

July 23, 2021

Ms. Gina L. Wolfman  
Senior Project Developer  
Greenskies Renewable Energy LLC  
127 Washington Avenue, West Bldg. – Lower Level  
North Haven, CT 06473

**RE: Wetland Delineation  
Goshen PV Solar Facility  
129 Bartholomew Hill Road  
Goshen, CT  
SLR #145.16763.00011.0011**

Dear Ms. Wolfman:

On December 14, 2020, SLR International Corporation (SLR) registered soil scientists Megan Raymond, MS, PWS, CFM and Peter Shea, and Wetland Professional in Training Aidan Barry, visited 129 Bartholomew Road, Goshen, Connecticut to determine the presence or absence of wetlands and/or watercourses, to demarcate (flag) the boundaries of wetlands and watercourses identified, and to identify onsite soil types within 37 acres of the total 69-acre parcel. This letter includes the methods and results of the investigation. In summary, three forested slope wetland systems were delineated along the eastern and western boundaries of the study area totaling 7.32 acres. The study area is located at the top of a small watershed that drains to Tyler Pond and the Marshepaug River within the Housatonic River regional basin. In addition, a seasonal study for vernal pool activity was completed in spring 2021. Three vernal pool areas were observed within the forested areas west and south of the existing fields. The vernal pool areas support wetland obligate amphibians, the wood frog (*Lithobates sylvaticus*). One pool contained spotted salamander (*Ambystoma maculatum*) egg masses.

### **Regulatory Definitions**

The Inland Wetlands and Watercourses Act (Connecticut General Statutes §22a-38) defines inland wetlands as "land, including submerged land...which consists of any soil types designated as poorly drained, very poorly drained, alluvial, and floodplain." Watercourses are defined in the act as "rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through or border upon the state or any portion thereof." The act defines intermittent watercourses as having a defined permanent channel and bank and the occurrence of two or more of the following characteristics: A) evidence of scour or deposits of recent alluvium or detritus, B) the presence of standing or flowing water for a duration longer than a particular storm incident, and C) the presence of hydrophytic vegetation.

The Tidal Wetlands Act (Connecticut General Statutes §22a-28) defines wetlands as "those areas which border on or lie beneath tidal waters, such as, but not limited to banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters and whose surface is at or below an elevation of 1 foot above local extreme high water; and upon which may grow or be capable of growing hydrophytic vegetation as identified in the Statutes."

Regulated Activity, per the Town of Goshen Inland Wetlands and Watercourses Regulations, means any area within 100' of the boundary of any inland wetland or watercourse.

## Methodology

A second-order soil survey in accordance with the principles and practices noted in the United States Department of Agriculture (USDA) publication *Soil Survey Manual* (1993) was completed at the subject site. The classification system of the National Cooperative Soil Survey was used in this investigation. Soil map units identified at the project site generally correspond to those included in the *Soil Survey of the State of Connecticut* (USDA, 2005).

Wetland determinations were completed based on the presence of poorly drained, very poorly drained, alluvial, or floodplain soils and submerged land (e.g., a pond). Soil types were identified by observation of soil morphology (soil texture, color, structure, etc.). To observe the morphology of the property's soils, test pits and/or borings (maximum depth of 2 feet) were completed at this site.

Intermittent watercourse determinations were made based on the presence of a defined permanent channel and bank and the occurrence of two or more of the following characteristics: A) evidence of scour or deposits of recent alluvium or detritus, B) the presence of standing or flowing water for a duration longer than a particular storm incident, and C) the presence of hydrophytic vegetation.

Wetland boundaries were demarcated (flagged) with pink surveyor's tape (hung from vegetation) or small flags (on wire stakes) that are generally spaced at a maximum of every 30 feet. Complete boundaries are located along the lines that connect these sequentially numbered flags. The wetland boundaries are subject to change until adopted by local, state, or federal regulatory agencies. Three forested wetlands were delineated within the study area. The wetland boundaries are depicted by flag series:

- **Wetland 1:** 10s through 60s, y6, 1b-1, 1b through 31b, 101b through 102b
- **Wetland 2:** wb1 through wb23
- **Wetland 3:** wa1 through wa5, wa1a through wa5a

On the day of the review, the weather was overcast with light snow and the temperature was 30° Fahrenheit. The ground was clear of snow cover, the soil was frost free, and the conditions were suitable for wetland delineation.

