DAVISON ENVIRONMENTAL

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

Natural Resource Assessment

Proposed Solar Generation Facility
Verogy Solar
Burlington Solar One

Lot 33, Prospect Street
Burlington, CT

Submitted To:
Robert Hiltbrand
R.R. Hiltbrand Engineers and Surveyors
575 North Main Street
Bristol, CT 06010

Submitted By:

Eric Davison
Wildlife Biologist
Registered Soil Scientist
Certified Professional Wetland Scientist

September 28, 2020

Table of Contents

Figures

Appendices

1.0 INTRODUCTION

A natural resource assessment was conducted at Lot 33 on Prospect Street in Burlington, Connecticut (the "Site") on behalf of Robert Hiltbrand (the "Applicant"). Figures 1 and 2, *Location Map* and *Topographic Map*, depict the location of the Site and surrounding area.

A 3.5-megawatt solar-based electric generation facility (the "Project") is proposed at the Site. This assessment report has been completed to support the Applicant's submission of a petition for declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the construction, maintenance, and operation of the Project.

In addition to resource investigations conducted by Davison Environmental, this report includes data and conclusions from studies conducted by other resource specialists on behalf of the Applicant. These include:

- Herpetologist Dennis Quinn assisted with the herptile survey
- Botanist William Moorhead assessed plant community types and habitat for rare plant species
- Hunter Brawley conducted a survey for the State-listed whippoorwill
- Tanner Matson assessed the site for State-listed invertebrates
- Soil Scientist David Lord delineated the wetlands and watercourses at the Site and conducted a survey for vernal pools.

This report is based on Project plans prepared by R.R. Hiltbrand Engineers and Surveyors dated September 2, 2020. The Project will be located within a 20.1 acre lease area within an the overall 62.98 acre Site. The Project limits encompass 11.58 acres of the lease area.

2.0 SITE DESCRIPTION

Existing site features and the proposed Project location are illustrated on Figure 3, *Site Features Map*. The Site is located on the north side of Prospect Street, a rural residential neighborhood in the Whigville Section of southeast Burlington.

The Site lies within the Copper Mine Brook Subregional Watershed (watershed #010802070403). The overall watershed totals 11,916 acres. Locally the Site is split between the Whigville Brook Watershed on the western side of the Site and the Wildcat Brook watershed on the east side of the Site.

From a bio-geographical perspective, the Site lies within the Northwest Hills Ecoregion (*Dowhan and Craig, 1976*). This is an interior upland ecoregion, 25-40 miles from the coast, characterized by a moderately hilly landscape of intermediate elevation with narrow valleys and local areas of steep and rugged topography.

Site elevations range from ± 360 feet to ± 442 feet above sea level. The Project area slopes from northwest to southeast. The Project area lies atop a relatively level plateau, with a steep slope dropping to a broad stream valley just east of the Project's easterly limits.

Historically, land use at the Site consisted of farmland, including hayfields and pastureland (source: 1934 statewide aerial photography). After 1951 and prior to 1970, and continuing presently, sand and gravel mining has occurred on the Site (source: 1970, 1986 statewide aerial photography). The former extent of the gravel mine extended east and north from the existing mine footprint, and those areas have since reforested. Portions of the Project limits (the southeast corner) are located within those formerly mined areas. This is evident on the ground by the irregular anthropogenically created topography including steep cut slopes, borrow pits and large soil mounds (former stockpiles).

3.0 WETLANDS

Three wetlands occur within the Project area. These wetlands are illustrated and numbered for reference on Figure 3 – *Site Features Map.* Their general characteristics are summarized in Table 1.

Table 1: Summary of wetland and watercourse characteristics

Wetland #	Habitat Type	Hydrologic Regime	Description
1	Forested wetland	Temporarily flooded	Small isolated forested wetland
2	Perennial stream & forested wetland	Perennial streamflow; wetland is saturated	Whigville Brook and bordering riparian/forested wetland
3	Perennial stream & forested wetland	Perennial streamflow; wetland is saturated to temporarily flooded	Wildcat Brook and bordering forested wetland

Wetland Hydrologic Regimes

Saturated – the soil is saturated to the surface, especially early in the growing season, but unsaturated conditions prevail by the end of the season in most years. Surface water is absent except for groundwater seepage and overland flow.

Temporarily flooded: flooded for brief periods during the growing season, but water table is otherwise well below surface.

3.1 Wetland Descriptions

Wetland 1
Wetland 1 is located nearest to the Project area. It is an isolated wetland totaling 0.44 acres. It is a Palustrine Forested Wetland (a.k.a. wooded swamp) with a temporarily flooded hydrology. The soil surface contains abundant stones and boulders.

The vegetation consists of red maple (*Acer rubrum*) dominant in the tree layer, with musclewood (*Carpinus caroliniana*) also occurring. The shrub layer includes winterberry (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*) and the invasive, non-native Japanese barberry (*Berberis thunbergii*). The herb includes layer royal fern (*Osmuna regalis*), cinnamon fern (*Osmunda cinnamomea*), sphagnum moss and poison ivy (*Toxicodendron radicans*). Vine cover includes Virginia creeper (*Parthenocissus quinquefolia*), greenbriar (*Smilax rotundolia*) and the invasive non-native Asiatic bittersweet (*Celastrus orbiculatus*).

Wetland and Watercourse 2
Whigville Brook flows through the southwest corner of the Site. The brook is located well beyond the Project limits (over 750 feet away), but a portion of the Project is within the Whigville Brook watershed. The brook is characterized by a meandering channel with a streambed dominated by coarse gravel and cobbles, with narrow bars of cobble and moderately incised and eroded banks. The streambank vegetation is dominated by two invasive non-native species - multiflora rose (*Rosa multiflora*) and Japanese knotweed (*Fallopia japonica*). A narrow border of younger trees are present, including red maple and sycamore (*Platanus occidentalis*), with shrub cover including witchhazel (*Hamamelis virginiana*) and spicebush (*Lindera benzoin*).

The brook is fed by a small upstream forested groundwater slope wetland. The wetland hydrology is saturated. The tree layer is dominated by red maple and American elm. The shrub layer is dominated by multiflora rose and bush honeysuckle (*Lonicera morrowii*), with highbush blueberry and winterberry also common.

Review of aerial photography of the Site from 1971 indicates that this wetland system, including this segment of Whigville Brook, was cleared of trees and open, lying within what appears to have been a hayfield.

Wetland and Watercourse 3
Wildcat Brook flows along the easterly Site boundary. Bordering the western side of the brook is a broad forested wetland that extends easterly approximately 200 feet from the brook (at its widest point). This

wetland includes areas of overbank flow with a narrow band of alluvial soils. The wetland hydrology ranges from saturated to temporarily flooded. The soil surface is extremely stony and bouldery.

Wetland vegetation consists predominately of red maple and yellow birch (*Betula allegheniensis*) in the tree layer, with musclewood, green ash (*Fraxinus pennsylvanica*) and hemlock (*Tsuga canadensis*) also occurring. The shrub layer is dominated by spicebush (*Lindera benzoin*), winterberry, multiflora rose, mountain laurel (*Kalmia latifolia*), Japanese barberry and highbush blueberry. The herb layer includes skunk cabbage (*Symplocarpus foetidus*), cinnamon fern (*Osmunda cinnamomea*), sphagnum moss, Virginia creeper and poison ivy.

Review of aerial photography from 1934 shows that this forested wetland was cleared and devoid of trees roughly to the limits of the brook.

3.2 Wetland Delineation

Project area wetlands were delineated by Soil Scientist David Lord on December 14, 2014 and December 21, 2016. A copy of the wetland delineation report is included in Appendix B.

The wetland delineation was conducted according to the requirements of the CT Inland Wetlands and Watercourses Act (P.A. 155). Wetlands are defined as areas of poorly drained, very poorly drained, floodplain, and alluvial soils, as delineated by a soil scientist. Watercourses are defined as bogs, swamps, or marshes, as well as lakes, ponds, rivers, streams, etc., whether natural or man-made, permanent or intermittent.

3.3 Wetland Soil Types

The soil types were identified by review of digitally available soil survey information from the Natural Resources Conservation Service (NRCS) as well as onsite field investigations conducted by Soil Scientist David Lord. The following wetland soil types are present in Site wetlands:

- Ridgebury, Leicester and Whitman Complex (Wetland 1, Wetland and Watercourse 3)
- Rippowam (Wetland and Watercourse 2)

Ridgebury, Leicester and Whitman is an undifferentiated mapping unit consisting of two poorly drained (Ridgebury and Leicester) and one very poorly drained (Whitman) soil developed on glacial till in depressions and drainageways in uplands and valleys. Their use interpretations are very similar, and they typically are so intermingled on the landscape that separation is not practical. The Ridgebury and Leicester

series have a seasonal high water table at or near the surface (0-6") from fall through spring. They differ in that the Leicester soil has a more friable compact layer or hardpan, while the Ridgebury soils have a dense to very dense compact layer. The Whitman soil has a high water table for much of the year and may frequently be ponded.

The Rippowam series consists of very deep, poorly drained loamy soils formed in alluvial sediments. They are nearly level soils on flood plains subject to frequent flooding. Permeability is moderate or moderately rapid in the loamy layers and rapid or very rapid in the underlying sandy materials.

4.0 UPLAND HABITATS

The Project area is located entirely within upland (non-wetland) habitats. Four upland habitats occur within and adjacent to the Project area as shown on Figure 4 – *Habitat Types Map* and described in the following sections. These include:

(1) Mixed Hardwood Forest

(2) Old field/ Forest Edge

(3) Hayfield

(4) Sand and Gravel Mine (and processing yard)

Mixed Hardwood Forest

The Project is located nearly entirely within the Site's mixed hardwood forest. Review of historic aerial photography from 1950 through 1970, along with field evidence of historic soil disturbance, shows that large portion of the Project area forest was cleared and mined for sand and gravel, with some portions appearing to be maintained as open field or pasture (lightly wooded areas that appears to be dominated by eastern red cedar (*Juniperus virginiana*) trees are visible). Based on this information, the current forest is approximately 70 years in age. The presence of several larger oak "wolf" trees (i.e., trees with a broad canopy spread) indicate that these trees were retained when the area was originally cleared.

The forest type is second growth mixed hardwoods, dominated by oaks. The moisture regime of this forest is xeric due to the upper terrace slope position and predominance of well to excessively-well drained soils (Canton and Charlton soil complex, Agawam and Hinckley soil series). As a result, the structural diversity of the forest is low. There is little herbaceous, shrub and midstory strata density (i.e., the forest is relatively open). The tree canopy is dominated by red oak (*Quercus rubra*), black oak (*Quercus velutina*), black cherry (*Prunus serotina*), black birch (*Betula lenta*), American chestnut (*Castanea dentata*), mockernut hickory

(*Carya tomentosa*), white oak (*Quercus alba*), scattered eastern red cedar, white pine (*Pinus strobus*), paper birch (*Betula papyrifera*) and shagbark hickory (*Carya ovata*).

The shrub layer is sparse and dominated by lowbush blueberry (*Vaccinium angustifolium*), mountain laurel, black huckleberry (*Gaylussacia baccata*) and scattered striped maple (*Acer pensylvanicum*).

The herbaceous layer is sparse and dominated by cinnamon fern (wetter areas), Christmas fern (*Polystichum acrosticoides*), lily-of-the-valley (*Convallaria majalis*), Virginia creeper (*Parthenocissus quinquefolia*), groundcedar (*Lycopodium complanatum*), princess pine (*Lycopodium obscurum*), haircap moss, hay-scented fern (*Dennstaedtia punctilobula*) and Pennsylvania sedge (*Carex pennsylvanica*).

More mesic midslope locations include sugar maple (*Acer saccharum*), red maple, American beech (*Fagus grandifolia*) and mapleleaf viburnum (*Viburnum acerifolium*). White pine is denser in the northeast corner of the project area. Mountain laurel becomes dense in the eastern portions of the project area nearer to the eastern stream valley.

Rock outcrops are scattered throughout the Project area, within the areas occupied by the Canton and Charlton soil complex. A network of ATV trails runs through the southeast corner of the Project area forest.

Old Field / Forest Edge

This habitat type occupies the eastern edge of the mining area, the easterly edge of the southern hayfield and scattered locations within the western hayfield. This is a narrow band of transitional habitat or "ecotone", with the most significant habitat patch lying between the mixed hardwood forest and the sand and gravel mine. Vegetation consists of scattered immature trees with dense shrub and herbaceous cover. Dominant species include cottonwood (*Populus deltoides*), black cherry (*Prunus serotina*), hickories (*Carya asp.*), eastern red cedar, red oak, dense Asiatic bittersweet, deer tongue grass (*Dichanthelium clandestinum*), grape (*Vitis sp.*), multiflora rose, goldenrods (*Solidago sp.*), flannel mullein (*Verbascum thapsus*) and the invasive non-native autumn olive (*Elaeagnus umbellata*), bush honeysuckle and mugwort (*Artemisia vulgaris*).

Hayfield

Hayfields dominate the southern portions of the Site. This habitat is located well-beyond the Project area (>450' at its closest point). They are vegetated with cool-season grasses, along with typical hayfield forbs including clovers and milkweeds.

Sand and Gravel Mine (and processing yard)

A sand and gravel extraction mine and processing yard occupies approximately seven acres of the site. Approximately 0.3 acres of the Project area falls within the mine and stockpile yard. This area is largely unvegetated and continually worked by heavy equipment. The area consists of material stockpiles and processing areas where the material is sorted and loading into trucks. There is a small settling basin on the southeast corner of the yard that captures stormwater runoff.

Sand and gravel pits often represent significant habitats for certain species of amphibians and reptiles, particularly when they occur as part of a larger intact habitat mosaic as is the case with this Site. Turtles often utilize the friable soils within pits for nesting, and toads often use ephemeral pools in pits for breeding. At this Site however, the habitat value of the mine area is low for breeding toads as no ephemeral pools are present due to the pit topography which consists predominately of steep slopes and stockpiles, as opposed to more gentle topography. The pit does represent optimal nesting habitat for eastern box turtle.

5.0 WILDLIFE

A baseline inventory of some amphibians, reptiles and birds was conducted within a defined "study area" which included the Project area and immediately surrounding areas (within approximately 400 feet) of the limits of disturbance (LOD). The following sections describe the species observed within the study area.

5.1 Amphibians and Reptiles

Amphibian and reptile surveys were conducted on May 15 and 20, and June 1, 3 and 17, 2020. Surveys were conducted between the hours of 9:30 AM and 3:30 PM in conditions ranging from 54ºF and partly cloudy to 86ºF and sunny. Methods consisted of visual encounter and cover object surveys (i.e., turning over of rocks, logs and other surficial cover objects). The primary focus of this work were two reptile species, the eastern hognose snake (*Heterodon platirhinos*) and the eastern box turtle (*Terrapene c. carolina*) which were indicated as potentially present based on the Preliminary Assessment provided by the NDDB.

A total of four amphibian species and one reptile species were observed within the study area.

Table 2: Comprehensive Species List

Common Name	Scientific Name	Status
Amphibians		
Gray treefrog	*Hyla versicolor*	None

Red-spotted newt	*Notopthalmus viridescens*	None
Green frog	*Rana clamitans*	None
Redback salamander	*Plethodon cinereus*	None
Reptiles		
Eastern box turtle	*Terrapene c. carolina*	SC

Status

Wildlife Action Plan Conservation Status (CS)

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

SC – State-listed species of special concern

Extensive cover object surveys within the project area yielded few amphibians and snakes which are typical of mixed hardwood forest and forest edges. Suitable habitat does exist on the site for a variety of snake species. Common species that were anticipated but not observed include the northern ringneck snake (*Diadophis punctatus edwardsii*), garter snake (*Thamnophis sirtalis*) and brown snake (*Storeria dekayi*). This is likely the result of several factors, including: the lack of overall habitat diversity within the study area; the former gravel mining and excavation which removed the topsoil and duff layer in portions of the forest; the lack of long hydroperiod wetlands that support aquatic turtles, or vernal pool species; the lack of forest diversity; and the lack of well-developed strata and limited ground cover vegetation. The few amphibians that were observed (e.g. red-spotted newt, gray treefrog, green frog) were concentrated in the eastern stream valley and wetland system.

The project area and bordering habitats do represent optimal habitat for the eastern box turtle, and a total of five eastern box turtle were observed during the survey work. See Figure 5 – *Box Turtle Location Map and Protection Measures* and detailed description in Section 6.0.

5.2 Vernal Pools

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, caries 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.).

No vernal pools occur in or near the Project area. As described in Section 3.1, there are three wetlands present on the Site. Two of these wetlands (Wetlands 2 and 3) are perennial streams, with bordering wetlands that lack suitable seasonally flooded hydrology required by vernal pool wildlife. Wetland 1 is an isolated wetland that is located nearest to the Project area. Wetland 1 was surveyed for vernal pools by David Lord from March through June or 2019, and no vernal pool activity was observed. Mr. Lord concluded that the wetland hydroperiod was insufficient to support breeding by vernal pool wildlife. The wetland has a predominately saturated hydrology, with no areas of suitable seasonal flooding (i.e., multi-month standing water) to support successful breeding and metamorphosis of vernal pool amphibians. See Appendix C for the Lord *Vernal Pool Monitoring* Report.

5.3 Breeding Birds

No breeding bird surveys were conducted at the Site, other than the surveys for whip-poor-will conducted by Hunter Brawley (see Section 6.0). Incidental observations of birds made during general assessment work included common forest-interior bird species like the red-eyed vireo (*Vireo olivaceus*) and the eastern wood pewee (*Contopus virens*). Early-sucessional habitat specialists noted included the woodcock (*Scolopax minor*) and the blue-winged warbler (*Vermivora cyanoptera*).

Habitat within the Project area is suitable for forest-dwelling birds including forest-interior neotropical migrants, many of which are identified as a "greatest conservation need" ("GCN") by the Connecticut Department of Energy & Environmental Protection's (CT DEEP) *2015 Connecticut Wildlife Action Plan*. However, the value of Project area forest is limited because forest cover is not extensive onsite or within the local landscape. The total contiguous forest on and adjacent to the Site totals only 108 acres, and it is highly fragmented (see Section 7.2 Core Forest Analysis).

Significant early-successional habitats (i.e., non-forested) include old field and hayfield. Such habitats can support several GCN species such as the observed blue-winged warbler (*Vermivora cyanoptera*) and indigo bunting (*Passerina cyanea*). Early-successional habitats will not be affected by the Project.

