• Soil & Wetland Studies
• Ecology • Application Reviews
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• Environmental Planning & Management
• Ecological Restoration & Habitat Mitigation
• Expert Testimony • Permitting

April 3, 2023

VIA E-MAIL

Town of Ledyard
Inland Wetlands & Water Courses Commission
Town Hall
741 Colonel Ledyard Highway
Ledyard, CT 06339

ATTN: Mr. Justin DeBrodt, Chairman

RE: **WETLANDS ASSESSMENT & MITIGATION**
Site Preparation for Future Industrial Development
1737 and 1761 Route 12, Gales Ferry (Ledyard), CT
REMA Job #23-2596-LED5

Dear Chairman DeBrodt and Commission Members:

At the request of the applicant, Gales Ferry Intermodal, LLC, REMA ECOLOGICAL SERVICES, LLC (REMA), has prepared this *Wetlands Assessment & Mitigation* report, to be submitted as part of an application before the Town of Ledyard Inland Wetlands and Water Courses Commission.

1.0 Introduction & Overview

The applicant is proposing to extract rock from roughly 38 +/- acres (i.e., "site," "study area") of a 165-acre industrial property, in order to prepare the site for future industrial development (see Figure A, attached).

The site is predominately wooded, and encompasses a portion of a moderately steep hill, that overlooks the Thames River to the west. Wetland delineations were conducted by JMM Wetland Consulting Services, LLC, with assistance from REMA, in April and September of 2022, and March of 2023.

The regulated resources associated with the proposal, are predominately disturbed, and/or man-made, isolated wetland pockets, as well as a man-made ditch, with intermittent watercourse characteristics. Within the proposed rock extraction area, Wetland Z, is a +/- 1,700 square foot wetland, created through past excavation. Westerly, and downgradient of the proposed rock extraction area, two small wetlands (i.e., Wetland X and Wetland Y), are connected via a ditched intermittent watercourse, for a combined wetland area of roughly 6,150 square feet. Finally, further downgradient and southwesterly of Wetlands X and Y, a ditched intermittent watercourse runs in a southwesterly direction parallel to an existing paved area that has been used in the past for equipment and materials storage.

In addition to providing brief descriptions and characterizations of the aforementioned regulated wetland areas (i.e., Wetlands X, Y, and Z), this report describes a proposed compensatory wetland mitigation plan for the disturbance of Wetland Z, and in part for Wetlands X and Y. If in the future, REMA, or another qualified wetlands professional, determines that Wetlands X and Y, while not being directly disturbed, have been hydrologically impacted by the proposal, additional compensatory mitigation would be required.

We note that REMA reviewed secondary source data, including archival aerial photographs (e.g., 1934, 1951, 1965, 1970, and 1986), and also more recent aerial photography for flight years 1990 through 2021 (Google Earth). We also reviewed USGS topographic maps, including historic ones, Connecticut Environmental Conditions Online (CTECO) Resource Maps, the State of Connecticut Soil Survey (USDA-NRCS) (attached), and several CT DEEP GIS-based resource maps (e.g., surficial and bedrock geology, etc.). Also, attached to this report, we provide several annotated photographs, primarily of the site's regulated resources (see Photos 1 through 14).

2.0 Existing Conditions

2.1 Wetlands Overview

The study area's primary regulated wetland/watercourse resources, Wetlands X, Y, and Z, are early successional, forested, and scrub shrub wetlands, for the most part created through prior excavation and/or ditching. These are *seasonally flooded* to *seasonally saturated* wetlands, low in floristic diversity.

In the early portion of the growing seasonal these wetlands receive shallow groundwater discharge. As the growing season progresses and evapotranspiration increases in the contributing forested areas, groundwater discharge decreases, and surface flows within these wetlands, and associated intermittent watercourses, are only observed during significant rain events.

2.2 Geology and Soils

The general surficial geology of all three delineated wetlands (i.e., Wetlands X, Y, and Z) is attributed to thin glacial till over bedrock, per field observations, and geologic maps. However, Wetlands X and Y, overlap upon are within an area that has been previously designated as a landfill, with soils derived from sandy fill.

