WETLANDS & HABITATS REPORT

SOLAR GENERATION FACILITY

Litchfield & Torrington, Connecticut

January 31, 2021

REMA

TABLE OF CONTENTS

ATTACHMENTS

(Following Page 48)

Attachment A: Figures (1 to 3)

Attachment B: Annotated Photographs of Vegetative Cover Types/Zones

Attachment C: Soil Investigations/Mapping

Attachment D: Table 1: Vernal Pool Surveys; Figures 4 to 8; Annotated Photographs

Attachment E: Avian Breeding Surveys; Annotated Photographs

Attachment F: DEEP NDDB Letter: May 29th, 2017

Attachment G: Connecticut Towns with confirmed Northern Long-eared bat hibernacula

1.0 INTRODUCTION

This *Wetlands and Habitats Report* describes inventory of natural habitats and the in-field delineations and characterization of regulatory wetlands and watercourses by Rema Ecological Services, LLC (REMA) on the proposed 19.8 MW (AC) Solar Photovoltaic Power Generation Facility site (the site, the study area) during the 2016 through 2020 growing seasons.

Specifically, six REMA staff with expertise in soils, ecology, botany, and wildlife visited the subject site starting on December 28, 2016. The last site visit, for the purpose of baseline ecological inventories covered in this document, was conducted on June 19, 2020. In all, REMA staff visited the site on 35 different days since late 2016, logging nearly 200 hours in the field.

2.0 STUDY AREA SETTING & OVERVIEW

The study area encompasses roughly 212 acres of land in Litchfield and Torrington, Connecticut. Of this acreage, roughly 80 acres would be developed to accommodate the solar power facility. The site, which consists of six interconnected parcels, is located to the east of Rossi and Wilson Roads, both north and south of Litchfield Town Farm Road and west of Rossi and Wilson Roads, and to south of Highland Avenue. The Wimbledon Gate North residential subdivision abuts the northeast portion of the site (see Figure 1, Attachment A). An Eversource electric transmission right-of-way (ROW) crosses through the site's northeastern section.

In its present condition the site is characterized by grassy fields (i.e., active hayfields), deciduous and mixed deciduous-evergreen second-growth forestland, and ruderal woods and scrub shrub thickets and tangles. The site contains one major riparian corridor associated with Gulf stream, as well as those of two unnamed perennial tributaries. Most of the identified and delineated wetlands are associated with these stream corridors and are forested. However, wet meadows, scrub shrub wetlands, and isolated wetlands are also present, including two small excavated farm ponds (see Figure 2, Attachment A).

3.0 PAST LAND USES

The site's existing open fields have been in agriculture since at least the turn of the 19th century, based on archival aerial photography. In fact, these fields were in hay production through the 2020 growing season. Most of the site appears open in the 1934 aerials, and only few areas were wooded at that time, including the site's higher elevation southeastern portion. Agricultural activities over the years included pasturing, hay production, silviculture (i.e., logging), and arboriculture (i.e., fruit trees).

In the 1950s some marginal hay production areas were abandoned, and that trend continued through the early 2000s, giving rise to wet or moist scrub shrub areas and meadows. Also, in the 1950s five "farm ponds" were developed through excavation or stream damming. Two were "in-stream" ponds associated with Gulf Brook and one of its perennial tributaries. The earthen embankments of these ponds have since been breached. Two small isolated ponds were excavated, one in the far northwestern section of the site, straddling the property boundary, another in a wet area in the southeastern section, within the electric ROW. Both ponds remain today and are serving as vernal pool habitats (see Section 6.0). One more, roughly half acre agricultural pond, was developed in a wetland area in the northern section of the site, along a westerly flowing intermittent watercourse. This pond has reverted to a marsh.

Also, in the late 1940s and into the early 1960s a roughly three acre area at the far southwestern section of the site, adjacent and to the west of Rossi Road, and up against Gulf Stream, was quarried for sand and gravel.

By the 1970s and through the early 2000s, more hayfields had been abandoned, and the ones that remained in production are the same hayfields that were in production as of 2020. The fields that were abandoned in the 1960s and early 1970s have reverted to young second-growth forest; some of it still in the pole size class.[1]

The review of the archival photographs also revealed that the northern segment of Gulf Stream within the site, northerly of the prominent steep sided ravine through which it flows just east of Rossi Road, was ditched and "straightened."

[1] Pole size class is a forestry term reflecting trees of 4 inches to 10 inches diameter at breast height that would not be considered not large enough for use as sawtimber, and can reflect a stand whose trees average this size.

4.0 SURFACE WATER RESOURCES & WETLANDS

4.1 Introduction

The study area's wetlands and surface waters (shown in Figure 2, Attachment A) were first characterized by examining federal and state wetlands maps and by conducting detailed site investigations of vegetation, soils, and hydrology to demarcate regulated (i.e., State), and jurisdictional (i.e., Federal) wetland boundaries. Attachment B provides representative annotated photographs of each of these regulated resource areas. This section briefly describes the overall wetland and surface water resources (i.e., streams and open water habitats) associated with the study area.

All of the wetlands and surface waters within the study area were field-delineated in accordance with both state and federal statutes and criteria by a professional wetland/soil scientist.[2] State regulated wetlands were delineated in accordance with the Inland Wetlands and Watercourses Act (Connecticut General Statutes §22a-38). Federal jurisdictional wetlands were delineated pursuant to the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual (1987): Northcentral and Northeast Region, Version 2.0 (2012)*.

4.2 Wetlands & Watercourses: Overview

Wetlands and stream flow patterns are influenced by the underlying bedrock and topography as well as that of the till deposits[3] that characterize the majority of the site. With the exception of the far northeastern corner of the site, which is underlain by the Ratlum Mountain Schist (i.e., a gray, medium-grained schist and granofels), the great majority is underlain by one bedrock type, the Rowe Schist and Amphibolite unit in the Rowe Schist formation, a light-gray to silvery, fine- to medium-grained schist. An example of this bedrock type can be seen exposed in southern section of the site to the east of the ravine that carries Gulf Stream.

Gulf Stream enters the Torrington portion of the site at its north-central boundary at an approximate elevation of 1,118 feet, where it is associated with post-agricultural young forested and scrub shrub wetlands, and is fed by seasonal hillside seepage wetlands (i.e.,

[2] i.e., George T. Logan, MS, PWS, CSE.
[3] Till deposits include both thick (i.e., > 10') and thin till, both lodgment till (i.e., with a "hardpan"), and ablation or meltout till.

5H- and 6H-series wetland[4]), and an intermittent stream flowing out of a roughly half acre pond agricultural pond, turned cattail marsh (i.e., 3C- and 4C-series). This intermittent stream corridor originates just over the western site boundary, at the adjacent residential subdivision. Approximately 540 feet after entering the site, Gulf Stream crosses over an unimproved agricultural road, which provides access from Rossi Road to the fields up the hill and to the east.

Flowing southerly from this farm road, the stream enters a roughly 600 linear foot segment which had been ditched in the past. The wetlands here are predominately scrub shrub and young forest (i.e., 1C- and 2C-series). At the southern end of this stream segment, and just southerly of the Torrington-Litchfield municipal boundary, Gulf stream is joined by an intermittent watercourse, which flows from the west under Rossi Road. A small agricultural pond once existed at the confluence of the two streams. However, its low embankment was breached many decades ago and the pond area has been filled with the stream's sediment load.

At this point Gulf Stream enters a mostly undisturbed, densely wooded, steep-sided ravine, which carries the stream approximately 1,000 feet to a large culvert under Wilson Road in Litchfield (i.e., C- and 5C-series). The ravine presents its own cold micro-climate during the growing season, and is shaded by many evergreen trees (e.g., eastern hemlock). Two forested hillside seep wetlands provide flows to the stream corridor from the east (i.e., 5-C series). Further up the slope, roughly 270 feet from these two seepage wetlands, another seepage wetland (i.e., AA-series) discharges down the hillside via short segment of intermittent stream, and then via sheet flow, towards the aforementioned seepage wetlands and Gulf Stream.

At the culvert under Wilson Road Gulf Stream has a watershed of approximately 325 acres, according to USGS StreamStats. From here it runs over 2,000 linear feet to the southernmost boundary of the site, where its watershed approaches 1,120 acres (USGS StreamStats). The stream exits the site at an approximate elevation of 955 feet. This segment is also characterized by an incised ravine (i.e., 1B- and 2B-series), but it is not as dramatic as the previous segment. At its far southern reach within the site, Gulf

[4] The site's wetlands will also be identified by the specific series of wetland boundary markers or survey flags with which they were delineated.

Stream is fed by a forested, hillside seasonal seepage wetland that rises easterly to the edge of Wilson Road (i.e., 4B-series).

Within this segment Gulf Stream is joined, first from the west, by an unnamed perennial tributary (i.e., B- and 1B-series) and, second, by a short section of an additional unnamed perennial tributary stream (i.e., 3B-, 4B-series). The first unnamed perennial stream enters the site under Litchfield Town Farm Road, coursing almost 1,700 linear feet to its confluence with Gulf Stream. A small intermittent stream associated with a seepage wetland (i.e., 1B-series), with scrub shrub, young forested, and emergent (i.e., wet meadow) cover types, flows into the perennial stream from the east. At the confluence of these two streams a farm pond had been developed partially by damming the perennial stream. However, the earthen embankment was breached many decades ago and pond area was filled with the sediment load carried by the two streams.

As mentioned above, an intermittent stream flows through a culvert under Rossi Road in Torrington to join Gulf Stream in Litchfield just prior to the scenic, steep-sided ravine. The intermittent stream originates off-site to the north of the site's hayfield located north of Litchfield Town Farm Road and west of Rossi Road. Within the site it is associated with a wetland corridor with young forested, scrub shrub, and emergent cover types (i.e., A-series[5]). The later cover type (a.k.a. wet meadow) occurs within the agricultural hayfield, where another two wet meadow isolated wetlands occur just upgradient and to the west (i.e., 1A-, 2A-series).

Other delineated wetlands, not associated directly with Gulf Stream, include a forested wetland that occurs at the far northern portion of the site, adjacent to Highland Avenue (i.e., N-, 1N- 2N-, 3N-series). This wetland drains through an agricultural ditched wetland, with an emergent cover type, in a southeasterly direction reaching the eastern property boundary.

Several isolated wetlands were delineated throughout the site, such as several man-made wetlands associated with an old sand and gravel operation within the southernmost section of the site, west of Russel Road and east of the Gulf Stream riparian corridor (i.e., H-series). Also, several relatively small forested wetlands occur immediately to the east of Wilson Road within the site's southern portion, and at the toe of a moderately to

[5] We note that only the western side of this wetland was delineated. The eastern side runs along the edge of Rossi Road.

steeply sloping hillside (i.e., V, W, and H-series). Finally, two delineated wetlands are associated with old farm ponds, both of which have been identified as vernal pool habitats (see Section 6.0). The first one (i.e., F-series) is located just north of the hayfield within northwestern section of the site, in Torrington. The second one (i.e., E-series) can be found in the eastern section of the site, also in Torrington, under the Eversource ROW. This wetland, drains via an intermittent watercourse downhill in a northeasterly direction, into the adjacent residential subdivision.

A qualitative benthic macroinvertebrate survey of the site's perennial streams was conducted. We documented the presence of wild brook trout (*Salvelinus fontinalis*) and numerous blacknose dace (*Rhinichthys atratulus*) within Gulf Stream. Also cover searching in riffle habitats of all the perennial streams revealed the presence of a moderately diverse population of benthic macroinvertebrates, including the EPT taxa (i.e., Ephenoptera, Plecoptera, Trichoptera), indicating very good water quality consistent with the streams' Class A surface water classification. The observations of finfish and benthic organisms are consistent with those published by DEEP Fisheries with a sampling station immediately downgradient of the box culvert carrying Gulf Stream under Wilson Road in Litchfield.

During our cover surveys of the site's three perennial streams, we also observed two stream and wetland seep amphibians at moderate abundance, especially along the main stem of Gulf stream. These were the two-lined salamander (*Eurycea bislineata*), and the northern dusky salamander (*Desmognathus fuscus*).

4.3 Soils & Surficial Geology

As part of the site investigations, REMA classified the soil types at the site, including both upland and wetland types. All of the soil types, with a few notable exceptions, are derived from glacial till deposits (i.e., unstratified sand, silt & rock). Most all of the upland soil types are derived from lodgment till, and have dense, firm restrictive layer, or hardpan.

The wetland soil types were identified during the wetland and watercourse delineations. These were found to belong to three soils series: Ridgebury, Leicester, and Whitman. While several wetlands had either the poorly drained Ridgebury or Leicester soils, in several wetlands the three series were found in complex (i.e., Soil Mapping Unit No. 3),

including the very poorly drained Whitman soil series. In a few places along Gulf Stream, there were delineated riparian wetlands with soils derived from alluvial deposits (i.e., stratified sand and silt). In these areas the soils are mapped as Fluvaquents (109). Finally, there are a few wetland areas that due to past disturbance or based on their man-made origin were mapped as Aquents (308w).

Following are brief descriptions of the identified wetland soil types:

Ridgebury fine sandy loam (3). This soil series consists of deep, poorly and somewhat poorly drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till on uplands. They are nearly level to moderately steep soils on till plains, low ridges and drumloidal landforms. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically, these soils have a black sandy loam surface layer 6 inches thick. The mottled subsoil from 6 to 16 inches is olive gray sandy loam. The mottled substratum from 16 to 60 inches is a light olive brown and olive, very firm and brittle gravelly sandy loam.

Leicester fine sandy loam (3). This series, which is some Connecticut counties is found only in complex with the Ridgebury and Whitman series, consists of deep, poorly drained loamy soils formed in friable glacial till on uplands. They are nearly level to gently sloping soils in drainage ways and low lying positions on till covered uplands. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically, these soils have a surface layer of black fine sandy loam 6 inches thick. The subsoil from 6 to 23 inches is grayish brown, mottled fine sandy loam. The substratum from 26 to 60 inches or more is dark yellowish brown, mottled, friable, gravelly fine sandy loam.

Whitman fine sandy loam (3). This series, which is some Connecticut counties is only mapped in complex with the Ridgebury and Leicester series, consists of deep, very poorly drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till on uplands. They are nearly level and gently sloping soils on till plains, low ridges and drumloidal landforms. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically, these soils have a black fine sandy loam surface layer 8 inches thick. The mottled subsoil from 8 to 15 inches is gray sandy loam. The mottled substratum from 15 to 60 inches is firm, olive gray to gray dense glacial till.

Fluvaquents (109). This soil map unit consists of relatively recently formed, moderately well drained and well drained, floodplain soils. Fluvaquents are typically found in disturbed landscapes on floodplains where two or more feet of the original soil surface has been filled over or excavated. Most areas of Fluvaquents flood each year for short periods, mainly in the spring. The Fluvaquents soil mapping unit is a miscellaneous unit which includes a large variety of soil materials. Common locations of Fluvaquents include disturbed areas for

community development and sand and gravel operations situated in the floodplains of rivers and major streams.

Aquents (308w). This soil map unit consists of poorly drained and very poorly drained, disturbed land areas. They are most often found on landscapes which have been subject to prior filling and/or excavation activities. In general, this soil map unit occurs where two or more feet of the original soil surface has been filled over, graded or excavated. The *Aquents* are characterized by a seasonal to prolonged high ground water table and either support or are capable of supporting wetland vegetation. *Aquents* are recently formed soils which have an aquic moisture regime. An aquic moisture regime is associated with a reducing soil environment that is virtually free of dissolved oxygen because the soil is saturated by groundwater or by water of the capillary fringe. The key feature is the presence of a ground water table at or very near to the soil surface for a period of fourteen days or longer during the growing season.

The upland type soils were identified through a high-intensity soil survey (i.e., HISS) conducted by REMA associate Bill Jackson, Registered Soil Scientist, in May 2020. This survey was concentrated within the areas of the proposed solar arrays. Additional soil types outside the footprint of the proposed solar arrays were checked to verify if they matched the published soil survey maps of Connecticut (see Attachment C). In general, we found that there were more moderately well drained Woodbridge soils within the areas of survey than indicated on the CT Soil Survey maps. Several representative soil profiles were described within the HISS areas and included with a memorandum in Attachment C[6].

Following are brief descriptions of the identified upland soil types:

Charlton very stony fine sandy loam (73). This series consists of very deep, well drained coarse-loamy soils formed in friable, glacial till on uplands. They are nearly level to very steep soils on till plains and hills. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. In tilled areas, these soils have a surface layer of dark brown fine sandy loam 8 inches thick. The subsoil from 8 to 26 inches is yellowish brown fine sandy loam and sandy loam. The substratum from 26 to 60 inches or more is grayish brown gravelly fine sandy loam.

Chatfield loam (73). This series consists of moderately deep, well drained, and somewhat excessively drained soils formed in till. They are nearly level to very steep soils on glaciated plains, hills, and ridges. Slope ranges from 0 to 70 percent. Crystalline bedrock is at depths

[6] The approximate locations of the representative soil profiles can be provided upon request.

of 20 to 40 inches. Permeability is moderate or moderately rapid. In tilled areas, these soils have a surface layer that is very dark to dark grayish brown loam up to 8 inches thick. The subsoil from 8 to 26 inches is brown, flaggy silt loam.

Canton stony fine sandy loam (62). This series consists of deep, well drained soils formed in a coarse-loamy mantle underlain by sandy glacial till on uplands. They are nearly level to very steep soils on till plains and hills. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically, these soils have a surface layer of very dark grayish brown fine sandy loam 2 inches thick. The subsoil from 2 to 23 inches is yellowish brown fine sandy loam, gravelly fine sandy loam and gravelly sandy loam. The substratum from 23 to 60 inches is pale brown gravelly loamy sand.

Montauk loam (84). This series consists of very deep, well drained soils formed in till derived primarily from granitic materials. These soils are on upland till plains and moraines. Slope ranges from 0 to 35 percent. Saturated hydraulic conductivity is moderately high or high in the solum and low to moderately high in the substratum. Mean annual temperature is about 49 degrees F, and mean annual precipitation is about 45 inches. Thickness of the solum and depth to the firm till substratum typically ranges from 20 to 38 inches but the range currently includes 18 to 38. Rock fragments range from 3 to 35 percent in the solum and 5 to 50 percent in the C horizon. The soil ranges from extremely acid to moderately acid throughout.

Paxton fine sandy loam (84). This series consists of deep, well drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till on uplands. They are nearly level to very steep soils on till plains, low ridges and drumloidal landforms. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. In tilled areas, these soils have a dark brown fine sandy loam surface layer 8 inches thick. The subsoil from 8 to 26 inches is dark yellowish brown and olive brown fine sandy loam. The substratum from 26 to 60 inches is olive, very firm and brittle gravelly fine sandy loam.

Woodbridge fine sandy loam (45). This series consists of deep, moderately well drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till on uplands. They are nearly level to moderately steep soils on till plains, low ridges and drumloidal landforms. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. In tilled areas, these soils typically have a very dark grayish brown fine sandy loam surface layer 7 inches thick. The subsoil from 7 to 30 inches is dark yellowish brown and light olive brown fine sandy loam, mottled below 18 inches. The substratum from 30 to 60 inches is light olive brown, very firm and brittle gravelly fine sandy loam.

Udorthents (308). This soil mapping unit consists of well drained to moderately well drained soils that have been altered by cutting, filling, or grading. The areas either have had two feet or more of the upper part of the original soil removed or have more than two feet of fill material on top of the original soil. *Udorthents* or Made Land soils can be found on any

soil parent material but are typically fluvial on glacial till plains and outwash plains and stream terraces.

5.0 ECOLOGICAL COMMUNITIES

5.1 Regional Context

The site is located within the *Northwest Uplands Ecoregion* of the *Northern Uplands – Transitional Hardwoods Zone* (Dowhan and Craig 1976).[7] An ecoregion is:

> *"An area characterized by a distinctive pattern of landscapes and regional climate as expressed by the vegetation composition and pattern and the presence or absence of certain indicator species and species groups."*

This interior ecoregion has minimal coastal influence. Bedrock is primarily metamorphic, complexly folded into north-trending belts, and soils are developed on glacial till in the uplands, and on local glaciofluvial deposits (i.e., stratified drift). Elevations are over 1,000 feet above mean sea level (amsl). Eastern hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*) are important evergreen forest constituents, and forests also include many oaks (*Quercus* sp.) and hickories (*Carya* sp.). Mesic sites are dominated by sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), and yellow birch (*Betula lutea*).

5.2 Vegetative Cover Types

Plant communities can be classified into *cover types* at any particular site, by considering plant species composition and site characteristics on a scale large enough to integrate minor differences. Whitlock et al. (1994) define a *cover type* as follows:

> *"A portion of a wetland or upland system that contains a uniform plant community composition and structure or that is influenced by one hydrologic regime. A distinct change in either hydrologic or vegetation characteristics indicates a change in cover types*." (Emphasis added.)

[7] Dowhan, J.J. and R.J. Craig. 1976. Rare and endangered species of Connecticut and their habitats. Natural Resources Center, Dept. of Environmental Protection, 137 p.

The cover type approach of ecosystem classification is well-suited to use as a rapid method of *habitat* survey. This method assumes that *vegetation structure* is a key factor influencing the type of fauna that a vegetation community is able to support. The vegetative *cover types* associated with the study area are described below.

Both upland and wetland cover types were encountered within the study area. REMA scientists have sampled and documented the soil types within the various cover types, as described in a previous section of the report (i.e., Section 4.0).

The attachments to this report include several figures (Attachment A), and representative photographs of the study area and its vegetative cover types (Attachment B). While wildlife utilization was recorded during each of 35 site visits, an exhaustive inventory was not undertaken, with the exception of avian inventories conducted in June of 2017 and July of 2019, in search of listed (i.e., endangered, threatened, and special concern) avians, that had been recorded in the vicinity of the site in years past (see Section 7.3). Additionally, breeding amphibian inventories were conducted at two documented vernal pool habitats (see Section 6.0).

Although natural resource observations were recorded throughout REMA fieldwork, a targeted survey during which the majority of the site was inventoried was conducted on October 7th, and 9th, 2017, with the exception of the far northern portion, which were added to overall site at a later date. These were inventoried during the wetland delineation efforts of those portions of the site.

However, a targeted search for a listed plant, namely the pale green bog-orchid, *Platanthera flava* var. *herbiola* was undertaken in favorable habitats in June and July of 2017. This is further discussed in Section 7.0 of this report. The cover type descriptions below note each area that was carefully searched because habitat was suitable for the target species, due to moist to wet soil, partial canopy cover, and a likely history of minimal disturbance.

It should be noted that detailed vegetative inventories of the fields were not undertaken, since they have been in hay production for many decades. However, plant communities along field edges and hedgerows were characterized while searching for *Platanthera flava*. Brief descriptions of the wet meadow communities that are part of the extensive fields will also be given below.

5.2.1 Cover Type Descriptions

Upland and wetland cover type descriptions per our October 2017 survey include vegetation structure, plant species composition, soil properties, and other habitat features such as rock outcrops or woody debris. Each cover type is depicted by representative annotated photos (see Attachment B). The locations of the cover type units or "zones" are shown in Figure 3 (see Attachment A). Secondary-source information reviewed included summer aerial photographs, which allowed cover type boundaries on the map to be more accurately drawn.

It should be noted that some of the cover type "zones" described below include both wetland and upland cover types. To the extent possible the wetland sub-cover types have been described in somewhat more detail. Each wetland has also been given a unique identification number (e.g., C/5C-series), which is based on the wetland boundary marker (or survey flag) series by which they were delineated in the field. These can be seen on the attached annotated 2018 aerial photograph (see Figure 2, Attachment A).

Area South of Town Farm Road and West of Wilson Road

Zone 1: The upper most portion of this forest is a sugar maple (*Acer saccharum*) - white ash (*Fraxinus americana*) - basswood (*Tilia americana*) forest. Pignut hickory (*Carya glabra*) and some shagbark hickory (*C. ovata*) are common as understory trees. Witch-hazel (*Hamamelis virginiana*) is the most common tall shrub, but other than an occasional barberry (*Berberis thunbergii*), there is almost no low shrub layer. Herbs include lady fern (*Athyrium angustum*), Christmas fern (*Polystichum acrostichoides*), sensitive fern (*Onoclea sensibilis*), and poison ivy (*Toxicodendron radicans*) (see Photo 1A, Attachment B).

A large hayfield to the south of Litchfield Town Farm Road borders the forest in Zone 1; the road has a well-developed hedgerow on the south side, with the same tree species that occur in Zone 1, e.g., mature sugar maple, shagbark hickory, and ash. Spicebush (*Lindera benzoin*), river grape (*Vitis riparia*), oriental bittersweet, and Morrow's honeysuckle (*Lonicera morrowii*) are present as well. Herbs in the hedgerow are species of moist, fertile soils, such as jewelweed, stinging nettle (*Urtica dioica*), hog peanut (*Amphicarpa bracteata*), wild geranium (*Geranium maculatum*), lady fern (*Athyrium*

felix-femina), enchanter's nightshade (*Circaea canadensisis*), and garlic mustard (*Alliaria petiolata*).

This hedgerow was searched carefully for the pale green orchid, *Platanthera flava* var. *herbiola* in view of the suitable habitat, with moist to wet fertile soil, partial shade and probably a long history of minimal disturbance. However, the moisture regimes within the adjacent fields to the north and to the south are too dry for this orchid species, based on the plant communities described below; they were not systematically searched.