5.4 Fisheries

Due to the significant setback distance of the Project area from Site perennial streams, a fisheries survey was not conducted. Publicly available data from the CT DEEP Fisheries Division was reviewed and included a Whigville Brook sample location from 2010, located at the brook's Prospect Street crossing. Fish species recorded included stocked and wild brook trout (*Salvelinus fontinalis*), stocked and wild brown trout (*Salmo*

trutta), Blacknose dace (*Rhinichthys atratulus*), creek chub (*Semotilus atromaculatus*) and slimy sculpin (*Cottus cognatus*).

5.5 Northern Long-eared Bat

The northern long-eared bat ("NLEB"; *Myotis septentrionalis*) is a federally-listed[1] threatened species known to occur in the vicinity of the Site. The NLEB's range encompasses the entire State of Connecticut and suitable NLEB roost habitat includes trees (live, dying, dead, or snag) with a diameter at breast height ("DBH") of three (3) inches or greater.

The *Northern long-eared bat areas of concern in Connecticut to assist with Federal Endangered Species Act Compliance map* (February 1, 2016) was reviewed to determine the locations of any known maternity roost trees or hibernaculum. This map reveals that there are currently no known NLEB maternity roost trees in Connecticut. The nearest NLEB hibernacula habitat resource to the Site is located in the Town of Morris, approximately 18 miles west of the Site.

6.0 NATURAL DIVERSITY DATABASE REVIEW & STATE-LISTED SPECIES HABITAT

The CT DEEP's Natural Diversity Database ("NDDB") program represents current documented data showing the known locations of any endangered, threatened or special concern species and significant natural communities. The NDDB mapping dated June 2019 was reviewed, revealing that a cluster of NDDB areas overlap the Site. As a result, an application to the NDDB was submitted, and a *Preliminary Assessment Letter* was received on January 12, 2020 from Environmental Analyst Dawn McKay (see Appendix D). That letter indicated the species noted in Table 2 as potentially present on the site.

Table 2: NDDB Preliminary Determination Species List

Common Name	Scientific Name
Freshwater Community	
Medium fen	
Invertebrates	
Ground beetle	*Agonum darlingtonia*
Ground beetle	*Agonum mutatum*
Pitcher plant moth	*Exyra fax*
Crimson-ringed whiteface	*Leucorrhinia glacialis*
Eastern pearlshell	*Margaritifera margaritifera*
Plants	
Mud sedge	*Carex limosa*

[1] Listing under the federal Endangered Species Act

Hare's tail	*Eriophorum vaginatum var. spissum*
Pod grass	*Scheuchzeria palustris ssp. americana*
Northern yellow-eyed grass	*Xyris montana*
Reptiles	
Eastern hognose snake	*Heterodon platirhinos*
Eastern box turtle	*Terrapene carolina*
Birds	
American bittern	*Botaurus lentiginosus*
Whip-poor-will	*Caprimulgus vociferus*

**Species and natural communities highlighted in red are those for which no suitable habitat is present on the Site.*

Many of the species noted in the NDDB assessment letter occur in highly specialized and regionally uncommon wetland habitat types known as fens or bogs. These habitats do not occur on this Site. Those species for which no habitat is present, as they area associated exclusively with fens and bogs, are highlighted in red in Table 2. These include the *medium fen* plant community type, along with the four associated fen plants - mud sedge, hare's tail, pod grass and northern yellow-eyed grass. Botanist William Moorhead assessed the Site for these species and confirmed no suitable habitat was present. These species are described in the report provided by Botanist William Moorhead (see Appendix E).

The NDDB Preliminary Assessment also included four invertebrate species, two *Agonum* ground beetles, pitcher plant moth and the crimson-ringed whiteface. An assessment of the Site's suitability for these invertebrate species was conducted by Invertebrate Biologist Tanner Matson. His report is included in Appendix F. Matson noted that these four species also inhabit fen or bog wetlands.

There is also no suitable habitat present for the American bittern. This species inhabits long hydroperiod wetlands (i.e., semi-permanently and permanently flooded), specifically freshwater marshes with tall emergent vegetation, particularly cattail and bulrushes (Bevier 1994). No such habitat is present on this Site.

For the remaining four species, suitable habitat does occur on the Site. These species are:

- Eastern box turtle
- Eastern hognose snake
- Eastern pearlshell
- Whip-poor-will

Eastern Box Turtle

The eastern box turtle is a State-listed species of special concern. Box turtle are widespread throughout the low-lying portions of Connecticut. They favor old field habitat and deciduous forest ecotones, including powerline cuts and logged over woodland (Klemens, 1993). Box turtles utilize different habitat types at different times of the year (Dodd, 2001). Early-successional habitats are generally inhabited during months with moderate temperate while forested habitats are utilized during the heat of the summer as well as for hibernation (Erb, 2011).

Eastern box turtle were confirmed present on the Site. A total of five turtles were found in June along the western limits of the existing sand and gravel mine/stockpile yard (see Figure 5). Three females and 2 males were observed. One female had 14 annuli, while the remaining four turtles had annuli too worn to count, represent an older age class (ca. >25 years old). No juvenile or sub-adult turtles were found. Photographs of each turtle, including their capture location, morphometrics and marking information are included in the Site Photographs in Appendix A.

The turtles were observed in old field/forest edge habitat between the mixed hardwood forest and the stockpile yard. These early-successional habitats are favored during the late spring just prior to and during the nesting period. Presumed nesting habitat is within the edges of the sand and gravel mine and the old field/forest ecotone. These areas contained ample sparsely vegetated and friable sandy soils favored for nesting.

Suitable hibernation habitat lies within the mixed hardwood forest, which occurs onsite within the Project area, onsite outside of the Project area, and offsite to the west. The precise location of hibernation is unknown. Due to the potential for hibernation to occur within the mixed hardwood forest that lies within the Project limits, a box turtle protection plan has been developed (see Appendix G).

Eastern Hog-nosed Snake

The hog-nosed snake is a State-listed species of special concern. It is found statewide in widely scattered populations with the exception of the highest elevations of northeastern and northwestern Connecticut, and along the coast, where this species has undergone a decline in its occurrence. The eastern hog-nosed snake nears its northeastern range limit in Connecticut, Rhode Island, Massachusetts and southern New Hampshire.

Eastern hog-nosed snakes are primarily found within early successional habitats and associated forest ecotones underlain by well-drained sandy and gravelly soils. Populations often occur in outwash plains within low-lying river valleys. They are typically found in lowland areas below 500 feet in elevation.

Suitable habitat occurs within mixed hardwood forest and the forest/old field ecotone along the margins of the stockpile yard.

Eastern Pearlshell

The pearlshell is a State-listed species of special concern. The pearlshell is a freshwater mussel that inhabits coldwater streams and small rivers that support Atlantic salmon, brook trout and brown trout populations which serve as the larval hosts for this species. Suitable habitat occurs within Whigville Brook and Wildcat Brook. No fisheries data was available for Wildcat Brook, but fisheries data for Whigville Brook (described in Section 5.4) indicates the presence of trout which could serve as host species for the larval pearlshell.

Whip-poor-will

The whip-poor-will is a State-listed species of special concern. They occur in open, deciduous, or mixed immature woods or areas of forest regrowth bordering more mature forest. Sites are typically relatively dry, with sandy soils often dominated by oak, beech and pine (Bevier 1994).

Hunter Brawley conducted surveys for whip-poor-will in June of 2020, and no birds were observed on the Site. The Brawley report is included in Appendix H.

7.0 IMPACT ASSESSMENT & MITIGATION MEASURES

7.1 Wetland Impacts & Mitigation

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

The Project has been successful in avoiding all direct temporary or permanent wetland impacts. Additionally, no tree-clearing or other vegetation alteration will occur within wetlands. The Project maintains substantial buffers from all wetlands and watercourses.

Development activity is proposed adjacent to wetlands and therefore there is the potential for secondary impacts to occur. Secondary impacts associated with development adjacent to wetlands are typically the result of erosion and sedimentation during construction as well as post-construction degradation of

wetlands through improper stormwater management. The potential for such secondary impacts will be minimized through the use of a number of Best Management Practices (BMP's) as described in the following sections.

The principal protection measure employed for this Project is the preservation of substantial undisturbed wetland and stream buffers. These buffers will not be affected by the Project, and the width of these buffers will allow for preservation of the existing watershed drainage patterns, natural infiltration of surface water runoff (within forest duff / leaf litter) and preservation of stream shading and temperature sensitive stream micro-climates. Summarized below in Table 3 are the wetland and watercourse setbacks from the Projects LOD:

Table 3: Disturbance area setbacks to wetlands and watercourses

Wetland / Watercourse	Minimum Distance from Project LOD
Whigville Brook	1,021 feet
Wildcat Brook	191 feet
Wetland 1	230 feet
Wetland 2	666 feet
Wetland 3	111 feet

The Project lies upslope (west) of Wildcat Brook. Wildcat Brook is bordered to the west by Wetland 3 that parallels the banks of the brook. As noted in Table 3, the proposed grading and clearing is closest to the brook at the northeast corner of the Project area (111 feet from bordering wetlands and 191 feet from the brook at its closest point). Beyond this point bordering the southeast corner of the Project area, that buffer distance widens considerably to 193 feet from the bordering wetland and 344 feet from Wildcat Brook.

<u>Erosion and Sedimentation Control Measures</u>

The potential for soil erosion and subsequent deposition in wetlands or watercourses exists at any construction project that involves soil disturbance. However, at this site, significant setbacks to wetlands and watercourse have been provided (see Table 3). This makes an elicit discharge of sediment during construction highly unlikely.

In order to minimize the potential for soil erosion and sedimentation, all erosion and sedimentation ("E&S") control measures have been designed in accordance with the standards and specifications of the "2002 Connecticut Guidelines for Soil Erosion and Sediment Control" (see Hiltbrand Site Plans, 9-2-20).

A three-phase construction plan has been established, as outlined in Site Plans. Project E&S control measures include the use of silt fencing and straw waddles (a.k.a. silt socks) around the perimeter of the LOD. Within the interior project area, swales, temporary sediment basins, and additional waddles with silt fence will manage runoff within the Project interior. These measures, if properly installed and maintained, should be effective at preventing erosion and sedimentation into wetlands.

Stormwater Management Measures

Stormwater discharge from developed lands has the potential to degrade downstream wetlands and watercourses if both the quantity and quality of stormwater are not effectively managed. A detailed stormwater management plan was developed for the Project. This stormwater management plan was reviewed for adherence with best design practices proven to prevent degradation of downstream waters from stormwater runoff. These practices are detailed in various technical documents including the CT Department of Energy and Environmental Protection's (DEEP) guidance document 2004 Connecticut Stormwater Quality Manual (the "Stormwater Manual").

The proposed stormwater management plan utilizes a combination of two stormwater quality basins, infiltration trenches and grass lined swales to mitigate stormwater runoff from the Project. The stormwater quality basins will have a multi-stage outlet design and emergency overflow. Both stormwater quality features include an up-slope grass infiltration and filter strip to provide pre-treatment of up-gradient sheet flow. A stone infiltration trench is provided for both stormwater quality features to enhance the treatment process. The result is a reduction in peak flows for the 2-year through 100-year storm events.

The stormwater basin is designed to capture and treat the Water Quality Volume (WQV) and capture and sequester sediment (i.e., Total Suspended Solids, or TSS).

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

It should be noted that due to the land-use proposed, high pollutant loads (i.e., nutrients, petroleum hydrocarbons and other pollutants) from stormwater runoff are not expected, particularly when compared to a residential or commercial development of similar scale. This is due to the fact these conventional types

of development include higher vehicular traffic, septic systems effluent and manicured lawns which are the primary sources of stormwater pollutants. Nevertheless, the stormwater management measures has been designed in a manner to maximize pollutant removal.

7.2 Habitat / Wildlife Impacts and Mitigation

Core Forest Impact Analysis

The size and extent of the contiguous forest present within and adjacent to the Site was evaluated. See Figure 6 – *Core Forest Analysis Map* and Figure 7 – *Core Forest Landscape Map*. The purpose was to determine the extent of "core forest" within the overall forest patch. UConn's Center for Land Use Education and Research's ("CLEAR") Forest Fragmentation Analysis ("FFA")[2] study designates "core forest" as forest that is located greater than 300 feet from non-forested habitat. This 300-foot zone is referred to as the "edge width" and represents sub-optimal breeding habitat for forest-interior birds due to decreased forest quality, increased levels of disturbance, and increased rates of nest predation and brood parasitism within this transitional forest edge (i.e., the "edge effect"). The FFA study identifies three categories of core forest: small (< 250 acres); medium (250-500 acres); and large (>500 acres).

Firstly, two publicly available GIS-based datasets designed to assess impacts to core forest habitat were reviewed. The first, the CT DEEP's *Forestland Habitat Impact Mapping*[3], shows that portions of the Project area are located within an area mapped as core forest. The second was CLEAR's FFA study mapping. The FFA mapping indicates that the site falls within a "medium core" forest block.

These two data sets are intended as landscape-scale analysis tools. Because they utilize satellite-derived land-use data to calculate forest cover, their accuracy at a Site-specific scale is low. Therefore, we conducted a site-specific analysis of contiguous forest and core forest using Esri's ArcMap software and review of the most current available aerial photography from the Spring 2019. This was necessary to provide a more accurate analysis of existing core forest in order to evaluate the post-construction impacts to core forest. The results of this analysis are shown on Figures 6 and 7:

[2] CLEAR's FFA: http://clear.uconn.edu/projects/landscape/forestfrag/forestfrag_public%20summary.pdf
[3] Source: http://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=7b81844bab634281b544c20bf2d7bfb8: This spatial screening layer identifies prime continuous and connected core forestland blocks. It is intended to identify areas of potential forestland habitat impacts relative to solar installation applications made to the Connecticut Siting Council. If the project intersects with the Forestland Habitat Impact Map there is a potential for material effects to core forest.

- The site's forest is part of a southerly extension of a larger forest block extending to the north. This southern extension consists primarily of edge forest flanking Wildcat Brook, situated between residential development along Stone Road and Wildcat Road.
- North of the residential developments along Stone Road and Wildcat Road, the narrow edge forest bordering Wildcat Brook then widens and joins with a large core forest block (i.e., >500 acres) within Nassahegan State Forest atop Wildcat Mountain.
- Because of the existing high level of forest fragmentation present within the southern end of this forest block, the total existing core forest is 22.66 acres.
- Total forest loss (all forest types) resulting from the project will be 16 acres.
- 6.98 acres of the total forest lost constitutes core forest.
- The remaining core forest within the 22 acres block post-development will be 15.68 acres, a 30.8% reduction in total core forest acreage.

Permanent Habitat Alteration

Habitat loss is an unavoidable consequence of land development. The solar arrays, gravel and grass surfaces associated with the Project will alter the habitat types present within the Project Area. Habitat loss will occur primarily within the mixed hardwood forest habitat. The Project will result in conversion of ±16 acres of mixed hardwood forest to a solar array field vegetated with low grass. A small portion of the Project area (0.3 acres) falls within the existing stockpile yard/former mine area.

To improve the quality of habitat within the Project area, efforts have been made to minimize the establishment of lawn (i.e., cool-season fescue grasses) as they offer little habitat for wildlife. Instead, portions of the Project area will be planted and maintained as native meadow habitat. These meadow areas will be established using two native seed mixes produced by New England Wetland Plants (www.newp.com) - *Showy Wildflower Mix* combined 50:50 with *Warm Season Grass Mix.* Meadow plantings will be established at the outer limits of the Project area, between the LOD (maintained to prevent panel shading) and perimeter fence surrounding the arrays. This area ranges from a minimum width of 15 feet to a maximum width of 50 feet.

While these plantings do not replace forest loss, they will serve to increase early-successional/forest edge habitat value, particularly for species like box turtle and hognose snake as well as forest edge birds and pollinator insects.

It is recommended that these meadow areas be mowed only once annually, between October 15th and March 30th to avoid the potential for impacting box turtles (or other wildlife).

State-listed Species Impacts

A total of 13 species and one rare plant community were identified in the NDDB preliminary assessment. As described in Section 6.0, The Project area lacks suitable habitat for most of these species which are associated with fen and bog wetland habitat types.

Of the 13 species/habitats identified in the NDDB review, suitable habitat is present for the following four of these species:

- Eastern box turtle
- Eastern hognose snake
- Eastern pearlshell
- Whip-poor-will

Detailed surveys were conducted for the eastern box turtle and hog-nosed snake. The box turtle was confirmed present on the Site. The hog-nosed snake was not observed, but due to its highly cryptic nature, it is still considered to be potentially present. The proposed box turtle protection plan is intended to minimize the likelihood of mortality for both box turtle and hog-nosed snake during construction.

The eastern pearlshell is potentially present within the two perennial streams. As noted in Section 7.1, significant buffer distances will remain between proposed activities and these two streams. This is in addition to proposed stormwater management measures. Given these factors, no adverse impact to eastern pearlshell habitat is anticipated.

Whip-poor-will surveys were conducted during June of 2020 by Hunter Brawley; the species was not observed on the Site.

Breeding Bird Impacts

The Site will impact 16 acres of forest, which provides suitable habitat for forest-dwelling birds. Given the location of this Project, this habitat loss will be unavoidable. The principal method for avoiding direct impact to nesting birds (as opposed to mitigating loss of habitat) is to conduct tree clearing outside of the breeding season. For most bird species, that period runs roughly from May 1st to August 15th (for most species). Unfortunately, to impose this clearing restriction would conflict with the recommended mitigation plan

proposed for eastern box turtle, which has been designed to avoid clearing while box turtles are hibernating, and then allow time for sweeps and removal of turtles prior to tree clearing.

Eastern Box Turtle Impacts and Proposed Protection Plan

The observed and otherwise suitable basking and nesting habitat for eastern box turtle will not be affected by the Project. These habitats consist of the old field/forest edge adjacent to the sand and gravel mine. These habitats lie beyond the project limits (>200 feet to the southeast) and will not be impacted. Additionally, the proposed meadow plantings along the LOD and the exterior array fencing will provide additional basking and nesting habitat for the species.

Due to the potential for box turtle to be hibernating within the Project area forest, a *Box Turtle Protection Plan* has been developed to minimize the likelihood of mortality during construction. The plan is detailed in Appendix G and illustrated on Figure 5 and consists of the following components:

1. Isolation of the project perimeter with fencing to be installed no later than April 1st, 2021 while turtles remain in hibernation.

2. Targeted searches of the project area prior to construction, between April 1st and May 31st to capture and remove turtles moving out of the hibernation sites into the bordering old field habitat.

3. Periodic inspection of the barrier fencing throughout construction period to search for box turtles that might remain within the construction zone.

