WRIGHT-PIERCE
Engineering a Better Environment

169 Main Street, 700 Plaza Middlesex
Middletown, CT 06457
860.343.8297 | wright-pierce.com

August 19, 2022

Town of Montville Zoning Board of Appeals
310 Norwich-New London Turnpike
Uncasville, CT 06382

SUBJECT: Cook Hill Tank Replacement Application for Variance
50 Cook Drive, Montville, CT 06382

Dear Chairman MacNeil,

On behalf of the Town of Montville Water Pollution Control Authority (WPCA), we request the following application for variance be accepted for site plan review: *Cook Hill Tank Replacement Project*.

Wright-Pierce has prepared this Application for the Cook Hill Tank Replacement Project. The project includes the construction of a new 531,200-gallon glass-fused-to-steel water storage tank at 50 Cook Drive in Montville, CT (the site). The new tank will be constructed adjacent to the existing 590,000-gallon welded steel tank built in 1999 on the same parcel. The existing tank is used by the Town of Montville Emergency Services to support communication equipment and antennas for the Town. The existing tank will remain in place pending a future project to demolish the tank and construct a dedicated antenna tower and equipment building on site.

Zoning Variance

The parcel is located in the R20 Zone and is subject to the setback requirements of 40-ft Front, 40-ft Rear, 10-ft Side. See attached Zoning Map. The existing tank was constructed at 16-ft front setback and 13-ft rear setback. This application applies for a variance to the front and rear setback requirements for the proposed tank, and for ancillary structures within the side setback. The proposed tank is located on the western side of the parcel, 17-ft from the front property line, 12-ft from the rear, and 12-ft from the western side property line. Ancillary structures consisting of equipment control enclosures, a pole-mounted site light, a hydrant, and a standby generator are proposed along the western side of the property. Site lighting will be shielded to prevent light from shining or reflecting on adjoining properties. Dimensions for these setbacks are shown on the attached Civil C-3 drawing and summarized in the table below.

Yard	Setback from Property Line to Tank (ft)	Setback from Property Line to Ancillary Structures (ft)
Front	17.4	11.4 (site light)
Side	12	1.7 (site light & hydrant)
Rear	12	6 (emergency generator)

Site

The parcel is owned by the Town of Montville and is 10,768-square feet (0.2472-acres) in area. The site is accessed by means of a Town-owned easement from the public right-of-way of Cook Drive. The project location is not within a FEMA flood hazard zone, as shown by the attached FIRMette. Additionally, the site was inspected by New England Environmental Services for wetlands or water courses, and none were identified. See the attached letter New England Environmental Services dated March 21, 2022. Finally, the site is located outside the Natural Diversity Data Base preliminary screening area. See attached NDDB map.

Stormwater

The site is located at the top of a hill and sheds surface water to the east. The existing tank has an overflow pipe that outlets on the east side of the tank for the rare event of over-filling the tank. The proposed tank also has an overflow pipe that outlets at the base of the tank onto a concrete pad extending to a riprap channel approximately 4-ft wide which extends 110-ft towards the eastern property line ending at the small detention basin and level spreader BMP on the east end. This proposed channel will serve not only to direct flows from the rare event of a tank overflow, but also collect surface water runoff and provide detention for approximately 185-cf to address the additional surface water flow increase from the new impervious surfaces. The detention basin has been sized for the 25-yr storm event, as detailed on the attached Civil C-3 drawing and details on the mitigation stormwater controls.

The impervious area of the site is increasing by 710-sf with the new water storage tank and ancillary ground-mounted equipment adjacent to the tank. The runoff volume for the existing and proposed conditions under a 25-year design storm are listed in the table below. This net increase in stormwater runoff is 174 cf.

For the hydrologic calculations, we utilized HydroCAD modeling software and used the NOAA Atlas, Volume 10, Version 3 rainfall data. The rainfall amount of 6.15 inches was used for the 25-year, 24 hour storm event.

	Impervious Area (sf)	25-yr Storm Volume (af)	25-yr Storm Volume (cf)	25-yr Storm Peak Discharge (cfs)
Pre-Development	710	0.064	2,788	0.61
Post-Development	1,420	0.068	2,962	0.64

Based upon the values below, the groundwater recharge volume is calculated to be 32 cf. This assumes the more conservative NRCS Hydrologic Soil Group of B, which corresponds to the Charlton-Chatfield complex (73E) identified in the attached Web Soil Survey. This volume of 32-cf is less than the volume of the 185-cf detention basin and therefore is satisfactory for the required groundwater recharge volume.

	Drainage Area (sf)	Impervious Area (sf)	I (Impervious Ratio)	Groundwater Recharge Depth (D)	Groundwater Recharge Volume (cf)
Cook Hill Tank	10,148	1,550	0.153	0.25	32

The project will result in the disturbance of less than 1 acre of land; therefore, a Soil and Erosion and Sediment Control Plan is not included in this application. However, erosion and sedimentation controls will be implemented in the final project drawings.

Please contact Barry Parfitt, PE of Wright-Pierce at (860) 852-1914 or barry.parfitt@wright-pierce.com with any questions.

Sincerely,
WRIGHT-PIERCE

Barry Parfitt, PE
Lead Project Engineer
barry.parfitt@wright-pierce.com

Mariusz Jedrychowski, PE
Senior Project Manager
mariusz.jedrychowski@wright-pierce.com

Attachments:

- Variance Application
- Site Location Map (1" = 1,000')
- USGS Topography Map
- GIS Map
- Zoning Map
- Wetlands Inspection Letter
- NDDB Preliminary Screening Map
- Stormwater HydroCAD Report
- FIRMette Map
- NRCS Web Soil Survey
- Site Plan (separate attachment)

Variance Application

APPLICATION FOR APPEAL OR VARIANCE
MONTVILLE ZONING BOARD OF APPEALS

Name of Owner(s) Town of Montville Application # 22 ZBA 2

Name of Applicant(s) Ron McDaniel c/o Montville WPCA Date Submitted 8/17/2022

Mailing Address 310 Norwich-New London Tpke. Uncasville, CT 06382

Tel # (860) 848-3030 Cell # _____ Business # _____ Zone _____

Street Address of Property 50 Cook Drive, Uncasville, CT 06382

Assessor's Map # 099 Lot # 009-001 Email Address rmcdaniel@montville-ct.org

Is Property in question within **500 feet** of the Town Line? Yes ☐ No ☒

Please List The **Names And Addresses** of the Adjacent, Abutting, etc. Property Owners below (attach an additional sheet if needed):

WICH Inc. 40 Cuprak Rd, Norwich, CT 06360

Vizion Enterprises 7 Richborough Rd, Madison, CT 06443

The Applicant's **Reason** for Submitting This Application (Check One):

_____ (1) There is an Error in an Order, Requirement, or Decision made by the Zoning Enforcement Officer.

X (2) The Applicant seeks a Variance in the Application of the Zoning Regulations.

_____ (3)Other, Describe _____

The **Decision** which is being Appealed, **or** the Section(s) of the **Zoning Regulations** from which a Variance is Requested:

Section 9.6 Minimum Setbacks of the Zoning Regulations.

The Applicant **Requests** the Board to take the following action:

The Nature of the Unusual Hardship or Exceptional Difficulty existing with regard to the property is due to the small size of the parcel, needed access for maintenance to the existing and future infrastructure and the connection point to the existing Town of Montville water distribution system.

