WETLAND DELINEATION REPORT

Connecticut College Mamacoke Brook Outfall Channel Stabilization and Restoration Waterford, Connecticut

February 6, 2026

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WETLAND DELIENATION REPORT
CONNECTICUT COLLEGE MAMACOKE BROOK OUTFALL CHANNEL STABILIZATION AND RESTORATION, WATERFORD, CT

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A Existing Conditions Mapping
B Natural Resources Conservation Service (NRCS) Soils Report
C Wetland Delineation Forms

Certification of Wetland Delineation

State jurisdictional wetlands and watercourses were delineated in accordance with the State of Connecticut Inland Wetlands and Watercourses Act (CGS 22a-36 to 22a-45 inclusive). Federal jurisdictional wetlands were delineated in accordance with U.S. Army Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1) and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (ERDC/EL TR-12-1) pursuant to Section 404 of the Federal Clean Water Act (33 U.S.C. 1344). To the best of my knowledge, the delineations depicted hereon are true and accurate.

The wetland and watercourses were delineated in accordance with applicable local, state and federal statutes, regulations and guidance. Classification and mapping of soils on site were conducted in a manner consistent with the U.S. Department of Agriculture Soil Survey Manual (Soil Science Division Staff, 2017). This delineation does not constitute an official wetland boundary until such time as it is accepted and approved by local, state or federal regulatory agencies.

2/6/26

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Registered Soil Scientist

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1.0 INTRODUCTION

The Connecticut College Mamacoke Brook Outfall Channel Stabilization and Restoration (the Site) is along an intermittent channel extending from the culvert outfall east of CT Route 32, located at approximately 600 feet north of the intersection with Benham Avenue, to a culvert under a private railroad berm, approximately 0.3 miles east in Quaker Hill, Waterford (New London County, Connecticut) (Figure 1). The Site historically was an agricultural homestead site but is now mixed hardwood/softwood forest, hedgerow, open field and open water.

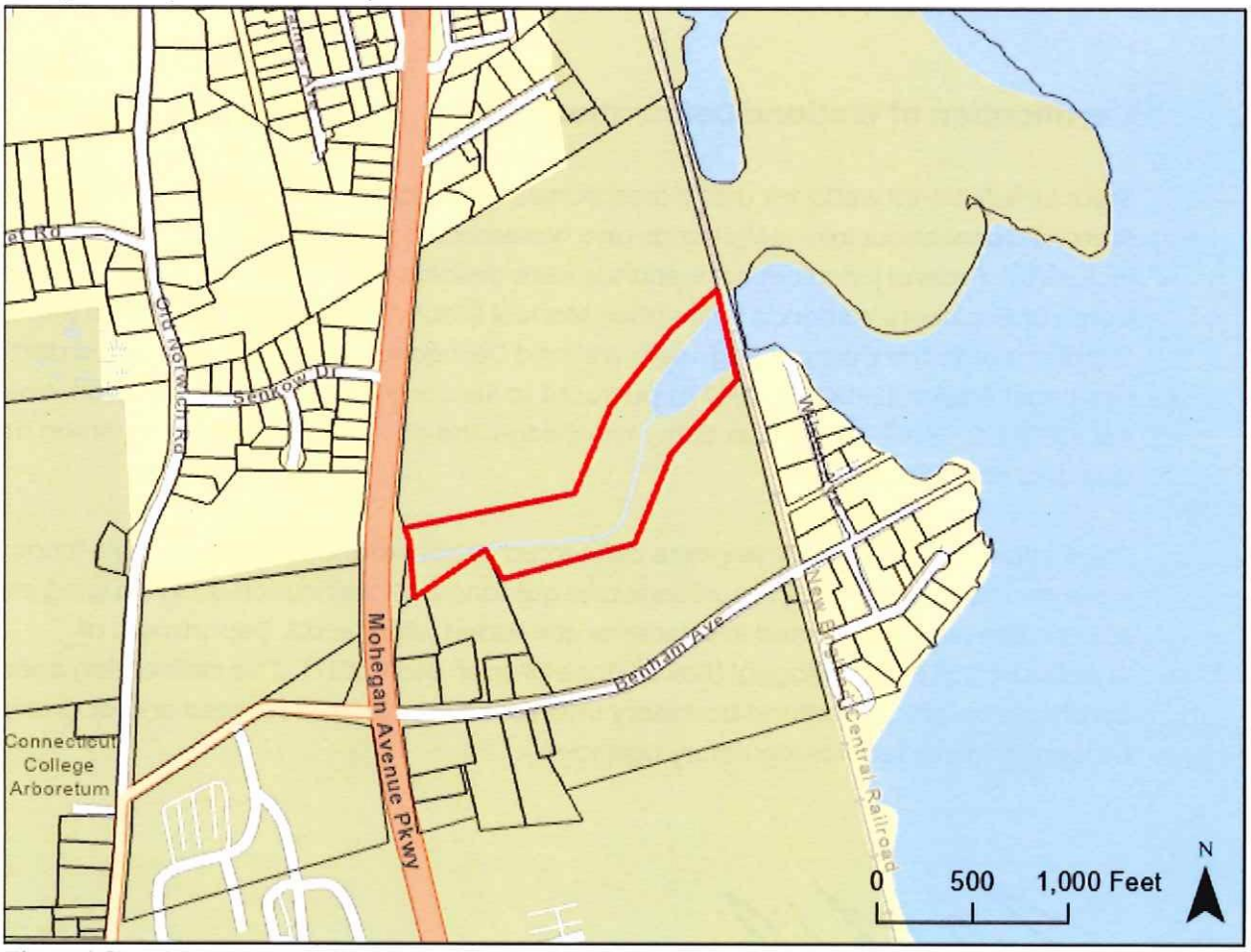

Figure 1 Site vicinity map.