4. Education of all contractors to conduct sweeps of the barrier fencing throughout the construction period.

The exclusion fencing will consist of silt fencing that will be installed during the hibernation period (with minimal soil and vegetation disturbance necessary for installation). Following installation of the exclusion fencing, the LOD interior to the fencing will be searched intensively during the period when box turtles are highly active – from early April to the end of May. During this period, the goal is to capture and remove the turtles from the Project area as they move from forest hibernacula to the early-successional basking and nesting sites bordering the stockpile yard. Turtles will be moved unharmed outside of the exclusion fencing, within approximately 200 feet of the capture site. Following detailed sweeps, construction will begin, with periodic inspections by the herpetologist during that period, along with more regular inspections of the exclusionary fencing boundary by the onsite construction personnel. Construction personnel will be trained by the herpetologist on what to look for and what to do in the event that a turtle is encountered. These methods are also intended to capture and exclude other reptiles including snakes.

8.0 REFERENCES

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

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

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

Dodd Jr., K.C. 2001. North American Box Turtles, a natural history. University of Oklahoma Press.

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

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

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

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

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

Figures

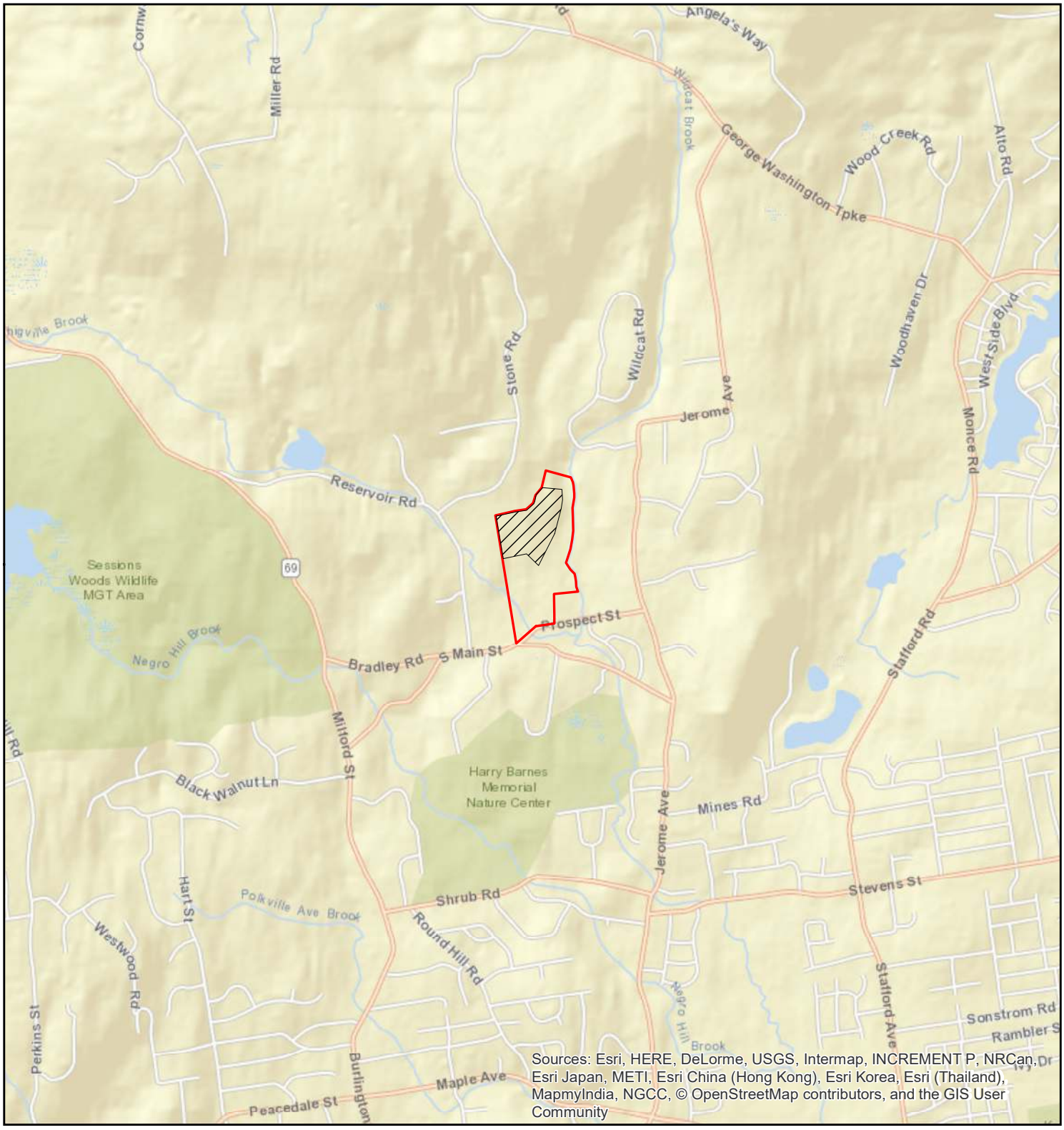


FIGURE 1
Location Map
Prospect Street
Burlington, CT

Property Boundary (approx)

Project Area Boundary (approx)

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

SCALE
0 1,000 2,000 Feet

N

Davison Environmental, LLC
10 Maple Street
Chester, CT 06412
860-803-0938

DAVISON ENVIRONMENTAL

FIGURE 2
Topographic Map
Prospect Street
Burlington, CT

Property Boundary (approx)

Project Area Boundary (approx)

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

SCALE
0 500 1,000 Feet
N

Davison Environmental, LLC
10 Maple Street
Chester, CT 06412
860-803-0938

DAVISON ENVIRONMENTAL

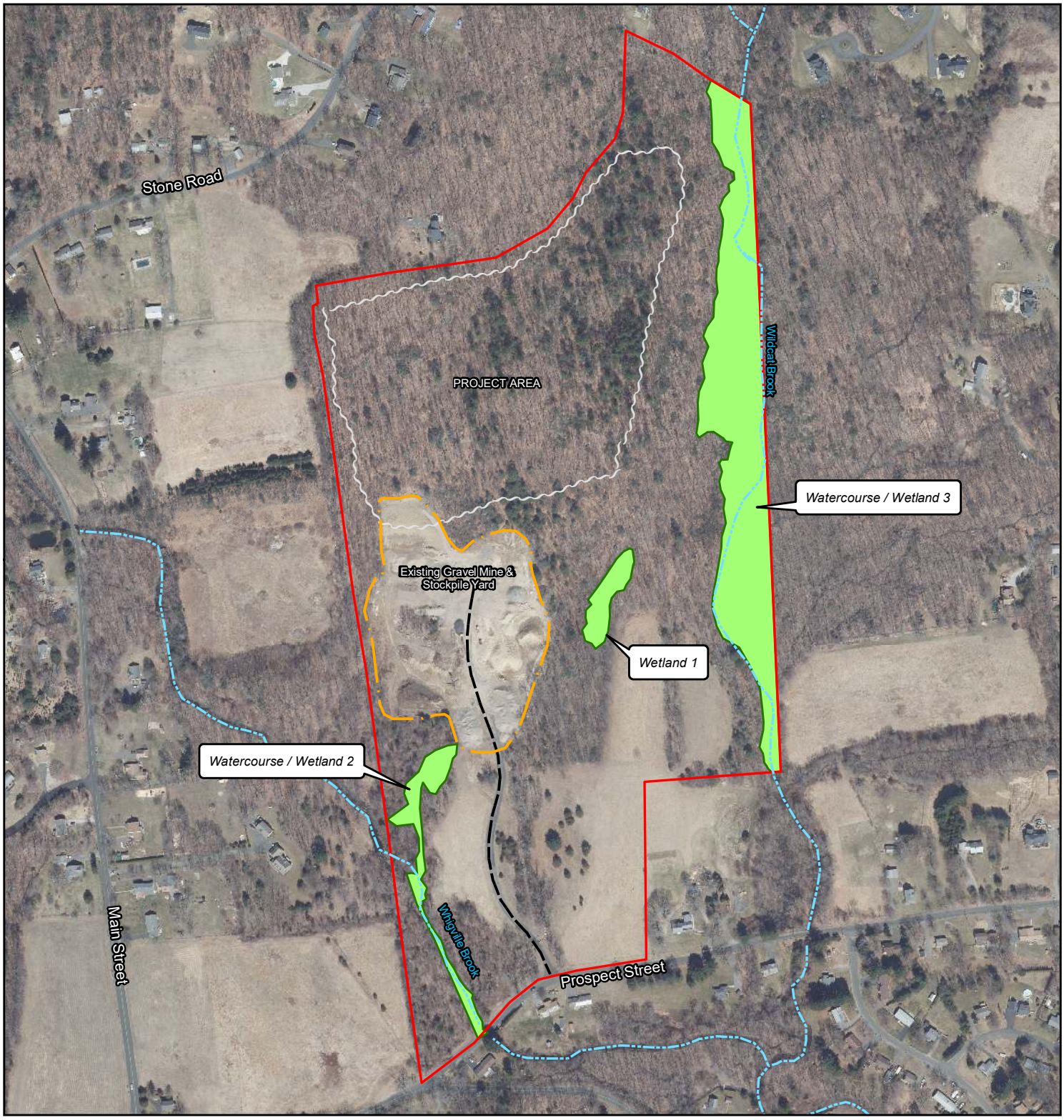


FIGURE 3 - SITE FEATURES MAP
Verogy Solar
Burlington Solar One Project
Prospect Street
Burlington, CT

LEGEND

- Property Boundary (approx)
- Project Limits
- Existing Access Drive
- Perennial Stream
- Wetlands

SCALE

0 200 400 Feet

N

Map Description
2019 Aerial map (source: CT ECO) showing the extent of contiguous forest and related core forest on the site. Core forest is defined as forest located >300ft from any non-forested habitat. This map is intended for illustrative purposes only.

Davison Environmental, LLC
10 Maple Street
Chester, CT 06412
860-803-0938

DAVISON ENVIRONMENTAL

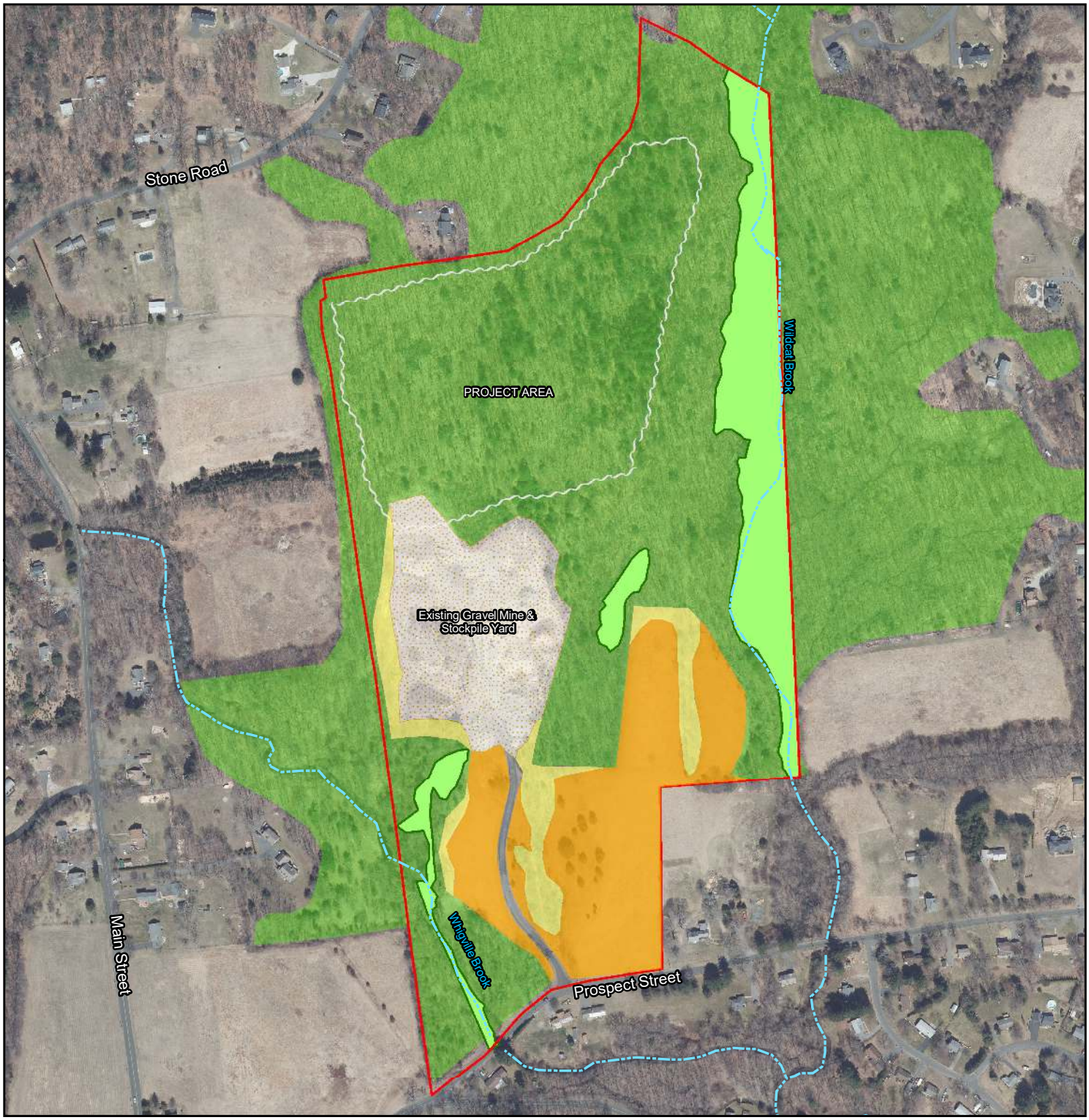


FIGURE 4 - HABITAT TYPES MAP
Verogy Solar
Burlington Solar One Project
Prospect Street
Burlington, CT

LEGEND

- Property Boundary (approx)
- Sand & Gravel Mine
- Old Field / Forest Edge
- Hayfield
- Project Limits
- Perennial Stream
- Wetlands
- Mixed Hardwood Forest

SCALE

0 200 400 Feet

N

Map Description
2019 Aerial map (source: CT ECO) showing habitat types.
This map is intended for illustrative purposes only.

Davison Environmental, LLC
10 Maple Street
Chester, CT 06412
860-803-0938

DAVISON ENVIRONMENTAL

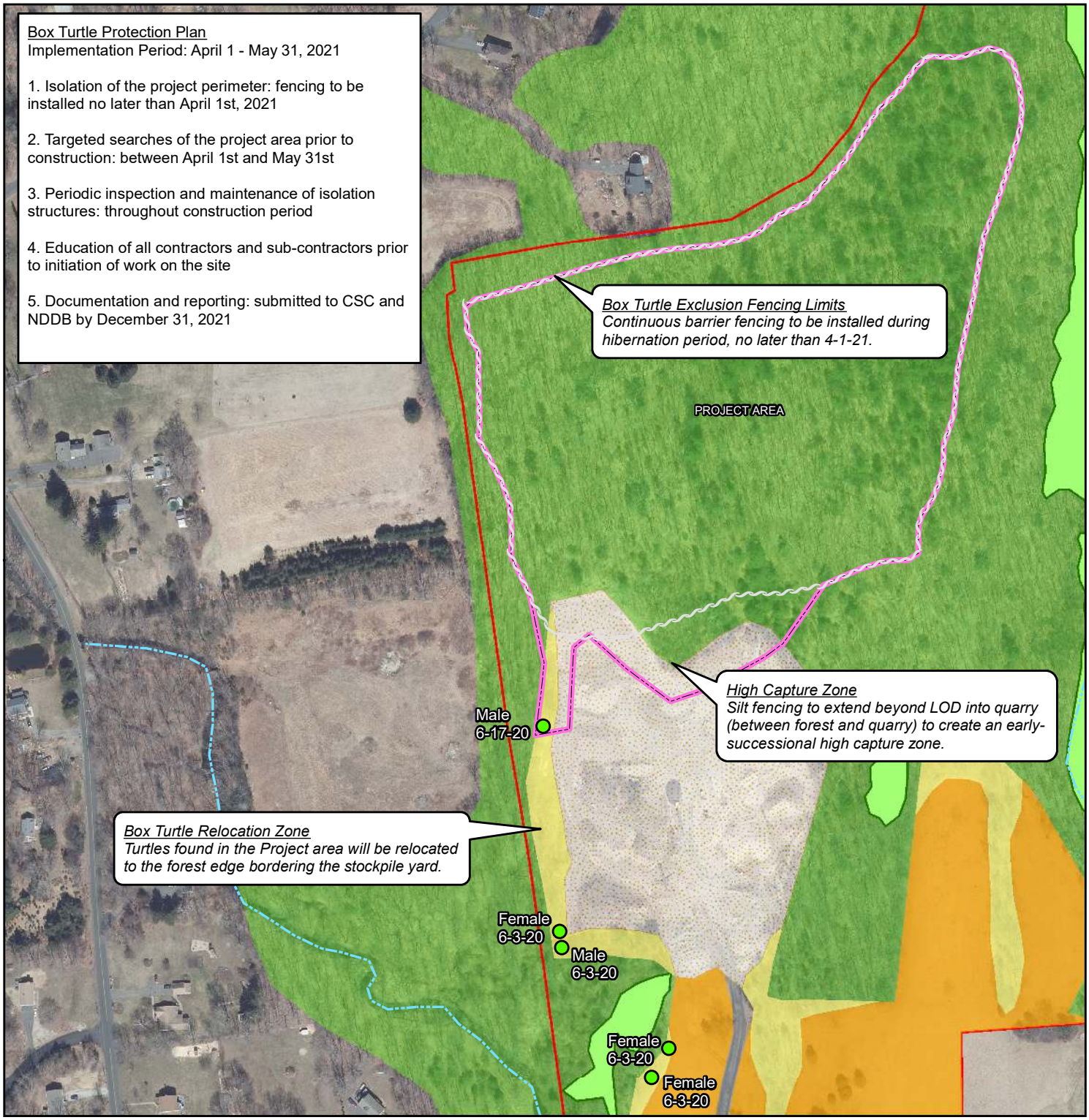


FIGURE 5 - Box Turtle Location Map & Protection Measures

Verogy Solar
Burlington Solar One Project
Prospect Street
Burlington, CT

LEGEND

- Box Turtle Locations (June 2020)
- Property Boundary (approx)
- Sand & Gravel Mine
- Old Field / Forest Edge
- Hayfield
- Project Limits
- Perennial Stream
- Wetlands
- Mixed Hardwood Forest

SCALE

0 125 250 Feet

N

Map Description
2019 Aerial map (source: CT ECO) showing habitat types.
This map is intended for illustrative purposes only.