Upland moist meadow communities occupy the adjacent fields. To the south of the hedgerow, the field includes wild strawberry (*Fragaria virginiana*), summer daisies (*Erigeron* spp.), Deptford pink (*Dianthus armeria)*, cow vetch (*Vicia cracca*), rough goldenrod (*Solidago rugosa*), madder (*Galium mollugo*), poison ivy (*Toxicodendron radicans*), little yellow rattle (*Rhinanthus minor*), and common nipplewort (*Lapsana communis*).

Upland plant species also grow in the field just to the north of Litchfield Town Farm Road, such as common cinquefoil (*Potentilla simplex*), sweet vernal grass (*Hierochloe odorata*), tall buttercup (*Ranunculus acris*), Timothy *(Phleum canadense*), oxeeye daisy *(Leucnthemum vulgare*), white campion (*Silene latifolia*), and bentgrasses (*Agrostis* spp).

The wetland corridor is a red maple-spicebush community. The wetland corridor includes the northernmost of the two perennial tributaries that flow to Gulf Stream (see Figure 2, Attachment A). Apart from the dominant red maple, another tree species of note is the swamp white oak (*Quercus bicolor*). The area directly south of the road is open, with a locally dense high-shrub cover (see Photo 1B) of winterberry (*Ilex verticillata*), spicebush (*Lindera benzoin*), and speckled alder (*Alnus rugosa*). Invasives, which are moderately dense, include *Euonymus alatus* (firebush) and multiflora rose (*Rosa multiflora*). Jewelweed (*Impatiens capensis*), and goldenrods (*Solidago rugosa* and *S. patula*) are common herbs, with multiflora rose invading the openings. Interrupted fern (*Osmunda claytoniana*) and cinnamon fern (*Osmundastrum cinnamomeum*) mark the wetland boundary with the upland sugar maple forest. *Carex bromoides* is a common sedge throughout the wetland soils. Skunk cabbage (*Symplocarpus foetidus*) is also common and dots the edges of the stream.

Zone 2: A tall **invasive shrub community** lines the southern pan-handle of the field. A very dense line of invasive shrubs: multiflora rose, Euonymus, barberry, Asiatic bittersweet (*Celastrus orbiculatus*), and an invasive honeysuckle (*Lonicera* sp.) compose this zone. Red elder (*Sambucus pubens*) is also present, as well as an occasional silky dogwood (*Swida amomum*), and willow (*Salix* sp.), and a suggestion of an old orchard with an apple tree was also noted. *Solidago rugosa* is abundant (see Photo 2A, Attachment B).

Along the west field edges the dense growth invasives continues, with the addition of numerous grape vines (*Vitis* sp.). This combination is very common throughout the property along the field edges.

Within this cover type zone, we include two protrusions of maintained wet meadow into the hayfield (i.e., Field 2; see Photo 2B, Attachment B).

Area West and South of Field East to Wilson Road

Zone 3: Sugar maple - White ash/New York fern. Red oak (*Quercus rubra*) becomes increasingly important in the canopy in this area. White birch (*Betula papyrifera*) is especially common east of the unnamed perennial stream, tributary of Gulf Stream, on the west-facing slope. For the most part, this forest maintains sugar maple dominance, but white ash is much less common than in Zone 1. White birch increases in importance moving south and to the east by Wilson Road. Black birch (*Betula lenta*) and yellow birch (*B. alleghaniensis*) are very important components throughout the entire stand, often competing for canopy dominance, the latter species more concentrated along the perennial stream corridors (see Photos 3C and 3F, Attachment B). Basswood, beech (*Fagus grandifolia*), black cherry (*Prunus serotina*), and red maple (*Acer rubrum*) maintain a low, but consistent presence in the lower tree layer, as does pignut hickory.

Big-tooth aspen (*Populus grandidentata*) is frequent throughout the zone, often occurring in clones, dominating locally. Eastern hemlock (*Tsuga canadensis*) is scattered and mostly in the understory. The most common shrub is witch-hazel, often growing to 20 feet in height. Also, occasional is maple-leaved viburnum (*Viburnum acerifolium*). In some seepage wetland areas within this zone spicebush may be present. Mountain laurel (*Kalmia latifolia*) becomes more common moving southward with the appearance of low hemlocks. Black cherry and pignut hickory saplings are very

common. A few Euonymus low shrubs are also present. Barberry increases in cover moving southward (see Photo 3A, Attachment B). Ferns dominate the forest floor, especially hayscented (*Dennstaedia punctilobula*), New York (*Thelypteris noveboracensis*), and Christmas ferns. Pennsylvania sedge (*Carex pensylvanica*) is frequent in the woods, especially in the upper slopes, on slightly drier areas. Wild sarsaparilla (*Aralia nudicaulis*), common dewberry (*Rubus flagellaris*), and poison ivy (*Rhus toxicodendron*) are common (see Photo 3D, Attachment B).

Within this zone, to the east of Gulf Stream and west of Wilson Road, an old roughly three-acre "borrow pit" (i.e., sand and gravel mining area) contains three isolated wetlands, created through excavation into the seasonal groundwater table (see Photo 3E, Attachment B). Many of the same overstory and understory species listed above also occur here. Additional species observed include cottonwood (*Populus deltoides*), meadowsweet (*Spirea latifolia*), rough bedstraw (*Galium asprellum*), soft rush (*Juncus effusus*), grasses (*Poa* spp.), field horsetail (*Equisetum arvense*), and sensitive fern (*Onoclea sensibilis*).

Area West of Wilson Road, South Portion

Zone 4: Mixed age forest of Eastern hemlock - Red oak, and Yellow birch. As the elevation continues to fall, the forest takes on a more ravine-like feel with the presence of eastern hemlock (*Tsuga canadensis*). Northern red oak, and yellow birch are very important in this zone, often overtopping the still common sugar maple. Witch-hazel is the dominant tall shrub, accompanied by patches of mountain laurel and some scattered shrubs of barberry and maple-leaf viburnum (*Viburnum acerifolium*). Pignut hickory is common, as are white and black birches and big-tooth aspen. Basswood, while still present, is very infrequent. White pines (*Pinus strobus*) occur sporadically (see Photo 4A, Attachment B).

Open glades of birches are frequent throughout the zone, some allowing the growth of clubmosses (*Huperzia lucidula* and *Diphasiastrum digitatum*)). Hayscented and Christmas ferns are still common in this zone. Sarsaparilla and Indian pipe (*Monotropa uniflora*) are common, along with an occasional starflower (*Lysimachia borealis*). Stands of hemlock on steep slopes, especially along Gulf Brook and its perennial tributaries, are quite dense, so that there is no understory vegetation (see Photo 4B, Attachment B).

Area West of Wilson Road Southwest of Field

Zone 5: This is a very small section where the brook emerges from beneath Wilson Road with wetland tall shrubs of winterberry, multiflora rose, spicebush, Euonymus. *Solidago rugosa* and *S. patula* (goldenrods) are common. Silvery spleenwort (*Deparia acrostichoides*) is on the steep bank along with Christmas fern (see Photo 5B, Attachment B).

Just to the north Zone 5's, before the field, the vegetation transitions into the sugar maple forest of Zone 6. This tiny stretch of land is dominated by red maple, with red oak, witch hazel, basswood and big-tooth aspen.

Zone 6: Sugar maple - white ash – basswood forest. This area is dominated by large sugar maples, many of which are being tapped for sugar maple production. Pignut hickory, red oak, and black cherry are common as well as shagbark hickory. Witch-hazel is frequent with maple-leaf viburnum and scattered barberry and Euonymus shrubs. Herbs include: white wood aster (*Eurybia divaricata*), snakeroot (*Ageratina altissima*), Elliott's goldenrod (*Solidago latissimifolia*), whorled loosestrife (*Lysimachia quadrifolia*), and scattered *Carex pensylvanica* (see Photo 6A, Attachment B).

Area East of Wilson and Rossi Roads

Zone 7: Sugar maple – White ash – basswood forest. This roadside, lowland forest is dominated by green ash (*Fraxinus pennsylvanica*) beside the intermittent stream that flows from the northwest under Rossi Road, sugar maple elsewhere. Red oak, birches, and shagbark hickory are also present, with a few understory red maples. Tall big-tooth aspen stands occur along the brook corridor. *Viburnum acerifolium* is frequent, with invasives due to proximity to road: *Euonymus*, multiflora rose, Asiatic bittersweet. Herbs include *Carex pensylvanica*, *Solidago rugosa*, and *S. gigantea* (smooth goldenrod). Hayscented fern and white wood aster occupy the drier zones, such as the small peninsula formed by the confluence of the brooks (i.e., Gulf Stream and intermittent tributary). This community extends north until the barbed wire, where it becomes a scrub shrub community (see Photo 7A, Attachment B).

Roadside forest by the brooks supports several additional wet meadow wildflowers: Meadow rue (*Thaliuctrum polygamum*), Jack-in-the pulpit (*Arisaema triphyllum*).

Another nearby brookside and roadside area supports populations of both swamp loosestrife (*Lysimachia terrestris*), and fringed loosestrife (*Lysimachia ciliata*), as well as goldenrods (*Solidago altissima* and *S. rugosa*), and a ten-foot wide swath of blackberry and bittersweet seedlings. Each of these roadside wetland areas were searched for the target rare plant: pale green orchid.

Zone 8: Hemlock Forest. This large area is composed of a mosaic of dense hemlock woods (see Photo 8D, Attachment B) on the steepest slopes and along Gulf Stream, and glades of birches (i.e., white, gray, black) (Photo 8E, Attachment B) in isolated pockets, especially in the more southern part of the zone. Hayscented ferns and New York ferns are common in the glades, with occasional wood ferns (*Dryopteris carthusiana*), spotted wintergreen (*Chimaphila maculata*). Most of this zone occupies relatively steep west and south facing slopes. Several rocky outcrops (see Photo 8F, Attachment B) are in the steeper sections of the hemlock forests, and include evergreen woodfern (*Dryopteris intermedia)* and common polypody (*Polypodium virginianum*).

White pines are common in the lower flatter areas, some obviously planted that appear to be about 90 years old. Red oaks are very common, and often large. White oaks are scattered throughout the area with deeper soil. Sugar maple, birches and beech (see Photo 8G, Attachment B) are also very common, though usually not as large as the red oaks. Pignut hickory is frequent, but not abundant as it was in the sugar maple forest. Mountain laurel is the most common low shrub in this forest. Witch-hazel is the most common tall shrub, though not as abundant as it was in the sugar maple forests. Skeletons of highbush blueberry (*Vaccinium corymbosum*) can be found in the densest stands of hemlocks. Hemlock trees line the ravine along the brook-side (see Photo 8H, Attachment B). Christmas fern is common here. Black currant (*Ribes americanum*) and blackberry (*Rubus* sp.) also are represented in the lower hemlock woods. Striped maple (*Acer pensylvanicum*) and hobblebush (*Viburnum lantanoides*) also occurs in this coolest part of the forest, especially along the pronounced rocky ravine that carries Gulf Stream through this portion of the site.

Within this zone several wetland areas were delineated. Two of them are seasonally saturated hillside seeps, which discharge to Gulf Brook through rocky channels carved down moderately steep slopes (see Photos 8C, 8X, 8Y, and 8Z, Attachment B). The overstory for both are dominated by red maple, yellow birch, eastern hemlock, and green ash, and also include ironwood (*Carpinus caroliniana*), gray birch (*Betula populifolia*),

and hophornbeam (*Ostrya virginiana*). The understory includes spicebush, multiflora rose, mountain laurel, and northern arrowwood (*Viburnum dentatum*). The northern of the two wetlands has a more open habitat and is invaded by multiflora rose and Japanese barberry. Common herbaceous species include Christmas, and New York ferns, evergreen wood fern, white grass (*Leersia virginica*), asters (*Symphyotrichum* sp.), trout lily (*Erythronium americanum*), skunk cabbage, Canada mayflower (*Maianthemum canadense*), and violets (*Viola* spp.).

Within this zone, and at a lower elevation at the toe of steep slopes, three isolated forested wetlands were delineated (i.e., V-, H-, W-series, see Figure 2, Attachment A) (see Photos 8Q, 8R, and 8S, Attachment B). The southern, and larger one of the three, discharges to a roadside ditch on the eastern edge of Wilson Road. All three are characterized as seasonal hillside seepage areas, and have both *seasonally flooded* and *seasonally saturated* hydrologic regimes. Dominant or common overstory species include yellow birch, eastern hemlock, gray birch, hophornbeam, green ash, and red maple. The woody understory is moderately dense and includes such species as winterberry, mountain laurel, spicebush, Japanese barberry, and multiflora rose, while the herbaceous stratum includes jewelweed, jack-in-the-pulpit (*Arisaema triphyllum*), violets, wild geranium (*Geranium maculatum*), grasses, Christmas, New York, and cinnamon ferns, wood ferns, swamp dewberry (*Rubus hispidus*), sedges (*Carex* spp.), and Canada mayflower. *Thuidium* and *Polytrichum* mosses cover many rock surfaces within these wetlands.

Also, within this overall zone, an additional seasonal hillside seep forested wetland was delineated, just a few feet off the southern edge of the long, west sloping field (i.e., AA-series) (see Photos 8I and 8J, Attachment B). This is a seasonally saturated wetland, which discharges downslope to the west via a short segment of delineated intermittent stream, towards two other hillside wetlands with direct discharge to Gulf stream. The overstory includes many of the same trees found throughout the site's forested wetlands, such as red maple, yellow birch, green ash, sugar maple, ironwood, witch hazel, red oak, shagbark hickory, but also included American and slippery elms (*Ulmus americana, U. rubra*). During a visit in 2020 we noted that most of the green ash had succumbed to emerald ash borer (EAB). In fact, these was noted throughout the site, and has contributed to the proliferation or expansion of invasive shrubs, particularly near existing woodland edges.

The woody understory included spicebush, honeysuckle, multiflora rose, Japanese barberry, arrowwood, meadowsweet, and nannyberry (*Viburnum lentago*). The herb stratum included cinnamon, sensitive, Christmas, and New York ferns, evergreen woodfern, soft rush, sedges, rough bedstraw, swamp dewberry, goldenrods (*S. rugosa, S. patula*), violets, purple willowherbs (*Epilobium* sp.), enchanter's nightshade (*Circeaea canadensis*), water horehound (*Lycopus americanus*), and arrow-leaved tearthumb (*Persicaria sagittata*), and field horsetail. Lianas included fox grape, Asiatic bittersweet, evening nightshade (*Solanum dulcamara*), Virginia creeper (*Parthenocissus quinquefolia*), and virgin's bower (*Clematis virginiana*).

Portions of the seepage wetlands in this zone had a moderate density overstory and well-developed herbaceous vegetation. These areas were searched for pale green orchid, as were adjacent moist uplands.

Zone 9: Northern red oak/Maple-leaf viburnum and Northern red oak/Black oak/Blue-Ridge blueberry communities. Red oak is ubiquitous throughout this zone, with varying amounts of sugar maple, pignut hickory and birches. The land in this area is scattered with rocky outcrops (see Photo 9A), especially in the southern area. It includes drier sites on thin soil, and slightly deeper soils on gently sloping hillsides. On the well-drained sites, a couple of small areas display a red oak- chestnut oak (*Quercus montana*) canopy with an understory of black huckleberry (*Gaylussacia baccata*) (see Photo 9B, Attachment B) and lowbush blueberry (*Vaccinium pallidum*), with a little mountain laurel. It is not quite dry enough to qualify as the park-like black huckleberry community.

Red oak – sugar maple mixed stands of white and black birch on the deeper soils and gently sloping areas comprise 80% of the forest area in this zone. Red maple, and pignut hickory are constant in the lower tree layer with hophornbeam (*Ostrya virginiana*) and beech frequent. Maple-leaf viburnum is the dominant low shrub, with scattered American hazelnut (*Corylus americana*) bushes. Hayscented fern is common, with occasional marginal shield fern (*Dryopteris marginalis*) along the numerous stone walls in this zone. Also, within this zone patches of Penn sedge can be found as well as asters.

Zone 10: Old field, young forest. At the lower slopes, near the boundary of the property, the vegetation becomes densely populated with grape vines under a young sugar maple canopy. Shagbark hickory and gray (*Betula populifolia*) and black birches

are common. Low hemlocks are scattered throughout the area. Spicebush is common, indicating higher moisture. Japanese barberry is abundant, and multiflora rose is moderate in abundance. Christmas fern dominates the forest floor (see Photo 10A, Attachment B). Lady fern and New York fern are frequent, poison ivy is common, and an occasional red trillium (*Trillium erectum*) was observed. Lianas form tangles, and include fox grape (*Vitis labrusca*) and Asiatic bittersweet. This was probably an old field that was left to regrow.

Zone 11: **Field edge invasive shrubs** makes access very difficult. It is similar to Zone 2, with numerous invasives (see Photo 11A, Attachment B). Sugar maple and green ash, mixed with red oak and pignut hickory are the predominant large trees, but big-tooth aspen and white oak (*Quercus alba*) are not infrequent. On the seepage areas, a bit removed from the well-lit field edge, such as on the western edge of the long field, white and black birches become common, with witch-hazel. Christmas fern and barberry become abundant. White-wood aster is also common (see Photo 11B, Attachment B).

Areas North of Fields, East of Houses on Rossi Road Extending Past the Powerline

Zone 12: Old field (moist to wet) early to mid-successional stage. The northern border of the fields comprises an extensive growth of tall shrubs mixed with herbaceous vegetation, and much of it has been delineated as wetlands. It represents fields that have been left abandoned, previously used as pasture, and are being overtaken by invasive species like in Zone 2, especially along the field edge and within its transitional moist areas (see Photo 12A, Attachment B). Where the wetland crosses an Eversource powerline, *Poa palustris* (Fowl blue grass) is dominant. Adjacent uplands support dense raspberries, multiflora rose, and thickets of ash saplings (see Photo 12C, Attachment B).

Besides the aforementioned invasive species particularly common in this area are virgin's bower (*Clematis virginiana*), willow (*Salix sericea*), meadowsweet, staghorn sumac (*Rhus typhina*), alder (*Alnus incana*) (which attains heights of 20 feet or more), red-osier dogwood (*Swida sericea*), red chokeberry (*Aronia arbutifolia*), arrowwood (*Viburnum dentatum*), winterberry, and occasional nannyberry (*Viburnum lentago*) and crab apple (*Malus* sp.) trees.

The precise mixture of herbs depends on moisture levels. Common herbs in the clearings include goldenrods (*Solidago rugosa*, S. gigantea, and *Euthamia graminifolia*), purple-

stemmed aster (*Symphyotrichum puniceum*), red clover (*Trifolium praetense*), black medick (*Medicago lupulina*), bedstraws (*Galium* spp.), queen anne's lace (*Daucus carota*) and brown knapweed (*Centaurea jacea*), and poison hemlock (*Conium maculatum*). Tall stands of sensitive fern and jewelweed are frequent in the seepage areas between the shrubs. Moist clearings were searched for the target listed species, the pale green orchid. This zone lies adjacent to an un-mowed field.

It should be mentioned that this zone is also descriptive of most of the non-mowed/hayed areas within the Eversource ROW within the study area (see Photo 12F, Attachment B). Zone 12A, at the far northern section of the ROW within the site, low shrub cover is much lower, and grasses and forbs predominate.

Zone 13: Zone 12 merges with red maples in the wetlands, but due to the difficulty of access, detailed data was not collected. Green ash, gray birch, and tall alders could be seen among the red maple. Shrubs within this mosaic of pole sized trees, shrubs, and open wet meadow patches, include spice bush, multiflora rose, maleberry (*Lyonia ligustrina*), willows, silky dogwood, Japanese barberry, meadowsweet, and an occasional highbush blueberry (see Photo 13A, Attachment B). Herbs include asters, goldenrods, arrow-leaved tearthumb, purple willowherbs, enchanter's nightshade, blue vervain (*Verbena hastata*), Joe-pye-weeds (*Eutrochium* spp.), soft rush, sedges, grasses, rice cut grass (*Leersia oryzoides*), and purple loosestrife (*Lythrum salicaria*).

Within the roughly half acre pond, centrally located within this wetland unit, cattail (*Typha latifolia*) is abundant, but also sedges, dark green bulrush (*Scirpus atrovirens*), and wool grass (*Scirpus cyperinus*) (see Photos 13C and 13D, Attachment B). A few buttonbush (*Cephalanthus occidentalis*) were also noted in the shallow waters. A robust spikerush species, *Eleocharis palustris* was also common.

The above-described east-west oriented wetland with a mosaic of scrub shrub, young forested, and emergent wetland cover types, discharges via a ditched intermittent stream to the southerly flowing Gulf stream further west, almost at the western property boundary. The wetland crosses a farm road, where alder, barnyard grass (*Echinochloa cruz*galli), wool grass *(Scirpus cyperinus)*, reed canary grass, skunk cabbage, cattail, blue cohosh (*Caulophyllum thalictroides*), tall buttercup (*Ranunculus acris*), and hedge bindweed (*Convolvulus sepium*), and Jack-in-the-pulpit were all observed in early June, 2017.

This wetland extends further to the north along the Gulf Stream corridor, and includes seasonal hillside seepage wetlands that discharge down moderate slopes to the stream. These wetlands are embedded in a relatively young moist forest that is replete with invasive Japanese barberry and multiflora rose, which form nearly impenetrable thickets in several areas. The wetlands are dominated by red maple, but also include American elm, green ash, red oak, black oak, black cherry (*Prunus serotina*), and sugar maple. Occasionally a remnant apple tree (*Malus* sp.), and hawthorn (*Cratageous* sp.) was observed. Apart from the aforementioned dominant shrubs these areas (i.e., wetlands and uplands) also include spicebush, meadowsweet, and honeysuckle.

The herb stratum includes such species as Christmas, sensitive, cinnamon, ferns, wood ferns, including evergreen, poison ivy, roughstem goldenrod, asters, goldenrods, violets, jewelweed, white avens (*Geum canadense*), sedges, tall meadow rue (*Thalictrum pubescens*), swamp dewberry, Penn sedge, grasses, jack-in-the-pulpit, and wood sorrel (*Oxalis* sp.). Lianas include Asiatic bittersweet, fox grape, and green briar (*Smilax rotundifolia*).

Zone 14: Sugar maple–white ash-basswood mixed age forest. Behind the wetland described in Zone 13, in the western portion of this zone is a grove of trembling aspen (*Populus tremuloides*). A forest of several large white ash trees and a variety of sizes of sugar maples extends east to the property boundary near a row of houses. Low trees are big-tooth aspen, blue-beech or ironwood (*Carpinus caroliniana*) and basswood. White pine is occasional. In the understory Japanese barberry is the dominant low shrub (see Photos 14A, Attachment B). Invasive honeysuckle is also common and spicebush is common in this lower slope forest.

Further to the north from the sugar maple-white ash-basswood forest, this zone transitions into a younger deciduous upland forest, where sugar maple is replaced by red maple (see Photo 14C, Attachment B). This once area, which was once a pasture in the 1950s and earlier, is relatively moist, and is replete with invasive species in the understory, including multiflora rose, and Japanese barberry. Herbaceous species include main of the same mentioned in other moist forested situations, such as New York fern, Canada mayflower, poison ivy, and dewberries (*Rubus* sp.), but also includes garlic mustard (*Alliaria petiolata*), and laxiflora sedge (*Carex laxiflora*). Lianas such as fox grape and Asiatic bittersweet are locally prevalent, reaching high into the forest canopy. As characterized in Zone 13, this area also contains poorly drained wetlands, as hillside

seeps (i.e., 5N/6N-series) or small, isolated wetland pockets (i.e., 3N- and 4N-series; see Figure 2, Attachment A). This zone abuts the Eversource ROW to the north, described as Zones 12, and 12A.

One more wetland was "lumped" in with this zone. This is a scrub shrub and forested wetland, with a seasonally saturated hydrologic regime. It is located to the west of Rossi Road, and north of Litchfield Town Farm Road. It is also associated with an intermittent stream, tributary to Gulf Stream via a culvert under Rossi Road (see Photo 14B, Attachment B). The overstory incudes red maple, green ash, American elm, black willow (Salix nigra), and speckled alder, while in the woody understory common species include northern arrowwood, Japanese barberry, Morrow's honeysuckle (*Lonicera morrowii*), whitherod (*Viburnum cassinoides*), multiflora rose, and meadowsweet. Dominant herbs include cinnamon, sensitive, and New York ferns, goldenrods, asters, sedges, including tussock (*Carex stricta*), and joe-pye-weed.

Zone 15: Northern red oak/Maple-leaf viburnum transitional forest. A transition zone exists from the edge of the field that is relatively free of invasive shrubs. It consists of black and white birch, red oak, sugar maple, pignut hickory, ironwood (*Ostrya virginiana*), and a few hemlocks. A clone of beech trees occupies a small area in the western portion of this area (see Photo 15A, Attachment B). Maple-leaf viburnum and witch hazel compose the shrub layer, while Christmas and hayscented ferns, Penn sedge, Canada mayflower, partridgeberry (*Mitchella repens*), poison ivy, and occasional white wood asters occupy the forest floor (see Photo 1B, Attachment B).

