



February 21, 2023  
Revised March 6, 2023

Ref: 43183.00

Jean Paul La Marche  
Greenskies  
127 Washington Avenue  
North Haven, CT 06457

Re: Wetland & Watercourse Delineation Report  
Proposed 5MW AC Solar Project  
Winchester, Connecticut 06098

Dear Mr. La Marche,

Vanasse Hangen Brustlin, Inc. (VHB) completed an on-site investigation to determine the presence or absence of wetlands and/or watercourses on a  $\pm 20$ -acre portion of a  $\pm 120$ -acre property located at Spencer Hill Road, Winchester, Connecticut (Figure 1), as requested and authorized (the "Project Study Area").

## Methods

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VHB's wetland and watercourse delineation was completed in accordance with the municipal and State of Connecticut Inland Wetlands and Watercourse regulations and the Corps of Engineers Wetlands Delineation Manual (January 1987) in conjunction with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) (Environmental Laboratory U.S. Army Corps of Engineers, January 2012). If applicable to the site, an Ordinary High Water Line (OHW Line) of perennial streams, if present, was delineated in accordance with the Connecticut Department of Transportation's Standard Operating Procedure (SOP) for Determining Ordinary High Water.

Connecticut *Wetland* determinations are based on the presence of poorly drained, very poorly drained, alluvial, or floodplain soils and submerged land. *Watercourses* are defined 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." *Intermittent watercourse* determinations are made based on the presence of a defined permanent channel and bank, and two of the following characteristics: (1) evidence of scouring or deposits of recent alluvium or detritus, (2) the presence of standing or flowing water for a duration longer than a particular storm incident, and (3) the presence of hydrophytic vegetation. (See Inland Wetlands and Watercourses Act §22a-38 CGS.)



Soil types were identified throughout the Project Study Area by observing soil morphology (soil texture, color, structure, etc.). Soil morphology is evaluated through numerous test pits and/or hand borings (generally to a depth of at least two feet). If a wetland and/or watercourse were determined to be present, their boundaries are identified with flags and hung from vegetation or small wire stakes if in fields or grass communities. For wetlands, these flags are labeled “Wetland Delineation” and generally spaced a maximum of  $\pm 50$  feet apart. For watercourses, these flags are blue and generally spaced a maximum of  $\pm 50$  feet apart. If the boundary between a wetland and a watercourse were found to be within  $\pm 10$  feet of each other, a single, most conservative line is delineated. It is important to note that flagged wetland and watercourse boundaries are subject to change until verified/approved by local, state, or federal regulatory agencies.

## INVESTIGATION

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The Study Area was investigated on Monday, December 5, 2022. The weather during the time of delineation was mostly cloudy, with a temperature of 42°F, and no rain events occurred within one day of the delineation effort. This investigation was completed by a qualified soil scientist and conducted in accordance with the principles and practices noted in the United States Department of Agriculture (USDA) Soil Survey Manual (1993). The soil classification system of the National Cooperative Soil Survey was used in this investigation to identify the soil map units present at the Project site. This report includes descriptions of site conditions, photographic documentation (Appendix A), and a Delineated Wetland and Watercourse Sketch map (Figure 2) depicting the limits and extent of resources within the Project Area. A Soils Map (Figure 3) has also been included, identifying mapped and observed soils onsite.

## WETLAND AND WATERCOURSE SITE DESCRIPTION

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As shown in Figure 2, the Project Study Area is undeveloped. The majority of the Project Study Area consists of an open farm field with forested areas around the perimeter to the north, east and west. To the north is undeveloped forested land with multiple residential buildings, to the east and west is undeveloped forest, and to the south is open farm field and undeveloped forest. The Project Study Area is situated on top of a hill, with the topography gradually sloping down in all directions. Please refer to Appendix A for photographs of current conditions onsite.

Wetland classifications used to identify the type of wetland(s) identified within the Study Area are based on guidance from the U.S. Fish and Wildlife Service (USFWS) (Cowardin et.al. 1979). These are further qualified with the Hydrogeomorphic Method of wetland classification (Brinson, 1993).