## Site Description

The project area is comprised of a 69.1-acre residential property north of Bartholomew Hill Road (Figure 1). The property is accessed to the north from Bartholomew Hill Road and contains a single-family home and associated garage adjacent to the road frontage. The property extends north in a rectangular shape to encompass open fields and forest edge. The land use surrounding the property is comprised of sparsely settled residential homes and agricultural fields. The Wings Ago Airstrip Airport abuts the site to the northeast.

Approximately one third of the project property (20 acres) is comprised of agricultural fields that are located primarily in the northern portion of the site. A large 9.5-acre field exists in the northwest portion of property and a long, narrow 8-acre field exists along the western portion of the property. Upland forest comprises 45 acres of the project area located in the southwestern portion of the property and along the parcel boundaries.

The property is located at the top of a 5.8-acre local watershed that drains into Tyler Lake located 0.9 miles to the southeast. The watershed is a long and narrow feature extending approximately from the project area south of Woodridge Lake. The highest elevation on the project property is located in the northern portion of the property. The topography in the study area generally slopes southward. The property is located within the Housatonic River regional basin.

## Wetland Delineation

Three forested wetlands and several intermittent watercourses were delineated on the property (Figure 2). The wetland delineation study area focused on the eastern, northern, and western extent of the property adjacent to the agricultural fields. Details regarding each wetland are listed below:

### Wetland 1

Wetland 1 (3.30 acres) extends from the northeastern portion of the property to a drainage pipe along the southeastern portion of the property. In the center of the wetland, a ditch, which is considered an intermittent watercourse, exists. The stream contains an unconsolidated bottom with approximately 3-foot-deep banks. The ditch straddles a localized watershed divide, with the ditch from wetland flags 100b draining south, approximately 1,970 linear feet on site and areas north of this point flowing to the north 1,200 linear feet on site. Vegetation in this portion of the wetland is comprised largely of red maple (*Acer rubrum*) and pin oak (*Quercus palustris*) and the understory consists of red-osier dogwood (*Cornus sericea*), silky dogwood (*Cornus amomum*), multiflora rose (*Rosa multiflora*), winterberry (*Ilex verticillata*), sensitive fern (*Onoclea sensibilis*), and skunk cabbage (*Symplocarpus foetidus*). A small meadow occupies the northern portion of the wetland with scrubby vegetation, such as red-osier dogwood, multiflora rose, and red maple saplings punctuating a dominant herbaceous groundcover.

### Wetland 2













Downslope of Wetlands 1 & 3, Wetland 2 (3.19 acres) extends from the center of the property to Bartholomew Hill Road. Within the wetland are two intermittent watercourses flowing southwards toward the road. The main watercourse is approximately 2 feet wide and flows southeast 3,700 linear feet before

draining off site. The tree canopy is composed of red maple, pin oak, hickory, and white pine (*Pinus strobus*). The understory scrub/shrub layer consists of winterberry, silky dogwood, multiflora rose, and sensitive fern.

### Wetland 3

TABLE 1

#### Functions and Values Assessment – Forested Slope Wetlands 129 Bartholomew Hill Road, Goshen, CT

	Functions and Values	Comments
	Groundwater Recharge/Discharge	Yes – The wetlands are supported by groundwater discharge.
	Flood Flow Alteration (Storage & Desynchronization)	Yes – The wetlands exist at the top of the watershed and display potential to regulate flood flow. However, due to the slope geomorphology and long linear nature of the wetlands, there is not considerable storage within the system.
	Fish & Shellfish Habitat	No – The hydrology of the wetlands does not support finfish or shellfish habitat.
	Sediment/Toxicant Retention	Yes – The landscape position of the wetlands allows contribution to this function.
	Nutrient Removal/Retention/Transformation	Yes – The wetlands do provide for nutrient retention and transformation.
	Production Export (Nutrient)	Yes – The wetlands display structural heterogeneity and the ability to transfer energy across trophic levels.
	Sediment/Shoreline/Watercourse Bank Stabilization	Yes – The banks of the intermittent stream are vegetated and stable.
	Wildlife Habitat	Yes – The wetlands display forested canopy and understory.
	Recreation (Consumptive & Non-Consumptive)	No – The wetlands do not provide recreational opportunities.
	Educational Scientific Value	No – The wetlands do not provide educational value.
	Uniqueness/Heritage	No – This area does not present unique attributes.
	Visual Quality/Aesthetics	No – This small wetland area does not contain inherent visual quality or aesthetic value.
ES	Endangered Species	No – Though a small portion of the site is mapped as Natural Diversity Data Base area (June 2020) by CT DEEP, this mapped area does not overlap the delineated wetland resources or project area.