Has any previous Appeal been filed in connection with these premises? No. If so, when? _____

If the Applicant has Designated an Agent:

Name of Agent: Barry A. Parfitt, PE - Wright-Pierce Relationship: Consulting Engineer

Address: 169 Main St, 700 Plaza Middlesex, Middletown, CT Phone No.: (860) 852-1914

I Certify that the information contained in this Application is true and correct and hereby authorize the Montville Zoning Board of Appeals and/or Zoning Enforcement Officer to enter upon the property in question for the purpose of inspecting the conditions described in this Application.

Date 8/24/2022 Applicant(s) _____

Ron McDaniel, Mayor - Town of Montville

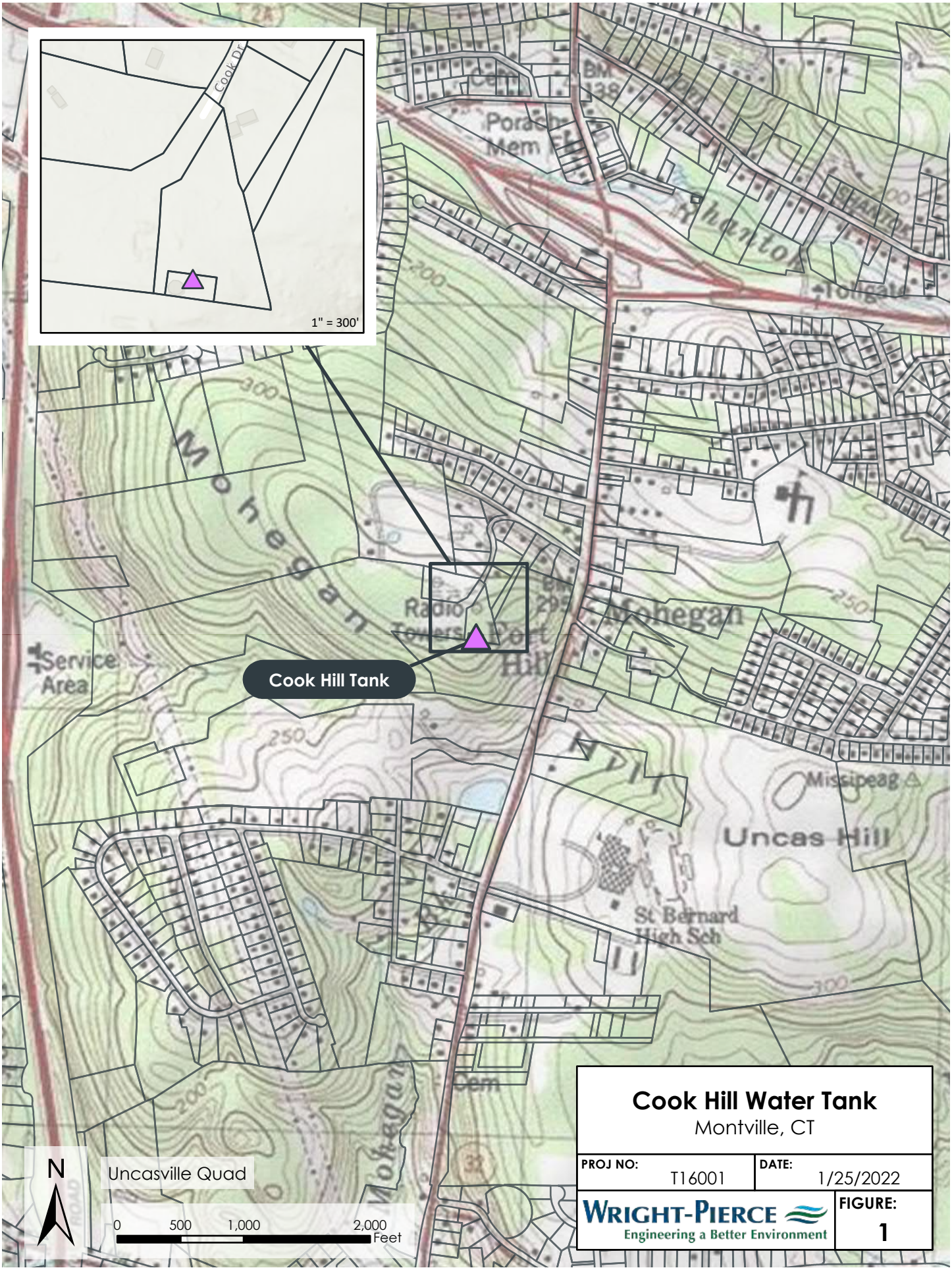
This Space Reserved For the Board

Date Officially Received _____ **Date of Public Hearing** _____

Action by Board _____ **Date** _____

H

Site Location Map (1” = 1,000’)



Cook Hill Water Tank

Montville, CT

PROJ NO:	DATE:
T16001	1/25/2022

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: 1

JMN W:\GIS_Development\Projects\CT\Montville\T16001_CookHillWaterTank\MXDs\CookHillTank.aprx - Topo Map

