December 6, 2023

Ref: 43338.00

Mr. Jean-Paul LaMarche
Greenskies Development Company, LLC
127 Washington Avenue
West Building, Lower Level
North Haven, Connecticut 06473

Re: Wetland & Watercourse Delineation Report
Fawn Meadow Lane, Woodbury, Connecticut

Dear Mr. LaMarche,

VHB completed an on-site investigation to determine the presence or absence of state and/or federally regulated wetlands and/or watercourses at a ±36-acre property along Fawn Meadow Lane (Woodbury Assessor's MBL 029-018D) in Woodbury, Connecticut (Figure 1) as requested and authorized. This investigation encompassed the entire parcel (herein referred to as the Study Area) and was completed by a Certified Professional Soil Scientist and in accordance with the principles and practices noted in the United States Department of Agriculture (USDA) Soil Survey Manual (2017). The soil classification system of the National Cooperative Soil Survey was used in this investigation to identify the soil map units present on the Project Site.

This delineation report includes descriptions of site conditions, photographic documentation (Appendix A), a (Natural Resources Conservation Service) NRCS Soils Report for the site (Appendix B) and a Delineated Wetland Sketch (Figure 2) displaying delineated wetland/watercourse resources within the Study Area.

INVESTIGATION & METHODOLOGY

The Study Area was investigated on August 17 and 23, 2023, under normal seasonal weather conditions. No rain event occurred within four days prior to the site visit. The site is currently undeveloped but was historically used as an agricultural farm field. No permanent buildings or structures are present onsite, but one roadway does extend from the southeastern border of the site inland. The surrounding area is primarily forested with residential neighborhoods and agricultural farm fields present.

Soil types are identified 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 are generally spaced 25 to 50 feet apart. It is important to note that

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flagged wetland and watercourse boundaries are subject to change until verified by local, state, or federal regulatory agencies.

REGULATORY INFORMATION

Wetlands and watercourses are regulated by both state and federal laws each with different criteria for establishing regulatory limits. Accordingly, the State may regulate waters that fall outside of federal jurisdiction; however, where federal jurisdiction exists concurrent State jurisdiction is almost always present. For this project, federal and state wetland boundaries are coincident.

State Regulation

Wetland determinations are based on the presence of poorly drained, very poorly drained, alluvial, or floodplain soils and submerged land. Drainage class identifies the natural drainage condition of the soil (USDA-NRCS 2014). It refers to the frequency and duration of wet periods under conditions similar to those under which the soil developed. Drainage class is inferred from observation of landscape position and relies principally on presence or absence of features in the soil profile associated with soil development under saturated conditions.

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 scour 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.)

Federal Regulation

Federal wetlands were delineated in accordance with the Corps of Engineers 1987 Manual (Environmental Lab. 1987) in conjunction with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0, January 2012), as amended. This method relies on the documentation of the presence of three parameters 1) wetland soils, 2) hydrophytic vegetation, and 3) wetland hydrology for an area to be mapped as a wetland. Field Indicators for Identifying Hydric Soils in New England- Version 4 and by inference Field Indicators of Hydric Soils in the United States A Guide for Identifying and Delineating Hydric Soils Version 8.2 were used to document the presence of hydric soils.

WETLAND AND WATERCOURSE SITE DESCRIPTION

Wetland classifications used to identify the type of wetland(s) occurring on the Study Area are based on guidance from the U.S. Fish and Wildlife Service (USFWS) (Cowardin et.al. 1979).

Wetland/Watercourse Descriptions

Wetland 1: (PEM1)[1]
Wetland 1 is a depressional emergent wetland located adjacent to an onsite accessway. Soils display a depleted matrix with faint redoximorphic characteristics present from the ground surface to ±13+ inches below the ground surface and are very poorly drained. Soils are saturated throughout the soil column, and the water table appeared at ±10 inches below the ground surface. Standing water present within Wetland 1 had a depth of ±2 feet at its deepest point. The vegetation present is dominated by hydrophytic shrub and herbaceous cover including but not limited to Pennsylvania smartweed (*Persicaria pensylvanica*), common barnyard grass (*Echinochloa crus-galli*), flat-top goldenrod (*Euthamia graminifolia*), common soft rush (*Juncus effusus*), mugwort (*Artemisia vulgaris*), and dock-leaved smartweed (*Persicaria lapathifolia*). Canopy trees are absent. Uplands adjacent to this wetland consist of a partially paved/gravel access road, and an overgrown field sloped downgradient towards the southern border of the Study Area.

During the field delineation efforts, numerous tadpoles were observed within this wetland. As the wetland held ±2 feet of water during August, it can be assumed water is also held during the Spring season. Therefore, VHB identifies this wetland as a Potential Vernal Pool. Although this habitat is exhibiting the ability to support obligate vernal pool species in August, in order to confirm whether this is in fact a Vernal Pool a survey of this habitat would need to be completed in the spring (late March-early May).

