burrows was appointed by the General Court to operate a ferry across the Mystic River. He and his family joined three other families that had moved into the area in the 1650s. When the first Congregational meeting house was built in 1673, it was arguably closer to the ferry than to any other point in the town; in 1674, a grist mill was built on the Mystic River above the falls. A 1761 census of the state recorded 3,900 people in the town, including 254 African Americans and 309 Native Americans (Greenhalgh 1999; Wheeler 1900). The Stonington North Ecclesiastical Society was established in 1720, but debate over the location of its Congregational meeting house led to its opening being delayed until 1723. The first Baptist church was organized in 1743, and a second in 1765; in 1746 a Separatist Congregational church was established (Crofut 1937).

By 1774, Stonington was already a substantial town, with a population of 5,431 that made it the sixth-largest in Connecticut. This number remained steady through 1800 (except for the failure to collect town data in New London county during the first census in 1790) (see population chart below; Keegan 2012). During the Revolutionary War, the town supported the cause, and many Stonington men served in the militias and the Continental Army. The future borough (then simply Long Point), with its wharves and shops, became a target of the British Navy in 1775, but the citizens fought off the attack (Wheeler 1900).

Nineteenth and Twentieth Centuries

The Town of North Stonington separated from Stonington in 1807; according to one report, the name of North Stonington was given to it despite a town meeting vote that it be called Jefferson. During the War of 1812, the Borough was bombarded by the British Navy but not invaded. The first meeting house was demolished in 1817, and replaced by a church built jointly by the established and separatist churches; in 1827 the two congregations united, and in 1828 a third Baptist congregation was created (Crofut 1937). The Groton and Stonington Turnpike Company, chartered in 1818 by the state as part of its efforts to improve transportation in the early nineteenth century, crossed the southeastern corner of North Stonington on its way to the Rhode Island border at Hopkinton. This corporation continued in existence, charging tolls for use of the road until competition from the railroads forced it to request dissolution from the legislature in 1853 (Wood 1919). According to an overview of the town from the 1830s, it had a rough landscape with good grazing and some good water power sites for mills; the only village at the time was called Milltown, and had approximately 30 houses, five stores, and two churches (one Congregationalist and one Baptist). There were also two other Baptist churches elsewhere in town (Barber 1837).

The local population began at 2,524 according to the 1810 census, and rose to 2,840 by 1830, but then fell steadily to a low of 1,100 in 1910, as shown in the population chart below (Keegan 2012). These population trends are consistent with the fact that during the mid to late nineteenth century, farming became an increasingly uneconomical proposition in Connecticut. The wiser and better-situated farmers switched from meat and grains, which could be purchased more cheaply from the Midwest, to butter, cheese, and perishable fruits and vegetables. In the 1880s, refrigerated railroad cars were developed, which allowed the production of fresh milk to become important as well. Overall, however, the farming population fell, and marginal lands were abandoned. Towns with industrial activity managed to keep their populations stable, while wholly agricultural places lost population through the 1930s. The number of farms continued to fall through the twentieth century, but because of suburbanization, a result of the rise of the automobile, the population of many towns began to grow again after 1940 (Rossano 1997).



Without a railroad connection or proximity to a major industrial city, North Stonington was disadvantaged and had a very low population through the 1950s, as shown in the population chart above. This is despite, as a map from 1916 or 1918 shows, a trolley line was built from Westerly to Norwich through North Stonington, passing just west of the project area (Figure 4). In 1932, the State of Connecticut reported that North Stonington's industries included only agriculture, it had post offices in North Stonington and Clark's Falls, and its public transportation was limited to a bus route passing through from Norwich to Westerly, R.I. (Connecticut 1932). Although its lack of ocean coastline was a disadvantage, during the automobile era the town did attract some summer residents, as evidenced by a report of a forest fire near Billings Pond in 1944 that destroyed 600 acres of forest, eight summer cottages, and an abandoned farmhouse (Haynes 1949). The year 1970 marked the largest recorded jump in the town's population, from 1,982 in 1960 to 3,748 a decade later – a near doubling that still left North Stonington a small town in modern terms (see population chart above; Keegan 2012).

By 2010, North Stonington's population had risen to 5,093 in 1,914 households. Its agricultural past was still represented, in 2005, by 2.7 percent of the town's workers being employed in that sector; another 6.1 percent were working in construction and mining, 18.3 percent in manufacturing, and 44.1 percent in services. According to a 2000 survey, many workers also commuted to Groton and Stonington for their jobs (CERC 2011). At the beginning of the twenty-first century, North Stonington was still a small town by Connecticut standards, with low population density and no obvious prospects for substantial growth.

Project Area History

For the purposes of organizing this discussion, the four land parcels that constitute the project area have been designated A, B, C, and D, as shown in Figure 5. Historic maps of this area tend to be distorted, due in part to the fact that it is near the edge of both a town and the State of Connecticut. Careful analysis of the maps is therefore required to avoid error, and matching current parcel boundaries and landmarks is often difficult. That being said, the analysis indicates that the present Ella Wheeler Road, which leads to Parcel B, is the surviving portion of an east-west trending road that appeared on the 1854 map of the county depicted in Figure 6. It extends from the present Voluntown Road to the sawmill at Lewis Pond. Thus, the buildings labeled "S. H. Babcock," "Miss. S. Stanton," "R. Wheeler," and "David A. Gallup" are likely to be in or near the project area. In addition, the present Boom Bridge Road is also shown, leading to what appears to be represented as a bridge in the map, indicating a very long-term use of that site as a bridge crossing. A number of other farms are shown in the area, as well as the Second Baptist Church to the north (Figure 6).

The 1868 map of the town is less distorted than the earlier one, though still imperfect. It shows, however, that the eastern end of Ella Wheeler Road had been abandoned by the late nineteenth century, and that the R. Wheeler farmstead was located at the end of the short western segment. The S. H. Babcock farmstead was still shown south of this road, though further to the west, and there was also not only a Mrs. Stanton south of the Wheeler place but also an H. Stanton there as well. At Lewis Pond there was now a textile mill ("Weaving Fac.") owned by Sanders and Wilber, as well as a sawmill and, south of all this, the home of P. H. Gallup. In the general area there were still other farmsteads, and a notation that the Baptist church to the north was known as "Old Miner Church founded 1785," with School No. 5 nearby (Figure 7).

The 1934 aerial photography provides a clearer picture of where these various households were located, as it is far more precise that the historic maps (Figure 8). Based on the available information, it can be concluded that the Babcock farmstead is the one visible to the south of Ella Wheeler Road, and it not located within the project area. The Richard Wheeler farmstead is certainly the one at the end of Ella Wheeler Road and within the Parcel B area. Finally, the Stanton farmsteads are most likely the ones visible at the end of a road across the northeast part of Parcel A, which seems to extend off the project area as well. In addition, there is clearly a farmstead at the west end of Parcel A, near the road, but at present there is no further information available about it since it post-dates the 1868 map mentioned above. At the east end of Parcel D, the buildings that are on Boom Bridge Road, but not within the project area, are probably associated with the Gallup farmstead (Figure 8).

Historic research has also revealed that there are two nineteenth-century cemeteries located within the boundaries of Parcel C, one close to Interstate-95 and the other near the parcel's southern boundary. Both cemeteries have been maintained to some degree over the years by various landowners. The northerly cemetery is listed as #73 in the Hale Collection for North Stonington, and it is called the Partlow Cemetery. According to the Hale Collection cemetery transcription records, the headstones that were recorded there in the 1930s were associated with:

Partlow, Hannah, w. Azariah, d. 10/09/1804, ae 54
Partlow, Thomas, d. 03/01/1816, ae 34
Partlow, Isaac, d. 10/23/1816, ae 29
Partlow, Nancy, dau. Azariah & Hannah, d. 10/28/1816, ae 31
Stanton, Henry, d. 10/25/1819, ae 51
Partlow, Azariah, d. 11/01/1821, ae 70

Historic research has turned up very little information about the Partlow family. Marriage records from the town and its parent, North Stonington, show only one marriage, Thomas Partelow to Deborah Wells in 1740, perhaps because records stopped being kept after 1781 – or perhaps because the Partelows became Baptists and their marriages were recorded elsewhere (Norman n.d.). The town began keeping better records after 1807, but the only entries for Partelows date from post 1820. The 1810 U.S. Census does contain an entry for Thomas Partilo, who was in the 26 to 44-year age group. He was described as living with a boy aged 10 to 15 and a girl aged 16 to 25. Henry Stanton, who is also buried in the Partlow Cemetery, appears in this Census as well; he was listed as head of a family totaling 11 (U.S. Census 1810). The subsequent 1820 Census included three Partlow families: Ezariah (4 people total), Weltha (2 people total), and Ezariah Jr. (10 people total) (U.S. Census 1820). Thus, it appears that family remained in town, but no longer used the cemetery after 1820.

The southern cemetery is listed in the Hale Collection for North Stonington Cemetery #74 and referred to as the Stanton Cemetery. Headstones recorded by Hale in this cemetery during the 1930s were:

Stanton, Eliza, w of John (stone broken)
Stanton, John, d. 04/21/1827, ae 17
Stanton, Amos, d. 01/08/1841, ae 72
Stanton, John, d. 05/24/1851, ae 90

The Stanton family was extremely numerous in Stonington and North Stonington, which presents a different research problem than the Partlow Family. However, the 90-year-old John Stanton is an excellent research target, and in fact appears in the 1850 U.S. Census, where he is listed as aged 90, as a farmer with $1,200 in real estate, and living with Martha Stanton, age 70, who owned $400 in real estate (U.S. Census 1850). In the 1860 Census, Martha (now 80) was listed in the household of Zebulon B. Minor, not (as far as can be determined) in or near the "Mrs. Stanton" house on the 1868 map. Other Stanton Family members who appear in the 1860 Census are:

House Number	Family	Name	Age	Sex	Occupation	Real Estate	Personal Estate
85	90	Hosa W. Stanton	45	M	Farmer	$600	$100
		Mary E. Stanton	25	F			
		Benjamin F. Stanton	9	M			
		Susan M. Stanton	5	F			
		John Stanton	2	M			
	91	Tryphena Stanton	55	F		$800	$100
		Courtland G. Stanton	20	M	Painter		
87	93	Richard Wheeler	31	M	Farmer		$2,000
		Lucy G. Wheeler	30	F		$2,000	
		Ella J. Wheeler	6	F			
		Emiline N. Bently	23	F		$2,000	
		Ethan Allen 2d	44	M	Farm Laborer		$700
		Polly Allen	45	F	Servant		
88	94	Samuel H. Babcock	62	M	Farmer	$1,800	$400
		Caroline S. Babcock	48	F			
		Samuel H. Babcock	26	M	Teacher		$500
		Heris S. Babcock	19	M	Farm Laborer		
		Albert C. Babcock	17	M	Clerk		

Particular attention should be paid to Richard Wheeler, who was described in 1905 as "one of the leading agriculturalists and prominent citizens of North Stonington for a very long period," having been born in 1829 (J. H. Beers 1905: 620). He was of the eighth generation of his family to live in North Stonington, but the house he lived in – presumed to be the one noted on the maps and in Parcel B, as noted below – had been built by his father-in-law in 1834. He moved there in 1847, presumably upon marrying Lucy G. (Bentley) Wheeler. Their children were Ella J. (born 1853, unmarried); Happie J. (born 1861, married to Oscar Vose); and Richard Bentley (born 1867 and engaged in the lumber business, married to Mary Wells) (J. H. Beers 1905).

The 1870 Census reports that Ethan and Polly Allen were still with the family as a farm hand and servant, respectively (U.S. Census 1870). The 1880 Federal agricultural census contains numerous corrections to its numbers; although it first had it that Richard Wheeler had 100 acres each of tilled land and other land, this was changed to 50 acres of each, plus 75 acres of woodland. The whole value of the farm was $7,000. He was reported to own 2 horses, 2 working oxen, 5 milk cows, 2 other cattle, 25 sheep, 4 swine, and 17 poultry; the farm made 300 pounds of butter in 1879 and got 170 dozen eggs. For crops, they grew small amounts of Indian corn, oats, and some potatoes, and had 142 apple trees (U.S. Census 1880, Schedule 2). Altogether this was a typical New England multi-faceted approach to agriculture. The 1880 population census listed all the children as still at home, aged 12 to 26, with no servants in the household anymore; Ella was at home, and Happie was teaching school (U.S. Census 1880). In the 1900 census, Happie had moved away, Richard B. was a lumber dealer, and the household had an unnamed female servant (U.S. Census 1900). In 1910, the elder Richard was 81 years old, Lucy G. B. was 80 years old, and Richard B. (age 42) had added his wife Mary A. (32) and 5-year-old daughter to the household (U.S. Census 1910). By 1920, however, the household consisted of Richard (age 91) and daughter Ella (66) (U.S. Census 1920). In 1930, Ella appeared living alone at 76 years of age, but finally, in the last entry for her, described as a farmer running a general farm and living on Wheeler Road (U.S. Census 1930). Ella, her siblings, and their parents are all buried or at least memorialized in Union Cemetery in North Stonington (Figure 9; Find A Grave n.d.). The last vestige of Ella on the property is the road that bears her name: Ella Wheeler Road.

Hosea W. Stanton and Tryphena Stanton also require attention, as their farm or farms were probably located at least partly on the northeastern part of Parcel A. Tryphena had appeared alone in the 1850 census, with daughter Almira (age 18) and son Courtland (10), owning $1,500 in real estate (U.S. Census 1850). According to her headstone in Union Cemetery, she died in 1872 and was the wife of Amos Stanton and the daughter of James Brown and Mary Main Brown. By 1870, Trifena and her son were apparently living elsewhere in North Stonington. Hosea and Mary, however, were still living next door to the Wheelers, their three children aged 12 to 20 (U.S. Census 1870). The children were all still there in 1880 as well, working on the farm and in the house, though all were in their twenties (U.S. Census 1880). In 1900, Mary was a widow aged 68, and reported that she had borne eight children of whom only three had survived. Henry, the youngest, had married and lived next door, but at age 42 and with his wife aged 51, had had no children. Her other two children, Benjamin F. and Susan A., still lived at home with her and were listed as unmarried (U.S. Census 1900). In 1910, only Mary (now 75), Susan, and Henry (now living alone) were left (U.S. Census 1910). In 1920, there was only Susan (age 65) (U.S. Census 1920). She was still living off Wheeler Road in 1930 (U.S. Census 1930).

The late-married and unmarried state of most of the last generations of these families is not uncommon among farmers of the late nineteenth and early twentieth centuries, as they were people engaged in an industry with declining opportunities, so their ability to attract mates also declined. Nevertheless, the 1934 aerial photograph shows that much of the project area was still cleared for farming, except for large portions of Parcel C; the Wheeler farmstead on Parcel B was still particularly large and clearly being worked (Figure 8). It is likely that mechanization had made it possible for fewer farmers to work large areas of land, though parts of the project area also show signs of relatively recent reforestation. In the 1939 aerial photograph, little has changed, though there appears to be a small area of mining near the riverside on Parcel D (Figure 10). Even in 1941, little appears to have changed, though it is known that both the Wheeler and the Stanton Families' occupation of the area had ended by that time (Figure 11). In the 1951 aerial photography, however, most or all of the buildings of the Stanton Farmstead in the northeast part of Parcel A had disappeared. On Parcel C, the area of farming had actually expanded – which is the opposite of what has usually happened in old farm areas. On Parcel D, there was a sand and gravel operation underway by the middle of the twentieth century (Figure 12). A 1953 topographic map marked buildings on the west end of Parcel A but not the northeast part, where the Stanton Farmstead was, and also on Parcel B, but nowhere else; it includes the location of the Stanton Cemetery but not the Partlow Cemetery; and it does not indicate the sand and gravel operation but does label the Boom Bridge (Figure 13).

In 1955, the Connecticut Highway Department carried out an extensive survey for a planned limited-access highway that included some of the western and northern ends of the project area. The maps show several buildings at the western end of Parcel A, and at least three (including a silo) on Parcel B (Figure

14). By 1957, however, the aerial photography suggests that the farmstead at the west end of Parcel A had been reduced in the number of buildings, and much of the rear part of the fields were reforesting, but the Wheeler Farmstead buildings still looked intact. Enough of Parcel C had been re-cleared for farming that the locations of both cemeteries stand out, and a larger area of Parcel D was being graveled (Figure 15). In 1962, the aerial photograph suggests that the cleared area around the farmstead at the west end of Parcel A was manicured lawn, but little else had hanged aside from further sand and gravel operations on Parcel D (Figure 16). As of 1965, Interstate 95 had been built along the northern edge Parcel B and Parcel C. At the northeastern end of Parcel A, the area of the Stanton farmstead had been cleared and plowed, with no visible trace of the former buildings. The gravel operations on Parcel D had become very extensive (Figure 17).

As of 1970, the cleared utility corridor extending from east to west across Parcel A had appeared, but there were no other visible additional changes (Figure 18). By 1972, it appears that the farmstead at the western end of Parcel A had been reduced to only two buildings (Figure 19). A 1988 photograph suggests that the buildings at the west end of Parcel A had been demolished, but it is not entirely clear (Figure 20). By 1997, the next available photograph, it is certain that the house at the west end of Parcel A had been razed and the entire parcel, aside from the utility right-of-way, was reforested. The Wheeler farmstead on Parcel B appears to have lost is northerly barn at this point, and it seems that on Parcel D a project to smooth and level the graveling area had led the water-filled pits to be filled with dirt instead (Figure 21). In 2005, the Wheeler farmstead on Parcel B appears even smaller in the aerial photography, and the sand and gravel area on Parcel D was greening over (Figure 22). In the 2012 aerial photography, it appears that the Wheeler Farmstead may have disappeared entirely; the sand and gravel area had become very brushy (Figure 23). By 2016, it is clear that the entire Wheeler farmstead had disappeared. The Area of Potential Effect contained a mix of woods, cleared fields, and the smoothed and leveled graveling operation area (Figure 24).

Conclusions

Although the project area no longer contains any visible historic buildings, below-ground historic resources may be expected in at least three locations: Post 1868 Farmstead at the west end of Parcel A, the Stanton Farmstead in the northeast part of Parcel A, and the Wheeler Farmstead on Parcel B. In addition, there are the two historic cemeteries on Parcel C. Stonewalls and the remains of fences also may be expected across the parcels, whether at the edge of still-active agricultural fields or in the woods. It is also possible that undocumented building remains (cellar holes, wells, or other ruins) may be identified in the forested area or plowed under in the fields. The only area that can be said to have less than elevated historical sensitivity is the part of Parcel D that was affected by the twentieth-century sand and gravel operation. The depositional integrity of this area has been destroyed.

CHAPTER V

PREVIOUS INVESTIGATIONS

Introduction

This chapter presents an overview of previous cultural resources research completed within the vicinity of the project area in North Stonington, Connecticut (Figures 25 through 28). This discussion provides the comparative data necessary for assessing the results of the current Phase IA cultural resources assessment survey, and it insures that the potential impacts to all previously recorded cultural resources located within and adjacent to the proposed project area are taken into consideration. Specifically, this chapter reviews all previously identified archaeological sites, National and State Register of Historic Places properties, and historic standing structures more than 50 years in age in and near the project area. 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 State of Connecticut archaeological site, National and State Register of Historic Places, and historic standing structure forms are reflected below.

Previously Recorded Cultural Resources Within the Vicinity of the Project area

A review of data currently on file at the Connecticut State Historic Preservation Office revealed that while there are no National or State Register of Historic Places in or near the project area, there are seven previously identified archaeological sites (102-5, 102-6, 102-7, 102-8, 102-9 102-98, and 137-10) and three historic standing structures (102-139, 102-67, and 102-70) within a 1.6 km (1 mi) area encompassing the project area (Figures 25 through 28). Each of the previously identified resources is reviewed briefly below.

Site 102-5

Site 102-5, also known as the Anthony's Dairy Farm Site, was recorded by Kathy Hoy in 1991 (Figure 25). This site location was related to Hoy by a former game warden named Louis Bayer. Mr. Bayer indicated that the site area contained temporally diagnostic artifacts, but the submitted site form does not enumerate what was found at his location. While it is unclear to which prehistoric time period this site belongs, it was listed as in good condition as of the time of recording. Site 102-5 has not been assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]), and it will not be impacted by the solar project since it is located outside of the project area.