1.1 Background

Connecticut College received grant funding for the stabilization and restoration of the Mamacoke Brook, which is located on Connecticut College Arboretum property between Route 32 and the Thames River. The Brook will be stabilized and restored as part of the Mamacoke Island Aquatic Habitat Resilience (MIAHR) Project, which also includes tidal

marsh restoration along the Thames River. The Brook is laterally and vertically unstable, with eroded banks 4-6 feet in height and deep channel incision along portions of its approximate 1,500-foot length. This instability is likely caused by concentrated stormwater flow contributions, a steeply sloped flow path, and a reduction in vegetation along portions of the channel. Consequently, this has resulted in channel enlargement and excessive sediment generation due to bank erosion. The proposed stream restoration will stabilize the flowpath, enhance the overall health and stability of the stream system, and reduce pollutant loading into the Thames River.

1.2 Objectives

The objective of this report is to describe any regulated jurisdictional wetlands within the Site project boundaries.

2.0 WETLAND DELINEATION

2.1 Federal Jurisdictional Wetlands

2.1.1 Regulatory Definition

The Army Corps of Engineers (Federal Register 1982) and the Environmental Protection Agency (Federal Register 1980) jointly define wetlands as:

> *Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.*

Wetlands are generally identified and delineated through the positive evidence of the following diagnostic environmental characteristics: 1) hydrophytic vegetation, 2) hydric soil, and 3) evidence of hydrological indicators. The 1987 USACE Wetland Delineation Manual (*Technical Report Y-87-1*) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (ERDC/EL TR-09-19) provides the specific guidelines and methodology required to complete federal wetland delineations.

2.1.2 Methodology

The 1987 USACE Wetlands Delineation Manual and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*

provide definitions and guidelines pertaining to the diagnostic environmental characteristics: 1) hydrophytic vegetation, 2) hydric soil, and 3) hydrological indicators. These three characteristics were evaluated during the Onsite Inspection (Level 2) and using the methods for Routine Determinations, Comprehensive Determinations, Atypical Situations, and Problem Areas.

2.1.2.1 Hydrophytic Vegetation

Vegetation that occurs in wetlands or hydrophytic vegetation is defined by the USACE as:

> *...the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (USACE 1987:12).*

Whether the hydrophytic vegetation is prevalent in an area is dependent on the presence of dominate species comprising the plant community or communities that are typically adapted for life in saturated soil conditions (USACE 1987:13). Plant species are assigned a wetland by the US Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI) program. Plant species with an indicator status of obligate (OBL), facultative wetland (FACW) or facultative (FAC) are considered to be typically adapted for life in flooded or saturated conditions. The indicator status of vegetation identified in this survey follows the PLANTS Database (USDA, NRCS 2006):

- Obligate wetland (OBL) plants are species that occur almost exclusively in wetlands; Estimated probability of time is >99%
- Facultative wetland (FACW) plants are species that usually occur in wetlands; Estimated probability of time is 67%–99%
- Facultative wetland (FAC) plants are species that are equally likely to occur in wetlands or non-wetlands; Estimated probability of time is 34%–66%

Hydrophytic vegetation is considered to be a primary characteristic of a wetland when "more than 50 percent of the dominant species are OBL, FACW, or FAC" (USACE 1987:17). At an observation point in each wetland area, the dominate plant species were determined as those having the greatest relative basal area (woody overstory or tree layer), greatest height (wood understory or shrub layer), and greatest percentage of areal coverage (herbaceous understory or herb layer) (USACE 1987:53).

2.1.2.2 Hydric Soils

Wetland or hydric soils are defined by the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) as:

> *...a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part ((Federal Register, July 13, 1994; USDA-NRCS Hydric Soils Technical Note 1: Proper use of Hydric Soil Terminology).*

A soil is considered to be a wetland soil by the USACE when the "hydric soil supports hydrophytic vegetation and the area has indicators of wetland hydrology" (USACE 1987:21). Hydric soils are typically poorly and very poorly drained soils. They undergo chemical reactions and physical processes as a result of soil saturation and reducing conditions which differ from those found in upland soils.

2.1.2.3 Wetland Hydrology

The USACE defines the term wetland hydrology as:

> *...all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season (USACE 1987:28).*

Thus, "areas with evident characteristics for wetland hydrology are those where the presence of water has an overriding influence on the characteristics of vegetation" (USACE 1987:28). The criterion for hydrology consists of inundation or saturation "to the surface continuously for at least 5% of the growing season in most years (50% probability of recurrence)" (USACE 1987:30).

The presence of primary and secondary wetland hydrological indicators was noted at each observation point selected in the wetland area. The guidelines (USACE 1987:34) consider that "wetland hydrology is present when any of these primary indicators is present when combined with a hydrophytic plant community and hydric soils." Additionally, the USACE guides that "in the absence of a primary indicator, any two secondary indicators must be present to conclude that wetland hydrology is present."

2.1.3 Determination and Identification of Federal Wetlands

The determination and identification of federal wetlands used the methods for Routine Determinations, Comprehensive Determinations, Atypical Situations, and Problem Areas. Overall, the generalized methods (based on USACE 1987, Figure 16, pages 63-64) involve the following:

A. Hydrophytic Vegetation (Step 13)

- Characterize each plant community types (i.e. trees, saplings, shrubs, herbs, moss/lichens, and vines)
- Record USFWS NWI indicator status of dominant species
- Determine if more than 50 percent of the dominant species are OBL, FACW, or FAC

B. Hydric Soils (Step 14)

- Gather soil profile data by using a spade or auger to dig a soil pit
- Record soil profile data
- Document hydric soil indicators

C. Wetland Hydrology (Step 15)

- Observe the presence of primary hydrologic indicators
- Observe the presence of secondary hydrologic indicators

D. Wetland Determination (Steps 16 and beyond)

- Using the guidelines determine if hydrophytic vegetation is present based on "A"
- Using the guidelines determine if hydric soils are present based on "B"
- Using the guidelines determine if wetland hydrology is present based on "C"
- Make the wetland determination based on the following:
- A wetland exists if all three of the wetland criteria (vegetation, hydrology, and soils) exists for a observation point
- The observation point is not a wetland if one or more of the wetland criteria are absent
- For Atypical Situations or Problem Areas, all three wetland criteria may not be met. Consideration for modifications or disturbances should be considered and greater weight may be assigned to on criteria over the others.