Wetlands 2 and 3 (PFO1E)
Wetlands 2 and 3 are within ±50 feet of each other along opposite sides of the delineated Stream 2 channel. The wetlands are depressional/slope forested fringe wetlands along Stream 2 and are sloped downgradient towards the eastern border of the site. Soils are reduced with redoximorphic characteristics present from the ground surface to ±12+ inches below the ground surface and are poorly drained. Soils are saturated throughout the soil column, but the water table was not encountered. No standing water was present. Dominant hydrophytic vegetation present includes skunk cabbage (*Symplocarpus foetidus*), grey alder (*Alnus incana*), American elm (*Ulmus americana*), and jewelweed (*Impatiens capensis*). Uplands adjacent to both wetlands consist of a mature forest and an overgrown open field.

Wetlands 4 and 5 (PFO1E)
Wetlands 4 and 5 are within ±70 feet of each other along Stream 3 in the southeast portion of the Study Area. Both wetlands are depressional/slope forested fringe wetlands located at the bottom of a slope that extends from the west and continues offsite to the east. Soils are reduced with redoximorphic characteristics present at ±5 inches below the ground surface and are poorly drained. While standing water is not present,

[1] U.S. Fish & Wildlife Service Classification of Wetlands and Deepwater Habitats of the United States, Cowardin *et al*. 1979.

soils are heavily saturated at the ground surface, and the water table was encountered ±10 inches below the ground surface. Dominant hydrophytic vegetation present includes skunk cabbage, cinnamon fern (*Osmundastrum cinnamomeum*), pin oak (*Quercus palustris*) and multiflora rose (*Rosa multiflora*). Uplands adjacent to both wetlands consist of heavily forested, rocky slopes.

Wetland 6 (PFO1E)
Wetland 6 is a depressional/slope forested wetland located in the northwestern corner of the site, along a stone wall fence. Soils displayed a thick dark surface above a depleted matrix, although a rocky restrictive layer was observed ±9 inches below the ground surface. The poorly drained soils were saturated, but due to the shallow restrictive layer the water table was not encountered. Dominant hydrophytic vegetation present includes Skunk cabbage, yellow birch (*Betula alleghaniensis*), red oak (*Quercus rubra*), and grey alder. Uplands adjacent to this wetland consist of forested uplands and a utility right-of-way.

Stream 1 (R5UBH)
Stream 1 is a forested stream channel that briefly intersects the Study Area before flowing offsite again. With a width of ±2.5 feet, this stream flows from north to south, and during the time of delineation exhibited ±7 inches of flowing water. Physical indicators of an Ordinary High Water Line along this portion of the stream include a well-defined channel, the presence of a wrack line, scouring, and exposed root systems.

Stream 2 (R5UBH)
Stream 2 is a forested stream channel that flows downslope towards a larger stream along the eastern boundary of the Study Area. This downstream channel hydrologically connects Streams 1 and 2, and ultimately Stream 3 to the south. With a width of ±4 feet, this stream flows from northwest to southeast through a well-defined and scoured channel, but during the time of delineation, no water was flowing. Therefore, it was concluded that this is an Intermittent Stream, as it consists of a scoured channel and hydrophytic vegetation despite the absence of flowing water during the investigation. Additionally, physical indicators of an Ordinary High Water Line include the destruction of terrestrial vegetation, the presence of a wrack line, scouring, water staining, and exposed root systems.

Stream 3 (R5UBH)
Stream 1 is a forested stream channel that flows north to south along the southeastern boundary of the Study Area. It is anticipated that this stream is hydrologically connected to Streams 1 and 2 to the north via a culvert pipe based on aerial imagery and walking the Study Area. With a width of ±4 feet, this stream exhibited ±8 inches of flowing water in a well-defined, scoured channel. Additional physical indicators of an Ordinary High Water Line include shelving, the presence of a wrack line, scouring and exposed root systems. Crayfish were observed during field efforts.

Dominant vegetation observed onsite are presented in Table 1.

TABLE 1: Dominant Vegetation Onsite

TREES & SAPLINGS				
Scientific	**Common**	**Indicator**	**Upland**	**Wetland**
Acer rubrum	Red maple	FAC	X	X
Alnus incana	Grey alder	FACW	-	X
Betula alleghaniensis	Yellow birch	FAC	X	X
Betula papyrifera	Paper birch	FACU	X	-
Fagus grandifolia	American beech	FACU	X	X
Quercus palustris	Pin oak	FACW	-	X
Salix alba	White willow	FACW	-	X
Ulmus americana	American elm	FACW	-	X

SHRUBS				
Scientific	**Common**	**Indicator**	**Upland**	**Wetland**
Clethra alnifolia	Sweet pepperbush	FAC	X	X

HERBS & VINES				
Scientific	**Common**	**Indicator**	**Upland**	**Wetland**
**Fallopia japonica*	Japanese knotweed	FACU	X	-
**Rosa multiflora*	Multi-flora rose	FACU	X	X
Carex grayi	Grey's sedge	FACW	-	X
Celastrus orbiculatus	Oriental bittersweet	UPL	X	-
Impatiens capensis	Jewelweed	FACW	-	X
Juncus effusus	Common rush	OBL	-	X
Osmunda claytoniana	Interrupted fern	FAC	X	X
Osmundastrum cinnamomeum	Cinnamon fern	FACW	-	X
Symplocarpus foetidus	Skunk cabbage	OBL	-	X
Toxicodendron radicans	Poison ivy	FAC	X	X

*Denotes state-listed non-native invasive species

SOIL MAP TYPES

The Cooperative Soil Survey used three map units when they mapped the Site. Uplands were mapped Udorthents-Urban land complex; uplands and wetlands are included in the mapped Windsor loamy sand area, and the southwest corner of the property was mapped as Walpole sandy loam. Descriptions of the named series which make up these map units are presented below including information from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Official Series Descriptions. Mapping from the NRCS Web Soil Survey tool is included in Appendix B. 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

The following soil series or their similar analogs were observed in the field.