Site 102-6

Site 102-6, also known as the Beriah Lewis Farm Site, also was recorded by Kathy Hoy in 1991 (Figure 25). This site location also was related to Hoy by Mr. Bayer, who indicated that the site yielded numerous prehistoric lithic artifacts recovered during surface collection of the area. Among them were an unspecified number of Levanna projectile points, which are indicative of a Late Woodland occupation of the site area. This site also was listed as in good condition as of the time of its recording. Like Site 102-5, the Beriah Lewis Farm Site also has not been assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). It also is located outside of the project area and will not be impacted by the solar project.

Site 102-7

Site 102-7 was recorded by Kathy Hoy in 1991 (Figure 25). As was the case with Sites 102-5 and 102-6, this site location was given to Hoy by Mr. Bayer, who indicated that he collected prehistoric lithic artifacts while walking over the site area; however, the submitted site form does not list what type or number of artifacts were collected from this location. While it is unclear what prehistoric time period this site belongs to, it was listed as in good condition as of the time of its recording. Site 102-7 also has not been assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]), and it will not be impacted by the solar project as it is located outside of the project area.

Site 102-8

Also known as the Lewis Farm Site, Site 102-8, was identified by Mr. Louis Bayer and reported by Kathy Hoy in 1991 (Figure 25). While the site reportedly contained a large number of temporally diagnostic prehistoric lithic artifacts, the types recovered were not listed on the submitted site forms. Thus, it is impossible to date this site; however, the site area was described as a large camp covering several acres of land. It also was listed as in good condition at the time of its recordation. Site 102-8 also has not been assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). This site is situated in the northeastern portion of the project area overlooking a large wetland, and may be impacted by the proposed solar project.

Site 102-9

Ste 102-9, also known as the Moran Farm Site, was recorded by Kathy Hoy in 1991 (Figure 25). This site location also was related to Hoy by Mr. Bayer, who indicated that the site area contained numerous temporally diagnostic prehistoric stone tool and lithic artifacts; however, the submitted site form does not describe what was recovered from this location. It is unclear to which prehistoric time period this site belonged, and it was listed as destroyed by sand and gravel operations as of 1991. Site 102-9 has not been assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). It will not be impacted by the solar project as it is located outside of the project area and has been destroyed.

Site 102-98

Site 102-98 was recorded by Public Archaeology Survey Team, Inc., in 2002 (Figure 25). Phase I cultural resources survey and Phase II National Register testing and evaluation of the site area resulted in the collection of 3 quartz flakes and a single possible quartz core with cortex. Public Archaeology Survey Team, Inc. described the site as of unknown function and dating from an unknown prehistoric time period. The site was listed as in good condition at the time of its recordation. However, it was assessed as lacking 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]). This site lies to the west of the project area and will not be impacted by the proposed development.

Site 137-10

Site 137-10, also known as the Rout 49 Site, was identified by Mr. Louis Bayer and recorded by Kathy Hoy in 1991 (Figure 25). This site is recorded as a prehistoric camp dating from an unknown time period. According to the submitted site form, the site area yielded numerous prehistoric lithic artifacts, including 25 "bird points." No other information about the site was listed on the site form other than that it was in good condition at the time of its recording. The Route 49 Site has not been assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]), and it will not be impacted by the solar project as it is located outside of the project area.

Historic Standing Structure 102-139

Historic Standing Structure 102-139, which was reported at 55 Stillman Road, was recorded by Jennifer Lutke in 1997 (Figure 28). According to the submitted historic resource inventory form, this house was built in ca. 1815. It was described as five-bay, two story Federal Style residence. It contained a gable roof and a single brick chimney. The house was sheathed in clapboard and contained an asphalt roof at the time of its recordation. The house contained six-over-one sash windows flanked by movable shutters, as well as a paneled front entrance door. The foundation of the main house was recorded as of cut stone, while the front porch rested on a cobble stone foundation. It does not appear that Historic Standing Structure 102-170 was assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). This building is located well to the south of the proposed project area and will not be impacted by construction of the proposed solar facility, either directly or indirectly.

Historic Standing Structure 102-167

Historic Standing Structure 102-167, which was located at 39 Ella Wheeler Road, was recorded by Jennifer Lutke in 1997 (Figure 28). According to the submitted historic resource inventory form, this address contained a house that was built in 1834. It was described as three-bay, two-and-a-half story Greek Revival residence. It had a gable roof and moderate sized chimney. The house was sheathed in clapboard and contained an asphalt roof at the time of its recordation. The house contained both three over three and six-over-six sash windows, as well as a paneled front entrance on its southern façade that was flanked by sidelights and surmounted with a pedimented casing. The foundation was described as large cut stone. It does not appear that Historic Standing Structure 102-167 was assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]), and it is clear from aerial photos dating from post 2004 that the house and all surrounding buildings have been demolished.

Historic Standing Structure 102-170

Historic Standing Structure 102-170, which was reported at 12 Ella Wheeler Road, also was recorded by Jennifer Lutke in 1997 (Figure 28). According to the submitted historic resource inventory form, this house was built in ca. 1850. It was described as five-bay, one-and-a-half story Greek Revival residence. It contained a gable roof and two chimneys. The house was sheathed in clapboard and contained an asphalt roof at the time of its recordation. The house contained six-over-six sash windows flanked by movable shutters, as well as a paneled front entrance on its southern façade that was flanked by sidelights and surmounted by a non-pedimented entablature. The foundation could not be discerned at the time of recording. It does not appear that Historic Standing Structure 102-170 was assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]); it is apparent from aerial photos dating after 2008 that the house and all surrounding buildings have been demolished.

Summary and Interpretations

The review of the previously identified cultural resources in the vicinity of the proposed project area indicates that the region possesses a long history of both prehistoric Native American and historic period occupation and use. Prehistoric archaeological sites recorded in the project region appear to date from at least the Late Woodland period and probably earlier. Moreover, the data noted in the previously identified prehistoric sites indicate that the area was used for a variety of tasks and for variable amounts of time, ranging from task specific and temporary occupations to seasonal camps. This suggests that prehistoric sites may be expected in those undisturbed portions of the project area that are in relatively close proximity to nearby freshwater sources, have level slopes, and that have not been heavily disturbed in the past. In addition, the historic resources in the area also suggest that the larger study region was settled by Euroamericans early on and that by the mid-nineteenth century farming was important to the local economy. It is possible that historic archaeological sites may be identified within 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 North Stonington, 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 completed cultural resources surveys and all previously recorded cultural resources in the area encompassing the project area; 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 its 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 historical and archaeological sensitivity of the proposed project area, as well as to visually examine the project area and record any prehistoric or historic resources noted during pedestrian survey. The undertaking was comprehensive in nature, and project planning considered the distribution of previously recorded cultural resources located within and near the project area, and 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 project area 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 2016; and a review of all National and State Register of Historic Places properties, previously identified archaeological sites, and historic standing structures more than 50 years in age data on file with the Connecticut State Historic Preservation Office, as well as electronic cultural resources data maintained by Heritage. The intent of this review was to identify all previously recorded cultural resources situated in and adjacent to the project area and to provide a natural and cultural context for the proposed project area. This information then was used to develop the archaeological context of the project area, and to assess its sensitivity with respect to producing intact cultural resources.

Background research materials, including historic maps, aerial imagery, and information related to previous archaeological investigations, were gathered from the North Stonington Public Library, North Stonington Town Hall, the Connecticut State Library, the Homer Babbidge Library on the Storrs Campus of the University of Connecticut, and the Connecticut State Historic Preservation Office. Finally, electronic databases and Geographic Information System files maintained by Heritage were employed during this project, and they provided valuable data related to the project area, as well as data concerning previously identified archaeological sites 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 proposed Pawcatuck Solar Center in North Stonington, Connecticut. This included pedestrian survey, photo-documentation, and mapping of the project area. During the completion of the pedestrian survey, representatives from Heritage visually reconnoitered and photo-documented the project area using digital media. Heritage also obtained GIS files depicting the proposed solar development from All-Points, contractor for the project sponsor, Pawcatuck Solar (Figure 2). The digital files were imported into ESRI's ArcGIS 10.2, the geographic information system (GIS) employed by Heritage. The inclusion of the digital files in the project GIS streamlined the research process and it ensured that all portions of the project area that may be impacted by the proposed solar project were examined during the investigation and mapped accurately. Finally, the GIS files were employed to output the maps and drawings included in this report.

Curation

Following the completion and acceptance of the final report, all cultural material, drawings, maps, photographs, and field notes will be curated with:

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CHAPTER VII

RESULTS OF THE INVESTIGATION

Introduction

As mentioned in Chapter I of this report, the current Phase IA cultural resources assessment survey consisted of the completion of the following tasks: 1) a contextual overview of the area'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 archaeological sites, National and State Register of Historic Places properties/districts, and historic standing structures in more than 50 years in age within the region encompassing the project area; 3) a review of readily available historic maps and aerial imagery depicting the project area to identify potential cultural resources and/or areas of past disturbance; and 4) pedestrian survey and photo-documentation of the project area to determine its archaeological sensitivity, as well as to record any prehistoric historic built resources. Tasks 1 and 2 of this list were completed and presented in Chapters II through V. The results of Tasks 3 and 4 are presented below.

Results of Pedestrian Survey and Photo-Documentation of the Project Items

As discussed throughout the report, the Pawcatuck Solar Center will be built in North Stonington, Connecticut. The proposed project area is bounded to the north be Interstate 95, the east by wooded area, the south by the Pawcatuck River, and the west by Pendleton Hill Road (aka Route 49). Heritage completed pedestrian survey and photo-documentation of the proposed project area on November 1 and 2, 2017. The visual reconnaissance of the area resulted in the identification of two former historic farmstead associated with known historic residents of the area (Wheeler and Stanton Farmsteads), one historic farmstead for which ownership information was not readily available (Post-1868 Farmstead), two historic era cemeteries (Stanton and Partlow Cemeteries), and a single prehistoric site location (102-8). Each of these resources is discussed below.

<u>Wheeler Farmstead (Site 102-130)</u>

Pedestrian survey of the northwestern portion of the proposed project area at the eastern end of Ella Wheeler Road resulted in the identification of the remnants of the Wheeler Farmstead. As was discussed in Chapters IV and V, the Wheeler Farmstead was owned and operated by the Wheeler Family. The main house was built in 1834 and according to early aerial images of the area several outbuildings and barns were located near the house (Figures 6 through 8 and 10 through 20). The Wheeler Farmstead first appeared on an 1854 historic map of the area, where it is ascribed to "R. Wheeler." Historical research presented in Chapter IV indicates that this was Richard Wheeler, who was "one of the leading agriculturalists and prominent citizens of North Stonington for a very long period" (J. H. Beers 1905:620). Richard represented the eighth generation of his family to live in North Stonington, and he dwelled in the house on the property area that was been built by his father-in-law in 1834. Richard lived on the project area with his wife Lucy G. and their two children, Ella J. and Richard B. (J. H. Beers 1905). It is Ella J. Wheeler that Ella Wheeler Road for which the road is named.

Based on the layout of the farmstead as seen in the aerial photographs discussed above, the Wheelers operated a farm typical of the region in the nineteenth and early twentieth centuries, and planted crops and raised dairy animals. The farm remained in place, and likely operating, until the last few decades of the twentieth century. However, as seen in Figure 20, a 1997 aerial image of the farmstead area, most of the buildings had been razed and the farming operations were much reduced. Just seven years later, in 2005, all traces of the Wheeler Farmstead disappeared as the farm ceased to operate (Figure 22).

Having noted the farmstead in various aerial images and on maps of the area, Heritage visited the location to determine what, if anything was left of the Wheeler Farmstead. Visual reconnaissance of the area revealed the presence of disturbed building remnants within an area measuring approximately 60. 9 x 76.2 m 200 x 250 m (200 x 250 ft) in size. This area, designated as Site 102-130, is situated at an approximate elevation of 48.7 m (160 ft) NGVD and was characterized by tall grasses, shrubs, and small trees, indicative of an area that is in the process of retuning to secondary forest. Examination of the site revealed several areas containing broken concrete slabs and large numbers of displaced stones. Based on the results of the pedestrian survey, it appears that the area that once contained the Wheeler Farmstead has been heavily disturbed by bulldozing, which likely took place when the buildings were demolished in the early sometime after 1997 (Photos 1 and 2). Due to the large amount of disturbance, it is clear the Wheeler Farmstead lacks research potential and the qualities of significance as defined by the National Register of Historic Places. As a result, it has been categorized as a no/low archaeologically sensitive area, and no additional archaeological examination of this area is recommended prior to construction of the proposed solar facility.

Stanton Farmstead (Site 102-131)

Pedestrian survey of the central portion of the proposed project area resulted in the identification of the remnants of the former location of the Stanton Farmstead. As discussed in Chapter IV, the Stanton Farmstead was owned by a "Mr. Stanton" (see Figures 6 and 7). The historical research for this project indicates that Tryphena Stanton is the likely owner of the Stanton Farmstead prior to and during the 1850s. She appeared in the 1850 census at that location, with her daughter Almira and son Courtland. It is clear by the 1870 census, however, that Mrs. Stanton no longer lived in house, having moved elsewhere by that time. Without additional exhaustive historic research, which is beyond the scope of the project, it cannot be said who owned the Stanton Farmstead after 1870. Despite not knowing the exact ownership of the farmstead in the late nineteenth century, the 1934 aerial image depicted in Figure 8 shows that the Stanton Farmstead remained in place and was comprised of approximately five buildings, one of which appears to be a dwelling house situated at the end of a dirt road. By 1939, it appears that some of these buildings were demolished; likely barns or other outbuildings (see Figure 10). Based on the layout of the farmstead as seen in the 1934 and 1939 aerial photographs discussed above, the Stanton Family operated a farm typical of the region in the nineteenth and early twentieth centuries just as the Wheeler Family did to the north. While the farm may have originated as early as the turn of the nineteenth century, it ceased to operate by the middle of the twentieth century. The 1957 aerial image, for example, shows that the Stanton Farmstead structures had been razed by then (Figure 15).

Once the farmstead was identified in various aerial images and on maps of the area, Heritage visited the location to determine what remained of the Stanton Farmstead. Visual reconnaissance of the area revealed the presence of a previously bulldozed area measuring approximately 60.9 x 60.9 m (200 x 200 ft) in size. This area, designated as Site 102-131 is situated at an approximate elevation of 39.6 m (130 ft) NGVD and was characterized by a combination of agricultural fields, tall grasses, shrubs, and small trees. Examination of the site revealed that the area that once contained the Stanton Farmstead buildings that been heavily disturbed by bulldozing, which likely took place when the buildings were demolished in the early 1950s and 1960s. Today, the only undisturbed remnant of the Stanton Farmstead is a stone lined well located in a portion of the agricultural field that contained the westernmost buildings of the farmstead (Photos 3 and 4). Despite the presence of the above-referenced well, it is clear that the Stanton

Farmstead has been massively disturbed, lacks research potential, and does not rise of the level of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). This area has been categorized as a no/low archaeologically sensitive area, and no additional archaeological examination of this area is recommended prior to construction of the proposed solar facility.

Post 1868 Farmstead (Site 102-132)
Located in the southwestern portion of the project area at an approximate elevation of 18.2 m (60 ft) NGVD, this historic farmstead, designated as the "Post 1868 Farmstead," consists of three remnant building foundations located in a wooded area to the east of Pendleton Hill Road. A built-up driveway leading to the farmstead area extends from the east side of Pendleton Hill Road across a narrow drainage ditch and travels east roughly 95 m (300 ft) to an area containing the stone and concrete building foundations. The driveway is lined on either side with wooden posts that stand approximately 1 m (3.3 ft) in height. At the end of the driveway and to the east lies a fieldstone foundation with a concrete addition. Behind the fieldstone foundation is a circular filled-in well structure, which measures approximately 1.5 m (5 ft) in diameter. The well is made of stone and patched with mortar. Behind the fieldstone foundation and well lies a long and narrow rectangular concrete foundation. Preliminary observations suggest the structure may represent the footprint of a former chicken coop, shed, or other type of outbuilding associated with the former farmstead. To the north lies a third foundation that appears to represent a former residence, which was built directly on bedrock ledge. The front stone steps are still in place (Photos 5 through 7).

Historic map research of the area containing this Site 102-132 suggests that it dates to after 1868, as it does not appear on that map; in contrast, the Wheeler, Babcock, and Stanton Farmsteads discussed in Chapter IV were recorded by that time. The Post 1868 Farmstead is visible in a 1934 image of the area, which shows the dwelling house, an outbuilding, and what appears to be the long narrow building mentioned above (Figure 7). This farmstead remains visible in all successive aerial images until the one taken in 1997. Thus, the Post 1869 Farmstead appears to have been in used an occupied for at least 70 years (see Figures 8 and 10 through 20). The field walkover suggests that the structures, based on their construction techniques that employed stone foundation, most likely date to the late nineteenth or turn of twentieth century. Further pedestrian survey of the area suggests that intact historical archaeological deposits may remain in this area.

Stanton Cemetery
In addition to the above-referenced farmsteads, pedestrian survey of the project area also resulted in the identification of two family cemeteries. The first, the Stanton Cemetery, was identified in a wooded area and just outside of the proposed project area (Photos 8 and 9). This burial ground it currently overgrown with tall grasses and shrubs, and it is situated at an approximate elevation of 19.8 m (95 ft) NGVD. The cemetery is bordered by a cornfield to the north and forested areas to the south, east, and west. The Pawcatuck River lies roughly 530 m (1740 ft) to the south. The boundary of the Stanton Cemetery was discernable and consisted of a low-lying stone wall that encompassed contains 400 m^2 (1,300 ft^2). A narrow gap on the southern side of the stone wall suggests a south-facing entrance. Approximately 10 burial marker stones were observed during the pedestrian survey. While most of the headstones have eroded and were not easily deciphered, one included the description "In memory of Dea. (Deacon) John Stanton, who died May 24, 1851 age 90 years." This is the same John Stanton that was referenced in Chapter IV of this report.

The Stanton Cemetery was recorded by Hale in the 1930s, and was referred to as Cemetery #74. The location of the cemetery is clearly marked on the 1953 topographic map of the area depicted in Figure 13, which listed it as "cem." Hale also indicated that the burial ground also contained, in addition to the marker for John Stanton, the headstones of Eliza Stanton, the wife of John Stanton; John Stanton (likely son of John); and Amos Stanton. While Hale only recorded the markers for four Stanton Family members, it is clear that other people are buried there as well. This cemetery is typical of early to mid-nineteenth century family burial grounds of rural Connecticut populations. As mentioned above, the Stanton Cemetery is located outside of the proposed project area, ca. 75 m (250 ft) to the west of the proposed project boundary. As long as the proposed project area does not increase to include the burial ground, no other recordation of the Stanton Cemetery is required.

Partlow Cemetery

Visual reconnaissance of the proposed project area also resulted in the identification of the Partlow Cemetery in the north-central portion of the project area (Photos 10 and 11). This cemetery is situated at an approximate elevation of 48.7 m (160 ft) NVGD and is surrounded by a large cornfield to the south of Interstate 95. It is first very visible in a 1965 aerial image of the area as depicted in Figure 17. The cemetery consists of an irregularly-shaped wooded area that was covered in brush and surrounded entirely by the agricultural field. The currently visible edges of the cemetery cover an area roughly 850 m^2 (2800 ft^2). The cemetery is not bounded by a fence of any kind or stone wall. A total of 30 to 40 head and foot stones were observed, of which only a few contained legible inscriptions. The most easily discerned inscription was “Nancy, daughter of Azariah and Hannah Partlow who died October 28, 1816, aged 81 years.” Based on the number of head and footstone pieces observed, it is estimated that there may be between 15 to 20 graves in the visible portion of the cemetery.