### Wetland/Watercourse Description

Six wetlands and three watercourses were delineated within the Study Area during the December 2022 delineation effort, which includes four palustrine emergent (PEM1B) wetlands and two palustrine forested (PFO1B) wetlands. No potential vernal pools were observed at the time of the delineation effort.



Wetland 1 is a palustrine emergent (PEM1B) depression wetland located on a hillside slope along the northern edge of the farm field. During the delineation effort, pockets of  $\pm 1$ -2 inches of standing water were observed in minor depressions throughout the wetland, and soils were consistently saturated from  $\pm 1$ -10 inches below the ground surface. Soils encountered were predominantly sandy loams with no observable restrictive layer within  $\pm 20$  inches below the ground surface. Redoximorphic characteristics were observed between  $\pm 3$ -12+ inches below the ground surface. The dominant vegetation species within Wetland 1 is reed canary grass (*Phalaris arundinacea*). Wetland 1 is associated with two intermittent watercourse channels, delineated as ordinary high water. One channel runs downslope from west to east along the edge of the farm field and extends into the wooded area to the northeast, where it drains into the upland slope and terminates. A second channel extends to the north from Wetland 1 and continues downslope off the Project site.

Wetland 2 is a palustrine emergent (PEM1B) wetland located within a depression on a hillside slope along the southwestern edge of the farm field. During the delineation effort, soils were consistently saturated from  $\pm 1$ -10 inches below the ground surface. Soils encountered were predominantly sandy loams with no observable restrictive layer within  $\pm 20$  inches below the ground surface. Redoximorphic characteristics were observed between  $\pm 4$ -12+ inches below the ground surface. The dominant vegetation species within Wetland 1 is common rush (*Juncus effusus*).

Wetland 3 is a palustrine emergent (PEM1B) wetland located within a depression on a hillside slope along the southeastern edge of the farm field. The wetland system is forested along the eastern side and the system continues offsite to the east. During the delineation effort, pockets of  $\pm 2$ -4 inches of standing water were observed in minor depressions throughout the wetland, and soils were consistently saturated from  $\pm 1$ -10 inches below the ground surface. Soils encountered were predominantly sandy loams with no observable restrictive layer within  $\pm 20$  inches below the ground surface. Redoximorphic characteristics were observed between  $\pm 2$ -12+ inches below the ground surface. The dominant vegetation species within Wetland 1 is reed canary grass (*Phalaris arundinacea*).

Wetland 4 is a palustrine forested (PFO1B) wetland located within a depression on a hillside slope along the southeastern edge of the farm field. The wetland system is located in the wooded edge of the Project site and continues offsite to the east. During the delineation effort, soils were consistently saturated from  $\pm 0$ -12 inches below the ground surface. Soils encountered were predominantly sandy loams with no observable restrictive layer within  $\pm 20$  inches below the ground surface. Redoximorphic characteristics were observed between  $\pm 5$ -14+ inches below the ground surface. The dominant vegetation species within Wetland 1 are red maple (*Acer rubrum*), sensitive fern (*Onoclea sensibilis*), and rough stem goldenrod (*Solidago rugosa*).

Wetland 5 is a palustrine emergent (PEM1B) wetland located within a depression on a hillside slope along the northeastern edge of the farm field. During the delineation effort, soils were consistently saturated from  $\pm 1$ -12 inches below the ground surface. Soils encountered were predominantly sandy loams with no observable restrictive layer within  $\pm 20$  inches below the ground surface. Redoximorphic characteristics were observed between  $\pm 3$ -12+ inches below the ground surface. The dominant vegetation species within Wetland 1 are reed canary grass (*Phalaris arundinacea*) and common rush (*Juncus effusus*). Wetland 5 is



associated with an intermittent stream channel which flows out of Wetland 5, downslope in a northerly direction where it flows into Wetland 6.

Wetland 6 is a palustrine forested (PFO1B) wetland located within a depression on a hillside slope along the northeastern edge of the farm field. During the delineation effort, soils were consistently saturated from ±1-12 inches below the ground surface. Soils encountered were predominantly sandy loams with no observable restrictive layer within ±20 inches below the ground surface. Redoximorphic characteristics were observed between ±5-10+ inches below the ground surface. The dominant vegetation species within Wetland 1 are red maple (*Acer rubrum*) and sensitive fern (*Onoclea sensibilis*). Wetland 6 is associated with an intermittent stream channel that flows into the western corner of the wetland from Wetland 5.