Gloucester gravelly sandy loam, 3 to 15 percent slopes, extremely stony – 59C
The Gloucester component makes up 80 percent of the map unit. Slopes are 3 to 15 percent. This component is on hills on uplands. The parent material consists of sandy and gravelly melt-out till derived from granite and/or schist and/or gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F144AY032NH Dry Till Uplands ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Wetland Soils

Ridgebury, Leicester and Whitman Complex (3), stony fine sandy loam

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 endoadquepts 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).

Raypol (Rb) silt loam

The Raypol series consists of very deep, poorly drained soils formed in loamy over sandy and gravelly outwash. They are nearly level to gently sloping soils in shallow drainageways and low-lying positions on terraces and plains. Slope ranges from 0 to 5 percent. The soils have a water table at or near the surface much of the year. The soils formed in loamy over sandy and gravelly glaciofluvial materials derived mainly from acid crystalline and sedimentary rocks. Diagnostic horizons include an ochric epipedon from 0 to 8 inches (Ap horizon), and a cambic horizon from 8 to 29 inches (Bg and Bw horizons).

REFERENCES

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

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.

Sara Berryman, CSS
Wetland Scientist
Sberryman@vhb.com

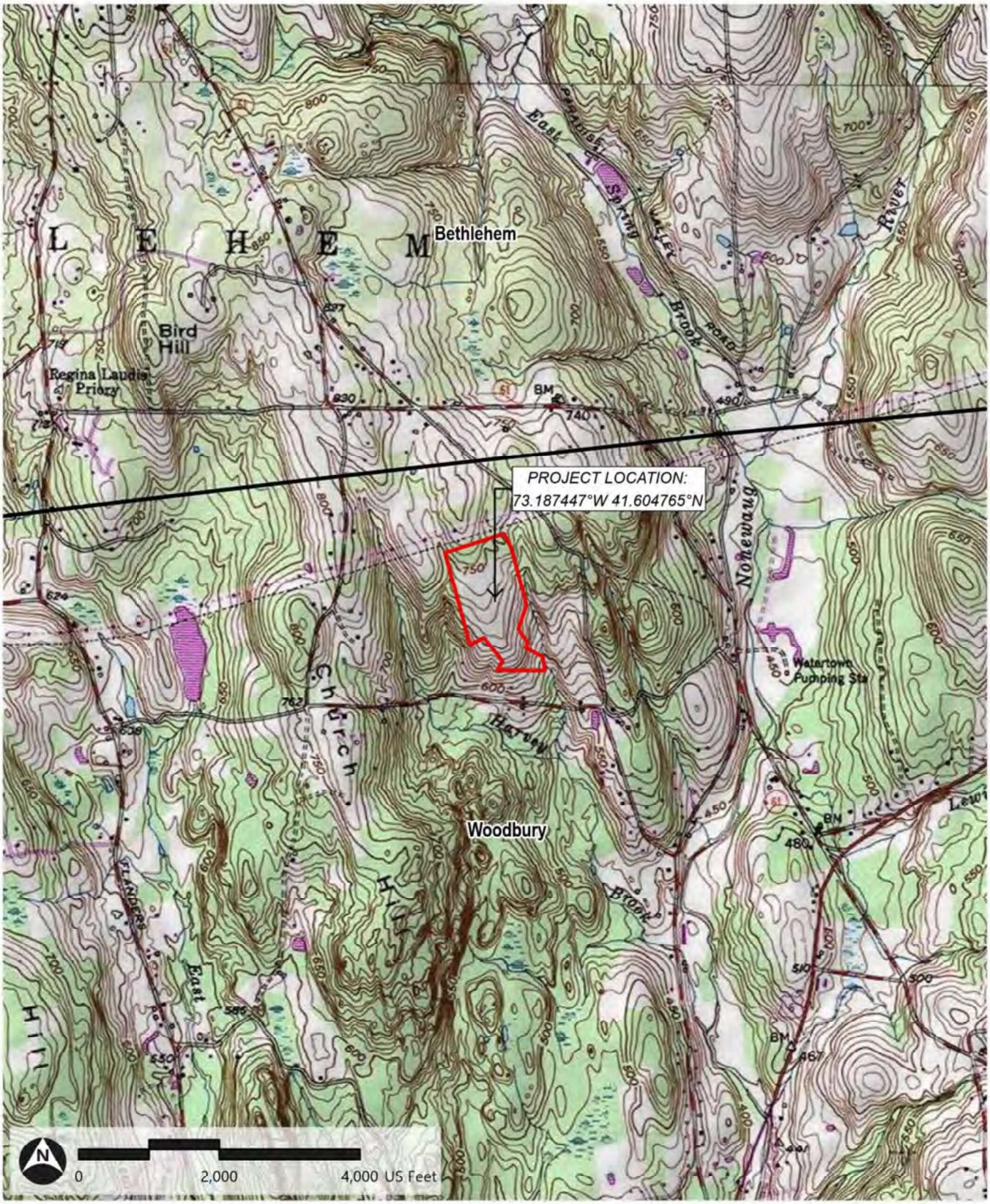
Jeffrey R. Shamas, CE, CSS, ENV SP, SPWS
Director, Energy & Natural Sciences
Jshamas@vhb.com