The historical research for this project indicates that the Partlow Cemetery was listed as #73 in the Hale Collection for North Stonington. According to the Hale Collection cemetery transcription records, the headstones that were recorded there in the 1930s were associated with, in addition to Nancy Partlow (mentioned above), Hannah Partlow, wife of Azariah Partlow; Thomas Partlow; Isaac Partlow; Henry Partlow; Azariah Partlow, and Henry Stanton. As discussed in Chapter IV, very little is recorded about this family in North Stonington. This may reflect that the Partlow Family were Baptists and only recorded births, deaths, and marriages with their church and not with the town. The earliest reference to any of the Partlows buried in this cemetery is in regard to Thomas Partlow in 1810. Thomas’ family included 11 members, some of which may be buried in the cemetery. Henry Stanton, also is listed in the 1810 census as the head of a family of 11 (U.S. Census 1810). The only other Partlow mentioned in any census of this area is Azariah Jr. who had 10 people in his family (U.S. Census 1820). The presence of Henry Stanton in the Partlow cemetery suggests that the Partlow and Stanton Families from the project area intermarried at least once.

In sum, Partlow Cemetery is currently located in small wooded area that is encompassed by a large cornfield. It is not bounded by a stone wall or fence of any kind, but the presence of 30 to 40 head and footstones is indicative of a burial population of at least 15 to 20 individuals, far more than the six as recorded by Hale in the 1930s. Thus, while the original owners of the land likely knew the extent of the cemetery, it is possible subsequent generations lost track of the cemetery’s boundaries and may have inadvertently began plowing over portions of the burial ground, as has been seen in other rural cemeteries in Connecticut. Thus, the cemetery boundaries may extend into the surrounding cornfield. Particular care should be taken when considering development plans in the area containing the Partlow Cemetery.

Site 102-8

As mentioned in Chapter V, Site 102-8 is also known as the Lewis Farm Site (Figure 25). This site was first reported in 1991 by Kathy Hoy who learned of the existence of the site from Mr. Louis Bayer, a former game warden. Mr. Bayer reportedly collected a large number of temporally diagnostic prehistoric lithic artifacts from the site area; however, it remains unknown as to what types of artifacts he recovered. To date, Site 102-8 also has not been assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). Pedestrian survey of the recorded site area during the current Phase I investigation revealed that is currently being used as a cow pasture and appears to be largely undisturbed

(Photos 12 and 13). This area, like the Post 1868 Farmstead discussed above, should be subjected to Phase IB cultural resource reconnaissance survey if it is to be impacted by the proposed project.

Overall Sensitivity of the Proposed Project area and Project Recommendations

In addition to the above-referenced research, the field data collected during the pedestrian survey was used in conjunction with the analysis of topographic and soils mapping to stratify the project area into zones of no/low, moderate, and high archaeological sensitivity. As seen above, historic sites are generally easy to find on the landscape because the features associated with them tend to be relatively permanent above-ground constructions (e.g., building foundations, wells, pens, etc.). Prehistoric sites, on the other hand, are less often identified during pedestrian survey, and predicting their locations relies more on 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 or moderate/high archaeological potential by analyzing landform types, slope, aspect, soils, and distance to water. In general, areas located less than 300 m (1,000 ft) and no more than 600 m (2,000 ft) from a freshwater source and that contain slopes of less than 8 percent and well-drained soils possess a moderate/high potential for producing prehistoric archaeological deposits. 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, on upland terraces, and near stream/river confluences. 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 deemed to retain a no/low archaeological sensitivity.

As discussed in Chapter I, proposed solar center will be built on parcels that encompass approximately 236 acres of land. A review of cultural resources on file with the Connecticut State Historic Preservation Office, historical research, and a pedestrian survey of the area indicates that 124 acres of the project area retain no/low archaeological sensitivity either due to the presence of wetlands, steep slopes and/or previous disturbances (i.e., bulldozing and building demolition. These areas, which contain both the Wheeler and Stanton Farmstead, have been assigned a no/low archaeological sensitivity. No additional archaeological investigation of these areas is recommended prior to construction of the proposed solar facility.

The above-reference literature review, historical research, and pedestrian survey revealed that of the remaining acreage, 46 acres and 66 acres possess a moderate and high potential to contain archaeological deposits, respectively. The moderate probability areas are those located on moderate slopes and at a distance from a freshwater source (see for example Photos 14 through 16). The high probability areas are located near freshwater sources, on low slopes, sandy soils, and/or contain previously identified archaeological sites, as is the case in the easternmost portion of the project parcel, which contains the Lewis Farm Site (102-8), a prehistoric occupation (see for example Photos 12, 13 and 17 through 19).

Figure 29 shows the portions of the project area that have been assessed as retaining no/low, moderate, and high sensitivities for historic and/or prehistoric deposits. They are highlighted yellow, orange, and red, respectively. As mentioned above, no additional examination of the no/low areas is required as they possess little if any potential to yield intact archaeological deposits due to steep slopes, poor soil conditions, or previous disturbances. No/low sensitivities comprise most of the eastern portion of the project areas, as the location of the previously bulldozed Wheeler Farmstead and steep areas in the western portion of the project acet. The moderate sensitivity areas contain moderately slope areas with good soils, and access to freshwater. These areas are located along a north to south axis in the central portion of the project area. Finally, the high sensitivity areas are those with low slopes, sandy soils, and close proximity to water. These areas are found around the Lewis Farm Site (102-8) in the northeastern portion of the project area, in the central portion of the project area that is flanked by wetlands, and two smaller areas in southwestern portion of the project area, one of which encompasses the Post 1868 Farmstead.

Based on the results of the background research for this project and the pedestrian survey, it is possible that historic and prehistoric deposits are likely to be identified within the moderate and high sensitivity portions of the project area. Thus, Phase IB cultural resources reconnaissance survey of these areas, using subsurface testing techniques, is recommended for those portions of the moderate and high sensitivity areas that will be impacted by construction, whether it be for the solar center or tree clearing where stumping will occur. The field methods for the recommended Phase IB cultural resources reconnaissance survey should be developed in consultation with the Connecticut State Historic Preservation Office. In addition, preservation plans for the Stanton and Partlow Cemeteries also should be crafted in consultation with the Connecticut State Historic Preservation Office prior to construction. Finally, no additional archaeological examination of the no/low sensitivity areas is recommended (see for example Photos 14 through 16).

CHAPTER VIII

SUMMARY AND MANAGEMENT RECOMMENDATIONS

The review of historic maps and aerial images of the project area, files maintained by the Connecticut State Historic Preservation Office, and pedestrian survey of the proposed Pawcatuck Solar Center resulted in the identification of three historic farmsteads, two historic cemeteries, and the location of single prehistoric archaeological site (102-8). Visual reconnaissance of the Wheeler and Stanton Farmsteads, both of which date from the nineteenth century and perhaps earlier, revealed that they have been massively disturbed in the past due to bulldozing. This occurred when these farmsteads were razed in the late twentieth century. Due to a lack of intact archaeological deposits and research potential, neither of these two historic cultural resources rises to the level of significance as defined by the National Register of Historic Places, and no additional archaeological examination of them is required prior to construction of the proposed solar facility. The third historic farmstead, known as the Post 1868 Farmstead was identified in the southwestern portion of the proposed project area in the vicinity of where the solar center will interconnect with Eversource's power grid. This area contained intact above ground features (e.g., house foundation and outbuilding footprints). If, as the project plan develops further, this area is to be disturbed, then Phase IB cultural resources reconnaissance survey of the Post 1868 Farmstead would appear warranted.

The pedestrian survey of the project area also resulted in the identification and recordation of two historic cemeteries and the location of a single previously identified prehistoric archaeological site. The Stanton Cemetery was noted outside of the southern limits of the proposed project area. It is clearly demarcated by a stone wall and contains the graves of approximately 10 members of the Stanton Family. Currently, no impacts to this historic resource are anticipated as the project boundary lies approximately ca. 75 m (250 ft) to the west of the proposed project boundary. As long as the proposed project area does not increase to include the burial ground, no other recordation of the Stanton Cemetery is required however, if the project plans change such that the cemetery will be in or near the project limits, it is recommended that no construction occur within 15 m (50 ft) the stone walls demarcating the cemetery.

The second cemetery was noted in the north-central portion of the proposed project area within a large cornfield. This area is associated with the Partlow Family and it was used during the nineteenth century. There are currently head and footstones there for between 15 and 20 individuals. However, while the area is located in a small stand of trees, there is no stonewall or fence demarcating its boundaries. Thus, it is possible that additional, unmarked graves may exist within the cornfield. As a result, the project sponsor should take particular care when developing plans for this area so that the cemetery is not inadvertently impacted. It is recommended that no construction occur within 15 m (50 ft) of the area around the small stand of trees where graves are known to exist.

In addition, the location of Site 102-8 was reidentified during pedestrian survey. This area is known to contain prehistoric deposits and is official recognized as an archaeological site by the State of Connecticut. Currently, the area is being used as a cow pasture and appears to be largely undisturbed. A

Phase IB cultural resource reconnaissance survey in this area also appears warranted if it is to be impacted by the proposed project.

Finally, 46 and 66 acres of land, respectively, have been categorized as moderate and high archaeologically sensitive areas. These are areas with access to freshwater, low to moderate slopes, and well drained soils. These areas also appear to be likely candidates for Phase IB cultural resources reconnaissance survey prior to disturbance associated with construction of the proposed solar center. Those portions of the solar facility area that possess steep slopes are characterized as no/low probability areas and need not be examined further prior to construction (Figure 17).

We recommend that the field methods for the Phase IB cultural resources reconnaissance survey be developed in consultation with the Connecticut State Historic Preservation Office.

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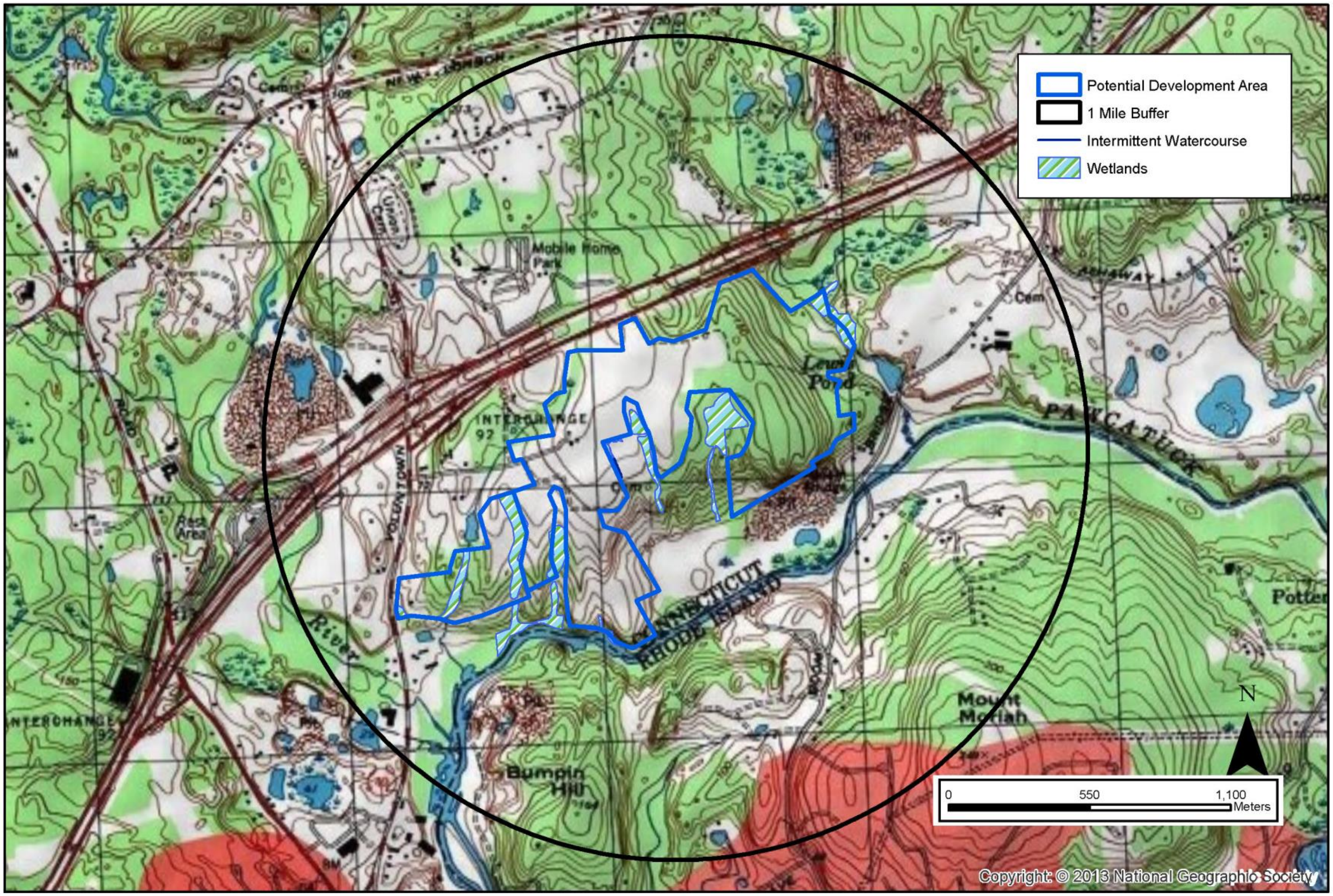

Figure 1. Excerpt from a USGS 7.5' series topographic quadrangle image showing the location of the study area in North Stonington, Connecticut.

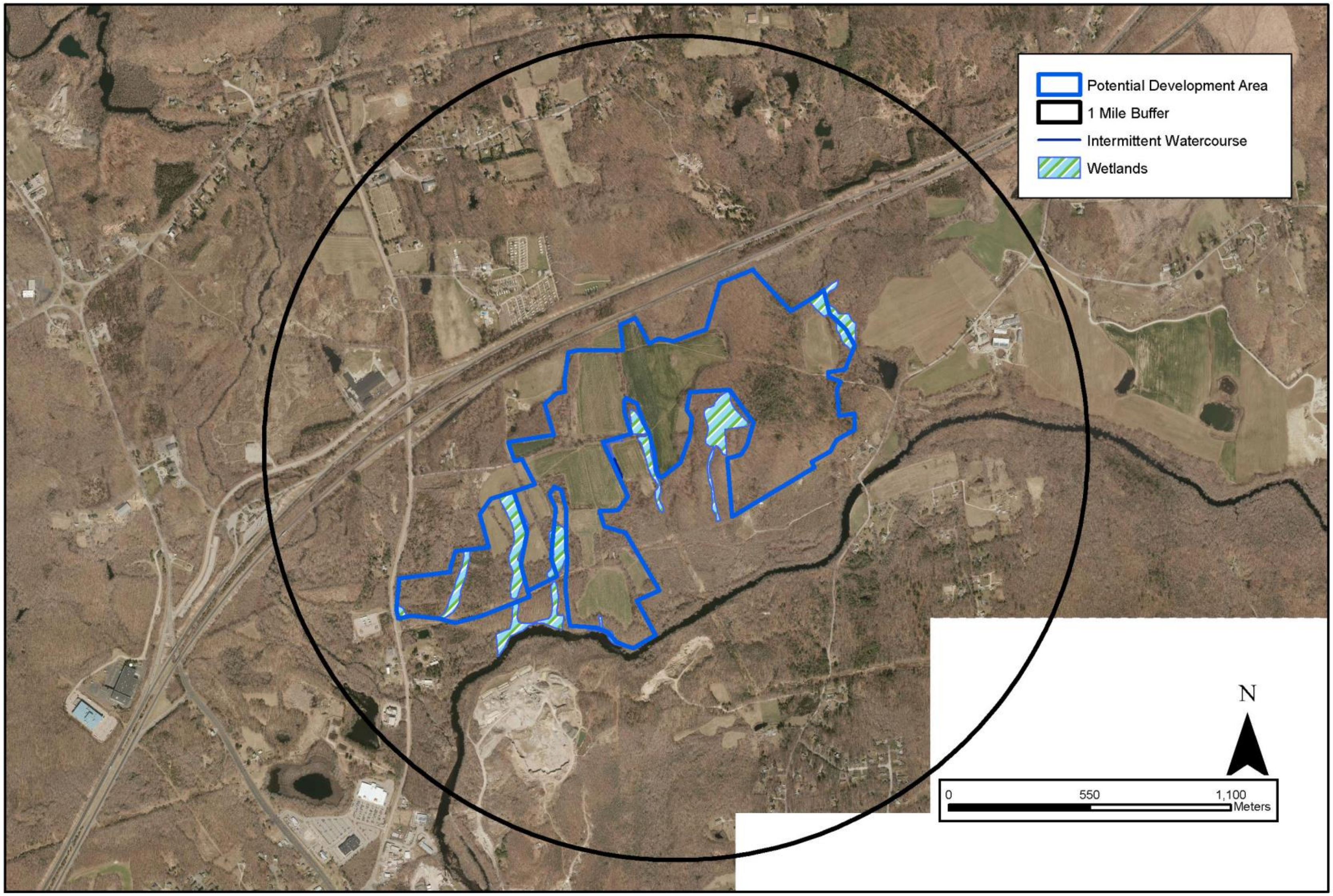

Figure 2. Excerpt from a 2016 aerial image showing the location of the project area in North Stonington, Connecticut.

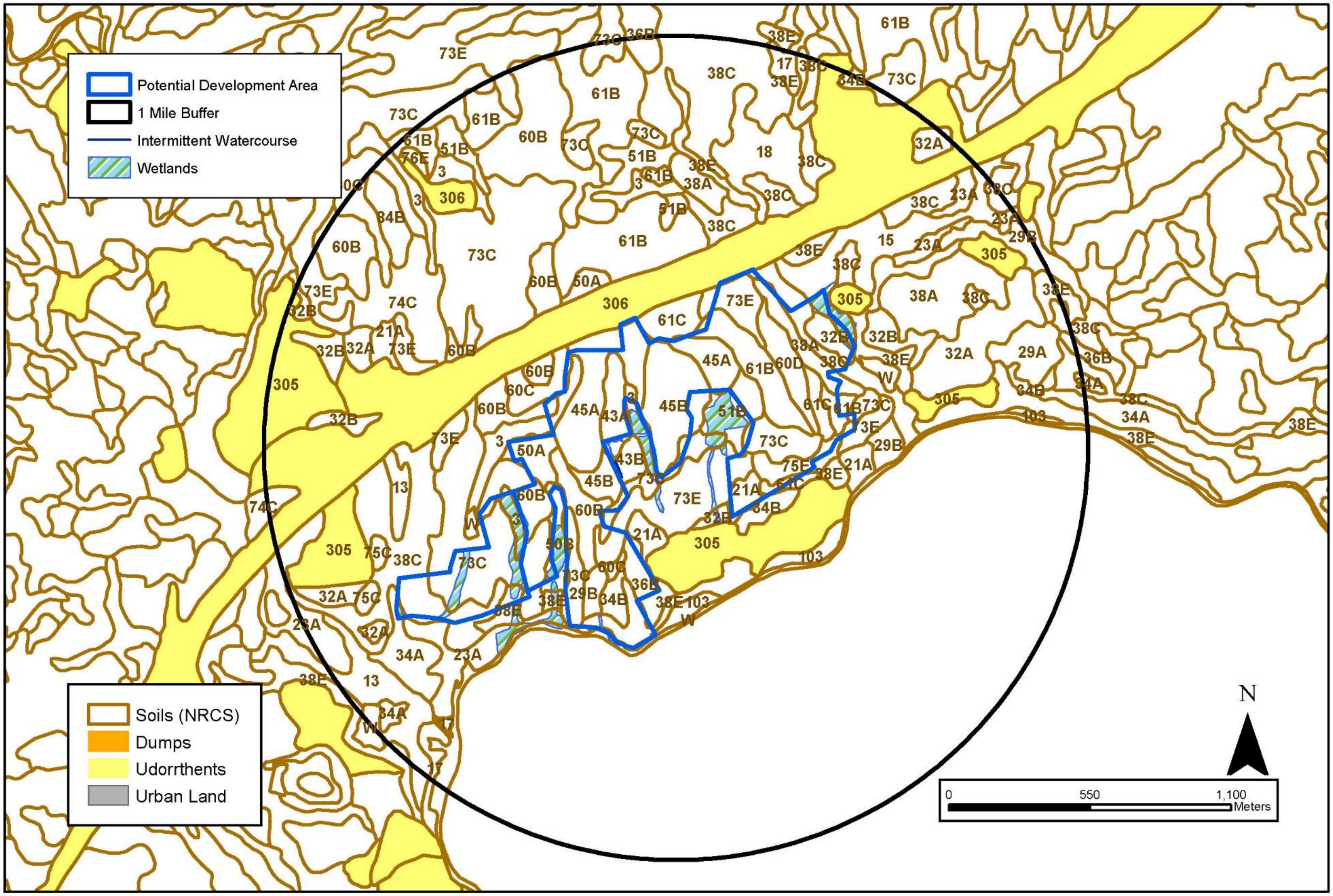

Figure 3. Digital maps of soil types present throughout the proposed project area in North Stonington, Connecticut.