2.2 Connecticut Jurisdictional Wetlands

A wetland, regulated under the Connecticut Inland Wetland and Watercourses Act, is, in general, defined as a soil that is saturated to within 20 inches of the surface during a portion of the growing season. These soils have redoximorphic features, a deficiency of oxygen near the surface, and/or ponded water during the growing season. They are

poorly drained, very poorly drained, alluvial, or fluvial as specified by the USDA Natural Resource Conservation Service (NRCS). Depth to seasonal high water table is determined by low-chroma mottling or wetness indicators. Hydric soils have a similar definition.

Watercourses are also regulated under the Connecticut Inland Wetland and Watercourses Act. Watercourses are rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs, and all other bodies of water including natural or artificial, vernal or intermittent, public or private. A defined permanent channel and bank, and the occurrence of two or more of the following characteristics delineate intermittent watercourses:

- Evidence of scour or deposits of recent alluvium or detritus
- Presence of standing or flowing water for a duration longer than a particular storm incident
- Presence of hydrophytic vegetation

2.3 Field Investigation

To prepare for the field investigation, the following current literature and mapping were reviewed:

- *NRCS Web Soil Survey* (http://websoilsurvey.nrcs.usda.gov/)
- USFWS Wetlands Online Mapper (http://wetlandsfws.er.usgs.gov/)
- *Keys to Soil Taxonomy*, Tenth Edition (Soil Survey Staff, 2006)
- *Soil Survey Manual* (Soil Survey Staff, 1993)

In September 2025, Biohabitats delineated the Federal and State wetlands on site. Soils were inspected on-site by a Biohabitats Soil Scientist using a soil auger or spade, digging at least 20 inches to view the soil profile at the observation point selected for each wetland area. Soil types were identified by observation of soil morphology (matrix color, mottle colors, mottle abundance/size/contrast, and soil texture/structure, etc.) using the terminology and abbreviations found in the "Field Book for Describing and Sampling Soils" (Schoneneberg et al., 2002). The hydric soil indicators and soils sections of the wetland determination form were completed using "Field Indicators for Identifying Hydric Soils in New England" (New England Hydric Soils Technical Committee 1998).

Wetland and watercourse (waterway) limits were demarcated (flagged) with pink surveyor's tape (hung from vegetation) or small flags (on wire stakes) labeled "WETLAND

DELINEATION" that were generally spaced at every 30 feet. Complete boundaries are located along the lines that connect sequentially numbered flags.

3.0 RESULTS OF THE WETLAND DELINEATION

3.1 US Fish and Wildlife Service National Wetland Inventory

The USFWS NWI (Figure 2) maps wetlands based on analyses of reconnaissance level information on the location, type, and size of wetlands habitats such that they are accurate at the nominal scale of the 1:24,000 USGS quadrangle base map. Wetlands identified are based on the classification of Cowardin et al. (1979) and the letter and number codes used in that reference. Thus, the maps provide a planning tool to determining whether a site contains wetlands.

The USFWS identifies the wetlands occurring on-site as:

- Estuarine Intertidal Scrub-Shrub Broad-leaved Deciduous Irregularly Flooded Mesohaline (E2SS1P5)
- Estuarine Subtidal Unconsolidated Bottom Subtidal (E1UBL)

Use of this resource, however, does not take the place of on-site wetland delineation and evaluation. As part of the field investigation, wetland areas were identified, characterized as to their hydrophytic vegetation, hydric soils, and hydrological indicators and assigned a wetland classification based on this information.

3.2 Natural Resource Conservation Service Soil Map

Wetland soils are identified by soil scientists based on established hydric criterion and boundaries depicted on aerial photographs and are accurate at a scale of three acres. Thus, the maps provide a planning tool to determining whether a site contains wetlands. (Figure 2) The upstream limits of the project area are classified as Canton and Charlton soils (60D), a steep-sloped, well-drained soil. The majority of soils within the project area are classified as Sutton fine sandy loams (51B), which is a moderately well-drained soil typically found on hillslopes and classified as having high runoff potential. The northern side and downstream limits of the project area are Charlton-Chatfield complex (73E), a very rocky, well-drained soil found on 15 to 45 percent slopes. All of these soil classes are derived from granite, gneiss, and/or schist.

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Use of NRCS soil mapping, however, does not take the place of on-site wetland delineation and evaluation. As part of the field investigation, wetland areas were identified, characterized as to their hydrophytic vegetation, hydric soils, and hydrological indicators and assigned a wetland classification based on this information. Soil characteristics were recorded during on-site field inspections of soil borings and test pits. Details of soil observations are provided in the wetland delineation forms (Appendix B).