Just northwesterly of a Zone 15 wooded area in the east-central section oof the site, and adjacent to the Eversource ROW (see Figure 3, Attachment A), a linear (ditched) wetland (i.e., D-series) is situated, in a shallow ravine (see Photo 15C, Attachment B). It is associated with Field 4 (F4). This was an area where rocks from the fields were deposited over many decades, and line its edges. This is a temporarily flooded to seasonally saturated area, receiving drainage from the surrounding fields and conveying them both to the north and to the south. Within the wetland or at its edge the dominant trees are red maple and gray birch. The woody understory, which is dense locally, includes elderberry, silky dogwood, Japanese barberry, Morrow's honeysuckle, speckled alder, and northern arrowwood. Dominant or common herbaceous species include sensitive fern, sedges, evergreen woodfern, and poison ivy. Lianas include Asiatic bittersweet and fox grape.

Zone 16: Northern red oak/Maple-leaf viburnum. This relatively large block of forest is dominated by red oak and pignut hickory (see Photo 16A, Attachment B). A smaller component of chestnut oak is scattered in the driest areas. Sugar maple and red maple compose the lower tree layer, mixed with ironwood, a few hemlocks, black cherries, beech, and birches. The shrub layer is maple leaf viburnum and American hazelnut, shadblow (*Amelanchier canadensis*), low bush blueberry (*Viburnum angustifolium*), with a little mountain laurel and Japanese barberry. A couple small patches of black huckleberry occupy the low shrub layer. The common herbs are sarsaparilla, white wood aster, and Pennsylvania sedge, but also include violets, asters, goldenrods, including blue-stem goldenrod (*Solidago caesia*), evergreen woodfern, starflower, and spotted wintergreen (*Chimaphila maculata*).

This zone is similar to Zone 9, technically of the same type of forest, but it is more homogeneous, and does not contain the rocky outcrops and far less white birch. Although hemlock is present in small amounts in Zone 16, it is much more common in Zone 9. Much of this cover type zone will be preserved in order to support the terrestrial life cycle phase of amphibians that are using Vernal Pool #2 (E-series wetland).

Zone 17: Birch glade variant of Northern red oak/Maple-leaf viburnum forest. This relatively narrow, elongated zone, between the red oak and hemlock forests, occurs along the upper slope, south of the fallow field, and continues down a few hundred feet as the slope steepens. The canopy lightens, almost like a woodland. The park-like feel derives from isolated clumps by white and black birches, beneath an open canopy of sugar maples and red oak. Pennsylvania sedge is dominant on the forest floor (see Photo 17A, Attachment t B) accompanied by white wood aster, small white aster (*Symphyotrichum racemosum*), and zig-zag goldenrod (*Solidago flexicaulis*). Locally heavy patches of tall witch-hazel form the shrub layer (see Photo 17B, Attachment B). At the southernmost, lower slope of this glade, red maple becomes more prevalent, with spicebush indicating the transition to Zone 10.

Zone 18: This area lies east of Wilson Road just below the field edge invasive shrub community described in Zone 11. It occupies a relatively narrow area transitioning from the shrub zone to the hemlocks around the ravine that carries Gulf Stream. Technically, a sugar maple-white ash forest, it is, however, heavily infested with Japanese barberry, pointing to its past as a pasture or an abandoned field. Witch hazel is the dominant tall shrub. Towards the northern end of the area the barberry extends all the way to the brook

(see Photo 18A, Attachment B). Grape vines are frequent and Christmas fern is abundant on the moist slope. A line of white pines along the toe slope marks the transition to the hemlock community.

Zone 19: This is an area of wet meadow, maintained through annual haying, as it is part of the large field north of Litchfield Town Farm Road, and west of Rossi Road, in Torrington (i.e., A-series; see Photos 19A, to 19D, Attachment B). It also includes the two isolated wet meadow pockets delineated nearby within the same field (i.e., 1A-, 2A-series). The larger elongated wet meadow transitions to the east into a forested and scrub shrub wetland that is associated with an intermittent watercourse, tributary to Gulf Stream via a culvert under Rossi Road (see description under Zone 14). At the lower elevation eastern edge of this wet meadow, sensitive fern, sedges, cinnamon fern, Joe-pye-weed, and goldenrods dominated. Further up the slope to the west, the wet meadow transitions to grasses (*Poa* spp.), clovers (*Trifolium* spp.), and reed canary grass (*Phalaris arundinacea*).

Zone 20: This the seasonally flooded to seasonally saturated forested swamp on nearly level ground, located at the far northern section of the site, up against Highland Avenue, in Torrington (i.e., N-series; see Photo 20, Attachment B). This is a typical, post-agricultural forested cover type dominated by red maple in the overstory, with occasional gray birch, American elm, and green ash. The woody understory is moderately dense and includes such species as spicebush, Japanese barberry, honeysuckle, multiflora rose, and high bush blueberry. The herbaceous stratum includes cinnamon, sensitive, New York, and Christmas ferns, swamp dewberry, Canada may flower, and stout wood reedgrass (*Cinna arundinacea*). This wetland drains in a southeasterly direction via a wide swale to the eastern property boundary that is maintained in emergent species, including sedges and grasses. A relatively narrow woods road cut through the wetland from Highland Avenue, providing access to the open agricultural field to the south.

It should be noted that a very similar wet meadow community can be found at the upgradient portion of the seasonal seep forested and scrub-shrub wetland, which feeds to the main perennial tributary stream of Gulf Stream (i.e., B/1B-series), located to the west of Wilson Road, and south of Litchfield Town Farm Road.

6.0 VERNAL POOL SURVEYS

6.1 Overview

This section presents and discusses the effort by Rema Ecological Services, LLC (REMA) to conduct in-field, breeding season surveys, of *two* semi-permanently to permanently flooded wetland areas that were identified in April 2017 as vernal pool habitats. The two vernal pools, identified as Wetland E and Wetland F (i.e., E- and F-series), are man-made or man-enhanced farm ponds, once used for irrigation of orchards or for watering of livestock (see Figure 4, Attachment D).

Wetland F (i.e., Vernal Pool 1) is located at the far northwestern corner of the site, just north of an existing hayfield (see Figure 2, Attachment A). Wetland E (i.e., Vernal Pool 2) is located in the eastern portion of the site, within the Eversource electric ROW that runs through the site (see Figure 2, Attachment A).

Vernal Pool 1 (i.e., Wetland F), is over 5 feet in depth, averaging 3 to 4 feet, and is well shaded by red maple an alder. The ponded portion is replete with large woody debris (i.e., branches) offering good cover and attachment sites for spotted salamander egg masses. Other common vegetation observed included gray birch, green ash, meadowsweet, multiflora rose, sedges, rushes, fox grape and Asiatic bittersweet. A small seasonal seep wetland is located at the northwest corner of the pond (see Photos 1 through 4, Attachment D). Organic deposits over mineral substrate are up to one foot in depth.

Vernal Pool 2 (i.e., Wetland E), is up to 4.5 feet in depth, averaging 2-3 feet. It does contain more than one foot of organics over mineral substrate and was typically found to be covered by green alga mats over 70% to 80% of its surface. Only the southern portion of the pond is well shaded. Typical vegetation at the perimeter or within the ponded area includes red maple, gray birch, green ash, speckled alder, gray dogwood, multiflora rose, buttonbush, meadowsweet, spicebush, cattail, rushes, sedges, sensitive fern, goldenrods, asters, including New York aster (*Symphyotrichum novi-belgii*), and pondweeds (*Potamogeton* spp.) (see Photos 5 through 10, Attachment D). It is likely that seasonal (i.e., spring) shallow groundwater seepage feeds pool hydrology from moderate sloping forestland to the west and southwest.

6.2 Methods

During each of the field survey events (i.e., April 15th, 2017, April 24th, 2018, April 13th, 2019, and April 12th, 2020), the two vernal pools were systematically reviewed, for component species (i.e., vertebrates and invertebrates), as well as abiotic characteristics (e.g., pH, temperature, depth, dimensions).

Each vernal pool was surveyed using chest waders/hip boots, dipnets, and a field pH meter. Detailed notes were taken in the field to allow accurate attribution of specific observations to particular pool locations, and a photographic log was compiled.

Egg masses of indicator species amphibians [spotted salamander, *Ambystoma maculatum*; wood frog *Lithobates sylvaticus*] were enumerated during systematic walking transects of the basins, typically by two observers in parallel. Polarized glasses were used occasionally, but turbidity and pollen film were both low during all of the field dates, facilitating comprehensive reviews.

During the initial field visit on April 15th, 2017, and also during each subsequent visit, wood frog egg masses were observed to be well developed, but not yet emerging. This indicated that breeding by wood frogs was largely complete and that egg mass counts were representative of the full breeding effort by that species for season. Spotted salamander egg masses were variably developed, partly attributable to depth of deposition and time since deposition.

During each survey date, and after a careful count of egg masses first from pool perimeter prior to entering the pool, two researchers methodically conducted dipnet sweeps, working towards each other from opposite sides of the vernal pool habitat. At each pool an attempt was made to dipnet the entire pool, but efforts were concentrated in representative micro-habitat areas, such as the shallow perimeter, areas with greater sun exposure, and areas with woody debris. Benthic litter materials were also investigated, such as deposits of fine particulate organic matter (FPOM), and samples were carefully sorted through in search of invertebrates, bivalves, and other aquatic organisms. Perimeter shallows were typically examined prior to entering the pool to increase the probability of capturing marbled salamander larvae, if present. Similarly, emergent, or erect herbaceous vegetation patches were sampled to reveal the invertebrate species often found occupying the three-dimensional structure of a lentic wetland system.

In addition to direct examination of the two vernal pools, other areas of ponding not previously identified as "potential vernal pools" (PVPs), such as the larger, open pond/marsh located in the north-central section of the site (i.e., 3C/4C/2N-seires; see Figure 2, Attachment A), were observed and evaluated, or were indicated by anuran calling. All these areas were not found to meet any of conventional criteria for vernal pools, and were dismissed as ephemeral, seasonally flooded depressions. There were, however, amphibian activity in some of these seasonal flooded areas, based on calls and observed amphibians, such as spring peeper (*Pseudacris crucifer*), green frog (*Lithobates clamitans*), pickerel frog (*Lithobates palustris*), and eastern toad (*Anaxyrus americanus*). All of these species are potential *facultative* amphibians and not *obligate*, such as wood frog and spotted salamander.

6.3 Survey Results

The two vernal pools (i.e., Vernal Pool 1, and Vernal Pool 2 were surveyed for the presence or absence of obligate vernal pool indicators (i.e., wood frog, spotted salamanders, fairy shrimp), during four consecutive amphibian breeding seasons (i.e., 2017 through 2020). Table 1, in Attachment D, provides a detailed summary of data collected for each of the two surveyed areas. Representative annotated photos of each of the surveyed areas are also included in Attachment D (Photos 1 to 10).

6.3.1 Vernal Pool 1 (Wetland F)

This vernal pool, excavated as a farm pond, was found to be consistently productive for both wood frogs and spotted salamanders during the four years of survey. It is likely that the search effort during the 2017 season was not as robust as in the following years, at least with respect to spotted salamanders that could have been obscured from a survey that was mostly conducted from the perimeter. In subsequent years the researchers entered the pond using chest waders. A few bullfrogs were also encountered, not unusual for a pond that is deep enough to allow for the overwintering of bull frog larva. We note that bullfrogs are predators of wood frog tadpoles, which may be keeping their numbers lower than would otherwise be expected in a pool of this size and in this landscape setting.

6.3.2 Vernal Pool 2 (Wetland E)

This is a moderately well defined, deep vernal pool, also used as a farm pond, and probably originally excavated within a wetland area, based on archival aerial photography. Wood frog egg mass numbers have been consistent through the four years of survey, most of them found within one large raft. In 2017 spotted salamander egg masses were counted, but none were observed in subsequent years. This may due to the fact that this is a suboptimal breeding habitat for spotted salamanders, in part because the majority of the pool is open to light, which promotes thick filamentous alga growth covering a large proportion of the pool (see annotated photos, Attachment D). It is, however, possible, that a few spotted salamander egg masses were obscured. As with Vernal Pool 1, several larval predators also exist here, including bull and green frog, as well as spotted newt. The latter species breeds here and several red efts (i.e., spotted newt juveniles) were observed in the nearby forest.

6.4 Discussion

The 2017 to 2020 amphibian breeding season field surveys indicate that the two identified vernal pools can be considered as Tier I vernal pool habitats, per the *Best Development Practices*[8] (BDP) (Calhoun and Klemens, 2002). Tier I pools are those that include at least 25 egg masses of any of the obligate vernal pool amphibians and, therefore, are worthy of conservation.

Table 2 provides information regarding the presence of Project features relative to the 100-foot Vernal Pool Envelopes (VPEs). The VPE is considered critical for vernal pool conservation as it is considered to be most protective against direct "physical" impacts of vernal pools, and are also the preferred habitat area for emerging metamorphs. For these two vernal pools, the VPE would be preserved in the post-construction phase (see Figures 5 through 8, Attachment D).

[8] 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.

Table 2: Proposed Activities within VPEs Associated with Proposed Solar Facility

VP#	VP Area (acres)	VPE Area (acres)	Existing VPE Disturbed?	Project Disturbance?	Percent of VPE Affected by Project Activities in CSC Petition[9]
1	0.07	1.36	Yes - Hayfield	0.22[10]	16
2	0.08	1.60	Yes – Utility ROW	0.31[11]	22

In regards to Vernal Pool 1, the VPE which would be within the proposed limit of disturbance (LOD), the great majority of it is an agricultural field under existing conditions. Only a few woodland edge shrubs, and perhaps one or two trees would be cleared, in an area roughly 0.11 acres in size (see Figure 6, Attachment D) for a proposed laydown area. However, the laydown area will be restored following construction, and the perimeter/security fence will be installed closer to the proposed solar arrays, to the south of the VPE. The restoration of the VPE area will include planting of trees and shrubs, and the use of a conservation seed mix. Therefore, in the post-construction phase the VPE will be higher functioning in regards to vernal pool amphibians than under existing conditions.

At Vernal Pool 2, the proposed LOD will not encroach within the VPE, some of which, as can be seen in Figures 7 and 8 (see Attachment D), is already part of the existing agricultural field.

The "critical terrestrial habitat" (CTH) was also considered to determine the potential for Project impact. Calculations were completed to evaluate the area of proposed Project activities located within the zone outward of 750 feet from the edge of each vernal pool. In calculating the CTH we excluded the acreage of existing hayfields. While these areas can be traversed by obligate vernal pool amphibians, they are not the preferred wooded habitat where these species will hibernate, forage, and spent the majority of their life cycle in the non-breeding period. Fields do not protect these species from desiccation as would the leaf litter and the duff layers found in woodland habitats. For the purposes of

[9] Includes clearing as well as other existing and proposed activities.
[10] This portion of the VPE is currently a hayfield and the proposed disturbance will be temporary.
[11] This portion of the VPE is currently a hayfield.

the CTH analysis, hayfields are considered "project neutral," since amphibians can still traverse the solar array fields, post-construction.

As shown in Table 3, the CTH for Vernal Pool 1 remains essentially the same with a very small reduction in area (i.e., 0.2 acres). Therefore, Vernal Pool 1 will continue to achieve the recommended "25% or less" disturbance within the CTH and, therefore, considered "conserved."

Table 3: Proposed Activities within CTHs Associated with the Proposed Solar Facility

VP#	VP Area (acres)	CTH Area (acres)	CTH Area Disturbance (Existing) (acres)	% of CTH Disturbance (Existing)	CTH Area Disturbance (Proposed) (acres)	% of CTH Affected including by Project Activities in CSC Petition
1	0.07	32.35	6.39	19.75	0.2	19.81
2	0.08	31.41	8.04	25.59	3.88	37.95

The CTH for Vernal Pool 2 is reduced by 3.88 acres by the proposed activities, taking the existing CTH impact from 25.59% to 37.95%. Based on the BDP model (Calhoun and Klemens 2002) going above the 25% threshold would result in an impact to a vernal pool. However, in this case some site specific factors would mitigate this impact.

First, of the 3.88 acres of reduction of the wooded CTH, only 1.49 acres are contiguous optimal habitat to the vernal pool. The balance of this "wooded" acreage is either discontinuous or poor habitat, including field hedgerows and young woods and scrub shrub/vine tangles within the Eversource ROW.

Second, an perhaps more importantly, Vernal Pool 2 is predominately a wood frog breeding pool. Only a few spotted salamander egg masses were counted, and only in the first of the four breeding season surveys. It is widely understood, that unless there is major additional fragmentation of optimal non-breeding habitat by busy roadways and a significant increase of impervious surfaces, "wood frog vernal pool" can be conserved with wooded CTH that is 50% or greater of the total acreage. Therefore, we consider that this pool is also considered "conserved" under the proposed conditions.

7.0 LISTED SPECIES SURVEYS

7.1 Overview

Prior to the commencement of fieldwork at the subject site in the Spring of 2017, REMA sent a query to the CT DEEP's Natural Diversity Data Base (NDDB), regarding the potential presence of CT-listed species [i.e., endangered (E), threatened (T), special concern (SC)] were known to be associated with the site. A response dated May 29th, 2017, was received from Ms. Dawn McKay, indicating that several listed species were known from the vicinity of the site (see Attachment F). These were:

➢ *Platanthera flava var. herbiola*	Pale Green Orchid	SC
➢ *Glyptemys insculpta*	Wood Turtle	SC
➢ *Lasiurus borealis*	Red Bat	SC
➢ *Lasiurus cinereus*	Hoary Bat	SC
➢ *Pooecetes gramineous*	Vesper Sparrow	E

A review of the on-line information at the time of the 2016 query revealed several "estimated habitats" for listed species near the site or overlapping the northernmost section of the site in Torrington, along Highland Avenue. These were based on a December 2016 revision of the NDDB area maps (see Figure 9, Attachment F). The most recent mapping, with a revision date of June 2020, shows that the habitat areas overlapping the northern portion of the site have been pulled back, such that there is no overlap of any NDDB areas on to the site (see Figure 10, Attachment F). In fact, the closest NDDB area to the subject site is roughly 800 feet downstream of Gulf Stream, as it exits the site, and nearly 3,000 feet from any of the proposed development activities, following this watercourse. As will be explained in more detail below, in all likelihood the listed species associated with the stream corridor south of the site is the wood turtle (*Glyptemys insculpta*).

Even though it appears that there are no NDDB habitat areas that overlap the site, REMA was authorized to conduct several targeted surveys for the CT-listed species in the May 29th, 2017 letter from the CT DEEP's NDDB (see Attachment F). In the late Spring of 2017, and again in 2019, breeding bird surveys were conducted at the appropriate habitats for the vesper sparrow (*Pooecetes gramineous*). In the Spring seasons of 2017, 2018, and 2019, targeted searches for wood turtle were conducted along all of the site's

perennial watercourses. In June and July of 2017, targeted searches at favorable habitats were conducted for pale green orchid (*Platanthera flava var. herbiola*). Searches for the two listed Special Concern bat species (i.e., hoary bat, red bat) were not conducted, as special seasonal restrictions for the cutting of maternity roosting trees are being considered in the development plans.

In the course of our site investigations and natural resource inventories, REMA came across several additional CT-listed species of Special Concern. These were three avian species: the bobolink (*Dolichonyx oryzivorus*), the savannah sparrow (*Passerculus sandwichensis*), and the American kestrel (*Falco sparverius*) (see Photos A1 through A9, Attachment E). The first two species are confirmed breeders, while the kestrel is a probable breeder. All of these three species have been recorded within the site surroundings, particularly in Litchfield, and although listed they appear to be underreported and, therefore, are more abundant than records would indicate.

7.2 Herptiles

Wood Turtle (*Glyptemys insculpta*)
CT Special Concern

This is a turtle species of broad riparian corridors, never far from water, but also uses several very different habitats (Ernst et al. 1994). In early spring, winter, and mid fall they occupy clean perennial brooks and rivers, feeding on the stream-bottom macroinvertebrates, and basking on the banks and on logs. In winter they hibernate under water in root tangles, bank overhangs, and at the bottom of deep meanders. Hibernation typically occurs in groups. Surges in stream volume and velocity due to urban runoff may dislodge hibernating wood turtles and scour banks, and urban runoff also reduces invertebrate food availability.

During the active growing season, wood turtles rove far afield on land, feeding in forests and meadows, with an omnivorous diet much like that of Eastern box turtles, though not confined to a small home range. The wood turtle populations that we (REMA) are aware of, and others described in the scientific literature, occupy very broad riparian corridors, averaging often over a thousand feet in width. A rural landscape setting is typical for the species, and good to excellent water quality of surfaces waters is preferred.

At the subject site, stream walks targeted specifically on wood turtle were conducted on June 30th, 2017, May 2nd, 2018, and May 14th, 2019. These are times of the year when it would have been most likely to observe wood turtles both within the perennial watercourses, and also adjacent to them, in areas appropriate for basking. Wood turtles were not observed in any of our targeted searches, each of which lasted approximately 2 to 3 hours.

It is REMA's opinion, based on our experience in observing wood turtles throughout Connecticut and in New York State, they prefer wider, lower gradient, and more open stream corridors, most often associated with glaciofluvial deposits (i.e., sands and gravel), or where sandy alluvial deposits adjacent to perennial watercourses are available. Moreover, these wider riparian corridors allow for basking in sunny spots, something that is not available at the site, whose streams are mostly in deep shaded ravines, with steep banks, and with an in-stream and near-stream environment that is characterized mostly by cobbles and boulders as well as exposed bedrock. It our opinion that the possibility of wood turtle at the site is very low.

7.3 Avians

Vesper Sparrow (*Pooecetes gramineus*)
Endangered

The vesper sparrow is distinctive bird of grasslands, preferring drier spectrum fields, dotted with shrubs or low stature trees, as is typical in early successional old field habitats[12]. It will also use cultivated crop fields, but as its scientific name would suggest it prefers fields dominated by graminoids, that is, grasses. Vesper sparrow is considered a moderate habitat generalist. For breeding it prefers open dry habitats with short, patchy herbaceous vegetation, with some bare ground nearby, and low shrub cover.

REMA began avian surveys in April of 2017, but targeted avian surveys for vesper sparrow were conducted on June 24th, 2017, and on July 3rd, 2019. Surveys were conducted approximately between 0600 and 0830 hours on mostly sunny days. REMA staff walked the perimeter of all the hayfields on both sides of Rossi Road, Torrington,

[12] Jones, S. L. and J. E. Cornely (2020). Vesper Sparrow (Pooecetes gramineus), version 1.0. In Birds of the World (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA.

and south of Litchfield Town Farm Road, in Litchfield. The avian counts can be found in Attachment E.

Results & Discussion

Vesper sparrow was not observed during the targeted avian surveys or at any other time during the numerous fieldwork days conducted by REMA staff, two of which have multi-year bird identification experience. Based on the surveys and baseline inventories at the site (see avian surveys, Attachment E), REMA is of the opinion that the likelihood that vesper sparrow is breeding here is very unlikely. In part, we base this opinion on the fact that habitat type preferred by this avian is very limited at the site. Areas that present the type of grass/forb habitat preferred by this species only occur in wet to moist areas. The small crop field at the top of the hill to the east of Rossi Road (see F5 in Figure 3, Attachment A) was checked during the breeding seasons of 2017 through 2020 for vesper sparrow, unsuccessfully.

However, as can be noted in the avian counts (see Attachment E), two Species of Special Concern were identified as infrequent breeders on the site: bobolink and savannah sparrow.

Bobolink (*Dolichonyx oryzivorus*)
Special Concern

Bobolink was observed at the site each year of survey (i.e., 2017 to 2020) in most of the hayfields (e.g., F1, F2, F4, and F6; Figure 3, Attachment A) (see Photos A2 and A3, Attachment E). In May of 2017 these birds were first observed in great numbers in the large west facing field east of Rossi/Wilson Roads (i.e., F6). By early June upwards of 80 individual bobolinks were observed at one time, both male and female. During our June 24th, 2017 breeding bird survey, we counted 50 individuals in the same field, and 5 in the field to the west of Rossi Road (i.e., F1).

That year (2017) the spring was particularly wet and the farmer, who has been cutting the hay twice a year (i.e., late June and August-September) for over a decade could not proceed with the first cut because of high soil moisture. When REMA discovered the breeding bobolinks, we asked the farmer to refrain from haying until the end of August, with which he complied. By that time the young birds had fledged.

Bobolinks were observed in all subsequent years, and in all fields, but disruption of nesting took place each year when the first cut of hay was harvested, typically by late June. Therefore, while 2017 was an unusual year, where successful breeding and reproduction took place because of favorable weather and human intervention (i.e., REMA), it appears that while bobolinks frequent these fields in the early spring, successful nesting is the exception rather than the rule due to the ongoing agriculture.

Savannah Sparrow (*Passerculus sandwichensis*)
Special Concern

Savannah sparrow was observed at the site each year of survey (i.e., 2017 to 2020) in several of the hayfields (e.g., F1, F2, F5, and F6; Figure 3, Attachment A) (see Photo A4, Attachment E). During our June 24th, 2017 breeding bird survey, two singing male birds were observed in field F1, while on July 3rd, 2019 five males were observed in two fields (i.e., F1 and F5). During other times these avians were also observed in other fields.

As with the bobolink, nesting was successful in 2017 since the first cut of hay did not take place until August, but also like the bobolink it is likely that successful breeding and reproduction are the exception rather than the rule at the site's fields due to the ongoing agricultural use (i.e., haying).

Discussion

Regarding the bobolink and the savannah sparrow, which have rarely successfully bred and reproduced at the site, they can also be found breeding or attempting to do so, in several other fields in the area, including several to the north and south of Litchfield Farm Town Road. This is based not only on a reconnaissance survey conducted by REMA from the roadway in 2017, but also on published results by avian enthusiasts found on the Cornell Lab of Ornithology online site (i.e., eBird).