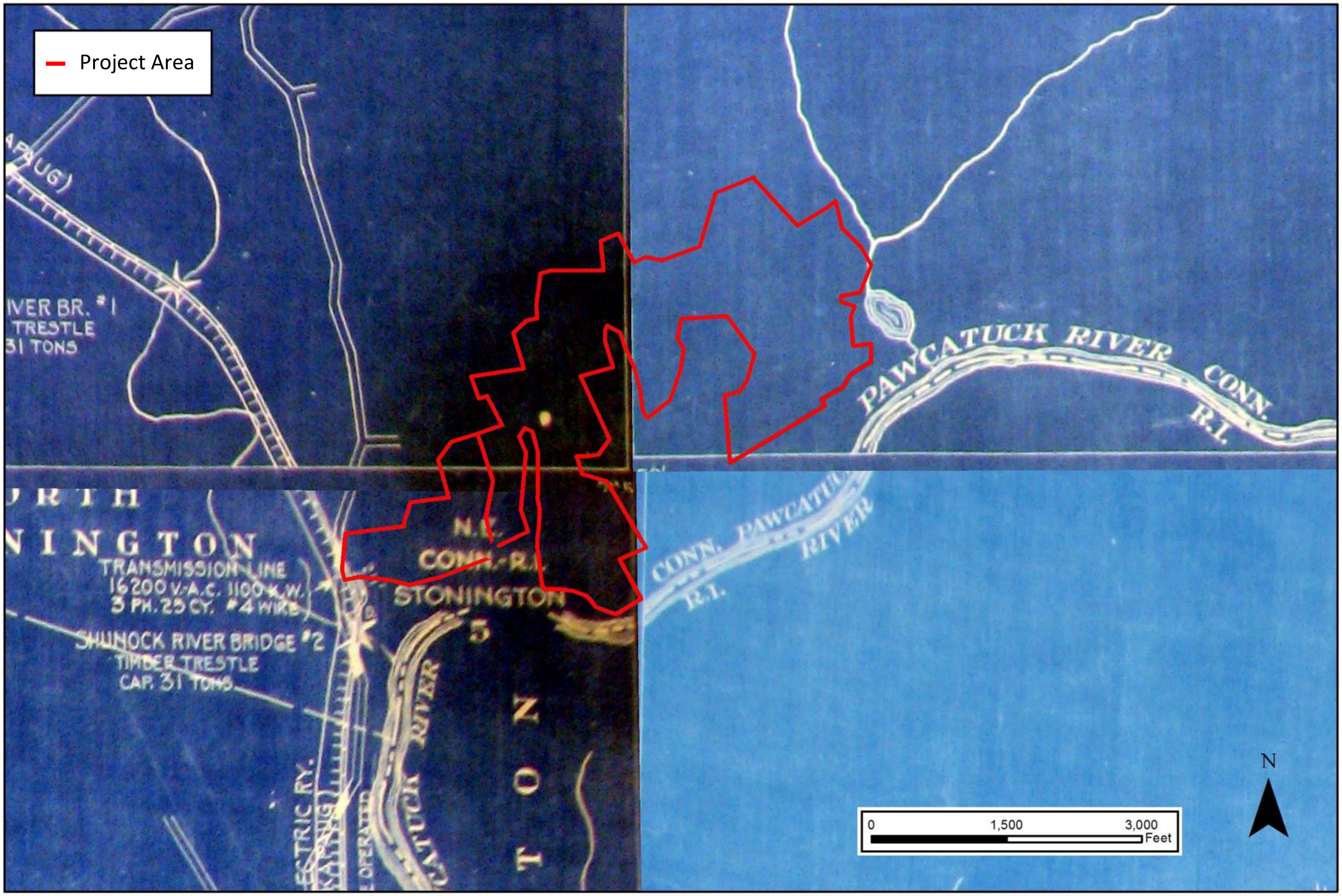

Figure 4. Excerpt from a 1916/1918 map showing the location of a trolley line to the west of the project area in North Stonington, Connecticut.

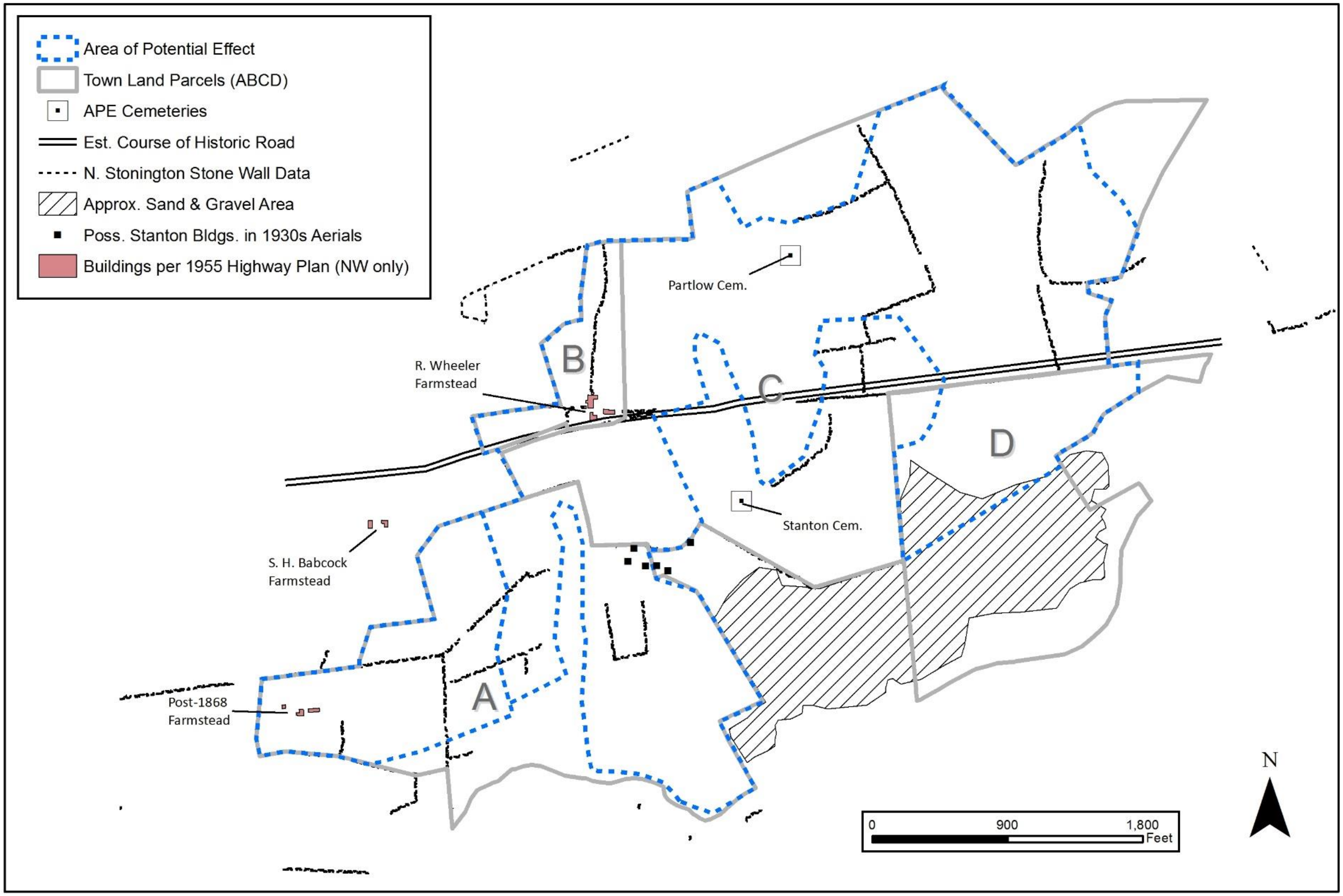

Figure 5. Digital index map of the project parcels comprising the study area in North Stonington, Connecticut.

Figure 6. Excerpt from an 1854 map depicting the project area in North Stonington, Connecticut.

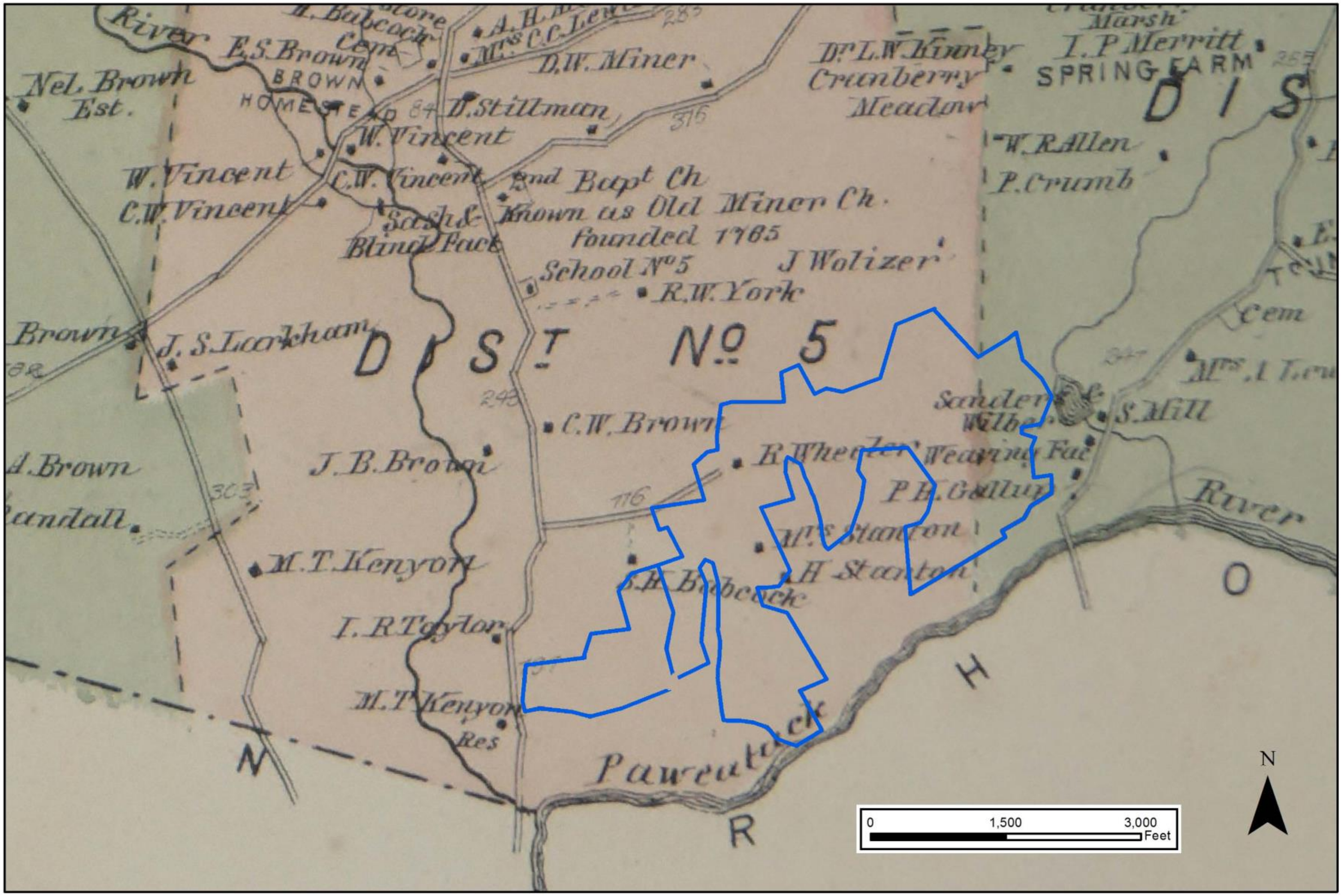

Figure 7. Excerpt from an 1868 map depicting the project area in North Stonington, Connecticut.

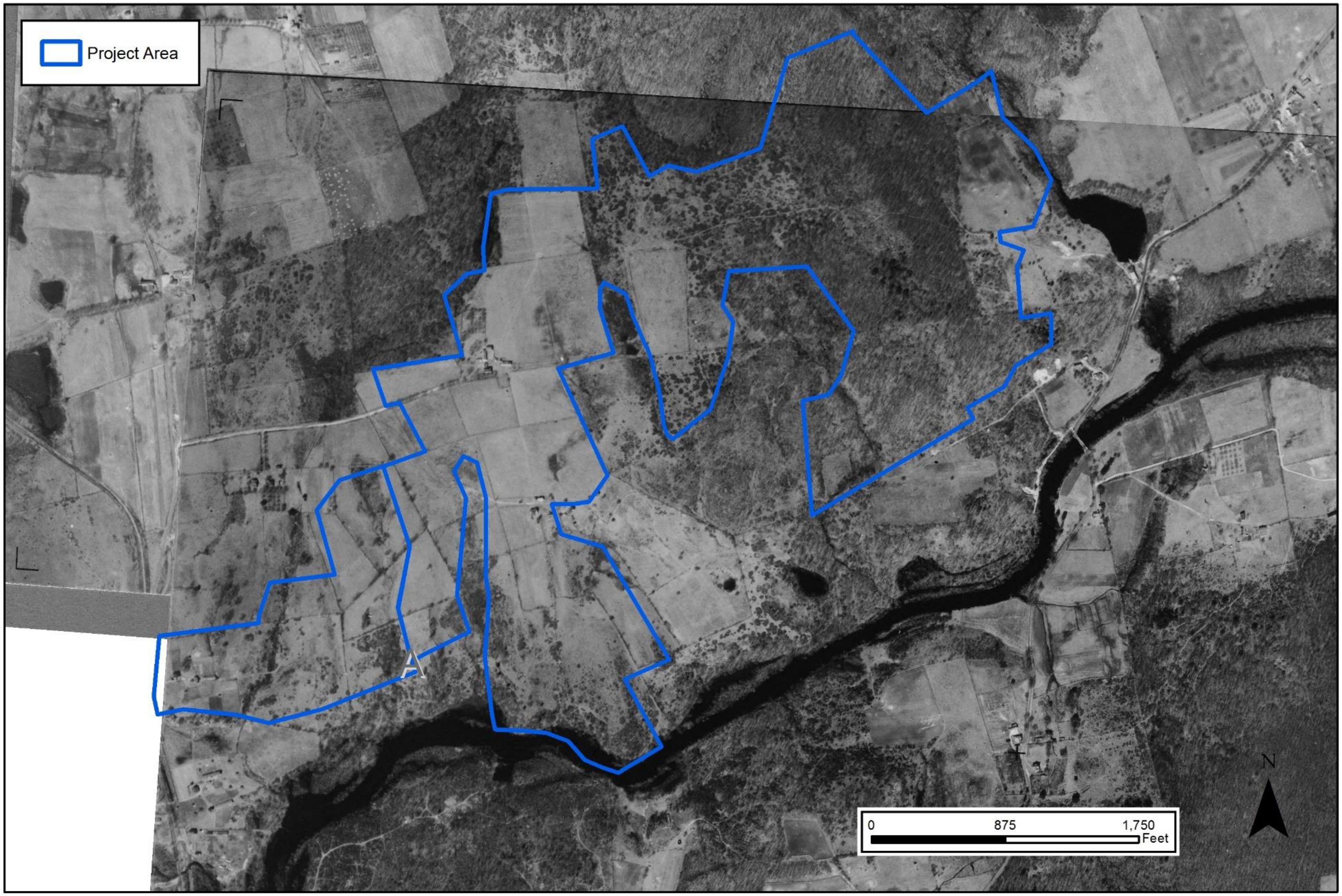

Figure 8. Excerpt from 1934 aerial image depicting the project area in North Stonington, Connecticut.

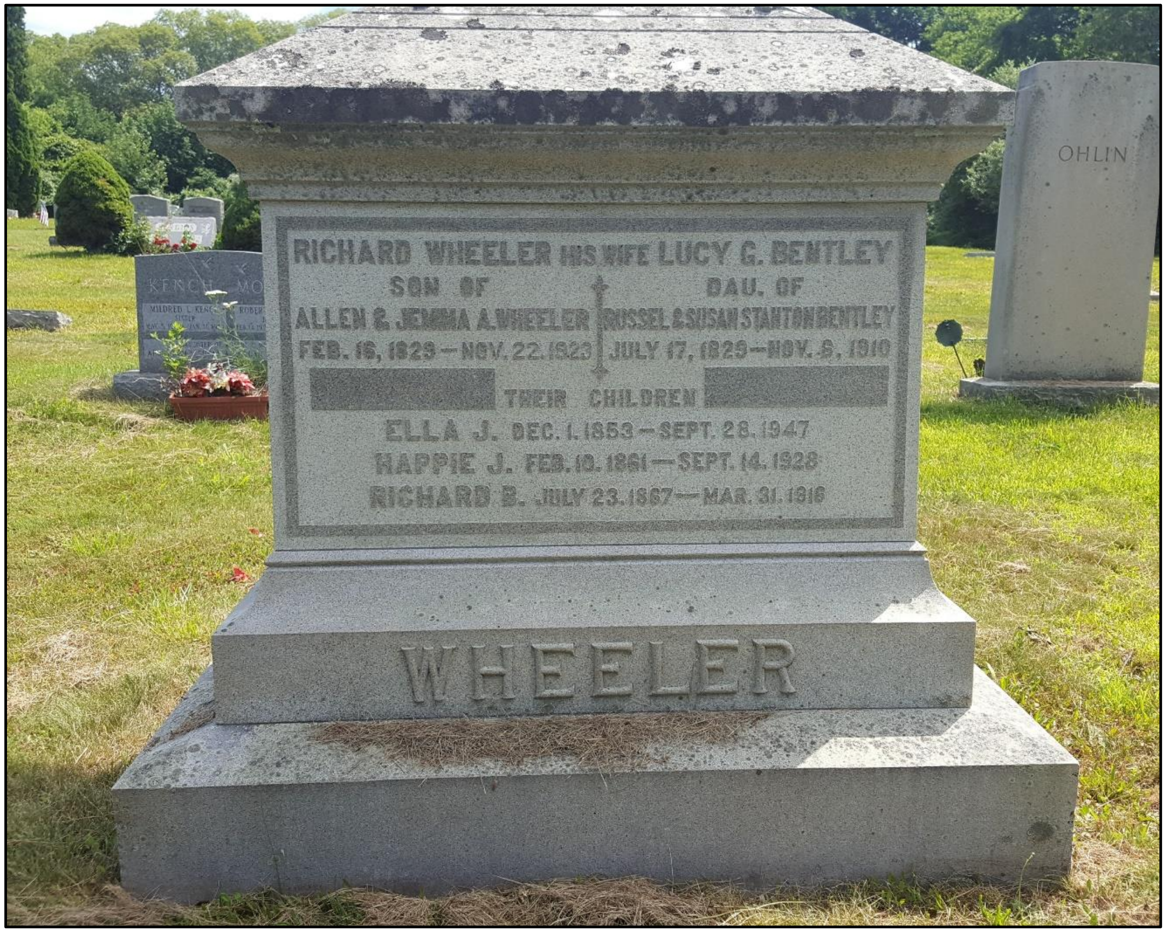

Figure 9. Photo of the Wheeler Family headstone.

