



July 18, 2023

Ref: 42924.00

Jean-Paul LaMarche
Greenskies Clean Energy
127 Washington Avenue
North Haven, CT 06473

Re: Wetland & Watercourse Delineation Report
GCE Durham 4MW, Durham, Connecticut

Jean-Paul,

VHB completed an on-site investigation to determine the presence or absence of state-regulated wetlands and/or watercourses at 141 Middlefield Road (Durham Assessor's Parcel Number 15-11) in Durham, Connecticut (Figure 1) as requested and authorized. This investigation encompassed the entire parcel (herein referred to as the Project Site) and was completed by a Certified Professional Soil Scientist and conducted 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 report includes descriptions of site conditions, photographic documentation (Appendix A), and a Delineated Wetland Sketch (Figure 2) displaying delineated wetland/watercourse resources within the Project Site.

INVESTIGATION & METHODOLOGY

The Project Site was investigated on May 19, 2023, during which time a delineation based on criteria used in the State of Connecticut Inland Wetlands and Watercourse Act was completed. Weather was seasonable, sunny with temperatures in the high-70's. The Project Area is a parcel spanning approximately 24.96 acres. The surrounding area is mostly rural residential development

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 generally spaced 25 to 50 feet apart. It is important to note that 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, only state wetlands were delineated.

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 but relies principally on presence of 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.)

WETLAND AND WATERCOURSE SITE DESCRIPTION

Wetland classifications used to identify the type of wetland(s) occurring on the Project Site 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 Descriptions

Wetland 1

Wetland 1 (W01) is located along northern edge of Stream S01. Soils observed in the wetland are poorly drained and contain prominent and distinct redoximorphic features, meeting the requirements to be classified as a Redox Dark Surface hydric soil indicator, as described by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). Hydrophytic vegetation observed onsite include jewelweed (*Impatiens capensis*), skunk cabbage (*Symplocarpus foetidus*), spicebush (*Lindera benzoin*), and red maple (*Acer rubrum*).

Stream 1

Stream S01 is a perennial stream that flows northeast to southwest along the southeastern edge of the property. Stream S01 is approximately two feet wide at the widest point. Within the area of delineated Stream S01, the USFWS National Wetlands Inventory (NWI) mapper shows a PFO1E (Palustrine Forested Broad-Leaved Deciduous Seasonally Flooded/Saturated) wetland.



Stream 2

Stream S02 is an intermittent stream that begins at the end of a drainage depression located towards the southwest of the property and flows to a culvert that continues under Middlefield Road. The stream is approximately 2 feet wide at the widest point. The USFWS NWI mapper does not show any mapped wetlands in this area.

Dominant vegetation species observed are presented in the Table 2 below.

TABLE 1: Delineated Wetlands and Watercourses within the Project Area

Wetland ID	Wetland Classification	HGM	Description
W01	PFO1E	Riverine	Small PFO wetland located on the northern edge of Stream S01.
S01	R5UBF	Riverine	Perennial stream flowing northeast to southwest along the southeastern edge of the project area.
S02	R4SB4J	Riverine	Intermittent stream flowing north to south from a drainage depression to a culvert that continues under Middlefield Road.

TABLE 2: Dominant Vegetation Onsite (Common (Scientific) names.)

TREES & SAPLINGS				
Scientific	Common	Indicator	Upland	Wetland
<i>Acer rubrum</i>	Red maple	FAC	X	X
<i>Pinus strobus</i>	Eastern white pine	FACU	X	
<i>Fagus grandifolia</i>	American beech	FACU	X	

SHRUBS				
Scientific	Common	Indicator	Upland	Wetland
<i>Lindera benzoin</i>	Northern spicebush	FACW	X	X

HERBS & VINES				
Scientific	Common	Indicator	Upland	Wetland
<i>Symplocarpus foetidus</i>	Skunk cabbage	OBL		X
* <i>Rosa multiflora</i>	Multi-floral rose	FACU	X	X
<i>Impatiens capensis</i>	Jewelweed	FACW	X	X
* <i>Artemisia vulgaris</i>	Mugwort	UPL	X	
<i>Toxicodendron radicans</i>	Poison ivy	FAC	X	X
<i>Rubus occidentalis</i>	Black raspberry	NC	X	

*Denotes state-listed non-native invasive species



SOIL MAP TYPES

The Cooperative Soil Survey used five map units when they mapped the Site. Uplands were mapped Ludlow and Wethersfield, and Yalesville Series, and Cheshire fine sandy loam. Wetlands were mapped as Wilbraham and Menlo soils. 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 E. 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.