Davison Environmental, LLC
10 Maple Street
Chester, CT 06412
860-803-0938

DAVISON ENVIRONMENTAL

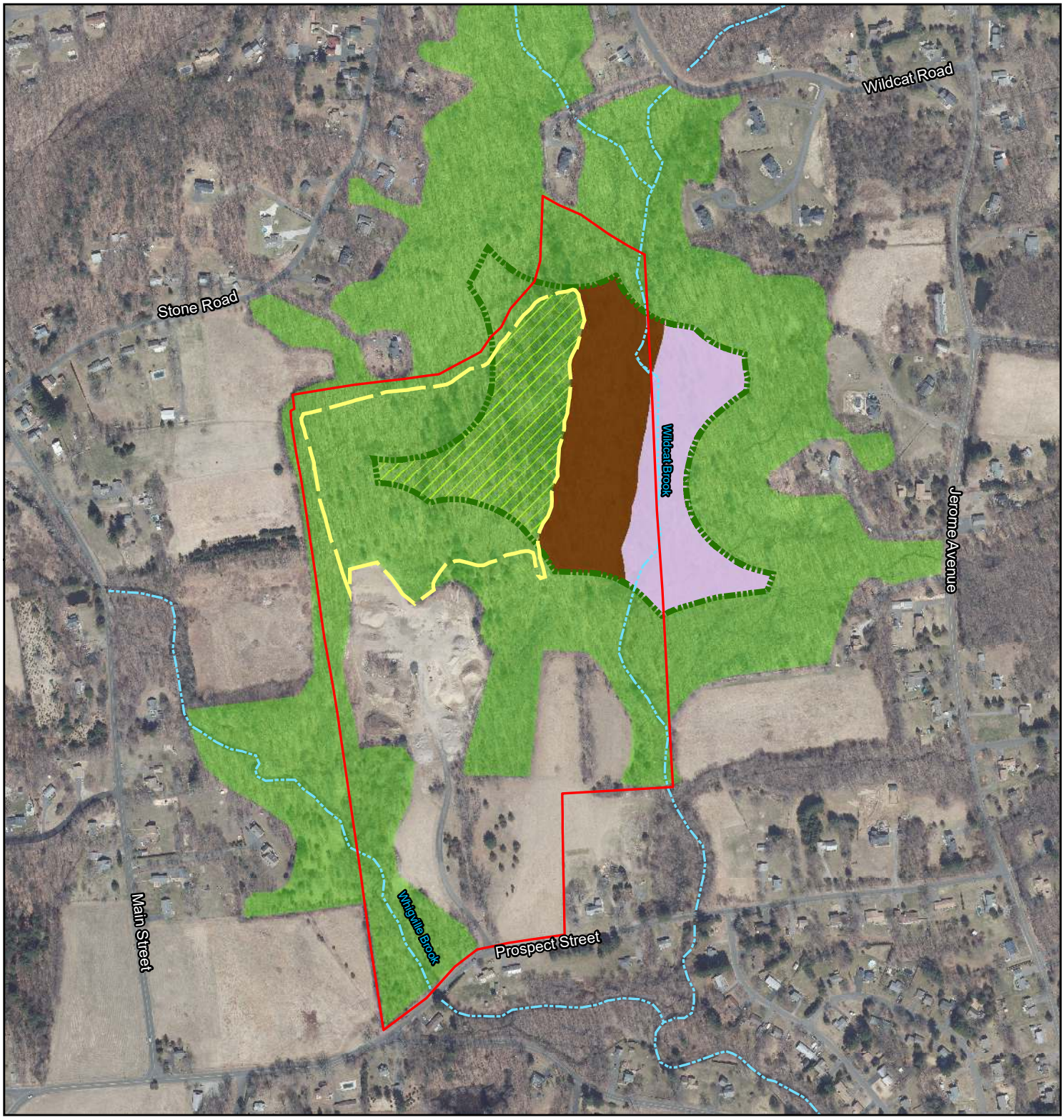


FIGURE 6- Core Forest Analysis
Verogy Solar
Burlington Solar One Project
Prospect Street
Burlington, CT

Map Description
2019 Aerial map (source: CT ECO) showing the extent of contiguous forest and related core forest on the site. Core forest is defined as forest located >300ft from any non-forested habitat. This map is intended for illustrative purposes only.

LEGEND

- Property Boundary
- Perennial Stream
- Contiguous Forest
- Core Forest (22.66 acres)
- Total Forest Clearing (16 acres)
- Core Forest, Lost (6.98 acres)
- Core Forest Conver. to Edge Forest (7.41 acres)
- Core Forest Remaining (6.98 acres)

SCALE
0 250 500 Feet
N

Davison Environmental, LLC
10 Maple Street
Chester, CT 06412
860-803-0938

DAVISON ENVIRONMENTAL

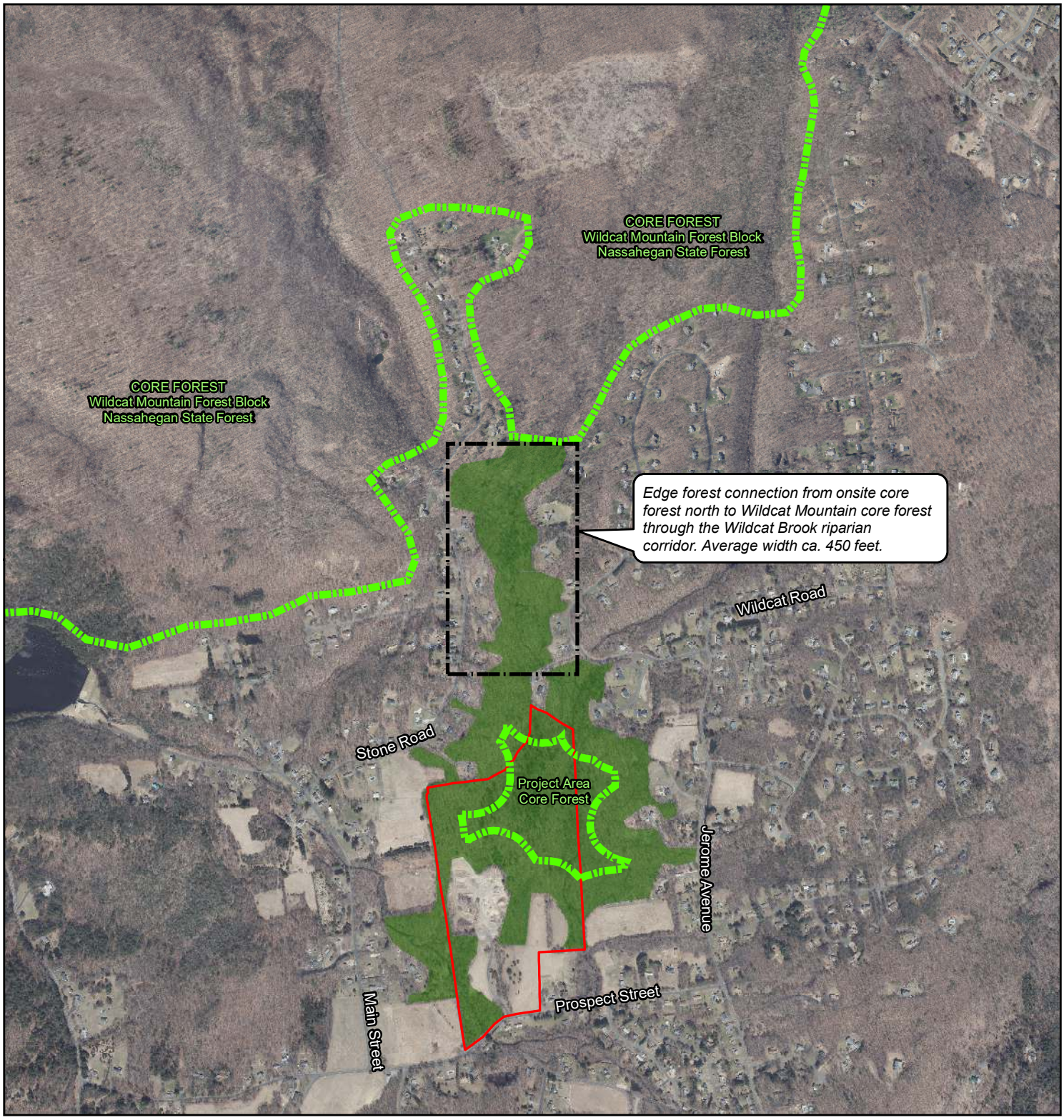


FIGURE 7 - Core Forest Landscape Map
Verogy Solar
Burlington Solar One Project
Prospect Street
Burlington, CT

LEGEND

- Property Boundary
- Core Forest Boundary
- Contiguous Forest

SCALE

0 500 1,000 Feet

N

Map Description
2019 Aerial map (source: CT ECO) showing the extent of contiguous forest and related core forest on the site. Core forest is defined as forest located >300ft from any non-forested habitat. This map is intended for illustrative purposes only.

Davison Environmental, LLC
10 Maple Street
Chester, CT 06412
860-803-0938

DAVISON ENVIRONMENTAL

Appendices

Appendix	Title
A	Site Photographs
B	Wetland Delineation Report (by David Lord)
C	Vernal Pool Monitoring Report (by David Lord)
D	CT DEEP NDDB Preliminary Assessment #201913067
E	Botanical Assessment (by Botanist William Moorhead)
F	Invertebrate Habitat Assessment (by Tanner Matson)
G	Eastern Box Turtle Protection Plan

APPENDIX A: Site Photographs

Photo 1: southern portion of Project area.

Photo 2: forest within former gravel mine.

Photo 3: central portion of Project area; note wolf oak tree.

Photo 4: south-central portion of Project area.

Photo 5: Wildcat Brook.

Photo 6: Wildcat Brook.

Photo 7: wetland bordering Wildcat Brook.

Photo 8: Whigville Brook.

Photo 9: Wetland 1, December 2019.

Photo 10: Wetland 1, August 2020.

Photo 11: box turtle habitat, east of sand and gravel mine.

Photo 12: box turtle habitat, east of sand and gravel mine.

Photo 13: male eastern box turtle found under log pile shown in Photo 11.

Photo 14: mine and stockpile yard, looking north towards Project area.

Photo 15: stockpile yard, looking north.

Photo 16: existing access road and bordering hayfield, looking north.

Burlington Solar One
Prospect Street, Burlington
Box Turtles Observed June 2020


- Adult Female. 14 annuli, 60% worn.
- Captured 6/3/20
- On edge of early/ late successional vegetation between forest and hayfield.
- Marked L-1
- Mass: 540g, SLC: 134mm, SLP- ATL: 55.5mm; PL: 78.5mm
- 41.7290, -72.9366


- Adult Female, 0 annuli, 100% worn
- Captured 6/3/20
- 30ft into hayfield off herb/shrub soft edge & forest
- Marked L-2
- Mass: 610g, SLC: 143mm, SLP- ATL: 57mm; PL: 86mm
- 41.7288, -72.9367


- Adult Female, 0 annuli, 100% worn
- Captured 6/3/20
- Edge of active mine, on shrub/herb edge.
- Marked R1
- Mass: 830g, SLC: 146mm, SLP- ATL: 60mm; PL: 90mm
- 41.7298, -72.9373

Burlington Solar One
Prospect Street, Burlington
Box Turtles Observed June 2020

- Adult Male, 0 annuli, 100% worn
- Captured 6/3/20
- Edge of active mine, on shrub/herb edge
- Marked L-3
- Mass: 740g, SLC: 162mm, SLP- ATL: 59mm; PL: 87mm
- 41.7298, -72.9374

- Adult Male, 21+ annuli, 80% worn
- Captured 6/17/20
- Edge of active mine, under log pile
- Not marked (plastral damage will be used for re-identification)
- Morphometrics not recorded
- 41°43'50.23"N, 72°56'15.02"W

APPENDICES B & C: Wetland Delineation and Vernal Pool Assessment Reports by David Lord

SOIL RESOURCE CONSULTANTS

P.O. Box 752 Meriden, CT 06450

March 24, 2015

SRC Job No. 14-76

Robert Hiltbrand, P.E.
R.R. Hiltbrand Engineers & Surveyors, L.L.C.
575 North Main Street
Bristol, CT 06010

Dear Mr. Hiltbrandt:

Re: **Wetland Delineation - Prospect Street Property - Burlington, CT**

At your request, I have completed an onsite investigation of a portion of this site fronting on Prospect Street. The purpose of my investigation was to identify and delineate the onsite inland wetlands and watercourse boundaries. The field work was completed on December 15, 2014.

The wetland and watercourse boundaries were marked with blue plastic flagging numbered **WF-1 to WF-77**. Please refer to the enclosed sketch for the approximate location of the inland wetland and watercourse boundaries and selected wetland flag numbers. The sketch is not drawn to scale but is a field drawn representation of wetland and watercourse configurations. Flag numbers at property lines and other readily identifiable landmarks can be used to locate wetland lines in the field.

The wetland soil map prepared for this site is a refinement of data found in the **Soil Survey of Hartford County**. Each map unit is composed of a unique combination of soils. Areas with the same symbol have a similar soil composition.

The map units described below are based on data collected at this particular site. Soil surveys in Connecticut were originally conducted for primarily agricultural purposes and do not provide site specific information. The minimum area delineated on a soil survey map sheet is approximately 2-3 acres in size. For this reason there may be some differences between the following information and that published in the Soil Survey.

INLAND WETLAND SOILS

The identification of inland wetland areas on this site is based on my field observations of test borings and the guidelines of the **National Cooperative Soil Survey Program**. Test borings were done using a shovel and or hand auger.

In Connecticut inland wetland soil categories include poorly drained soils, very poorly drained soils, alluvial and flood plain soils.

RN (3)
The **RN** map unit consists primarily of Leicester, Ridgebury and Whitman soils on 0 to 5 percent slopes. These soils are mapped together because they react similarly to most uses and management. These poorly and very poorly drained soils formed in drainageways. Ridgebury soils are very deep and poorly drained. Typically they have loam to fine sandy loam textures to a depth of 60 inches or more.

Whitman soils are generally found in localized depressional areas. Whitman soils are very deep and very poorly drained. Typically they have loam, silt loam or fine sandy loam textures to a depth of 60 inches or more.

Leicester soils are very deep, poorly drained soils which formed in loamy glacial till derived from gneiss and schist. Typically they have fine sandy loam textures to a depth of 60 inches or more.

Ru (103)
The **Ru** map unit is composed primarily of Rippowam (originally named Rumney) soils on 0 to 5 percent slopes. These soils are very deep and poorly drained They formed in alluvial sediments. Typically they have fine sandy loam textures overlying stratified sand and gravel to a depth of 60 inches or more.

W\C
The **W\C** designation refers to the existence of a watercourse on the subject property. The watercourse is a well defined channel or ditch area that conveys excess surface water runoff from its drainage area as well as groundwater seepage areas and or inland wetland soil areas. Wetland soils may not occur in all locations along the watercourse channel.

NON-WETLAND SOILS

The non-wetland soils were not studied or mapped in detail. Some observations were made of these soils during the process of identifying the inland wetland areas. Random soil borings in upland areas were marked with pink and black stripped flagging. The following map unit descriptions do not constitute a detailed soil investigation of these upland areas, but may be used as a guide in site planning.

Af (29)
The **Af** map unit is composed primarily of Agawam soils on 3 to 8 percent slopes. Agawam soils are very deep, well drained soils that formed in loamy over sandy and gravelly glacial outwash deposits. Typically they have a fine sandy loam surface layer and subsoil overlying a stratified sand and gravel substratum to a depth of 60 inches or more.

Hk (38)
The **Hk** map unit consists primarily of Hinckley soils on 3 to 15 percent slopes. Hinckley soils are very deep and excessively drained. These soils formed in glacial outwash materials. Typically Hinckley soils have gravelly sandy loam surface and subsoil layers overlying stratified sand and gravel to a depth of 60 inches or more.

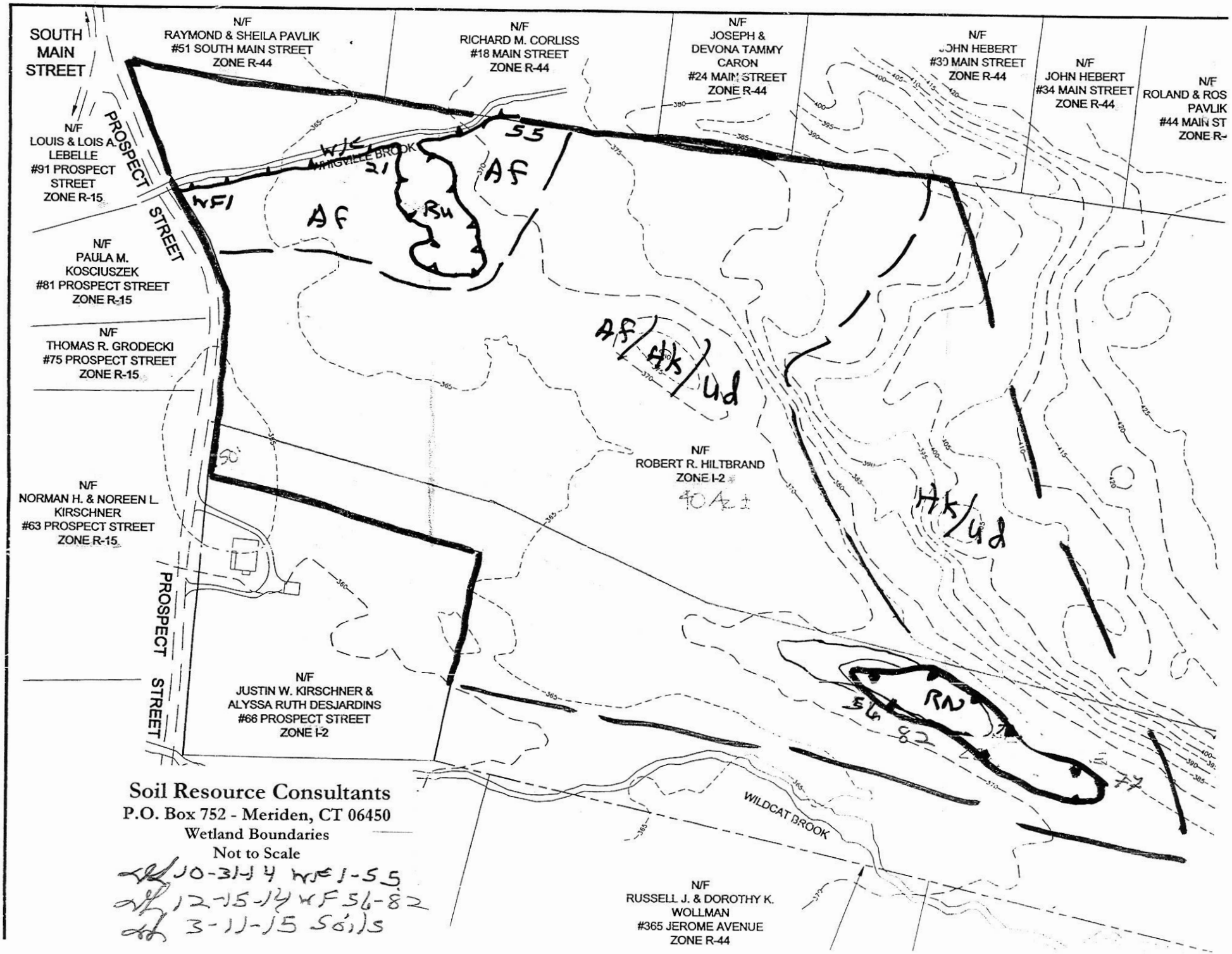
Ud (304)
The **Ud** map unit consists of moderately well to well drained disturbed soils. It is composed of filled areas and areas consisting of both cut and fill. Soils in this map unit have been extensively disturbed by grading and filling activities associated with the existing altered portions of this site.