The USDA/NRCS soils map shows the excessively drained Hinckley loamy sand (Unit 38E) underlying Wetlands X and Y, which a soil type derived from glacial outwash. However, field observations would indicate that both of these wetlands were either excavated or derived from glacial till deposits and/or sandy fill. With the exception of the small, southerly hillside portion of Wetland Y, which has some poorly drained, undisturbed soils, the balance of these wetlands are mapped as Aquents (308w). These are poorly and very poorly drained soils of previously disturbed land. The undisturbed wetlands soils, which are limited to one small area of Wetland Y, are the poorly drained to very poorly drained Ridgebury, Leicester, and Whitman (3) soils series complex.

2.3 Wetland Characterization

The wetlands within the study area (i.e., Wetlands X, Y, and Z) are predominately classified as *palustrine, forested/scrub shrub, seasonally saturated/seasonally flooded* (PFO/SS1E) per the National Wetlands Inventory (NWI) classification system. Being relatively narrow, and steep sided, they contain vegetation of both wetlands and moist uplands. Floristic diversity is relatively low, and the percentage of invasive species is low (Wetland Z) to moderate (Wetlands X and Y).

Dominant or common overstory trees and large shrubs observed, included red maple, gray birch, flowering dogwood, sugar maple, cottonwood, green ash, speckled alder, black willow, bigtooth aspen, and eastern hemlock. The woody understory contained such species as mountain laurel, multiflora rose, Morrow's honeysuckle, wineberry, autumn olive, Japanese knotweed, sweet pepperbush, highbush blueberry, and silky dogwood. Observed herbaceous species included skunk cabbage, jewelweed, clearweed, field horsetail, cinnamon, New York, royal, Christmas, and sensitive ferns, evergreen woodfern, swamp dewberry, garlic mustard, goldenrods, asters, poison ivy, and grasses. Lianas included Asiatic bittersweet, fox grape, and Virginia creeper.

2.4 Wetland Functions & Values

Wetland/watercourse functions and values[1] were assessed informally, using the rationales of a standardized evaluation methods [e.g., US Army Corps of Engineers' *Descriptive Approach* (1995)], and best professional judgment. Wetland and upland baseline data provide the basis for the assessment, as well as the landscape setting of the site. We note that the small size of the wetlands within the study area does not allow for a more formal evaluation. In fact, the *Descriptive Approach* resolution in evaluating wetlands that are much less than a half-acre is relatively low, which is the reason for relying mostly on best professional judgment. Table A (below) shows the results of the assessment. Generally, small disturbed wetlands do not score highly for wetland functions and values.

[1] Functions are those provided by a given wetland/watercourse that are intrinsic to the resource. That is, they would present regardless of society (e.g wildlife habitat, nutrient removal/transformation). Values are those services that society benefits from (e.g., floodflow alteration, recreation, educational/scientific value. Some "functions" also benefit society, such as sediment/toxicant/pathogen retention.

Table A, also includes a column of potential functions & values that would result from the proposed compensatory mitigation. This is attributed to several factors, including landscape position, juxtaposition with other wetlands, expected hydrology, number of wetland cover type classes and subclasses, and proposed floristic diversity.

Table A: Summary of Wetland/Watercourse Functions-Values Assessment

Function/Value	Wetlands X, Y, and Z	*Potential* Wetland Creation Area (post-dev.)
Groundwater Recharge/discharge	**P**	Y
Floodflow alteration	N	Y
Sediment/Shoreline Stabilization	N	Y
Sediment/toxicant/pathogen retention	N	Y
Nutrient Removal/Transformation	Y	Y
Production Export	N	N
Aquatic Habitat	N	Y
Wildlife Habitat	Y	Y
Endangered Species Habitat	N	N
Visual Quality/aesthetics	N	Y
Educational/Scientific Value	N	Y
Recreation (passive/active)	N	N
Uniqueness/heritage	N	N

Notes: P = Primary function; Y = function present; N = function not appreciably present or absent