Attachments:
Figure 1 – USGS Site Location Map
Figure 2 – Delineated Wetland Map
Appendix A – Site Photograph Log
Appendix B – Web Soil Survey Map

Figure 1 USGS Site Location Map

Figure 1: USGS Site Location Map

Greenskies | Woodbury, Connecticut



Source: USGS, VHB

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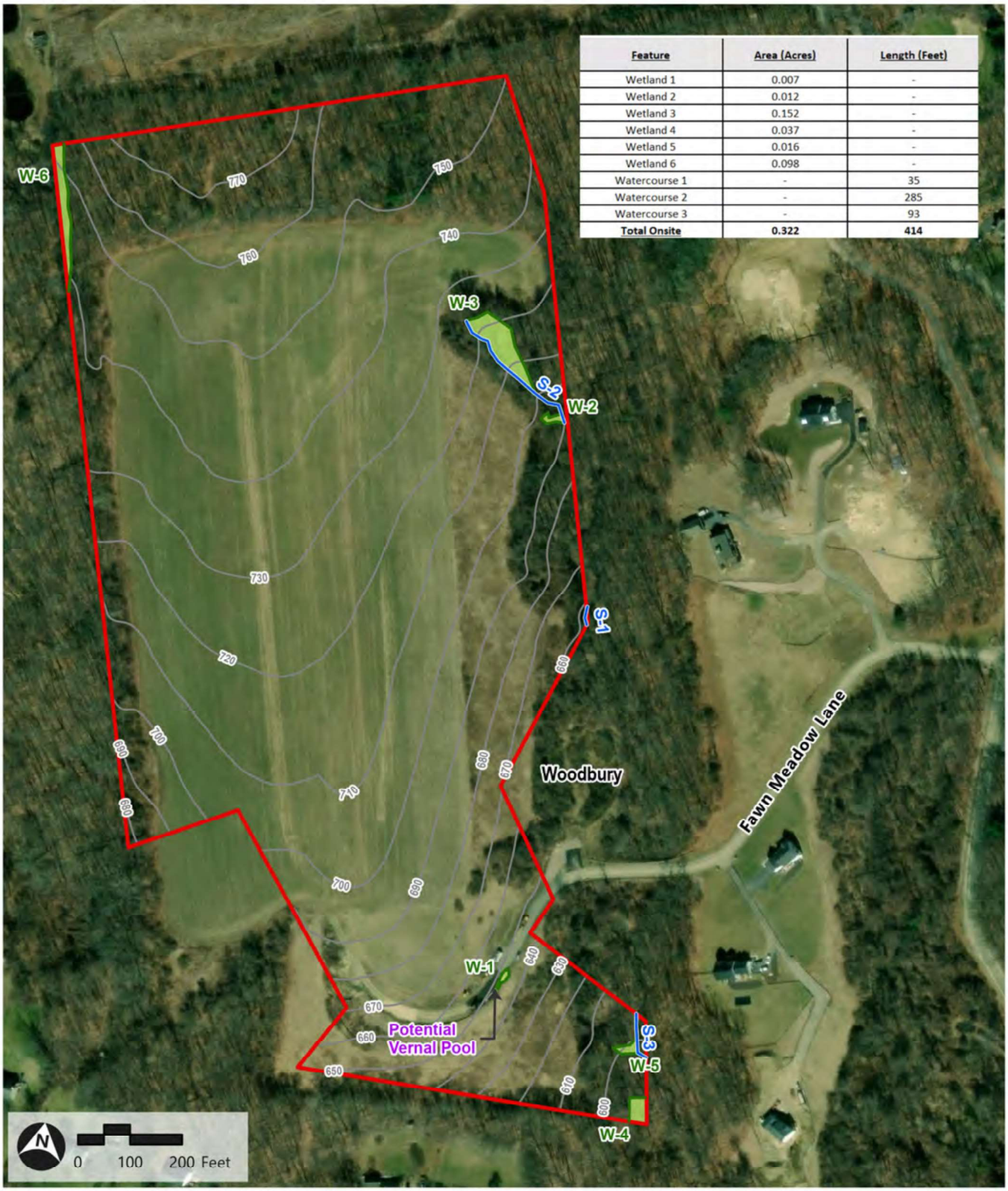
Figure 2 Delineated Wetland Map

Figure 2: Delineated Wetlands and Watercourses Map

Greenskies | Woodbury, Connecticut



Feature	Area (Acres)	Length (Feet)
Wetland 1	0.007	-
Wetland 2	0.012	-
Wetland 3	0.152	-
Wetland 4	0.037	-
Wetland 5	0.016	-
Wetland 6	0.098	-
Watercourse 1	-	35
Watercourse 2	-	285
Watercourse 3	-	93
Total Onsite	**0.322**	**414**

Study Area
Delineated Wetland Edge
10-ft Contours
Delineated Stream Centerline
Wetland Resource Area

Source: CTDEEP, USGS, VHB

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Appendix A Site Photograph Log

Figure 1: Site Photograph Log

Greenskies | Woodbury, Connecticut

Study Area
Photo Location
Delineated Wetland Edge
Delineated Stream Centerline
Wetland Resource Area

Source: CTDEEP, USGS, VHB

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vhb Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 1 **Date:** 8/17/23

Description: Looking southeast, a view of Wetland 1 adjacent to a gravel roadway. A silt fence barrier is in place but does appear to be failing in a few locations around the wetland.

