APPLICATION FOR PERMIT TO CONDUCT REGULATED ACTIVITY FOR BANK PROTECTION ON THE FARMINGTON RIVER

October 2015

SUBMITTED FOR:

Simsbury WPCA
36 Drake Hill
Simsbury, CT 06070

SUBMITTED BY:

WMC
CONSULTING ENGINEERS

87 Holmes Road
Newington, CT 06111

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EXECUTIVE SUMMARY

Wengell, McDonnell & Costello Consulting Engineers (WMC) has been retained by the Simsbury Water Pollution Control Authority (WPCA) to perform design and permitting services for addition of streambank protection for ±440 feet of the west bank of the Farmington River. The Simsbury WPCA has a 30-inch interceptor pipe located in a right-of-way on the river bank. The interceptor pipe is adjacent to the river from approximately the cul-de-sac at the end of Mather's Crossing southward (upstream).

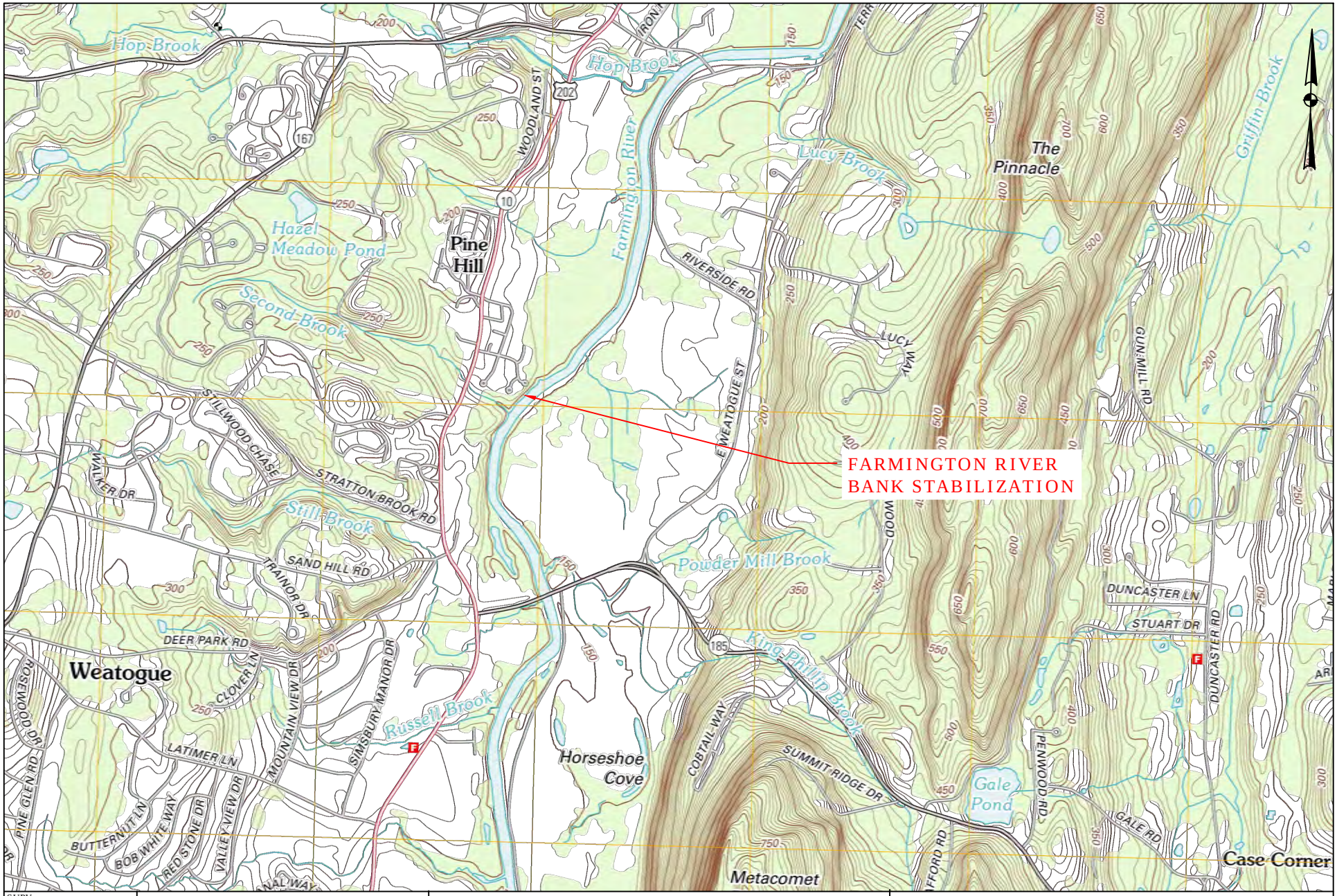
A portion of the river bank further upstream already has had protective measures added. A riprap layer was added to the stream bank. Subsequently, the same area was redone with heavier riprap. It is now proposed to add protection to the remainder of the unprotected stream bank adjacent to the sewer interceptor.

The Farmington River is located in alluvial material, and has a history of lateral migration, which is illustrated by the sinuous nature of the river in vicinity of the project and the number of oxbows in the region. The river banks are relatively fine material. Given the velocity of the river and the fine materials, the result is that the river is fairly dynamic in its movement.

The natural riverbank in the vicinity of the sewer interceptor is too steep to remain stable. Normal geomorphic processes are causing the bank to migrate. Recently, larger floods also caused the failure of some of the large trees on the river bank, which resulted in removal of all the trees on the bank along the subject reach. The trees added stability to the river bank. As the roots of the recently removed trees decay, the degradation of the river bank will accelerate. As slumping of the bank approaches the interceptor pipe, the soil will lose its ability to support the large pipe, leading to a failure and potentially a large spill of raw sewage into the river.

It is proposed to re-grade the river bank and install ConnDOT Standard Class riprap. The bank protection was designed in accordance with the method used by the Army Corp of Engineers (ACOE) and the Federal Highway Administration (FHWA).

Installation of the bank protection is anticipated to occur in summer 2016. Due to the presence of state-listed species of concern, and the possible presence of federally endangered species, coordination with CT DEEP and the US Fish and Wildlife Service has been initiated and will continue through the performance of the work and after the work is completed. The Contractor will be required to engage a consulting biologist specializing in the endangered species for relocation of state and federally listed species found along the impacted river reach prior to the start of the work.