3.0 Mitigation

The proposed 1,700 square foot *direct wetland impact* to Wetland Z will be mitigated through the creation of at least 5,400 square feet of productive wetlands, within the southwestern section of the site, adjacent to an existing wetland, and in part within the southernmost portion of an existing paved area (see Figure B, attached). Typically, a 1.5:1 or 2:1 wetland creation to wetland impact area ratio is provided for mitigating impacts to low-functioning, disturbed wetlands, but in this case a higher ratio was provided. Should in the future hydrologic impacts be experienced in Wetlands X and Y, the proposed wetland mitigation will compensate for all or most of such a wetland disturbance.

The goal for the wetland creation is to provide a mosaic of scrub shrub, wet meadow, and marsh wetland cover types, with a much higher diversity of vegetation than is provided by Wetland Z, which would be impacted. Seeding and plant materials tables, as well as detailed

mitigation implementation notes, have been provided by REMA and are part of the submitted plan set. It should be noted that the intent is for a qualified wetland professional to supervise the implementation of the mitigation plan, and its planting and seeding, including the actual placement of plants (i.e., emergents, shrubs, and trees).

4.0 Conclusion

It is our professional opinion that the proposed compensatory wetland mitigation will more than off-set the direct impact to Wetland Z.

Please call us if you have any questions on the above or need further assistance.