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 2 **Date:** 8/17/23

Description: Looking north at Wetland 1, a portion of the surrounding upland consists of a gravel accessway, a pavement roadway, and equipment/machinery storage.

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PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 3 **Date:** 8/17/23

Description: Looking east, the topography slopes downgradient from Wetland 1 offsite, and consists of an open grass area with a forest in the background continuing offsite.

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 4 **Date:** 8/17/23

Description: A view of Stream 1, which is approximately three feet across at this location.

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PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 5 **Date:** 8/17/23

Description: A view of Stream 2 which is intermittent. A defined channel and hydrophytic vegetation are present, however, there does not appear to be a flow at this time.

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 6 **Date:** 8/22/23

Description: Looking east into Wetland 2, the wetland is heavily forested with herbaceous, shrub, and tree cover.

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PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 7 **Date:** 8/17/23

Description: A view of Wetland 3, located in a canopy cover area.m Soils are poorly drained and obligate vegetation is dominant.

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 8 **Date:** 8/22/23

Description: Facing southeast into Wetland 4, the area is forested with a minor stream adjacent to the site.

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PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 9 **Date:** 8/17/23

Description: A view of Stream 3. A defined channel, flow of water, and hydrophytic vegetation are present.

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 10 **Date:** 8/17/23

Description: Facing south, a view of Wetland 5 located in a dense forested area.

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PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 11 **Date:** 8/17/23

Description: Facing west, a view of Wetland 6. A stone wall bounds this wetland, which extends to the west offsite.

Client Name: Greenskies Development Company, LLC	**Site Location:** Fawn Meadow Lane, Woodbury CT	**Project No**: 43338.00

Photo No.: 11 **Date:** 8/17/23

Description: Facing southeast, forested uplands adjacent to Wetland 6.

Appendix B Web Soil Survey Map

Soil Map—State of Connecticut
(GCE Woodbury)

Map Scale: 1:3,460 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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 22, Sep 12, 2022

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

Date(s) aerial images were photographed: Oct 21, 2022—Oct 27, 2022

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
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	0.4	1.0%
12	Raypol silt loam	0.4	1.2%
59C	Gloucester gravelly sandy loam, 3 to 15 percent slopes, extremely stony	4.0	11.5%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	2.7	7.8%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	0.1	0.2%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	13.2	37.9%
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	14.1	40.5%
Totals for Area of Interest		**34.8**	**100.0%**

Memorandum

To: Mr. Jean-Paul LaMarche
Greenskies Development Company, LLC
127 Washington Avenue
West Building, Lowel Level
North Haven, Connecticut 06473

Date: May 1, 2024

Project #: 43338.00

From: Sara Berryman, CSS, Jeffrey Shamas, CE, CSS, SPWS, ENV SP

Re: Vernal Pool Investigation Memo
Fawn Meadow Lane, Woodbury, Connecticut

Introduction

Vanasse Hangen Brustlin, Inc. (VHB) has prepared this Vernal Pool Memorandum on behalf of Greenskies Development Company, LLC (the Client) for the Project site located along Fawn Meadow Lane, Woodbury, Connecticut (Figure 1). During VHB's August 2023 inland wetland and watercourse delineation for the Project site one potential vernal pool was identified. On April 5, 2024 VHB conducted an on-site vernal pool investigation to verify the presence/absence of vernal pools. This memorandum provides a summary of site conditions, criteria for identifying vernal pools, and the findings of VHB's investigation.

Site Description

The ±36-acre Project site is bound to the north by a forested utility Right-of-Way, to the east by forest and Orchard Avenue, to the south by forest and Church Hill Road, and to the west by the same contiguous forest and a stream feature. During VHB's August 2023 inland wetland and watercourse delineation effort, three wetland areas were delineated, one of which included a potential vernal pool. A brief description of this wetland (Wetland 1) is provided below, but a more detailed description can be found in VHB's Inland Wetlands and Watercourse Report, dated December 6, 2023.

Wetland 1

At ±0.007 acres, Wetland 1 is a palustrine emergent (Cowardin USFWS: PEM) wetland located adjacent to the onsite access drive (Figure 2). At the time of delineation, the wetland had standing water at least two feet deep, and numerous tadpoles were observed within the surface water in the wetland. The wetland vegetation was dominated by herbaceous grasses, including Pennsylvania smartweed (*Persicaria pensylvanica*), common barnyard grass (*Echinochloa crus-galli*), flat-top goldenrod (*Euthamia graminifolia*), common soft rush (*Juncus effusus*), mugwort (*Artemisia vulgaris*), and dock-leaved smartweed (*Persicaria lapathifolia*), with saplings also present.