**Dominant Upland and Wetland Vegetation**

As noted above and depicted in Appendix A, the delineated emergent wetlands located within the farm field are largely dominated by reed canary grass (*Phalaris arundinacea*) and common rush (*Juncus effusus*) while the delineated forested wetlands are dominated by red maple (*Acer rubrum*) and sensitive fern (*Onoclea sensibilis*). The most dominant observed vegetation species present throughout the Study Area include orchard grass (*Dactylis glomerata*); red maple (*Acer rubrum*), reed canary grass (*Phalaris arundinacea*), and multiflora rose (*Rosa multiflora*). Additional vegetation located within uplands and wetlands identified within the Study Area is presented in Table 1 below.

**TABLE 1:** Vegetation Within the Study Area

TREES & SAPLINGS				
Scientific	Common	Indicator	Upland	Wetland
<i>Acer rubrum</i>	Red maple	FAC	X	X
<i>Quercus rubra</i>	Northern red oak	FAC	X	X
<i>Quercus bicolor</i>	Swamp white oak	FACW	-	X
<i>Fagus grandifolia</i>	American beech	FACU	X	-
<i>Pinus strobus</i>	Eastern white pine	FAC	X	X
<i>Prunus serotina</i>	Black cherry	FACU	X	-
<i>Betula alleghaniensis</i>	Yellow birch	FAC	X	X
<i>Acer nigrum</i>	Black maple	FACU	X	-
SHRUBS				
Scientific	Common	Indicator	Upland	Wetland
* <i>Rosa multiflora</i>	Multiflora rose	FACU	X	-
* <i>Euonymus alatus</i>	Burning bush	NI	X	-
* <i>Ligustrum obtusifolium</i>	Border privet	NI	X	-
* <i>Berberis thunbergii</i>	Japanese barberry	FACU	X	-
* <i>Lonicera x bella</i>	Honeysuckle	NI	X	-



HERBS & VINES				
Scientific	Common	Indicator	Upland	Wetland
<i>Dactylis glomerata</i>	Orchard grass	FACU	X	-
* <i>Phalaris arundinacea</i>	Reed canary grass	FACW	-	X
<i>Juncus effusus</i>	Common rush	OBL	-	X
<i>Galium mollugo</i>	Hedge bedstraw	FACU	X	-
* <i>Celastrus orbiculatus</i>	Oriental bittersweet	UPL	X	-
<i>Solidago gigantea</i>	Giant goldenrod	FACW	-	X
<i>Onoclea sensibilis</i>	Sensitive fern	FACW	-	X
<i>Polystichum acrostichoides</i>	Christmas fern	FACU	X	-

\*Denotes State non-native invasive species  
 OBL-Obligate wetland species (99% or more occurring in wetlands)  
 FACW-Facultative wetland species (67%-99% occurring in wetlands)  
 FAC- Facultative species (34% -66% occurring in both wetlands and uplands)  
 FACU-Facultative upland plants (1%-33% occurring in wetlands)  
 UPL- Obligate Upland species (<1% occurring in wetlands)  
 NI- No Indicator

## SOIL MAP TYPES

A brief description of each soil unit mapped and/or identified in the Study Area is presented below including information from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil descriptions. For further information on these and other soils, please refer to the internet site at <http://soils.usda.gov/technical/classification/osd/index.html>.

### Upland Soils

(84C) Paxton and Montauk fine sandy loams, 3 to 15 percent slopes

The Paxton series consists of well drained loamy soils formed in lodgment till. The soils are very deep to bedrock and moderately deep to a densic contact. They are nearly level to steep soils on hills, drumlins, till plains, and ground moraines. Slope ranges from 0 to 45 percent. Saturated hydraulic conductivity is moderately high or high in the surface layer and subsoil and low or moderately low in the substratum.