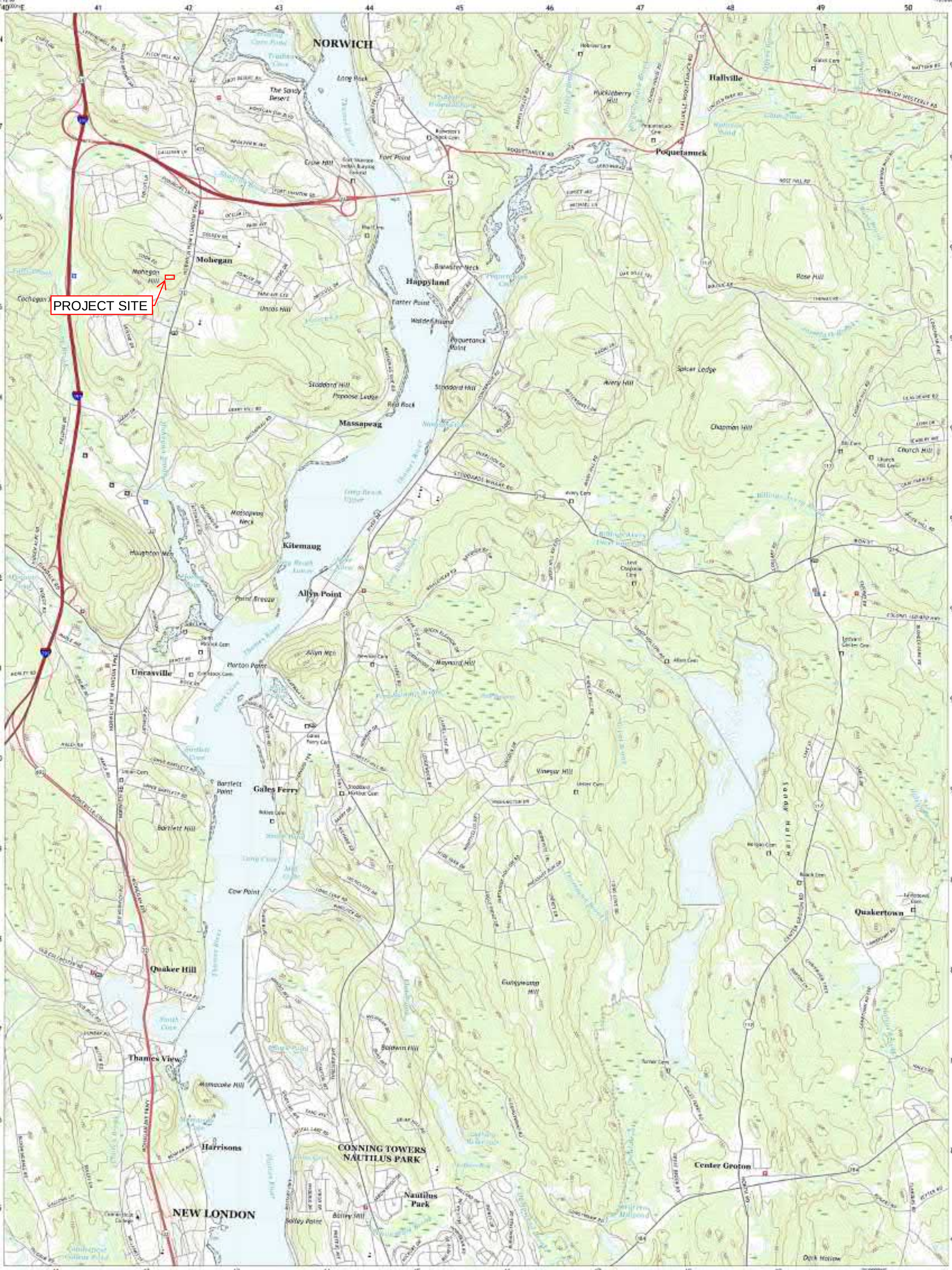
USGS Topography Map

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

UNCASVILLE QUADRANGLE
CONNECTICUT - NEW LONDON COUNTY
7.5-MINUTE SERIES



Produced by the United States Geological Survey

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

UNCASVILLE, CT
2021

GIS Map

Cook Water Storage Tank

Montville, CT

January 25, 2022

1 inch = 141 Feet

0 141 282 423

www.cai-tech.com

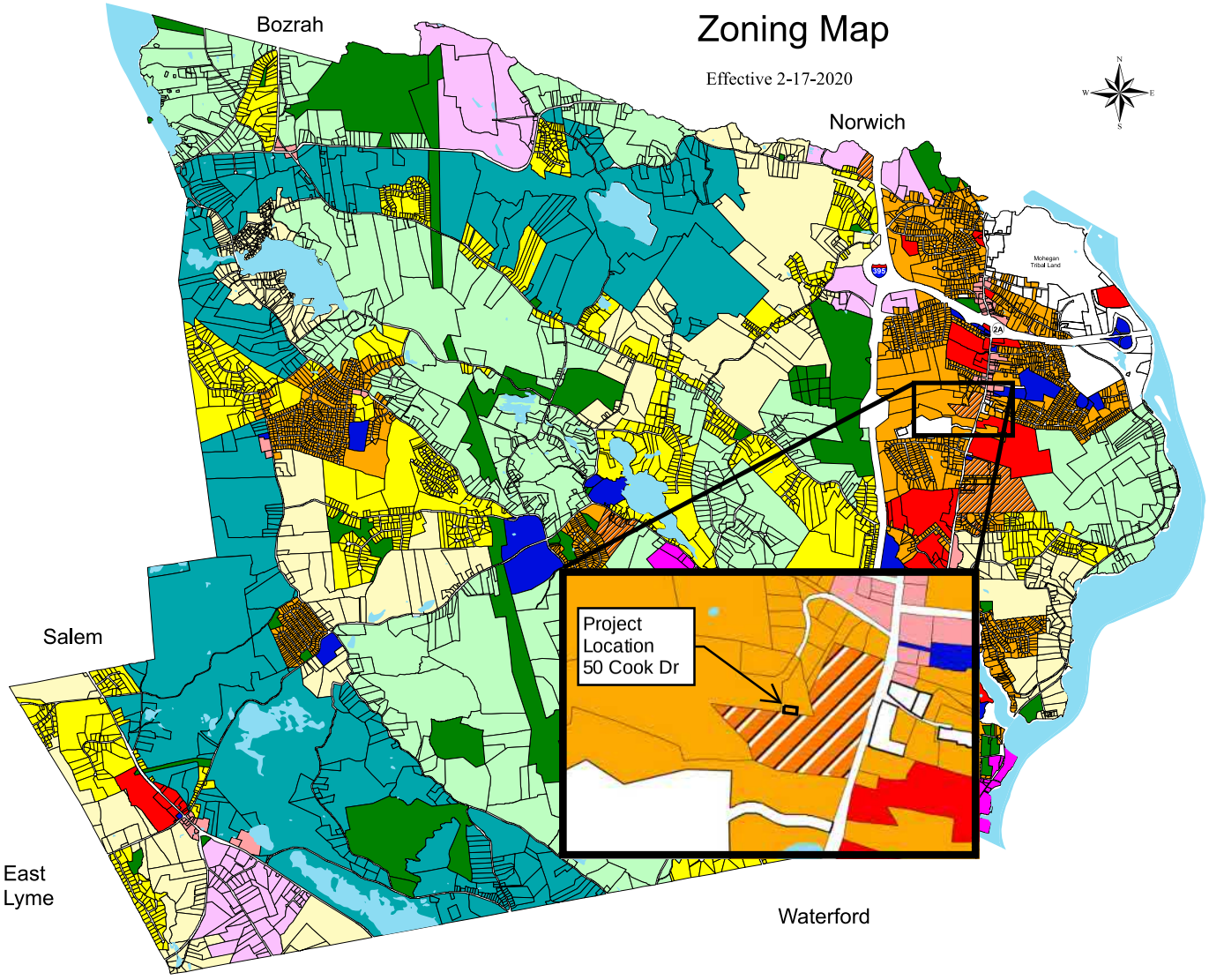
Parcel Lines - Ortho

Lot and Ac - anno

Zoning Map

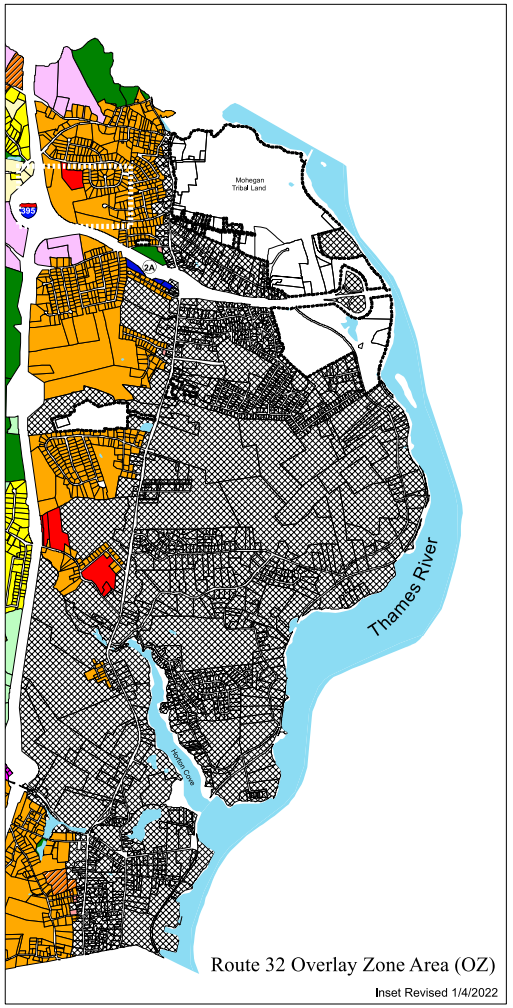
Town of Montville
Zoning Map

Effective 2-17-2020



Legend

- Land Held In Trust by the United States of America
- Annex
- C1
- C2
- GOV
- I
- LI
- OS
- R120
- R20
- R-20-M
- R40
- R80
- WRP-160
- HOD Overlay
- Route 32 OZ



Created By
Town of Montville Planning Dept
For Informational Purposes Only

Wetlands Inspection Letter

NEW ENGLAND ENVIRONMENTAL SERVICES
Wetland Consulting Specialists Since 1983

March 21, 2022

Mr. Jason P. Berasi, P.L.S.
Martinez Couch & Associates, LLC
1084 Cromwell Avenue, Suite A2
Rocky Hill, CT 06067

Re: Cook Drive
Montville, Connecticut

Dear Mr. Berasi:

On February 28, 2022, I inspected the land on Cook Drive in Montville, which is shown on the attached map in red. There are no wetlands or watercourses present in the land outlined in red.