Classification into natural soil units is impossible. This map unit is referred to taxonomically as Udorthents. Original diagnostic soil horizons are not present. Soils in this map unit have a wide range of characteristics. Textures are predominantly gravelly fine sandy loams. Permeability can be variable due to the lack of soil profile structure caused by the grading activities.

If you have any questions regarding this report, or need additional assistance with this site, please contact me. Environmental planning and wetland impact evaluation services are also available upon request. I am available to attend Inland Wetland Commission meetings and site walks.

Sincerely,

David H. Lord
Certified Soil Scientist
& Environmental Consultant


SOUTH MAIN STREET
PROSPECT STREET
PROSPECT STREET
N/F RAYMOND & SHEILA PAVLIK #51 SOUTH MAIN STREET ZONE R-44
N/F RICHARD M. CORLISS #18 MAIN STREET ZONE R-44
N/F JOSEPH & DEVONA TAMMY CARON #24 MAIN STREET ZONE R-44
N/F JOHN HEBERT #30 MAIN STREET ZONE R-44
N/F JOHN HEBERT #34 MAIN STREET ZONE R-44
N/F ROLAND & ROS PAVLIK #44 MAIN ST ZONE R-
N/F LOUIS & LOIS A. LEBELLE #91 PROSPECT STREET ZONE R-15
N/F PAULA M. KOSCIUSZEK #81 PROSPECT STREET ZONE R-15
N/F THOMAS R. GRODECKI #75 PROSPECT STREET ZONE R-15
N/F NORMAN H. & NOREEN L. KIRSCHNER #63 PROSPECT STREET ZONE R-15
N/F ROBERT R. HILTBRAND ZONE I-2
10 Ac ±
N/F JUSTIN W. KIRSCHNER & ALYSSA RUTH DESJARDINS #66 PROSPECT STREET ZONE I-2
N/F RUSSELL J. & DOROTHY K. WOLLMAN #365 JEROME AVENUE ZONE R-44
WRIGHTVILLE BROOK
WILDCAT BROOK
WF1
21
55
AF
AF
Rh
AF/Hk/Ud
Hk/Ud
RN
56
82
77
50'
Soil Resource Consultants
P.O. Box 752 - Meriden, CT 06450
Wetland Boundaries
Not to Scale
10-31-14 WF1-55
12-15-14 WF56-82
3-11-15 Soils

Soil Resource Consultants

P.O. Box 752 Meriden, CT 06450

December 30, 2016

SRC Job No. 16-119

Robert Hiltbrand, P.E.
R.R. Hiltbrand Engineers & Surveyors, L.L.C.
575 North Main Street
Bristol, CT 06010

Dear Mr. Hiltbrandt:

Re: **Wetland Delineation - Lot 33 - Prospect Street - Burlington, CT**

At your request, I have completed an onsite investigation of this site. The purpose of my investigation was to identify and delineate the onsite inland wetlands and watercourse boundaries. The field work was completed on December 21, 2016.

The wetland and watercourse boundaries were marked with blue plastic flagging numbered **WF-1 to WF-75**. Please refer to the enclosed sketch for the approximate location of the inland wetland and watercourse boundaries and selected wetland flag numbers. The sketch is not drawn to scale but is a field drawn representation of wetland and watercourse configurations. Flag numbers at property lines and other readily identifiable landmarks can be used to locate wetland lines in the field.

The wetland soil map prepared for this site is a refinement of data found in the **Soil Survey of Hartford County**. Each map unit is composed of a unique combination of soils. Areas with the same symbol have a similar soil composition.

The map units described below are based on data collected at this particular site. Soil surveys in Connecticut were originally conducted for primarily agricultural purposes and do not provide site specific information. The minimum area delineated on a soil survey map sheet is approximately 2-3 acres in size. For this reason there may be some differences between the following information and that published in the Soil Survey.

INLAND WETLAND SOILS

The identification of inland wetland areas on this site is based on my field observations of test borings and the guidelines of the **National Cooperative Soil Survey Program**. Test borings were done using a shovel and or hand auger.

In Connecticut inland wetland soil categories include poorly drained soils, very poorly drained soils, alluvial and flood plain soils.

4 (Lc)
The **Lg** map unit is composed primarily of Leicester extremely stony soils on 0 to 5 percent slopes. Leicester soils are very deep, poorly drained soils which formed in loamy glacial till derived from gneiss and schist. Typically they have gravelly fine sandy loam textures to a depth of 60 inches or more.

W\C
The **W\C** designation refers to the existence of a watercourse and intermittent watercourses within the delineated wetland boundaries on the subject property. The watercourse and intermittent watercourse channels are well defined swales or ditch areas that convey excess surface water runoff from ground water seepage areas and or inland wetland soil areas. The only difference between the two channels is that the watercourse appears to convey persistent to perennial flows.

NON-WETLAND SOILS

The non-wetland soils were not studied or mapped in detail. Some observations were made of these soils during the process of identifying the inland wetland areas. Random soil borings in upland areas were marked with pink and black stripped flagging. The following map unit descriptions do not constitute a detailed soil investigation of these upland areas, but may be used as a guide in site planning.

Af (29)
The **Af** map unit is composed primarily of Agawam soils on 3 to 8 percent slopes. Agawam soils are very deep, well drained soils that formed in loamy over sandy and gravelly glacial outwash deposits. Typically they have a fine sandy loam surface layer and subsoil overlying a stratified sand and gravel substratum to a depth of 60 inches or more.

Hk (38)
The **Hk** map unit consists primarily of Hinckley soils on 3 to 15 percent slopes. Hinckley soils are very deep and excessively drained. These soils formed in glacial outwash materials. Typically Hinckley soils have gravelly sandy loam surface and subsoil layers overlying stratified sand and gravel to a depth of 60 inches or more.

If you have any questions regarding this report, or need additional assistance with this site, please contact me. Environmental planning and wetland impact evaluation services are also available upon request. I am available to attend Inland Wetland Commission meetings and site walks.

Sincerely,

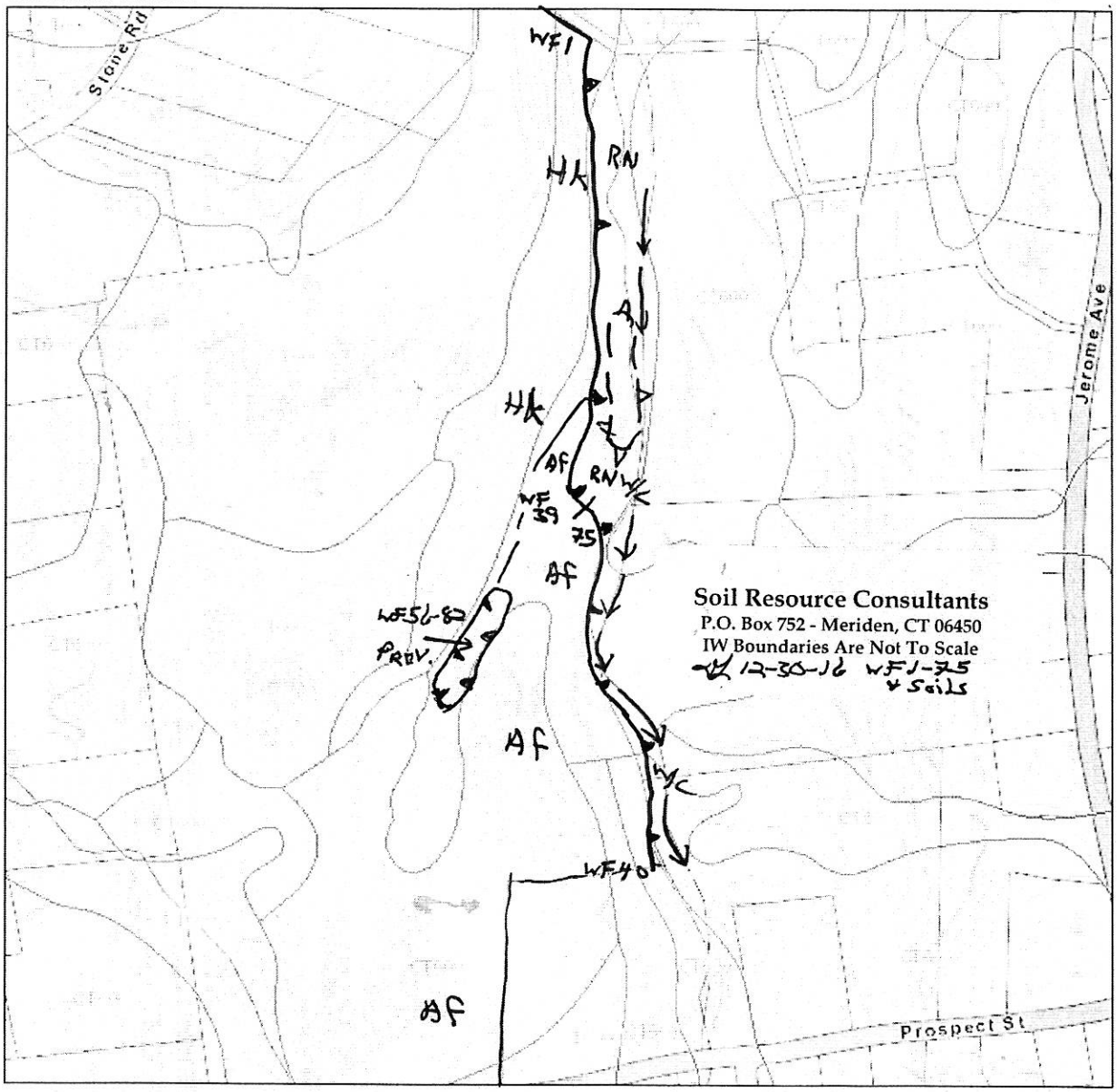
David H. Lord

David H. Lord
Certified Soil Scientist
& Environmental Consultant

Lot 33 - Prospect Street
Burlington, CT

Town of Burlington
Geographic Information System (GIS)

Date Printed: 12/8/2016



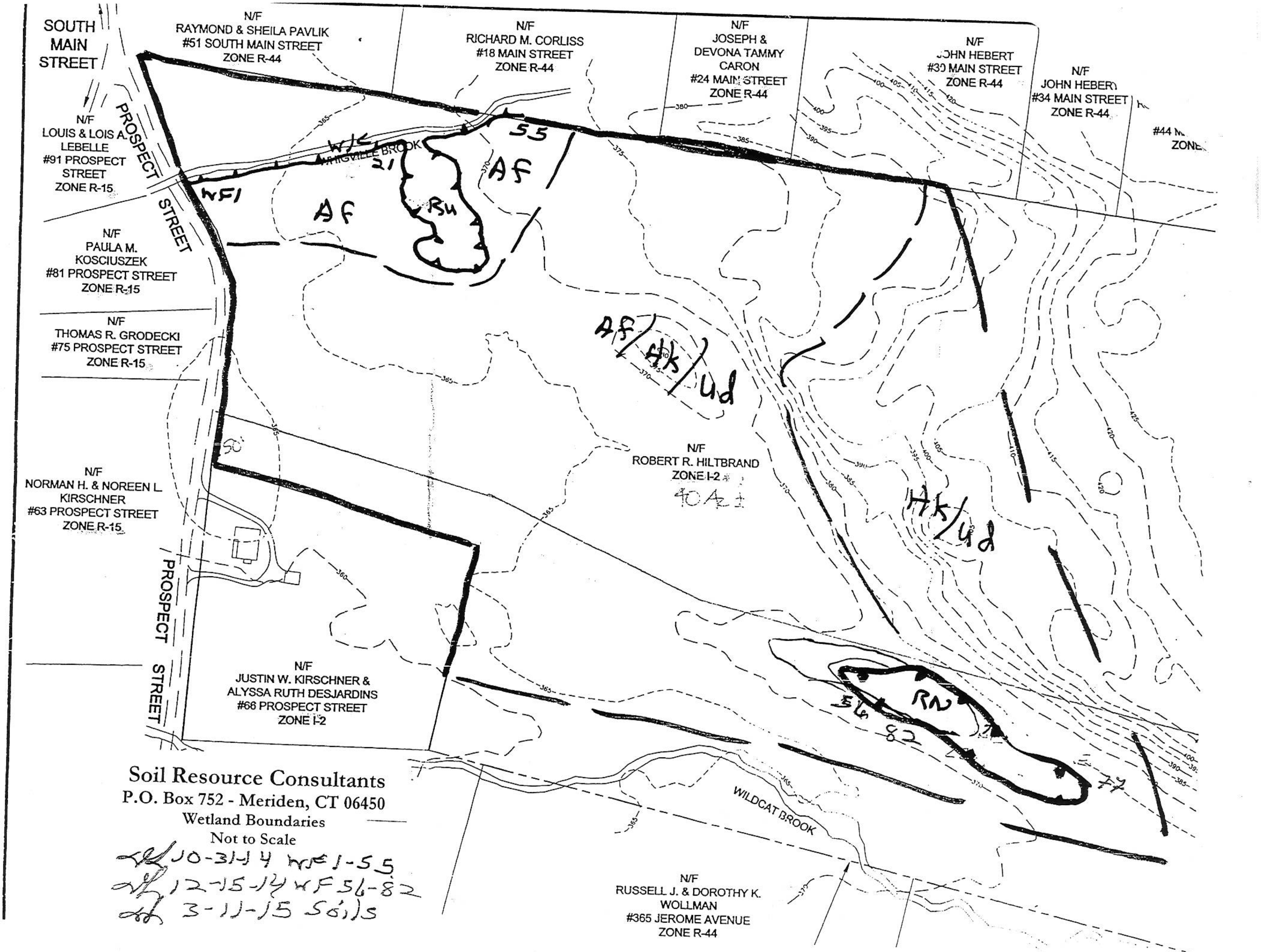
MAP DISCLAIMER - NOTICE OF LIABILITY
This map is for assessment purposes only. It is not for legal description or conveyances. All information is subject to verification by any user. The Town of Burlington and its mapping contractors assume no legal responsibility for the information contained herein.

Approximate Scale: 1 inch = 400 feet

0 400 Feet

N W E S

Wetland Delineations **Wetland Impact Evaluations** **Environmental Planning**



Soil Resource Consultants
P.O. Box 752 - Meriden, CT 06450
Wetland Boundaries
Not to Scale

10-31-14 WF1-55
12-15-14 WF56-82
3-11-15 Soils

Soil Resource Consultants

P.O. Box 752 Meriden, CT 06450

January 21, 2020

SRC Job No. 19 - 24

Robert Hiltbrand, P.E.
R.R. Hiltbrand Engineers & Surveyors, L.L.C.
575 North Main Street
Bristol, CT 06010

Dear Mr. Hiltbrandt:

Re: **Vernal Pool Monitoring - MBL: 2-03-33 - Prospect Street - Burlington, CT**

At your request, I have completed a series of onsite investigations of this site. The purpose of my investigations was to determine the presence or absence of functioning vernal pools on this property. The field work was completed during the period of late March through early June, 2019. Six separate observation visits to this site were made during this time period.

The subject site contains one (1) pool area located the delineated wetland bounded by flags WF-56 to 82. Maximum water depth within the pool limits was observed to be less than 2 feet during the study period. Only one central area had persistent surface water pooling during my observations.

Spring rainfall amounts during the monitoring period were at or above normal averages. The subject pool area was filled to its apparent regular configuration based on existing contours and discolored leaf material (indicative persistent inundation).

The following photograph indicates the general character of the subject pocket wetland during the study period.

The first photograph shows the overall character of the subject wetland pocket. It consists of an extremely stony shallow depression. Signs of standing water were observed in shallow depressions. These small shallow depressions were not interconnected and were generally less than 6 inches deep.

Photo #2 - Southeasterly View of Main Area of Surface Pooling

The above photo taken in early May of 2019 shows the absence of any pooling water within the largest and deepest of the surface water pooling areas.

Photo #3 - Easterly View of Main Pooling Area in Center of Wetland on May 24, 2019

As indicated in Photo #3 by May 24th all portions of the subject pocket wetland were saturated to the soil surface but only a few subareas where localized extremely small areas off 1-2 inches of surface water were present.

Conclusion
Based on my observations of the subject wetland area during the appropriate spring monitoring period, this wetland does not contain or function as a vernal pool.

If you have any questions regarding this report, or need additional assistance with this site, please contact me. I am available to attend Inland Wetland Commission meetings and site walks.

Sincerely,

David H. Lord

David H. Lord
Certified Soil Scientist
& Environmental Consultant

APPENDIX D: NDDB Preliminary Assessment Letter

Connecticut Department of

ENERGY &
ENVIRONMENTAL
PROTECTION

January 12, 2020

Mr. Eric Davison
Davison Environmental
10 Maple Street
Chester, CT 06412
eric@davisonenvironmental.com

Project: Preliminary Assessment for Burlington Solar One Located on Prospect Street in Burlington, Connecticut
NDDB Preliminary Assessment No.: 201913067

Dear Eric Davison,

I have reviewed Natural Diversity Database maps and files regarding the area delineated on the map provided for Burlington Solar One located on Prospect Street in Burlington, Connecticut.

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

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

1. Survey date(s) and duration.
2. Site descriptions and photographs.
3. List of component vascular plant and animal species within the survey area (including scientific binomials).
4. Data regarding population numbers and/or area occupied by State-listed species. Include special plant and/or animal forms found at:
https://www.ct.gov/deep/cwp/view.asp?a=2702&q=323460&deepNav_GID=1628
5. Detailed maps of the area surveyed including the survey route and locations of State listed species.
6. Conservation strategies or protection plans that indicate how impacts may be avoided for all state listed species present on the site.
7. Statement/résumé indicating the biologist's qualifications. Please be sure when you hire a consulting qualified biologist to help conduct this site survey that they have the proper experience with target taxon and have a CT scientific collectors permit to work with state listed species for this specific project.

