# Site Engineering Report

## Home Design and Build, LLC
## 171 Compo Road South
## Westport, Connecticut

*Prepared for:*

Home Design and Build, LLC
129 Harbor Road
Westport, CT 06880

*Date Prepared:*

April, 2022

*Prepared by:*
DiVesta Civil Engineering, LLC

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# 171 Compo Road South

Westport, CT

March 22, 2022

1 inch = 70 Feet

0 70 141 212

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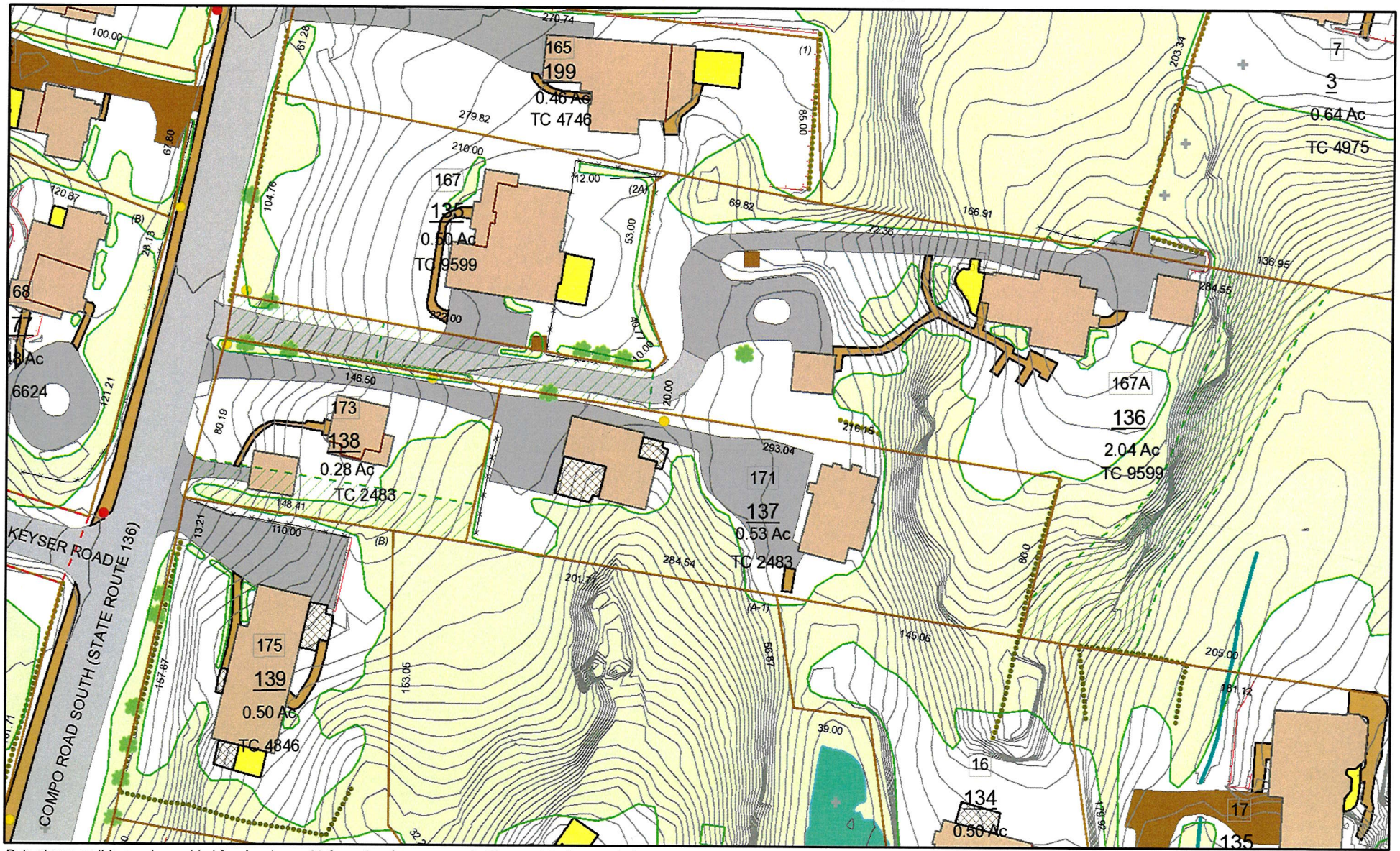


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## I. Introduction

This report has been prepared to present technical information in support of the project to raze the existing houses and to construct two new single family residences in the same general location as the two existing dwellings and to abandon the existing septic systems and install stormwater management systems for each new dwelling along with connecting the two new houses to the sanitary sewer in Compo Road South. The property is located at 171 Compo Road South, Westport, CT.