SUPV.	S.R.M.
DESIGN	M.E.F.
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CHECKED	
DATE	3/25/14

WMC CONSULTING ENGINEERS

• WENGELL, McDONNELL & COSTELLO •
87 HOLMES ROAD
NEWINGTON, CT 06111
(860) 667-9624

PREPARED FOR:

TOWN OF SIMSBURY

P.O. BOX 495

SIMSBURY, CT 06070

FARMINGTON RIVER BANK STABILIZATION
LOCATION MAP
USGS QUAD - AVON SCALE - 1:2,000

PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
FARMINGTON RIVER BANK STABILIZATION – PERMIT PKG.	– LOCATION	– 14029.10	– 0	1	1

STATEWIDE INLAND WETLANDS & WATERCOURSES ACTIVITY REPORTING FORM

Connecticut Department of ENERGY & ENVIRONMENTAL PROTECTION

GIS CODE #: ___ ___ ___ ___ ___ ___ ___ ___ ___
For DEEP Use Only

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

Statewide Inland Wetlands & Watercourses Activity Reporting Form

Please complete and mail this form in accordance with the instructions on pages 2 and 3 to:
Wetlands Management Section, Inland Water Resources Division, CT DEEP, 79 Elm Street – 3rd Floor, Hartford, CT 06106

PART I: To Be Completed By the Municipal Inland Wetlands Agency Only

1. DATE ACTION WAS TAKEN: Year **Click Here for Year** Month **Click Here for Month**

2. ACTION TAKEN: **Click Here to Choose a Code**

3. WAS A PUBLIC HEARING HELD (check one)? Yes ☐ No ☐

4. NAME OF AGENCY OFFICIAL VERIFYING AND COMPLETING THIS FORM:

(type name) _____ (signature) _____

PART II: To Be Completed By the Municipal Inland Wetlands Agency or the Applicant

5. TOWN IN WHICH THE ACTION IS OCCURRING (type name): **Simsbury**

Does this project cross municipal boundaries (check one)? Yes ☐ No ☒

If Yes, list the other town(s) in which the action is occurring (type name(s)): _____, _____,

6. LOCATION (click on hyperlinks for information): USGS Quad Map Name: **Avon** or Quad Number: **36**

Subregional Drainage Basin Number: **-430000**

7. NAME OF APPLICANT, VIOLATOR OR PETITIONER (type name): **Simsbury WPCA**

8. NAME & ADDRESS/LOCATION OF PROJECT SITE (type information): **Farmington River Bank @ Mathers Crossing**

Briefly describe the action/project/activity (check and type information): Temporary ☐ Permanent ☒ Description: **River Bank Protection w riprap**

9. ACTIVITY *PURPOSE* CODE: **E**

10. ACTIVITY *TYPE* CODE(S): **1**, **2**, **5**, **12**

11. WETLAND / WATERCOURSE AREA ALTERED (type in acres or linear feet as indicated):

Wetlands: **0.01** acres Open Water Body: **0.00** acres Stream: **440** linear feet

12. UPLAND AREA ALTERED (type in acres as indicated): **0.36** acres

13. AREA OF WETLANDS / WATERCOURSES RESTORED, ENHANCED OR CREATED (type in acres as indicated): **0.00** acres

DATE RECEIVED:

PART III: To Be Completed By the DEEP

DATE RETURNED TO DEEP:

FORM COMPLETED: YES NO

FORM CORRECTED / COMPLETED: YES NO

NARRATIVE

EXISTING SITE CONDITION

For a length of the Farmington River, the Simsbury Water Pollution Control Authority (WPCA) maintains a sewer interceptor on the west bank of the river. The interceptor is a 30-inch concrete pipe, and was installed circa 1970. Approximately one million gallons per day of raw sewage is conveyed through this pipe to the Town of Simsbury wastewater treatment facility. The interceptor pipe is located within a 60 foot right-of-way along the edge of the river. The interceptor parallels the river from approximately the end of the Mathers Crossing cul-de-sac southward (upstream).

The Farmington River in vicinity of the area of the proposed work is a dynamic stream. The banks of the river are fine material, and the river has a history of lateral movement. Normal geomorphic processes are causing change and movement of the river bank, which will soon jeopardize the stability of the sewer interceptor. In addition, recent flood events have caused trees on the river bank to topple, and the subsequent removal of all the trees on the bank along the reach on which the proposed work is to occur. Removal of the large trees will lead to decay of the tree roots, further destabilizing the river bank.

The crest of the river bank is grassed, and is regularly mowed by the WPCA. Local residents use the right-of-way for passive recreation. The river bank itself is nearly vertical, which cannot be sustained, and has several areas of slumping. Further upstream (south) the river bank is already armored. ConnDOT Modified Class riprap had been placed on the bank. That riprap was inadequate, and larger riprap was placed in the same area in subsequent work.

Please refer to photographs in Attachment A.

EXISTING WETLAND ENVIRONMENT

Wetlands at the site were flagged by a Certified Soil Scientist on May 8, 2014. A copy of the report from the soil scientist is enclosed as Attachment B. Wetland flags placed by the soil scientist were removed soon after they were placed, and the area was re-flagged in summer 2015 just prior to survey work.

The soil scientist found minimal wetland soils in the reach of the river affected by the proposed bank stabilization. It was found that the soils in the area of the sewer interceptor were all disturbed. Pockets of wetland soils occur near the north and south end of the proposed work.

The soil scientist also flagged the Ordinary High Water marks (OHW) along the affected river reach. For the purpose of permitting, the area below the OHW level is considered to be part of the regulated watercourse area.

Although little of the proposed river bank protection work is within Connecticut wetlands, the entire project is within the Town regulated upland buffer.

PROPOSED SITE CONDITION

The proposed river bank protection is to be added from the downstream end of the sewer right-of-way adjacent to the river, by Mather's Crossing, upstream (south) to the end of the existing river bank protection. The bank protection work will generally consist of re-grading the slope back to a 1.5:1 maximum slope, placement of a geotextile and then placement of a layer of Standard Class riprap. The usual detail for placement of riprap on a slope is to excavate below the base of the slope and install a key below the surface of the toe of slope. For this project, to minimize the impact to the edge of the river, the alternate method of placing a 3 foot x 3 foot base course of riprap will be used. Refer to the details in the plans. The alternate detail eliminates all excavation in the river channel, and minimizes the environmental impact of the proposed work.

A small drainage outfall at Mather's Crossing is set back from the edge of the river. The discharge from this pipe flows across the grassed area and down the river bank. This flow has caused slumping of the bank. A small manhole will be installed at the outlet location, and a new pipe extended to the river bank. A preformed scour hole will be added at the bank. The scour hole will be grouted to stabilize it.

PROPOSED WETLAND IMPACTS

Most of the area of the proposed work is in previously disturbed areas and non-hydric soils. However, some Connecticut wetlands will be impacted by the proposed work. A wetland area of 600 SF (0.014 Ac.) at the north end of the project is impacted.

Approximately 4 feet vertically is estimated to be below the ordinary high water (OHW) line. This area is considered to be watercourse impacts. Impacts within the watercourse are approximately 3,300 SF (0.076 Ac.).

Upland areas disturbed by the proposed work are approximately 15,690 SF (0.36 Ac.).

Using the depths of the riprap to be installed and the areas impacted, volumes of the impacts can be calculated.

Table 1 - Impact Volume Table

Impact	Volume (C.Y.)	Impact Area and Association
Wetland - Temporary	0	
Wetland - Permanent	27	Bank protection
Wetland - Total	**27**	
Waterway - Temporary	0	
Waterway - Permanent	342	Fill below OHW line
Waterway - Total	**342**	
Total	**369 CY**	

PROPOSED WETLAND ENVIRONMENT

The proposed project will place riprap on the sloped river bank. The wetlands impacted are at the north end of the proposed work area. The sloped area of the river bank within the wetland area will have riprap in the proposed condition. The flat area on the top of the bank is currently an area of brushy growth. The area will be reseeded with a wild flower mix when the work is completed.