Cheshire fine sandy loam (63 B & C)

The Cheshire series consists of very deep, well drained loamy soils formed in supraglacial till on uplands. Cheshire soils are nearly level through very steep and are on till plains and upland hills. Slope ranges from 0 through 60 percent. The soils formed in acid glacial till derived mostly from reddish sandstone, shale, and conglomerate with some basalt. The diagnostic horizons and features recognized in this pedon include an ochric epipedon in the zone from 0 to 8 inches (Ap horizon) and a cambic horizon in the zone from 8 to 26 inches (Bw horizons).

Ludlow Series

The Ludlow series consists of moderately well drained soils formed in loamy lodgment till. They are very deep to bedrock and moderately deep to a densic contact. They are nearly level to strongly sloping soils on till plains, hills, and drumlins. Slope ranges from 0 to 15 percent. The soils formed in acid till derived mostly from reddish sandstone, shale, and conglomerate with some basalt. Diagnostic horizons and features recognized in this pedon include an ochric epipedon (0 to 8 inches, Ap horizon), a cambic horizon (8 to 26 inches, Bw horizon), aquic features (iron depletions within a 24-inch depth, Bw2 horizon), and dense till stratum (26-65 inches, Cd horizon).

Wethersfield Series

The Wethersfield series consists of very deep, well drained loamy soils formed in dense glacial till on uplands. The soils are moderately deep to dense basal till. They are nearly level to steep soils on till plains, low ridges, and drumlins. The soils formed in acid glacial till derived mostly from reddish sandstone, shale, and conglomerate with some basalt. Diagnostic horizons include: an ochric epipedon (1 to 3 inches, A horizon) and a cambic horizon (3 to 27 inches, Bw horizon).



Yalesville Series

The Yalesville series consists of moderately deep, well drained soils formed in a loamy till. They are nearly level to moderately steep soils on hills and ridges. Slope ranges from 0 to 50 percent. The soils formed in acid till derived mostly from red sandstone, shale, and conglomerate with some basalt. Diagnostic horizons and features recognized in this pedon include: an ochric epipedon (0 to 8 inches, Ap horizon), and a cambic horizon (8 to 25 inches, Bw horizon).

Wetland Soils

Menlo, coarse loam

Menlo soils are very poorly drained nearly level and are in drainageways and low depressional areas of glaciated till plains and hills. Slope ranges from 0 to 3 percent. The soils formed in acid till derived mostly from reddish sandstone, shale, and conglomerate with some basalt. In some pedons there is a thin layer of organically enriched local alluvium on the surface. Diagnostic horizons and features recognized in this pedon includes: a Mollic epipedon (A horizon), a cambic horizon (Bg horizons), and an Aquic moisture regime- a chroma of 2 or less with redoximorphic features in the zone from 16 to 27 inches (Bg horizons), and a Dense till substratum (C horizon).

Wilbraham (6), silt loam

The Wilbraham series consists of poorly drained loamy soils formed in subglacial till. Wilbraham soils are nearly level to gently sloping and are in depressions and drainageways on glaciated hills. Slope commonly is less than 5 percent, but the range includes 0 to 8 percent. The soils formed in acid till derived mainly from reddish sandstone, shale, and conglomerate with some basalt. Diagnostic horizons and features recognized in this pedon includes an ochric epipedon (0 to 4 inches (A horizon)), a cambic horizon 4 to 20 inches (Bw1 and Bw2 horizons and aquic features (low chroma iron depletions within a 24-inch depth (Bw1, Bw2, and Cd 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>.

Jean-Paul LaMarche
Greenskies Clean Energy
Ref: 42924.00
July 18, 2023
Page 6



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.

A handwritten signature in black ink, appearing to read "S. Berryman", written in a cursive style.