## II. Existing Site Conditions

The subject property is located on the east side of Compo Road South at 171. The property is .5287 ± acres or 13,031. ± square feet in size and is located in the 'A' residential zone of the Town of Westport. The property is an interior lot with a 15-foot easement accessing the buildable portion of the property. The property is surrounded by residential properties on all sides. The existing dwelling located in the front portion of the site was constructed in 1938 according to the assessor card. The existing dwelling located in the rear portion of the property was constructed in 1940 according to the assessor card. Currently the property is developed with two single family residences, gravel and paved driveways and some mature landscaping throughout the property with a little lawn area surrounding the houses. There is outcropping of the ledge rock throughout the property. The existing houses are serviced by on-site subsurface sewage disposal systems and municipal water from Compo Road South. The roof leaders drain onto the ground. A portion of the easterly side of the property is wooded.

## III. Project Description

The proposal for the property is to raze the two existing houses and to construct two new single family residences in its place. The existing curb cut and easement will remain from Compo Road South. The driveways will follow the general path of the existing driveways with parking areas in front of the two dwellings. The existing septic systems will be abandoned and a new sewer extension will be brought up to this property within Compo Road South and the two new dwellings will be connected via grinder pumps. A stormwater management system will be installed to handle the increase in impervious areas for each new dwelling. There will be some regrading associated with the construction of the proposed houses and stormwater management systems.

## IV. Stormwater Management Facilities

### 1. *Existing site runoff characteristics*:

The existing rear house roof area drains onto the ground and sheet flows in a southerly direction. The existing front house, which has been razed therefore it is unknown where the roof runoff drains. The current drainage pattern from this site is from south to north in the central and westerly portion of the site. This portion of the site will then drain in a westerly direction. From the central and easterly portion of the site the drainage pattern is from the north to the south. This property is fully developed with two residential structures, paved and gravel driveways, small areas of manicured lawn and mature landscaping and wooded areas.

### 2. *Developed Condition Site Runoff Characteristics*

The proposed construction of the two new dwellings will not change the runoff pattern for this property. The general drainage patterns will remain the same for post development as they currently exist.

The analysis that was conducted on this site was to compare the pre-development conditions which consist of an undeveloped parcel of land and compare it to the post-development conditions which will consist of the proposed houses, driveways, other impervious areas and lawn. The goal for the project is to manage the runoff so that post-development peak rate of runoff will be equal to or less than pre-development peak rate of runoff.

It is proposed to collect the runoff from the proposed residences, driveways and a portion of the lawn and direct it to a subsurface detention system for each house. The front house detention system will consist of 4 rows of 5 units each of Contactor 100's. The rear house detention system will consist of 2 rows of 7 units each of Contactor 100's. The area below the lowest control release orifice will handle the water quality volume consisting of the first inch of runoff from the drainage area. The outlet flow will be metered out. The remaining portion of the property will sheet flow as it currently does. Adding remaining flow from the site to the outlet flow from the detention systems will provide a flow that is equal to or less than pre-development flows for all design storms. (Please see the chart below for a summary of our findings.)

The methodology used to determine the peak rate of runoff was TR-20 computer model by HydroCAD. The 2, 10 and 25 year 24-hour design storms were used for the analysis of this property. We calculated the runoff for the whole site to determine the peak rate of runoff from the site. We looked at the pre development conditions and then compared it to the post-development conditions with and without detention.

***3. Summary:***

| | 2 – Year Storm Event (cfs) | 10 – Year Storm Event (cfs) | 25 – Year Storm Event (cfs) |
|---|---|---|---|
| Pre-Development | .50 | 1.30 | 1.87 |
| Post- Development without Detention | .88 | 1.76 | 2.35 |
| Post-Development with Detention | .16 | 1.31 | 1.54 |

Based on our findings the post-development peak rate of runoff from the proposed site plan will be equal to or less than pre-development conditions for all design storm events.