The remainders of the impacted area outside the wetlands or river bank areas will re-graded, have loam placed and be re-seeded with a grass mix.

ENDANGERED SPECIES

The area of the proposed work is shown on CT DEEP mapping to be within an area having State and/or federal listed species. WMC contacted CT DEEP to initiated discussions regarding endangered species. Through these discussions, it was found that the species of concern for this location was fresh water mussels. There is a history of state-listed and federal endangered varieties of mussels in the Farmington River. To understand the site conditions, a biologist specializing in surveys of mussels was hired. A field survey of the site occurred on August 5, 2014. The survey found state-listed, but no federally listed species in the area of the proposed work. A report of the survey is located in Attachment C.

Subsequent discussions with DEEP and US Fish and Wildlife staff defined the measures to be taken as a condition of approval for the project. A letter from CT DEEP is included in Attachment C. Generally, a second field survey is to be conducted just prior to the start of the work. Any state or federally listed animals found within the area of the project are to be tagged, relocated upstream, and monitored.

SEQUENCE OF CONSTRUCTION

During construction, the contractor is required to maintain an effective sedimentation and erosion control plan to ensure protection of the stream environment within the project area. During construction, sedimentation control fencing will be installed and maintained on the landward side of the proposed project area. A construction entrance will be established at the end of Mather's Crossing. A second construction entrance may be established at the south end of the river bank segment of te interceptor, adjacent to the parking area for the trail. If so, a construction entrance and appropriate sedimentation controls will be established at this location.

Turbidity curtains will be installed parallel to the river bank along the length of the project site. Turbidity curtains will be maintained for the duration of the work.

WATER HANDLING PLAN

As part of the Contractor's Erosion and Sediment Control Plan, which must be submitted for approval prior to the start of construction, the Contractor shall describe control of the flow of water through the project site and how the watercourse will be protected from the work. Such protection shall, at the minimum, be in accordance with the erosion and sedimentation control plans and details contained in the Contract Documents.

Construction is scheduled to begin in May 2016 with an anticipated duration of approximately 2 months to complete.

SEDIMENT AND EROSION CONTROL PLAN

As part of the approved Sedimentation and Erosion Control Plan, the Contractor shall also describe how dewatering operations will be carried out. Such operations shall, at the minimum, be in accordance with the erosion and sedimentation control plans and details and procedures contained in the Contract Documents. Turbid water generated through dewatering operations or other activities shall be effectively treated prior to discharge to a wetland or watercourse, in order to avoid sedimentation of these systems. Such measures will include utilizing adequately designed pads for discharging of pumped water. Such pads will not be located within a wetland or watercourse.

The Contractor shall maintain effective erosion and sediment controls at all times. The Contractor shall prepare, in writing, an Erosion and Sediment Control Plan and submit such plan to the Engineer, and revise as directed for approval. The Erosion and Sediment Control Plan shall also include plans for Water Handling, Dewatering, and Flood Contingency. No construction activities shall commence until the Plan is approved by the Engineer. The Contractor shall, at all times, comply with the approved Plan. The Plan shall conform to accepted standards and the following references:

- Connecticut Department of Transportation Form 816 Section 1.10 “Environmental Compliance”, as amended;

- 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as amended;

- And, Connecticut Department of Transportation document *On Site Mitigation for Construction Activities*, 1994, as amended.

At no time will machinery be allowed to enter the watercourse. Any material or equipment placed or flow rated to a wetland or watercourse not in accordance with the Contract Documents shall be removed immediately. The impacted wetland or watercourse will then be promptly restored by the Contractor to original conditions, or as specified by the Contract Documents.

Maintenance and fueling of vehicles shall not occur within wetland areas. Fuel should be stored in approved containers at a location above the 100-year flood elevation.

Sedimentation control systems will be installed and maintained in accordance with the Contractor's approved Erosion and Sediment Control Plan and the Contract Documents. The Contract Documents depict the minimum controls expected to be maintained by the Contractor.

Sedimentation control systems will include temporary construction measures such as silt fence, hay bales, pumping settling basins, riprap, and stone check dams, as required for the control of pumped water and surface runoff, as well as sheeting and turbidity control curtains to protect water quality during in-stream construction.

ATTACHMENT A - PHOTOGRAPHS

Photo 1 - Overview of work area - looking north

Photo 2 - Existing slope protection

Photo 3 - Area of slope failure

Photo 4 - Area of unstable, near vertical slope

Photo 5 - Area of slope damaged by runoff from stormwater outfall

ATTACHMENT B - SOIL SCIENTIST REPORT

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

Wetland Delineations Ecological Studies Site Assessments Project Planning Soil Testing

May 8, 2014

RECEIVED

MAY 12 2014

WENGELL, McDONNELL & COSTELLO
CONSULTING ENGINEERS

ATTN: Michael Fanning
WMC Consulting Engineers
87 Holmes Road
Newington, CT 06111

Re: <u>Wetlands Delineation Report</u>
+/- 400 feet along Farmington River east of Mather's Crossing, Simsbury, CT
SS&ES Job No. 2014-26-CT-SIM-1

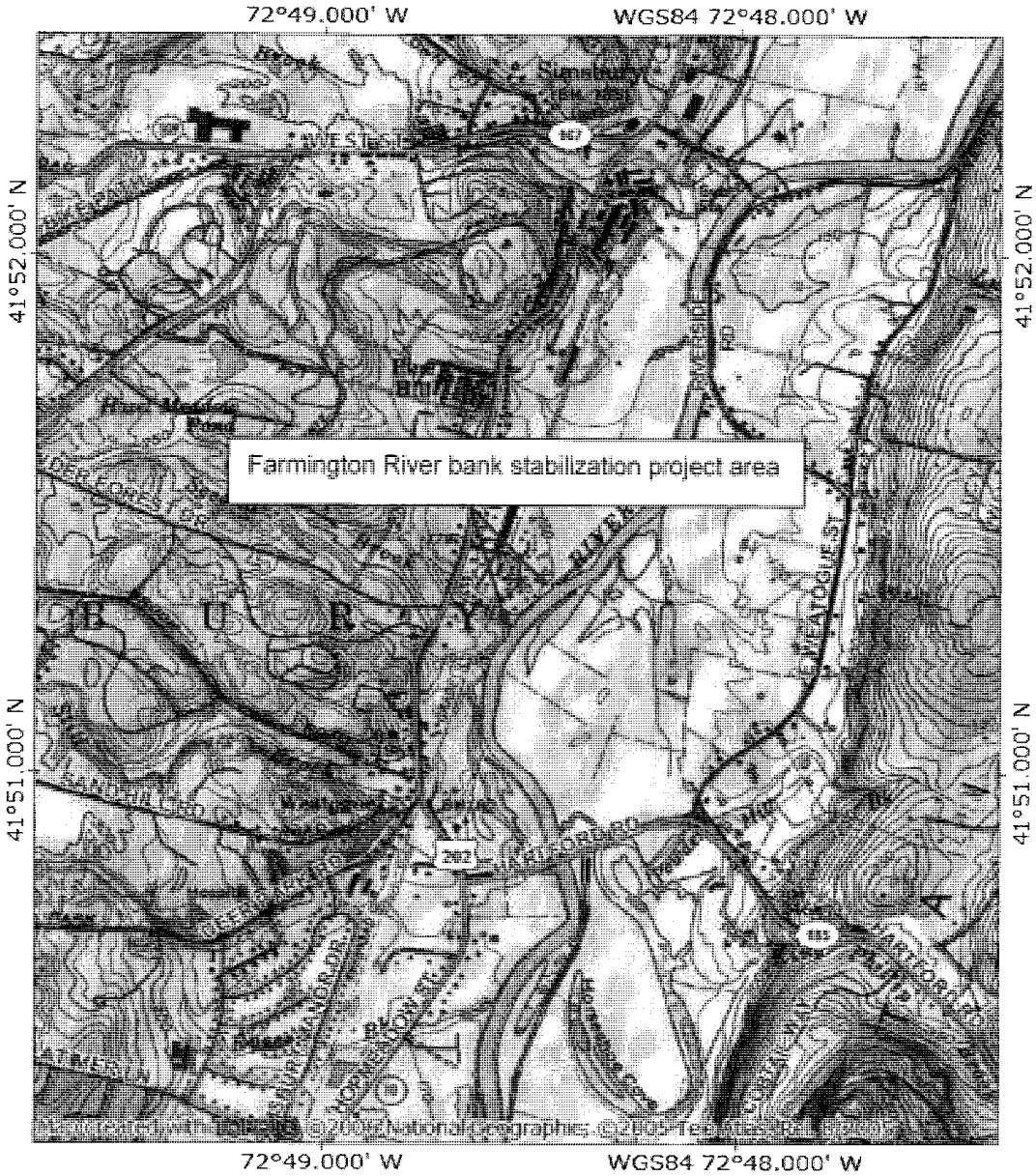
Dear Mr. Fanning:

In accordance with your request, Scott D. Stevens, Soil Scientist and Jennifer L. Beno, Biologist, with Soil Science And Environmental Services, Inc. (SSES) inspected the referenced Farmington River bank stabilization project area on May 8, 2014. The purpose of the inspection was to identify regulated wetlands and waters in the vicinity of the project area.

The project area is located in the eastern portion of the Town of Simsbury within a residentially developed area (Figure 1). The project area consists of the Farmington River, its western bank, a filled sewer line and floodplain wetlands. The western bank of the river is steep and is eroding. A sewer line exists at the top of the bank adjacent to the river.

Regulated waters and wetlands are present in and near the project area, including the Farmington River and CT Inland Wetlands. Definitions of waters and wetlands that are regulated by the State of Connecticut and Federal Government are presented in Appendix I. Rivers and streams are regulated by the State of CT as watercourses according to the Inland Wetlands and Watercourses Act. Rivers and streams are regulated by the Federal Government as "Waters of the U.S." Wetlands are defined differently by the State of CT and the Federal Government. CT Inland Wetlands are defined by soil types that are either poorly drained, very poorly drained, floodplain or alluvial. Federal Wetlands consist of areas that are inundated or saturated by ground or surface water at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

545 Highland Avenue • Route 10 • Cheshire • Connecticut • 06410 • (203) 272-7837 • Fax (203) 272-6698



SOIL SCIENCE and ENVIRONMENTAL SERVICES, INC.	U.S.G.S. Topography Map Farmington River east of Mather's Crossing, Simsbury, CT	Date 5/8/14 Figure No. 1

A spade and auger were used to dig test holes for soils identification during the investigation. The vegetation communities and any physical indicators of hydrology on the site were also examined. Limits of the CT Inland Wetlands were delineated with consecutively numbered orange survey tapes. No Federal wetlands were delineated within the project area. A sketch map of the delineated wetland boundary is included as Figure 2.

CONNECTICUT INLAND WETLANDS & SOIL TYPES

Inland Wetlands were delineated near the northeastern extent of the bank stabilization project area along the Farmington River. The wetland soils within the project area were identified as the following:

102 Pootatuck fine sandy loam (Fluvaqentic Dystrudepts) – This is a deep, moderately well drained, friable, coarse-loamy textured soil that formed in alluvial sediments principally derived from schist, gneiss and granite. Pootatuck soils occur in nearly level floodplains and along rivers and streams which are subject to frequent flooding. The Pootatuck soil was formerly mapped in Connecticut as the Podunk fine sandy loam.

103 Rippowam fine sandy loam (Aeric Fluvaquents) – This is a deep, poorly drained, friable, coarse-loamy textured soil that formed in alluvial sediments principally derived from schist, gneiss and granite. Rippowam soils occur in nearly level floodplains and along rivers and streams which are subject to frequent flooding.

The non-wetland soils were identified as the following:

229 Agawamt-Urban land complex - This complex consists of well drained Agawam soils and areas of urban land. The Agawam is a friable, coarse-loamy textured soil developed over sandy and gravelly, glacial outwash. Urban land consists of areas covered by streets, parking lots and buildings. The Agawam-Urban land complex occurs on terraces and outwash plains in densely populated areas of the state. The complex consists of about 40% Agawam soils, 40% Urban land and 20% other soils.

308 Udorthents, smoothed This is a well drained to moderately well drained soil area that has had two or more feet of the original soil surface altered by filling, excavation or grading activities. Udorthents, smoothed soils commonly occur on leveled land and fill landforms.