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

If you do not intend to do site surveys to determine the presence or absence of state-listed species, then you should presume species are present and let us know how you will protect the state-listed species from being impacted by this project. You may submit these best management practices or protection plans with your new request for an NDDB review. After reviewing your new NDDB request form and the documents describing how you will protect this species from project impacts we will make a final determination and provide you with a letter from our program to use with DEEP-Permits.

Natural Diversity Database information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey, cooperating units of DEEP, landowners, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the NDDB should not be substitutes for onsite surveys necessary for a thorough environmental impact assessment. The result of this review does not preclude the possibility that listed species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits.

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

Sincerely,

Dawn M. McKay

Dawn M. McKay
Environmental Analyst 3

Species List for NDDB Request

Scientific Name	Common Name	State Status
Freshwater Community - Other Classification		
Medium fen		
Invertebrate Animal		
Agonum darlingtoni	Ground beetle	SC
Agonum mutatum	Ground beetle	SC
Exyra fax	Pitcher plant moth	T
Leucorrhinia glacialis	Crimson-ringed whiteface	T
Margaritifera margaritifera	Eastern pearlshell	SC
Vascular Plant		
Carex limosa	Mud sedge	T
Eriophorum vaginatum var. spissum	Hare's tail	T
Scheuchzeria palustris ssp. americana	Pod grass	E
Xyris montana	Northern yellow-eyed grass	T
Vertebrate Animal		
Botaurus lentiginosus	American bittern	E
Caprimulgus vociferus	Whip-poor-will	SC
Cottus cognatus	Slimy sculpin	SC
Heterodon platirhinos	Eastern hognose snake	SC
Terrapene carolina carolina	Eastern box turtle	SC

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

APPENDIX E: Botanical Evaluation by William Moorhead

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

March 19, 2020

Rob Hiltbrand
R.R. Hiltbrand Engineers & Surveyors
575 North Main Street
Bristol, Connecticut 06010

Dear Mr. Hiltbrand,

I am writing to report the results of my recent survey of the Burlington Solar One Project Area on you property on Prospect Street in Burlington. I am a consulting field botanist with 30 years of experience conducting surveys for rare plants and plant communities in the Northeast, the bulk of that time working in Connecticut (see attached Curriculum Vitae).

The objectives of my survey were the following.

1) Detection of and mapping of the Critical Habitat listed in the letter dated Jan. 12, 2019, from the Connecticut Dept. of Energy and Environmental Protection - Natural Diversity Data Base (CTDEEP-NDDB) to Mr. Eric Davison:

   Medium Fen

2) An assessment of the potential of existing habitats at the site as habitat for the following State-listed plants listed in the same letter:

Table 1. State-listed plants for which survey is suggested by CTDEEP-NDDB in January 12, 2019 letter.		
Scientific Name	**Common Name**	**State-listing Status**
Carex limosa	Mud Sedge	Threatened
Eriophorum vaginatum var. *spissum*	Hare's tail	Threatened
Scheuchzeria palustris ssp. *americana*	Pod Grass	Endangered
Xyris montana	Northern Yellow-eyed Grass	Threatened

I conducted field survey of the site on February 23 and 24, and March 18, 2020. The routes of my surveys are shown in Attachment 1 to this letter. Conditions were ideal for winter botanical and community survey work, in that there was essentially no snow cover. All of these species are herbaceous, and not reliably detectable in the winter (except sometimes for *Carex limosa* and *Xyris montana*), and therefore my survey was not for the plants themselves but for potential habitat for them. I compiled a plant taxa list of those species I could identify in winter, and it is Attachment 4 to this report.

Results.

Medium Fen.

No Medium Fen habitat exists in or near the Project Area. The Project is in largest part upland forest, and in smaller parts, at the southwest corner open-canopy recently disturbed excavated areas which are currently sparsely vegetated (see Fig. 5). The only wet areas I observed in the Project Area were two shallow pools (see orange bull's eye on Attachment 2 map and Figs. 1 and 2 below). Outside of the Project Area, south of its southeast corner, I observed a area of recently disturbed, sloping, unvegetated, wet sand that was kept saturated on the dates of my field surveys by seepage from the base of a cut (see Fig. 3). None of these wet areas bear any resemblance, in appearance or in terms of vegetation present, to Medium fen habitat. There is a type of Medium Fen that can occur

on wet sand, but the wet sand at this site is so recently disturbed that there has been no opportunity for any vegetation to develop, and I observed no occurrences of fen vegetation anywhere nearby on the property outside of the Project Area.

Figure 1. Southern-most shallow pool in Project Area. Northern-most pool is within ~50 ft to the left.

Figure 2. Northern-most of 2 shallow pools in Project Area. Southern-most pool is within ~50 ft to the right.

Figure 3. Wet unvegetated sand kept saturated by seepage, south of southeast corner of Project Area.

Figure 5. Sparsely vegetated recently cleared and excavated area at the southwest corner of the Project Area.

Figure 4. Sand Barren habitat (outlined in red) at the border of forest and excavation south of southeast corner of the Project Area.

Figure 6. Western of 2 Sand Barrens in small openings in forest, connected by short trail to Sand Barren in Fig. 5. Northern limit of this Barren appears to be about 25 ft south of southern limit of Project Area.

Figure 7. Eastern of 2 Sand Barrens in small openings in forest. This one is on little knoll in small opening in forest. It appears to be about 30 ft south of southern limit of Project Area.

Assessment of Potential Habitat for State-listed Plants.

The 4 State-listed plants for which survey was recommended by CTDEEP-NDDB are all specialists that occur only in Poor and Medium Fens that occur on deep poorly decomposed organic deposits, or, in older, colloquial terminology, "peat bogs". Nothing resembling habitat for these species occurs within the Project Area, nor does it exist on the larger property east and southeast of the Project Area, where I also surveyed, and there appears not to be any such habitat west and southwest of the Project Area, based on my review of aerial photography of that area (I did not field survey that area).

Assessment of other potential State-listed plant habitat at the site.

During the course of this survey, I traversed the entire site and observed a Critical Habitat type called Sand Barren, which appears to be about 25-30 feet outside of, and to the south of, the Project Area. This is only an estimate, which is derived from 1) my plotting of the Sand Barren polygons, using GIS software, over 2016 and 2019 ortho-recitified aerial photographs, using a GPS data from the field and aerial photo interpretation, and 2) my

hand-digitizing, using GIS software[1], of the southern limits of grading and solar panels as shown on the sheet entitled "Grading Plan, Lot 33, Prospect Street, Burlington, Connecticut, October 31, 2019". Transfer of the southern Project Area boundary into my GIS coverage was done using reference points that appear on the "Grading Plan" that were also evident in aerial photos, and by comparing the topographic contour lines on the "Grading Plan" to 2016 Lidar elevation data available from the UCONN-CTDEEP CTECO web site.

In the field, I flagged the boundaries of the two Sand Barren areas using a combination of blue surveyor flagging tied to trees and shrubs and blue wire stake flags (the latter are placed along the southern border of the western area, where there is no woody vegetation). Flags around the western polygon are coded SB-1-1 through -32, and those around the eastern area are coded SB-2-01 through -10.

Sand Barren is potential habitat for several State-listed plants, including State-Special Concern *Crocanthemum propinquum* (Low Frostweed), State -Endangered *Piptatherum pungens* (Slender Mountain Rice-grass), and State-Special Concern (Historic) *Dichanthelium ovale* ssp. *pseudopubescens* (Stiff-leaved Rosette-panicgrass). The first two species are currently known in similar habitat within a few miles of this site, and last species I mention because I observed a dried last-year's remnant that resembles the State-listed plant but could not be identified with confidence in its winter state. If surveys to document presence or absence of these species are required, they should occur during the May 15 - July 15 period.

I observed no other Critical Habitat in the Project Area and no other habitat with a significant potential as a host for State-listed plants. The list of plant taxa that I observed on site is provided as Attachment 4.

Sincerely,

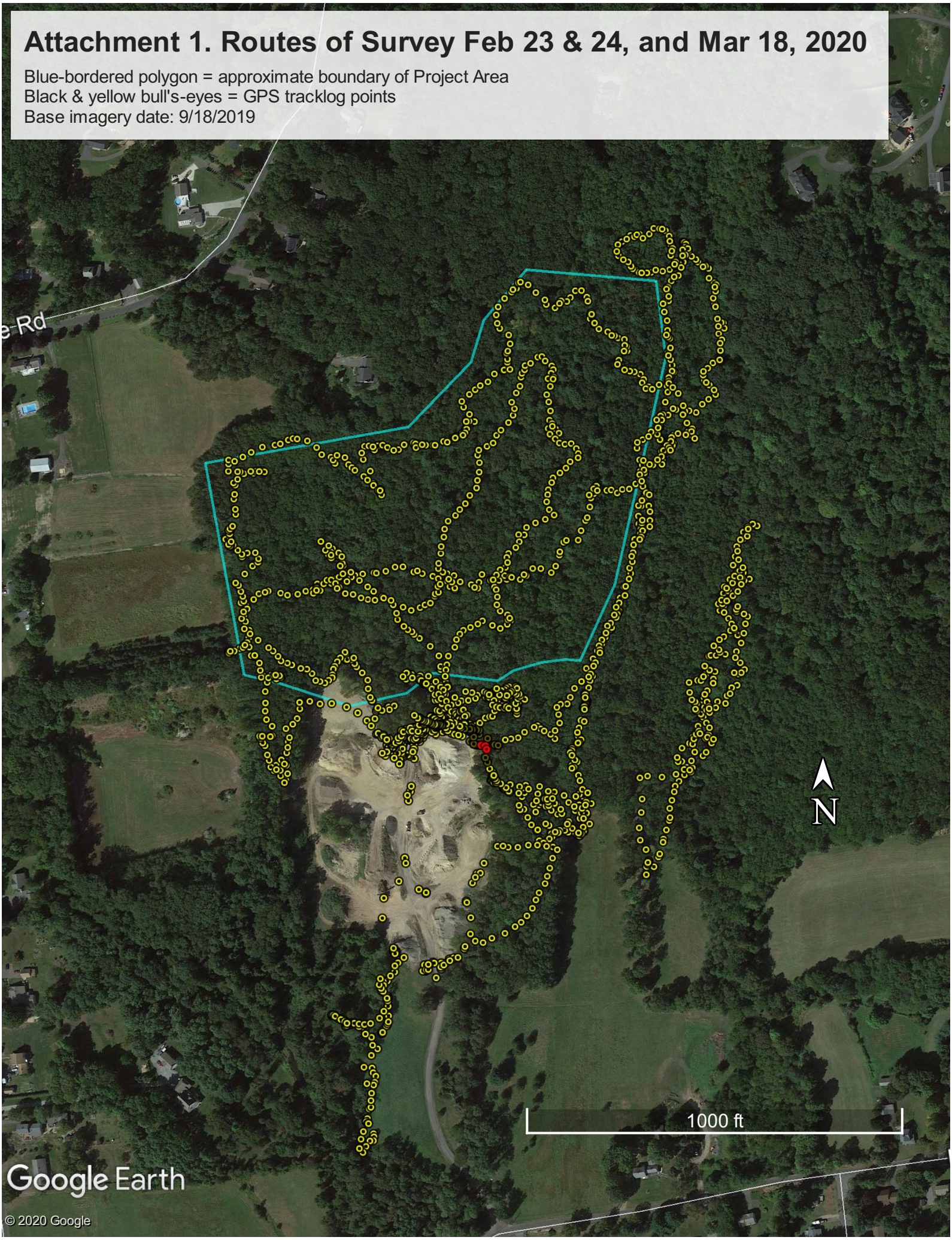
William H. Moorhead III, Consulting Field Botanist

Attachments:

Attachment 1. Routes of Survey Feb 23 & 24, and Mar 18, 2020
Attachment 2. Location of 2 shallow pools in Project Area
Attachment 3. Sand Barrens and Approx. Boundary of Project Area
Attachment 4. Vascular and non-vascular plants observed by Moorhead Feb. 23 & 24, and Mar. 18, 2020, at proposed Burlington Solar One site, in Project area and south and west of Project area.
Attachment 4. Moorhead Curriculum Vitae

Attachment 1. Routes of Survey Feb 23 & 24, and Mar 18, 2020

Blue-bordered polygon = approximate boundary of Project Area
Black & yellow bull's-eyes = GPS tracklog points
Base imagery date: 9/18/2019

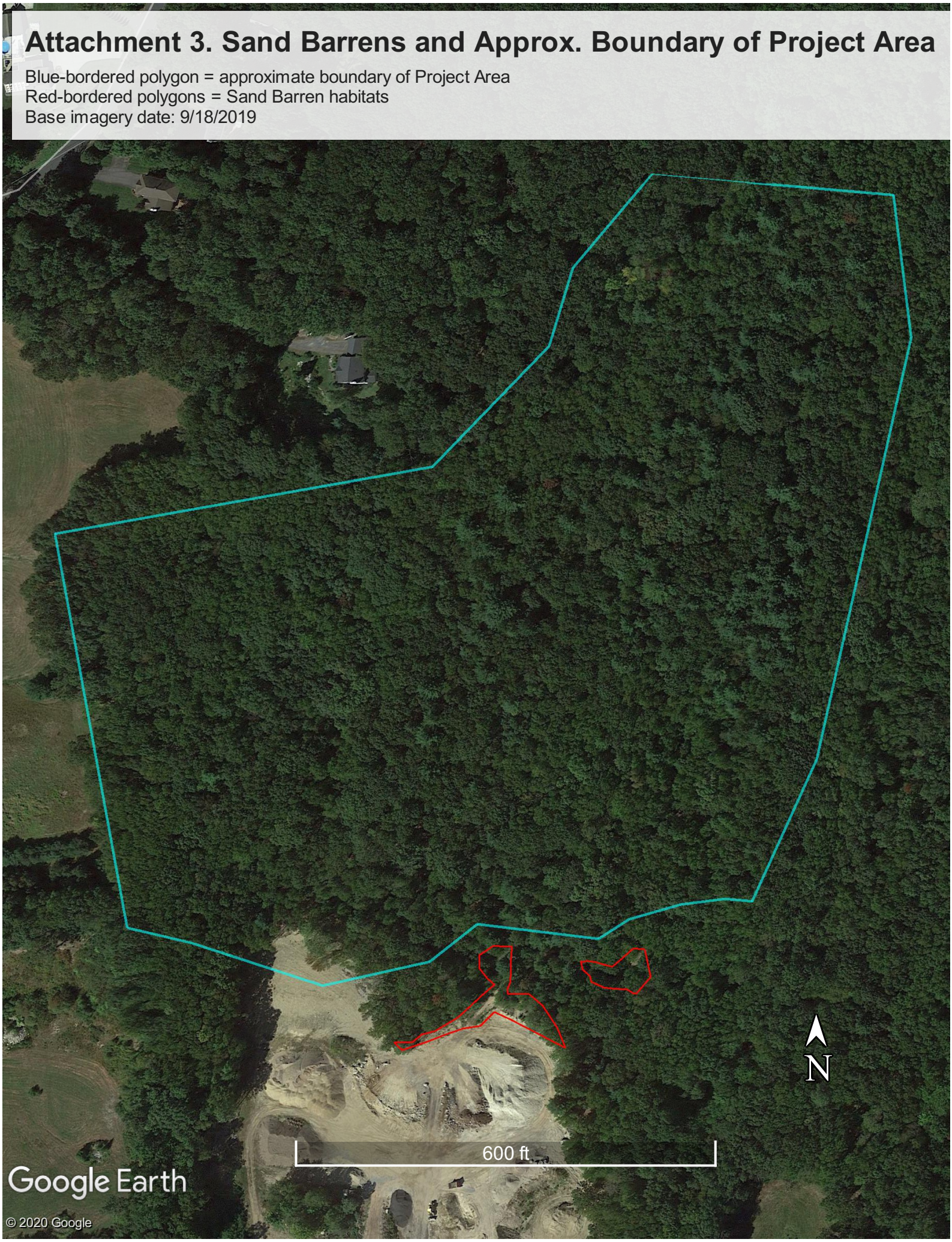


Attachment 2. Location of 2 shallow pools in Project Area

Blue-bordered polygon = approximate boundary of Project Area
Black & orange bull's-eye = location of 2 seasonally flooded pools observed on February site visits
Base imagery date: 9/18/2019

Attachment 3. Sand Barrens and Approx. Boundary of Project Area

Blue-bordered polygon = approximate boundary of Project Area
Red-bordered polygons = Sand Barren habitats
Base imagery date: 9/18/2019