## V. Site Utilities

a. Water Supply

The proposed residences will be serviced by municipal water from Compo Road South.

b. Sanitary Sewer Facilities
It is proposed to extend the sewer main from Keyser Road north to just past the driveway easement and connect the two houses via force mains from grinder pumps.

## VI. Sedimentation and Erosion Control Narrative

There will be minor regrading associated with the development of this property. Proper erosion controls are to be in place before work begins and remain in place until all areas are stabilized. Care should be taken during the initial stage of excavation for the proposed houses and the installation of the various underground utilities and installation of the stormwater management systems.

Prior to any excavation the perimeter silt fence shall be installed and maintained throughout the life of the project until all areas have been stabilized. After each rain event the silt fence shall be checked to determine its condition. Accumulated silt shall be removed and disposed of properly. Any damage to the silt fence shall be repaired.

Haybales should be placed in front of the yard drains as they are installed and the grates shall be wrapped with filter fabric one they are installed.

Reference is made to the Sedimentation and Erosion Controls on the site plan, which are, along with this text included in the report, part of the Sedimentation and Erosion Control Plan for this project.

## VII. Sequence of Construction

1. Obtain all necessary permits from the Town.
2. Removal of the existing residences.
3. Install the silt fence.
4. Install the various underground utilities from Compo Road South to the property.
5. Start the excavation for the proposed footings and foundations.
6. Backfill around the foundations.
7. Start the construction of the houses.
8. Connect the houses to the various underground utilities.
9. Start the excavation for the various stormwater management systems.
10. Connect the proposed roof leaders to the various stormwater management systems.
11. Prepare final grading around the houses.
12. Top soil the lawn area and seed.
13. Remove the sedimentation and erosion controls once the area has been stabilized and/or have been approved by the project engineer or the Town of Westport officials.

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# Appendix A:

# **Hydrology Calculations**

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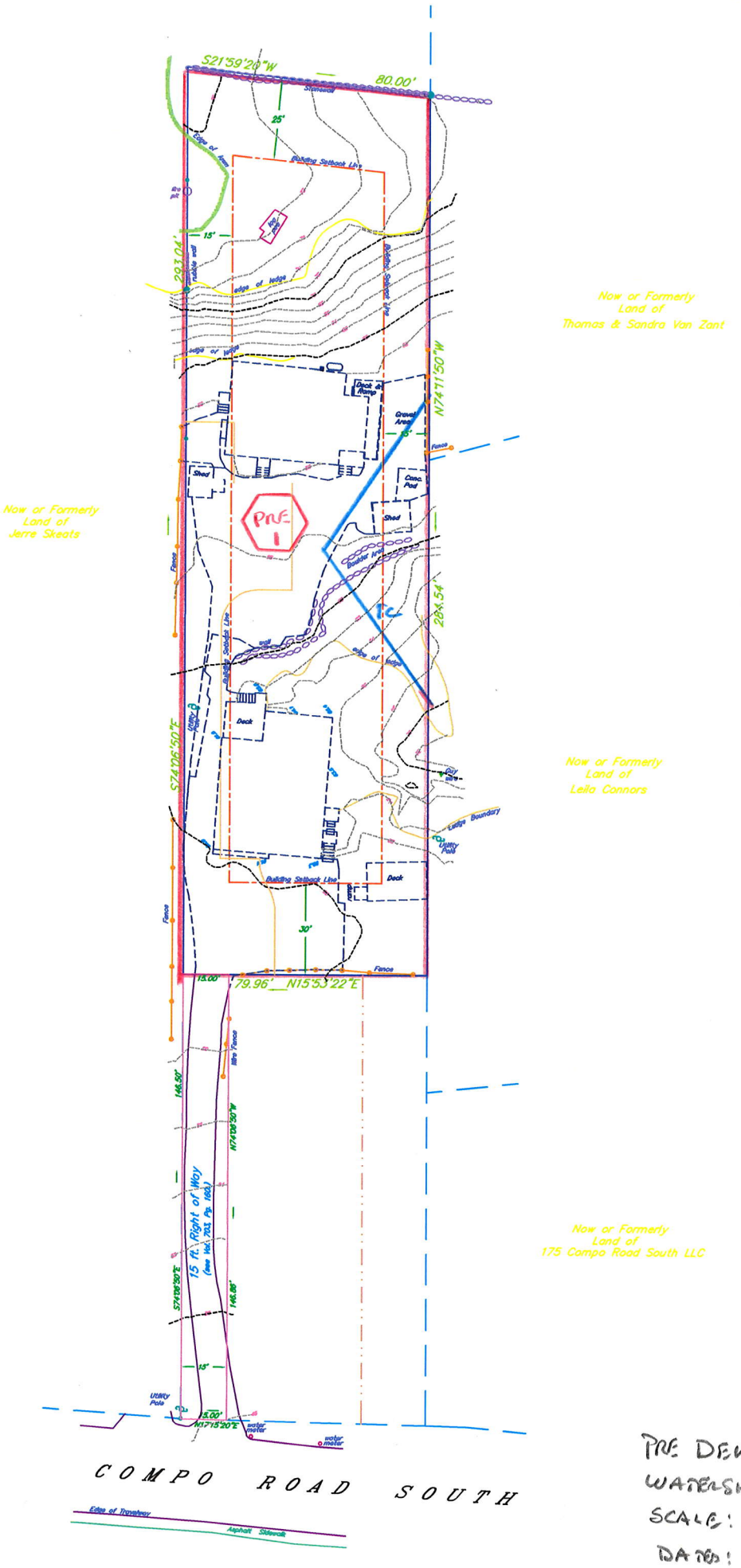
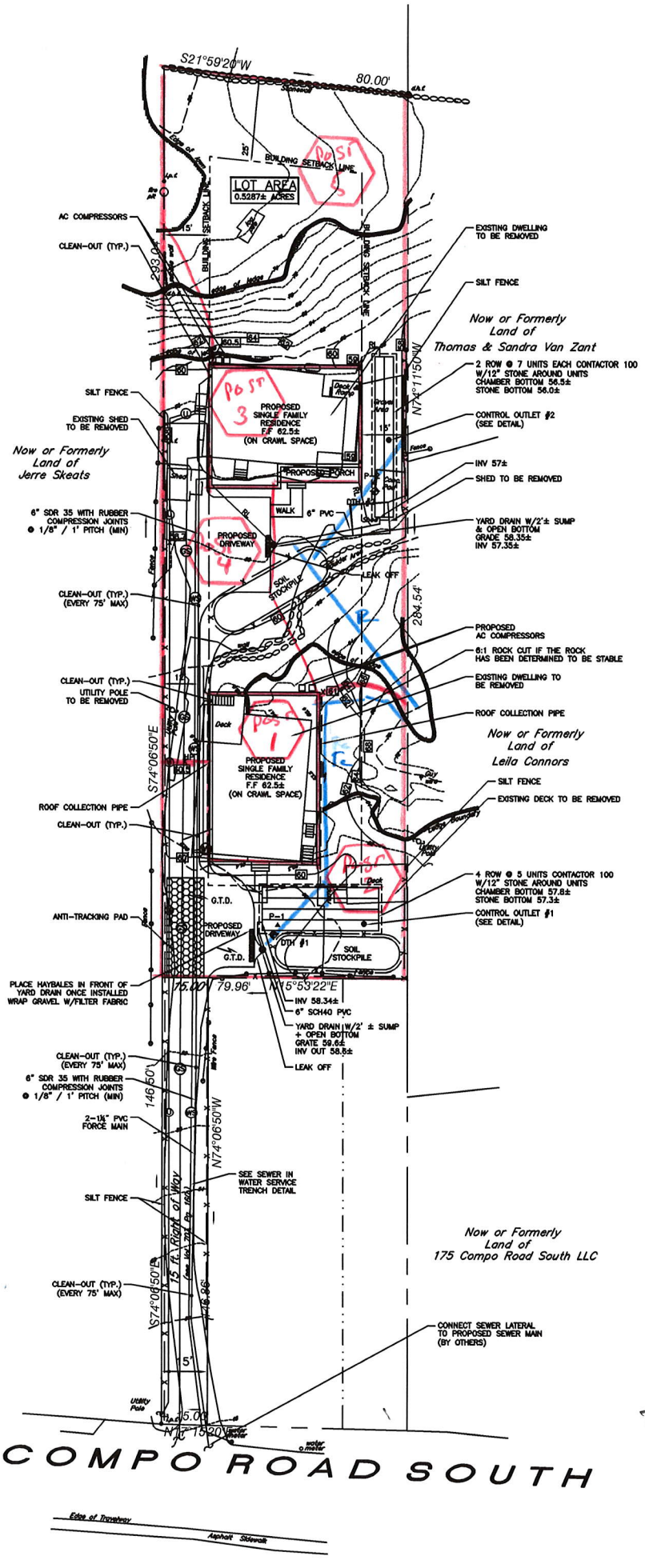