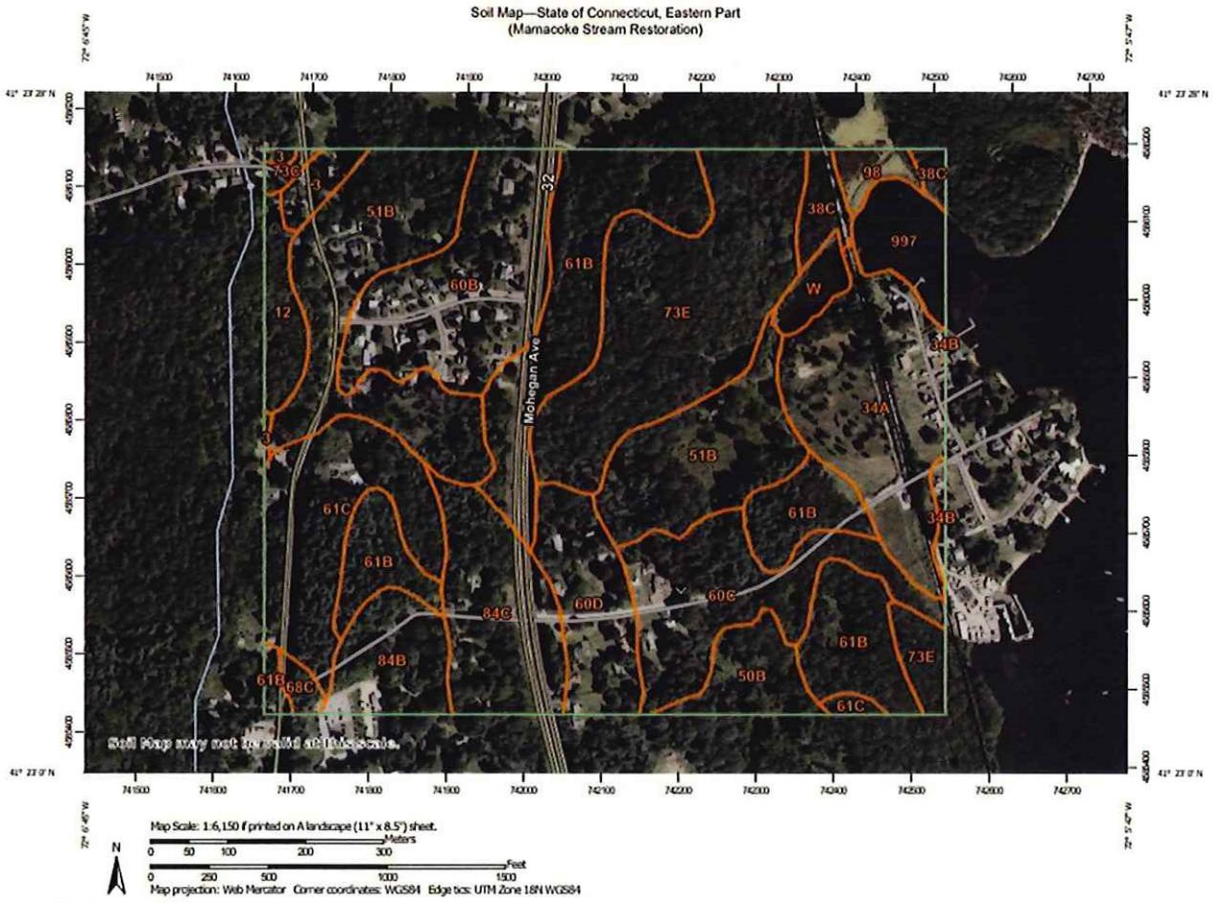

Figure 2 Site soils map.

3.3 Field Delineated Wetland Units

Three (3) wetland/watercourse units were identified on the property. One of the 3 were outside of the investigated area of disturbance and were not delineated or inspected at the same level of detail as the remaining 2 wetland/watercourse units. Appendix A provides the location of the 2 wetland/watercourse units that were characterized and are described in this report. The limits of the wetlands and watercourses on site were flagged

in the field and enumerated WA-1 to WA-35. A generalized description for each wetland and watercourse unit is provided below.

3.3.1 Wetland Unit A

Wetland Unit A is a freshwater nontidal scrub-shrub broad-leaved deciduous wetland present along the western edge of the salt pond impoundment at the eastern extent of the project area. This wetland is fed partially by a seep at the toe of slope to the west and the pond to the west and is characterized by shrub layer that is dominated by grey alder (*Alnus incana*) and spicebush (*Lindera benzoin*). The herb layer is dominated by common reed (*Phragmites australis*), skunk cabbage (*Symplocarpus foetidus*) and beggarsticks (*Bidens frondosa*). Hydric soils were encountered at the toe of the surrounding slope and the following indicators were met: stratified layers (A5), dark surface (S7), thin dark surface (S9). The wetland hydrology present in Wetland Unit A included primary indicators of surface water (A1), saturation (A3), sparsely vegetated concave surface (B8) and secondary indicators of drainage patterns (B10), dry season water table (C2), geomorphic position (D2) and the plant community passes the FAC neutral test (D5).

The upland conditions adjacent to Wetland Unit A consist of steep sideslopes of coarse material that drain well. Hillslope forests are dominated by American beech (*Fagus grandifolia*), black birch (*Betula lenta*), sugar maple (Acer saccharum) and black oak (*Quercus velutina*) species in the tree layer with the shrub layer dominated by burning bush (*Euonymus alatus*), maple leaved viburnum (*Viburnum acerifolium*), sassafras (*Sassafras albidum*), arrowwood (*Viburnum dentatum*) and barberry (*Berberis thunbergii*). The herb layer is composed of wintergreen (*Chimaphila maculata*), white wood aster (*Eurybia divaricate*), garlic mustard (*Alliaria petiolate*), woodland sedge (Carex , burnweed, and woodland sedge (*Carex sylvatica*) poison ivy (*Toxicodendron radicans*), Japanese honeysuckle (*Lonicera japonica*) and Asiatic bittersweet (*Celastrus orbiculatus*) vines. No wetland hydrology or vegetation was present and there were no hydric soil indicators present.

3.3.2 Watercourse A

The project site centers around Watercourse A (Mamacoke Brook) which is an intermittent channel that is laterally and vertically unstable, with eroded banks 4-6 feet in height and deep channel incision along portions of its approximate 1,500-foot length. sediment generation due to bank erosion.

4.0 CONCLUSIONS

This Wetland Survey and Evaluation has been prepared to determine the wetlands and watercourses occurring on the Connecticut College Arboretum property in Waterford, Connecticut. Two wetland and watercourse units were identified on the property in the area of USEPA and USACE interest.

5.0 REFERENCES

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APPENDIX A – EXISTING CONDITIONS MAPPING