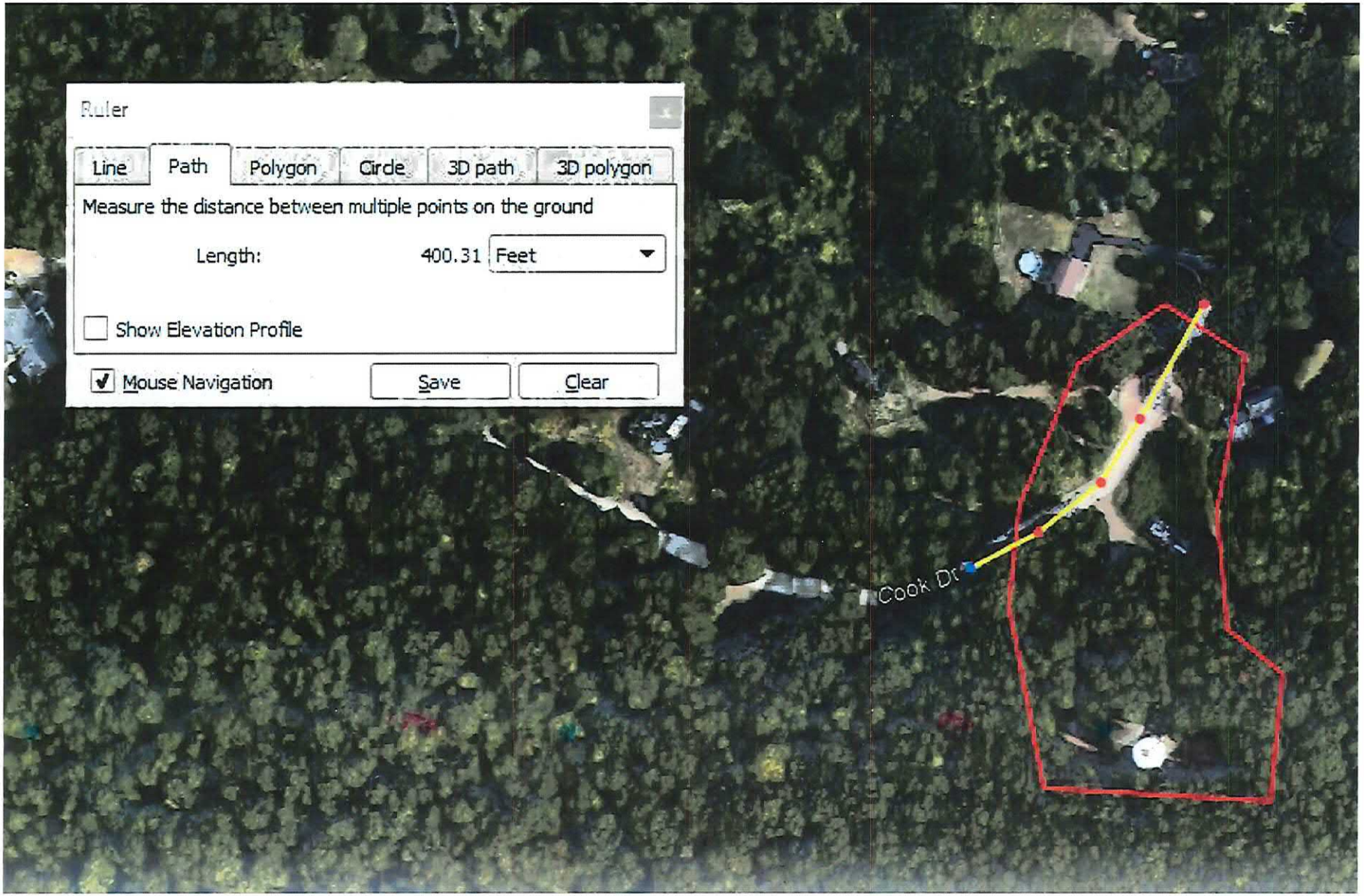
If you have any questions, feel free to contact me.

Respectively Submitted,

New England Environmental Services
R. Richard Snarski
R. Richard Snarski
Professional Wetlands Scientist #1391
Registered Professional Soil Scientist
Consulting Botanist

RRS/srh

30 GINA LANE, MARLBOROUGH, CONNECTICUT 06447
richsnarski@gmail.com • 860-918-1970 • www.richsnarski.com


Ruler
Line
Path
Polygon
Circle
3D path
3D polygon
Measure the distance between multiple points on the ground
Length:
400.31
Feet
Show Elevation Profile
Mouse Navigation
Save
Clear
Cook Dr

NDDB Preliminary Screening Map

Natural Diversity Data Base Areas

MONTVILLE, CT

June 2021

State and Federal Listed Species

Critical Habitat

Town Boundary

NOTE: This map shows general locations of State and Federal Listed Species and Critical Habitats. Information on listed species is collected and compiled by the Natural Diversity Data Base (NDDB) from a variety of data sources . Exact locations of species have been buffered to produce the generalized locations.