Respectfully submitted,

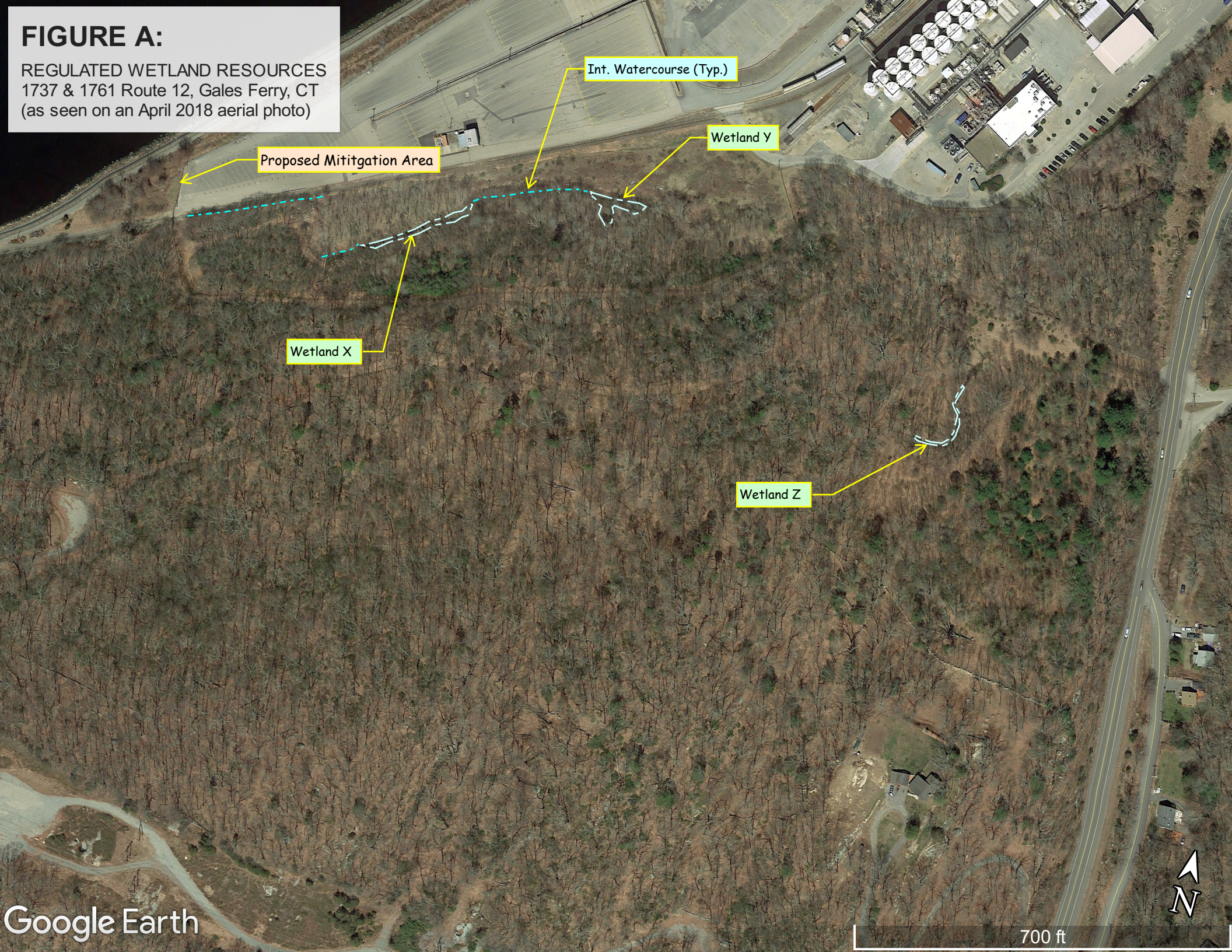
REMA ECOLOGICAL SERVICES, LLC

George T. Logan, MS, PWS, CSE
Certified Senior Ecologist
Professional Wetland Scientist
Registered Soil Scientist

Attachments: Figures A and B; Annotated Photographs (1-14); CT Web Soil Survey

FIGURE A:

REGULATED WETLAND RESOURCES
1737 & 1761 Route 12, Gales Ferry, CT
(as seen on an April 2018 aerial photo)



CT Environmental Conditions Online

FIGURE B: PROPOSED COMPENSATORY WETLAND MITIGATION AREA
1737 & 1761 Route 12, Gales Ferry, Connecticut

Legend

Town Boundary

State Boundary

Town Boundary

Coastline

Light Gray Canvas Base

Notes

0.0 0 0.01 0.0 Miles

© Connecticut Environmental Conditions Online

THIS MAP IS NOT TO BE USED FOR NAVIGATION

This map is intended for general planning, management, education, and research purposes only. Data shown on this map may not be complete or current. The data shown may have been compiled at different times and at different map scales, which may not match the scale at which the data is shown on this map.

REMA	**SITE/LOCATION:** 1737 & 1761 Route 12 Gales Ferry, CT	REMA JOB NO.: 23-2596-LED5	**ANNOTATED PHOTO LOG**
	INVESTIGATOR(S): George T. Logan, MS, PWS, CSE		

DATE: March 29, 2023	**FACING:** NORTHEASTERLY	**PHOTO NO.:** 1

Wetland X; man-made wetland receives seasonal groundwater discharge and surface runoff from hillside about it to the south

DATE: March 29, 2023	**FACING:** SOUTHWESTERLY	**PHOTO NO.:** 2

Wetland X; seasonally ponds a few inches of water; no amphibian activity noted

REMA	**SITE/LOCATION:** 1737 & 1761 Route 12 Gales Ferry, CT	REMA JOB NO.: 23-2596-LED5	**ANNOTATED PHOTO LOG**
	INVESTIGATOR(S): George T. Logan, MS, PWS, CSE		

DATE: March 29, 2023	**FACING:** NORTHEASTERLY	**PHOTO NO.:** 3

Flagged ditched intermittent watercourse between Wetland Y, upgradient and Wetland X

DATE: March 29, 2023	**FACING:** EASTERLY	**PHOTO NO.:** 4

Wetland Y; seasonally saturated hillside seep; only partially disturbed

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DATE: March 29, 2023	**FACING:** NORTHERLY	**PHOTO NO.:** 5

Wetland Y; two wetland delineation flags denote the top (uphill) limit of the wetland

DATE: March 29, 2023	**FACING:** WESTERLY	**PHOTO NO.:** 6

Wetland Y; seasonally saturated hillside seep; beginning (easterly) edge of hillside dicharge and embedded intermittent watercourse

REMA	**SITE/LOCATION:** 1737 & 1761 Route 12 Gales Ferry, CT	REMA JOB NO.: 23-2596-LED5	**ANNOTATED PHOTO LOG**
	INVESTIGATOR(S): George T. Logan, MS, PWS, CSE		

DATE: September 7, 2022	**FACING:** NORTHEASTERLY	**PHOTO NO.:** 7

Westerly end of flagged ditched intermittent watercourse that begins at the westerly edge of Wetland X; past this point surface waters infiltrate readily into sandy soils, at the interface between glacial till and glacial outwash deposits.