Vernal Pool Identification Criteria

Although Connecticut's municipal inland wetlands agencies regulate vernal pools, the Connecticut Department of Energy and Environmental Protection (CTDEEP) does not provide a formal definition for vernal pools (CTDEEP 2020). The Connecticut Association of Wetland Scientists (CAWS) website notes that a CTDEEP Task Force developed the following vernal pool draft definition:

> *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 as obligate to such watercourses. These species include spotted salamander, the Jefferson salamander complex, marbled salamander, wood frog, and fairy shrimp.*

According to Calhoun and Klemens (2002) in their technical paper addressing vernal pool considerations for site development, vernal pools generally occupy less than 2 acres and include the following criteria also noted by Donahue (1996):

- presence of one or more obligate species,
- water for approximately 2 months during the growing season,
- a confined depression that lacks a permanent outlet stream,
- no fish, and
- dries out in most years.

These criteria are similar, although the CTDEEP draft definition does not require the pool to dry in most years. The common and scientific names for Connecticut species considered by Calhoun and Klemens (2002) to be obligate biological indicators of vernal pool habitat are listed below in Table 1.

Table 1 Obligate Vernal Pool Species

Common Name	Scientific Name
Blue-spotted Salamander complex	*Ambystoma laterale*
Eastern Spadefoot Toad	*Scaphiopus holbrookii*
Fairy Shrimp	*Eubranchipus spp.*
Jefferson Salamander	*Ambystoma jeffersonianum*
Marbled Salamander	*Ambystoma opacum*
Spotted Salamander	*Ambystoma maculatum*
Wood Frog	*Lithobates sylvaticus*

Vernal Pool Investigation Methodology

VHB wetland scientists investigated the potential vernal pool that was observed during the August 2023 delineation effort. Upon arrival at the site, VHB scientists listened for wood frog calls and searched the pool for spermatophores and egg masses. A wading survey was conducted within the potential vernal pool while wearing polarized glasses. A dip net was used to sample for biological indicators within the potential vernal pool as well. Discretion was used during dipnet sweeps, such that small, shallow areas containing obligate vernal pool indicators were not substantially disrupted (i.e., silting up of areas containing egg masses or spermatophores). Upland habitat around the vernal pool was also evaluated, as upland terrestrial habitat is critical for supporting the adult life stages of most vernal pool obligate amphibians. The extent of development was assessed within the vernal pool envelope (the 100-foot (ft) radius from the perimeter of each vernal pool) and the critical terrestrial habitat (the 100 to 750-ft radius from the vernal pool envelope). The Vernal Pool Assessment Sheet provided by Calhoun and Klemens (2002) defines undeveloped upland as *open land largely free of roads, structures, and other infrastructure; it can be forested, partially forested, or open agricultural land*. Geographic information system (GIS) tools and aerial imagery were used to determine land use surrounding breeding areas and calculate percentages of functional habitat.

Vernal Pool Investigation Findings

VHB wetland scientists did not observe or identify any wood frog or spotted salamander egg masses, or spermatophores. No obligate species were observed. Table 2 summarizes the potential vernal pool's compliance with the vernal pool criteria outlined above, and Table 3 summarizes indicator observations from the field investigation. A site photograph log depicts the current conditions of the potential vernal pool (Attachment A).

Based on VHB's April 5, 2024 investigation, this wetland was not observed to be a confirmed vernal pool. Future investigations may result in verified criteria. Due to the absence of obligate species and indicators, no field data sheets were prepared for this potential vernal pool.

Table 2 Potential Vernal Pool 1 Indicator Observations

Criteria Indicator	Present?	Comments
The presence of one or more obligate species	No	No obligate species were observed during VHB's investigation
Water is present for ±2 months during the growing season	Yes	Water observed was ±1.5 feet deep during the vernal pool investigation
A confined depression that lacks a permanent outlet stream	Yes	No outlet stream is present
Fish observed	No	-
Dries out during the majority of the year	No	Based on VHB's visits to the site for delineation (August) and vernal pool investigations (April), as well as aerial imagery reviewed, the feature appears to hold water for the majority of the year.

Table 3 Potential Vernal Pool 1 Obligate Species and Observations

Indicator Identified	Total Egg Mass Count	Individual Count	Comments
Blue-spotted Salamander complex	0	0	No indicators were observed during the April 5, 2024, investigation effort.
Eastern Spadefoot Toad	0	0	
Fairy Shrimp	0	0	
Jefferson Salamander	0	0	
Marbled Salamander	0	0	
Spotted Salamander	0	0	
Wood Frog	0	0	

Conclusions

Based on our vernal pool investigation for the Project site on April 5, 2024, VHB has documented the absence of vernal pool criteria and obligate species. Therefore, VHB has determined that the potential vernal pool identified during our August 2023 wetland delineation does not qualify as a verified vernal pool.

Figures

Figure 1 – USGS Site Location Map

Figure 2 – Wetlands and Watercourse Delineation Sketch

Attachments

Attachment A – Site Photograph Log

References

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.

Connecticut Association of Wetland Scientists (CAWS). 2020. Vernal Pool Monitoring webpage: http://www.ctwetlands.org/vpmonitoring.html; last accessed 4/23/2020.

Connecticut Department of Energy and Environmental Protection (CT DEEP). 2020. Vernal Pools webpage: https://portal.ct.gov/DEEP/Water/Wetlands/Vernal-Pools; last accessed 4/23/2020.