Wetland 3 (0.83 acres) is located along the western portion of the property, southeast of an agricultural field. Several intermittent watercourses originate from the wetland and off site to the west. The main



watercourse flows 75 linear feet southwest before draining off site. The forested wetland is comprised of red maple, pin oak, and white pine. The understory consists of shrubs such as winterberry, multiflora rose, silky dogwood, and red maple saplings.

A functional evaluation of the onsite forested wetlands based on SLR field observations is summarized in Table 1. Due to the similarity in wetland composition from a vegetative and geomorphic perspective, functional assessment has been completed collectively for each of the three wetlands. The first column lists the functions generally ascribed to wetlands; the second column summarizes the rationale used to determine whether these functions are being performed within the subject wetland and/or watercourse.

The principal functions and values of the wetland system at this location include the following:

- Groundwater Recharge/Discharge
- Nutrient Removal/Retention/Transformation
- Watercourse stabilization
- Wildlife habitat

### **Special Wetlands – Vernal Pools**

SLR conducted a vernal pool investigation within targeted portions of wetland systems adjacent to the project area. Vernal pools are wetland areas that provide unique habitat attributes beyond basic wetland functions. In Connecticut, the working definition of a vernal pool is as follows: *“vernal pool means a seasonal watercourse in a defined depression or basin, that lacks a fish population and supports or is capable of supporting breeding and development of amphibian or invertebrate species recognized in such watercourses. These species include spotted salamander, Jefferson salamander complex marbled salamander, wood frog, and fairy shrimp”* (CAWS website).

Vernal pool habitat is comprised of three distinct areas (Calhoun and Klemens, 2002). Specifically, 1) the vernal pool depression, which is the active breeding area, 2) the vernal pool envelope, the area within 100 feet of spring high water to the depression, and 3) the critical terrestrial habitat, which is the area within 750 feet of the depression. Critical terrestrial habitat is comprised of adjacent upland or drier wetland areas where wetland obligate amphibians spend the majority of their life cycle absent breeding. Forested areas are considered preferred overwintering habitat. Open fields lack the structural complexity in the duff layer and are not typically utilized in this capacity.

SLR conducted site evaluations on April 8 and May 26, 2021, to evaluate portions of the wetlands for indicators of vernal pool activity. The wetland systems on the property consist of long linear drainage corridors and thus generally do not contain the requisite hydrology to support vernal pool breeding and development. However, there are areas where water ponds due to impoundment or excavation. SLR employed direct observation techniques as well as dip nets to evaluate aquatic biota within these wetland environments containing standing surface water. Three breeding areas were observed, two within wetland 2 - vernal pool a and b – and one within wetland 3 - vernal pool c.

The identified pools support breeding and development of wood frog and one vernal pool, vernal pool b, supports spotted salamander egg masses. During the first site evaluation in April, water depths in both wetlands were between 18" and 40". Over 25 wood frog egg masses were observed in each pool and ten spotted salamander egg masses were observed in vernal pool b.

The second site evaluation took place on May 26 and all areas were directly evaluated. The water level in vernal pool c had dropped significantly and approximately 3" of water remained in the pool. Hundreds of wood frog tadpoles were observed in the shallow water. The evening of May 26 brought rain and a large storm system occurred over the next several days, refilling the pool and allowing the wood frogs to complete their development cycle. Water levels in vernal pools a and b had only dropped to 12" and the water was cool and clean. Numerous wood frog tadpoles were observed. Mayflies, caddisfly larvae, and mosquito larvae were observed within all three vernal pools.

Proposed activities demonstrate limited potential to affect vernal pool habitat on the property. No work is proposed within the vernal pool depression or within the vernal pool envelope. Hydrology to the wetland system will be maintained both in terms of water quality and quantity. Proposed activities adjacent to the vernal pool are limited as well. Approximately 2.23 acres of forest edge around the perimeter of the fields and between the fields will be converted to open field to support the solar array. These areas of clearing are narrow and linear and are small compared to the size of undisturbed forest to the west and south and are not anticipated to affect vernal pool functionality (Figure 3). The forest surrounding the pools will be left undisturbed, which will maintain the directional buffer of vernal pool obligate amphibians from uplands to wetlands. The maintenance of these corridors will support the metapopulation of amphibian species within these systems.