It is our opinion that the proposed utility-scale solar project will not adversely affect the breeding reproduction of these two species at the site or its immediate vicinity.

7.4 Plants

Pale green orchid (*Platanthera flava var. herbiola*)
Special Concern

In the aforementioned letter from the CT DEEP's Wildlife Division, dated May 29th, 2017, REMA was informed of a Connecticut-listed plant species that has been reported from the vicinity of the subject site: the pale green orchid (*Platanthera flava, var. herbiola*).

This DEEP communication recommended that field surveys for the State-listed species should conducted by qualified biologists, at the time when these targeted species are identifiable. The letter also asked that the habitats on the site be described and photographed, and a conservation plan be developed should the likelihood of this plant's presence be determined to be probable, even if not found during searches. Targeted surveys were conducted in early summer when this orchid is in bloom, on June 15th, and July 15th, 2017 by a REMA botanist and plant ecologist. The tall spikes, from 12 to 30 inches tall, have closely packed flowers interspersed between leafy bracts. The greenish yellow flowers with a protuberance on the upper side, just below the middle, and irregular margins.

Habitat assessment and species inventories continued in the early fall of 2017, when the orchid would be more difficult to detect, although the spent spikes of this orchid would likely have been spotted, if present. The tapering sizes of the leaves and the long bracts among the flowers are distinctive for this orchid, even when out of bloom, and would still be visible in mid fall. Again, no pale green orchid was found, though many other herbs of wet and moist soils were documented (see above sections describing cover types or zones).

The habitats reported for this species were checked in all the botanical manuals that cover southern New England. According to the botanical references listed below, the northern *herbiola* variety of *Platanthera flava*, the pale green orchid, formerly *Habenaria flava*, grows in moist habitats, including wooded swamps, wet meadows, swales, and shores of waterbodies. It occurs most often on the coastal plain of Connecticut and in the southwestern part of the state, and is often found on sandy soils. The following references were consulted: State Geological & Natural History Survey Bulletin No. 14

(Charles Graves et al, 1910), Gray's Manual of Botany, 8th Edition by M.L. Fernald 91950); Manual of Vascular Plants of NE US and Adjacent Canada by Gleason & Cronquist (1991); The vascular Flora of SE Connecticut by Gordon Tucker ((1995), and Flora Novae-Angliae by Arthur Haines (1913).

Soils on this site are fine sandy loams, not sands. However, suitable mesic to moist or wet moisture regimes are widespread. The *herbiola* variety of *Platanthera flava*, per Fernald, occurs more often in open habitats. Open sunny, or partly sunny areas are also common on this site, adjacent to roads, active hayfields, and watercourses, and following relatively recent field abandonment, where clearings persist among thickets and young woods.

Multiple suitable habitat areas were carefully examined for this orchid. Each search location has been noted in the preceding Section as part of the characterization of that particular cover type zone. They include the following areas, shown on Figures 2 and 3 (Attachment A): wet meadow along the Eversource ROW (WD and 3C/4C/2H), clearings in west-draining thicket wetlands, just north of the large central field (Zone 13), the farm road crossing by Gulf Stream, (Zone 12) the early successional wet meadow/seepage thicket habitat east of Wilson Road (Zone 18). Likely wet meadow and moist forest habitat was also searched along Wilson Road and Rossi Road, in the larger vicinity of the crossing by Gulf Stream. Another search area was north of Zones 1 and 2, and along the hedgerow south of Litchfield Town Field Road. No plants of the target species were found.

Other hydrophytic herb and vine species observed in the search areas, potential habitats with moist to wet soil, either sunny or partially shaded included the following: jewelweed, Jack -in-the pulpit, sensitive fern, soft rush, fox sedge, enchanter's nightshade, lady fern, skunk cabbage, river grape, blue cohosh, *Solidago gigantea*, *Solidago patula*, *Soldago rugosa*, *Lysimachia terrestris*, *Lysimachia ciliata*, *Thalictrum polygamum*, *Galium asprellum*, poison ivy, purple willowherb, monkey flower, ironweed, spotted Joe Pye weed, reed canary grass, fowl blue grass, and barnyard grass.

It is not surprising that the site has many wet meadow areas, where haying has been discontinued, but where the pale green orchid is lacking. Although it produces abundant tiny seeds, which do persist for long periods in the seed bank (McKormick; in Cutlip 2018.), the spread of this species to newly available habitat is constrained by the fact that

orchids cannot become established unless the spores of three different fungi are also concurrently present along with the seed. One type of fungus is required for seeds to germinate; another for seedlings to become established; and a third for adult plants to receive adequate nutrition and persist (Rumussen 2015). Note that seed banking for orchids now includes the spores of the associated fungus species as well as the orchid seeds (McKormick; in Cutlip 2018).

More extensive haying in the past, as well as pasturing, which took place at the site for many decades before abandonment, would have limited the population of this species. Like all orchids, as well as lilies, it is highly palatable to grazing animals. Early summer mowing prevents seed production. It is not known how long or how well populations of this orchid, subject to agricultural activities or in excessive shade can persist in a vegetative state. While remnants could persist in seasonally saturated pole-size woods, though with insufficient light to bloom, it is unlikely that ions would have been missed during the surveys.

7.5 Mammals - *Chiroptera*

Hoary bat (*Lasiurus cinereus*)
Special Concern

Hoary bat is a widespread migratory bat species, which most often hibernates in large colonies south of Connecticut (e.g., central South America), where winters are warm, but migrates to Connecticut during the growing season, where it gives birth, often to twin pups, in forest habitats, where they are reared, typically through July. Because hoary bat it is a tree-roosting species, it has not been adversely affected by white-nose syndrome (WNS). However, its distribution and abundance in Connecticut has declined over the years due to impacts to preferred habitats, which includes mature forests, and good quality edge habitat.

Eastern Red bat (*Lasiurus borealis*)
Special Concern

Red bat is widely distributed in forested regions of the United States. In Connecticut they tend to choose rural habitats, away from human habitation, in mature woods near

clearings or forest-field ecotones. They are migratory species, arriving in Connecticut in April and leaving by late October, after breeding. During their time in Connecticut, they roost in dense foliage oaks, one of their preferred roosting trees. They give birth and rear their pups through July. Because red bat it is a tree-roosting species, it has not been adversely affected by white-nose syndrome (WNS). However, its distribution and abundance in Connecticut has declined due to impacts to preferred habitats, which includes mature forests, and good quality edge habitat.

Northern Long-Eared bat (*Myotis septentrionalis*)
Endangered (Connecticut); Threatened (Federal)

The Northern Long-Eared Bat (NLEB), which also federally listed as "threatened," was not listed in the original May 29, 2017 letter for the DEEP's NDDB regarding potential listed species at the subject site (see Attachment D).[13] Also, since more than year had gone by since the original query, a new query was submitted to Dawn McKay of NDDB on December 29th, 2020. In a brief email communication, Ms. McKay informed us that the original 2017 list of "listed species" would still be considered valid. As noted, the 2017 list did not include NLEB.

This is one bat species that has been severely impacted by white-nose syndrome (WNS), and is in danger of extinction. This bat species hibernates in caves and mines in the winter where is most susceptible to WNS. In Connecticut this species hibernacula have been surveyed, and a map has been produced showing the towns in which these are found (see Attachment G). The closest hibernacula to the site are several miles to the north and to the south in the Towns of Winchester and Morris, respectively. There are no recorded hibernacula in Litchfield or Torrington.

In the summer, this species will roost singly or in small colonies underneath the exfoliating bark of mature trees, or in crevices of tree snags. They will occasionally roost in structures such as barns.

[13] It should be noted that a revised query to the CTDEEP's NDDB was submitted on ??, since more than a year had gone by since the one sent in 2017.

Discussion – Mitigation

It is likely that both the hoary bat and the red bat utilize the site during the roosting season, and the possibility exists that NLEB could also utilize the site. The presence of mature forest, forested edges, wetlands, and on-site or nearby open water sources, contribute to this assessment.

As a precautionary mitigative measure, tree clearing for the proposed solar facility will be restricted according with 4(d) rule requirements of the Endangered Species Act (ESA), associated with the conservation of NLEB. Tree clearing will not occur in the months of June or July, in order to avoid the pup rearing season for not only NLEB but also for the two other listed bats (i.e., hoary and red bats). In the post-construction phase of the project, significant wooded areas will remain on the site or in the vicinity, and expansion of edge habitat will take place, providing additional foraging lanes for bats. Therefore, the site will continue to provide suitable habitats for the Connecticut and federally-listed bats during the spring and summer activity period.

7.6 Conclusion

Based on the listed species surveys conducted by REMA during several growing seasons, and as discussed above, it is unlikely that any of the species found in the May 2017 letter from DEEP's NDDB, occur or breed on the subject site. Two of the three additional Special Concern avian species that were observed, that is, the bobolink, and savannah sparrow, are likely very infrequent breeders at the site due to the ongoing agricultural activities (i.e., hayfield production). In fact, the site has acted more as an "ecological sink" encouraging breeding by these grassland species early in the growing season, only for their nests to be destroyed with the first cut of hay, typically in June. Therefore, in a sense, the solar facility will ensure that these species do not attempt to breed on the site, but rather to seek more suitable habitats elsewhere. The American kestrel was not confirmed as a breeder at the site, however, it could continue to use the site after the solar facility is in place, since suitable breeding and foraging habitat will be maintained throughout the site.

8.0 PROPOSED & POTENTIAL WETLAND/WATERCOURSE IMPACTS

8.1 Direct Wetland/Watercourse Impacts

Direct permanent wetland impacts are proposed at three locations (i.e., Impact Areas 2, 2, and 3; IA-1 through 1A-3, see Figure 2, Attachment A), to provide access to proposed solar array fields, totaling 9,660 square feet (i.e., 0.0.22 Acres). To the north, off of Highland Avenue in Torrington, access is provided to the northern portion of the project area, while in the central portion of the project area, access is provided from Rossi Road to the west. Also, an internal access roadway is proposed in the northernmost section of the site in Torrington, to provide connectivity between two farm fields with proposed arrays (see Figure 2, Attachment A).

The access roadway from Highland Avenue (i.e., Impact Area 1; IA-1), would disturb approximately 866 square feet (0.02 acres) of a forested wetland (i.e., Wetland N/1N, see Figure 2, Attachment A) (see Photo 20A, Attachment B). This necessary access roadway takes advantage of an old farm road which traverses the wetland, by placing up to two feet of fill through it, likely in the 1970s. Thus, the direct impact to this wetland has been minimized and the intensity of this "upgraded" crossing upon wetland functions and values shall be *minimal*.

The internal access roadway, would connect two existing open fields within the northernmost section of the overall site, by utilizing and upgrading an existing farm road that crosses over a narrow wetland corridor (i.e., Wetland N/1N, see Figure 2, Attachment A). The total direct impact for this crossing is approximately 587 square feet (0.013 acres). This wetland impact is considered to have a *minimal* effect to wetland functions and values. In addition to direct impacts, a *secondary* wetland impact shall take place at this crossing, through the clearing of shrubs and a few pole size trees in order to provide a wide enough access. This impact, which is estimated at 696 square feet (0.16 acres), is considered to be a *minimal* impact to wetland functions and values.

The access roadway from Rossi Road, would entail a *direct* wetland impact of approximately 8,207 square feet (0.188 acres) of scrub shrub and mowed wet meadow wetlands (i.e., Wetland C, see Figure 2, Attachment A), including the southerly flowing Gulf Stream. In addition, a *secondary* impact of 312 square feet (0.007 acres), associated with shrub clearing is proposed. As in the case of the northerly access roadway, this

roadway aligns with an existing, long-standing roadway that has served the farming operation for many decades (see Photo 12B, Attachment B). In fact, this agricultural roadway clearly appears on the 1934 archival aerial photo.

The engineering design for this second crossing improves upon the habitat of Gulf Stream by providing a 15-foot wide, bottomless arch culvert, which will completely span the Gulf Stream channel at this location. Under existing conditions, erosion and sedimentation of the stream downgradient of the farm road has taken place over the many decades of its use. This proposed design will eliminate this ongoing stream impact, while at the same time providing connectivity for aquatic organisms that utilize this riparian corridor. The culvert design and size complies with the U.S. Army Corps of Engineers (ACOE) Openness Ratio (OR). Therefore, the proposed wetland and watercourse crossing at this location is considered a *minimal* impact upon the regulated resources and the functions and values that they provide, and may also be considered an enhancement, with respect to protection of Gulf Stream.

It should be noted that consideration was given to crossing the riparian corridor further south and downstream, which would have reduced the *direct* wetland impact. However, this would have impacted an established, higher functioning portion of the riparian corridor, with somewhat steeper grades, and the opportunity of eliminating the existing ongoing impact of the farm road upon Gulf Stream would have been missed. Moreover, at least half of the direct impact at the preferred crossing location is low functioning meadow that has been hayed for many decades.

8.2 Indirect Wetland/Watercourse Impacts

Indirect or secondary impacts to a wetland or watercourse can occur as a result of activities *outside* of wetlands or watercourses. Such impacts can be *short-term* or *long-term*, and are typically associated with erosion and sedimentation, mostly during the construction period, the removal or disturbance of vegetation in upland areas but adjacent or in close proximity to wetlands or watercourses, the alteration of wetland hydrology or the flow regime of a watercourse, and the discharge of degraded surface water or groundwater, in the post-construction phase, which may adversely impact the water quality of the regulated resources.

The potential for any of these indirect impacts to occur at the site as a result of the proposal depends on the regulated resources themselves, their environmental sensitivity, and their ecological and physical characteristics. These potential impacts, as they relate to the specific development proposal, are discussed below.

8.2.1 Erosion and Sedimentation

The potential for soil erosion and subsequent deposition in wetlands or watercourses exists at every construction site that involves soil disturbance. At this site the risk or the potential for adverse impacts from erosion and sedimentation is considered to be *moderate.* The primary reasons for this assessment are as follows: (1) appropriate erosion and sedimentation controls have been proposed, in accordance with the 2002 *Connecticut Guidelines for Soil Erosion & Sediment Control*, (2) the dominant soils in the areas to be exposed or excavated during the construction phase have *moderate* erodibility[14]; and (3) slopes subject to soil disturbance are generally *moderate* throughout most of the site (i.e., C-slope), with a few steeper areas (i.e., D slope), in the central portion of the project area, such as the lower portion of the fields to the east of Rossi and Wilson Roads.

The site plans show sizeable detention basins, which will act as sedimentation basins during construction, are proposed in the lower portions of the areas to be graded for the solar panel installations, and include diversion swales to trap and convey surface flows to them. Also, reverse slope benching is proposed for every 15 feet of vertical grade change, as well as many other controls, as seen in the submitted documents by the petitioner. Nevertheless, diligent monitoring and maintenance of erosion and sedimentation controls is necessary to ensure that the regulated resources are protected during the construction phase.

8.2.2 Removal of Native Vegetation and Habitat Loss

Habitat loss associated with land clearing is an unavoidable consequence of land development, which has the potential of impacting wetlands and watercourses. At the

[14] The two dominant upland soil types to be disturbed at the site are the well-drained Paxton and Montauk soil series complex, and the moderately well drained Woodbridge soil series. The K-factor for these soils, which indicates the susceptibility of a soil to sheet and rill erosion is moderate, based on K-Factor (whole soil) ratings of 0.24 to 0.28. However, slope increases the erodibility of these soils, which necessitates the use of robust erosion and sedimentation controls.

subject site, a minimum permanent wetland buffer of 25 feet is maintained. The security fence that surrounds the solar array fields are typically further away from delineated wetlands, and the solar panels are yet further away. The one notable exception into the 25-foot non-disturbance buffer is some minimal grading for Stormwater Pond #9, in the northern portion of the site.

In the northern section of the site, a distance of 100 feet or more is maintained to the site's primary perennial watercourse, namely Gulf Stream. The closest any clearing associated with the proposed development comes to this watercourse to the east of Rossi and Wilson Road is 65 feet, roughly 300 feet downstream of the access roadway wetland/watercourse crossing. To the west of Rossi Road, the permanent buffer to Gulf Stream is maintained to over 100 feet, except in one limited location south of Stormwater Pond #2, but this area to be graded will be stabilized and planted. Proposed grading will come within 60 feet of the northern of the two hillside seepage areas associated with Gulf Stream to the east of Wilson Road (i.e., Wetland C/5C, see Figure 2, Attachment A) but this area will also be stabilized and planted.

Overall, the wetland and watercourse buffers that are proposed are of sufficient in width and quality to continue to protect the regulated resources and to provide complimentary habitat that will maintain wetland functions and values.

8.2.3 Potential Impacts to Wetland Hydrology and Stream Flow

The hydrologic and flow regimes to the site's extensive wetland areas, including isolated wetlands are dependent predominately direct precipitation and surface flows from their respective watersheds. However, seasonally for most wetlands, a groundwater component is also contributing the wetland hydrology, as infiltrated rain water rides on the hardpan that is characteristic of most of the site's soils, and discharges into wetland areas. Throughout the site, surface and shallow groundwater flows will be maintained. There will be no significant diversions of flows from the proposal which would deny water to any wetland. Therefore, the proposed activities will not result in any appreciable hydrologic changes (i.e., overall or localized) to the regulated wetlands, and no impacts to wetland hydrology are anticipated.

8.2.4 Potential Water Quality Impacts

Stormwater runoff from impervious surfaces of development (e.g., commercial, residential) sites has the potential of degrading the water quality (i.e., surface and groundwater) of regulated resources. Generation of potential pollutants on impervious surfaces typically results from vehicular traffic over them. The more the "axle-miles" or the movements of vehicles over impervious surfaces, the higher is the potential loading of runoff constituents, including sediment, nutrients, heavy metals, and the like.

However, at this site, runoff constituents associated with vehicular traffic and "active" interconnect impervious surfaces will not be generated. All stormwater runoff generated from the "inactive" and functionally disconnected impervious surfaces (i.e., solar panels) will be treated on site through properly sited, configured, and sized, above-ground, primary treatment systems, in accordance with the guidelines set forth in CT DEEP's Stormwater Quality Manual (2004). It should be noted, however, that the primary water *quality* control measure at the site is the maintained grass and forb cover associated with the solar array fields. The proposed stormwater basins' primary function is water *quantity* control. Therefore, with the proposed best management practices in place, the water quality of the receiving waters, including Gulf Stream will be maintained at existing levels.

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Attachment A

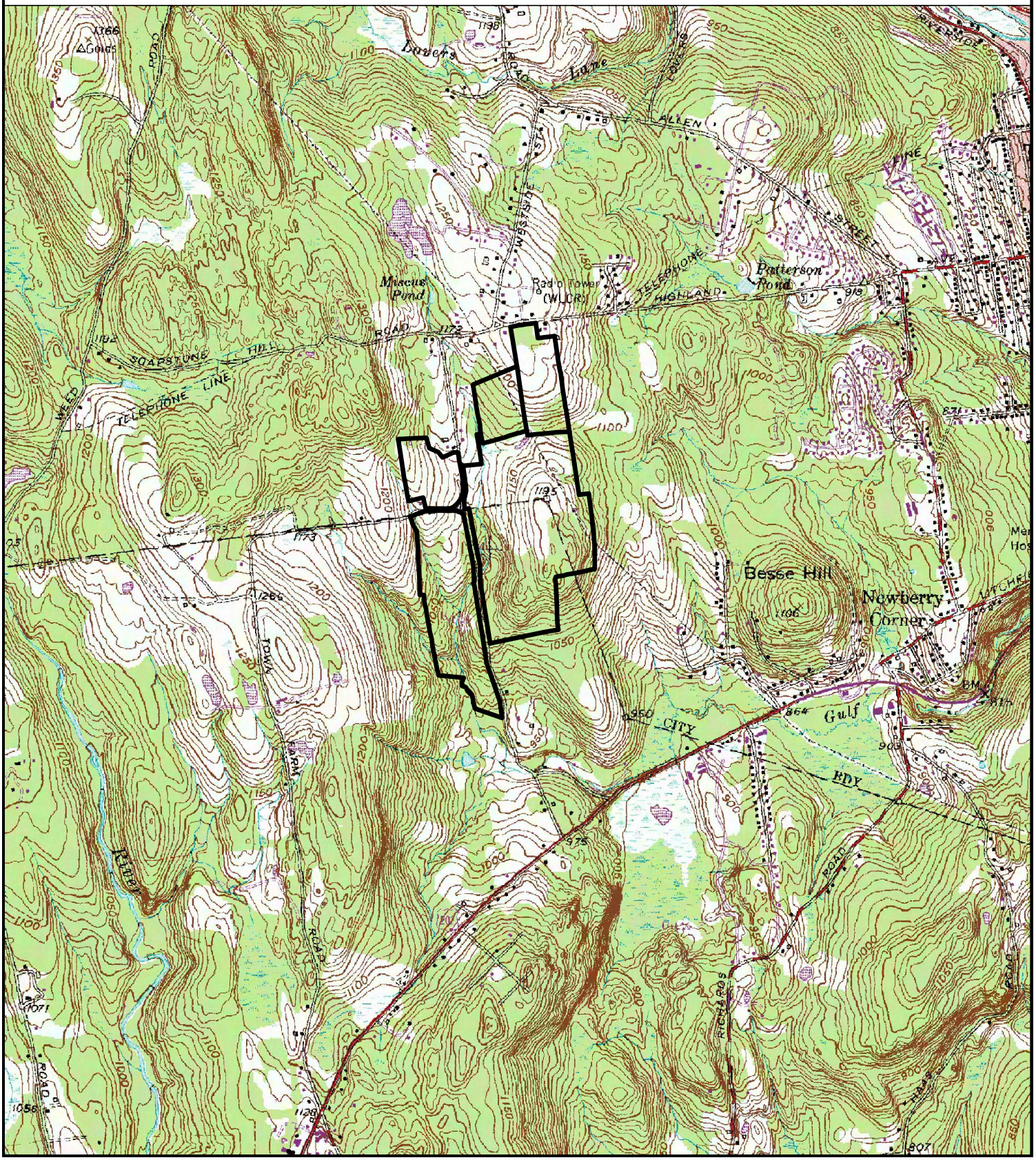
Figures (1 to 3)

FIGURE 1:

SITE LOCUS MAP
Litchfield-Torrington Solar Facility

2000 1000 0 2000
GRAPHIC SCALE IN FEET

N



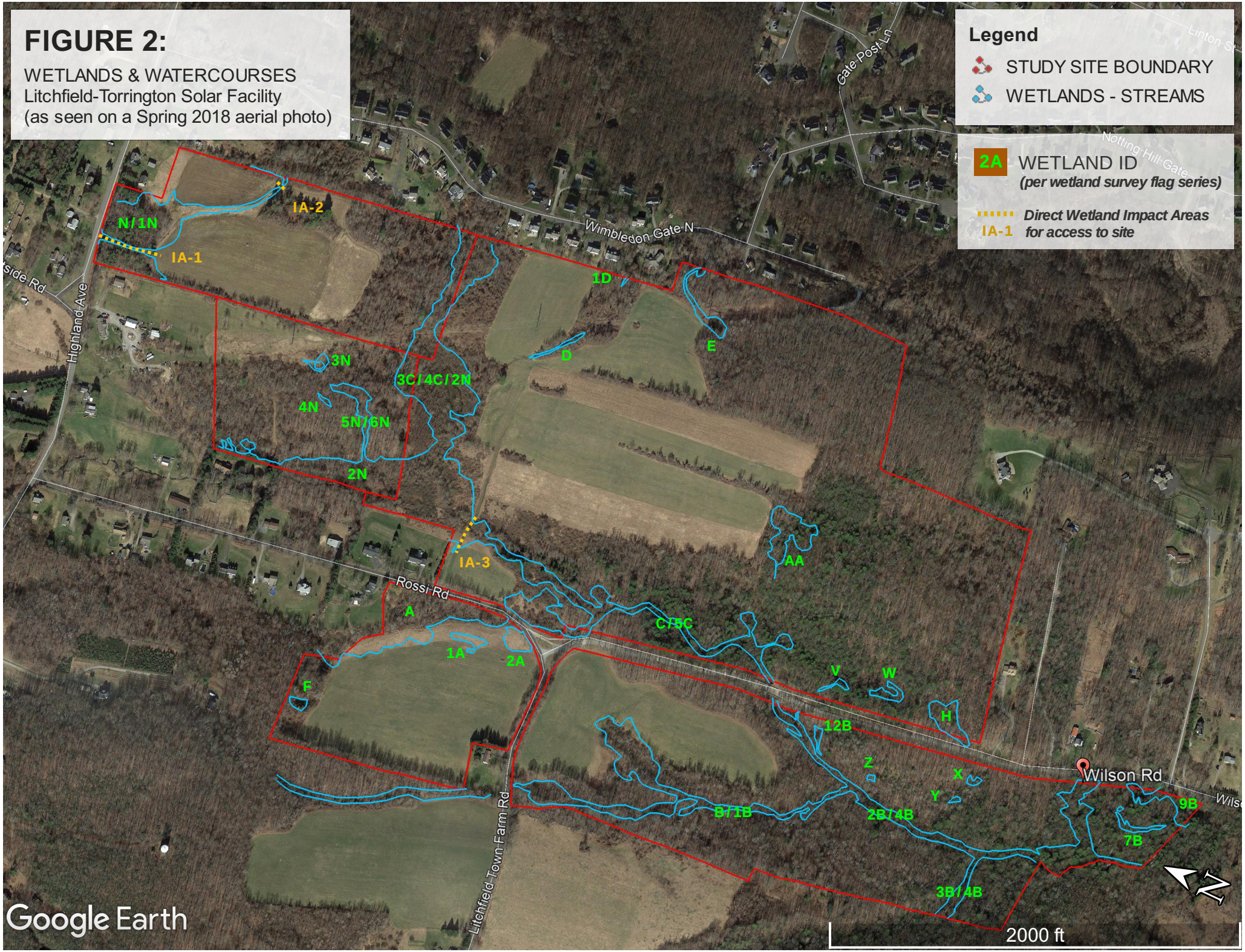
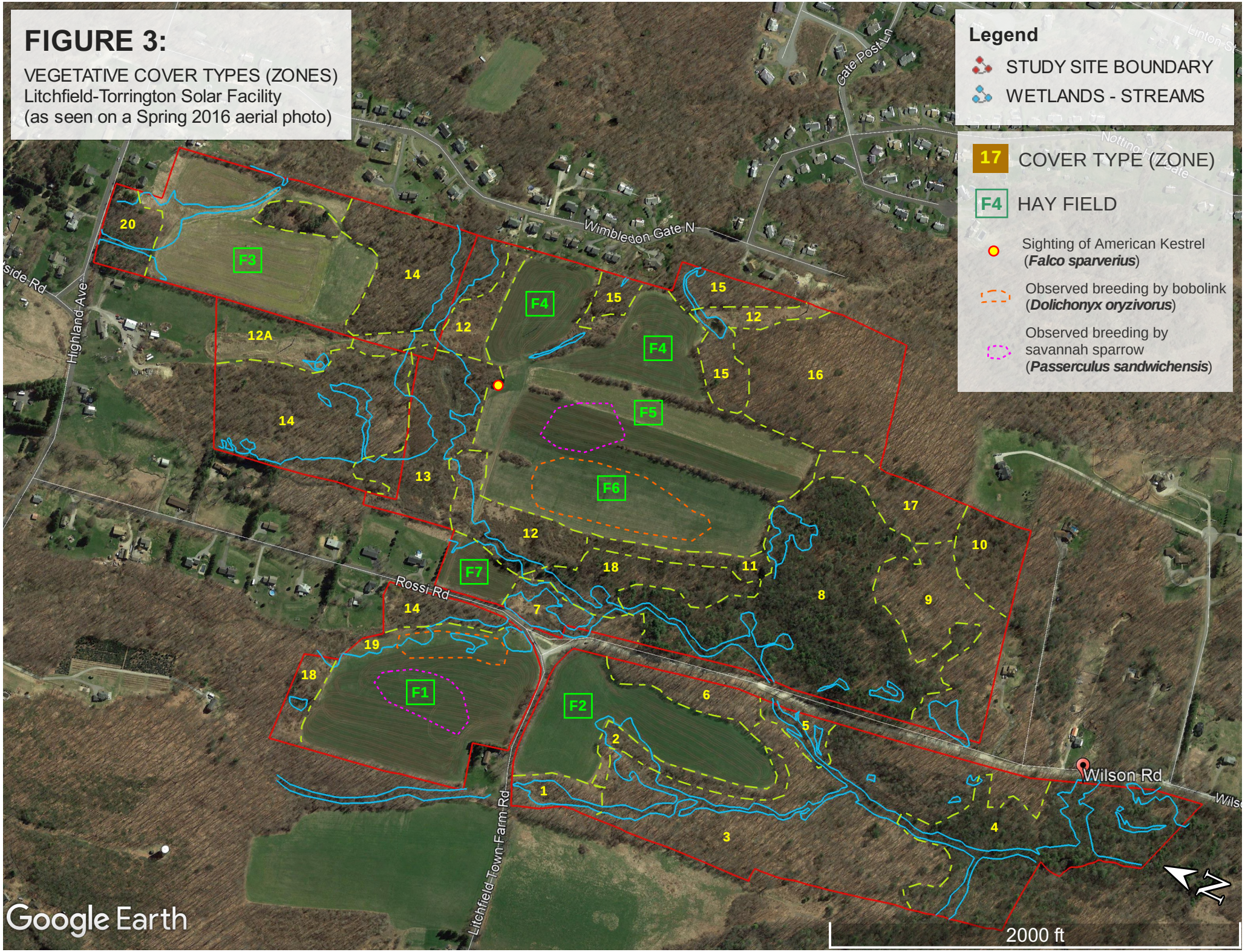


FIGURE 2:
WETLANDS & WATERCOURSES
Litchfield-Torrington Solar Facility
(as seen on a Spring 2018 aerial photo)
Legend
STUDY SITE BOUNDARY
WETLANDS - STREAMS
2A WETLAND ID
(per wetland survey flag series)
IA-1 Direct Wetland Impact Areas for access to site
Wimbledon Gate N
Gate Post Ln
Notting Hill Gate
Highland Ave
Rossi Rd
Litchfield Town Farm Rd
Wilson Rd
IA-2
N/1N
IA-1
1D
E
D
3N
3C/4C/2N
4N
5N/6N
2N
IA-3
AA
A
C/5C
1A
2A
F
V
W
H
12B
Z
X
Y
B/1B
2B/4B
9B
7B
3B/4B
Google Earth
2000 ft

FIGURE 3:

VEGETATIVE COVER TYPES (ZONES)
Litchfield-Torrington Solar Facility
(as seen on a Spring 2016 aerial photo)



Attachment B

Annotated Photographs of Vegetative Cover Types/Zones

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 1A: Cover Type Zone 1; sugar maple – white ash – basswood upland forest; stream corridor on far left; facing southerly

Photo 1B: Cover Type Zone 1, wetland portion; facing westerly

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 2A: Cover Type Zone 2; tall invasive shrub community; edge of field; facing easterly

Photo 2B: Cover Type Zone 2 (far let of photo, edge of field); wetland (wet meadow) extends into hay field (F2), facing northerly (January 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 3A: Cover Type Zone 3; Sugar maple – White ash community; southerly of open field (F2); facing northerly (October 2017)

Photo 3B: Cover Type Zone 3 Gulf Stream below Wilson Road box culvert, facing southwesterly (December 2016)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 3C: Cover Type Zone 3; Sugar maple – White ash community; confluence of Gulf Stream with site's perennial watercourse; facing northwesterly (April 2017)

Photo 3D: Cover Type Zone 3; hillside west of Gulf Stream; facing northerly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 3E: Cover Type Zone 3; disturbance wetland within in old quarry (Z-series); facing northwesterly (April 2017)

Photo 3F: Cover Type Zone 3; Gulf Stream; facing northeasterly (upstream) (December 2016)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 4A: Cover Type Zone 4; mixed age forest of eastern hemlock – Red oak – yellow birch (white pine seen here); facing easterly (October 2017)

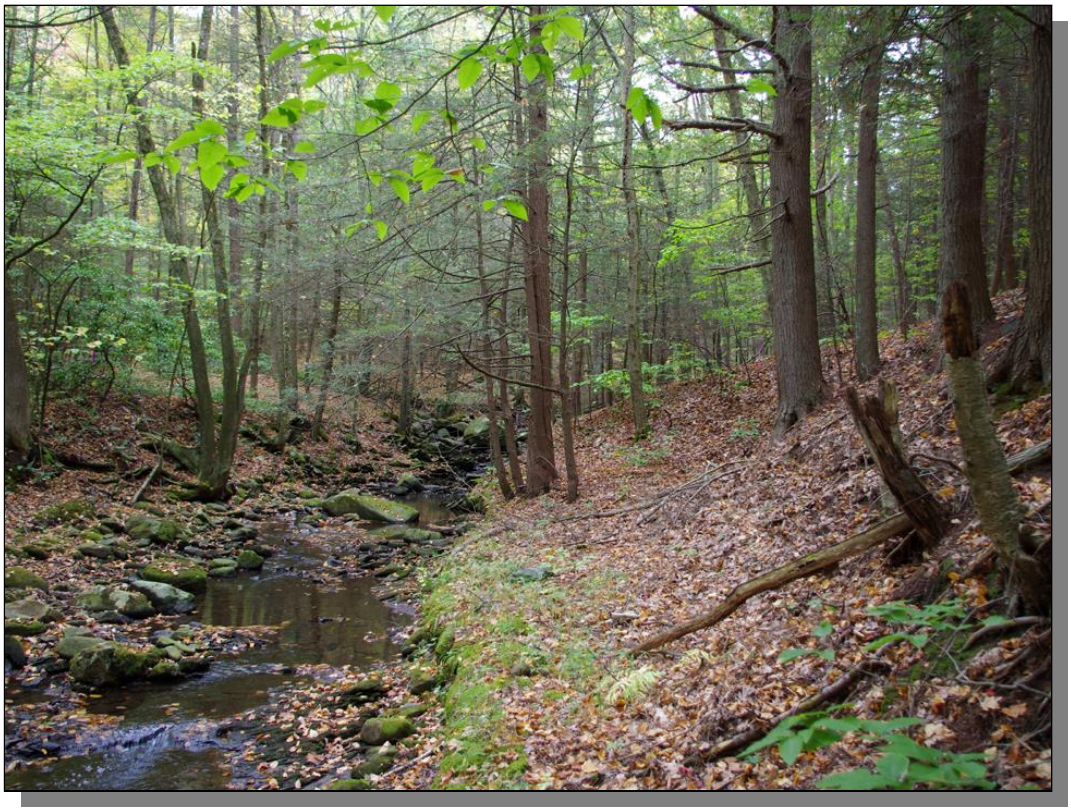


Photo 4B: Cover Type Zone 4; Gulf Stream; facing northerly (upstream) (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 5A: Cover Type Zone 5; upper section of Gulf Stream and seepage wetland (12B-series); box culver under Wilson Road; facing northeasterly (January 2017)

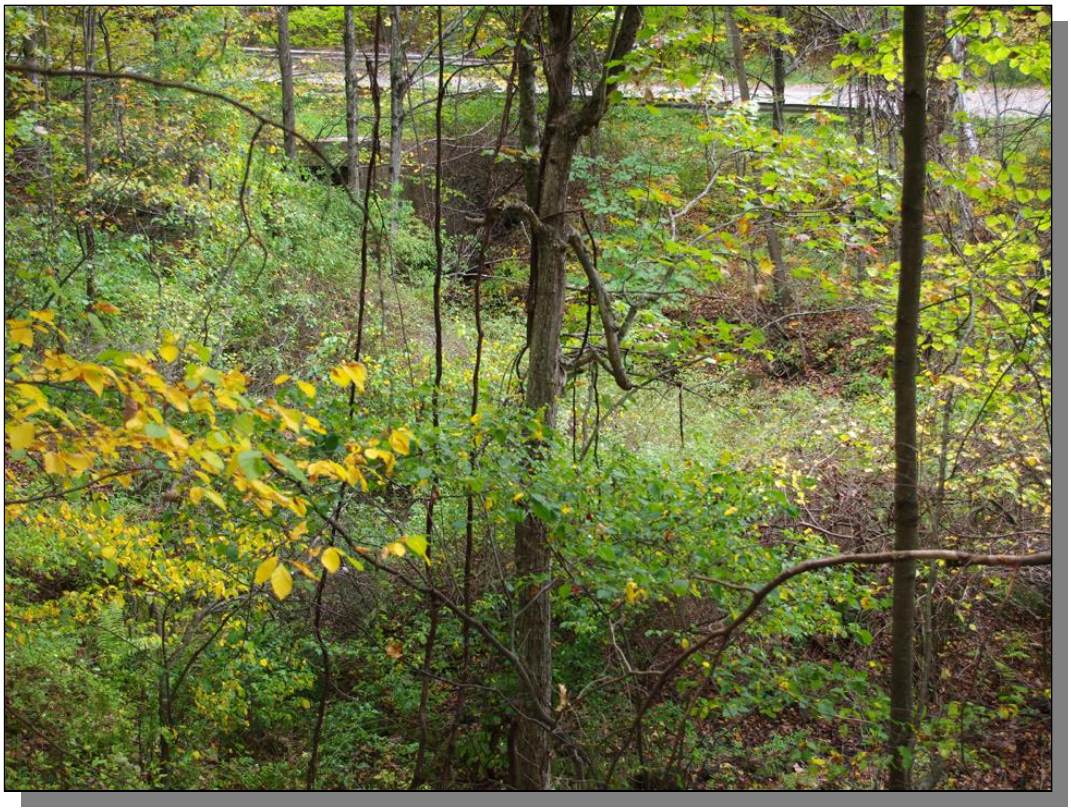


Photo 5B: Cover Type Zone 5; Gulf Stream at the bottom of hill; facing easterly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 6A: Cover Type Zone 6; sugar maple – white ash hardwood forest; Wilson Road in background; facing southerly (October 2017)

Photo 7A: Cover Type Zone 7; Sugar maple – white ash hardwood forest, east of Rossi and Wilson Roads; facing westerly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8A: Cover Type Zone 8; Hemlock-pine mixed forest; discharge from seepage wetland; facing southeasterly (January 2017)

Photo 8B: Cover Type Zone 8; Hemlock – white pine forest, mixed hardwoods forest; plateau at top of hill; facing southwesterly (March 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8C: Cover Type Zone 8; Hemlock-pine mixed forest; one of two (southern) hillside seep wetlands; facing southeasterly (January 2017)

Photo 8D: Cover Type Zone 8; Hemlock – white pine forest, mixed hardwoods forest; brow of slope; facing southwesterly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8E: Cover Type Zone 8; Hemlock-pine mixed forest; hardwood patches mixed in; facing southerly (October 2017)

Photo 8F: Cover Type Zone 8; Hemlock – white pine forest, mixed hardwoods forest; bedrock (schist); facing southerly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8G: Cover Type Zone 8; Hemlock-pine mixed forest; hardwood patches mixed in; facing northwesterly (October 2017)

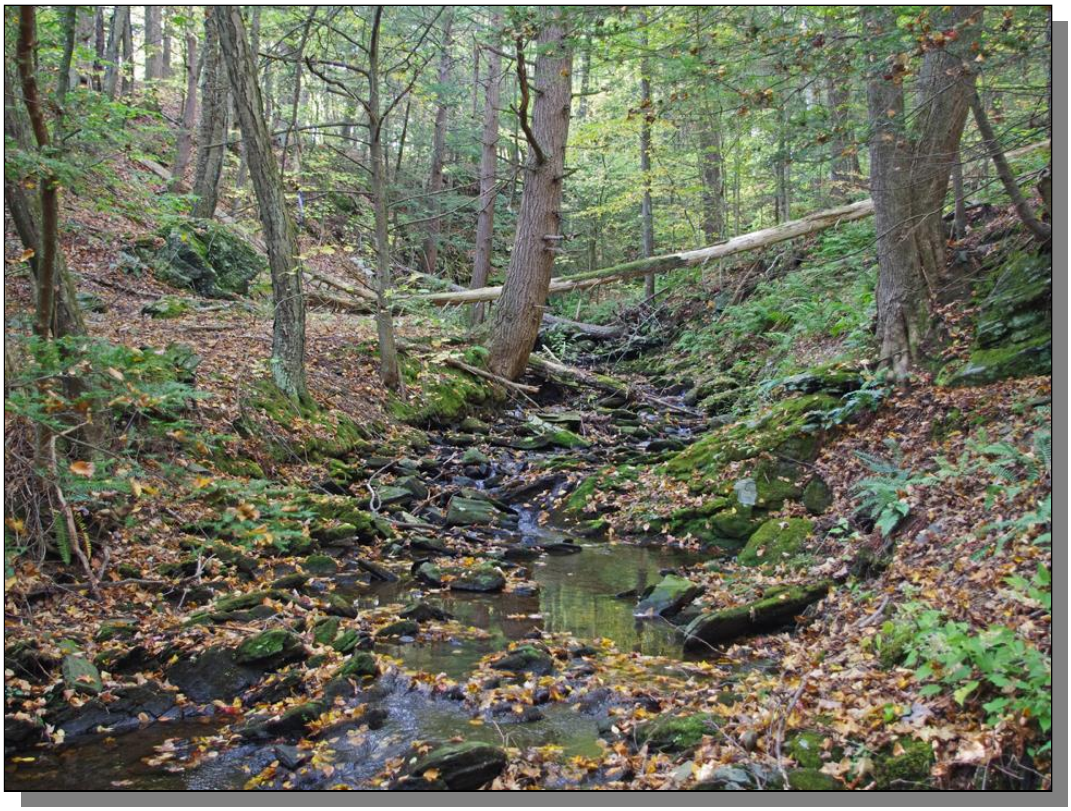


Photo 8H: Cover Type Zone 8; Hemlock – white pine forest, mixed hardwoods forest; bedrock (schist); Gulf Stream within ravine; facing northeasterly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8I: Cover Type Zone 8; Hemlock-pine mixed forest; embedded seepage wetland near top of west facing hill (i.e., AA-series; facing southwesterly (September 2017)

Photo 8J: Cover Type Zone 8; Hemlock – white pine forest, mixed hardwoods forest; embedded Wetland AA; facing westerly (September 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8K: Cover Type Zone 8; Hemlock-pine mixed forest; bedrock outcrops at hill prominence; facing southwesterly (April 2017)

Photo 8L: Cover Type Zone 8; Hemlock – white pine forest, mixed hardwoods forest; Gulf Stream; facing southwesterly (December 2016)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8O: Cover Type Zone 8; Hemlock-pine mixed forest; Gulf Stream; facing northeasterly (April 2017)

Photo 8P: Cover Type Zone 8; downgradient terminus of flagged intermittent watercourse outflow of Wetland AA; facing southwesterly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8O: Cover Type Zone 8; Hemlock-pine mixed forest; Gulf Stream; facing northeasterly (January 2017)

Photo 8P: Cover Type Zone 8; Gulf Stream; facing southwesterly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8Q: Cover Type Zone 8; Hemlock-pine mixed forest; isolated wetland (H-series); facing westerly (Wilson Road in background) (January 2017)

Photo 8R: Cover Type Zone 8; same wetland as previous shot; facing southwesterly (April 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8S: Cover Type Zone 8; Hemlock-pine mixed forest; isolated wetland (W-series); facing northeasterly (March 2017)

Photo 8U: Cover Type Zone 8; bedrock outcrop with Canada mayflower and common polypody (fern); facing northeasterly (April 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8V: Cover Type Zone 8; Hemlock-pine mixed forest; Gulf Stream; facing southerly (January 2017)

Photo 8W: Cover Type Zone 8; bedrock outcrops; facing northeasterly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8X: Cover Type Zone 8; Hemlock-pine mixed forest; seepage wetland feeding Gulf Stream from slope to east; facing northwesterly (April 2017)

Photo 8Y: Cover Type Zone 8; seepage wetland feeding Gulf Stream; facing westerly (April 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 8Z: Cover Type Zone 8; Hemlock-pine mixed forest; seepage wetland feeding Gulf Stream from slope to east; facing northwesterly (April 2017)

Photo 9A: Cover Type Zone 9; N. red oak-maple leaf viburnum-blue ridge blueberry; bedrock outcrops; facing northerly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 9B: Cover Type Zone 9; N. red oak-maple leaf viburnum-blue ridge blueberry; lowbush blueberry understory; facing southwesterly (October 2017)

Photo 10A: Cover Type Zone 10; Old Field/Young forest; facing southerly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 11A: Cover Type Zone 11; Field edge/invasive shrubs; facing southwesterly (October 2017)

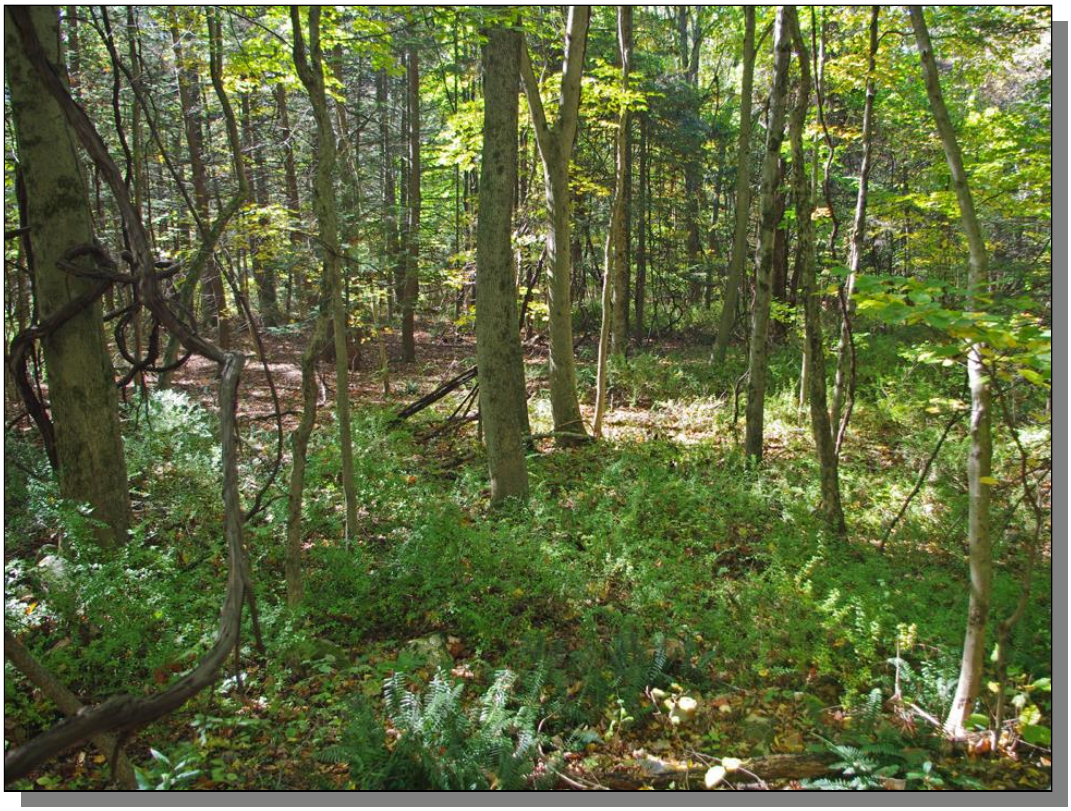


Photo 11B: Cover Type Zone 11; Japanese barberry and Christmas fern dominate understory; facing southwesterly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 11C: Cover Type Zone 11; field edge-invasive shrubs; seepage Wetland AA is located just beyond invasives; note ash die-out; facing southerly (October 2017)

Photo 12A: Cover Type Zone 12; Old Field/Young forest; facing southerly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 12B: Cover Type Zone 12; old field-early to mid-successional; 3C/4C/2N wetland and Gulf Stream farm crossing; facing westerly (January 2017)

Photo 12C: Cover Type Zone 12; Old field; facing southerly (June 2020)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 12D: Cover Type Zone 12; old field-early to mid-successional; 3C/4C/2N wetland (scrub shrub/emergent mosaic; facing northeasterly (April 2017)

Photo 12E: Cover Type Zone 12; Old field; easterly of Gulf Stream corridor, southerly of farm crossing; facing westerly (June 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 12F: Cover Type Zone 12; old field (variant); most of the non-mowed portions of the Eversource ROW are this cover type; facing northerly (April 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 13A: Cover Type Zone 13; shrub-scrub/meadow mosaic; 3C/4C/2N wetland; facing southwesterly (April 2017)

Photo 13B: Cover Type Zone 13; transitioning into young woods; Gulf Stream (channelized) entering south from the north; facing northerly (April 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 13C: Cover Type Zone 13; man-made pond/marsh; 3C/4C/2N wetland; facing westerly (January 2017)

Photo 14A: Cover Type Zone 14; sugar maple-white ash-basswood forest; facing westerly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 13D: Cover Type Zone 13; man-made pond/cattail marsh; 3C/4C/2N wetland; facing westerly (April 2018)

Photo 13E: Cover Type Zone 13; young red maple/alder swamp within 3C/4C/2N-series wetland (January 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 13F: Cover Type Zone 13 (in background); view of 3C/4C/2N-series wetland from Field 5 (F5); facing westerly (April 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 14B: Cover Type Zone 14; inlet of culvert under Rossi Road; A-series wetland; facing southerly (December 2016)

Photo 14C: Cover Type Zone 14; in the northern section of this zone sugar maple is replaced by red maple; multiflora dominates; facing westerly (April 2018)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 15B: Cover Type Zone 15; 4N-series isolated wetland; invasives dominated understory; facing southeasterly (April 2018)

Photo 15C: Cover Type Zone 15; Northern red oak/maple-leaf viburnum transitional forest; beech grove; facing northerly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 16A: Cover Type Zone 16; northern red oak/maple leaf viburnum; this habitat block will be preserved in association with VP #2; facing easterly (April 2018)

Photo 17A: Cover Type Zone 17; Birch glade variant of northern red oak/maple-leaf viburnum; facing northeasterly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 17B: Cover Type Zone 17; northern red oak/maple leaf viburnum; facing southeasterly (October 2017)

Photo 18A: Cover Type Zone 18; sugar maple/ash forest; note Japanese barberry understory dominance to edge of Gulf Stream; facing northeasterly (October 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 19A: Cover Type Zone 19; wet meadow (maintained) (A-series wetland); facing southeasterly (December 2016)

Photo 19B: Cover Type Zone 19; isolated wet meadow (maintained) (1A-series wetland); facing southeasterly (December 2016)

Photo 19C: Cover Type Zone 19; wet meadow (maintained) (A-series wetland) at the edge of Cover Type Zone 14 (A-series); facing southeasterly (December 2016)

Photo 19D: Cover Type Zone 19; wet meadow (maintained) (A- and 1A-series wetland); facing northeasterly (June 2017)

Litchfield – Torrington Solar Facility, Cover Type Zones
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 20A: Cover Type Zone 20; forested swamp (N-series wetland) at the far northern portion of site by Highland Avenue; facing southwesterly (October 2017)

Attachment C

Soil Investigations/Mapping

MEMORANDUM

To: George T. Logan, Rema Ecological Services, LLC
From: Bill Jackson, RS, LEP, Registered Soil Scientist
Date: May 26, 2020
Subject: Spade & Auger Test Holes to Determine Soil Drainage Class
Silicon Ranch Corporation Parcels, Litchfield and Torrington, CT

Introduction

The subject properties within the project limits for proposed ground-mounted solar arrays are underlain by soils derived from glacial till parent materials. The Web Soil Survey[1] shows the glacial till uplands having well-drained and moderately-well-drained soils belonging to Paxton fine sandy loam and Woodbridge fine sandy loam soil series. Both of these soil series are derived from glacial lodgment till and commonly exhibit a dense substratum. Spade & auger test holes were performed on the subject properties on May 16, 19 and 20, 2020 to describe soil profiles and assign soil drainage classifications. The purpose of the investigation was predominately to distinguish between well-drained and moderately-well-drained soils on the landscape, and to verify or revise the Web Soil Survey mapping of soil types.