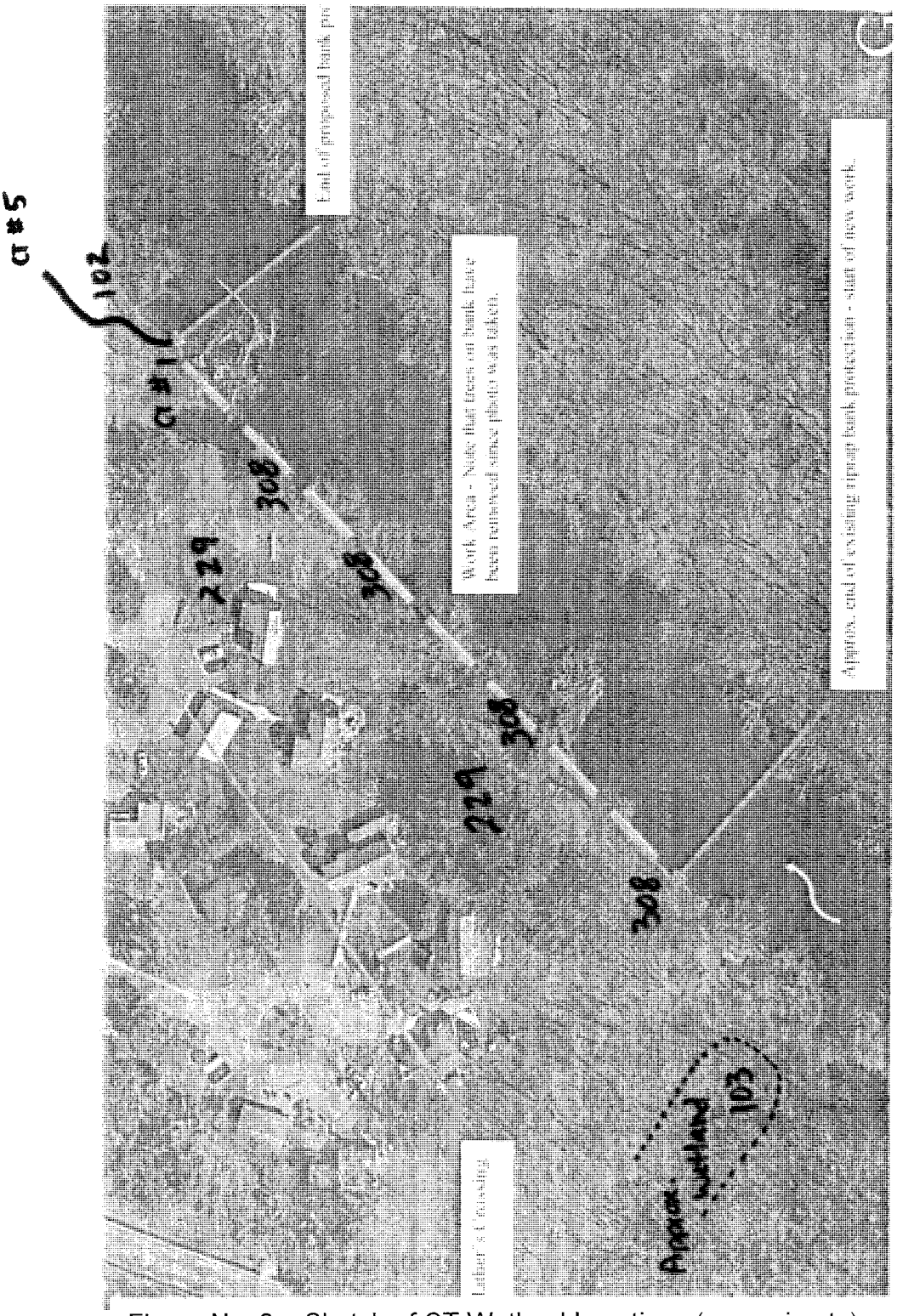


Figure No. 2 – Sketch of CT Wetland Locations (approximate)

Farmington River bank stabilization project area east of Mather's Crossing (5/8/14).

Floodplain wetland northeast of Farmington River bank stabilization project area (5/8/14).

FEDERAL WETLANDS

No Federal Wetlands were identified within the project area.

ORDINARY HIGH WATER MARK IDENTIFICATION

The lateral limits of U.S. Army Corps jurisdiction for non-tidal rivers, streams and water bodies extends to the ordinary high water mark (OHW), in the absence of adjacent wetlands. The Corps defines the term "ordinary high water mark" as the following: "means the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." 33 CFR 328.3(e). The Corps recommends that whenever possible the investigator should consider the former indicators along with a number of others, that include: wracking; vegetation matted down, bent or absent; sediment sorting; leaf litter disturbed or washed away; scour; deposition; multiple observed flow events; beds and banks; water staining; and change in plant community.

The above-listed indicators were utilized during the May 8, 2014 investigation for determination of ordinary high water of the Farmington River. On May 8, 2014 the ordinary high water mark (OHW) was delineated with flagging in three areas along the western bank of the Farmington River within the project area. Blue survey tapes were tied onto branches and plant stems to identify the OHW elevation. The knot of the tied survey tape marks the OHW elevation. A sketch showing locations of the OHW boundary survey tapes is presented in Figure 3.

Respectfully submitted,

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

Scott D. Stevens
Soil Scientist

Jennifer L. Beno
Biologist

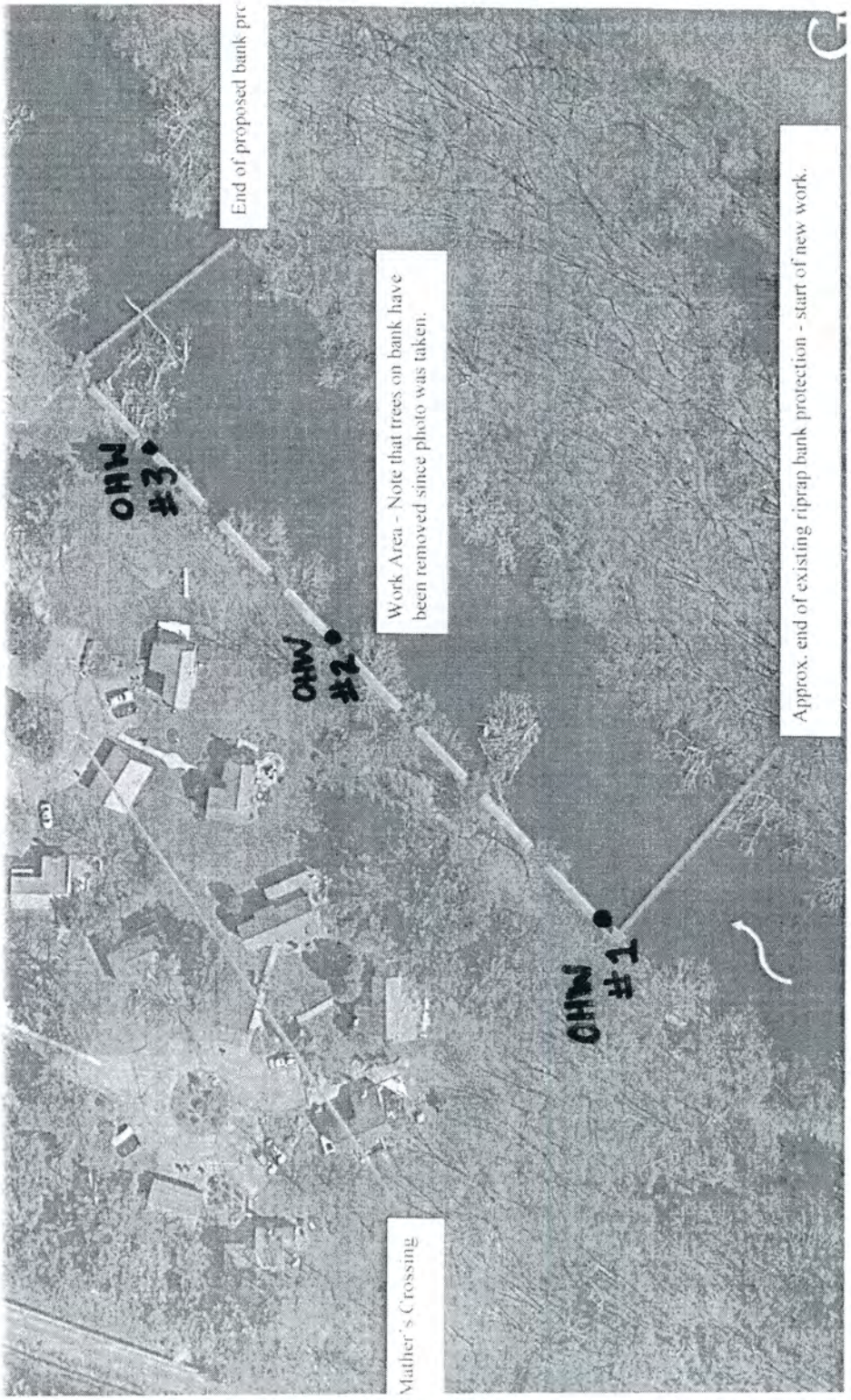


Figure No. 3 – Sketch of Ordinary High Water Flag Locations (approximate)

APPENDIX I

REGULATED WATERS AND WETLANDS BY THE STATE OF CT AND FEDERAL GOVERNMENT

I. State of Connecticut

Wetlands and watercourses are regulated in the State of Connecticut by the Connecticut General Statutes, Chapter 440, section 22a-28 to 22a-45. These Statutes are divided into the Inland Wetlands and Watercourses Act (sections 22a-36 to 22a-45) and the Tidal Wetlands Act (sections 22a-28 to 22a-35). Definitions of the resources are provided in the statutes.