LIFE FORM	Taxon	Common Name	ID confidence	Family	Native vs. non-native in CT[3]	CIPWG Invasive Status[5]	Project area	Project area	Project area	Outside Project area	Outside Project area	Outside Project area	Outside Project area	Outside Project area	Outside Project area	Outside Project area
							Project area upland forest	Sparsely vegetated excavated area that is not Sand Barren	Sand Barren-like recently excavated areas	Former Sand Barren with canopy recently closed	Sand Barren not recently excavated/ cleared	"RN" Wetland	Upland forest W of Project area	Little brook channel and bank W of Project area	Valley bottom wetland W of project area	Main brook channel and bank W of Project area
T	*Acer rubrum* L.	Red Maple		Sapindaceae	native		t					**t**			**t**	
T	*Acer saccharum* Marsh. var. *saccharum*	Sugar Maple		Sapindaceae	native								t			
H	*Anaphalis margaritacea* (L.) Benth. & Hook.f.	Pearly Everlasting		Asteraceae	native				h							
H	*Andropogon virginicus* L. var. *virginicus*	Broom-sedge		Poaceae	native						**h**					
H	*Artemisia vulgaris* L. var. *vulgaris*	Mugwort		Asteraceae	non-native	I			h							
S	*Berberis thunbergii* DC.	Japanese Barberry		Berberidaceae	non-native	I	s,h							s		s,h
T	*Betula alleghaniensis* Britt.	Yellow Birch		Betulaceae	native										t	
T	*Betula lenta* L.	Black Birch		Betulaceae	native								**t**			
T	*Betula papyrifera* Marsh.	Paper Birch			native		t									
T	*Betula populifolia* Marsh.	Gray Birch		Betulaceae	native		t				t					
	Bulbostylis capillaris (L.) Kunthe *ex* C.B. Clarke	a sedge		Cyperaceae	native				h		h					
H	*Cardamine pensylvanica* Muhl. ex Willd.	Pennsylvania Bitter-cress		Brassicaceae	native									h		
H	*Carex albicans* Willd. *ex* Spreng. var. *albicans*	a sedge	sp.?	Cyperaceae	native		h									
H	*Carex albicans* Willd. *ex* Spreng. var. *emmonsii* (Dewey ex Torr.) J. Rettig	a sedge	sp.?	Cyperaceae	native							h				
H	*Carex* L.	unidentified sedge spp.	sp.?	Cyperaceae	native		h					h				
H	*Carex laxiculmis* Schwein. var. *laxiculmis*	a sedge	sp.?	Cyperaceae	native											h
H	*Carex pensylvanica* Lam.	a sedge	sp.?	Cyperaceae	native		h									
H	*Carex tonsa* (Fern.) Bickn.	a sedge	sp.?	Cyperaceae	native						h					
T	*Carya glabra* (P. Mill.) Sweet	Pignut Hickory		Juglandaceae	native		t									
T	*Carya ovata* (P. Mill.) K. Koch	Shagbark Hickory		Juglandaceae	native		t					t				
SS,GV?	*Chimaphila maculata* (L.) Pursh	Spotted Wintergreen		Ericaceae	native		h									
H	*Crocanthemum canadense* (L.) Britt.	Canada Frostweed		Cistaceae	native						h					
H	*Crocanthemum* sp.	unidentified rock-rose		Cistaceae	native						h					
H	*Dendrolycopodium hickeyi* (W.H. Wagner, Beitel, & Moran) A. Haines	Hickey's Tree Clubmoss		Lycopodiaceae	native		**h**									
H	*Dennstaedtia punctilobula* (Michx.) T. Moore	Hay-scented Fern		Dennstaedtiaceae	native		h									
	Dichanthelium (Hitchc. & Chase) Gould	a panic grass	sp.?	Poaceae	native						h					
H	*Digitaria* Haller.	crabgrass		Poaceae	?				h							
H	*Diphasiastrum digitatum* (Dill. ex A. Braun) Holub	Southern Running-pine		Lycopodiaceae	native		h									
T	*Fraxinus americana* L.	White Ash		Oleaceae	native							t,s				
SS,GV	*Gaultheria procumbens* L.	Wintergreen		Ericaceae	native		h									
SS	*Gaylussacia baccata* (Wangenh.) K. Koch	Black Huckleberry		Ericaceae	native		h					h				
H	*Goodyera pubescens* (Willd.) R. Br. in Ait. & Ait. f.	Downy Rattlesnake-plantain		Orchidaceae	native		h									
S	*Hamamelis virginiana* L.	American Witch-hazel		Hamamelidaceae	native		s									
H	*Hypericum gentianoides* (L.) B.S.P.	Orange-grass		Hypericaceae	native				h							
S	*Ilex verticillata* (L.) Gray	Common Winterberry		Aquifoliaceae	native							s				
S	*Juniperus communis* L. var. *depressa* Pursh	Common Juniper		Cupressaceae	native		h				h					
T,S	*Juniperus virginiana* L. var. *virginiana*	Eastern Red Cedar		Cupressaceae	native		t					t				
S	*Kalmia angustifolia* L.	Sheep Laurel		Ericaceae	native		h (loc. dom.)									
S	*Kalmia latifolia* L.	Mountain Laurel		Ericaceae	native		**s,h**				h				**s,h**	**s,h**

LIFE FORM	Taxon	Common Name	ID confidence	Family	Native vs. non-native in CT[3]	CIPWG Invasive Status[5]	Project area Project area upland forest	Project area Sparsely vegetated excavated area that is not Sand Barren	Project area Sand Barren-like recently excavated areas	Outside Project area Former Sand Barren with canopy recently closed	Outside Project area Sand Barren not recently excavated/ cleared	Outside Project area "RN" Wetland	Outside Project area Upland forest W of Project area	Outside Project area Little brook channel and bank W of Project area	Outside Project area Valley bottom wetland W of project area	Outside Project area Main brook channel and bank W of Project area
H	*Lechea maritima* Leggett ex B.S.P.	Beach Pinweed		Cistaceae	native				h							
T	*Liriodendron tulipifera* L.	Tuliptree		Magnoliaceae	native								**t**		**t**	
H	*Lycopodium clavatum* L.	Running Clubmoss		Lycopodiaceae	native		h									
SS,GV	*Mitchella repens* L.	Partridge-berry		Rubiaceae	native		h									
H	*Onoclea sensibilis* L.	Sensitive Fern		Onocleaceae	native			h				h				
H	*Osmundastrum cinnamomeum* (L.) C. Presl	Cinnamon Fern		Osmundaceae	native										**h**	h
T	*Picea* A. Dietr.	non-native spruce	sp.?	Pinaceae			t,s					s				
T	*Pinus resinosa* Ait.	Red Pine		Pinaceae	native					t						
T	*Pinus rigida* P. Mill.	Pitch Pine		Pinaceae		native					s					
T	*Pinus strobus* L.	Eastern White Pine		Pinaceae	native		**t**						**t**		s	
H	POACEAE	unidentified grasses		Poaceae	depends on sp. ID			h								
H	*Polystichum acrostichoides* (Michx.) Schott	Christmas Fern		Dryopteridaceae	native		h						h		h	h
T	*Populus grandidentata* Michx.	Bigtooth Aspen		Salicaceae	native		t									
H	*Pteridium aquilinum* (L.) Kuhn	Bracken Fern		Dennstaedtiaceae	native		h									
H	*Pyrola* L.	a shinleaf		Ericaceae	native								h			
T	*Quercus alba* L.	Eastern White Oak		Fabaceae	native		**t**				h	t,s	**t**			
T	*Quercus coccinea* Muenchh.	Scarlet Oak		Fabaceae	native		**t**									
T	*Quercus rubra* L.	Northern Red Oak		Fabaceae	native		**t**						**t**			
T	*Quercus velutina* Lam.	Black Oak		Fabaceae	native		**t**				h					
T,S	*Robinia pseudoacacia* L.	Black Locust		Fabaceae	non-native	I	t									
SS(?),GV	*Rubus hispidus* L.	Swamp Dewberry		Rosaceae	native							h				
H	*Schizachyrium scoparium* (Michx.) Nash var. *scoparium*	Little Bluestem		Poaceae	native					h	**h**					
L	*Smilax glauca* Walt.	Sawbrier		Smilacaceae	native		h									
L	*Smilax rotundifolia* L.	Comon Greenbrier		Smilacaceae	native							**s,h**				
H	*Solidago juncea* Ait.	Early Goldenrod		Asteraceae	native						h					
H	*Solidago rugosa* P. Mill.	Wrinkle-leaved Goldenrod		Asteraceae	native							h				
	Thelypteris palustris Schott var. *pubescens* (Lawson) Fern.	Marsh Fern		Thelypteridaceae	native										**h**	
	Trichostema dichotomum L.	Bastard Pennyroyal		Lamiaceae	native				h							
T	*Tsuga canadensis* (L.) Carr.	Eastern Hemlock		Pinaceae	native		t					t			t	
T	*Ulmus americana* L.	American Elm		Ulmaceae	native							t				
SS	*Vaccinium angustifolium* Ait.	Late Low Blueberry		Ericaceae	native		h(sp. ID?)				**h (sp. ID?)**	s				
S	*Vaccinium corymbosum* L.	Highbush Blueberry		Ericaceae	native		s					s				
SS	*Vaccinium pallidum* Ait.	Early Low Blueberry	sp.?	Ericaceae	native		h(sp. ID?)				**h (sp. ID?)**					
H	*Veronica officinalis* L.	Common Speedwell		Plantaginaceae	non-native								h			
	Non-vascular plants															
M/L	*Cladonia* sp[p].	a fruticose lichen			native					m						
M/L	unidentified lichen									**m**						m
M/L	unidentified non-sphagnous mosses											m		**m**		**m**
M/L	*Climacium*											m				
M/L	*Polytrichum* sp[p].	haircap moss			native					**m**						
M/L	*Thuidium*													**m**		
M/L	*Sphagnum* sp[p].	peat moss			native									m		m

LIFE FORM	Taxon	Common Name	ID confidence	Family	Native vs. non-native in CT[3]	CIPWG Invasive Status[5]	Project area Project area upland forest	Project area Sparsely vegetated excavated area that is not Sand Barren	Project area Sand Barren-like recently excavated areas	Outside Project area Former Sand Barren with canopy recently closed	Outside Project area Sand Barren not recently excavated/ cleared	Outside Project area "RN" Wetland	Outside Project area Upland forest W of Project area	Outside Project area Little brook channel and bank W of Project area	Outside Project area Valley bottom wetland W of project area	Outside Project area Main brook channel and bank W of Project area

TABLE NOTES:

[3]"native" and "non-native" means native or non-native to Connecticut, according to Dreyer et al. 2013. Native and naturalized vascular plants of Connecticut checklist. Memoirs of the Connecticut Botanical Society No. 5. 232 pp.

[5](CIPWG = CT Invasive Plant Working Group) I = on current Inavisive Plant List as an Invasive; P = on current Invasive Plant List as "Potentially Invasive"; ED = on current Early Detection List; R = on current Research List

Abreviations:

dom. dominant
ID identification
loc. local or locally
p present in Project Area
p* present at site outside Project Area
sp. species, one
sp.? identification uncertain at species level
spp. species, more than one
sp[p]. species, one or possibly more species
ssp. subspecies
var. variety

Life form codes:
T tree (woody, not a vine, > 5m high at maturity)
S shrub (woody, non a vine, 1-5m high at maturity)
H herbaceous
L liana (high-climbing woody vine)
GV woody trailing vine
SS subshrub, max ht << 1 m, acc. to refs.
SS subshrub, max ht to 1 m, acc. to refs.
SS* subshrub, aerial parasite

Stratum codes (when code is **bold** plant is a dominant generally or dominant somewhere in habitat type; if code is not in bold, plant is present but not among dominants):
t tree layer (woody, > 5m high)
s shrub layer (woody, 1-5m high)
h herb layer (herbaceous any height; woody, < 1m)
m moss/liverwort/lichen

Curriculum Vitae

William H. Moorhead III

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

TECHNICAL EXPERTISE

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

PROFESSIONAL EXPERIENCE

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

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

EMPLOYMENT

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

MAJOR PROJECTS:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SPECIAL PROJECTS

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

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

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

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

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

EDUCATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MAJOR PRESENTATIONS

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

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

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

REPRESENTATIVE TECHNICAL REPORTS

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

.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

REFEREED PUBLICATIONS

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

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

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

AFFILIATIONS

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

References and samples of previous work furnished upon request

APPENDIX F: Matson Invertebrate Assessment

SITE VISIT FOR SOLAR FARM

BURLINGTON, CONNECTICUT

Prepared for:

Rob Hiltbrand
R.R. Hiltbrand Engineers & Surveyors
575 North Main Street
Bristol, Connecticut 06010

prepared by:

Tanner A. Matson

30 March, 2020

Introduction: R.R. Hiltbrand Engineers & Surveyors, on behalf of their client, submitted an environmental assessment carried out by Davison Environmental to the State of Connecticut Department of Energy and Environmental Protection (CT-DEEP). After review by the state's environmental review biologists, the CT-DEEP requested additional surveys and reporting steps before any construction activities begin on site.

I was contacted by Rob Hiltbrand of R.R. Hiltbrand Engineers & Surveyors, to assess the parcel's conservation value for state-listed invertebrates. CT-DEEP's Dawn MacKay's letter on 12 January, 2020, identified five state-listed invertebrates (CT-DEEP 2015) that might be present on site:

- Ground beetle (*Agonum darlingtoni*)
- Ground beetle (*Agonum mutatum*)
- Pitcher plant moth (*Exyra fax*)
- Crimson-ringed whiteface (*Leucorrhinia glacialis*)
- Eastern pearlshell (*Margaritifera margaritifera*)

Initial Site Visit: The site was walked by Rob Hiltbrand and Tanner Matson on 08 February, 2020. We walked the entire parcel, spending most of our time in lowland swamp habitats searching for evidence of sphagnum peat bog. The site visit lasted approximately 60 minutes.

Most of the visit was spent examining vegetation and remnant plants. Special attention was placed on finding evidence of hostplants or specialized habitats of the five state-listed invertebrate species. Specifically, evidence of fen or acidic peat bog communities.

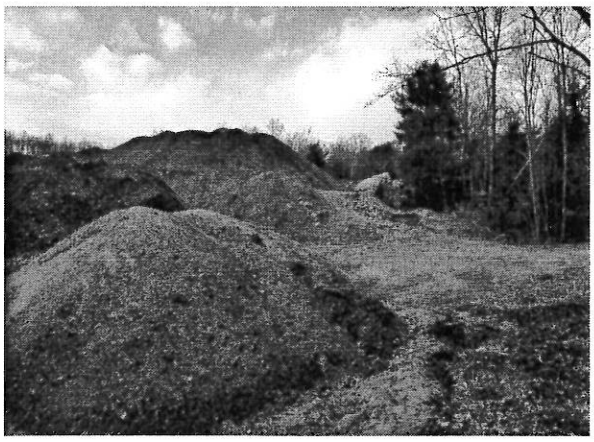


Fig. 1 Left: Historic Burlington gravel, southwest end of property. **Fig. 2** Right: Wildcat Brook running through seepage swamp, east end of property.

Evaluation:

The sandy soils on the property, perhaps of biological interest in times past, are no longer tenable for arenophilic invertebrates. The udorthent dry gravel has been mined for over 50 years, has been continuously disturbed, and large amounts of the sand have been relocated there from winter ice control from previous years (Fig.1).

The east end of the property is seepage swamp with Wildcat Brook (Fig. 2) running through it. This area is unremarkable, dominated by *Acer rubrum*, and home to other mesic plant species, e.g., *Vaccinium corymbosum*, *Pinus strobus*, etc. There is nothing unusual or noteworthy about this habitat.

The proposed solar farm will be constructed at the northern end of the property. The area is currently dry glacial till upland forest reminiscent of typical New England woodland habitats. The forest is young, and earmarks of past mining can be seen across the surface as evidenced by small exploratory berms. To the south and east, the upland forest descends into seepage swamp, the slope between is composed mostly of Hinckley loamy sand.

All plant species listed in the DEEP preliminary assessment and all invertebrates except for the mollusk, Eastern pearlshell (*Margaritifera margaritifera*), are associated with fen or sphagnum peat bog habitat. The Crimson-ringed whiteface (*Leucorrhinia glacialis*) occurs in boreal vegetated ponds, lakes, and marshes—there only three extant populations on CT—the other two, are located far to the west in Litchfield County. The wetlands on site are wholly unsuitable. Dr. William Krinsky was contacted about the two listed ground beetle species and confirmed these taxa are bog habitat specialists.

Two local invertebrate zoologists and Connecticut natural historians, Dr. David Wagner and Michael Thomas, were consulted further about sphagnum peat bogs in the area. The two produced the state's Odonate checklist and have published together on the state's fauna (Wagner and Thomas 1999). Michael Thomas grew up in Burlington, less than two miles from the project site, and is quite familiar with the area. He has extensive knowledge of where local peat bog habitat exists. As far as we can tell, the nearest bog area that would have triggered NDDB species of concern sits nearly two miles away at what was historically called Major Curtiss Swamp, or more contemporarily, the Lamson Corner Bog.

Dr. Wagner and Mike Thomas believe that the carabid beetles and dragonfly records are all anchored to the Lamson Corner Bog. To the best of their knowledge, there are no other suitable wetlands in the areas based on their experience. Dr. Wagner also spent 45 minutes on GoogleEarth in late February, reviewing aerial imagery for the lands surrounding the project site—and concluded that the Lamson Bog site was the only wetland in the region likely to harbor colonies of the state-listed dragonflies.

Perhaps the most ecologically specialized of the state-listed species is Pitcher Plant Moth (*Exyra fax*), the pitcher plant moth (Wagner et al. 2011). This species feeds on pitcher plants and is known from just a few high-quality sphagnum bogs sites. There was no habitat on site that was suitable for this bog-dweller.

Wildcat Brook does not appear to be suitable for the Eastern pearlshell, as it is not suitable habitat for its larval host. Glochidium of this species attach themselves to the gills of salmonids—in Connecticut, most typically freshwater trout. It is of no coincidence that the Farmington River, a short distance away from the site and known for its trout populations, has healthy populations of the Eastern pearlshell. Wildcat Brook will not, as the trout and subsequently the mussel, need seasonally consistent cold water, more rapid flow, and persistence of stream flow through summer drought. During the site visit, this rather large mussel was not observed.

Summary: Given the nonexistence of sphagnum peat bog habitat, and the unremarkable nature of the existing ecosystems, this site does not appear to warrant mitigation. Other factors that also weigh in on the conservation importance of the parcel: the site bears the earmarks of substantial human activity and mining, and the solar farm is set to be built upon the dry upland forest habitat, and as planned, will not affect the hydrology of the swamp and streams below.

References:

CT-DEEP. 2015. Revised. Connecticut's Endangered, Threatened, and Special Concern Species. The Connecticut Endangered Species Act. Chapter 495. General Statutes of Connecticut. Public Act 89-224.

Wagner, D. L. and M. C. Thomas. 1999. The odonate fauna of Connecticut. Bull. Amer. Odonatology. 5:59-85.

Wagner, D. L., D. F. Schweitzer, J. B. Sullivan, and R. C. Reardon. 2011. *Owlet Caterpillars of Eastern North America*. Princeton University Press. Princeton, New Jersey. 576 pp.

APPENDIX E: Box Turtle Protection Plan

Eastern Box Turtle Protection Plan

Eastern Box Turtle, a State Special Concern species afforded protection under the Connecticut Endangered Species Act and listed as a Greatest Conservation Need species in Connecticut's Comprehensive Wildlife Conservation Strategy (CT DEP 2005), is known to occur on the site. The following protective measures are recommended to satisfy requirements from the Connecticut Department of Energy & Environmental Protection ("CTDEEP") Wildlife Division and follow protocols developed from previous rare species consultations and state-approved protection plans. This plan is focused on preventing incidental mortality to eastern box turtle but will also serve to limit mortality to other herpetofauna located within the construction, including hognose snake, should they be present.

Davison Environmental, LLC will serve as the Environmental Monitor for this project to ensure that Eastern Box Turtle protection measures are implemented properly.

The Contractor shall contact Eric Davison at least 5 business days prior to the pre-construction meeting. Mr. Davison can be reached by phone at (860) 803-0938 or via email at eric@davisonenvironmental.com.