The following definition of moderately-well-drained soil was referenced:

Moderately-well-drained soils have a udic moisture regime and, between a depth of 16 to 40 inches below the soil surface, have one of the following: redoximorphic features:

1) *redoximorphic features: that are common to many, distinct or prominent, and that are chroma 3 or less.*
2) *a matrix chroma of 3 or less and mottles that are common to many, distinct or prominent, regardless of their chroma.*[2]

The glacial till uplands within the subject parcels exhibited shallow depths to dense lodgment till and/or bedrock. The dense till and bedrock apparently serve as boundary conditions and influence the infiltration and migration of water within the soil profile. Consequently, the majority of the upland-type soils on the subject parcels, with the exception of the northwestern-

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[1] The Web Soil Survey, USDA, Natural Resources Conservation Service. http://websoilsurvey.nrcs.usda.gov

[2] Guidelines for Soil Drainage Class Determination in New England. http://nesoil.com/properties/drainageclasses.htm

most section of the project limits within Parcel No. 217/001/024, were classified as moderately-well-drained.

We should note that the Paxton fine sandy loam soil series is considered as having a well-drained drainage class. However, with a compact till layer found 22 to 24 inches the effects on drainage are profound. Therefore, for this site and for the work that is being proposed, we consider these soils to act as moderately well drained soils, similar to the Woodbridge soil series, which dominates much of the landscape within the project limits.

1. Parcel No. 217/004/074, Torrington, CT

This parcel is located east of Rossi Road and south of Highland Avenue. The parcel includes sections of the former Follert Property and the Helen Lippincott Living Trust property. Two test holes and a hand auger boring were conducted in areas mapped by USDA-NRCS as Paxton fine sandy loam. Test hole TH-1 was located in the cornfield. Test hole TH-2 was located within the steep forested hillside immediately south of the cornfield. The soil boring was located west of the corn field and immediately east of the right-of-way for the electric power transmission lines. The approximate locations of the test holes (TH) and soil boring (SB) were plotted on as set of project drawings, which were provided to the project engineer. Soil profile descriptions for the test holes are included within a set of typed Soil Investigation Field Notes. The soils within the test holes and the hand auger boring were classified as moderately-well drained.

A dense C-horizon was encountered 19-inches below surface grade in test holes TH-1 and TH-2. A core sample of the C-horizon (i.e., the substratum) was collected between 20 and 25-inches below surface grade within test hole TH-1. The core sample exhibited the following physical characteristics:

Soil Core, Test Hole TH-1, May 16, 2020

Core Interval	20 to 25-inches below surface grade
Texture	fine sandy loam
Structure	not observed
Dry Bulk Density	1.85 grams per cubic centimeter (g/cm3)
Porosity	29 %
Volumetric Moisture Content	28 %
Degree of Saturation	95 %

The 1.85 g/cm3 measured value for dry bulk density represents very dense soil. This value was within the range of values for maximum dry density reported for the substratum of Paxton and Woodbridge fine sandy loam soils in Table 3 of the Litchfield County Soil Survey.[3]
The western section of the parcel was also inspected on May 15 and May 16, 2020, and additional wetland boundaries were flagged in the vicinity of Gulf Stream at the western property boundary. This section of the parcel is located west of the right-of-way for the electric power transmission lines and is an area mapped has Woodbridge fine sandy loam by the Web Soil Survey (USDA-NRCS).

2. Parcel No. 217/004/016, Torrington, CT

This parcel is located east of Rossi Road. Test holes TH-3, TH-4, TH-10 and TH-13 were conducted along a transect that extended up-slope on the side of a drumlin, in an easterly direction, perpendicular to the topographic contours, in an area mapped as Paxton fine sandy loam. The drumlin was vegetated predominately by grasses and herbaceous vegetation. Test hole TH-3 was located at the tree-line at the base of the drumlin, the soil profile indicated poorly-drained conditions. However, this is an isolated, somewhat depressional area that is considered a poorly drained inclusion within predominately upland-type soils. This area is too small to delineated as a wetland. It is also an area at the edge of a hayfield that has been manipulated by many decades of agriculture. The soil profiles for test holes TH-4, TH-10 and TH-13 were described as moderately-well-drained. A soil profile description for TH-13 was not included; however, the soil profile was similar to the one for TH-10. A Cd-horizon was encountered approximately 30-inches below surface grade.

3. Parcel No. 217/004/016, Litchfield, CT

This parcel is located east of Wilson Road. Test holes TH-11 and TH-12 were located within a forested area of the drumlin top southeast of a cornfield. Test holes TH-11 and TH-12 exhibited shallow depths (i.e., less than 30-inches) to bedrock. The soil profile within test hole TH-12 exhibited moderately-well drained conditions. The bedrock mapped beneath the project area is identified as "Rowe Schist" and described as a grey to silvery-grey micaceous crystalline metamorphic rock.[4]

[3] Gonick, W.N., Shearin, A.E. and Hill, D.E. 1970. Soil Survey of Litchfield County, Connecticut. United States Department of Agriculture in Cooperation with the Connecticut Agricultural Experiment Station and the Storrs Agricultural Experiment Station.

[4] Rogers, J. 1985. Bedrock Geological Map of Connecticut, Connecticut Geological and Natural History Survey, Natural Resources Center, CT DEP, in cooperation with U.S. Geological Survey, Department of the Interior, Scale: 1:125,000.

4. Parcel No. 217/001/024, Torrington, CT

This parcel is located west of Rossi Road and north of Town Farm Road. Test holes TH-5, TH-6, TH-7 and TH-8 were conducted along a transect, shown on the attached drawing, that extended up-slope on the side of a drumlin, in a westerly direction, perpendicular to the topographic contours. The drumlin was vegetated predominately by grasses and herbaceous vegetation. Test hole TH-5 was located immediately west of the wetland boundary shown on the existing conditions plans. The soil profiles for test holes TH-5, TH-6 and TH-7 were described as moderately-well-drained. A soil profile description for TH-7 was not included; however, the soil profile was similar to the one for TH-6. A Cd-horizon was encountered approx. 20-inches below surface grade.

The soil profile characteristics recorded for test hole TH-8 showed a coarser texture that suggested the test hole may have been located within ablation till. The test hole extended 32-inches below surface grade to hand auger refusal, presumably on bedrock. Although the boring did not extend a full 40-inches below surface grade, well-drained soil conditions were assumed due to the absence of "common to many" or "distinct or prominent" redoximorphic features within the soil solum.

5. Parcel No. 162/020/015, Litchfield, CT

This parcel is located west of Wilson Road and south of Town Farm Road. Test holes TH-14 and TH-15 were located within glacial till uplands in a mowed hay field. Test hole TH-14 extended 31-inches below surface grade to hand auger refusal. The soil profile within Test hole TH-14 exhibited moderately-well-drained conditions. Test hole TH-15 was located approximately 600-feet further south. A Cd-horizon was encountered 22-inches below surface grade. The soil profile for test hole TH-15 was also described as moderately-well drained.

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-2

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN
SITE LOCATION: Parcel No. 217/004/074 Silicon Ranch Corporation, Torrington, CT (East of Rossi Road, South of Highland Ave.) Located within Steep Forested Hillside Immediately South of Edge of Cornfield	

DATE: MAY 16, 2020	TIME: 12:00	WEATHER: Clear, Sunny, 70 F
LAND USE: Forested Land	LANDFORM: Glacial Till Uplands	SLOPE: N/R
SOIL MAP UNIT: Paxton fine sandy loam		DEPTH TO GRNDWTR: N/A
SOIL DRAINAGE CLASS: Moderately Well Drained		DEPTH TO BEDROCK: N/A
PARENT MATERIAL: Basal (Lodgment) Glacial Till		DEPTH TO COMPACT SOIL: 19-inches

			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 5.5	clear	fine sandy loam	10YR 3/3	- -	granular	friable	0%	common roots
Bw1	5.5 - 9.5	abrupt	fine sandy loam	10YR 5/4		m. subang blky	friable	10%	few roots, worm casts
Bw2	9.5 - 17	abrupt	loamy fine sand	2.5Y 5/3	7.5YR 4/4	m. subang blky	friable	10%	Redox: f,m,d. No roots
Bw3	17 - 19	abrupt	loamy fine sand	2.5Y 5/3	7.5YR 4/4	m. subang blky	friable	10%	Redox: f,m,d. No roots
					10YR 5/1				Redox: c,m,d.
Cd	19 - 25	N/A	fine sandy loam	2.5Y 4/2	7.5 YR 4/6	N/A	very firm	N/R	Redox: c,m,p.
					2.5Y 5/1				Redox: f,m,f.

NOTE: N/A = Not Applicable
N/R = Not Recorded

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-1

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN								
SITE LOCATION: Parcel No. 217/004/074 Silicon Ranch Corporation, Torrington, CT (East of Rossi Road, South of Highland Ave.) Former Lippencott and Follert Properties Located Approx. 300 feet South of Edge of Cornfield, in Line with Access Road from Highland Avenue									
DATE: MAY 16, 2020			TIME: 11:00						WEATHER: Clear, Sunny, 70 F
LAND USE: Cultivated Agricultural Field			LANDFORM: Glacial Till Uplands						SLOPE: 0 to 3%
SOIL MAP UNIT: Woodbridge fine sandy loam									DEPTH TO GRNDWTR: N/A
SOIL DRAINAGE CLASS: Moderately Well Drained									DEPTH TO BEDROCK: N/A
PARENT MATERIAL: Basal (Lodgment) Glacial Till									DEPTH TO COMPACT SOIL: 19-inches
			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 6	clear	fine sandy loam	10YR 3/3	- -	granular	friable	5%	common roots, Ap Horiz. 6 to 9-in. thick
Bw1	6 - 9.5	abrupt	fine sandy loam	10YR 5/4		m. subang blky	friable	10%	few roots, worm casts.few roots
Bw2	9.5 - 16	abrupt	loamy fine sand	10YR 5/4	10YR 4/6	m. subang blky	friable	10%	Redox: f,m,d. No roots
Bw3	16 - 19	abrupt	loamy fine sand	10YR 5/4	10YR 4/6	m. subang blky	friable	10%	Redox: f,m,d. No roots
					2.5Y 4/2				Redox: c,m,d.
Cd	19 - 25	N/A	fine sandy loam	2.5Y 4/2	7.5 YR 4/6	N/A	very firm	N/R	Redox: c,m,p. no roots
					2.5Y 5/1				Redox: f,m,f.

NOTE: N/A = Not Applicable
N/R = Not Recorded
Core Sample: Cd Horizon, 20 to 25-inches below surface grade

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-3

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN								
SITE LOCATION: Parcel No. 217/004/016 Silicon Ranch Corporation, Torrington, CT (East of Rossi Road) Located at Edge of Field, Approx. 300 feet East of Gulf Stream, Approx. 300 feet south of tractor access path									
DATE: MAY 19, 2020	TIME: 11:00							WEATHER: Clear, Sunny, 70 F	
LAND USE: Mowed Field	LANDFORM: Glacial Till Uplands							SLOPE: N/R	
SOIL MAP UNIT: Paxton fine sandy loam								DEPTH TO GRNDWTR: N/A	
SOIL DRAINAGE CLASS: Poorly Drained								DEPTH TO BEDROCK: N/A	
PARENT MATERIAL: Glacial Till								DEPTH TO COMPACT SOIL: N/A	

			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 6	abrupt	v fine sandy loam	10YR 3/2	- -	granular	friable	0%	many roots, moist
Bw1	6 - 9	abrupt	sandy loam	2.5Y 5/2	GY1 4/5	m. subang blky	friable	10%	Redox: c,m,p. few roots, moist
					7.5 YR 3/4				Redox: c,m,p.
Bw2	9 - 19	clear	fine sandy loam	10YR 4/4	10YR 4/1	m. subang blky	friable	10%	Redox: f,c,d. no roots, moist
Bw3	19 - 27	N/A	fine sandy loam	2.5Y 4/3	10YR 4/4	N/A	friable	10%	Redox: f,c,f. no roots, very moist
					5Y 5/1				Redox: c,m,d.

NOTE: N/A = Not Applicable
N/R = Not Recorded
Sample collected: Bw1 Horizon

NOTE: This is considered an inclusion within moderately well drained soils

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-4

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN
SITE LOCATION: Parcel No. 217/004/016 Silicon Ranch Corporation, Torrington, CT (East of Rossi Road) Located Approx. 100 feet Upslope from Edge of Field, Approx. 400 feet East of Gulf Stream, Approx. 300 feet south of tractor access path	

DATE: MAY 19, 2020	TIME: 12:00	WEATHER: Clear, Sunny, 70 F
LAND USE: Mowed Field	LANDFORM: Glacial Till Uplands	SLOPE: N/R
SOIL MAP UNIT: Paxton fine sandy loam		DEPTH TO GRNDWTR: N/A
SOIL DRAINAGE CLASS: Moderately Well Drained		DEPTH TO BEDROCK: N/A
PARENT MATERIAL: Glacial Till		DEPTH TO COMPACT SOIL: N/A

			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 5	abrupt	fine sandy loam	10YR 3/3	- -	granular	friable	0%	many roots, moist
Bw1	5 - 8	abrupt	fine sandy loam	10YR 3/3	10YR 4/6	- -	friable	10%	Redox: f,f,d. common roots
					10YR 4/2	m. subang blky			Redox: c,m,d.
Bw2	8 - 14	clear	fine sandy loam	10YR 3/3	- -	m. subang blky	friable	10%	common roots, moist
Bw3	14 - 26	abrupt	fine sandy loam	10YR 3/2	10YR 4/4	N/A	friable	10%	Redox: f,m,d. very moist, few roots
Bw4	26 -30	N/A		2.5Y 4/3	10YR 5/6		friable	10%	Redox: f,m,d. few roots
					2.5Y 5/1				Redox: c,c,d.

NOTE: N/A = Not Applicable
N/R = Not Recorded

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES**

SPADE & AUGER

TEST HOLE#: TH-5

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN								
SITE LOCATION: Parcel No. 217/001/024 Silicon Ranch Corporation, Torrington, CT (West of Rossi Road, North of Town Farm Road) Located Approx. 330 feet North of Pole #4494, Town Line Road & Rossi Road, Approx. 130 feet Upslope from Edge of Field									
DATE: MAY 19, 2020			TIME: 14:00						WEATHER: Clear, Sunny, 70 F
LAND USE: Mowed Field			LANDFORM: Glacial Till Uplands						SLOPE: N/R
SOIL MAP UNIT: Paxton fine sandy loam									DEPTH TO GRNDWTR: N/A
SOIL DRAINAGE CLASS: Moderately Well Drained									DEPTH TO BEDROCK: N/A
PARENT MATERIAL: Glacial Till									DEPTH TO COMPACT SOIL: N/A
			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 6	abrupt	v fine sandy loam	10YR 3/3	- -	granular	friable	0%	many roots, moist
Bw1	6 - 11.5	clear	fine sandy loam	10YR 3/3	7.5 YR 3/4	- -	friable	10%	Redox: c,f,f. common roots
					10YR 4/2	f. subang blky			Redox: c,m,f.
Bw2	11.5 - 20	clear	fine sandy loam	10YR 5/3	7.5 YR 4/4	m. subang blky	friable	10%	Redox: f,f,d. few roots
					10YR 5/1				Redox: f,m,d.
Bw3	20 - 25	N/A	fine sandy loam	10YR 5/3	7.5 YR 4/4	N/A	friable	10%	Redox: c,f,d. very moist, few roots
					10YR 5/1				Redox: c,m,d.

NOTE: N/A = Not Applicable
N/R = Not Recorded
Sample collected: Bw3 Horizon

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-6

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN	
SITE LOCATION: Parcel No. 217/001/024 Silicon Ranch Corporation, Torrington, CT (West of Rossi Road, North of Town Farm Road) Located Approx. 330 feet North of Pole #4494, Town Line Road & Rossi Road, Approx. 160 feet Upslope from Edge of Field		
DATE: MAY 19, 2020	TIME: 15:00	WEATHER: Clear, Sunny, 70 F
LAND USE: Mowed Field	LANDFORM: Glacial Till Uplands	SLOPE: N/R
SOIL MAP UNIT: Paxton fine sandy loam		DEPTH TO GRNDWTR: N/A
SOIL DRAINAGE CLASS: Moderately Well Drained		DEPTH TO BEDROCK: N/A
PARENT MATERIAL: Basal (Lodgement) Glacial Till		DEPTH TO COMPACT SOIL: 20-inches

			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 6	abrupt	fine sandy loam	10YR 3/3	- -	granular	friable	0%	many roots, moist
Bw1	6 - 11.5	clear	fine sandy loam	10YR 3/3	10YR 3/2	- -	friable	10%	Redox: f,m,f. common roots
Bw2	11.5 - 20	clear	fine sandy loam	10YR 4/3	7.5 YR 4/3	m. subang blky	friable	10%	Redox: f,f,f. few roots
					10YR 4/2				Redox: c,m,f.
Cd	20 - 25	N/A	v fine sandy loam	2.5Y 3/2	7.5YR 4/6	N/A	very firm	N/R	Redox: c,m,p. no roots
					2.5Y 4/1				Redox: f,m,f.

NOTE: N/A = Not Applicable
N/R = Not Recorded
Sample collected: Cd Horizon

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-8

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN								
SITE LOCATION: Parcel No. 217/001/024 Silicon Ranch Corporation, Torrington, CT (West of Rossi Road, North of Town Farm Road) Located Approx. 330 feet North of Pole #4494, Town Line Road & Rossi Road, Approx. 330 feet Upslope from Edge of Field									
DATE: MAY 19, 2020	TIME: 17:00							WEATHER: Clear, Sunny, 70 F	
LAND USE: Mowed Field	LANDFORM: Glacial Till Uplands							SLOPE: N/R	
SOIL MAP UNIT: Paxton fine sandy loam								DEPTH TO GRNDWTR: N/A	
SOIL DRAINAGE CLASS: Well Drained								DEPTH TO BEDROCK: N/A	
PARENT MATERIAL: Glacial Till (Ablation)								DEPTH TO COMPACT SOIL: N/A	

			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 6	abrupt	fine sandy loam	10YR 3/4	- -	granular	friable	0%	many roots
Bw1	6 - 21	clear	fine sandy loam	10YR 4/4	- -	m. subang blky	friable	10%	common roots
Bw2	21 - 32	clear	loamy sand	10YR 5/3	10YR 4/4	c. subang blky	friable	10%	Redox: f,m,f. few roots

NOTE: Hand Auger Refusal @ 32-inches
N/A = Not Applicable
N/R = Not Recorded

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-9

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN								
SITE LOCATION: Parcel No. 217/004/016 Silicon Ranch Corporation, Torrington, CT (East of Rossi Road) Located within Field, Approx. 100 feet East of EOP Rossi Road and Approx. 150 South of Property Line with Residence to the North									
DATE: MAY 20, 2020	TIME: 13:00							WEATHER: Clear, Sunny, 70 F	
LAND USE: Mowed Field	LANDFORM: Glacial Till Uplands							SLOPE: 3 to 5%	
SOIL MAP UNIT: Woodbridge fine sandy loam								DEPTH TO GRNDWTR: N/A	
SOIL DRAINAGE CLASS: Moderately Well Drained								DEPTH TO BEDROCK: N/A	
PARENT MATERIAL: Glacial Till								DEPTH TO COMPACT SOIL: N/A	
			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 7	abrupt	fine sandy loam	10YR 4/4	- -	granular	friable	0%	many roots
Bw1	7 - 16	clear	fine sandy loam	10YR 4/4	10 YR 3/3	m. subang blky	friable	10%	common roots, worm casts
Bw2	16 - 20	clear	fine sandy loam	2.5Y 4/4	10YR 5/6	m. subang blky	friable	10%	Redox: f,f,d. few roots
					2.5Y 5/2				Redox: f,m,d.
Bw3	20-26	N/A	fine sandy loam	2.5Y 4/3	10YR 5/6	N/R	friable		Redox: c,m,p.
					10YR 4/2				Redox: c,m,f.

NOTE: N/A = Not Applicable
N/R = Not Recorded
Sample collected: Bw3 Horizon

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-10

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN								
SITE LOCATION: Parcel No. 217/004/016 Silicon Ranch Corporation, Torrington, CT (East of Rossi Road) Located Approx. 200 feet Upslope from Edge of Field, Approx. 500 feet East of Gulf Stream, Approx. 300 feet south of tractor access path									
DATE: MAY 20, 2020	TIME: 14:00								WEATHER: Clear, Sunny, 70 F
LAND USE: Mowed Field	LANDFORM: Glacial Till Uplands								SLOPE:
SOIL MAP UNIT: Paxton fine sandy loam									DEPTH TO GRNDWTR: N/A
SOIL DRAINAGE CLASS: Moderately Well Drained									DEPTH TO BEDROCK: N/A
PARENT MATERIAL: Basal (Lodgment) Glacial Till									DEPTH TO COMPACT SOIL: 32-inches

			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 6	abrupt	fine sandy loam	10YR 3/3	- -	granular	friable	0%	many roots, moist
A/B	6 - 9	clear	fine sandy loam	2.5Y 3/3	10YR 5/4	m. crumb	friable	10%	Redox: f,m,d. many roots
					2.5Y 4/2				Redox: c,m,f.
Bw1	9 - 23	clear	fine sandy loam	10YR 5/4	10YR 3/3	m. subang blky	friable	10%	Redox: c,m,f. Common roots, moist
Bw2	23 - 32	abrupt	fine sandy loam	2.5Y 4/3	10YR 4/4	m. subang blky	friable	10%	Redox: c,c,d. very moist, few roots
					2.5Y 5/2				Redox: f,m,f.
Cd	32 -34	N/A	fine sandy loam	2.5Y 5/2	7.5YR 5/6	N/A	very firm	0%	Redox: m,c,p. no roots

NOTE: Stone: Rounded stones 4 to 8-inches in diameter
N/A = Not Applicable
N/R = Not Recorded

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-11

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN								
SITE LOCATION: Parcel No. 162/019/009 Silicon Ranch Corporation, Litchfield, CT (East of Wilson Road) Located Approx. 500 feet East, Upslope, from Wetland Flag Series AA (RES-AA-25) and 100 feet east of Edge of Field									
DATE: MAY 20, 2020	TIME: 15:00							WEATHER: Clear, Sunny, 70 F	
LAND USE: Forested Uplands	LANDFORM: Glacial Till Uplands							SLOPE:	
SOIL MAP UNIT: Paxton fine sandy loam								DEPTH TO GRNDWTR: N/A	
SOIL DRAINAGE CLASS: Well Drained								DEPTH TO BEDROCK: 19-inches	
PARENT MATERIAL: Glacial Till, Shallow to Rock								DEPTH TO COMPACT SOIL: N/A	
			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Oe	2 - 0	clear	organic, hemic	7.5YR 3/1	- -	- -	friable	0%	many roots, moist
A	0 - 6	abrupt	fine sandy loam	7.5YR 3/2	- -	granular	friable	10%	very moist
Bw1	6 - 19	abrupt	fine sandy loam	7.5YR 5/6	- -	m. subang blky	friable	10%	very moist, nearly saturated
R	19 - 20	N/A	saprolite						muscovite schist saprolite

NOTE: N/A = Not Applicable
N/R = Not Recorded

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-12

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN	
SITE LOCATION: Parcel No. 162/019/009 Silicon Ranch Corporation, Litchfield, CT (East of Wilson Road) Located Approx. 550 feet East, Upslope, from Wetland Flag Series AA (RES-AA-25) and 150 feet east of Edge of Field, within saddle landform		
DATE: MAY 20, 2020	TIME: 15:30	WEATHER: Clear, Sunny, 70 F
LAND USE: Forested Uplands	LANDFORM: Glacial Till Uplands	SLOPE:
SOIL MAP UNIT: Paxton fine sandy loam		DEPTH TO GRNDWTR: N/A
SOIL DRAINAGE CLASS: Moderately Well Drained		DEPTH TO BEDROCK: 27-inches
PARENT MATERIAL: Glacial Till, Shallow to Rock		DEPTH TO COMPACT SOIL: N/A