Inland Wetlands, "means land, including submerged land, not regulated pursuant to sections 22a-28 to 22a-35, inclusive, which consist of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soils Survey, as may be amended from time to time, of the Natural Resources Conservation Service of the United States Department of Agriculture" section 22a-38(15).

Watercourses "means rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private which are contained within, flow through or border upon this state or any portion thereof, not regulated pursuant to sections 22a-28 to 22a-35, inclusive. Intermittent watercourses shall be delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation" section 22a-38(16).

Tidal Wetlands are defined as "those areas which border on or lie beneath tidal waters, such as, but not limited to banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters, and whose surface is at or below an elevation of one foot above local extreme high water; and upon which may grow or be capable of growing some but not necessarily all, of the following:" (includes plant list) section 22a-29(2).

II. Federal Government

The Federal Government regulates waters and wetlands in accordance with the Code of Federal Regulations, Title 33, Parts 320 through 330 (33 CFR parts 320 to 330). Regulated areas include navigable waters; interstate waters; tributaries to navigable and interstate waters, including adjacent wetlands; and certain other waters and wetlands of the U.S. The United States Army Corps of Engineers has been authorized to regulate these waters and wetlands by Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Definitions of wetlands and watercourses that are regulated by the Corps are found in Parts 328 and 329 of the Code.

Waters of the United States as defined in Part 328 means, " (1) all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (2) all interstate waters including interstate wetlands; (3) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce; (4) all impoundments of waters otherwise defined as waters of the U.S. under the definition; (5) tributaries of waters indentified in 1 thru 4; (6) territorial seas; and (7) wetlands adjacent to waters that were identified in 1 thru 6. Waters of the United States do not include prior converted cropland" (33 CFR Part 328.3 (a)).

Wetlands are a subset of waters of the United States and are defined 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" (33CFR Part 328.3(b)). The 1987 U.S. Corps of Engineers Delineation Manual and the Draft Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (dated July 2008) provide information and procedures for conducting Federal Wetland delineation. The methodology established by the Federal Government uses a three parameter approach utilizing hydrologic indicators, hydrophytic vegetation and hydric soils for identifying Federal Wetlands.

Navigable waters of the United States as defined in Part 329 mean "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33CFR Part 329.2).

ATTACHMENT C - ENDANGERED SPECIES SURVEY

Connecticut Department of

ENERGY &
ENVIRONMENTAL
PROTECTION

December 22, 2014

Michael Fanning
WMC Consulting Engineers
87 Holmes Road
Newington, CT 06111

Re: Farmington River bank stabilization in Simsbury, Connecticut
NDDB 201403057

Dear Michael:
After review of the report on a freshwater mussel survey of the Farmington River in Simsbury dated September 2014 by Biodrawversity, we concur with your mussel biologist's conclusions and recommendations, including marking and relocating the animals that are in the construction footprint to appropriate habitat as well as monitoring for mortality associated with relocation. These mitigation activities, along with the use of turbidity barriers to limit the amount of sediment released downstream, will limit outright mortality to freshwater mussels from the construction. A final report of the mussel work should be sent to me for review.

In the interest of limiting the loss of freshwater mussel habitat in this section of the Farmington River, we recommend minimizing the amount of excavation and rip rap in the river to the greatest extent possible. Based on what you provided as a visual via email on 12/12/14 (from the ConnDOT Drainage Manual 10/2000), less rip-rap and excavation will be required for this project than what is utilized in similar projects.

In addition we recommend:

- rip rap should be clean (or washed prior to installation) so that excess sediment is not released downstream that could potentially impact mussel beds outside of the project footprint
- materials used for sediment and erosion control should not contain plastic netting/mesh. Products that have plastic mesh embedded in them have been documented to entangle reptiles, amphibians and even birds. Entanglements such as this lead to mortality. Additionally, plastic products that claim to be "degradable" or "biodegradable" have varying decomposition rates and continue to present entanglement hazards for many years after degrading. A better alternative would be erosion control products composed of 100% biodegradable plant-based netting material, such as jute (vegetable fibers), sisal (stiff Agave fibers) or coir fiber (coconut husk fibers). Not only are these products truly biodegradable, but because the weave in these natural fiber nets is not fixed, as is the case in synthetic netting, it is easier for wildlife to freely move through the weave without getting entangled.
- the town of Simsbury consider removal of some of the woody debris that has accumulated in the river and has degraded the habitat for Federally-listed freshwater mussels through increased silt accumulation and stagnating conditions (see Biodrawversity report)

- any plantings planned for the upland area associated with the project consist of plant species native to the northeastern United States.

Please be advised that if state permits are required or should state involvement occur in some other fashion, specific restrictions or conditions relating to the species discussed above may apply. This State-listed species review is based on the information you provided to the Wildlife Division. This determination is valid for one year. **Please submit an updated NDDB Request for Review if the scope of the project changes or if work has not been initiated by December 22, 2015.**

If you have any additional questions, please feel free to contact me at Laura.Saucier@ct.gov, please reference the NDDB number in the subject line of this letter when you e-mail or write.

Sincerely,

Laura Saucier
Wildlife Biologist

cc. S. von Oettingen

REPORT

Freshwater Mussel Survey in the Farmington River for Proposed Bank Stabilization in Simsbury, Connecticut

prepared for

WMC Consulting Engineers
87 Holmes Road, Newington, CT 06111

prepared by

Biodrawversity LLC
433 West Street, Amherst, Massachusetts

September 2014

Part of the mussel survey area in the Farmington River, where bank stabilization is proposed.

INTRODUCTION

Biodrawversity LLC conducted a freshwater mussel survey in the Farmington River as part of the permitting for a bank stabilization project in Simsbury, Connecticut. The project is located just downstream of existing riprap, approximately 0.75 miles north of the Route 185 Bridge. The survey was intended to document the presence, distribution, and density of the state-listed and federally endangered species in areas that would be affected by riprap, to recommend a relocation plan if target species are found, and to identify a potential relocation site a safe distance away from the project area. Based on previous surveys in this area of the Farmington River, target species included Dwarf Wedgemussel (*Alasmidonta heterodon*), Eastern Pearlshell (*Margaritifera margaritifera*), and Eastern Pondmussel (*Ligumia nasuta*).