MAMACOKE BROOK OUTFALL CHANNEL
Waterford, Connecticut

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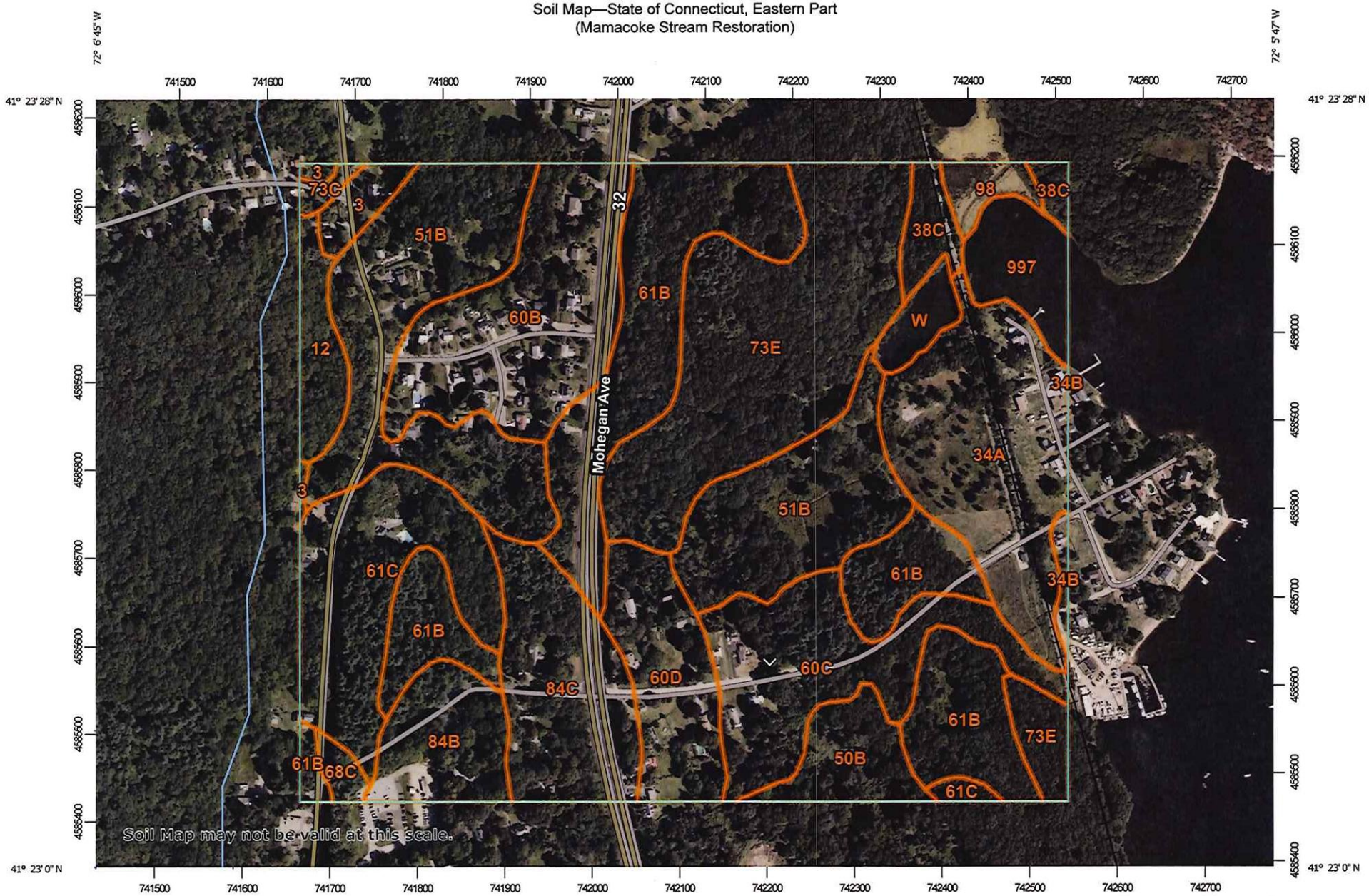
APPENDIX A – NRCS SOILS REPORT

MAMACOKE BROOK OUTFALL CHANNEL
Waterford, Connecticut

Soil Map—State of Connecticut, Eastern Part
(Mamacoke Stream Restoration)



Map Scale: 1:6,150 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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, Eastern Part
Survey Area Data: Version 2, Aug 30, 2024

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
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	1.7	1.1%
12	Raypol silt loam, 0 to 3 percent slopes	2.8	1.7%
34A	Merrimac fine sandy loam, 0 to 3 percent slopes	14.0	8.8%
34B	Merrimac fine sandy loam, 3 to 8 percent slopes	0.5	0.3%
38C	Hinckley loamy sand, 3 to 15 percent slopes	2.3	1.5%
50B	Sutton fine sandy loam, 3 to 8 percent slopes	3.7	2.3%
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	23.9	15.1%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	13.1	8.3%
60C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes	10.9	6.9%
60D	Canton and Charlton soils, 15 to 25 percent slopes	6.9	4.4%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	23.9	15.2%
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	11.2	7.1%
68C	Narragansett silt loam, 3 to 15 percent slopes, extremely stony	0.7	0.5%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	0.5	0.3%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	20.9	13.2%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	5.2	3.3%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	9.3	5.9%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
98	Westbrook mucky peat, 0 to 2 percent slopes, very frequently flooded	1.4	0.9%
997	Thames silt loam, subtidal	3.6	2.3%
W	Water	1.6	1.0%
Totals for Area of Interest		**158.0**	**100.0%**

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APPENDIX B – WETLAND DELINEATION FORMS

MAMCOKE BROOK OUTFALL CHANNEL
Waterford, Connecticut

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Mamacoke Brook Outfall Channel Stabilization & Restoration City/County: Waterford/New London Sampling Date: 09/12/2025

Applicant/Owner: Connecticut College State: CT Sampling Point: Wet 1

Investigator(s): B. Salladin Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope %: 1

Subregion (LRR or MLRA): LRR R Lat: -72.102159 Long: 41.388310 Datum: NAD83

Soil Map Unit Name: Charlton-Chatfield complex NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X No ____	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- x Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ *Surface Soil Cracks (B6)*
- x Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- x Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes x	No ____	Depth (inches): 1.5
Water Table Present?	Yes x	No ____	Depth (inches): 16.8
Saturation Present? *(includes capillary fringe)*	Yes x	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

ENG FORM 6116-8, SEP 2024 Northcentral and Northeast – Version 2.0

VEGETATION – Use scientific names of plants.