Sara Berryman, CSS
Wetland Scientist
sberryman@vhb.com

A handwritten signature in black ink, appearing to read "J. Shamas", written in a cursive style.

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

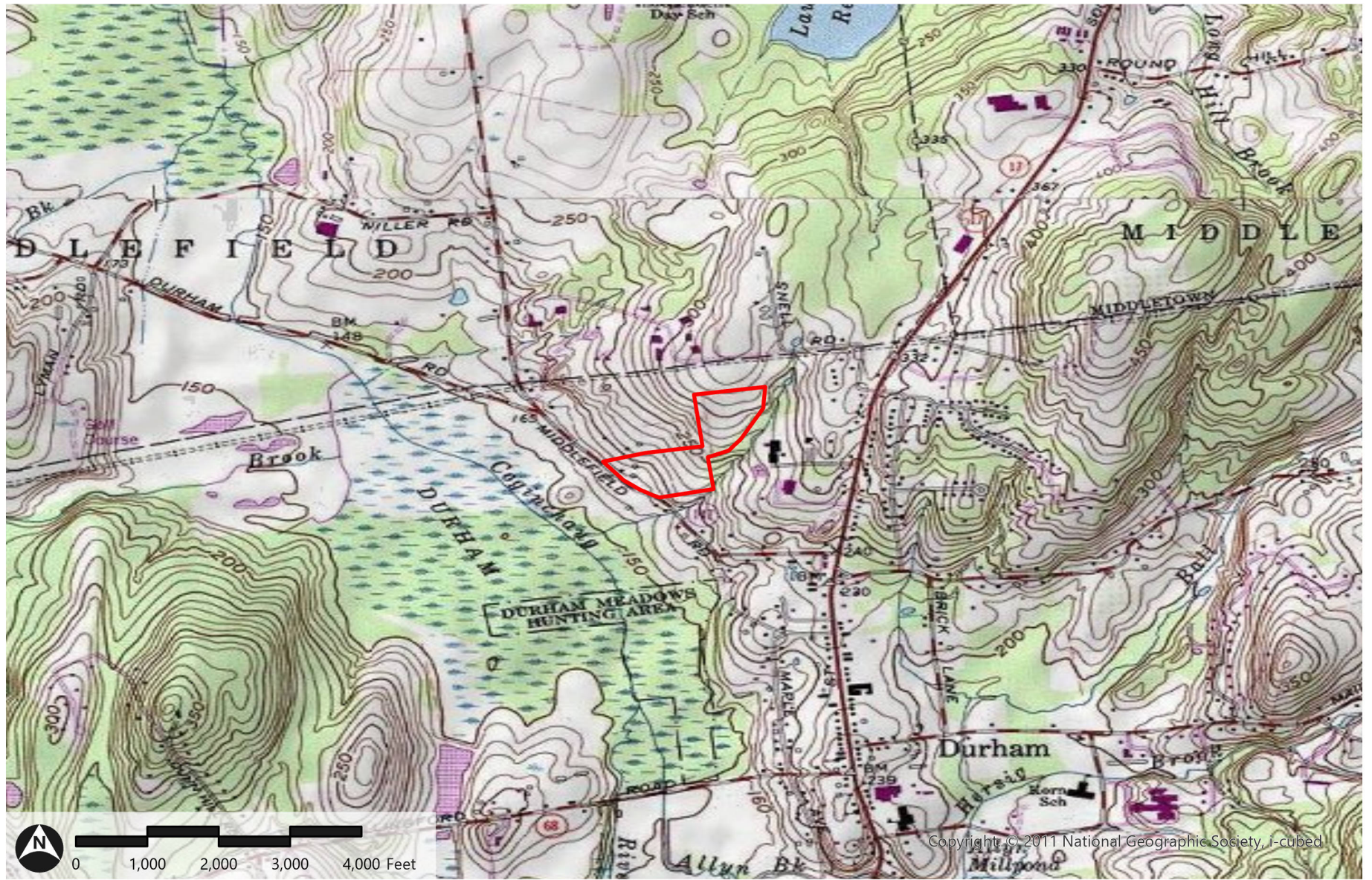
Attachments:

- Figure 1 – USGS Site Location Map
- Figure 2 – Delineated Resources Map
- Appendix A – Site Photograph Log
- Appendix B – Web Soil Survey Map



Figure 1 USGS Site Location Map

Figure 1: USGS Site Location Map
GCE Durham 4MW | Durham, Connecticut



 Project Area

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Source: USGS, VHB



Figure 2 Delineated Resources Map

Figure 2A: Delineated Resources Map
GCE Durham 4MW | Durham, Connecticut



- Project Area
- Delineated Intermittent Stream
- Waterbody
- Delineated Wetland Area
- Delineated Perennial Stream

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Figure 2B: Delineated Resources Map
GCE Durham 4MW | Durham, Connecticut



- Project Area
- Delineated Intermittent Stream
- Waterbody
- Delineated Wetland Area
- Delineated Perennial Stream

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Appendix A Site Photographic Log

PHOTOGRAPHIC LOG

Client Name: GCE Durham 4MW

Site Location: Durham, CT

Project No: 42924.00

Photo No.: 1

Date: 5/19/2023

Description: Facing southeast, view of Wetland W01 and Stream S01.



PHOTOGRAPHIC LOG

Client Name: GCE Durham 4MW

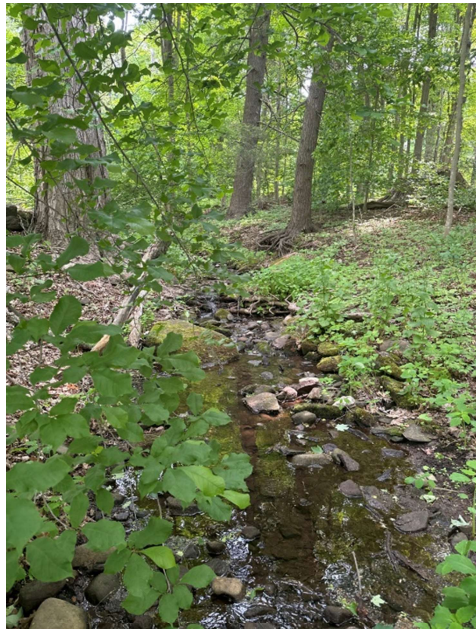
Site Location: Durham, CT

Project No: 42924.00

Photo No.: 2

Date: 5/19/2023

Description: Facing northeast, view of Stream S01 looking upstream.



Client Name: GCE Durham 4MW

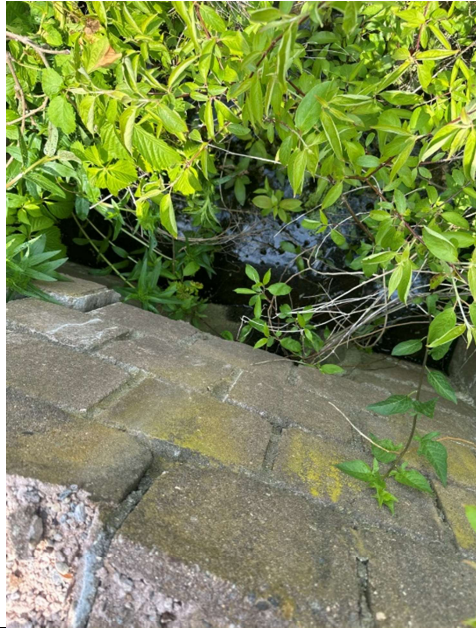
Site Location: Durham, CT

Project No: 42924.00

Photo No.: 3

Date: 5/19/2023

Description: Facing north, a view of Stream S02 at the culvert that continues under Middlefield Road.



Client Name: GCE Durham 4MW

Site Location: Durham, CT

Project No: 42924.00

Photo No.: 4

Date: 5/19/2023

Description: Facing southeast, a view of Stream S02, looking downstream.



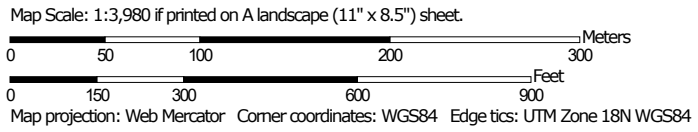


Appendix B Web Soil Survey Map

Soil Map—State of Connecticut
(GCE Durham 4MW, Durham, CT)




Soil Map may not be valid at this scale.