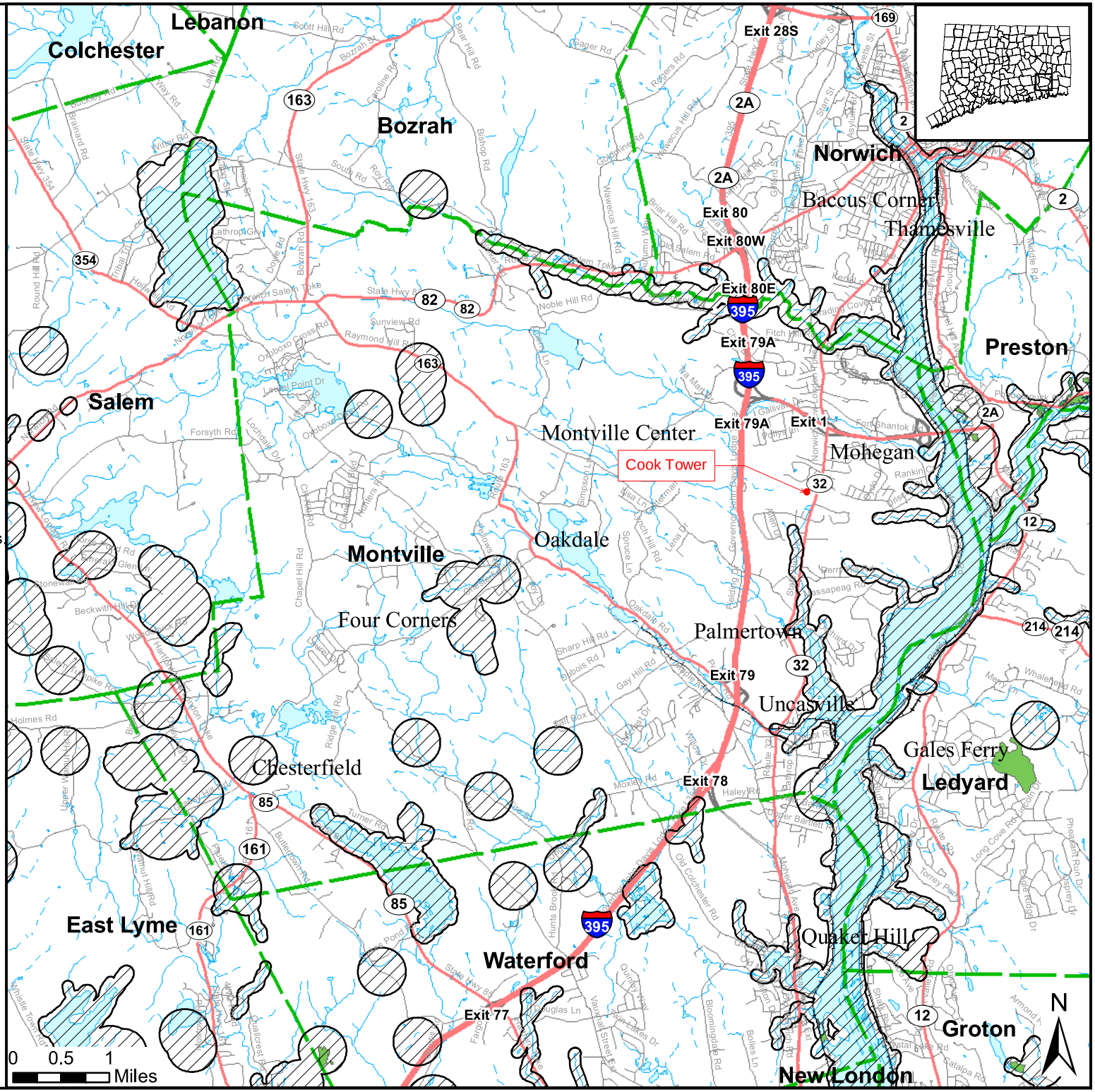
This map is intended for use as a preliminary screening tool for conducting a Natural Diversity Data Base Review Request. To use the map, locate the project boundaries and any additional affected areas. If the project is within a hatched area there may be a potential conflict with a listed species. For more information, complete a Request for Natural Diversity Data Base State Listed Species Review form (DEP-APP-007), and submit it to the NDDB along with the required maps and information. More detailed instructions are provided with the request form on our website.

www.ct.gov/deep/nddbrequest

Use the CTECO Interactive Map Viewers at http://cteco.uconn.edu to more precisely search for and locate a site and to view aerial imagery with NDDB Areas.

QUESTIONS: Department of Energy and Environmental Protection (DEEP)
79 Elm St, Hartford, CT 06106
email: deep.nddbrequest@ct.gov
Phone: (860) 424-3011

Connecticut Department of Energy & Environmental Protection
Bureau of Natural Resources
Wildlife Division



Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

February 4, 2022

Mia Jordan
Wright-Pierce
169 Main St, 700 Plaza Middlesex
Middletown CT 06457
Mia.jordan@wright-pierce.com

Project: Cook Hill Water Tower Replacement, 50 Cook Dr, Montville, CT
NDDB Determination No.: 202201074

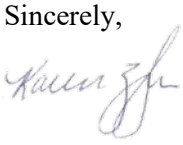
Dear Mia Jordan,

I have reviewed Natural Diversity Database (NDDB) maps and files regarding the area provided for the proposed replacement of the Cook Hill Water Tower in Montville, Connecticut. According to our records there are no reported populations of state or federal listed species in the vicinity of this property. We have not visited this site. The result of this review does not preclude the possibility that listed species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits. Contact NDDB to report the presence of any listed species and for more detailed guidance. This determination is good for two years. Please re-submit a new NDDB Request for Review if the scope of work changes or if work has not begun on this project by February 4, 2024.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey, cooperating units of DEEP, landowners, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the NDDB should not be substitutes for on-site surveys necessary for a thorough environmental impact assessment. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the database as it becomes available.

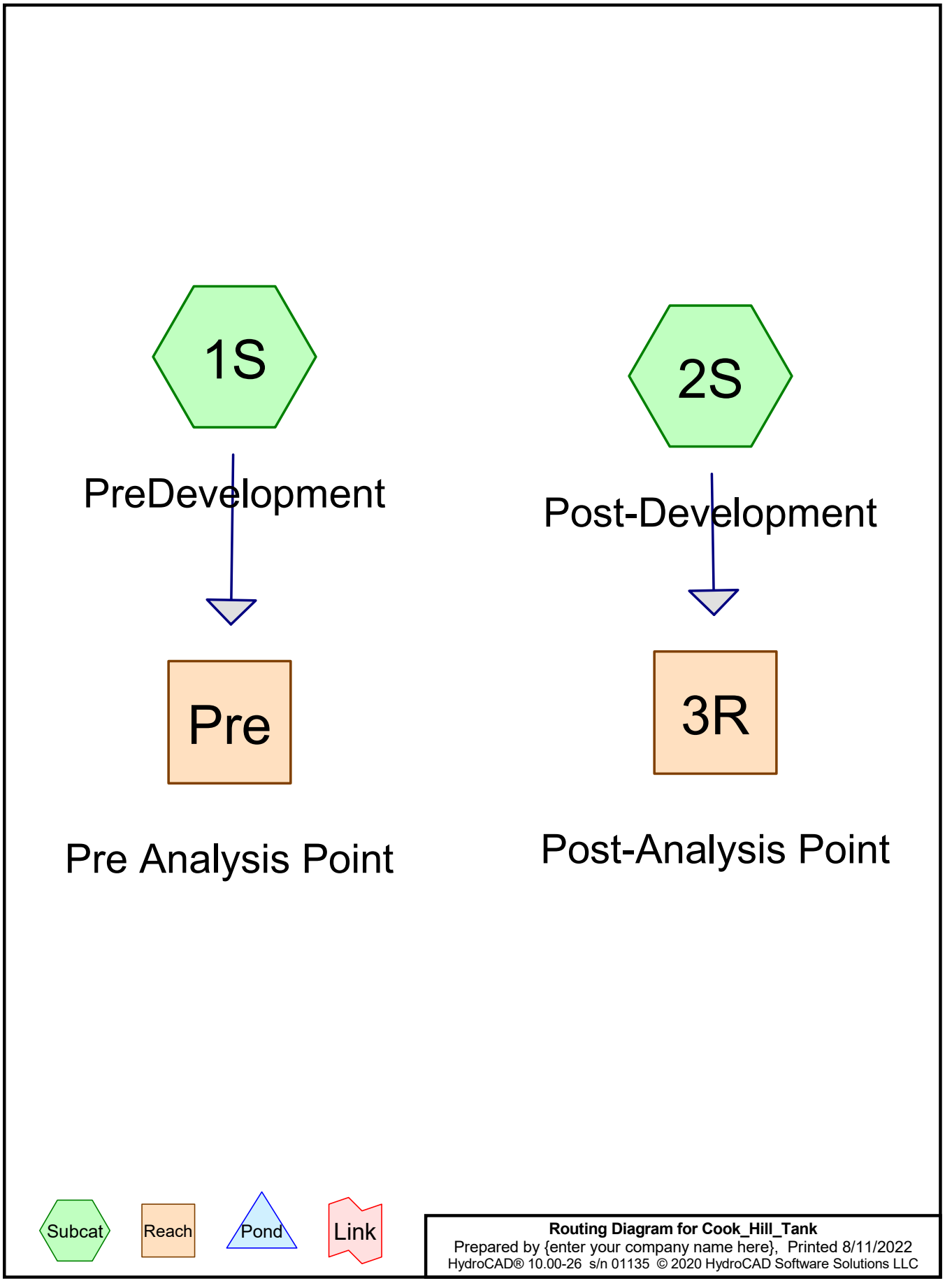
Please contact me if you have further questions at (860) 424-3378, or karen.zyko@ct.gov . Thank you for consulting the Natural Diversity Database.