Sampling Point: Wet 1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Lindera benzoin*	10	Yes	FACW
2. *Ligustrum vulgare*	10	Yes	FACU
3. *Alnus incana*	30	Yes	FACW
4.			
5.			
6.			
7.			
	50 =Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phragmites australis*	20	Yes	FACW
2. *Peltandra virginica*	8	No	OBL
3. *Symplocarpus foetidus*	15	Yes	OBL
4. *Bidens frondosa*	15	Yes	FACW
5. *Pilea pumila*	5	No	FACW
6. *Typha angustifolia*	10	No	OBL
7. *Solidago gigantea*	5	No	FACW
8. *Impatiens capensis*	10	No	FACW
9. *Juncus effusus*	5	No	OBL
10. *Boehmeria cylindrica*	5	No	OBL
11.			
12.			
	98 =Total Cover		
Woody Vine Stratum (Plot size: 30)			
1. *Vitis riparia*	5	No	FAC
2. *Ampelopsis brevipedunculata*	20	Yes	UPL
3. *Toxicodendron radicans*	10	Yes	FAC
4.			
	35 =Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	43	x 1 =	43
FACW species	95	x 2 =	190
FAC species	15	x 3 =	45
FACU species	10	x 4 =	40
UPL species	20	x 5 =	100
Column Totals:	183 (A)		418 (B)

Prevalence Index = B/A = 2.28

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Northcentral and Northeast – Version 2.0

SOIL

Sampling Point: Wet 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2.4	10YR 2/2	100					Sandy	
2.4-19.2	10YR 3/1	100					Sandy	
19.2-24	10YR 4/1	100					Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- x Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- x Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- x Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ High Chroma Sands (S11) **(LRR K, L)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR K, L)**
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Mamacoke Brook Outfall Channel Stabilization and Restoration City/County: Waterford/New London Sampling Date: 9/12/2025

Applicant/Owner: Connecticut College State: CT Sampling Point: Non-wet 1

Investigator(s): B. Salladin Section, Township, Range:

Landform (hillside, terrace, etc.): hillside Local relief (concave, convex, none): convex Slope %: 25

Subregion (LRR or MLRA): LRR R Lat: -72.102159 Long: 41.388310 Datum: NAD83

Soil Map Unit Name: Charlton-Chatfield complex NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** Yes ____ No X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ____	Depth (inches): ____
Water Table Present?	Yes ____	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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VEGETATION – Use scientific names of plants.

Sampling Point: Non-wet 1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus velutina*	40	Yes	UPL
2. *Betula lenta*	30	Yes	FACU
3. *Fagus grandifolia*	25	Yes	FACU
4. *Acer saccharum*	5	No	FACU
5.			
6.			
7.			
	100	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Euonymus alatus*	20	Yes	UPL
2. *Viburnum acerifolium*	15	Yes	UPL
3. *Berberis thunbergii*	10	No	FACU
4. *Sassafras albidum*	10	No	FACU
5.			
6.			
7.			
	55	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Eurybia divaricata*	10	Yes	UPL
2. *Alliaria petiolata*	10	Yes	FACU
3. *Carex sylvatica*	5	No	FACU
4. *Erechtites hieraciifolius*	10	Yes	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35	=Total Cover	
Woody Vine Stratum (Plot size:)			
1. *Toxicodendron radicans*	10	Yes	FAC
2. *Celastrus orbiculatus*	10	Yes	FACU
3. *Lonicera japonica*	10	Yes	FACU
4.			
	30	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 11 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 9.1% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	125	x 4 =	500
UPL species	85	x 5 =	425
Column Totals:	220 (A)		955 (B)

Prevalence Index = B/A = 4.34

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - *Prevalence Index is ≤3.0*[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

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Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: (Include photo numbers here or on a separate sheet.)

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Northcentral and Northeast – Version 2.0

SOIL

Sampling Point: Non-wet 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-.5	10YR 3/4	100					Loamy/Clayey	
.5-12	10YR 4/3	100					Loamy/Clayey	
12-18	10YR 5/4	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
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- ___ Depleted Matrix (F3)
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- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR K, L)**
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

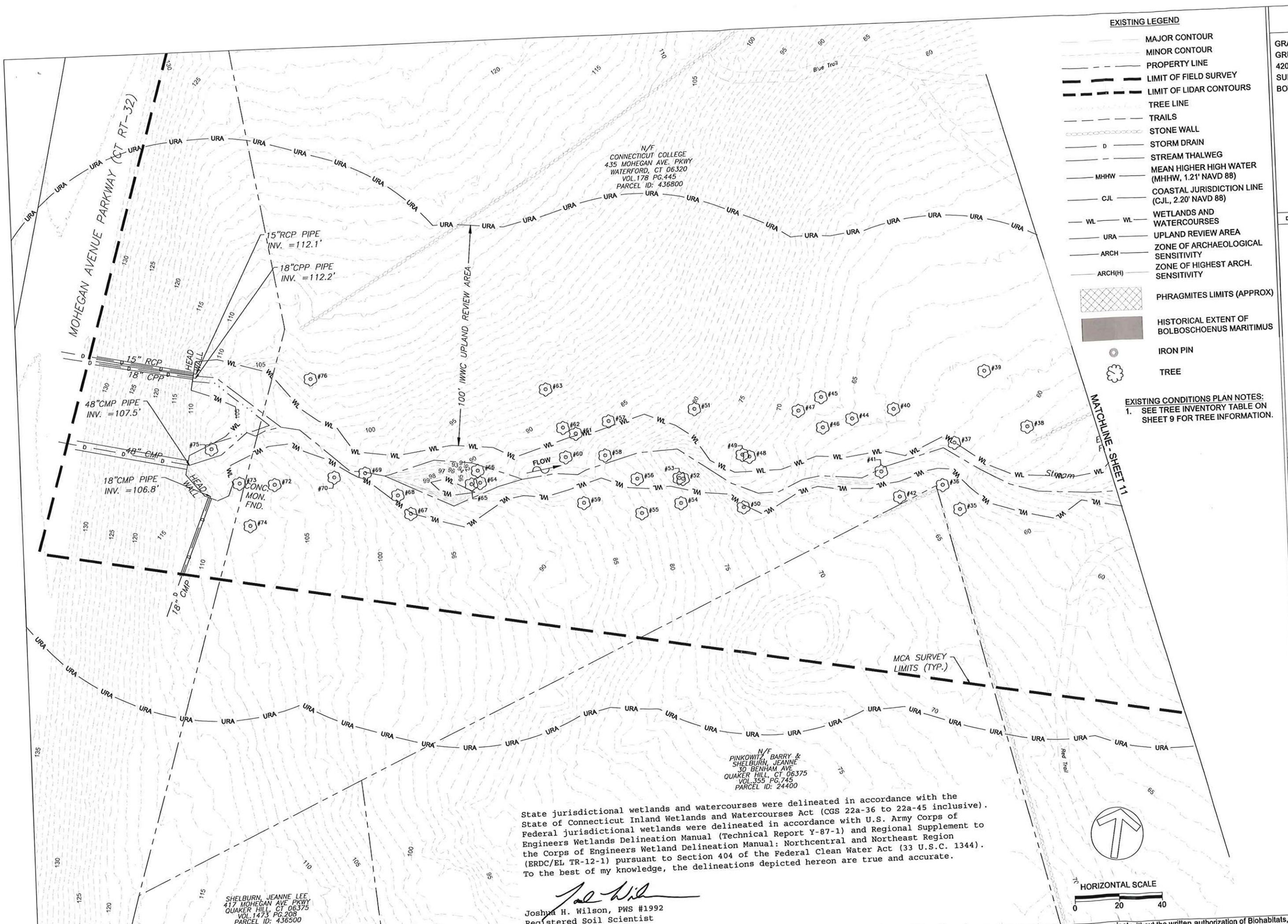
Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