PRE DEVELOPMENT
WATERSHED MAP
SCALE: 1"=50'
DATE: 4/14/22




POST DEVELOPMENT
WATERSHED MAP
SCALE: 1"=50'
DATE: 4/14/22

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# Appendix B:

# **Miscellaneous Calculations**

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# Water Quality Volume (WQV)
## Calculations

Home Design and Build, LLC
171 Compo Road South
Westport, Connecticut
Dated: 04/14/22

**Water Quality Volume Calculations:**

Water Quality Volume (WQV) = ((1") (R) (A)) / 12
Where:
A = total area in square feet
R = 0.05 + 0.009 (I)
I = percent impervious cover

**Proposed Site Development Sub-catchment # 1: Available Storage = 334 cu-ft @ elev = 58.3 ±**

A = 7,389 sf (house roof, driveway, lawn)
I = 3,309/7,389 = .4478 = 44.78%

R = 0.05 + 0.009 (44.78%)
R = 0.4530

WQV = ((1") (R) (A)) / 12
WQV = ((1") (0.4530) (7,389 sf)) / 12
WQV = 279 cu-ft (required)

**Proposed Site Development Sub-catchment # 2: Available Storage = 340 cu-ft @ elev = 57.3±**

A = 6,153 sf (house roof, driveway, lawn)
I = 4,070/6,153 = .6614 = 66.14%

R = 0.05 + 0.009 (66.14%)
R = 0.6452

WQV = ((1") (R) (A)) / 12
WQV = ((1") (0.6452) (6,153 sf)) / 12
WQV = 330 cu-ft (required)

# Infiltration System Drawdown Calculations

Home Design and Build, LLC
171 Compo Road South
Westport, CT

Dated: 04/14/22

**Detention System**
Source: Town of Greenwich Drainage Manual, Appendix B

## Proposed Site Sub Catchment # 1 (Front House)

$Time_{drawdown}$ = DV / (K)(A)
Where:
DV = Design Volume = 279 $ft^3$ (Refer to WQV calculations)
K = Infiltration Rate = 1.02 in/hr (HSG B –Sandy Loam – Table B-2)
A = Bottom Area = 640 sf (Refer to Site Plan)

$Time_{drawdown}$ = (279 $ft^3$) / [(1.02 in/hr) x (640 $ft^2$)] = **.43 hr**

The proposed infiltration systems will drawdown within 72 hours.

## Proposed Site Sub Catchment # 2 (Rear House)

$Time_{drawdown}$ = DV / (K)(A)

Where:
DV = Design Volume = 330 $ft^3$ (Refer to WQV calculations)
K = Infiltration Rate = 0.52 in/hr (HSG B – Loam – table B-2)
A = Bottom Area = 432 sf (Refer to Site Plan)

$Time_{drawdown}$ = (330 $ft^3$) / [(0.52 in/hr) x (432 $ft^2$)] = **1.5 hr**

The proposed infiltration system will drawdown within 72 hours.

**Table B-1. Requirements for Determining Field Infiltration Rates**

| Infiltration Design Method | NRCS Hydrologic Soil Groups | | | |
|---|---|---|---|---|
| | A | B | C | D |
| Static Method | Soil Textural Analysis | Soil Textural Analysis | Saturated Hydraulic Conductivity Testing | Infiltration Not Allowed |
| Simple Dynamic Method | Soil Textural Analysis | Soil Textural Analysis | Saturated Hydraulic Conductivity Testing | Infiltration Not Allowed |
| Dynamic Field Method | Saturated Hydraulic Conductivity Testing | Saturated Hydraulic Conductivity Testing | Saturated Hydraulic Conductivity Testing | Infiltration Not Allowed |

**Table B-2. Default (Rawls) Infiltration Rates**

| Texture Class | NRCS Hydrologic Soil Group (HSG) | Infiltration Rate Inches/Hour |
|---|---|---|
| Sand | A | 8.27 |
| Loamy Sand | A | 2.41 |
| Sandy Loam | B | 1.02 |
| Loam | B | 0.52 |
| Silt Loam | C | 0.27 |
| Sandy Clay Loam | C | 0.17 |
| Clay Loam | D | 0.09 |
| Silty Clay Loam | D | 0.06 |
| Sandy Clay | D | 0.05 |
| Silty Clay | D | 0.04 |
| Clay | D | 0.02 |

Source: Rawls, Brakensiek and Saxton, 1982.