Sincerely,



Karen Zyko
Environmental Analyst

Stormwater HydroCAD Report



Routing Diagram for Cook_Hill_Tank
Prepared by {enter your company name here}, Printed 8/11/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.373	79	50-75% Grass cover, Fair, HSG C (1S, 2S)
0.033	98	Existing Tank, HSG C (1S, 2S)
0.016	98	Proposed, HSG C (2S)
0.422	**81**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.422	HSG C	1S, 2S
0.000	HSG D	
0.000	Other	
0.422		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.373	0.000	0.000	0.373	50-75% Grass cover, Fair	1S, 2S
0.000	0.000	0.033	0.000	0.000	0.033	Existing Tank	1S, 2S
0.000	0.000	0.016	0.000	0.000	0.016	Proposed	2S
0.000	**0.000**	**0.422**	**0.000**	**0.000**	**0.422**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: PreDevelopment Runoff Area=9,191 sf 7.72% Impervious Runoff Depth>3.65"
Flow Length=152' Slope=0.0050 '/' Tc=22.9 min CN=80 Runoff=0.61 cfs 0.064 af

Subcatchment 2S: Post-Development Runoff Area=9,194 sf 15.44% Impervious Runoff Depth>3.86"
Flow Length=152' Slope=0.0050 '/' Tc=22.9 min CN=82 Runoff=0.64 cfs 0.068 af

Reach 3R: Post-Analysis Point Inflow=0.64 cfs 0.068 af
Outflow=0.64 cfs 0.068 af

Reach Pre: Pre Analysis Point Inflow=0.61 cfs 0.064 af
Outflow=0.61 cfs 0.064 af

Total Runoff Area = 0.422 ac Runoff Volume = 0.132 af Average Runoff Depth = 3.76"
88.41% Pervious = 0.373 ac 11.59% Impervious = 0.049 ac

Summary for Subcatchment 1S: PreDevelopment

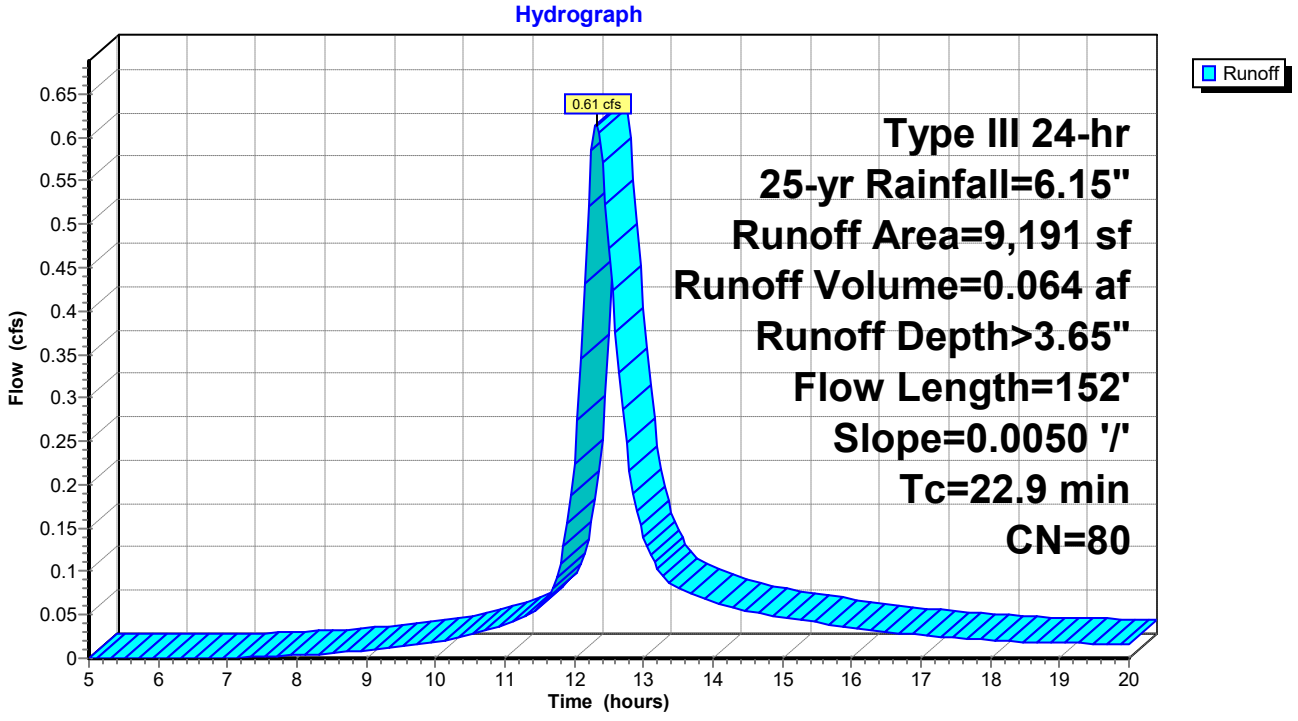
Runoff = 0.61 cfs @ 12.31 hrs, Volume= 0.064 af, Depth> 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.15"

	Area (sf)	CN	Description
	8,481	79	50-75% Grass cover, Fair, HSG C
*	710	98	Existing Tank, HSG C
	9,191	80	Weighted Average
	8,481		92.28% Pervious Area
	710		7.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	152	0.0050	0.11		**Sheet Flow, Grassy Area** Grass: Short n= 0.150 P2= 3.46"