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: Jun 14, 2022—Oct 6, 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
6	Wilbraham and Menlo soils, 0 to 8 percent slopes, extremely stony	0.6	2.3%
40B	Ludlow silt loam, 3 to 8 percent slopes	0.4	1.5%
63C	Cheshire fine sandy loam, 8 to 15 percent slopes	4.8	20.0%
69B	Yalesville fine sandy loam, 3 to 8 percent slopes	2.8	11.9%
87B	Wethersfield loam, 3 to 8 percent slopes	15.2	63.7%
87C	Wethersfield loam, 8 to 15 percent slopes	0.1	0.5%
Totals for Area of Interest		23.8	100.0%



August 1, 2023

Ref: 42924.00

Jean-Paul LaMarche
Greenskies Clean Energy
127 Washington Avenue
North Haven, CT 06473

Re: Vernal Pool Investigation Letter
GCE Durham 4MW, Durham, Connecticut

Jean-Paul,

VHB completed an on-site investigation to determine the presence or absence of inland wetlands and watercourses at 141 Middlefield Road (Durham Assessor's Parcel Number 15-11) in Durham, Connecticut (Figure 1) as requested and authorized. In addition, and as is typical with our delineation field work, we include identifying potential vernal pools. This investigation encompassed the entire parcel (herein referred to as the Project Site) and was completed by a Certified Professional Soil Scientist. The Wetland & Watercourses Delineation Report was issued on July 18, 2023.

REGULATORY INFORMATION

As defined in the Connecticut Inland Wetlands and Watercourses Act §22a-38 CGS, '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." Therefore, under state law, vernal pools, which contain a specific ecology, are one type of vernal watercourse. Vernal pools are seasonal depressional wetlands, which in the northeast occur in glaciated areas that are covered by shallow water for variable periods from winter to spring but may be completely dry during the summer and fall.

INVESTIGATION & METHODOLOGY

The Project Site was investigated on May 19, 2023, during which time a delineation and potential vernal pool investigation based on criteria used in the State of Connecticut Inland Wetlands and Watercourse Act were completed. Weather was seasonable, sunny with temperatures in the high-70's. The Project Area is a parcel spanning approximately 24.96 acres, surrounded by mostly rural residential development.

The Project Site was investigated and any depressional areas with evidence of or having the potential evidence of suitable habitat for amphibian breeding activity (for example), such as egg masses or visual/auditory observations of vernal pool species was completed and, if found, would have been



included in our Wetland and Watercourse Delineation Report noted above. Typical vernal pool species include wood frog (*Lithobates sylvaticus*), spotted salamander (*Ambystoma maculatum*), blue-spotted salamander (*Ambystoma laterale*), marbled salamander (*Ambystoma opacum*), Jefferson's salamander (*Ambystoma jeffersonianum*), and/or fairy shrimp (*Branchiopoda anostraca*).

No evidence of vernal pool species was observed within the Project Site. While the site was investigated toward the end of the amphibian breeding season (May), no auditory observations were heard and only one wetland was delineated, to the southeast of the project area, with no evidence of amphibian breeding observed. As such, no impacts to vernal pool species re anticipated within the project area.

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.

A handwritten signature in black ink, appearing to read "Sf", positioned above the name Sara Berryman.

Sara Berryman, CSS
Wetland Scientist
Sberryman@vhb.com

A handwritten signature in black ink, appearing to read "J. Shamas", positioned above the name Jeffrey R. Shamas.