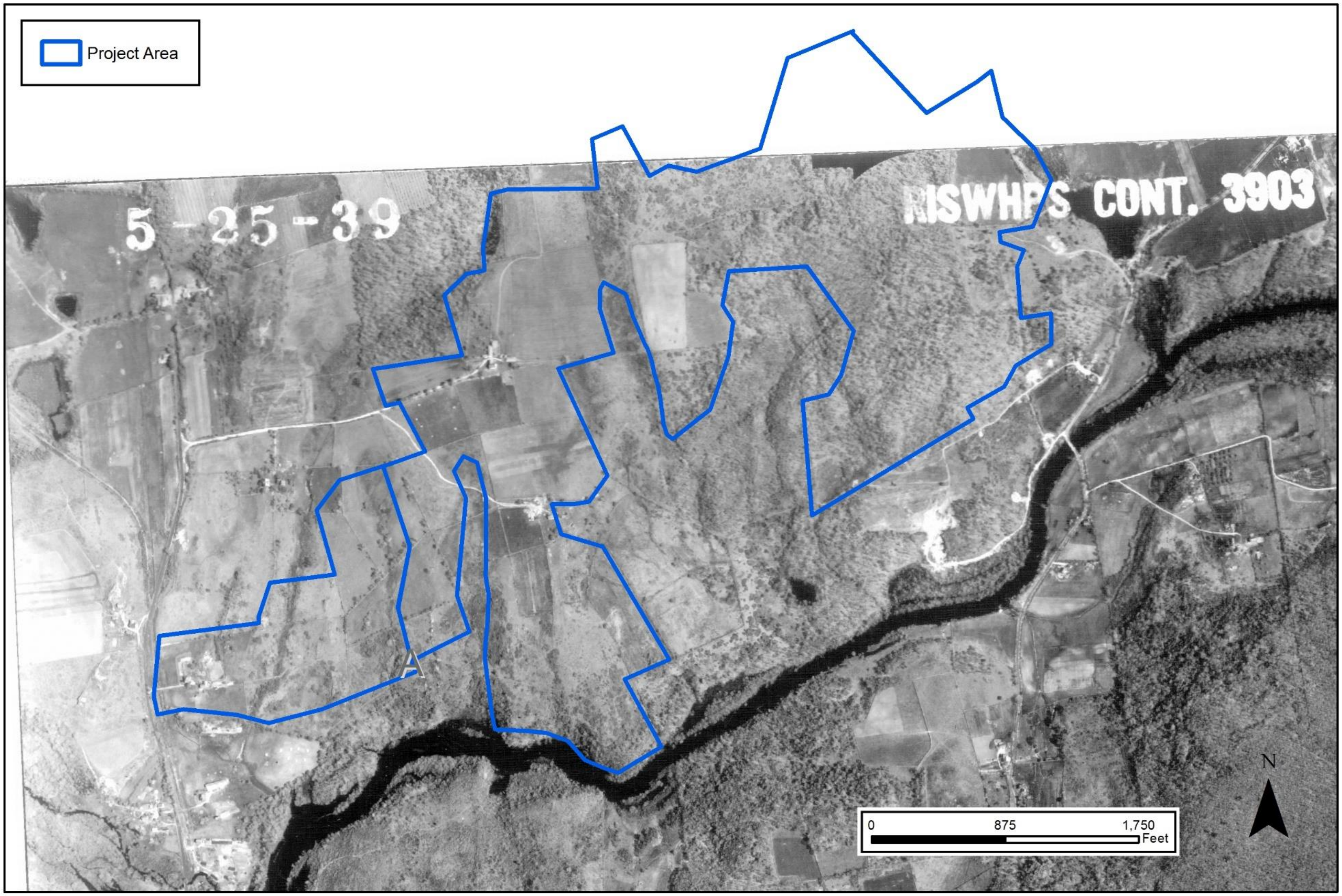

Figure 10. Excerpt from a 1939 aerial image depicting the project area in North Stonington, Connecticut.

Figure 11. Excerpt from a 1941 aerial image depicting the project area in North Stonington, Connecticut.

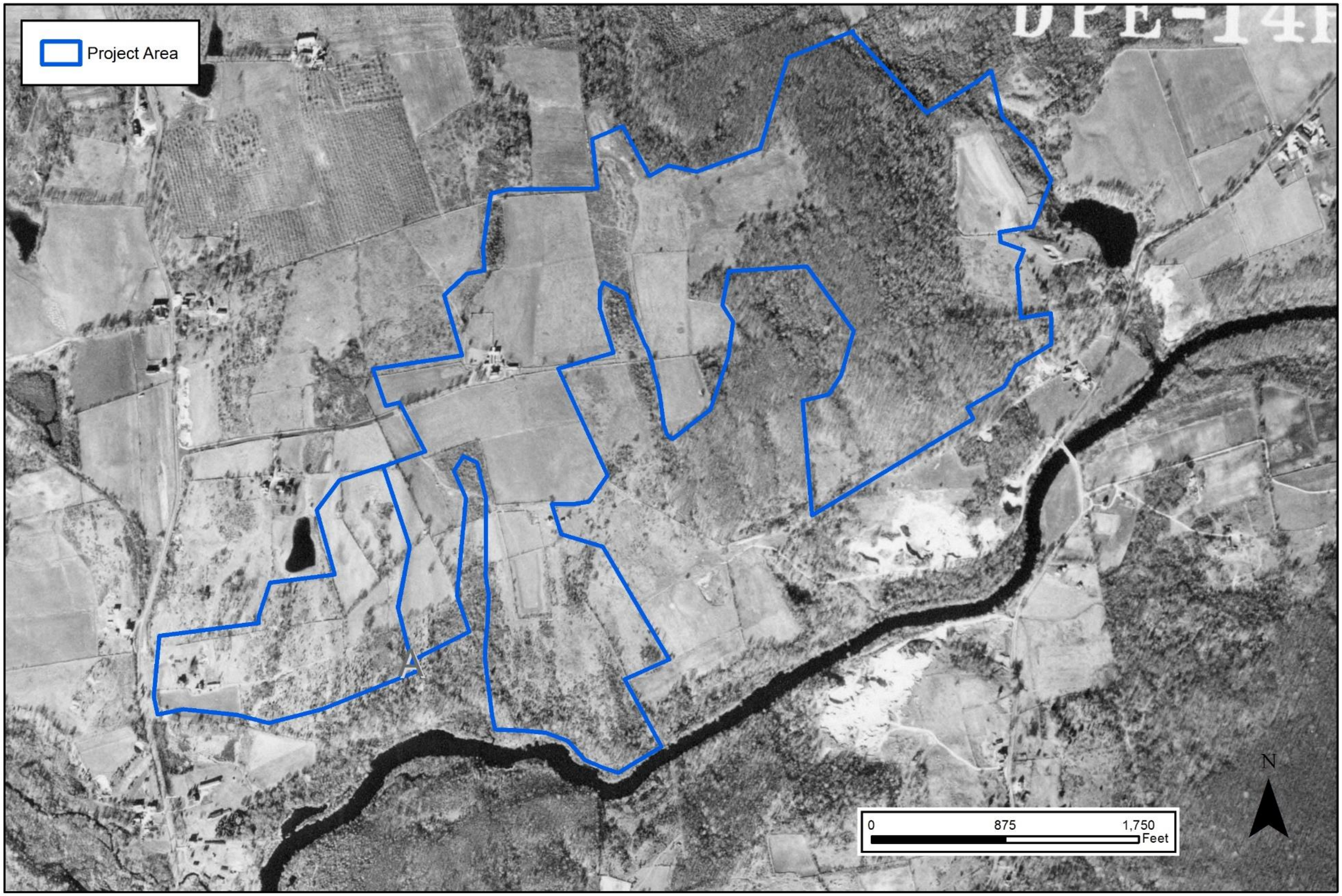

Figure 12. Excerpt from a 1951 aerial image depicting the project area in North Stonington, Connecticut.

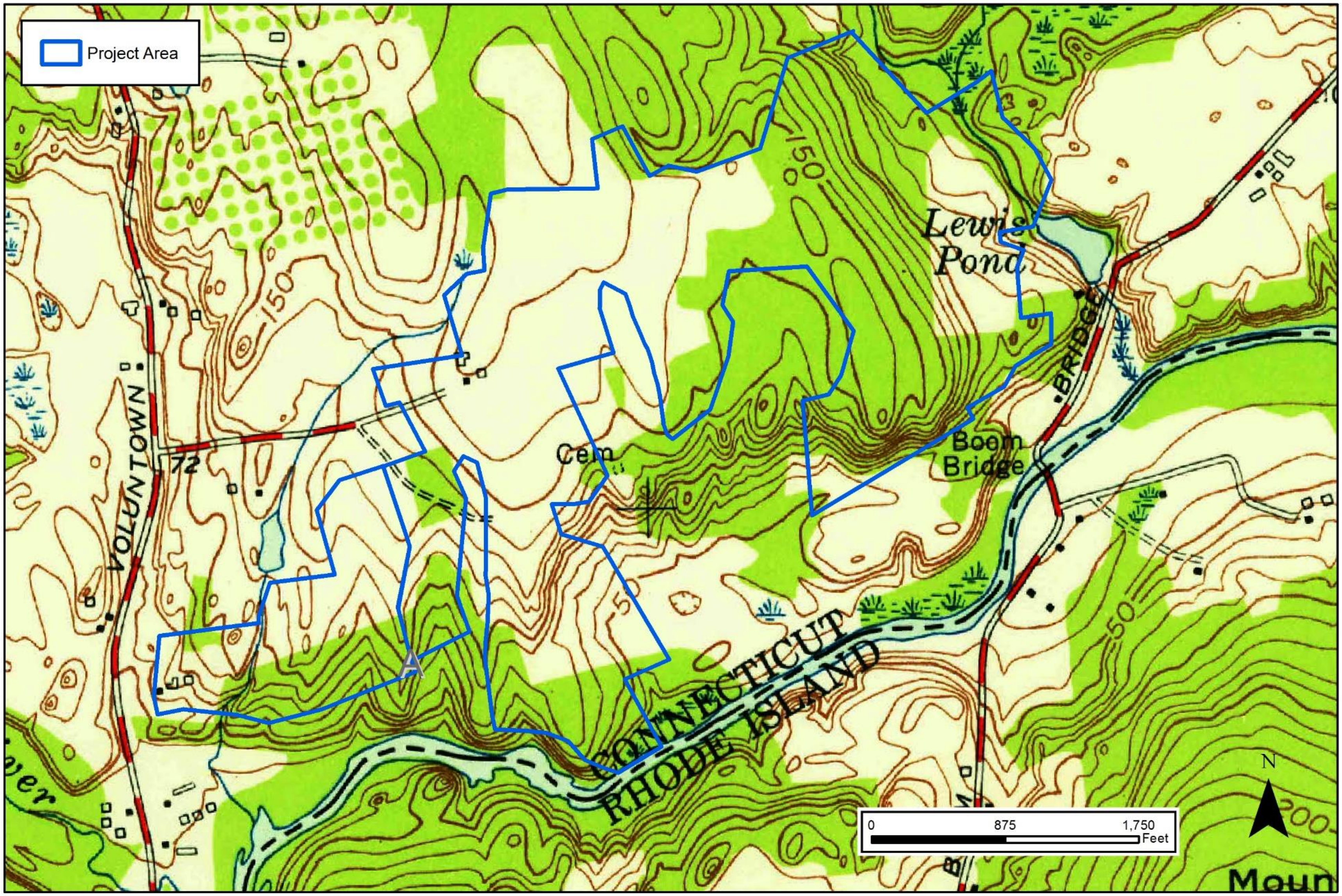

Figure 13. Excerpt from a 1953 USGS 7.5' topographic quadrangle depicting the project area in North Stonington, Connecticut.

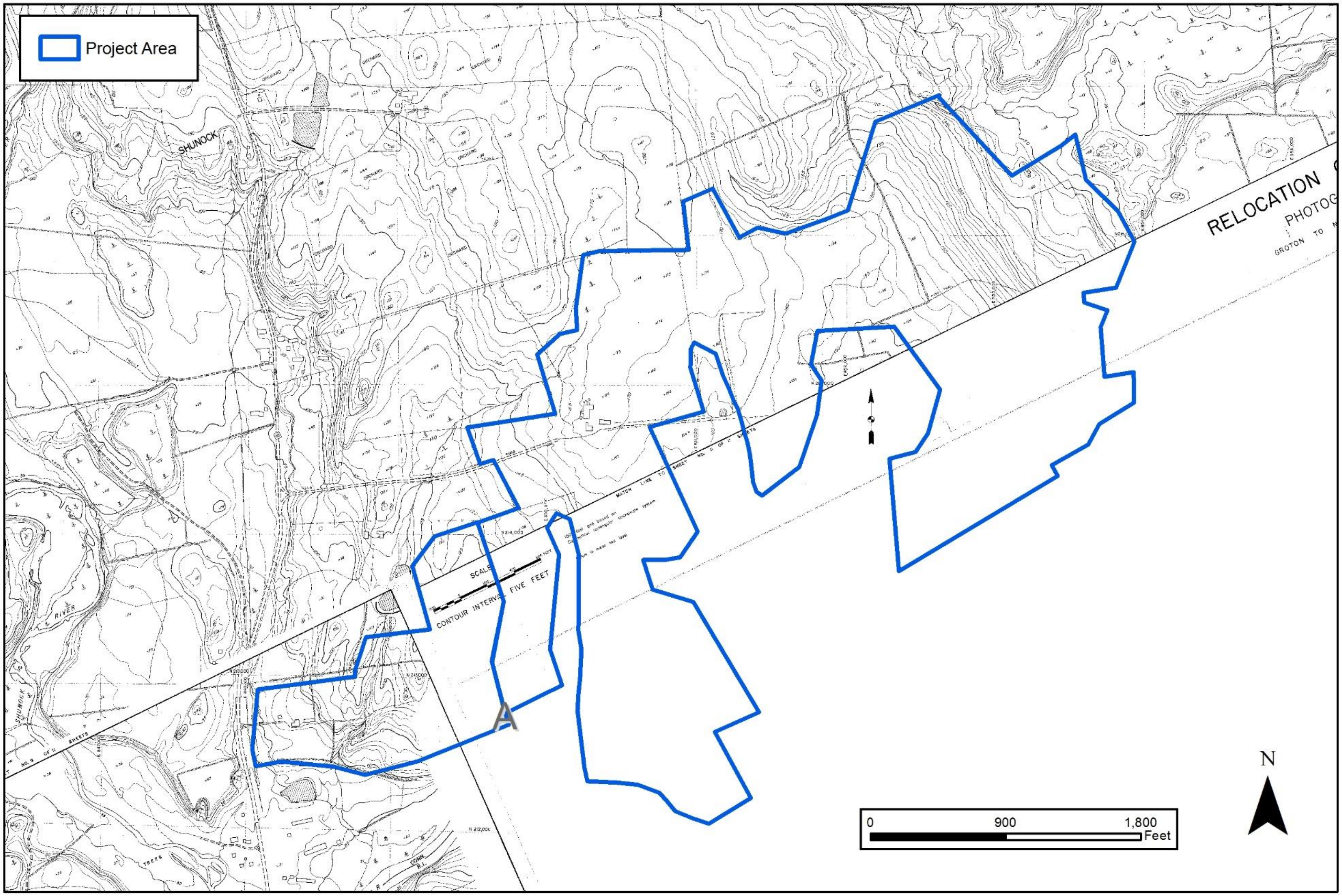

Figure 14. Excerpt from a 1955 map depicting the project area in North Stonington, Connecticut.

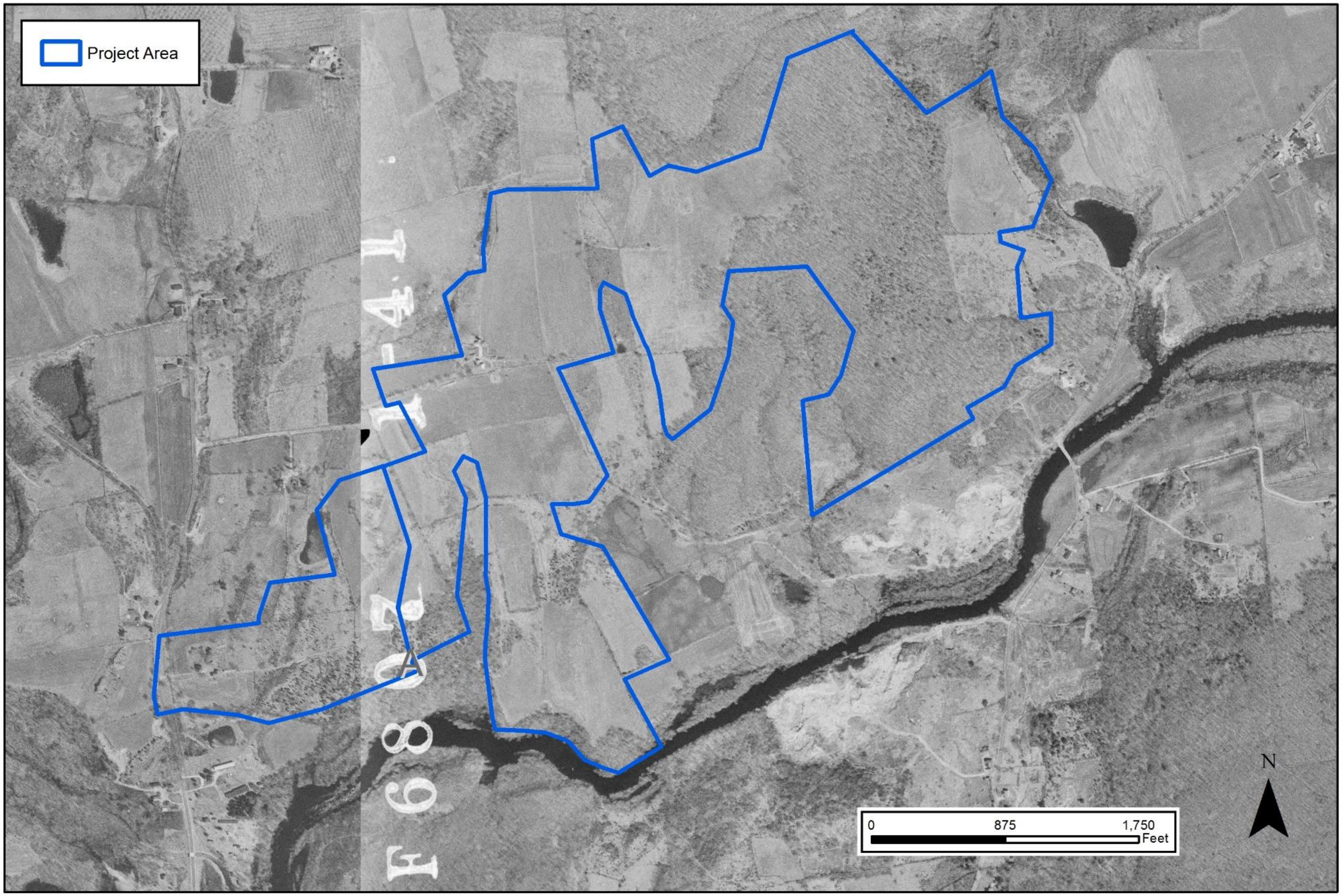

Figure 15. Excerpt from a 1957 aerial image depicting the project area in North Stonington, Connecticut.