(45B) Woodbridge fine sandy loam, 3 to 8 percent slopes

The Woodbridge series consists of moderately well drained loamy soils formed in lodgment till. They are very deep to bedrock and moderately deep to a densic contact. They are nearly level to moderately steep soils on hills, drumlins, till plains, and ground moraines. Slope ranges from 0 to 25 percent. Saturated hydraulic conductivity ranges from moderately high to high in the surface layer and subsoil and low or moderately low in the dense substratum.

(73C) Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

The Charlton series consists of very deep, well drained soils formed in loamy melt-out till. They are nearly level to very steep soils on moraines, hills, and ridges. Slope ranges from 0 to 60 percent. Saturated hydraulic conductivity is moderately high or high.



## **Wetland Soils**

### Ridgebury, Leicester and Whitman Complex

#### Ridgebury Soils

The Ridgebury complex is a very deep poorly drained soil that includes poorly drained Leicester, and very poorly drained Whitman soils formed in till derived mainly from granite, gneiss and schist. Ridgebury soils on the landscape are in slightly concave areas and shallow drainageways of till uplands with slopes that range from 0-8 percent. Depth to the perched seasonal high water table from November to May, or longer, is perched above the densic materials. The soils diagnostic horizons include an ochric epipedon (0 to 5 inches (A horizon)), aeric feature 100 percent of the zone from 5 to 9 inches (Bw1 horizon), and a cambic horizon (5 to 18 inches (Bw and Bg horizons)). Densic contact root limiting material begins at 18 inches (Cd). Endosaturation occurs within the zone from 9 to 18 inches and is saturated above the densic contact (Bw2 horizon).

#### Leicester Soils

The Leicester series consists of very deep, poorly drained loamy soils formed in friable till. They are nearly level or gently sloping soils in drainage ways and low-lying positions on hills. Slope ranges from 0 to 8 percent. Permeability is moderate or moderately rapid in the surface layer and subsoil and moderate to rapid in the substratum. The horizons and features recognized in this pedon are an ochric epipedon in the zone from 1 to 7 inches (A horizon) and a cambic horizon in the zone from 7 to 23 inches (Bg and BC horizons). There is also an aquic moisture regime as indicated by chroma of 2 in Bg horizon but with chroma too high within 30 inches (chroma 3 in BC horizon) to qualify for Typic Endoaquepts. This series also contains an endoaquepts subgroup based on saturation to a depth of 200 cm from the mineral soil surface. There is an aeric great group based on matrix color and a chroma of 3 or more in one subhorizon between the Ap and 75 cm. (BC horizon) and the particle-size class in control section ranges from 10 to 40 inches and is considered coarse loamy type of soil.

#### Whitman Soils

The Whitman series consists of very deep, very poorly drained soils formed in glacial till derived mainly from granite, gneiss, and schist. They are shallow to a densic contact. These soils are nearly level or gently sloping soils in depressions and drainageways on uplands. Permeability is moderate or moderately rapid in the solum and slow or very slow in the substratum. The diagnostic horizons and features in this pedon include an umbric epipedon in the zone from the soil surface to a depth of 10 inches (Ap horizon) and a cambic horizon in the zone from 10 to 18 inches (Bg horizon). This soil also has aquic conditions as evidenced by a chroma of 1 in the Bg horizon. A densic contact is also present with the root limiting layer beginning at 18 inches. Whitman soils are considered to have a shallow depth class because the depth to the densic contact is less than 20 inches (Cd1 is at 18 inches).



## REFERENCES

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1. Brinson, M.M. 1993. *A Hydrogeomorphic Classification for Wetlands*. Tech. Rpt.WRP-DE-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
2. Cowardin, L.M., V. Carter, F.C. Golet and E.T. LaRoe, 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service. Washington, D.C. FWS/OBS-79/31.
3. United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil descriptions. Internet site:  
<http://soils.usda.gov/technical/classification/osd/index.html>).

## CLOSING

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Thank you for the opportunity to work with you on this Project. Please contact Jeffrey Shamas at 860-807-4388 if you have any questions or require additional assistance.

Sincerely,  
Vanasse Hangen Brustlin, Inc.

A handwritten signature in black ink that reads "Eric A. Olson".

Eric A. Olson, PWS  
Senior Environmental Scientist  
[EOlson@vhb.com](mailto:EOlson@vhb.com)

A handwritten signature in black ink that reads "Jeffrey R. Shamas".