In summary, due to the scope and position of the proposed activities, the installation and utilization of a solar facility on the subject property will not adversely affect vernal pool habitat. Hydrology to the wetland will be maintained and preferred overwintering habitat will not be affected. Thus, existing population dynamics within the wetland system will be maintained.

## Soil Mapping

Nine soil map units were identified on the property (eight upland soil and one wetland soil; Figure 4). Each map unit represents a specific area on the landscape and consists of one or more soils for which the unit is named. Other soils (inclusions that are generally too small to be delineated separately) may account for 10 to 15 percent of each map unit. The mapped units are by name, symbol, and typical characteristics (parent material, drainage class, high water table, depth to bedrock, and slope) (Table 2). These characteristics are generally the primary characteristics to be considered in land use planning and management. A description of each characteristic can be found in the *Soil Survey of the State of Connecticut* (USDA, 2005). Wetland soils, comprising 0.5 acres, are mapped in the northern portion of the property according to the USDA Natural Resources Conservation Service (NRCS) soil mapping and are connected to an offsite wetland north of the property. This mapping is not reflective of soil conditions encountered during the wetland delineation where poorly drained soils are mapped to the west and east of the field areas.

**Table 2: Soil Unit Properties**

Map Unit		Parent Material	Slope (%)	Drainage Class	High Water Table			Depth To Bedrock (in)
Sym	Name				Depth (ft)	Kind	Mos.	
Upland Soil								
421B	Bice fine sandy loam	Coarse-loamy melt-out till	3-8	well drained	> 6	--	--	> 80
413C	Bice-Millsite complex	Coarse-loamy melt-out till	3-15	Well drained	> 6	--	--	> 80
417C	Bice fine sandy loam	Coarse-loamy melt-out till	8-15	Well drained	> 6	--	--	> 80
417D	Bice fine sandy loam	Coarse-loamy melt-out till	15-25	Well drained	> 6	--	--	> 80
418C	Schroon fine sandy loam	Coarse-loamy melt-out till	2-15	Moderately well drained	1.5-3	--	--	> 80
420A	Schroon fine sandy loam	Coarse-loamy melt-out till	0-3	Moderately well drained	1.5-3	--	--	> 80
420B	Schroon fine sandy loam	Coarse-loamy melt-out till	3-8	Moderately well drained	1.5-3	--	--	> 80
425C	Shelburne fine sandy loam	Coarse-loamy melt-out till	8-15	Well drained	1.5-3	--	--	20-30
Wetland Soil								
443	Brayton-Loonmeadow complex	Coarse-loamy melt-out till	0-8	Poorly drained	< 1	--	--	20-27

Parent material is the unconsolidated organic and mineral material in which soil forms. Soil inherits characteristics, such as mineralogy and texture, from its parent material. Glacial till is unsorted while nonstratified glacial drift, consisting of clay, silt, sand, and boulders, is transported by glacial ice. Alluvium is material such as sand, silt, or clay, deposited on land by streams. Organic deposits consist of decomposed plant and animal parts.

A soil's texture affects the ease of digging, filling, and compacting and the permeability of a soil. Generally, sand and gravel soils, such as outwash soils, have higher permeability rates than most glacial till soils. Soil permeability affects the cost to design and construct subsurface sanitary disposal facilities and, if too slow or too fast, may preclude its use. Outwash soils are generally excellent sources of natural aggregates (sand and gravel) suitable for commercial use such as construction subbase material. Organic layers in soils can cause movement of structural footings. Compacted glacial till layers make excavating more difficult and may preclude the use of subsurface sanitary disposal systems or increase their design and construction costs if fill material is required.

Generally, soils with steeper slopes increase construction costs, increase the potential for erosion and sedimentation impacts, and reduce the feasibility of locating subsurface sanitary disposal facilities.

Drainage class refers to the frequency and duration of periods of soil saturation or partial saturation during soil formation. There are seven natural drainage classes. They range from excessively drained, where water is removed from the soil very rapidly, to very poorly drained, where water is removed so slowly that free water remains at or near the soil surface during most of the growing season. Soil drainage affects the type and growth of plants found in an area. When landscaping or gardening, drainage class information can be used to assure that proposed plants are adapted to existing drainage conditions or that necessary alterations to drainage conditions (irrigation or drainage systems) are provided to assure plant survival.