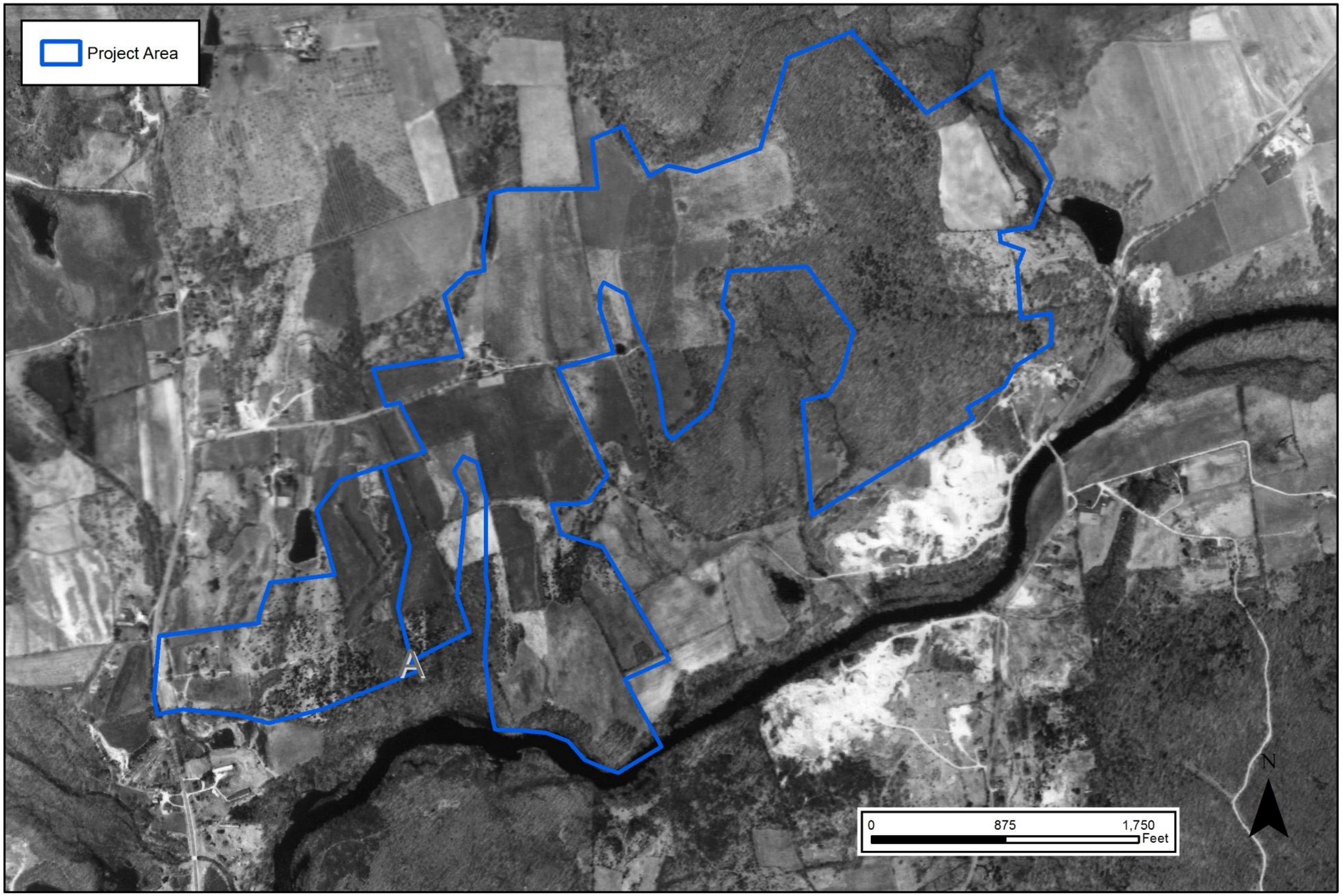

Figure 16. Excerpt from a 1962 aerial image depicting the project area in North Stonington, Connecticut.

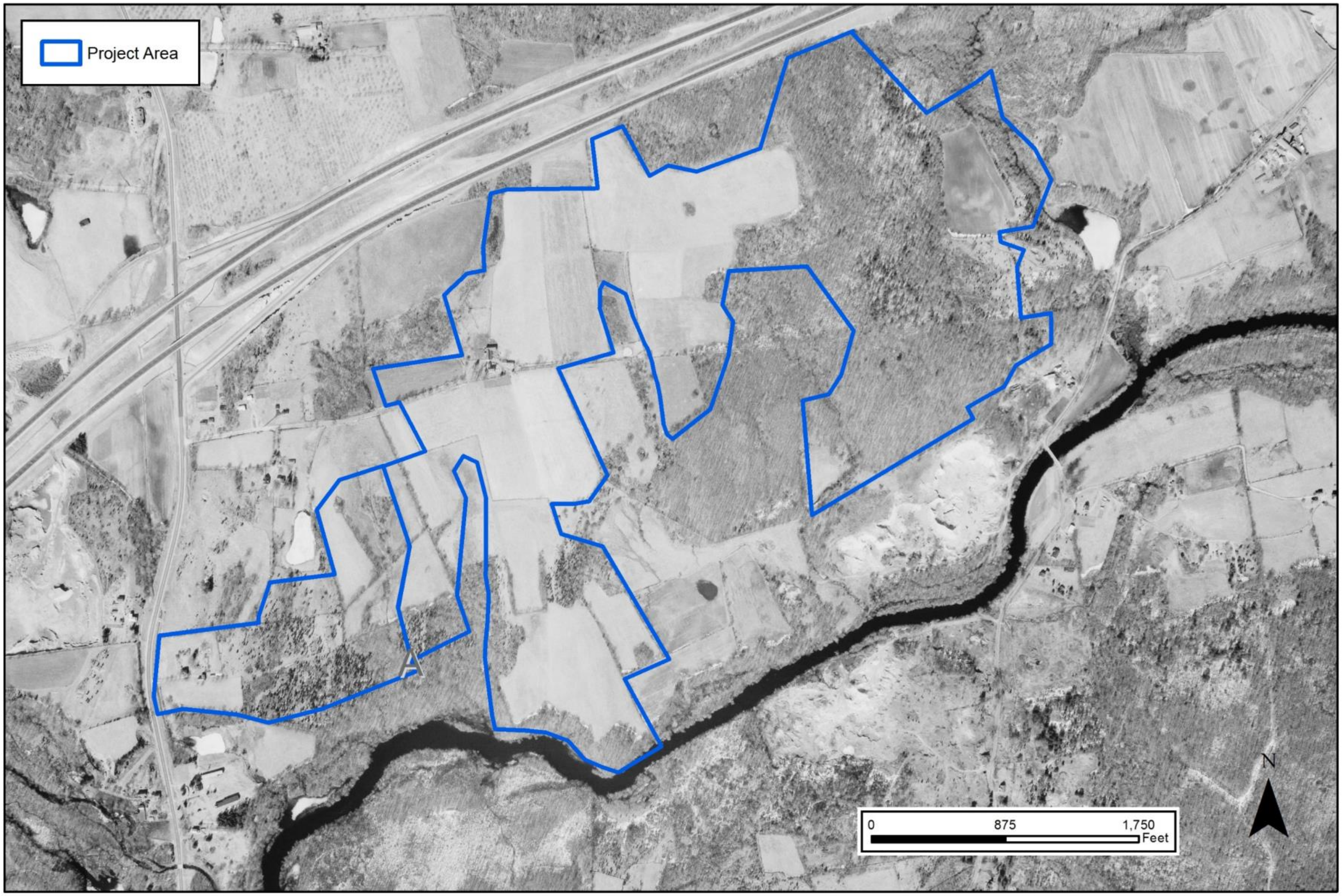

Figure 17. Excerpt from a 1965 aerial image depicting the project area in North Stonington, Connecticut.

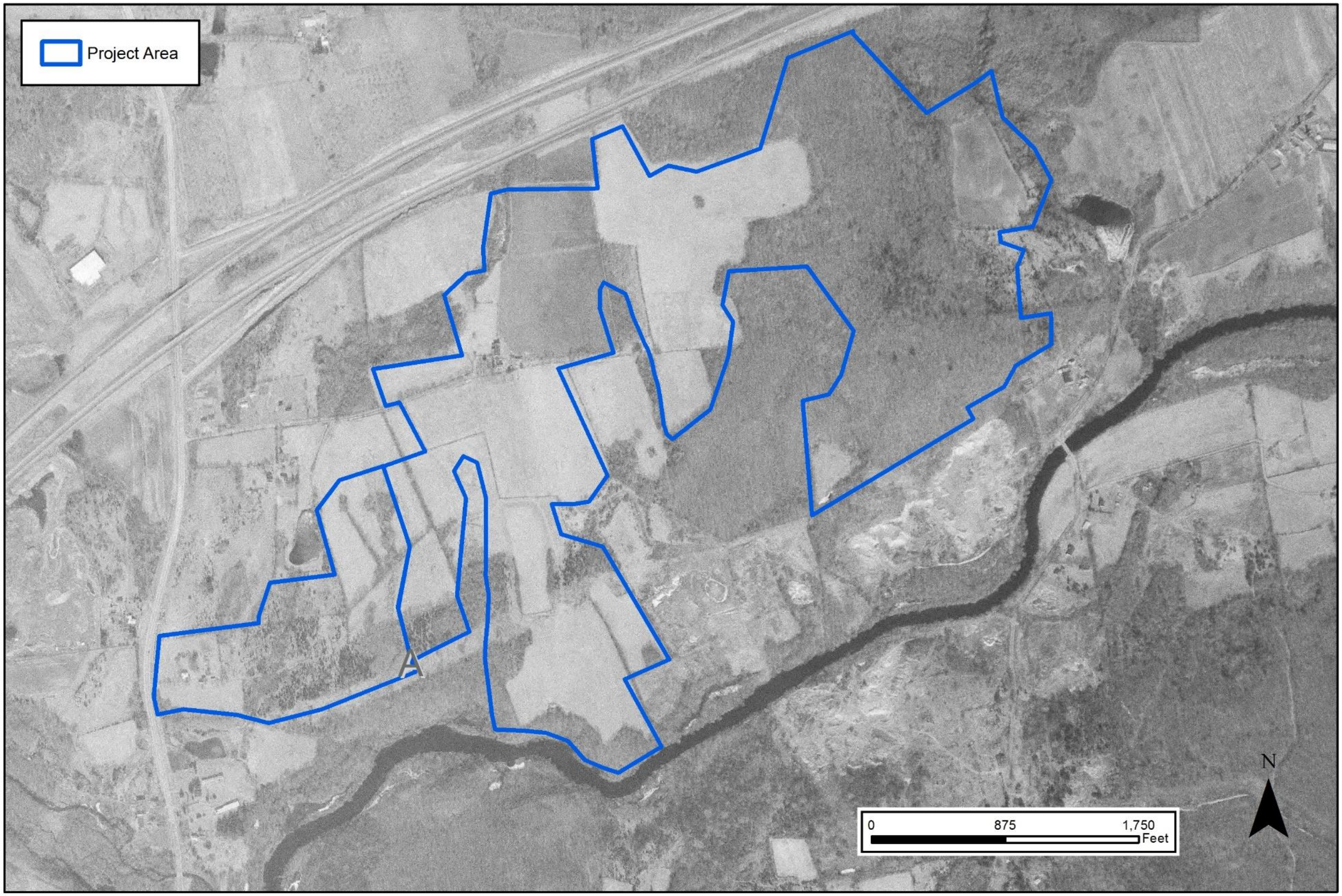

Figure 18. Excerpt from a 1970 aerial image depicting the project area in North Stonington, Connecticut.

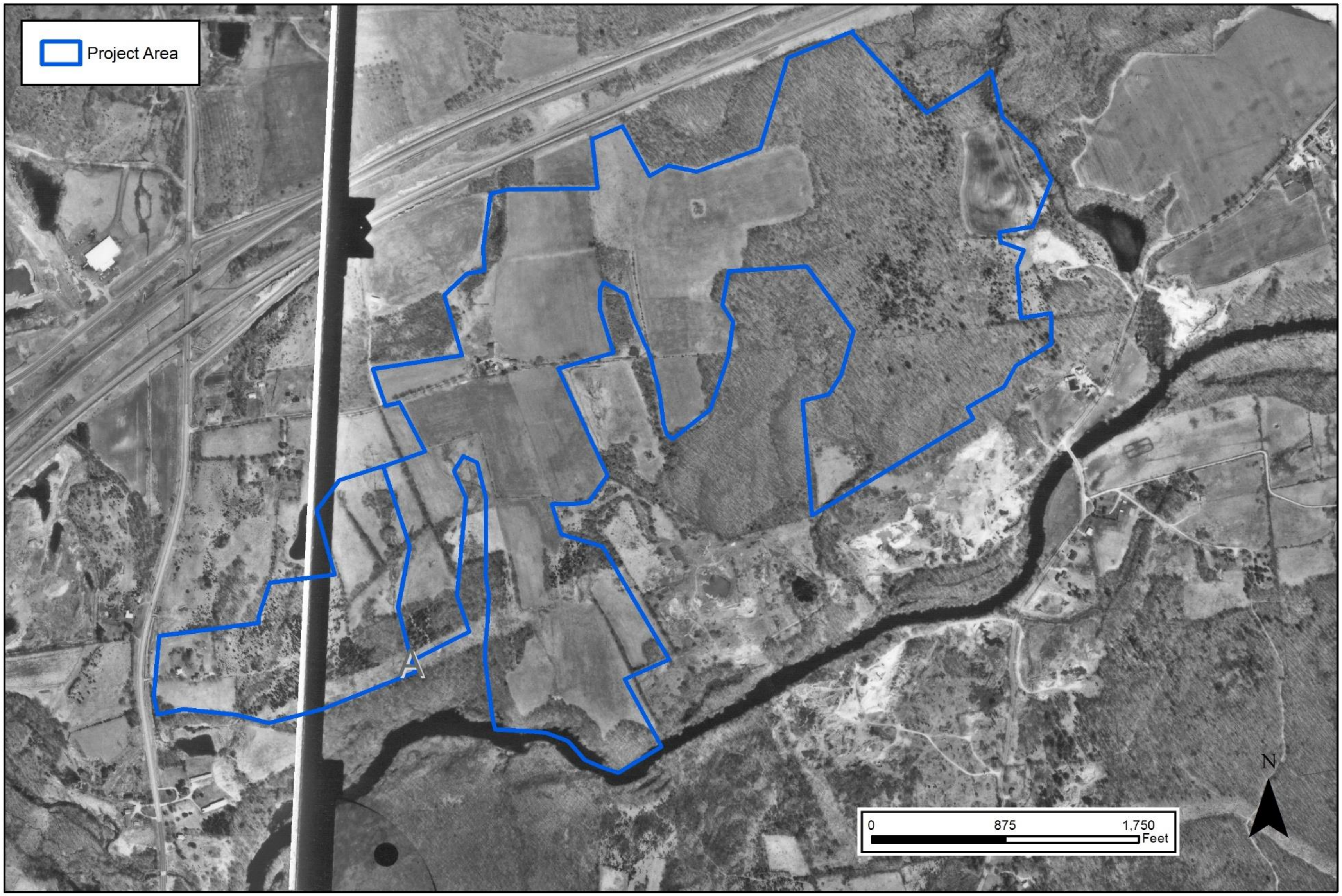

Figure 19. Excerpt from a 1972 aerial image depicting the project area in North Stonington, Connecticut.

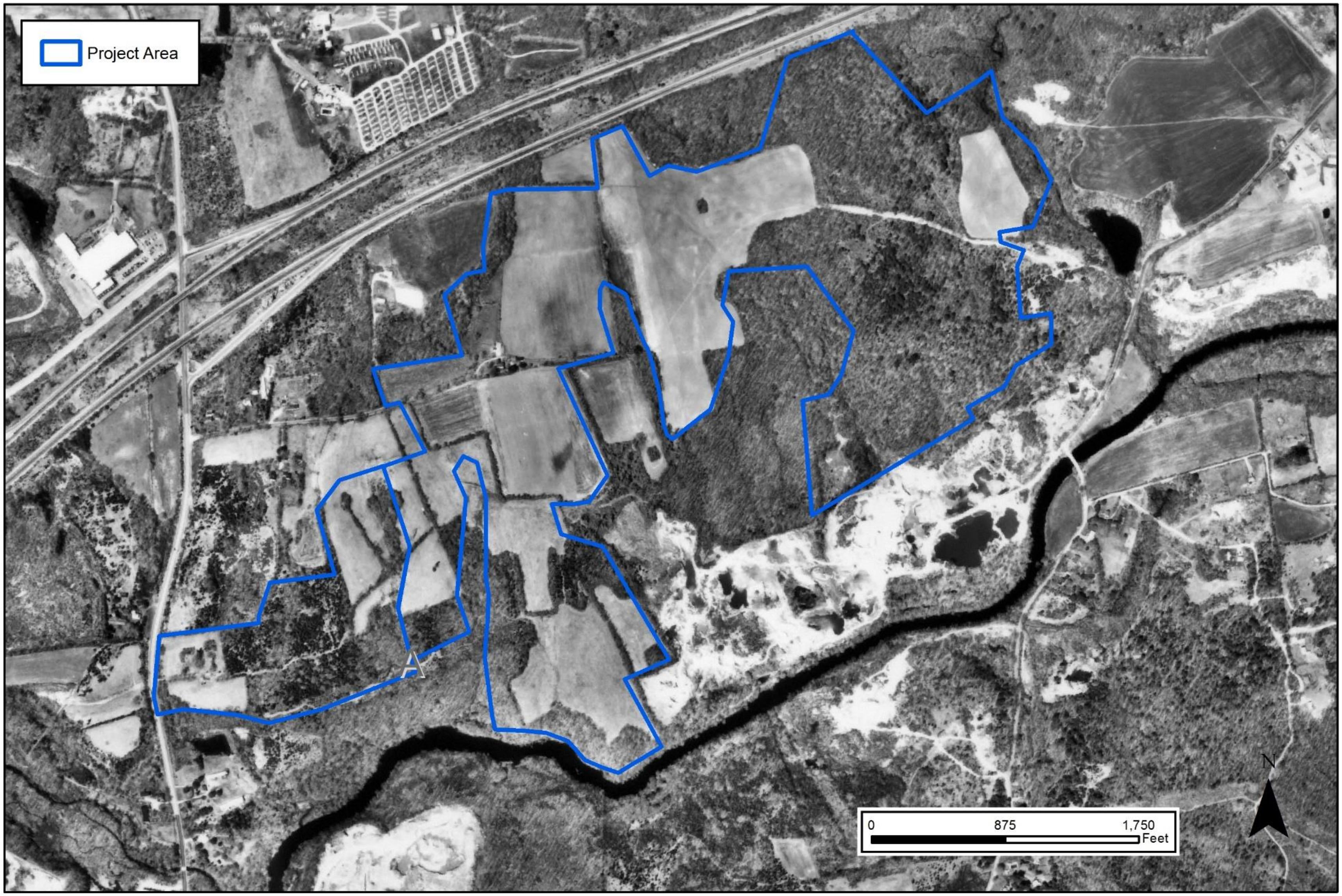

Figure 20. Excerpt from a 1988 aerial image depicting the project area in North Stonington, Connecticut.

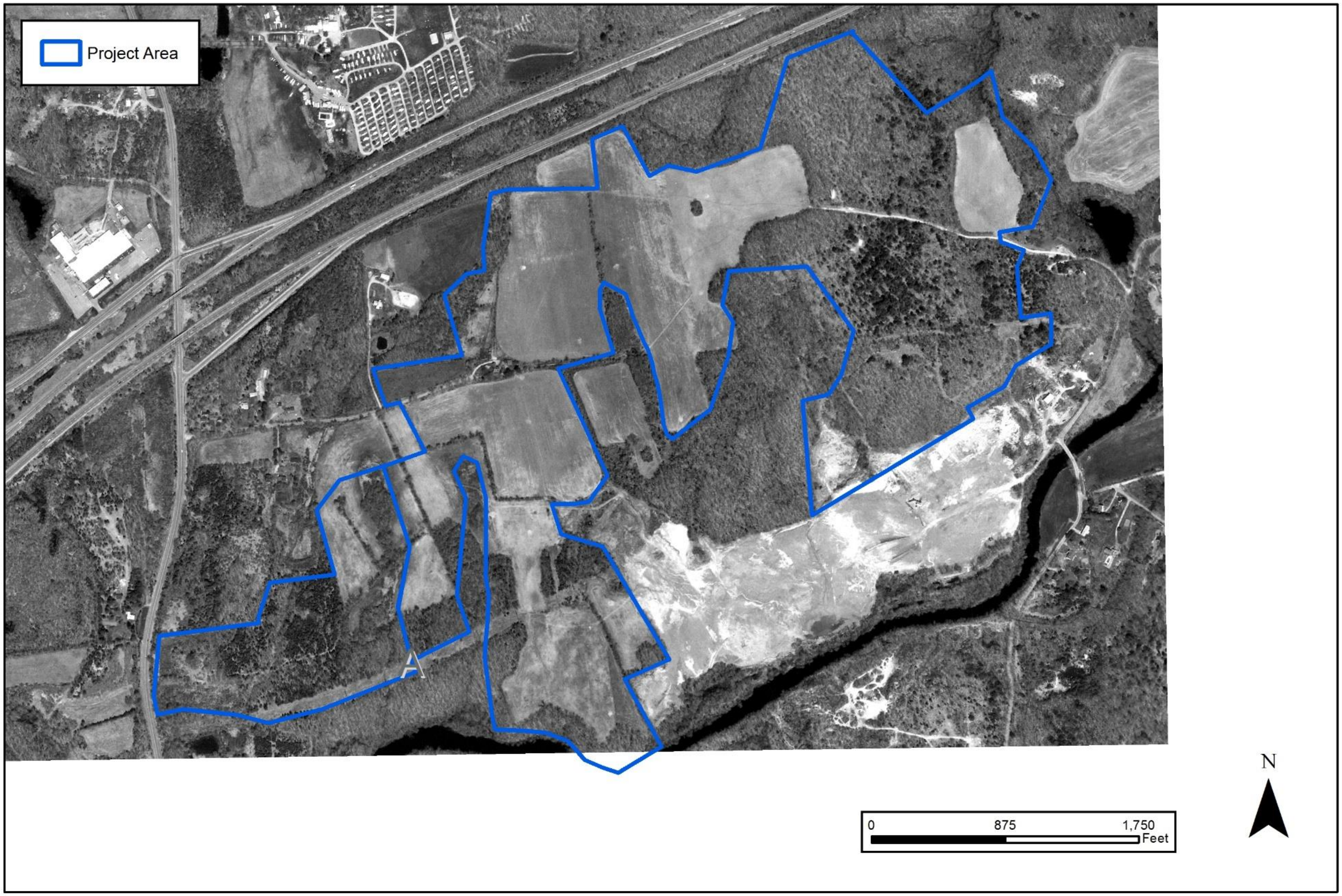

Figure 21. Excerpt from a 1997 aerial image depicting the project area in North Stonington, Connecticut.