- The slowest of the Hydrologic Soil Groups determined to exist at the point where infiltration is proposed shall be used.
    - *Example:* Two samples are taken at a proposed infiltration bioretention system in the actual soil layer where recharge is proposed. One sample indicates sandy soils. The second sample indicates a sandy loam soil. The default infiltration rate used for the design analysis must use the sandy loam rate and not the sandy soil rate. Soils must not be composited for purposes of the soil textural analysis.

- When the "Dynamic Field" method is used to size the infiltration system (regardless of Hydrologic Soil Group) or infiltration is proposed within Hydrologic Soil Group C soils

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# Appendix C:

# **Web Soil Report**

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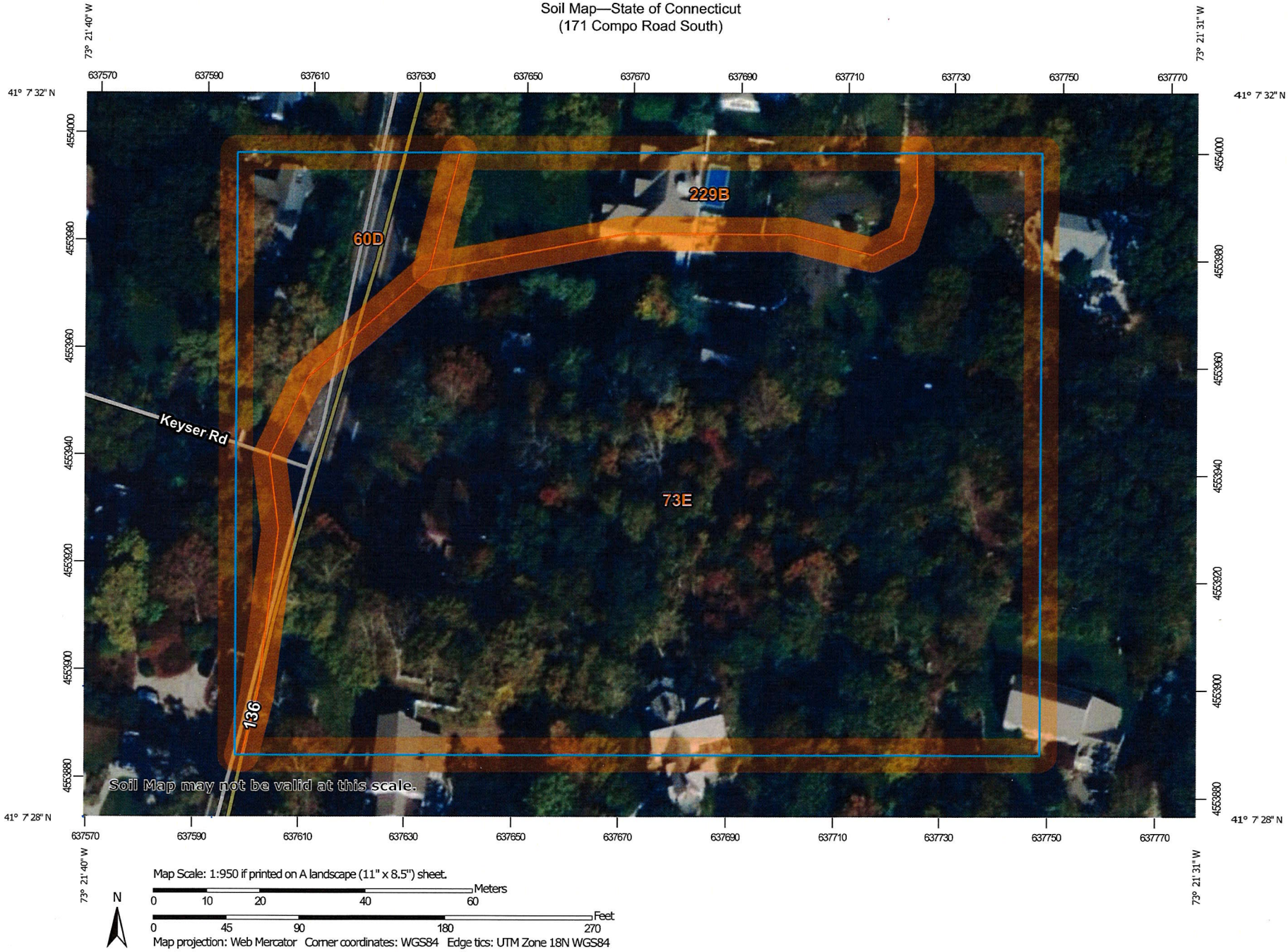
Soil Map—State of Connecticut
(171 Compo Road South)