METHODS

The mussel survey was conducted on August 5, 2014, when water levels, water temperature, and water clarity were conducive for finding mussels with visual searches. The survey was conducted in all areas where the substrate might be affected by project-related construction, including a 50-meter upstream buffer and a 100-meter downstream buffer, for a total survey distance of approximately 300 meters (~950 feet) (Figure 1). Biologists also evaluated a potential relocation site 300 meters upstream from the project area. The site was selected because environmental conditions (flow, depth, and substrate) were similar to the project area, and a brief survey confirmed that mussels existed at the site. Two biologists spent one day searching for freshwater mussels at the sediment surface (visually) by snorkeling, and by excavating/sieving sediment to attempt to locate buried mussels. Biologists recorded the shell length, shell condition, microhabitat (depth, substrate), and location (using GPS) of every individual of each target species that is encountered, and took digital voucher photographs mussels and their habitat.

RESULTS

Of the three target species, only Eastern Pondmussel was found; a total of 22 live animals were found throughout the project area, with three additional animals found at the

Eastern Pondmussel (*Ligumia nasuta*) found during the survey.

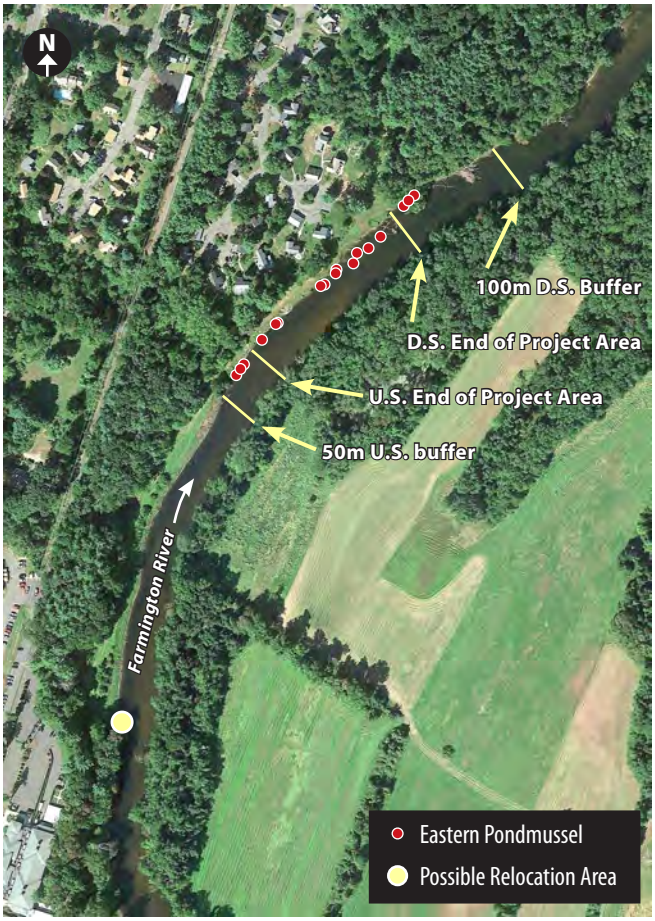


Figure 1. Farmington River, showing the upstream and downstream limits of proposed bank stabilization, the mussel survey area (from 50 m upstream to 100 m downstream), locations where Eastern Pondmussel were found, and the potential relocation site that was evaluated.

potential relocation site that was evaluated. Other mussel species found included Eastern Elliptio (*Elliptio complanata*), Eastern Lampmussel (*Lampsilis radiata*), and Triangle Floater (*Alasmidonta undulata*). The non-native Asian Clam (*Corbicula fluminea*) was also common.

Eastern Pondmussel ranged in length from 47.0 to 81.0 mm (mean = 68.1 mm), and most had light to moderate levels of shell erosion (Table 1). They were found at depths ranging from 0.5 to 4.0 feet, in all available substrate types (silt, sand, gravel, and cobble), often among woody debris and submerged aquatic vegetation.

Within the project area, prevalent habitat conditions included silt substrate, large amounts of woody debris, and patches of dense aquatic vegetation. Sand, gravel, and cobble increased away from the riverbank, and the center of the channel was mostly sand. The potential relocation site had less silt and woody debris, higher amounts of gravel, slightly stronger flows, and overall provided better mussel habitat than the project area.

CONCLUSION AND RECOMMENDATION

Although the federally endangered Dwarf Wedgemussel was found near this location in 2006, none were detected during this survey despite a much more intensive survey effort. Habitat was quite different between the two years. The extensive accumulation of woody debris observed in 2014 was not present in 2006; this debris also contributed to a significant increase in silt and stagnant conditions in the nearshore areas where Dwarf Wedgemussels were observed in 2006. Asian Clams were not observed in this section of the Farmington River in 2005 or 2006, but appear to now be well established.

Table 1. Location, shell length, and habitat data for the 22 Eastern Pondmussel found within the project area.

Species	Latitude	Longitude	Shell Length (mm)	Water Depth (ft)	Substrate
E. Pondmussel	41.85566	-72.80778	62.0	4.0	Gravel
E. Pondmussel	41.85595	-72.80747	81.0	1.5	Silt and Sand
E. Pondmussel	41.85594	-72.80749	74.0	0.5	Silt and Sand
E. Pondmussel	41.85592	-72.80753	56.0	2.0	Silt and Sand
E. Pondmussel	41.85559	-72.80791	65.0	2.0	Silt and Sand
E. Pondmussel	41.85556	-72.80799	62.0	2.0	SIlt, Dense Vegetation
E. Pondmussel	41.85547	-72.80805	78.0	2.5	Silt, Sand, Woody Debris
E. Pondmussel	41.85547	-72.80805	61.5	2.5	Silt, Sand, Woody Debris
E. Pondmussel	41.85541	-72.80822	75.0	3.0	Silt, Sand, Woody Debris
E. Pondmussel	41.85537	-72.80833	47.0	1.5	Silt, Cobble
E. Pondmussel	41.85531	-72.80833	76.0	2.5	Silt, Cobble
E. Pondmussel	41.85531	-72.80833	65.0	3.0	Silt, Woody Debris
E. Pondmussel	41.85532	-72.80838	81.0	1.5	Silt, Cobble
E. Pondmussel	41.85508	-72.80880	60.0	2.5	Silt, Sand, Gravel, Cobble
E. Pondmussel	41.85509	-72.80880	67.0	2.0	Silt and Cobble
E. Pondmussel	41.85497	-72.80889	80.0	3.0	Silt and Cobble
E. Pondmussel	41.85478	-72.80908	64.0	2.0	Silt and Cobble
E. Pondmussel	41.85470	-72.80917	76.0	1.5	Silt and Cobble
E. Pondmussel	41.85470	-72.80917	69.0	1.5	Silt and Cobble
E. Pondmussel	41.85470	-72.80917	62.0	1.5	Silt and Cobble
E. Pondmussel	41.85470	-72.80917	73.0	1.5	Silt and Cobble
E. Pondmussel	41.85473	-72.80914	65.0	2.0	Silt and Cobble

The Eastern Pondmussel is listed as Special Concern in Connecticut. The Connecticut Department of Energy and Environmental Protection (DEEP) requires relocation and monitoring for construction projects where this species has been documented. The following is standard procedure for this type of project:

- Within two weeks prior to construction, biologists will survey, collect, and relocate Eastern Pondmussels and other state-listed species (which may also include Dwarf Wedgemussel).
- The survey area should extend from 50 meters upstream from the upstream-most disturbance to 100 meters downstream from the downstream-most disturbance.
- Grids will be established with weighted lines to facilitate a systematic snorkel search of the entire area.
- Biologists will search for mussels at the surface of the sediment by snorkeling. In areas where target species are encountered and interstitial habitat seems promising, especially in areas within or near the direct footprint of construction, biologists will excavate and sieve sediment within 0.25m^2 quadrats, using a 6-mm screen to attempt to detect subsurface adults or juveniles.
- All target species encountered will be gathered and held underwater in a mesh bag. Each will be measured, photographed, and tagged using a numeric 3x5mm pennant tag affixed with super glue.
- After mussels have been tagged, they will be transported to the relocation site and placed into the substrate. The precise location of each animal will be recorded using GPS and permanent markers will be established on the stream bottom and bank to facilitate finding these animals at a later date.
- Relocated mussels will be checked one month and one year following relocation to monitor mortality, movement, or growth.
- Interim and final reports will be submitted as required by the Connecticut DEEP, and contractors will comply with other permit conditions.

ATTACHMENT D - BANK PROTECTION COMPUTATION

Hydraulic Analysis Report

Project Data

Project Title: Farmington River Bank Stabilization
Designer: MEF
Project Date: Wednesday, September 09, 2015
Project Units: U.S. Customary Units
Notes: Bank protection for interceptor

Channel Analysis: Farmington River

Notes: Get values for riprap design

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 1.0000 ft/ft
Side Slope 2 (Z2): 1.5000 ft/ft
Channel Width: 150.0000 ft
Longitudinal Slope: 0.0025 ft/ft
Manning's n: 0.0350
Depth: 17.0600 ft

Result Parameters

Flow: 36496.5162 CFS
Area of Flow: 2922.8045 ft^2
Wetted Perimeter: 204.8818 ft
Hydraulic Radius: 14.2658 ft
Average Velocity: 12.4868 ft/s
Top Width: 192.6500 ft
Froude Number: 0.5649
Critical Depth: 11.8430 ft
Critical Velocity: 18.6993 ft/s
Critical Slope: 0.0086 ft/ft
Critical Top Width: 179.61 ft
Calculated Max Shear Stress: 2.6614 lb/ft^2
Calculated Avg Shear Stress: 2.2255 lb/ft^2

Project Name:	Farmington River Bank Stabilization, Simsbury
WMC Project Number:	14029
Bridge No.:	N/A
ConnDOT Project No.:	N/A
Calculation Date:	September 25, 2015
By:	MEF

Riprap Revetment Design

HEC-23 "*Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance*"
3rd Edition, September 2009

Design Guideline 4 - Riprap Revetment
After ACOE EM 1110-2-1601

$$d_{30} = y\left(S_f C_S C_V C_T\right)\left[\frac{V_{des}}{\sqrt{K_1\left(S_g - 1\right)gy}}\right]^{2.5} \qquad \text{Eq. 4.1}$$

d_{30} = Particle size for which 30% is finer by weight, ft
y = Local depth of flow, ft
S_f = Safety Factor (must be > 1.0)
C_S = Stability coefficient (for blanket thickness = d_{100} or $1.5d_{50}$, whichever is greater, and uniformity ratio d_{85}/d_{15} = 1.7 to 5.2)
C_V = Velocity distribution coefficient
= 1.0 for straight channels or the inside of bends
= $1.283 - 0.2\log(R_c/W)$ for the outside of bends (1.0 for $R_c/W > 26$)
= 1.25 downstream from concrete channels
= 1.25 at the end of dikes
C_T = Blanket thickness coefficient given as a function of the uniformity ratio d_{85}/d_{15}
C_T = 1.0 is recommended because it is based on very limited data
V_{des} = Characteristic velocity for design, defined as the depth-averaged velocity at a point 20% upslope from the toe of the revetment, ft/s
For natural channels, $V_{des} = V_{avg}(1.74-0.52\log(R_c/W))$
$V_{des} = V_{avg}$ for $R_c/W > 8$
For trapezoidal channels, $V_{des} = V_{avg}(1.71-0.78\log(R_c/W))$
$V_{des} = V_{avg}$ for $R_c/W > 8$
V_{avg} = Channel cross-sectional average velocity, ft/s
K_1 = Side slope correction factor

$$K_1 = \sqrt{1 - \left(\frac{\sin(\theta - 14°)}{\sin(32°)}\right)^{1.6}}$$

where: θ is the bank angle in degrees

R_c = Centerline radius of curvature of channel bend, ft
W = Width of water surface at upstream end of channel bend, ft
S_g = Specific gravity of riprap (2.65 unless otherwise noted)
g = Acceleration due to gravity, 32.2 ft/s^2
$d_{50} = 1.20d_{30}$

WMC Consulting Engineers, Inc.
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Newington, CT 06111
(860) 667-9624

Location : West bank of Farmington River

Variable	Bank Full Flood	50-Yr Flood	100-Yr Flood	500-Yr Flood	Notes
y =	17.06	0.00	0.00	0.00	From FIS Profile
V_{avg} =	12.49	0.00	0.00	0.00	From Computation
W =	192.65	0.00	0.00	0.00	From aerial
R_{C} =	0	0	0	0	Centerline radius
R_C/W =	99999	N/A	N/A	N/A	If Rc is 0 = 99999
S_f =	1.1	1.1	1.1	1.1	Safety Factor
C_s =	0.300	N/A	N/A	N/A	Stability coefficient 0.30 for angular rock (default) 0.375 for rounded rock
Location	Straight	---	---	---	See C_v for options (below)
C_v =	1.00	N/A	N/A	N/A	1.0 for straight channels or inside of bends 1.283-0.2log(R_c/W) for outside of bends 1.0 for Rc/W > 26 1.25 downstream of concrete channels 1.25 at the end of dikes
C_T =	1.00	N/A	N/A	N/A	HEC-23 recommended value
Channel Type	Natural	---	---	---	Natural or Trapezoidal
V_{des} =	12.49	FALSE	FALSE	FALSE	Natural channels: $V_{des} = V_{avg}$ (1.74 - 0.52(log(R_C/W)) $V_{des} = V_{avg}$ for R_C/W > 26 Trapezoidal channels: $V_{des} = V_{avg}$ (1.71 - 0.78(log(R_C/W)) $V_{des} = V_{avg}$ for R_C/W > 8
θ =	33.69	N/A	N/A	N/A	1.5 H:1V slope (Average)
K_1 =	0.72	N/A	N/A	N/A	
S_g =	2.65	N/A	N/A	N/A	Default Value = 2.65
D_{30} =	0.94	N/A	N/A	N/A	Feet
D_{50} =	1.13	N/A	N/A	N/A	Feet
ConnDOT Riprap Size	Standard	N/A	N/A	N/A	
FHWA Riprap Class	III	N/A	N/A	N/A	

Use **Standard** **Riprap**

Riprap Type	D_{50}	Φ	Riprap Layer Thickness	Granular Filter Base Thickness
Modified	5"	40.9°	12"	6"
Intermediate	8"	41°	18"	6"
Standard	15"	41.2°	36"	12"

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