Jeffrey R. Shamas, CE, CSS, EVN SP, SPWS
Director, Energy & Natural Sciences
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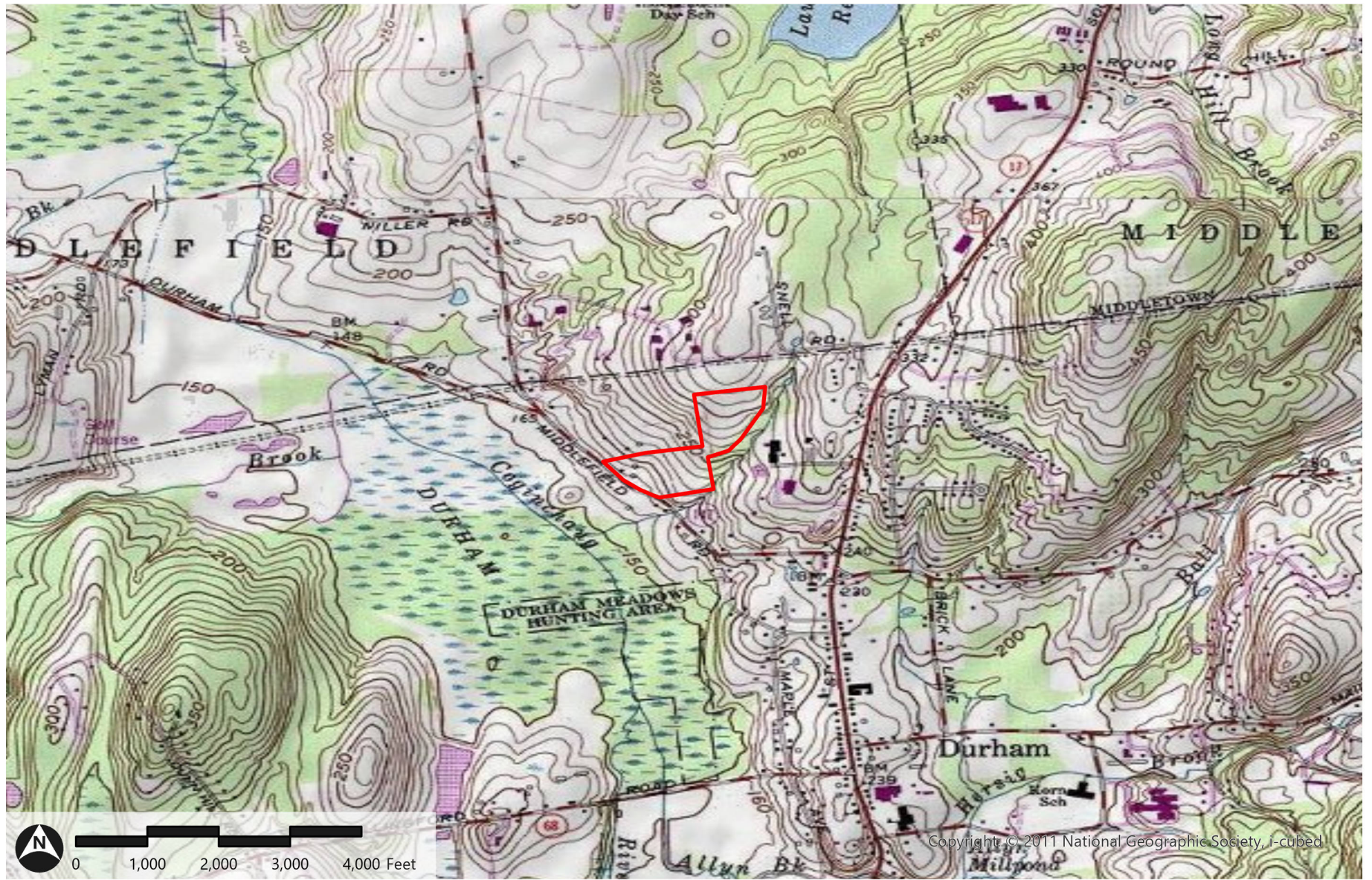
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- Figure 1 – USGS Site Location Map
- Figure 2 – Delineated Resources Map



Figure 1 USGS Site Location Map

Figure 1: USGS Site Location Map
GCE Durham 4MW | Durham, Connecticut



 Project Area

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Source: USGS, VHB

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Figure 2 Delineated Resources Map

Figure 2A: Delineated Resources Map
GCE Durham 4MW | Durham, Connecticut



- Project Area
- Delineated Intermittent Stream
- Waterbody
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- Delineated Perennial Stream

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Figure 2B: Delineated Resources Map
GCE Durham 4MW | Durham, Connecticut



- Project Area
- Delineated Wetland Area
- Delineated Intermittent Stream
- Delineated Perennial Stream
- Waterbody

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