Subcatchment 1S: PreDevelopment



Summary for Subcatchment 2S: Post-Development

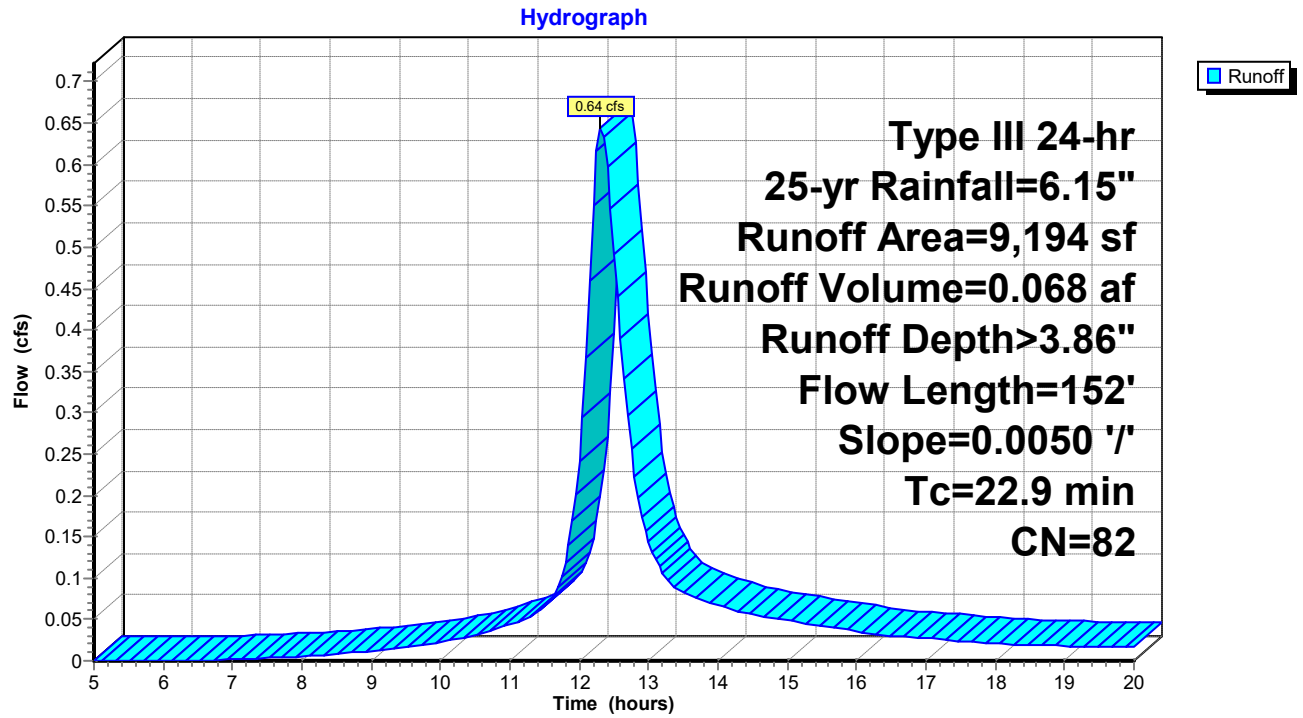
Runoff = 0.64 cfs @ 12.31 hrs, Volume= 0.068 af, Depth> 3.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.15"

	Area (sf)	CN	Description
	7,774	79	50-75% Grass cover, Fair, HSG C
*	710	98	Existing Tank, HSG C
*	710	98	Proposed, HSG C
	9,194	82	Weighted Average
	7,774		84.56% Pervious Area
	1,420		15.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	152	0.0050	0.11		**Sheet Flow, Grassy Area** Grass: Short n= 0.150 P2= 3.46"

Subcatchment 2S: Post-Development



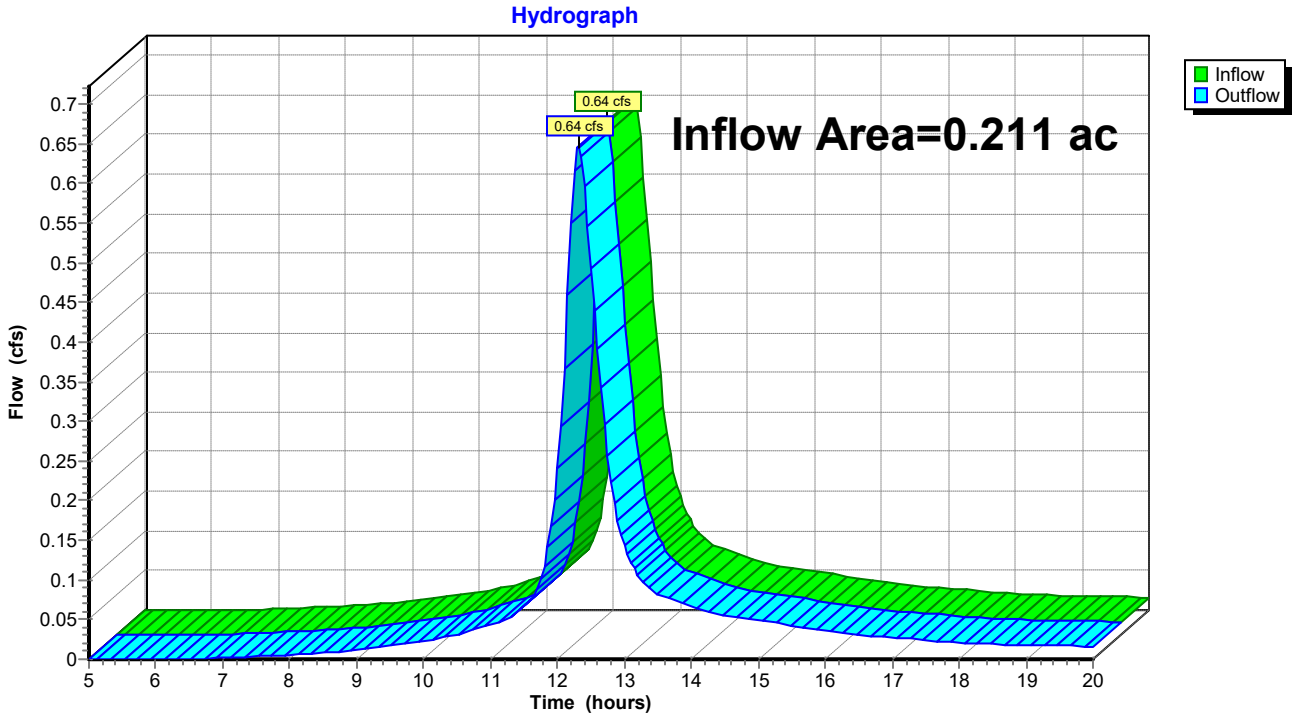
Summary for Reach 3R: Post-Analysis Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.211 ac, 15.44% Impervious, Inflow Depth > 3.86" for 25-yr event
Inflow = 0.64 cfs @ 12.31 hrs, Volume= 0.068 af
Outflow = 0.64 cfs @ 12.31 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: Post-Analysis Point