High water table is the highest level of a saturated zone in the soil in most years. The water table can affect the timing of excavations; the ease of excavating, constructing, and grading; and the supporting capacity of the soil. Shallow water tables may preclude the use of subsurface sanitary disposal systems or increase design and construction costs if fill material is required.

The depth to bedrock refers to the depth to fixed rock. Bedrock depth affects the ease and cost of construction such as digging, filling, compacting, and planting. Shallow depth bedrock may preclude the use of subsurface sanitary disposal systems or increase design and construction costs if fill material is required.

## **Conclusions**

On December 14, 2020, SLR delineated three wetlands within the project area of 129 Bartholomew Hill Road in Goshen, Connecticut. Forested wetlands with associated intermittent watercourses exist along the eastern, western, and central portions of the property abutting the centrally located agricultural fields. Wetlands comprise approximately 7.32 acres of the 37-acre study area within the 69.1-acre parcel. A vernal pool assessment was completed in spring 2021 and identified three vernal pools within forested areas west and south of the proposed activities. Due to maintenance of vernal pool hydrology and limited clearing of forest, the proposed solar project is not anticipated to affect vernal pool functionality.

Thank you for the opportunity to assist you. If you should have any questions or comments, please do not hesitate to contact me.

Sincerely,

**SLR International Corporation**

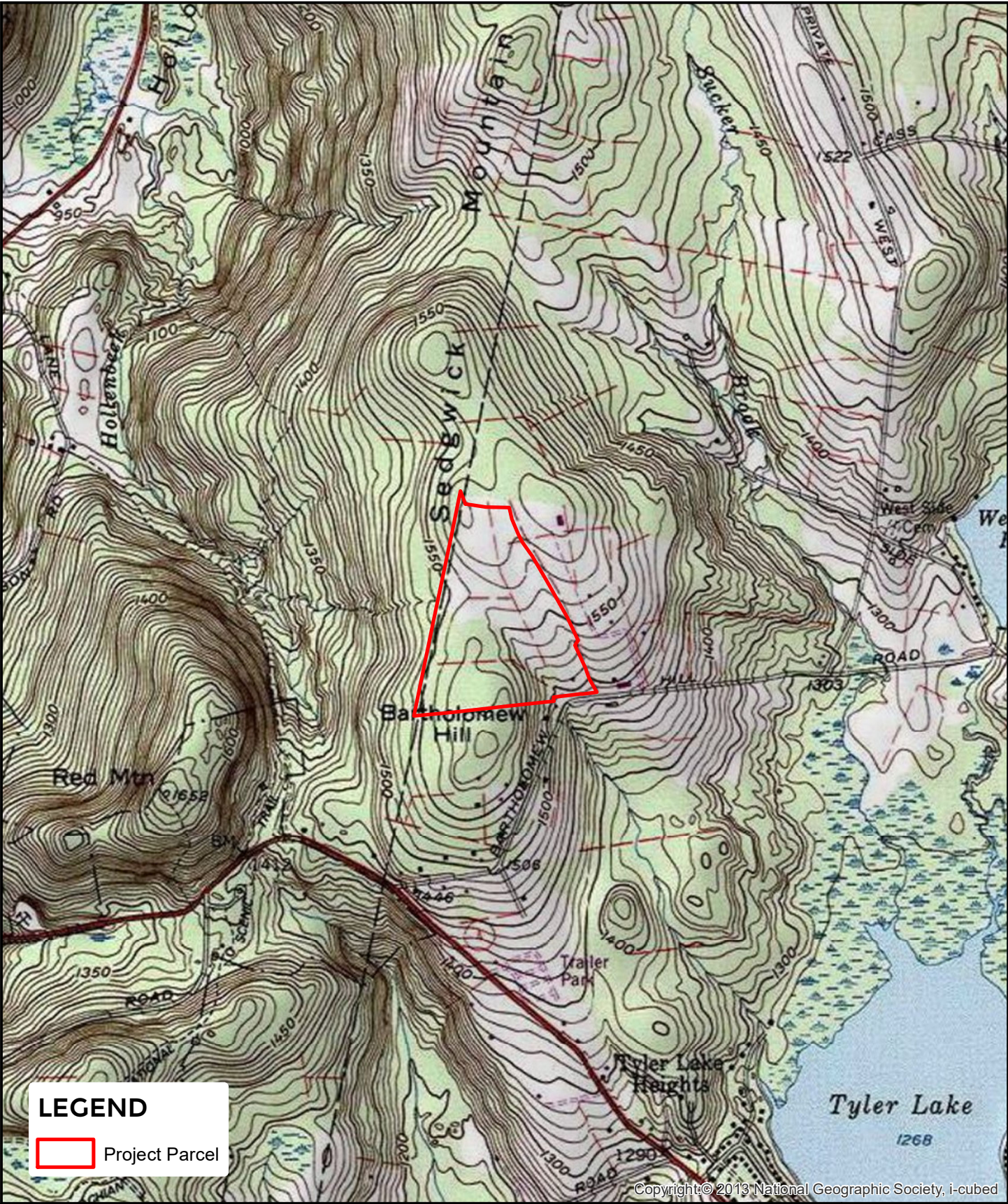


Megan B. Raymond, MS, PWS, CFM  
Principal Scientist, Wetlands and Waterways Lead

Enclosures

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**SLR**

195 CHURCH STREET  
7TH FLOOR  
NEW HAVEN, CT 06511  
203.344.7887

USGS LOCUS MAP  
GREENSKIES RENEWABLE ENERGY












129 BARTHOLOMEW HILL ROAD  
GOSHEN, CONNECTICUT

N

0 500 1,000  
Feet

SCALE	1" = 2,000'
DATE	12/21/2020
PROJ. NO.	16763.00011
<b>FIG. 1</b>	



-  Intermittent Watercourse
-  Vernal Pool
-  100-Foot Vernal Pool Envelope
-  750-Foot Critical Terrestrial Habitat
-  Wetland Flags
-  Wetland Boundary
-  Wetland
-  Goshen 100-Foot Regulated Activity Area
-  Wetland Study Area
-  Project Parcel Boundary
-  Goshen Parcels



195 CHURCH STREET  
7TH FLOOR  
NEW HAVEN, CT 06511  
203.344.7887

## WETLAND DELINEATION

GREENSKIES CLEAN ENERGY

129 BARTHOLOMEW HILL ROAD  
GOSHEN, CONNECTICUT

SOURCE: 2004 AERIAL PHOTO, CTDEEP, 2006

DATE: DECEMBER 17, 2020

SCALE: 1"=400'