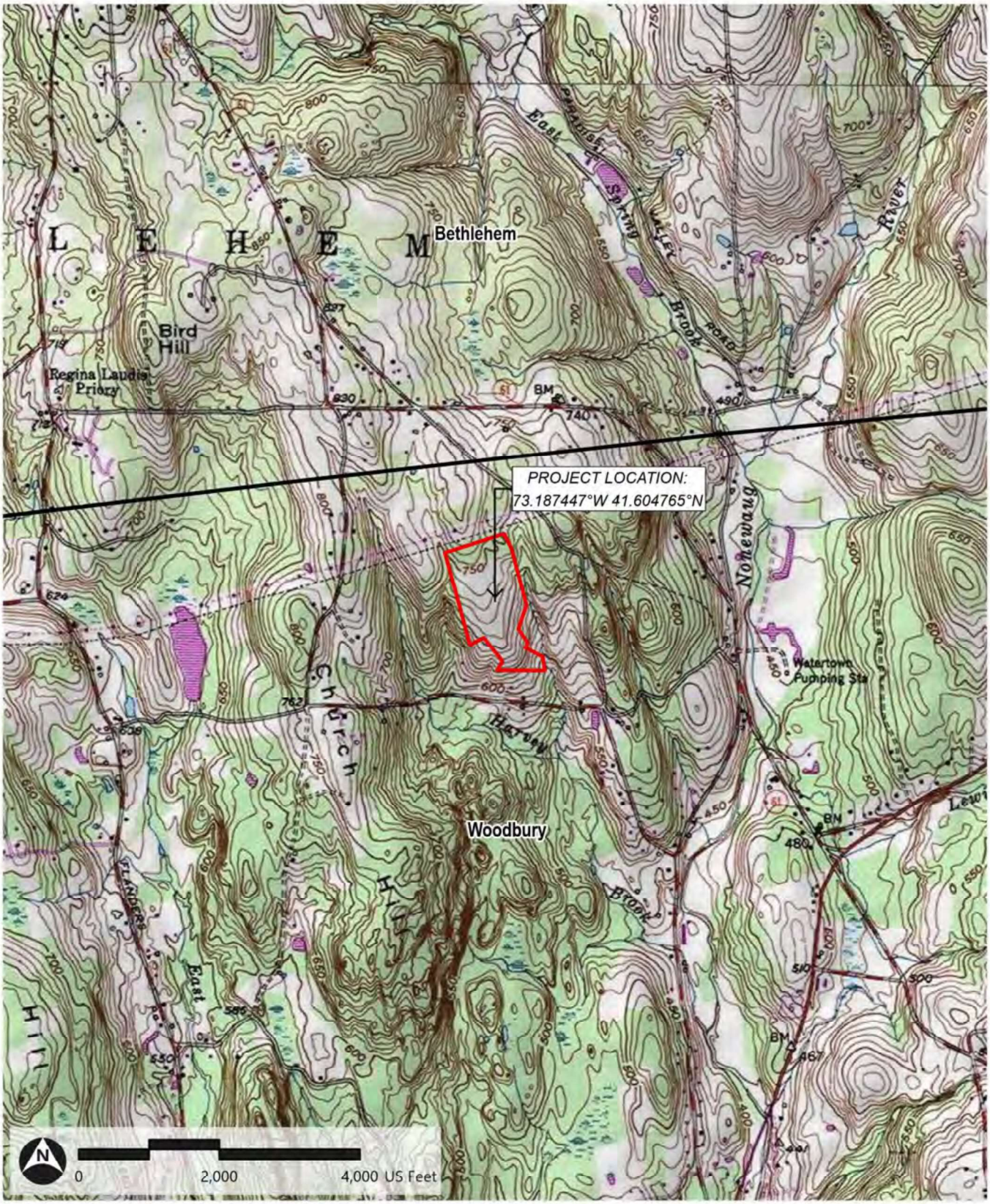
Donahue, D. F. 1996. A guide to the identification and protection of vernal pool wetlands in Connecticut. University of Connecticut Cooperative Extension Program.

Klemens, M. W. 1993. Amphibians and reptiles of Connecticut and adjacent regions. State Geological and Natural History Survey of Connecticut, Bulletin No. 112, Connecticut Department of Environmental Protection, Hartford, CT.