DATE: March 29, 2023	**FACING:** EASTERLY	**PHOTO NO.:** 8

Wetland Z; man-made, through excavation, seasonally flooded and seasonally flooded, isolated wetland; no amphibian activity observed in the 6-8 inches of inundation

REMA	**SITE/LOCATION:** 1737 & 1761 Route 12 Gales Ferry, CT	REMA JOB NO.: 23-2596-LED5	**ANNOTATED PHOTO LOG**
	INVESTIGATOR(S): George T. Logan, MS, PWS, CSE		

DATE: March 29, 2023	**FACING:** WESTERLY	**PHOTO NO.:** 9

Wetland Z; upper portion at hillside cut

DATE: March 29, 2023	**FACING:** NORTHERLY	**PHOTO NO.:** 10

Wetland Z; central section; ditched

REMA	**SITE/LOCATION:** 1737 & 1761 Route 12 Gales Ferry, CT	REMA JOB NO.: 23-2596-LED5	**ANNOTATED PHOTO LOG**
	INVESTIGATOR(S): George T. Logan, MS, PWS, CSE		

DATE: March 29, 2023	**FACING:** SOUTHWESTERLY	**PHOTO NO.:** 11

Edge of delineated wetland, next to which (i.e., easterly) wetland creation is proposed; this partially forested wetland is not connected via surface flows to the the tidal waters of the Thames River; up to 10 inches of sandy fill over wetland topsoil was observed in this wetland, which is seasonally satruated to temporarily flooded

DATE: March 29, 2023	**FACING:** NORTHEASTERLY	**PHOTO NO.:** 12

Looking roughly 180 degrees from previous photo, into a portion of the upland area to be converted to wetlands; replete with invasives, such as multiflora rose and Asiatic bittersweet.

REMA	**SITE/LOCATION:** 1737 & 1761 Route 12 Gales Ferry, CT	REMA JOB NO.: 23-2596-LED5	**ANNOTATED PHOTO LOG**
	INVESTIGATOR(S): George T. Logan, MS, PWS, CSE		

DATE: March 29, 2023	**FACING:** WESTERLY	**PHOTO NO.:** 13

Mugwort infested upland that would be converted to a productive/functioning wetland

DATE: March 29, 2023	**FACING:** SOUTHERLY	**PHOTO NO.:** 14

A portion of the area at the western portion of the paved area would be excvated to create a wetland habitat

Soil Map—State of Connecticut
(1737 and 1761 Route 12, Gales Ferry, CT)

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.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 22, Sep 12, 2022

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

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	3.4	1.1%
18	Catden and Freetown soils, 0 to 2 percent slopes	6.5	2.1%
34B	Merrimac fine sandy loam, 3 to 8 percent slopes	4.1	1.3%
38E	Hinckley loamy sand, 15 to 45 percent slopes	38.7	12.5%
47C	Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	0.0	0.0%
50B	Sutton fine sandy loam, 3 to 8 percent slopes	6.7	2.2%
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	1.9	0.6%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	2.5	0.8%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	20.1	6.5%
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	4.1	1.3%
62D	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	16.5	5.3%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	2.9	0.9%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	3.6	1.2%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	19.7	6.4%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	50.5	16.3%
76E	Rock outcrop-Hollis complex, 3 to 45 percent slopes	16.2	5.2%
86D	Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony	2.5	0.8%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
306	Udorthents-Urban land complex	26.5	8.6%
307	Urban land	28.5	9.2%
W	Water	54.7	17.6%
Totals for Area of Interest		**309.9**	**100.0%**