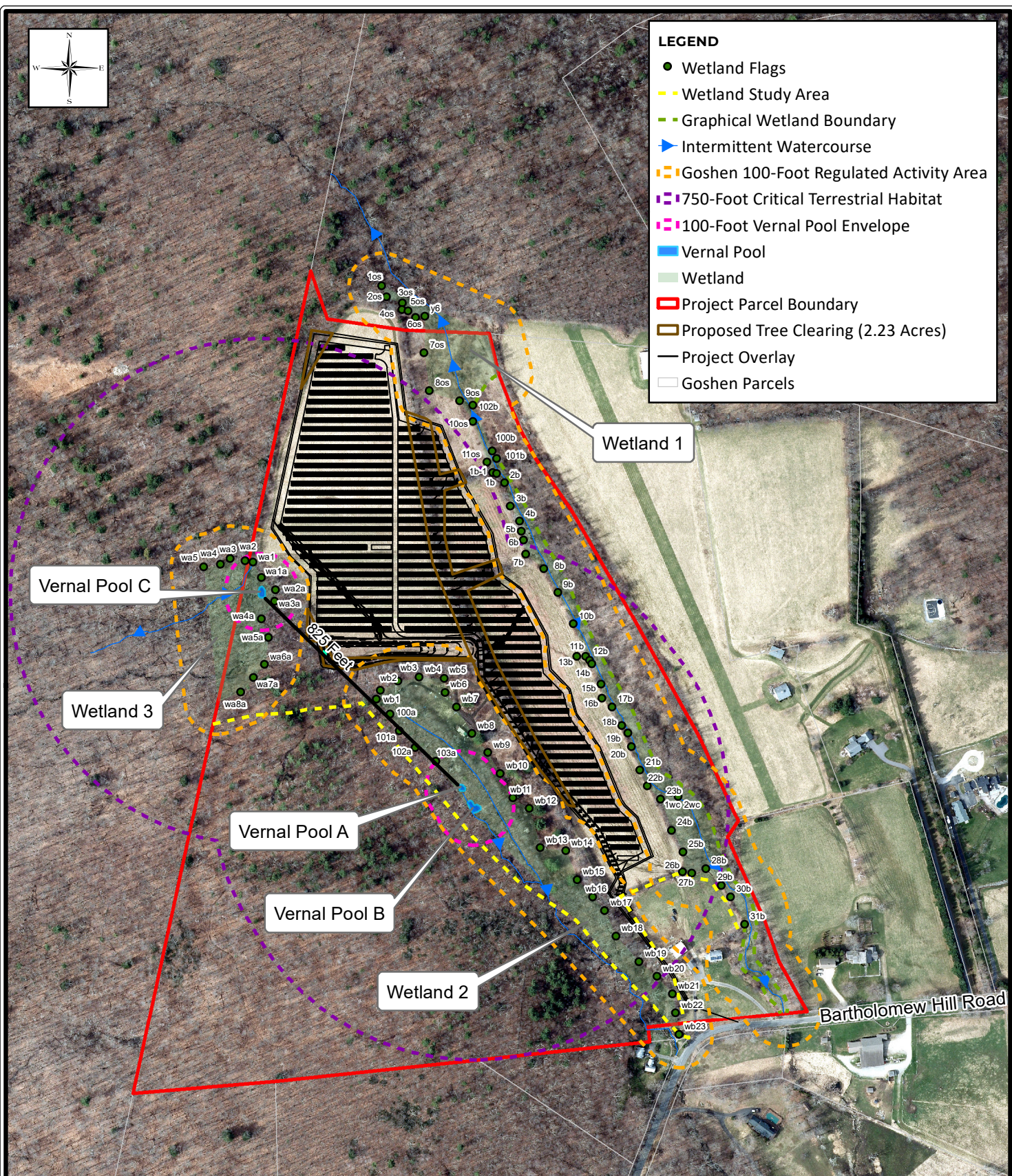
PROJ. NO.: 16763.00011

DESIGNED ATB	DRAWN ATB	CHECKED MBR
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DRAWING NAME:

**FIG. 2**





195 CHURCH STREET  
7TH FLOOR  
NEW HAVEN, CT 06511  
203.344.7887

## PROJECT OVERLAY

GREENSKIES CLEAN ENERGY

129 BARTHOLOMEW HILL ROAD  
GOSHEN, CONNECTICUT

SOURCE: 2004 AERIAL PHOTO, CTDEEP, 2006

DATE: DECEMBER 17, 2020

SCALE: 1"=400'