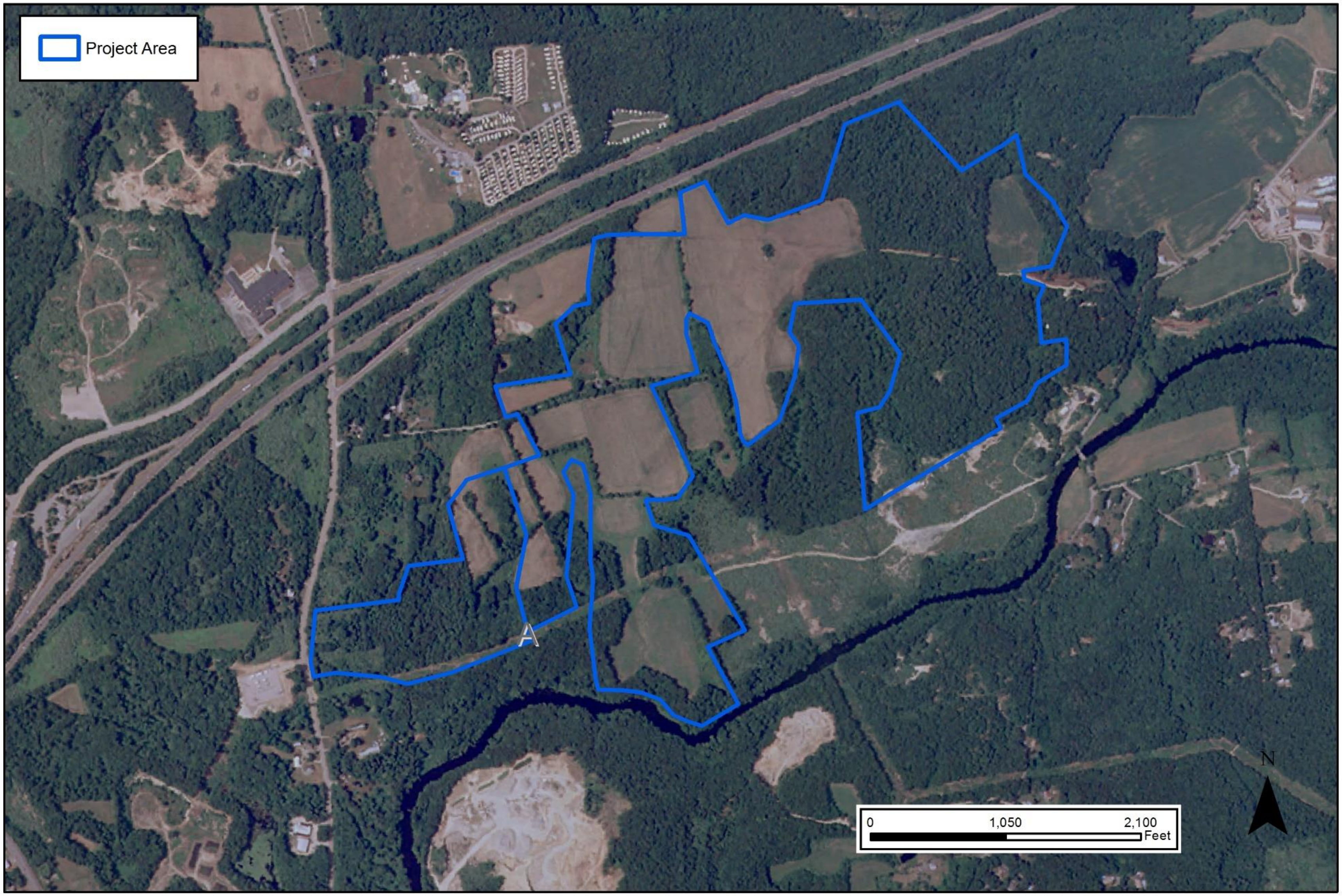

Figure 22. Excerpt from a 2005 aerial image depicting the project area in North Stonington, Connecticut.

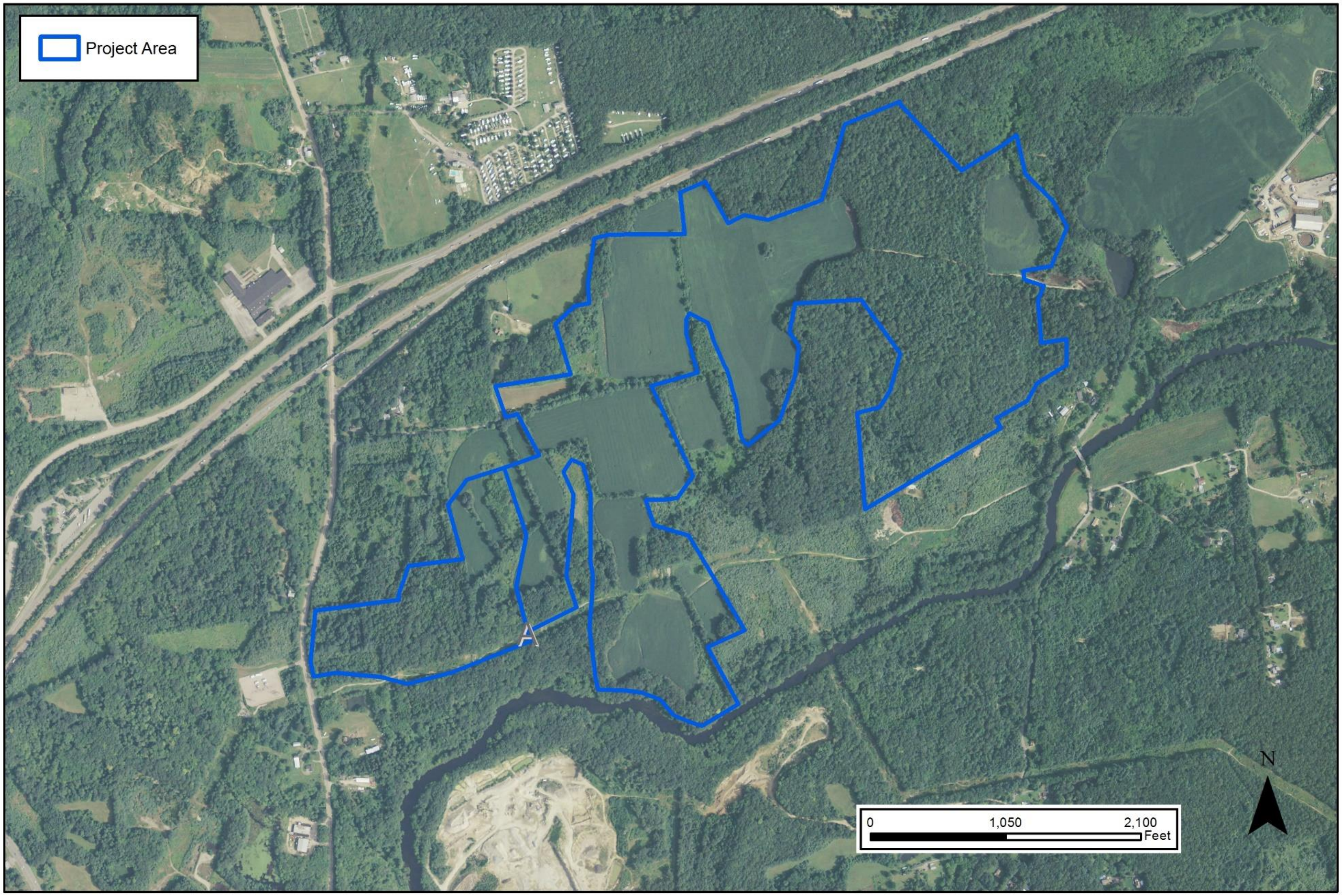

Figure 23. Excerpt from a 2012 aerial image depicting the project area in North Stonington, Connecticut.

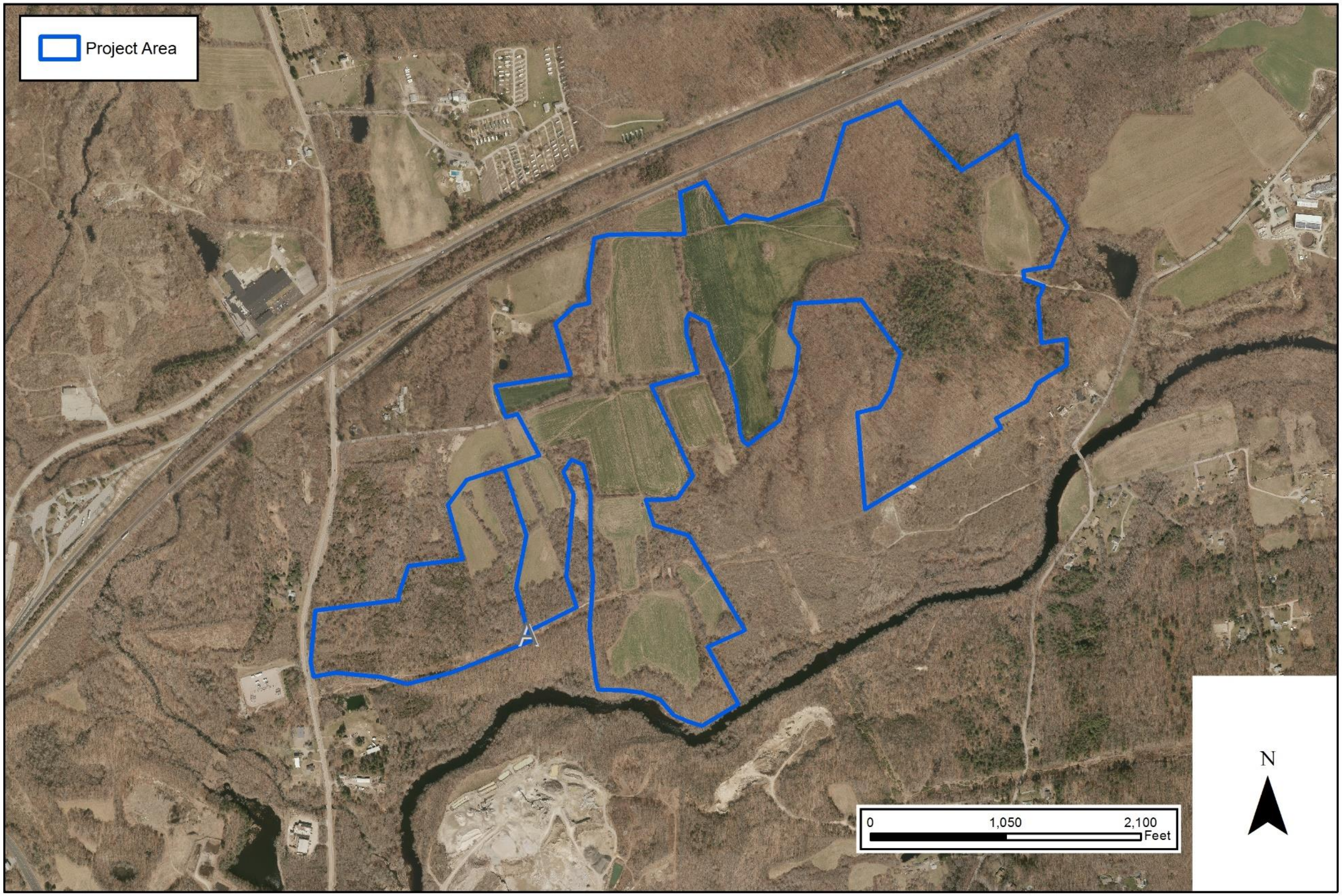

Figure 24. Excerpt from a 2016 aerial image depicting the project area in North Stonington, Connecticut.

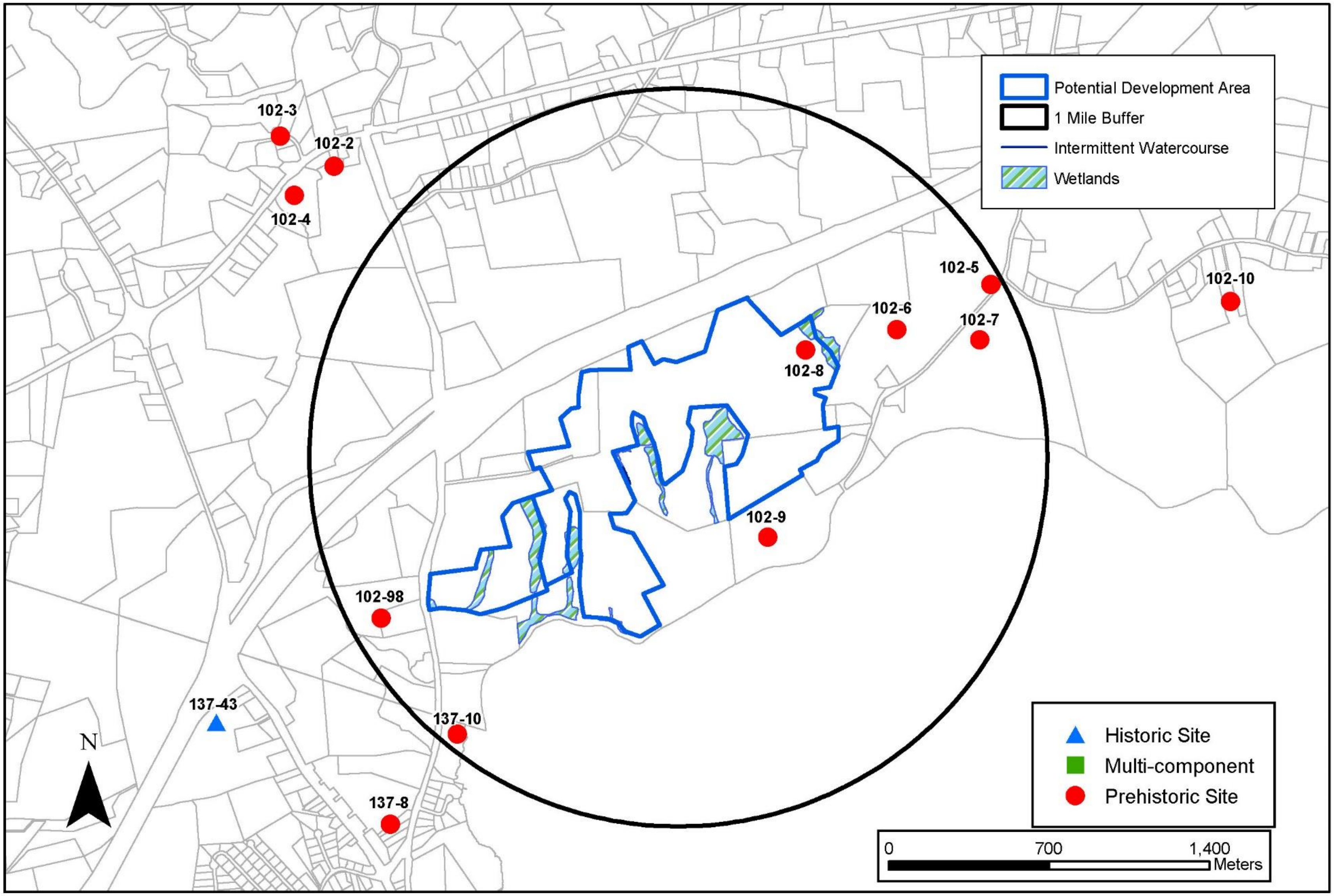

Figure 25. Digital map showing the locations of previously identified archaeological sites in the vicinity of the project area in North Stonington, Connecticut.

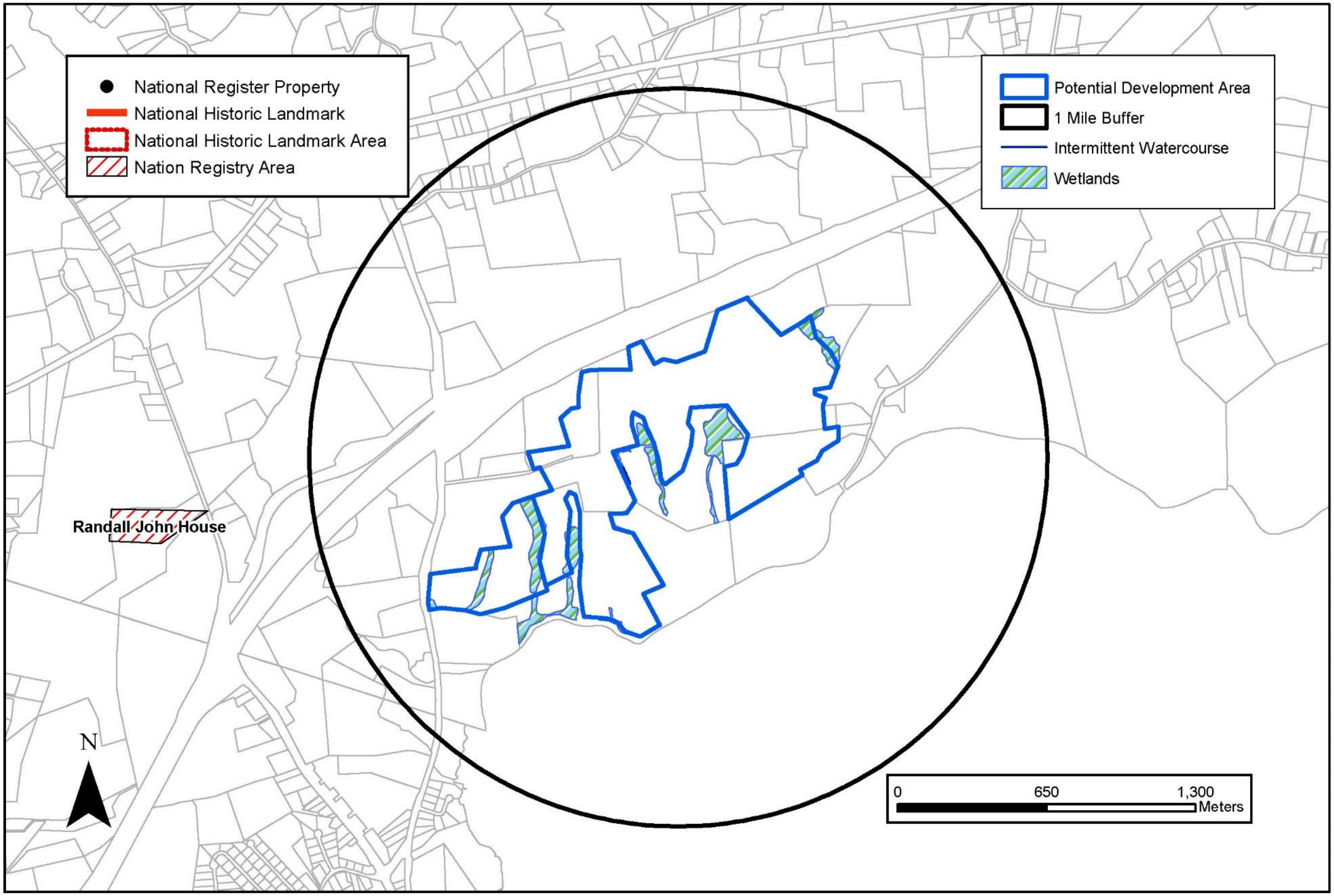

Figure 26. Digital map showing the locations of previously identified National Register of Historic Places properties/districts in the vicinity of the project area in North Stonington, Connecticut.