ENG FORM 6116-8, SEP 2024 Northcentral and Northeast – Version 2.0



State jurisdictional wetlands and watercourses were delineated in accordance with the State of Connecticut Inland Wetlands and Watercourses Act (CGS 22a-36 to 22a-45 inclusive). Federal jurisdictional wetlands were delineated in accordance with U.S. Army Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1) and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (ERDC/EL TR-12-1) pursuant to Section 404 of the Federal Clean Water Act (33 U.S.C. 1344). To the best of my knowledge, the delineations depicted hereon are true and accurate.

Joshua H. Wilson, PWS #1992
Registered Soil Scientist

EXISTING LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- LIMIT OF FIELD SURVEY
- LIMIT OF LIDAR CONTOURS
- TREE LINE
- TRAILS
- STONE WALL
- D — STORM DRAIN
- STREAM THALWEG
- MHHW — MEAN HIGHER HIGH WATER (MHHW, 1.21' NAVD 88)
- CJL — COASTAL JURISDICTION LINE (CJL, 2.20' NAVD 88)
- WL WL — WETLANDS AND WATERCOURSES
- URA — UPLAND REVIEW AREA
- ARCH — ZONE OF ARCHAEOLOGICAL SENSITIVITY
- ARCH(H) — ZONE OF HIGHEST ARCH. SENSITIVITY
- PHRAGMITES LIMITS (APPROX)
- HISTORICAL EXTENT OF BOLBOSCHOENUS MARITIMUS
- IRON PIN
- TREE

EXISTING CONDITIONS PLAN NOTES:
1. SEE TREE INVENTORY TABLE ON SHEET 9 FOR TREE INFORMATION.

CLIENT

GRAHAM BOARDMAN
GREENVEST LLC
4201 NORTHVIEW DRIVE
SUITE 202
BOWIE, MD 20716

DATE: 02/06/2026 ISSUES / REVISIONS

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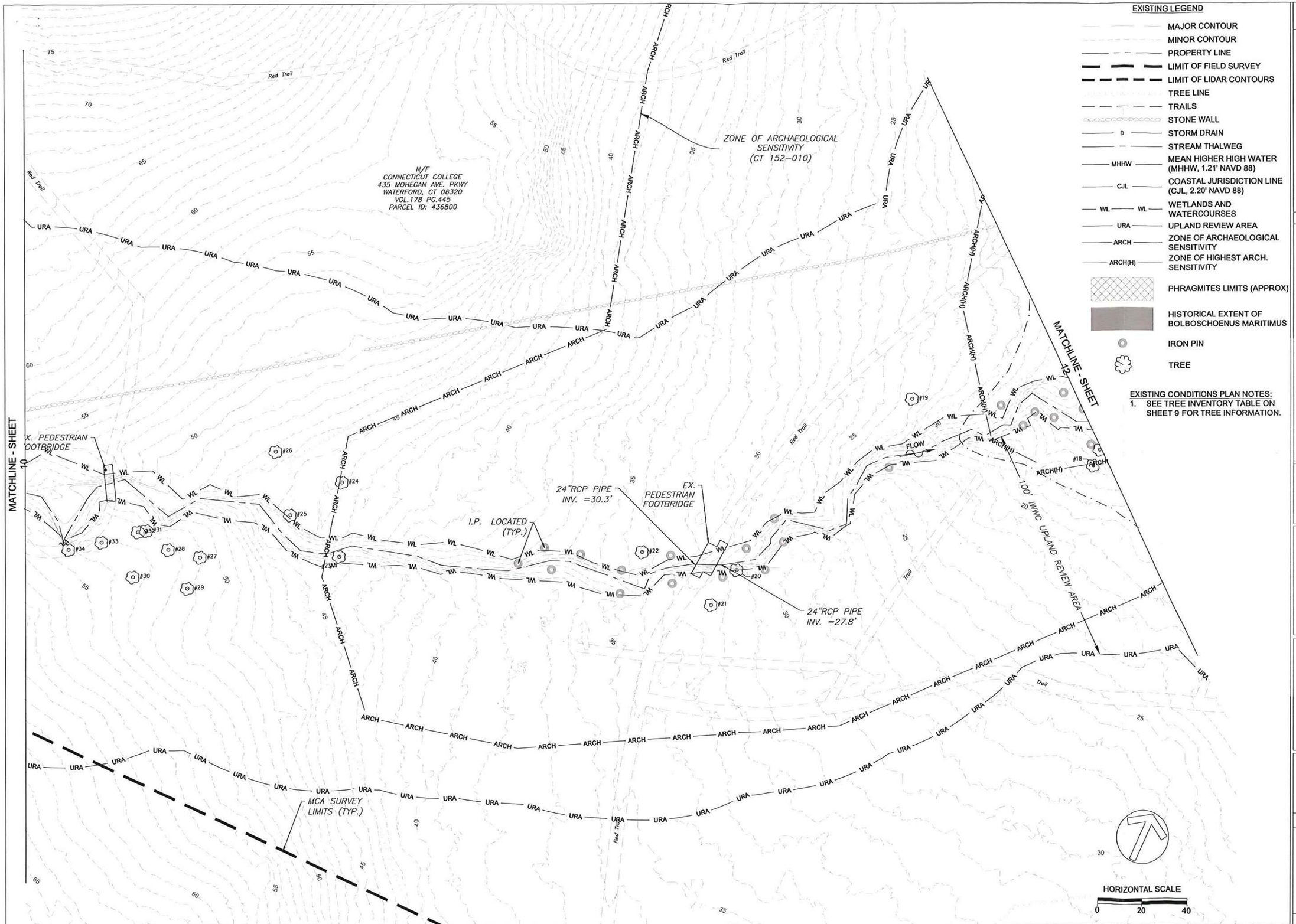
fx: 410.554.0168 / www.biohabitats.com
Restore the Earth & Inspire Ecological Stewardship