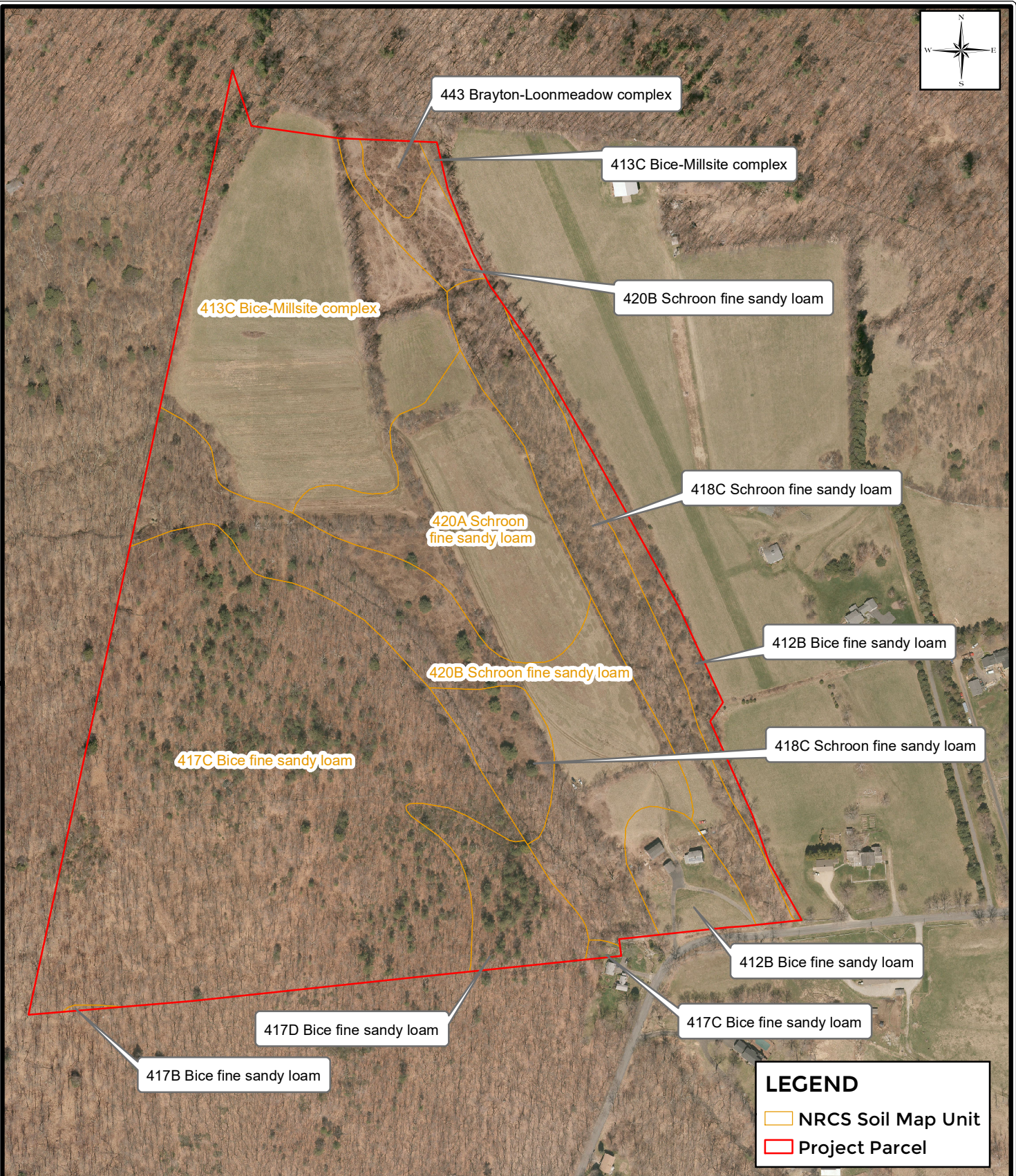
PROJ. NO.: 16763.00011

DESIGNED	DRAWN	CHECKED
ATB	ATB	MBR

DRAWING NAME:

**FIG. 3**





**LEGEND**

NRCS Soil Map Unit

Project Parcel

**SLR**

195 CHURCH STREET  
7TH FLOOR  
NEW HAVEN, CT 06511  
203.344.7887

**NRCS SOIL MAP**

GREENSKIES RENEWABLE ENERGY

129 BARTHOLOMEW HILL ROAD  
GOSHEN, CONNECTICUT

SOURCE: 2004 AERIAL PHOTO, CTDEEP, 2006

DATE: DECEMBER 17, 2020		
SCALE: 1"=350'		
PROJ. NO.: 16763.00011		
DESIGNED ATB	DRAWN ATB	CHECKED MBR
DRAWING NAME:		
<b>FIG. 4</b>		



**Client Name:**  
Greenskies Renewable Energy, LLC

**Site Location:**  
129 Bartholomew Hill Road, Goshen, Connecticut

**Project No.**  
145.16763.00011

**Photo No.**  
1

**Date:**  
05/26/21

**Direction Photo Taken:**  
West

**Description:**  
Photo of the upland fields in the northern portion of the property.  
Approximately 20 acres of the property is comprised of agricultural fields.



**Photo No.**  
2

**Date:**  
05/26/21

**Direction Photo Taken:**  
South

**Description:**  
Photo of the upland fields in the northern portion of the property. The fields are bounded by upland forest and forested wetlands.





**Client Name:**  
Greenskies Renewable Energy, LLC

**Site Location:**  
129 Bartholomew Hill Road, Goshen, Connecticut

**Project No.**  
145.16763.00011

**Photo No.**  
3

**Date:**  
05/26/21

**Direction Photo Taken:**  
South

**Description:**  
Forested wetland within the property contains a diverse native canopy and understory.



**Photo No.**  
4

**Date:**  
05/26/21

**Direction Photo Taken:**  
West

**Description:**  
Vernal pool A located within Wetland 2. Numerous wood frog tadpoles were present in the pool which contained 12" of water.





**Client Name:**

Greenskies Renewable Energy, LLC

**Site Location:**

129 Bartholomew Hill Road, Goshen, Connecticut

**Project No.**

145.16763.00011

**Photo No.**

5

**Date:**

05/26/21

**Direction Photo Taken:**

South

**Description:**

Vernal pool C within the eastern portion of Wetland 3. Water levels dropped since the April 8, 2021 evaluation and approximately 3" of water was present on May 26, 2021.