FIGURES

Figure 1: USGS Site Location Map

Greenskies | Woodbury, Connecticut

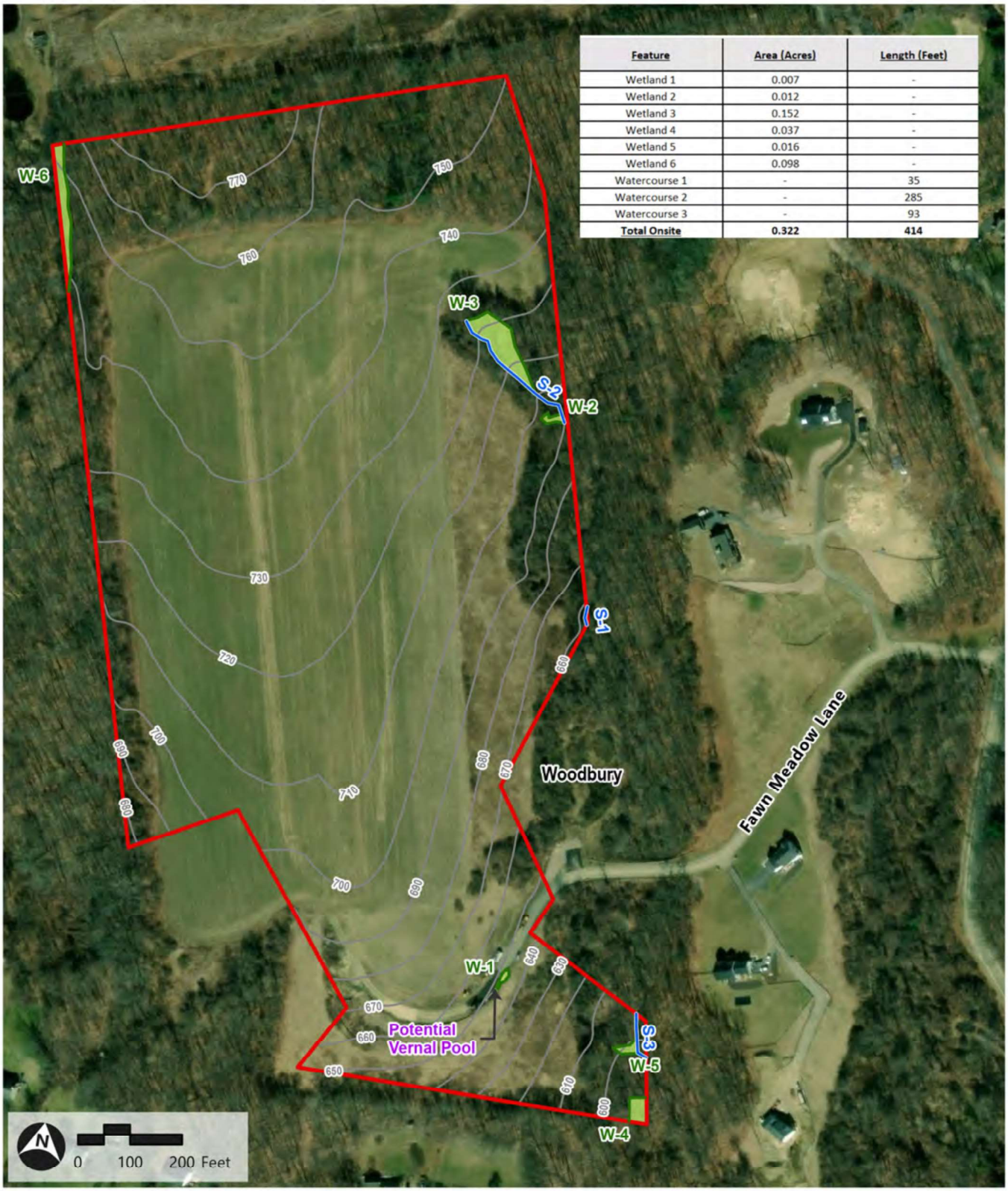


Source: USGS, VHB

Path: \\vhb.com\gis\proj\Wethersfield\43338.00\Project\Project\FawnMeadowsaprx (jburbank, 8/25/2023)

Figure 2: Delineated Wetlands and Watercourses Map

Greenskies | Woodbury, Connecticut



Feature	Area (Acres)	Length (Feet)
Wetland 1	0.007	-
Wetland 2	0.012	-
Wetland 3	0.152	-
Wetland 4	0.037	-
Wetland 5	0.016	-
Wetland 6	0.098	-
Watercourse 1	-	35
Watercourse 2	-	285
Watercourse 3	-	93
Total Onsite	**0.322**	**414**

Study Area
Delineated Wetland Edge
10-ft Contours
Delineated Stream Centerline
Wetland Resource Area

Source: CTDEEP, USGS, VHB

Path: \\vhb.com\gis\proj\Wethersfield\43338.00\Project\Project\FawnMeadow.aprx (lburbank, 8/30/2023)

ATTACHMENT A

SITE PHOTOGRAPH LOG

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PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC | **Site Location:** Woodbury, CT | **Project No**: 43338.00

Photo No.: 1 **Date:** 08/17/2023

Description: Photo of Wetland 1 (W1), taken during wetland delineation efforts, looking south.

vhb Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC | **Site Location:** Woodbury, CT | **Project No**: 43338.00

Photo No.: 2 **Date:** 08/17/2023

Description: Photo of W1, taken during wetland delineation efforts, looking south.

vhb Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC | **Site Location:** Woodbury, CT | **Project No**: 43338.00

Photo No.: 3 | **Date:** 08/17/2023

Description: Photo of W1, taken during wetland delineation efforts, looking south.

vhb Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC | **Site Location:** Woodbury, CT | **Project No**: 43338.00

Photo No.: 4 | **Date:** 4/5/2024

Description: Photo of W1 during vernal pool assessment looking southeast, no evidence of breeding activity was observed.

vhb Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC | **Site Location:** Woodbury, CT | **Project No**: 43338.00

Photo No.: 5 **Date:** 4/5/2024

Description: Photo of W1 during vernal pool assessment looking south, no evidence of breeding activity was observed.

vhb Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Greenskies Development Company, LLC | **Site Location:** Woodbury, CT | **Project No**: 43338.00

Photo No.: 6 **Date:** 4/5/2024

Description: Photo of W1 during vernal pool assessment looking south, no evidence of breeding activity was observed.