MAMACOKE BROOK OUTFALL CHANNEL STABILIZATION AND RESTORATION

TITLE:
EXISTING CONDITIONS

PROJECT NO.: 25201.01
SCALE:
SEAL:
BY: EB,TB
CHECK: DS
DWG. NO.:
1 of 3



EXISTING LEGEND

- MAJOR CONTOUR
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- TREE LINE
- TRAILS
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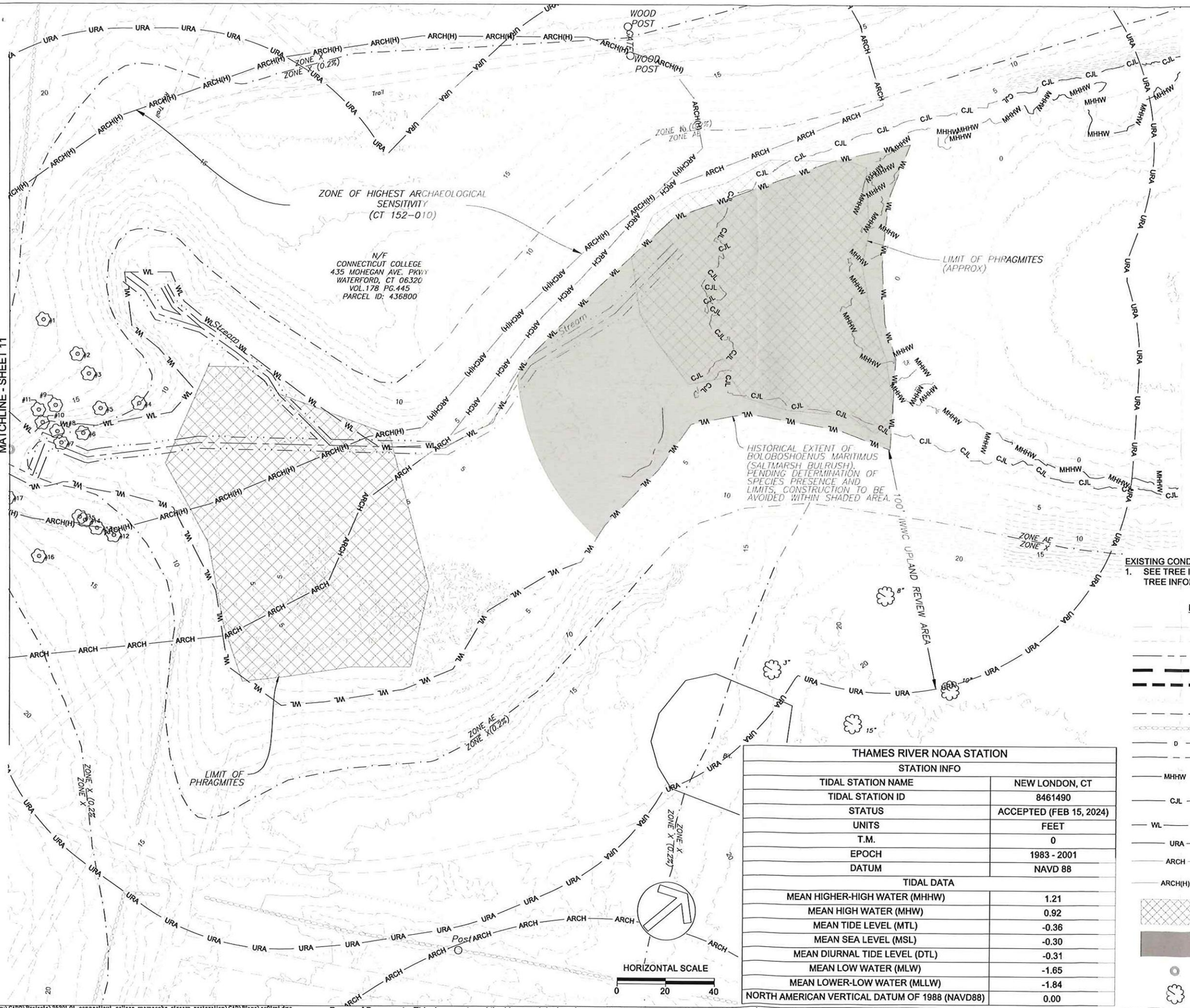
2 of 3



THAMES RIVER NOAA STATION	
STATION INFO	
TIDAL STATION NAME	NEW LONDON, CT
TIDAL STATION ID	8461490
STATUS	ACCEPTED (FEB 15, 2024)
UNITS	FEET
T.M.	0
EPOCH	1983 - 2001
DATUM	NAVD 88
TIDAL DATA	
MEAN HIGHER-HIGH WATER (MHHW)	1.21
MEAN HIGH WATER (MHW)	0.92
MEAN TIDE LEVEL (MTL)	-0.36
MEAN SEA LEVEL (MSL)	-0.30
MEAN DIURNAL TIDE LEVEL (DTL)	-0.31
MEAN LOW WATER (MLW)	-1.65
MEAN LOWER-LOW WATER (MLLW)	-1.84
NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)	0.00

EXISTING CONDITIONS PLAN NOTES:

1. SEE TREE INVENTORY TABLE ON SHEET 9 FOR TREE INFORMATION.

EXISTING LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- LIMIT OF FIELD SURVEY
- LIMIT OF LIDAR CONTOURS
- TREE LINE
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3 of 3