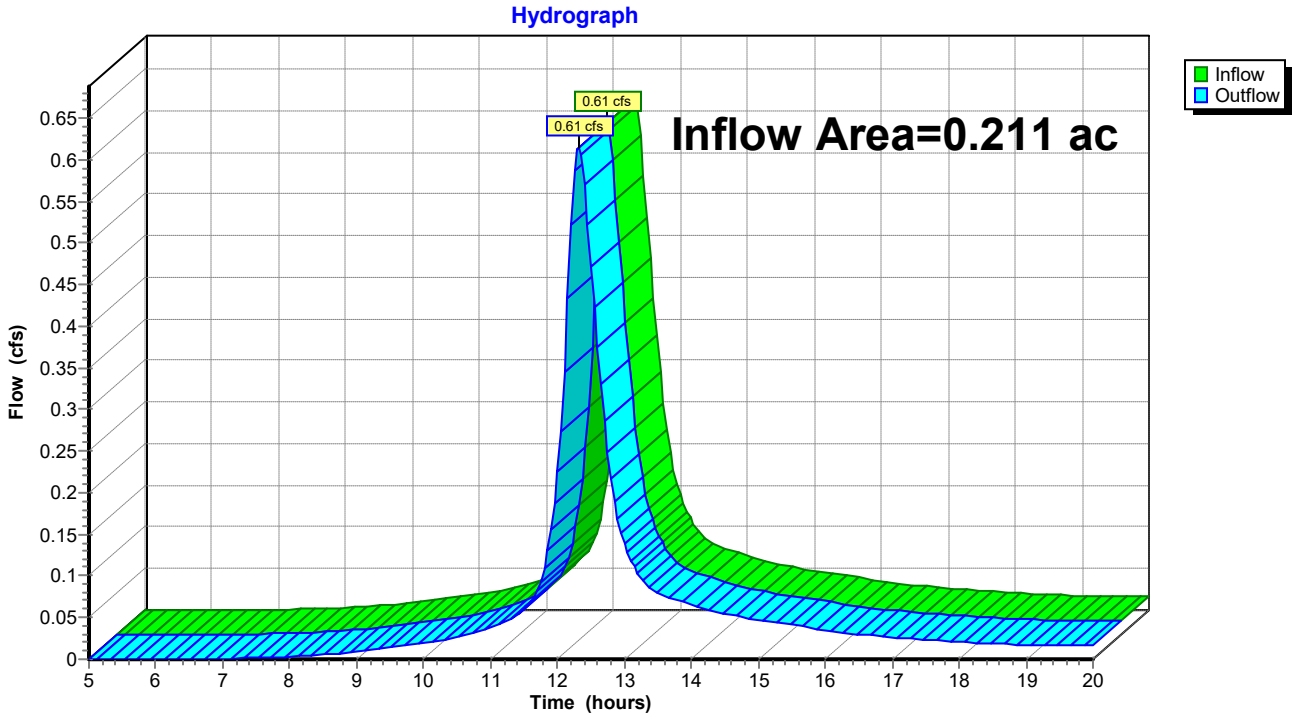
Summary for Reach Pre: Pre Analysis Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.211 ac, 7.72% Impervious, Inflow Depth > 3.65" for 25-yr event
Inflow = 0.61 cfs @ 12.31 hrs, Volume= 0.064 af
Outflow = 0.61 cfs @ 12.31 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach Pre: Pre Analysis Point

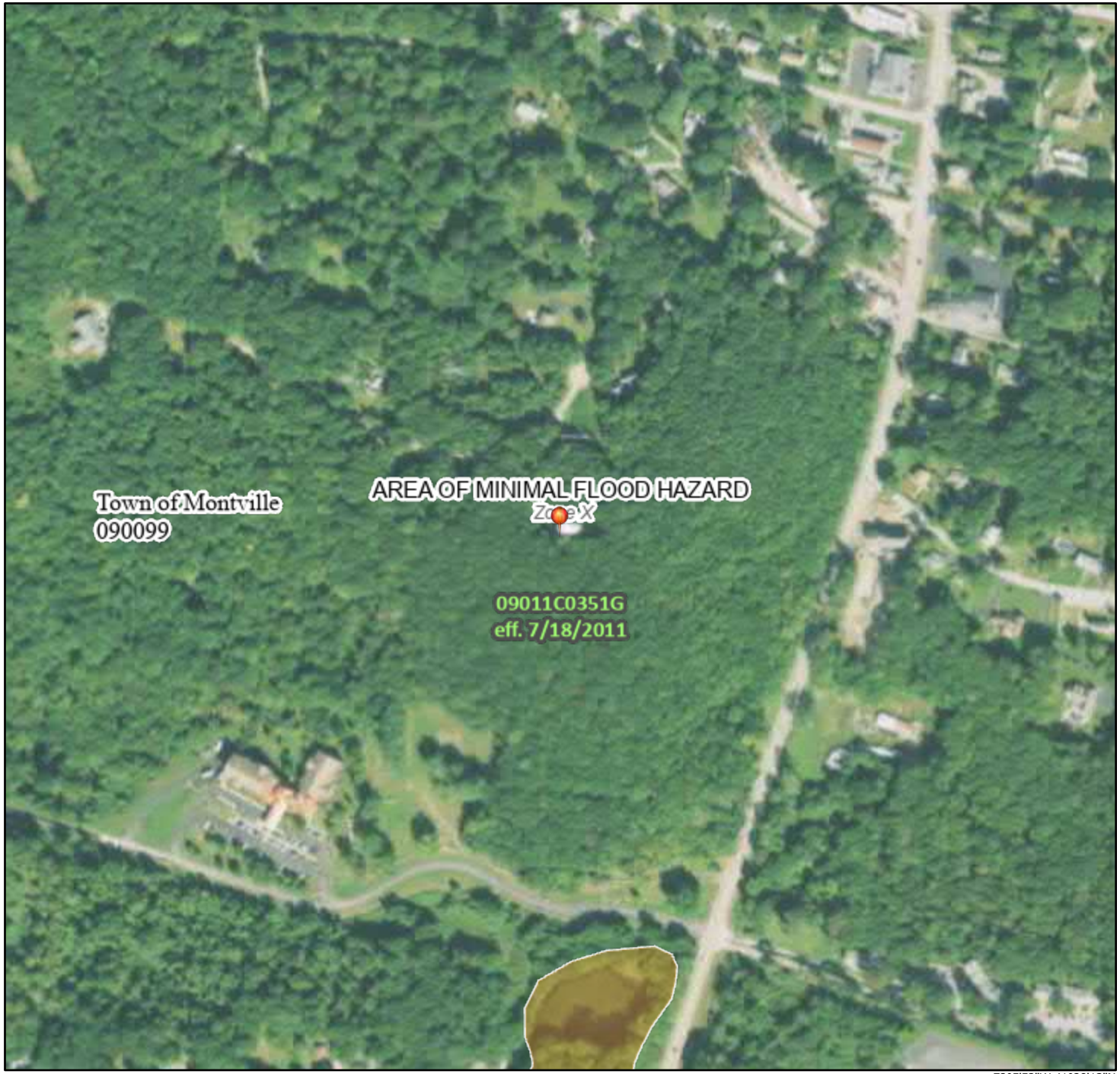


FIRMette Map

National Flood Hazard Layer FIRMette

FEMA

72°6'30"W 41°28'40"N



72°5'53"W 41°28'13"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/29/2022 at 12:21 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

NRCS Web Soil Survey

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for State of Connecticut

Cook Hill Tank - Montville, CT

May 3, 2022

Custom Soil Resource Report
Soil Map

Map Scale: 1:748 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 10 20 40 60

Feet
0 35 70 140 210

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
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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: Data not available.

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
44B	Rainbow silt loam, 2 to 8 percent slopes, very stony	1.9	66.3%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	1.0	33.7%
Totals for Area of Interest		**2.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

State of Connecticut

44B—Rainbow silt loam, 2 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9lnp
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

Rainbow and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rainbow

Setting

Landform: Hills, drumlins
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Eolian deposits over coarse-loamy lodgment till derived from gneiss and/or schist and/or sandstone and/or basalt

Typical profile

Ap - 0 to 6 inches: silt loam
Bw1 - 6 to 18 inches: silt loam
Bw2 - 18 to 26 inches: silt loam
2Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Sutton

Percent of map unit: 5 percent

Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Broadbrook

Percent of map unit: 5 percent
Landform: Till plains, hills, drumlins
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Unnamed, nonstony surface

Percent of map unit: 2 percent
Hydric soil rating: No

Woodbridge

Percent of map unit: 2 percent
Landform: Hills, drumlins
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 2 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Wilbraham

Percent of map unit: 2 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Narragansett

Percent of map unit: 2 percent
Landform: Till plains, hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

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