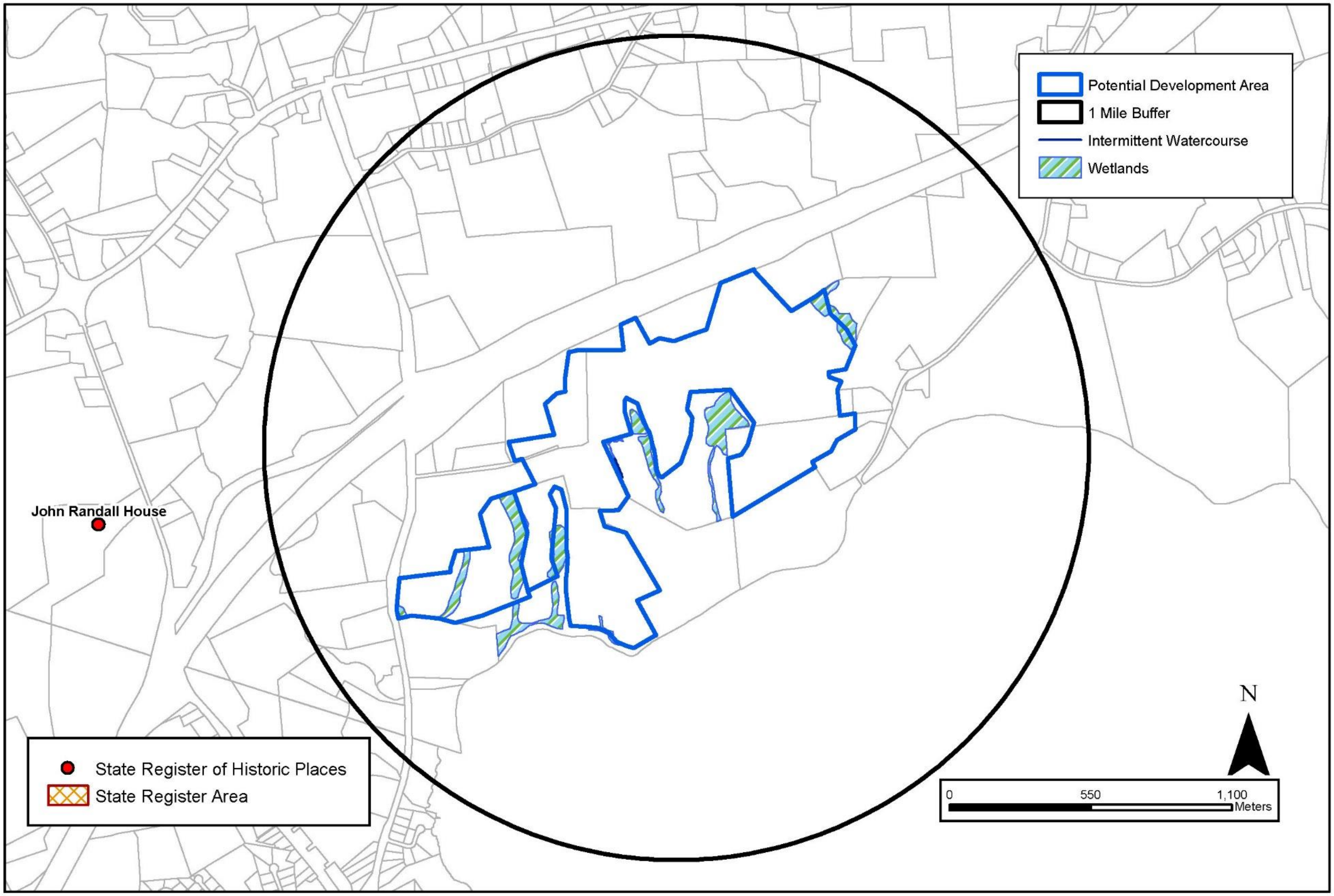

Figure 27. Digital map showing the locations of previously identified State Register of Historic Places properties/districts in the vicinity of the project area in North Stonington, Connecticut.

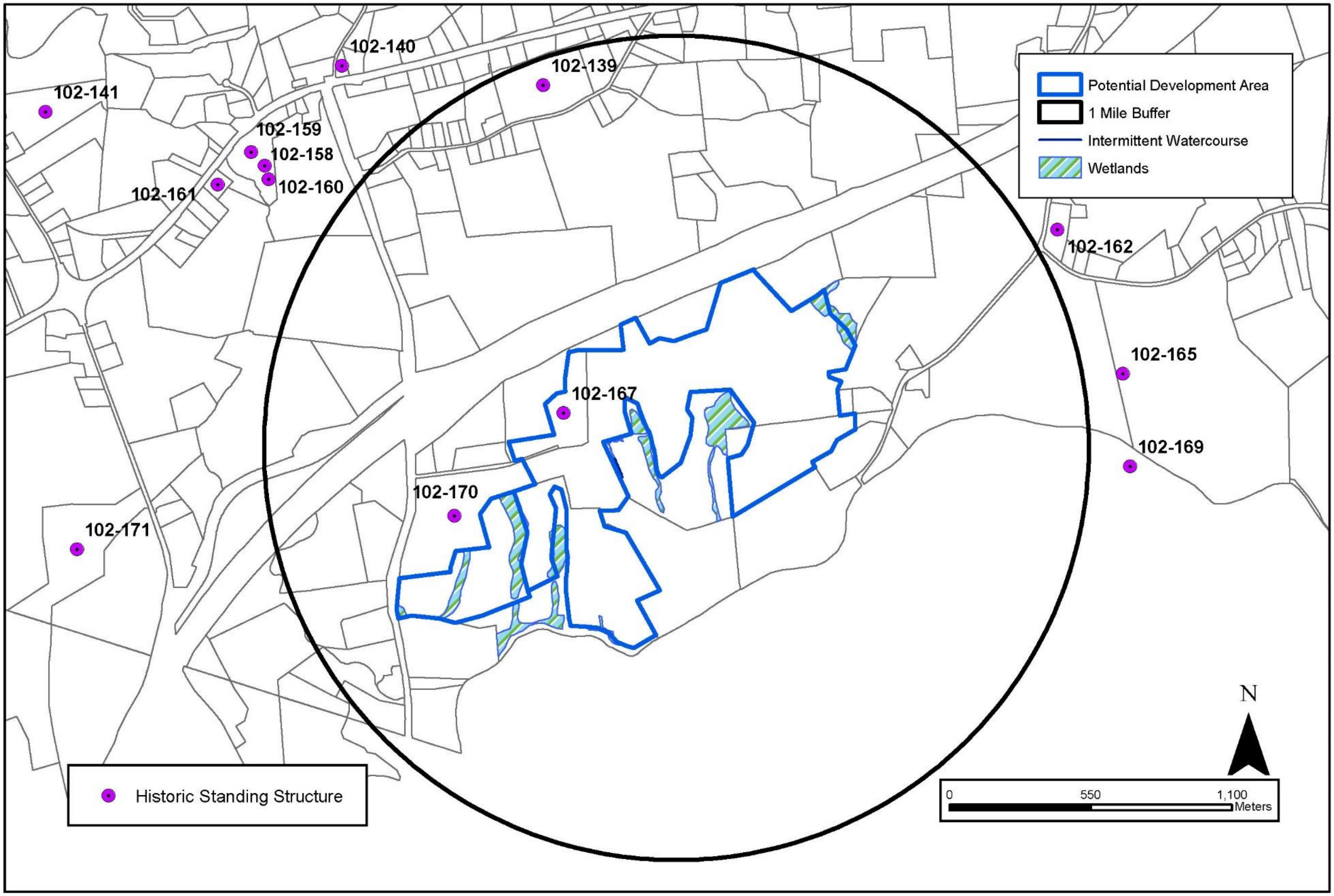

Figure 28. Digital map showing the locations of previously identified historic standing structures in the vicinity of the project area in North Stonington, Connecticut.

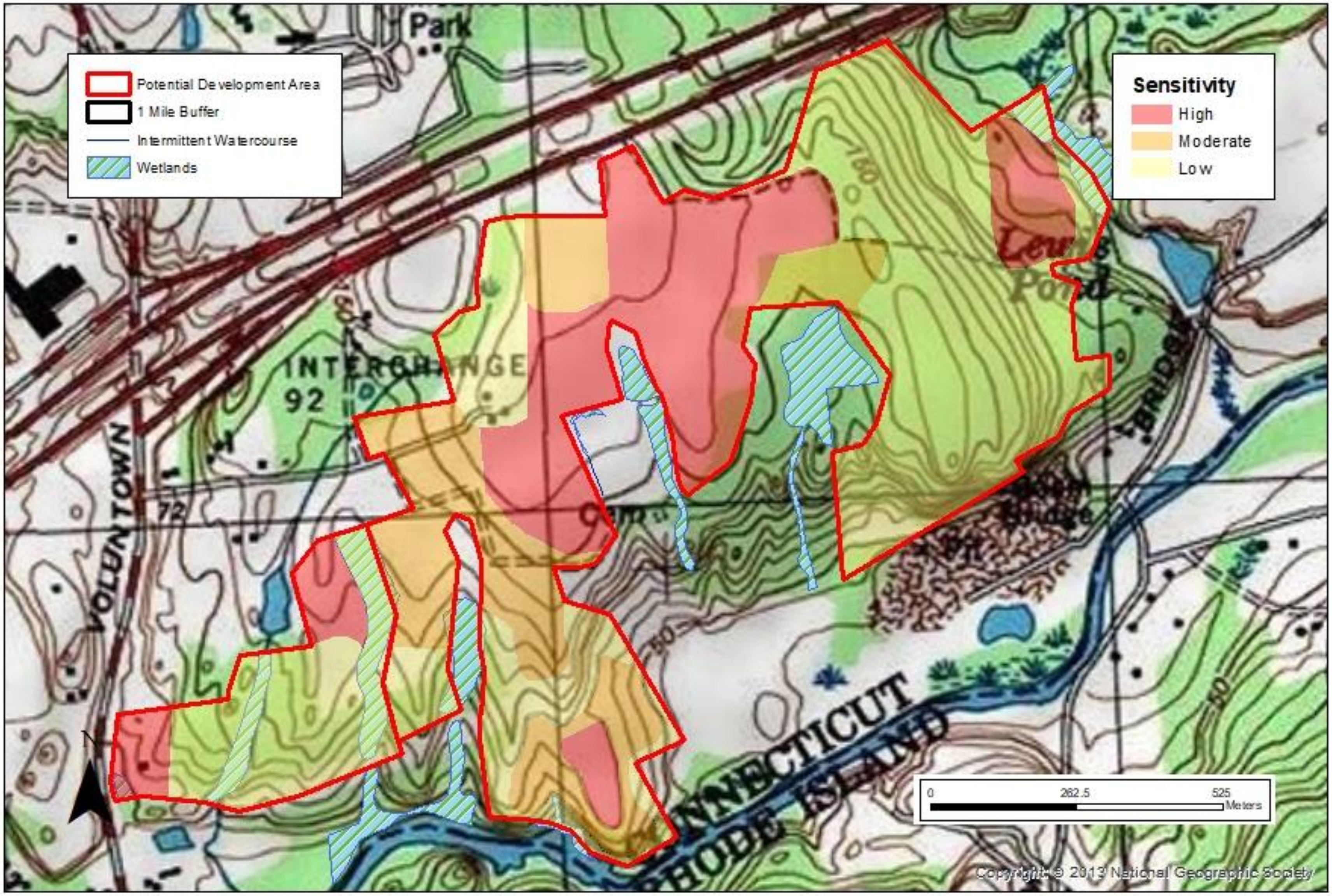

Figure 29. Excerpt from a 1996 USGS 7.5' topographic quadrangle depicting the no/low, moderate, and high sensitivity areas within the project area in North Stonington, Connecticut.

Photo 1. Overview photo east towards the Wheeler Farmstead.

Photo 2. Overview photo of the former Wheeler Farmstead location facing west (note this area has been bulldozed).

Photo 3. Overview photo of the former Stanton Farmstead (note bulldozed rubble in background of photo).

Photo 4. Overview photo of former Stanton Farmstead facing southwest (note vegetated area contains the well).

Photo 5. Overview photo of the Post 1868 Farmstead house foundation facing east.

Photo 6. Overview photo of the stone lined well associated with the Post 1868 Farmstead facing east.

Photo 7. Overview photo of the long narrow building foundation associated with the Post 1868 Farmstead facing east.

Photo 8. Photo of John Stanton's headstone in the Stanton Cemetery.

Photo 9. Overview photo of the Stanton Cemetery facing southeast (note the cemetery is covered in brush).

Photo 10. Overview photo of the Partlow Cemetery facing east.

Photo 11. Overview photo of Henry Stanton's headstone in the Partlow Cemetery.

Photo 12. Overview photo of Site 102-8 facing northeast.

Photo 13. Overview photo of Site 102-8 facing northwest.

Photo 14. Overview photo of a typical no/low sensitivity zone in the project area (note steep slopes and rocks).

Photo 15. Overview photo of a typical no/low sensitivity zone in the project area (note this area characterized by wet soils).

Photo 16. Overview photo of a typical no/low sensitivity zone in the project area (note this area disturbed by previous bulldozing).

Photo 17. Overview photo of a typical moderate sensitivity zone in the project area (note moderate slopes in this area).

Photo 18. Overview photo of a typical moderate sensitivity zone in the project area (note moderate slopes in this area).

Photo 19. Overview photo of a typical moderate sensitivity zone in the project area (note moderate slopes in this area).

Photo 20. Overview photo of a typical high sensitivity zone in the project area (note low slopes and sandy well drained soils in this area).

Photo 21. Overview photo of a typical high sensitivity zone in the project area (note low slopes and sandy well drained soils in this area).

Photo 22. Overview photo of a typical high sensitivity zone in the project area (note low slopes and sandy well drained soils in this area).

APPENDIX E

Wetland and Vernal Pool Protection Plan

WETLAND AND VERNAL POOL PROTECTION PLAN

As a result of the proposed development's location in the vicinity of wetlands and vernal pool habitat, the following Best Management Practices ("BMPs") are recommended to avoid unintentional impact to wetland habitats or mortality to vernal pool herpetofauna (i.e., spotted salamander, wood frog, turtles, etc.) during construction activities. This plan includes elements that will protect herpetofauna should construction activities occur during peak amphibian movement periods (early spring breeding [March 1st to May 15th] and late summer dispersal [July 15th to September 15th]) as well as wetlands regardless of the time of year. Complete details of the recommended BMPs are provided below, which will be incorporated into the construction drawings to ensure the Contractor is fully aware of the project's environmentally sensitive setting.

A wetland scientist from All-Points Technology Corp. ("APT") experienced in compliance monitoring of construction activities will serve as the Environmental Monitor for this project to ensure that the following BMPs are implemented properly. The proposed wetland and vernal pool protection program consists of several components including: isolation of the development perimeter; periodic inspection and maintenance of erosion controls and isolation structures; herpetofauna sweeps; education of all contractors and sub-contractors prior to initiation of work on the site; protective measures; and, reporting.

1. Erosion and Sedimentation Controls

a. Plastic netting with large mesh openings (> ¼") 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. No permanent erosion control products or reinforced silt fence will be used on the project. Temporary erosion control products that will be exposed at the ground surface represent a potential for wildlife entanglement will use either erosion control blankets and fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (netless) or netting with a mesh size <¼" such as that typically used in compost filter socks to avoid/minimize wildlife entanglement.

b. Installation of erosion and sedimentation controls, required for erosion control compliance and creation of a barrier to possible migrating/dispersing herpetofauna, 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 herpetofauna and satisfactorily installed. The intent of the barrier is to segregate the majority of the work zone from migrating/dispersing herpetofauna. Oftentimes complete isolation of a work zone is not feasible due to accessibility needs and locations of staging/material storage areas, etc. In those circumstances, the barriers will be positioned to deflect migrating/dispersal routes away from the work zone to minimize potential encounters with herpetofauna.

c. If a staging area for equipment, vehicles or construction materials is required for this project, such area(s) shall be located outside of any wetland resource upland review area and surrounded by silt fence to isolate the area from possible migrating herpetofauna.

d. All erosion control measures shall be removed within 30 days of completion of work and permanent stabilization of site soils so that herpetofauna movements between uplands and wetlands are not restricted.

2. Contractor Education:

a. Prior to work on site and initial deployment/mobilization of equipment and materials, the Contractor shall attend an educational session at the pre-construction meeting with the Environmental Monitor. This orientation and educational session will consist of information such as, but not limited to: representative photographs of typical herpetofauna that may be encountered, rare that could be encountered (if possible), typical species behavior, and proper procedures to protect such species if they are encountered. The meeting will further emphasize the non-aggressive nature of these species, the absence of need to destroy such animals and the need to follow Protective Measures as described in Section 4 below. The Contractor will designate one of its workers as the "Project Monitor", who will receive more intense training on the identification and proper handling of herpetofauna.

b. The Contractor will designate a member of its crew as the Project Monitor to be responsible for the daily "sweeps" for herpetofauna within the work zone each morning, during any and all transportation of vehicles along the access drive, and for any ground disturbance work. This individual will receive more intense training from the Environmental Monitor on the identification and protection of herpetofauna in order to perform sweeps. Any herpetofauna discovered will be reported to the Environmental Monitor, photographed if possible, and relocated outside the work zone in the general direction the animal was oriented.

c. The Environmental Monitor will also post caution signs throughout the project site and maintain them for the duration of construction to provide notice of the environmentally sensitive nature of the work area, the potential for encountering various amphibians and reptiles and precautions to be taken to avoid injury to or mortality of these animals.

d. The Contractor will be provided with the Environmental Monitor's cell phone and email contact information to immediately report any encounters with herpetofauna.

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 due to the project's location in proximity to sensitive wetland resources.

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 take place on an impervious pad with secondary containment designed to contain fuels.
      2. Any refueling drums/tanks 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.

iv. Reporting
1. Complete an incident report.
2. Submit a completed incident report to the Connecticut Siting Council.

4. Protective Measures

a. A thorough cover search of the construction area will be performed by the Environmental Monitor for herpetofauna prior to and following installation of erosion control measures/silt fencing barriers to remove any species from the work zone prior to the initiation of construction activities. Any herpetofauna discovered would be relocated outside the work zone in the general direction the animal was oriented. Periodic inspections will be performed by the Environmental Monitor throughout the duration of construction.

b. The Contractor's Project Monitor will inspect the work area each morning and escort initial vehicle access into the site each morning along the access drive to visually inspect for any herpetofauna. Any herpetofauna discovered would be relocated outside the work zone in the general direction the animal was oriented.

c. Any herpetofauna requiring relocation out of the work zone will be captured with the use of a net or clean plastic bag that has been moistened with clean water for careful handling and placement out of the work zone in the general direction it was observed heading.

d. Any stormwater management features, ruts or artificial depressions that could hold water created intentionally or unintentionally by site clearing/construction activities will be properly filled in and permanently stabilized with vegetation to avoid the creation of vernal pool "decoy pools" that could intercept amphibians moving toward the vernal pools. Stormwater management features such as level spreaders will be carefully reviewed in the field to ensure that standing water does not endure for more than a 24 hour period to avoid creation of decoy pools and may be subject to field design changes. Any such proposed design changes will be reviewed by the design engineer to ensure stormwater management functions are maintained.

5. Herbicide and Pesticide Restrictions

a. The use of herbicides and pesticides at the proposed solar facility shall be avoided when possible. In the event herbicides and/or pesticides are required at the proposed 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.

6. Reporting

a. Daily inspection reports (brief narrative and applicable photos) will be prepared by the Environmental Monitor documenting each inspection and submitted to Pawcatuck Solar Center for compliance verification. Any non-compliance observations of erosion control measures or evidence of erosion or sediment release will be immediately reported to the Contractor and Pawcatuck Solar Center's Construction Manager and included in the reports.

b. Any incidents of sediment release into the wetland resource areas shall will be reported within 24 hours to the Town of Branford Inland Wetlands Director.

c. Any observations of rare species will be reported to the Connecticut Department of Energy & Environmental Protection Natural Diversity Data Base.

d. Following completion of the project, a summary report will be prepared by the Environmental Monitor documenting compliance with the Wetland and Vernal Pool Protection Plan and submitted to Pawcatuck Solar Center.