Jeffrey R. Shamas, CE, CSS, ENV SP, SPWS  
Director, Energy & Natural Sciences  
[Jshamas@vhb.com](mailto:Jshamas@vhb.com)

### Attachments:

- Figure 1 – USGS Site Location Map
- Figure 2 – Wetland and Watercourse Delineation Map
- Figure 3 – Soils Map
- Appendix A – Site Photograph Log

## FIGURES



**Figure 1: USGS Site Location Map**  
Greenskies | Winchester, CT



 Project Study Area

**Figure 2: Wetland and Watercourse Delineation Sketch**

Greenskies | Winchester, CT



Study Area Delineated Wetlands		
Wetland ID	Ft <sup>2</sup>	Acres
W-1	1,834.80	0.04
W-2	72.46	0.00
W-3	32,560.37	0.75
W-4	875.24	0.02
W-5	912.87	0.02
W-6	870.75	0.02
<b>Total</b>	<b>37,126.50</b>	<b>0.85</b>

- Project Study Area
- Study Area Delineated Wetland Edge
- Study Area Delineated Wetland Area
- Approximated Offsite Delineated Wetland Edge
- Approximated Offsite Delineated Wetland Area
- Delineated Ordinary High Water
- Delineated Stream Center

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**Figure 3: NRCS Soils Map**  
Greenskies | Winchester, CT



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- Project Study Area
- NRCS Soils Boundary



**APPENDIX A**

**SITE PHOTOGRAPH LOG**

**Figure 1: Photograph Log Map**  
Greenskies | Winchester, CT



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- |                    |  |                                |
|--------------------|--|--------------------------------|
| Project Study Area | Study Area Delineated Wetland Area           | Delineated Ordinary High Water |
| Photo              | Study Area Delineated Wetland Edge           | Delineated Stream Center       |
|                    | Approximated Offsite Delineated Wetland Area |                                |
|                    | Approximated Offsite Delineated Wetland Edge |                                |



# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 1

**Date:** 12/05/22

**Description:** View facing southeast at Wetland 1.



# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 2

**Date:** 12/05/22

**Description:** View facing northeast of Wetland 1.





# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 3

**Date:** 12/05/22

**Description:** View facing southeast of Wetland 3.



# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 4

**Date:** 12/05/22

**Description:** View facing southwest of Wetland 3.





# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 5

**Date:** 12/05/22

**Description:** View facing northeast of Wetland 3.



# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 6

**Date:** 12/05/22

**Description:** View facing east of Wetland 4.







# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 7

**Date:** 12/05/22

**Description:** View facing northwest of Wetland 5.



# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 8

**Date:** 12/31/22

**Description:** View facing north towards Wetland 6.





# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 9

**Date:** 12/05/22

**Description:** View facing southeast of upland field in the northwestern portion of the Site.



# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 10

**Date:** 12/05/22

**Description:** View facing west of upland field in the central portion of the Site.





# PHOTOGRAPHIC LOG

Client Name: Greenskies

Site Location: Winchester, CT

Project No: 43183.00

Photo No.: 11

Date: 12/05/22

**Description:** View facing northeast of upland field in the southern portion of the Site.



# PHOTOGRAPHIC LOG

Client Name: Greenskies

Site Location: Winchester, CT

Project No: 43183.00

Photo No.: 12

Date: 12/05/22

**Description:** View facing northeast of upland forest adjacent to the northeastern corner of the Site.





# PHOTOGRAPHIC LOG

Client Name: Greenskies

Site Location: Winchester, CT

Project No: 43183.00

Photo No.: 13

Date: 12/05/22

Description: View facing southwest of upland forest adjacent to the southwestern corner of the Site.



# PHOTOGRAPHIC LOG

Client Name: Greenskies

Site Location: Winchester, CT

Project No: 43183.00

Photo No.: 14

Date: 12/05/22

Description: View facing southwest of Wetland 2.





# PHOTOGRAPHIC LOG

**Client Name:** Greenskies

**Site Location:** Winchester, CT

**Project No:** 43183.00

**Photo No.:** 15

**Date:** 12/05/22

**Description:** View facing northeast of upland field in the southeastern portion of the Site.