			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Oe	2 - 0	clear	organic, hemic	7.5YR 3/1	- -	- -	friable	0%	many roots, moist
A	0 - 3	abrupt	fine sandy loam	7.5YR 3/1	- -	med. Crumb	friable	10%	very moist
Bw1	3 - 16	clear	fine sandy loam	7.5YR 5/6	- -	m. subang blky	friable	10%	very moist
Bw2	16 - 25	abrupt	fine sandy loam	10YR 4/4	7.5YR 5/8	N/R	friable	10%	Redox: f,f,p. Mn staining, very moist
Bw2	25 - 27	abrupt	fine sandy loam	10YR 4/4	10YR 4/6	N/R	friable	10%	Redox: c,m,d. very moist
					10YR 5/2				Redox: c,m,d.
R	27	N/A							Hand Auger Refusal

NOTE: N/A = Not Applicable
N/R = Not Recorded

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-14

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN								
SITE LOCATION: Parcel No. 162/020/015 Silicon Ranch Corporation, Litchfield, CT (South of Town Farm Road and West of Wilson Road) Located Approx. 100 South from EOP Town Farm Road, South of driveway for Residence at 66 Town Farm Road									
DATE: MAY 20, 2020	TIME: 17:00							WEATHER: Clear, Sunny, 70 F	
LAND USE: Mowed Field	LANDFORM: Glacial Till Uplands							SLOPE:	
SOIL MAP UNIT: Paxton fine sandy loam								DEPTH TO GRNDWTR: N/A	
SOIL DRAINAGE CLASS: Moderately Well Drained								DEPTH TO BEDROCK: 31-inches	
PARENT MATERIAL: Glacial Till, Shallow to Rock								DEPTH TO COMPACT SOIL: N/A	
			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 8	abrupt	fine sandy loam	10YR 4/3	- -	granular	friable	0%	
Bw1	8 - 19	clear	fine sandy loam	10YR 5/4	7.5YR 5/4	m. subang blky	friable	10%	Redox: f,m,f.
					10YR 3/3				Redox: f,f,f.
Bw2	19 - 31	abrupt	fine sandy loam	2.5Y 4/3	10YR 4/6	N/R	friable	10%	Redox: c,c,d.
					2.5Y 3/2				Redox: f,f,f.
R	31	N/A	NA	N/A	NA	N/A	N/A		Hand Auger Refusal

NOTE: N/A = Not Applicable
N/R = Not Recorded
Hand Auger Refusal @ 31-inches, Sample collected: Bw2 Horizon

SOIL INVESTIGATION/FIELD NOTES **REMA ECOLOGICAL SERVICES, LLC**

SPADE & AUGER

TEST HOLE#: TH-15

JOB NO. 16-1957-LIT10	CLIENT: Silicon Ranch, Nashville, TN								
SITE LOCATION: Parcel No. 162/020/015 Silicon Ranch Corporation, Litchfield, CT (South of Town Farm Road and West of Wilson Road) Located Approx. 700 feet South of EOP, Town Farm Road									
DATE: MAY 20, 2020	TIME: 18:00							WEATHER: Clear, Sunny, 70 F	
LAND USE: Mowed Field	LANDFORM: Glacial Till Uplands							SLOPE: 0 to 3%	
SOIL MAP UNIT: Woodbridge fine sandy loam								DEPTH TO GRNDWTR: N/A	
SOIL DRAINAGE CLASS: Moderately Well Drained								DEPTH TO BEDROCK: N/A	
PARENT MATERIAL: Basal (Lodgment) Glacial Till								DEPTH TO COMPACT SOIL: 22-inches	
			SOIL PROFILE DESCRIPTION						
SOIL HORIZON	DEPTH (IN.)	BOUNDARY	SOIL TEXTURE	MATRIX COLOR, MOIST	SOIL REDOX COLORS, MOIST	STRUCTURE	CONSISTENCY DRY/MOIST/WET	% STONE	NOTES
Ap	0 - 6	clear	fine sandy loam	10YR 3/3	- -	granular	friable	0%	many roots
Bw1	6 - 9	abrupt	fine sandy loam	10YR 3/3	10YR 5/6	m. subang blky	friable	10%	Redox: f,f,d. worm casts
					10YR 3/2				Redox: c,m,f.
Bw2	9 - 22	abrupt	fine sandy loam	10YR 4/4	7.5YR 5/6	m. subang blky	friable	10%	Redox: c,m,d. No roots
					10YR 5/2				Redox: c,m,d.
Cd	22 - 25	N/A	fine sandy loam	2.5Y 5/3	7.5 YR 4/6	platy	very firm	N/R	Redox: m,m,p.
					2.5Y 5/1				Redox: c,m,d.

NOTE: N/A = Not Applicable
N/R = Not Recorded
Sample Collected: Cd Horizon

Soil Map—State of Connecticut
(Proposed Solar Generation Facility, Litchfied-Torrington, CT)

Map Scale: 1:12,300 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 20, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 2, 2015—Sep 17, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Ridgebury fine sandy loam, 0 to 3 percent slopes	4.4	0.6%
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	77.2	9.8%
34B	Merrimac fine sandy loam, 3 to 8 percent slopes	13.2	1.7%
34C	Merrimac fine sandy loam, 8 to 15 percent slopes	4.8	0.6%
38E	Hinckley loamy sand, 15 to 45 percent slopes	9.4	1.2%
45A	Woodbridge fine sandy loam, 0 to 3 percent slopes	3.0	0.4%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	20.2	2.6%
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes	8.0	1.0%
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	2.4	0.3%
47C	Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	58.6	7.5%
50B	Sutton fine sandy loam, 3 to 8 percent slopes	3.6	0.5%
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	6.4	0.8%
57C	Gloucester gravelly sandy loam, 8 to 15 percent slopes	3.4	0.4%
57D	Gloucester gravelly sandy loam, 15 to 25 percent slopes	3.4	0.4%
58C	Gloucester gravelly sandy loam, 8 to 15 percent slopes, very stony	5.8	0.7%
59C	Gloucester gravelly sandy loam, 3 to 15 percent slopes, extremely stony	6.2	0.8%
59D	Gloucester gravelly sandy loam, 15 to 35 percent slopes, extremely stony	0.3	0.0%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	18.4	2.3%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	6.7	0.9%
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	4.3	0.5%
62C	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony	30.8	3.9%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	55.8	7.1%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	9.9	1.3%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	11.7	1.5%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	94.0	11.9%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	103.6	13.2%
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	26.1	3.3%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	6.0	0.8%
85C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony	29.6	3.8%
86C	Paxton and Montauk fine sandy loams, 3 to 15 percent slopes, extremely stony	68.0	8.6%
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	59.4	7.5%
107	Limerick and Lim soils	4.4	0.6%
306	Udorthents-Urban land complex	10.0	1.3%
308	Udorthents, smoothed	18.0	2.3%
W	Water	0.4	0.1%
Totals for Area of Interest		**787.1**	**100.0%**

Attachment D

Table 1: Vernal Pool Surveys
Figures 4 to 8
Annotated Photographs of Vernal Pools

Table 1: Litchfield/Torrington Solar Facility, Vernal Pool Survey

Wetland Series	2017 Amphibian Egg Mass Count	2018 Amphibian Egg Mass Count	2019 Amphibian Egg Mass Count	2020 Amphibian Egg Mass Count	Facultative Species	Comments
Wetland 'F' Vernal Pool 1 – man-made pond at top of hill; north-western corner of site	8 SS 30 WF	11 SS 33 WF	29 SS 47 WF	30 SS 46 WF	A few bullfrogs, spring peepers	Green algae on bottom 70% to 80% coverage, maximum depth 5+ feet, much woody debris/tree fall, wood frog egg masses on east side, salamander egg masses on eastern side of pool
Wetland 'E' Vernal Pool 2 – small farm pond under Eversource powerline	6 SS 60 WF	81 WF	73 WF	59WF	Spring Peepers heard, green frog and bullfrog, spotted newts	Green algae across 80% of pond surface, may be obscuring SS egg masses; up to 4.5 feet deep, wood frog egg masses found in the east side of pool in shade

SS = Spotted Salamander

WF = Wood Frog

FIGURE 4:

VERNAL POOL
LOCATION MAP
Litchfield-Torrington Solar Facility

800 400 0 800
GRAPHIC SCALE IN FEET

LEGEND

LIMIT OF WETLANDS
VERNAL POOL ENVELOPE (VPE)
CRITICAL TERRESTRIAL HABITAT (CTH)

N

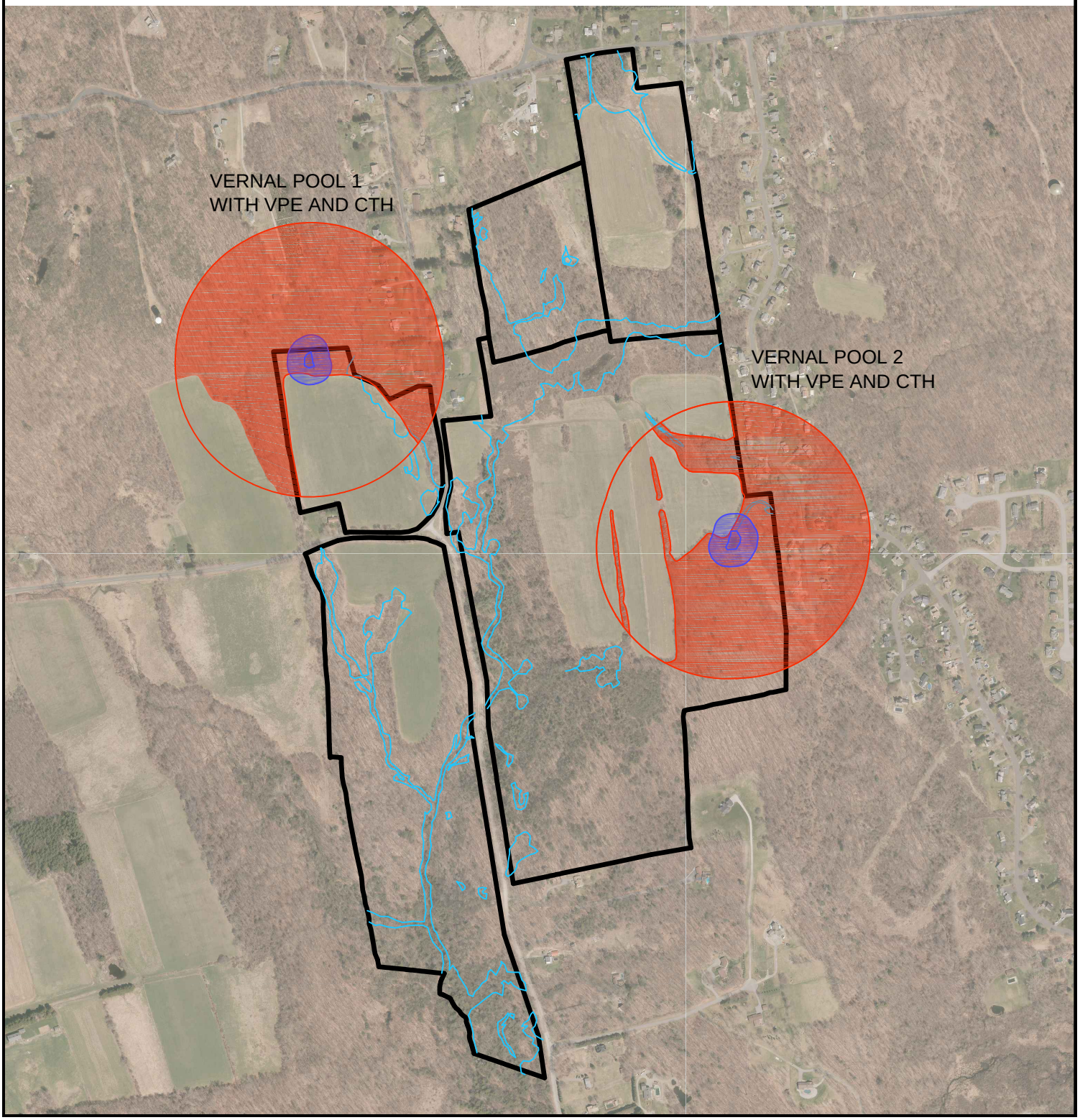


FIGURE 5:

VERNAL POOL 1
EXISTING CONDITIONS
Litchfield-Torrington Solar Facility

250 125 0 250
GRAPHIC SCALE IN FEET

LEGEND

LIMIT OF WETLANDS
VERNAL POOL ENVELOPE (VPE)
CRITICAL TERRESTRIAL HABITAT (CTH)

N

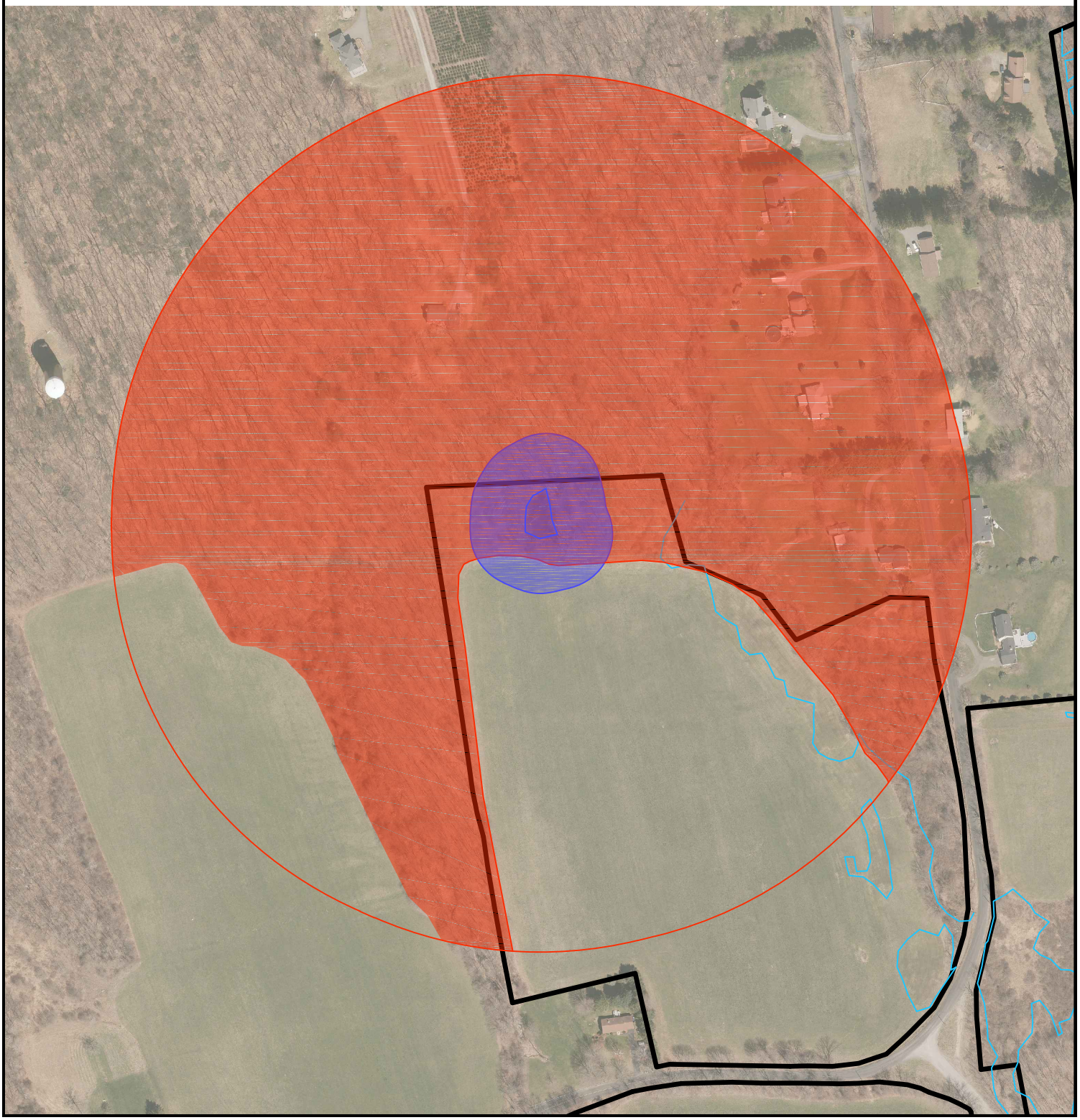


FIGURE 6:

VERNAL POOL 1
PROPOSED CONDITIONS
Litchfield-Torrington Solar Facility

250 125 0 250
GRAPHIC SCALE IN FEET

LEGEND

- LIMIT OF WETLANDS
- VERNAL POOL ENVELOPE (VPE)
- CRITICAL TERRESTRIAL HABITAT (CTH)
- PROPOSED LIMIT OF DISTURBANCE
- LIMIT OF PROPOSED SOLAR ARRAY

N

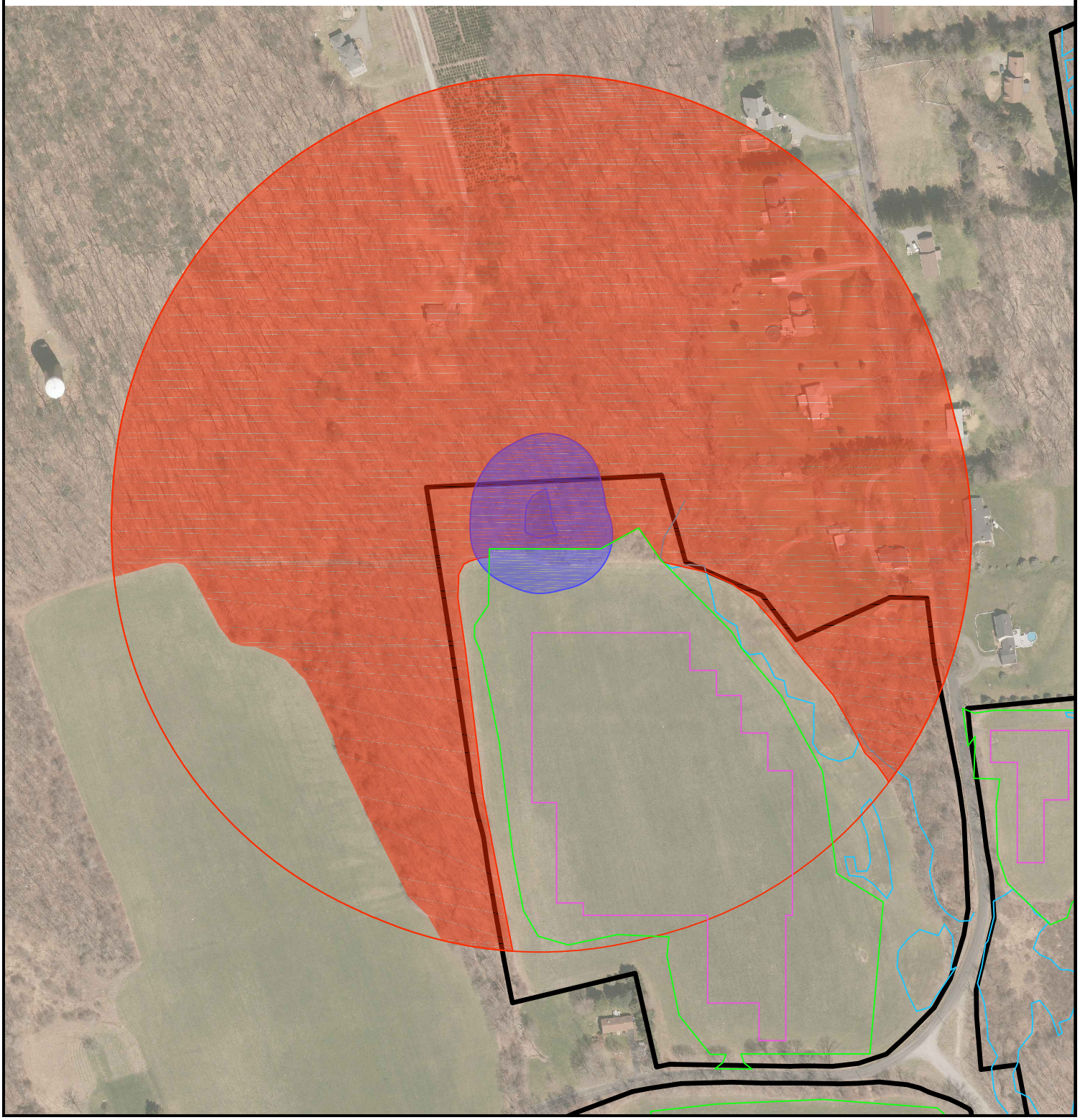


FIGURE 7:

VERNAL POOL 2
EXISTING CONDITIONS
Litchfield-Torrington Solar Facility

250 125 0 250
GRAPHIC SCALE IN FEET

LEGEND

LIMIT OF WETLANDS
VERNAL POOL ENVELOPE (VPE)
CRITICAL TERRESTRIAL HABITAT (CTH)

N

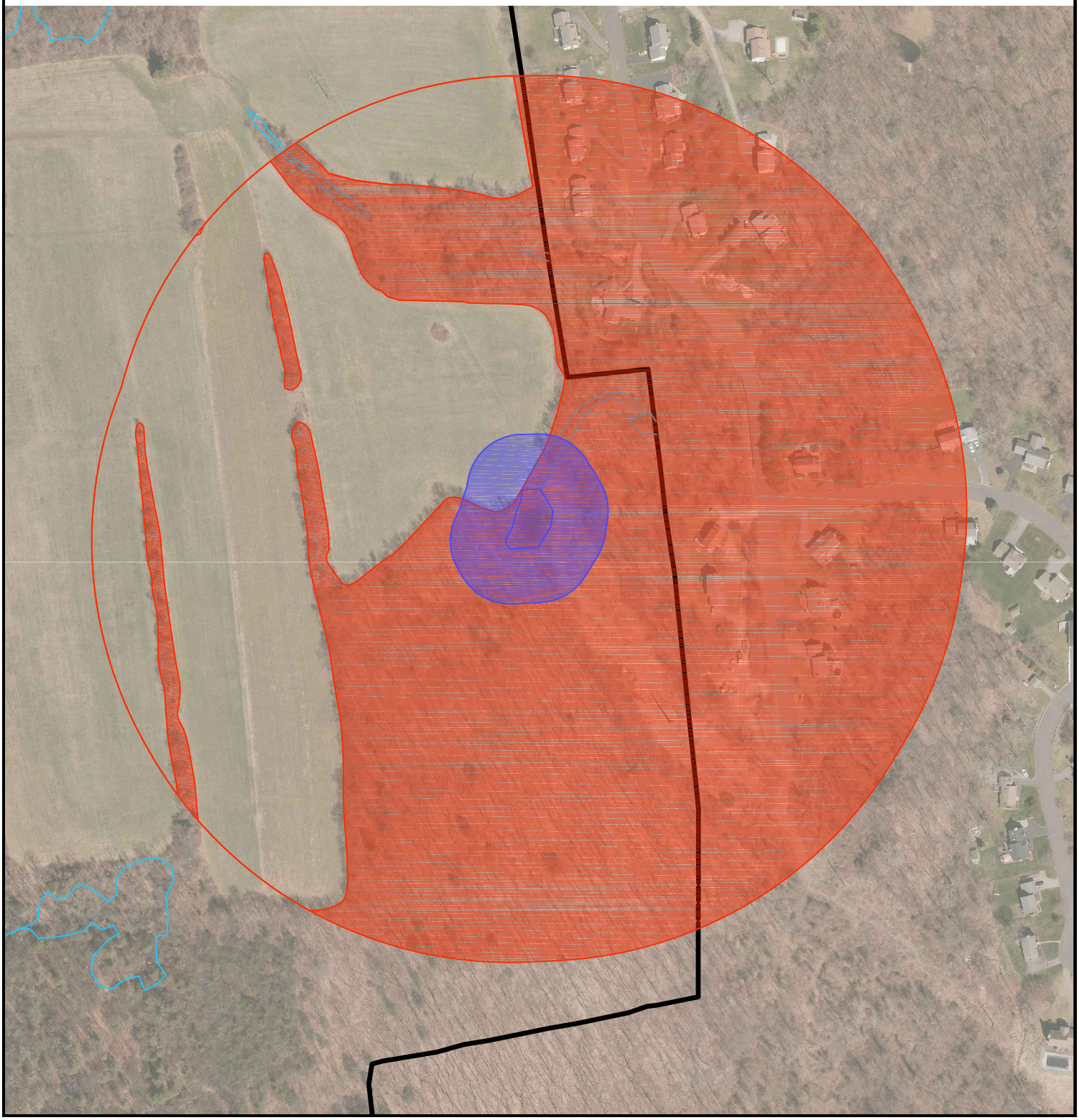


FIGURE 8:

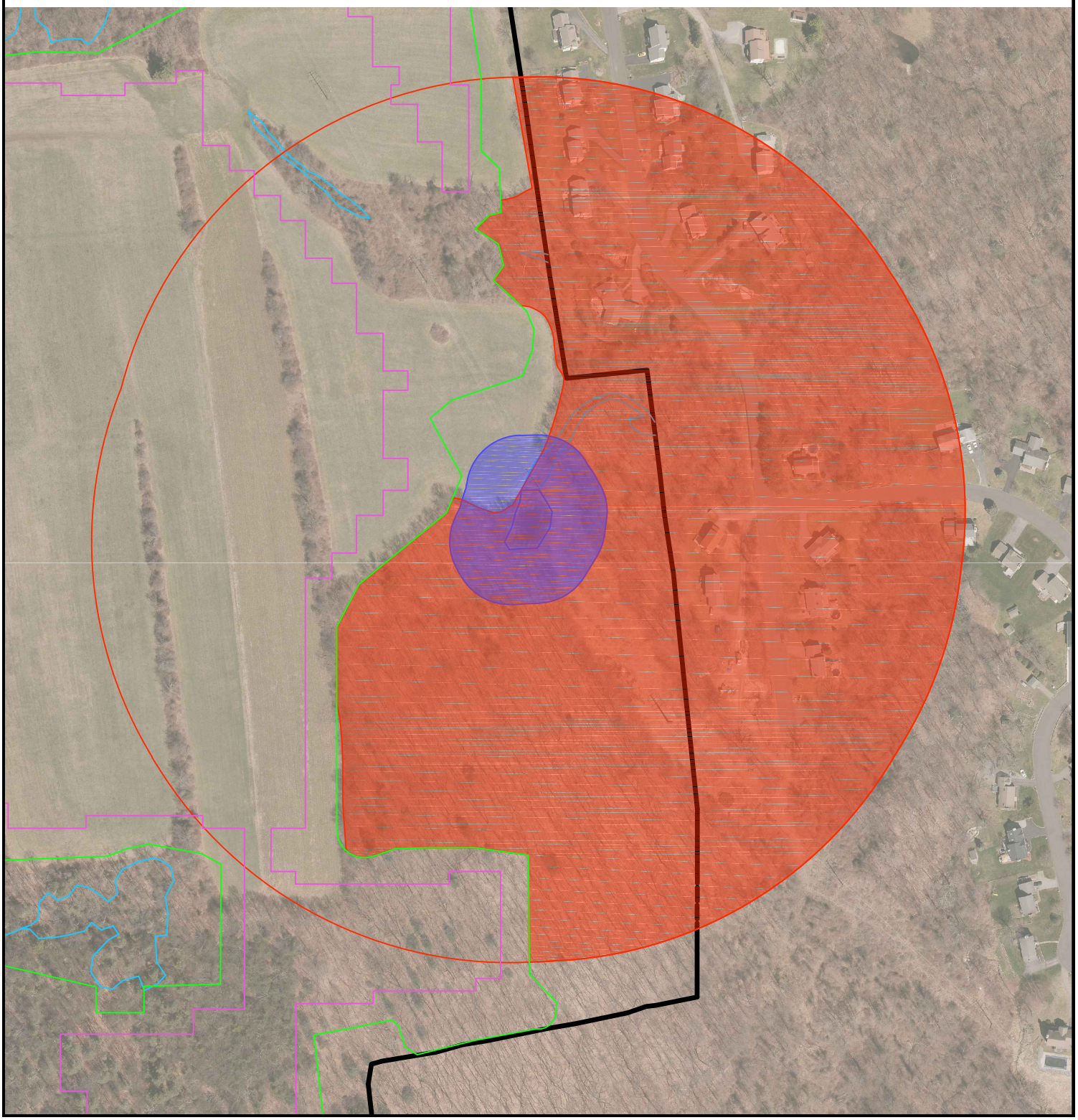
VERNAL POOL 2
PROPOSED CONDITIONS
Litchfield-Torrington Solar Facility

250 125 0 250
GRAPHIC SCALE IN FEET

LEGEND

- LIMIT OF WETLANDS
- VERNAL POOL ENVELOPE (VPE)
- CRITICAL TERRESTRIAL HABITAT (CTH)
- PROPOSED LIMIT OF DISTURBANCE
- LIMIT OF PROPOSED SOLAR ARRAY

N



Litchfield – Torrington Solar Facility
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 1: Vernal Pool 1 (Wetland F); facing southerly

Photo 2: Vernal Pool 1; facing northwesterly (January 2017)

Litchfield – Torrington Solar Facility
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 3: Vernal Pool 1; spotted salamander egg mass; April 2017

Photo 4: Vernal Pool 1; wood frog egg mass raft; April 2017

Litchfield – Torrington Solar Facility
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo 5: Vernal Pool 2; facing northeasterly; January 2017

Photo 6: Vernal Pool 2; facing northeasterly; September 2017

Photo 7: Vernal Pool 2; facing southwesterly; April 2017

Photo 8: Vernal Pool 2; large wood frog egg mass raft; April 2017

Photo 9: Vernal Pool 2; wood frog egg mass; April 2017

Photo 10: Vernal Pool 2; wood frog egg masses and filamentous green alga; late April 2018

Attachment E

Avian Breeding Surveys
Annotated Photographs

Avian Survey, Rossi Road, Torrington - 6/24/2017

Species	Count
Rock Pigeon (Columba livia)	2
Mourning Dove (Zenaida macroura)	4
Green Heron (Butorides virescens)	1
Turkey Vulture (Cathartes aura)	1
Cooper's Hawk (Accipiter cooperii)	1
Red-shouldered Hawk (Buteo lineatus)	1
Red-tailed Hawk (Buteo jamaicensis)	1
Yellow-bellied Sapsucker (Sphyrapicus varius)	2
Downy Woodpecker (Dryobates pubescens)	5
Pileated Woodpecker (Dryocopus pileatus)	1
Willow Flycatcher (Empidonax traillii)	1
Eastern Phoebe (Sayornis phoebe)	1
Red-eyed Vireo (Vireo olivaceus)	5
Blue Jay (Cyanocitta cristata)	8
American Crow (Corvus brachyrhynchos)	4
Raven (Corvus corax)	1
Black-capped Chickadee (Poecile atricapillus)	4
Tufted Titmouse (Baeolophus bicolor)	6
Tree Swallow (Tachycineta bicolor)	2
White-breasted Nuthatch (Sitta carolinensis)	1
European Starling (Sturnus vulgaris)	3
Gray Catbird (Dumetella carolinensis)	10
Veery (Catharus fuscescens)	8
Wood Thrush (Hylocichla mustelina)	1
American Robin (Turdus migratorius)	3
Cedar Waxwing (Bombycilla cedrorum)	3
American Goldfinch (Spinus tristis)	6
Chipping Sparrow (Spizella passerina)	2
Field Sparrow (Spizella pusilla)	1
Savannah Sparrow (Passerculus sandwichensis)	2
Song Sparrow (Melospiza melodia)	8
Eastern Towhee (Pipilo erythrophthalmus)	1
Bobolink (Dolichonyx oryzivorus)	55
Baltimore Oriole (Icterus galbula)	2
Red-winged Blackbird (Agelaius phoeniceus)	8
Brown-headed Cowbird (Molothrus ater)	1
Ovenbird (Seiurus aurocapilla)	9
Blue-winged Warbler (Vermivora cyanoptera)	5
Black-and-white Warbler (Mniotilta varia)	2
Common Yellowthroat (Geothlypis trichas)	10
American Redstart (Setophaga ruticilla)	6
Yellow Warbler (Setophaga petechia)	4
Chestnut-sided Warbler (Setophaga pensylvanica)	2
Prairie Warbler (Setophaga discolor)	1
Scarlet Tanager (Piranga olivacea)	1
Northern Cardinal (Cardinalis cardinalis)	4
Rose-breasted Grosbeak (Pheucticus ludovicianus)	4
Total	**214**

Avian Survey, Rossi Road, Torrington - 7/3/2019

Species	Count
Mourning Dove (Zenaida macroura)	6
Killdeer (Charadrius vociferus)	1
Green Heron (Butorides virescens)	1
Red-shouldered Hawk (Buteo lineatus)	1
Yellow-bellied Sapsucker (Sphyrapicus varius)	1
Red-bellied Woodpecker (Melanerpes carolinus)	2
Downy Woodpecker (Dryobates pubescens)	1
Pileated Woodpecker (Dryocopus pileatus)	1
Eastern Wood-Pewee (Contopus virens)	2
Willow Flycatcher (Empidonax traillii)	2
Eastern Phoebe (Sayornis phoebe)	2
Yellow-throated Vireo (Vireo flavifrons)	1
Red-eyed Vireo (Vireo olivaceus)	2
Blue Jay (Cyanocitta cristata)	3
American Crow (Corvus brachyrhynchos)	2
Common Raven (Corvus corax)	1
Black-capped Chickadee (Poecile atricapillus)	3
Barn Swallow (Hirundo rustica)	4
White-breasted Nuthatch (Sitta carolinensis)	1
House Wren (Troglodytes aedon)	2
Gray Catbird (Dumetella carolinensis)	10
Eastern Bluebird (Sialia sialis)	2
Veery (Catharus fuscescens)	4
Wood Thrush (Hylocichla mustelina)	2
American Robin (Turdus migratorius)	6
Cedar Waxwing (Bombycilla cedrorum)	5
American Goldfinch (Spinus tristis)	6
Chipping Sparrow (Spizella passerina)	1
Savannah Sparrow (Passerculus sandwichensis)	5
Song Sparrow (Melospiza melodia)	10
Eastern Towhee (Pipilo erythrophthalmus)	1
Bobolink (Dolichonyx oryzivorus)	45
Red-winged Blackbird (Agelaius phoeniceus)	30
Eastern kingbird (Tyrannus tyranus)	1
Brown-headed Cowbird (Molothrus ater)	1
Ovenbird (Seiurus aurocapilla)	1
Common Yellowthroat (Geothlypis trichas)	10
Yellow Warbler (Setophaga petechia)	3
Chestnut-sided Warbler (Setophaga pensylvanica)	4
Northern Cardinal (Cardinalis cardinalis)	3
Rose-breasted Grosbeak (Pheucticus ludovicianus)	1
Total	**190**

Litchfield – Torrington Solar Facility
Photos taken December 2016 through June 2020, by REMA Ecological Services, LLC

Photo A1: Avian Surveys; June 2017

Photo A2: Solitary bobolink at the edge of Field 1 (F1); May 2019

Photo A3: Bobolink in Field 6 (F6); June 2017

Photo A4: Savanah Sparrow on blue spruce at edge of Field 1 (F1); June 2017

Photo A5: Chestnut-sided warbler; June 2017

Photo A6: Common yellowthroat (warbler); June 2017

Photo A7: Song sparrow; one of the abundant avians on the site (hedgerow); September 2017

Photo A8: Willow flycatcher; June 2017

Photo A9: American kestrel (Species of Special Concern); at edge of Field 5 (F5); April 2018

Attachment E

May 29, 2017 CT DEEP NDDB Letter
Figures 9 and 10

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

May 29, 2017

Mr. George T. Logan
Rema Ecological Services, LLC
164 East Center Street, Suite 8
Manchester, CT 06040
Rema8@aol.com

Project: Preliminary Site Assessment for Connecticut Solar Park on Rossi Road in Torrington and Wilson Road in Litchfield, Connecticut
NDDB Preliminary Assessment No.: 201703803

Dear George Logan,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map provided for a Preliminary Site Assessment for Connecticut Solar Park on Rossi Road in Torrington and Wilson Road in Litchfield, Connecticut.

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

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

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

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

The site surveys report should be sent to our CT DEEP-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, please let us know how you will protect the state-listed species from being impacted by this project. You may submit these best management practices or protection plans with your new request for an NDDB review.

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

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

Dawn M. McKay

Dawn M. McKay
Environmental Analyst 3

Species List for NDDB Request

Scientific Name	Common Name	State Status
Vascular Plant		
Platanthera flava var. herbiola	Pale green orchid	SC
Vertebrate Animal		
Glyptemys insculpta	Wood turtle	SC
Lasiurus borealis	Red bat	SC
Lasiurus cinereus	Hoary bat	SC
Pooecetes gramineus	Vesper sparrow	E

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

Natural Diversity Data Base Areas

LITCHFIELD, CT

December 2016

State and Federal Listed Species & Significant Natural Communities

Town Boundary

NOTE: This map shows general locations of State and Federal Listed Species and Significant Natural Communities. Information on listed species is collected and compiled by the Natural Diversity Data Base (NDDB) from a number of data sources . Exact locations of species have been buffered to produce the general locations. Exact locations of species and communities occur somewhere in the shaded areas, not necessarily in the center. A new mapping format is being employed that more accurately models important riparian and aquatic areas and eliminates the need for the upstream/downstream searches required in previous versions.

This map is intended for use as a preliminary screening tool for conducting a Natural Diversity Data Base Review Request. To use the map, locate the project boundaries and any additional affected areas. If the project is within a shaded area there may be a potential conflict with a listed species. For more information, complete a Request for Natural Diversity Data Base State Listed Species Review form (DEP-APP-007), and submit it to the NDDB along with the required maps and information. More detailed instructions are provided with the request form on our website.

www.ct.gov/deep/nddbrequest

Use the CTECO Interactive Map Viewers at www.cteco.uconn.edu to more precisely search for and locate a site and to view aerial imagery with NDDB Areas.

QUESTIONS: Department of Energy and Environmental Protection (DEEP)
79 Elm St., Hartford CT 06106
Phone (860) 424-3011

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

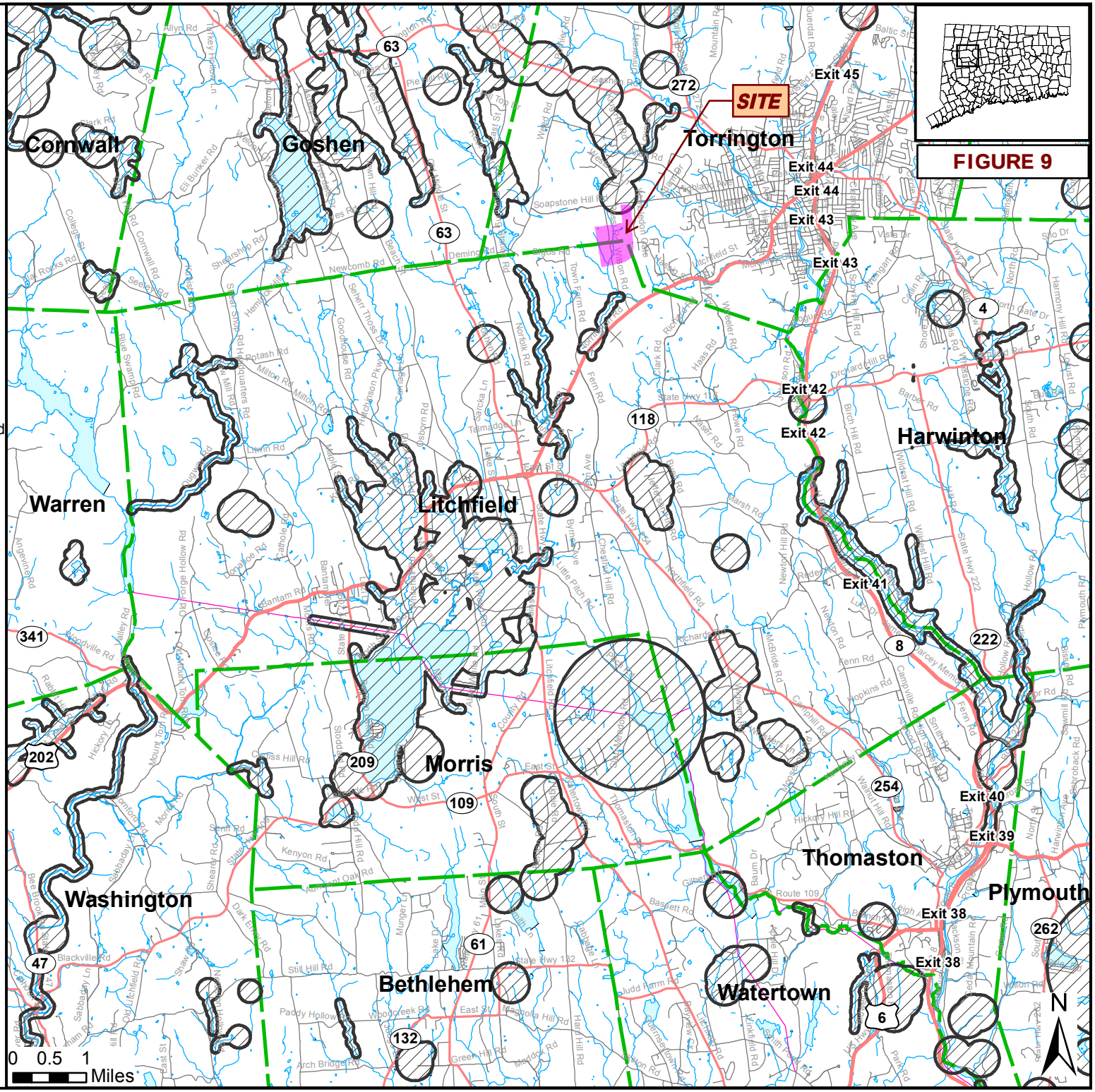


FIGURE 9

Natural Diversity Data Base Areas

TORRINGTON, CT

June 2020

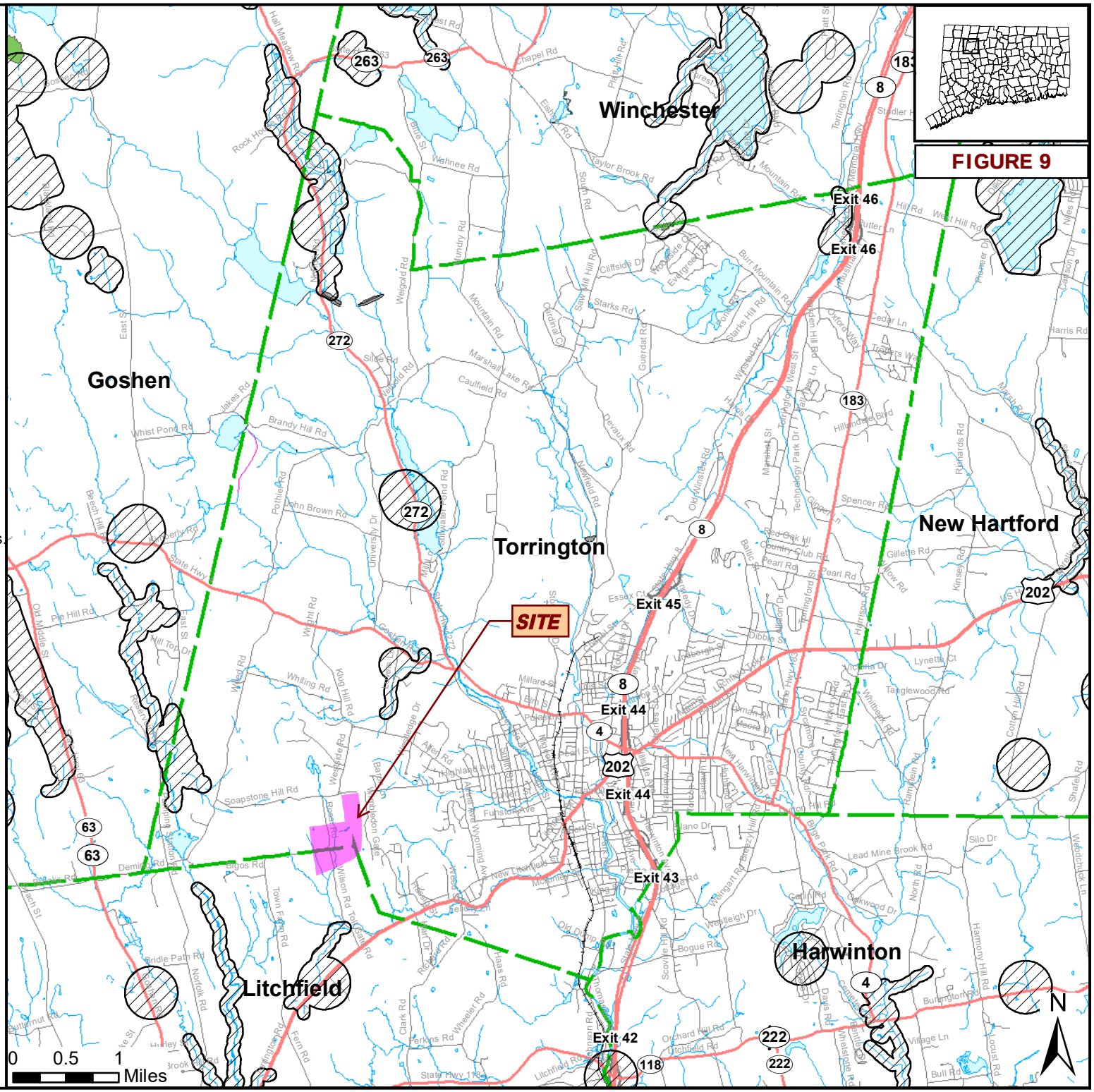


FIGURE 9

State and Federal Listed Species

Critical Habitat

Town Boundary

NOTE: This map shows general locations of State and Federal Listed Species and Critical Habitats. Information on listed species is collected and compiled by the Natural Diversity Data Base (NDDB) from a variety of data sources . Exact locations of species have been buffered to produce the generalized locations.

This map is intended for use as a preliminary screening tool for conducting a Natural Diversity Data Base Review Request. To use the map, locate the project boundaries and any additional affected areas. If the project is within a hatched area there may be a potential conflict with a listed species. For more information, complete a Request for Natural Diversity Data Base State Listed Species Review form (DEP-APP-007), and submit it to the NDDB along with the required maps and information. More detailed instructions are provided with the request form on our website.

www.ct.gov/deep/nddbrequest

Use the CTECO Interactive Map Viewers at http://cteco.uconn.edu to more precisely search for and locate a site and to view aerial imagery with NDDB Areas.

QUESTIONS: Department of Energy and Environmental Protection (DEEP)
79 Elm St, Hartford, CT 06106
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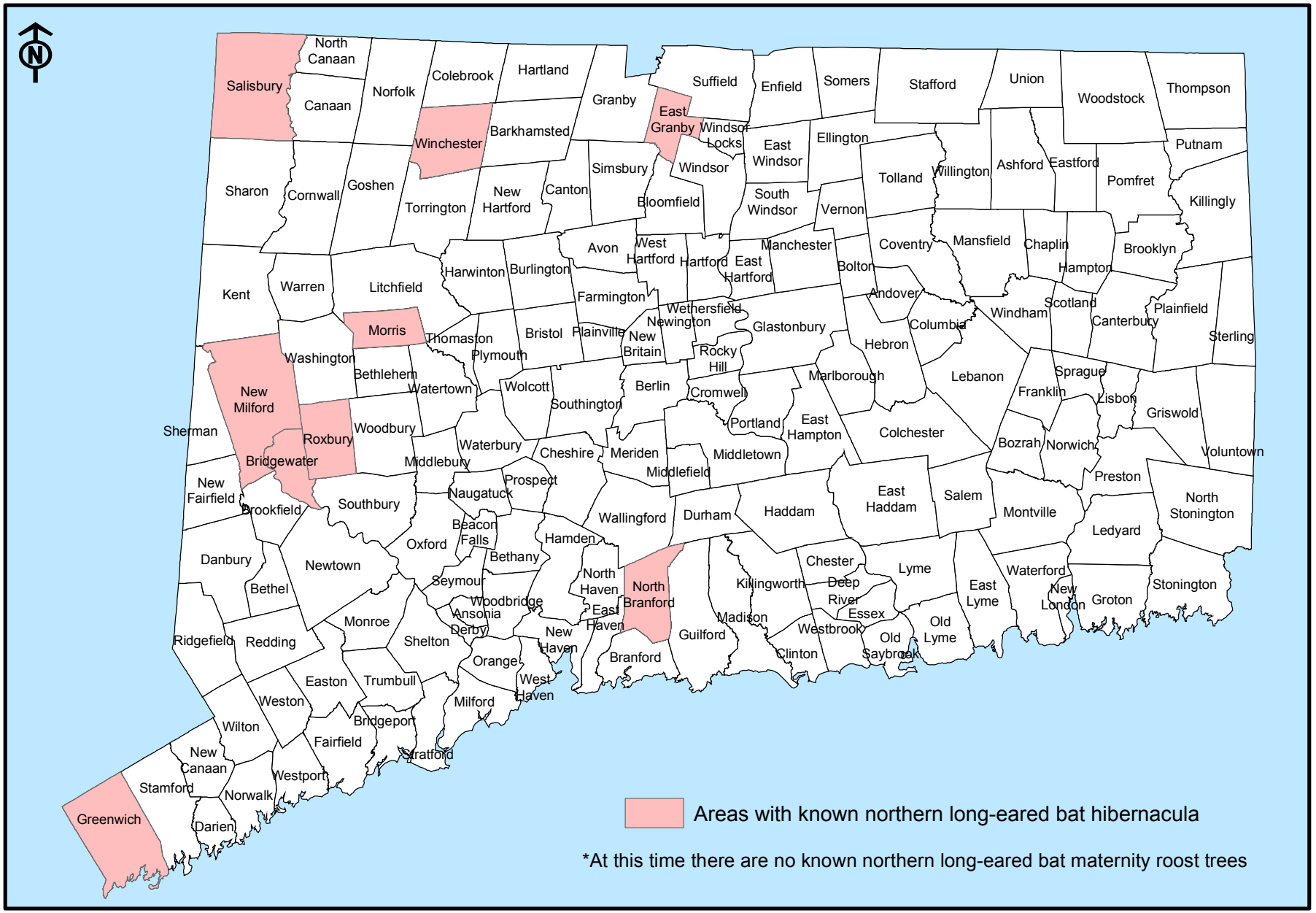
Connecticut Department of Energy & Environmental Protection
Bureau of Natural Resources
Wildlife Division

Attachment G

Connecticut Towns
With confirmed Northern Long-Eared Bat Hibernacula

Northern long-eared bat areas of concern in Connecticut to assist with Federal Endangered Species Act Compliance



March 6, 2019

For information on federal requirements visit http://www.fws.gov/midwest/endangered/mammals/nleb/