Map Scale: 1:950 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

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 21, Sep 7, 2021

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

Date(s) aerial images were photographed: Oct 8, 2020—Oct 14, 2020

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 |
|---|---|---|---|
| 60D | Canton and Charlton soils, 15 to 25 percent slopes | 0.5 | 10.8% |
| 73E | Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky | 3.4 | 80.5% |
| 229B | Agawam-Urban land complex, 0 to 8 percent slopes | 0.4 | 8.8% |
| **Totals for Area of Interest** | | **4.2** | **100.0%** |

# State of Connecticut

## 73E—Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

### Map Unit Setting

*National map unit symbol:* 9lql
*Elevation:* 0 to 1,200 feet
*Mean annual precipitation:* 43 to 56 inches
*Mean annual air temperature:* 45 to 55 degrees F
*Frost-free period:* 140 to 185 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Charlton and similar soils:* 45 percent
*Chatfield and similar soils:* 30 percent
*Minor components:* 25 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Charlton

#### Setting

*Landform:* Hills
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

#### Typical profile

*Ap - 0 to 4 inches:* fine sandy loam
*Bw1 - 4 to 7 inches:* fine sandy loam
*Bw2 - 7 to 19 inches:* fine sandy loam
*Bw3 - 19 to 27 inches:* gravelly fine sandy loam
*C - 27 to 65 inches:* gravelly fine sandy loam

#### Properties and qualities

*Slope:* 15 to 45 percent
*Surface area covered with cobbles, stones or boulders:* 1.6 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Runoff class:* High
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.57 to 5.95 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 5.9 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 7s

*Hydrologic Soil Group:* B
*Ecological site:* F144AY034CT - Well Drained Till Uplands
*Hydric soil rating:* No

### Description of Chatfield

#### Setting

*Landform:* Ridges, hills
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Parent material:* Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

#### Typical profile

*Oa - 0 to 1 inches:* highly decomposed plant material
*A - 1 to 6 inches:* gravelly fine sandy loam
*Bw1 - 6 to 15 inches:* gravelly fine sandy loam
*Bw2 - 15 to 29 inches:* gravelly fine sandy loam
*2R - 29 to 80 inches:* unweathered bedrock

#### Properties and qualities

*Slope:* 15 to 45 percent
*Surface area covered with cobbles, stones or boulders:* 1.6 percent
*Depth to restrictive feature:* 20 to 40 inches to lithic bedrock
*Drainage class:* Well drained
*Runoff class:* High
*Capacity of the most limiting layer to transmit water (Ksat):* Low to high (0.01 to 5.95 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 3.3 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 7s
*Hydrologic Soil Group:* B
*Ecological site:* F144AY034CT - Well Drained Till Uplands
*Hydric soil rating:* No

### Minor Components

#### Rock outcrop

*Percent of map unit:* 10 percent
*Hydric soil rating:* No

#### Sutton

*Percent of map unit:* 5 percent
*Landform:* Drainageways, depressions
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Leicester

*Percent of map unit:* 5 percent

*Landform:* Drainageways, depressions
*Down-slope shape:* Linear
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Hollis**

*Percent of map unit:* 3 percent
*Landform:* Ridges, hills
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Unnamed, sandy subsoil**

*Percent of map unit:* 1 percent
*Hydric soil rating:* No

**Unnamed, red parent material**

*Percent of map unit:* 1 percent
*Hydric soil rating:* No

## Data Source Information

Soil Survey Area: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021