The recommended Eastern Box Turtle protection program consists of the following components:

1. Isolation of the project perimeter: *fencing to be installed no later than April 1st, 2021*
2. Targeted searches of the project area prior to construction: *between April 1st and May 31st*
3. Periodic inspection and maintenance of isolation structures: *throughout construction period*
4. Education of all contractors and sub-contractors prior to initiation of work on the site
5. Documentation and reporting: *submitted to CSC and NDDB by December 31, 2021*

1. Isolation Barrier (Erosion and Sedimentation Controls)

a. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals. These products or reinforced silt fence should not be used on the project. Temporary erosion control products, either erosion control blankets, fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (netless) and/or netting composed of planar woven natural biodegradable fiber should be used to avoid/minimize wildlife entanglement.

b. Installation of erosion and sedimentation controls (i.e., silt fencing), required for erosion control compliance and creation of a barrier to migrating/dispersing herpetofauna, should be installed by the Contractor prior to clearing activities or any earthwork, and prior to April 1, 2021. The intention is to install the barrier prior to box turtle emergence from hibernation.

c. The barrier fencing should be installed with minimal ground disturbance and tree clearing, preferably using a single small backhoe or trenching equipment.

d. The fencing will consist of non-reinforced conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven to ten-foot intervals using four-foot oak stakes or approved equivalent. The Contractor is responsible for daily inspections of the fencing for tears or breeches in the fabric and accumulation levels of sediment, particularly following storm events of 0.25 inch or greater. Davison Environmental will provide periodic inspections of the fencing throughout the duration of construction activities, generally on a biweekly frequency or more frequently if site conditions warrant.

e. The barrier fencing should extend into the existing quarry, to create a zone of early-successional habitat between the forest and the barrier fencing to aid in box turtle location and capture.

f. The Environmental Monitor will inspect the work zone following erosion control barrier installation to ensure the barrier is satisfactorily installed.

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

h. The extent of the barrier fencing will be as shown on the site plans. The Contractor should have available additional barrier fencing should field conditions warrant extending the fencing as directed by Davison Environmental.

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

j. All silt fencing shall be removed within 30 days of completion of work and permanent stabilization of site soils.

2. Targeted Searches – Pre-Construction

a. Upon completion of the barrier fence installation, the project limits will be searched for eastern box turtle from April 1st through May 30th. The purpose of this work is to locate and remove all box turtles from within the construction zone. This time period coincides with the period of highest activity and movement for box turtle just prior to the nesting period.

b. All turtles observed will removed from the project area to the identified *Relocation Zone* that is located immediately southwest of the project limits.

c. The time of day, frequency and intensity of the pre-construction searches should be determined by the Environmental Monitor based on weather conditions and success of relocation progression. It is anticipated that searches will be conducted once per week at a minimum, with more intensive and frequent searches conducted during periods of high activity

which would increase the likelihood of captures.

d. The *Relocation Zone* consists of an area of mixed hardwood forest/old field transition zone at the edge of the active quarry. This is the area where all (5) turtles were observed. All existing mining and stockpiling activity within this zone should temporarily cease while relocation is underway.

e. The *Relocation Zone* should also be searched from April 1st through May 30th, to relocate the (5) observed box turtle, along with others that may be present onsite. Should any turtles be observed/relocated in this zone, it would indicate that the subject turtle did not hibernate within the project limits. Any turtles found within the *Relocation Zone* will be documented and left *in situ*.

3. Contractor Education

a. Prior to the start of construction, the Contractor shall attend an educational session at the pre-construction meeting with Davison Environmental. This orientation and educational session will consist of an introductory meeting with Davison Environmental providing photos of herpetofauna that may be encountered during construction activities, including eastern box turtles, emphasizing the non-aggressive nature of these species, the absence of need to destroy wildlife that might be encountered and the need to follow the prescribed protection measures.

b. The Contractor will be provided with cell phone and email contacts for Davison Environmental to immediately report encounters with any turtles or other herpetofauna. Educational poster materials will be provided by Davison Environmental and displayed on the job site to maintain worker awareness as the project progresses.

4. Turtle Protective Measures – During Construction

a. Prior to the start of construction each day, the Contractor shall search the entire work area for turtles. The Environmental Monitor will also conduct periodic inspections of the work area depending upon weather conditions, observed turtle activity, or other factors.

b. If a turtle is found, it shall be immediately moved by carefully grasped in both hands, one on each side of the shell, between the turtle's forelimbs and the hind limbs, and placed just outside of the isolation barrier closest to where it was encountered. The Environmental Monitor should be notified of any observed eastern box turtle.

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

5. Reporting

a. Following completion of the construction project, Davison Environmental will provide a summary report to the Connecticut Siting Council and CTDEEP documenting the monitoring and maintenance of the barrier fence and erosion control measures.

b. Any observations of eastern box turtle or other state listed species will be reported to CTDEEP by Davison Environmental with photo-documentation (if possible) and with specific information on the location and disposition of the animal.

APPENDIX H: Whip-poor-will Survey Report

Brawley Consulting Group, LLC

Land Conservation and Management Services

June 30, 2020

Mr. Rob Hiltbrand
R.R. Hiltbrand Engineers & Surveyors
575 North Main Street
Bristol, Connecticut 06010

Subject: Whip-poor-will surveys, Burlington, CT

Dear Mr. Hiltbrand,

Per your request I have surveyed the property located on Prospect Street in Burlington for the presence of whip-poor-will (*Caprimulgus vociferous*), a nocturnal State-listed bird species typically associated with open woodland habitats. The project site contains an active gravel pit/operation and also approximately 20 acres of undeveloped, relatively mature oak/hemlock dominated woodland.

To determine whether whip-poor-will are breeding on the site, I established three survey points within the woodland area that were between 150-175 meters apart (See Fig. 1.). The survey methods and timing were based on recommendations from Shannon Kearney at the Connecticut DEEP Wildlife Division. The surveys were conducted on June 8, June 13 and June 17, 2020 between the hours of 10:00 and 1:00 PM). The optimal dates for the surveys were obtained from the *Nightjar Survey Network* website http://www.nightjars.org/.

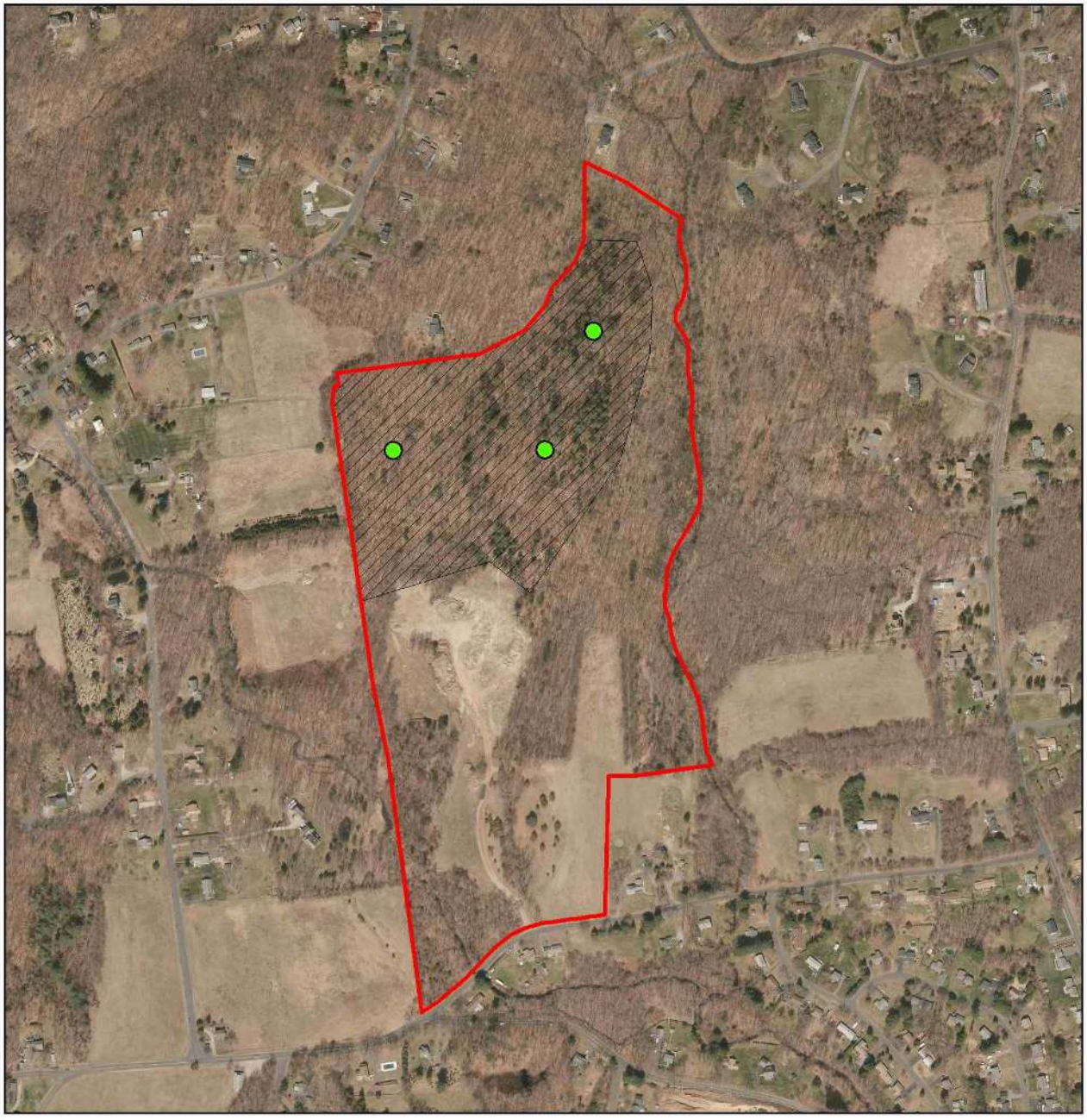
Ideal survey conditions for whip-poor-will are when the moon is at least half illuminated and above the horizon (and not obscured by clouds) and there is minimal wind. A six-minute survey was conducted at all three points consisting of 3 minutes of silent listening, followed by a callback, followed by 3 minutes of silent listening. The weather during each visit was ideal.

Whip-poor-will was not recorded on the site during any of the three visits. I suspect the on-going gravel operation and extensive ATV use throughout the woodlands may create suboptimal breeding habitat for this ground-nesting species.

Please feel free to contact me to discuss the surveys and results if you have any questions. My qualifications are attached.

Sincerely,

A. Hunter Brawley,
Brawley Consulting Group, LLC
Windsor, CT



Survey Point Locations

Solar One Project
Prospect Street
Burlington, CT

NOTES:
(1) This map contains no authoritative data and is intended for planning purposes only; (2) Basemap data sources include USGS topographic (USA TOPO) maps & 2016 CT DEEP Orthophotography; (3) parcel shapes are approximate.

Legend

- Solar One Burlington
- Approx. Project Area
- Survey Points

SCALE

N

0 50 100 200 Meters

Map Prepared By:
Brawley Consulting Group, LLC
95 Pilgrim Drive
Windsor, CT 06095
www.brawleycg.com

A. Hunter Brawley
95 Pilgrim Drive, Windsor, CT 06095
Cell: 203-525-5991
hbrawley@gmail.com
www.brawleycg.com

PROFESSIONAL EXPERIENCE

Owner/Manager, Brawley Consulting Group, LLC, Windsor, CT
(January 2008 to present).
Provides land conservation and management services to land trusts and other conservation organizations, including design and implementation of habitat restoration projects, bird and wildlife surveys, grant writing, trail design and construction, monitoring conservation easements and fee properties, boundary posting and preparation of Baseline Documentation Reports and Property Management Plans. www.brawleycg.com

Land Manager, Naromi Land Trust, Sherman, CT
(March 2004 to September 2016).
Manage all land trust properties and help acquire, monitor and enforce conservation easements. Responsibilities also include designing and building trails, securing funding for habitat restoration projects, and assisting with organizational and administrative tasks. Work cooperatively with the town and other conservation organizations to identify and prioritize lands for future acquisition. www.naromi.org

Land Manager, Kent Land Trust, Kent, CT
(September 2008 to August 2014).
Manage all land trust properties and help acquire, monitor and enforce conservation easements. Responsibilities also include securing funding for habitat restoration projects and preparing baseline documentation reports (BDRs) and property management plans. Addressed backlog of stewardship items required for Kent Land Trust to become the second land trust in Connecticut accredited by the Land Trust Alliance.

Project Manager, Northeast Instream Habitat Program, Amherst MA.
(January 2004 to March 2005).
Coordinated all facets of two fisheries habitat assessment projects working with researcher at the University of Massachusetts, including project planning, data collection, hiring and overseeing seasonal staff, data analysis and report preparation.

Executive Director, Pomperaug River Watershed Coalition, Southbury, CT
(July 2001 to May 2003).
Managed all activities of non-profit watershed management organization dedicated to conserving regional water resources, including research, outreach, budgets, grant writing, website development, fundraising, and volunteer relations. www.pomperaug.org

Senior Project Manager, LabLite LLC, New Milford, CT
(January 2000 to June 2001).
Product development, testing, sales, and customer service for a software company that provides Laboratory Information Management Software (LIMS) to environmental and other laboratories. www.lablite.com

Research Coordinator, The National Audubon Society, Southbury, CT
(March 1998 to January 2000).
Designed and implemented all research on birds and other wildlife at the 625-acre wildlife sanctuary. Conducted natural resources inventory, created checklists of wildlife and plants, established environmental education programs, and coordinated cooperative research projects with state agencies and regional conservation organizations. http://ct.audubon.org/IBA_BOR.html

Environmental Analyst, Land-Tech Consultants, Inc., Southbury, CT
(November 1996 to February1998).
As Project Manager conducted environmental impact statements, wetland assessments, and wildlife surveys; prepared federal, state and local permit applications; designed pond and tidal wetland restoration projects; and conducted lake diagnostic studies. Worked with state agencies and local land use agencies to mitigate impacts of residential and commercial development projects. www.landtechconsult.com

Wetland Ecologist, The Deep River Land Trust, Deep River, CT.
(July to October 1995).
Worked in association with The Nature Conservancy Connecticut Chapter on a conservation project at two freshwater tidal marshes in the lower Connecticut River. Project entailed mapping dominant vegetation communities, identifying potential environmental impacts, researching information on appropriate buffer zones and recommending methods for long-term monitoring of the system.

Research Assistant, The Nature Conservancy CT Chapter, Weston, CT.
(May to July 1995).
Assisted with research on the productivity and survivorship of Worm-eating Warblers at the 1700-acre Devil's Den Preserve in Weston, CT. Responsibilities included mist-netting, bird banding, and locating and monitoring approximately 25 nest sites throughout the breeding season.

Master's Thesis Research, Connecticut College, New London, CT.
(September 1993 to May 1995).
Conducted two-year study investigating relationships between bird populations and environmental conditions in tidal wetlands of Connecticut. Quantified bird use, vegetation, and selected environmental parameters in eight tidal marsh systems on the Long Island Sound to assess the use of birds as indicators of environmental quality.

Research Associate, Connecticut College Arboretum, New London, CT.
(Sept. 1992 to January 1994).
Conducted a natural resources inventory of The Harriet C. Moore Foundation property in Westerly, RI., including producing lists of all plants and animals (flora and fauna), conducting a breeding bird census, and identifying and tagging over 100 ornamental trees. Developed a five-year plan for the management and use of this 35-acre public land preserve.

Principal Investigator, The Nature Conservancy CT Chapter, Middletown, CT
(summer 1994).
Studied five marshes in the tidelands of the lower Connecticut River to assess the impacts of the spread of common reed (*Phragmites australis*) on bird populations. Designed project that included the systematic collection of data on bird use, vegetation sampling and an analysis of physical site characteristics.

EDUCATION

Connecticut College, New London, CT. Master of Arts in Botany, 1995.
Connecticut College, New London, CT. Bachelor of Arts in American History, 1982.
The Loomis Chaffee School, Windsor, CT. Graduated 1978.

PUBLICATIONS

Brawley, A. H., Zitter, R. and L. Marsicano, Editors. 2005. Candlewood Lake Buffer Guidelines. Candlewood Lake News *Special Edition*, Vol 1:21.

Warren, R.S., P. E. Fell, R. Rozsa, A. H. Brawley, A. C. Orsted, E. T. Olson, V. Swamy and W. A. Niering. 2002. Salt Marsh Restoration in Connecticut: 20 years of Science and Management. *Restoration Ecology* 10 (3) 497-513.

Markow, J. and H. Brawley. 2001. Herpetofaunal and Avifaunal Surveys of Vaughn's Neck Peninsula, Candlewood Lake, Connecticut. Report to the Town of New Fairfield, CT. 32 p.

Brawley, A. H. 1998. A Vegetation Survey and Conservation Analysis of Vaughn's Neck Peninsula. Report to The Candlewood Lake Authority. The National Audubon Society. 11 p.

Brawley, A. H., R. S. Warren and R. A. Askins. 1998. Bird Use of Restoration and Reference Marshes Within the Barn Island Wildlife Management Area, Stonington, Connecticut, USA. *Environmental Management* 22(4): 625-633.

Marsicano, L. J. and A. H. Brawley. 1997. Land Use, Watersheds, and Aquatic Resources. *Connecticut Woodlands* 62(3): p. 21.

Niering, W. A., and A. H. Brawley. 1996. Functions and Values Assessment of Area A Downstream Wetlands and Watercourses. Naval Submarine Base New London, Groton, CT. Report to Brown & Root Environmental, The Environmental Protection Agency, and The United States Navy. 36 p.

Brawley, A.H. 1995. Pratt and Post Coves: A Vegetation Survey and Conservation Analysis. Report to the Deep River Land Trust, Deep River, CT. 62 p.

Brawley, A.H. 1995. Birds of Connecticut's Tidal Wetlands: Relating Patterns of Use to Environmental Conditions. Master's Thesis, Connecticut College, New London, CT. 87 p.

Brawley, A.H. 1994. Birds of the Connecticut River Estuary: Relating Patterns of Use to Environmental Conditions. Report to the Nature Conservancy Connecticut Chapter Conservation Biology Research Program, Middletown, CT. 23 p.

Brawley, A.H., G.D. Dreyer. 1994. Master Plan for the Future Management and Use of Moore Woods. Connecticut College Arboretum Publication. New London, CT. 65 p.

Brawley, A.H., G.D. Dreyer and W.A. Niering. 1993. Connecticut College Arboretum Phase One Report to the Harriet Chappell Moore Foundation. Connecticut College Arboretum Publication. New London, CT. 100 p.

ACTIVITIES

Forest and Trails Conservation Committee, Connecticut Forest & Park Association (CFPA)
Coverts Project Cooperator, UConn Cooperative Extension System