



9/19/2014

To: Lori Sommer
NH DES Wetlands Bureau
PO Box 95
Concord, NH 03302

CC: Steven Rickerich, Ransom Consulting, Inc.
Michael Mates, Pease Development Authority
David Keddell, US Army Corps of Engineers

From: Adele Fiorillo, NHCWS, PWS

Re: NH DES File #2012-001052 & 2012-1060
First Year Monitoring Report

Introduction

This report outlines the first year monitoring results following completion of the mitigation design at the Pease Golf Course, located in the Towns of Newington and Greenland and the City of Portsmouth, New Hampshire. This report is in accordance with the conditions of the New Hampshire Department of Environmental Services (DES) permits dated December 6, 2012 and was prepared on behalf of the Pease Development Authority (PDA). Mitigation activities were completed on September 26, 2013, and included stream channel and bank restoration, pond expansion, and wetland creation. Monitoring initiated on August 27, 2014 and was completed on September 16, 2014 following completion of the remedial actions to repair a portion of the stream bank as outlined in a letter from Normandeau Associates dated August 12, 2014.

Monitoring Results

The stream restoration and wetland creation areas are well established with native wetland vegetation. Common arrowhead (*Sagittaria latifolia*) and Canada rush (*Juncus canadensis*) were both observed in the created wetland. Planted shrubs along the stream corridor and within the wetland creation area were located and checked for health and survivability. Of the 993 planted shrubs, 39 were either dead or could not be located. Upon inspection of the shrubs, over 100 plants (10%) exhibited 50-70% dieback. Additionally, many root bulbs were exposed 2-3 inches above the ground. Mowing and

exposed roots are the likely contributions to observed poor health and mortality. Despite these observations survivorship was relatively high. Percent survivability by species is outlined in Table 1 and averaged 96%. The greatest mortality was observed in plantings of silky dogwood (*Cornus amomum*).

Table 1: Plant Survivorship- (Planted September 2013)

Common Name	Scientific Name	Number Planted	Number Dead	Survivorship
Sweetfern	<i>Comptonia peregrina</i>	266	10	96%
Sand Cherry	<i>Prunus depressa</i>	166	6	93%
Meadowsweet	<i>Spirea latifolia</i>	166	2	99%
Sweet pepperbush	<i>Clethra alnifolia</i>	65	1	98%
Silky dogwood	<i>Cornus amomum</i>	65	9	83%
Red Chokeberry	<i>Aronia arbutifolia</i>	65	6	90%
Steeplebush	<i>Spirea tomentosa</i>	100	5	95%
Sweetgale	<i>Myrica gale</i>	100	0	100%
Total Shrubs		993	=39	=96%

Several sites of erosion were also noted during the monitoring inspection. One area of erosion within the stream channel was previously observed during a site review on July 11, 2014. In a letter dated on August 12, 2014, Normandeau recommended that the eroded area be remediated using an erosion control blanket and installation of a level spreader within the drainage area. These recommendations were completed by the PDA during the week of September 8th, 2014. Erosion was also noted in two locations along the perimeter of pond 1. These areas were smoothed and reseeded by the PDA during the week of September 8, 2014.

Invasive Species

Per the conditions outlined in the permit, invasive species were also monitored. A few purple loosestrife (*Lythrum salicaria*) plants were observed in the stream bank restoration area and in the wetland creation area.

Remedial Actions

Normandeau makes the following recommendations for remedial actions. These remedial actions should be completed as soon as possible.

- 1.) Hand pull the few Purple Loosetrife plants within the mitigation areas while the population is small and manageable.
- 2.) The newly installed level spreader has created an increase in hydrology causing ponding behind the rip rap. Steeplebush (*Spirea tomentosa*) will likely not survive in ponded conditions. Relocate these shrubs out of the ponded area to low flat areas adjacent to side slopes in the same area.
- 3.) Check all shrubs for root bulb exposure and re-plant all shrubs with root bulbs exposed. Ensure that roots are ½" below the ground and heeled in to reduce the likelihood of heaving of roots this winter. Add loam if needed.
- 4.) Replace dead shrubs (see Table 1 below from original list). Nursery availability for replacements may be limited and replacing what was lost by species may not be feasible. Once nursery availability is determined the species list will need to be approved by the DES prior to planting. Shrub species in Table 1 with an * should be planted in play-over areas (short growth habit).
- 5.) In the upland mound, near hole 4, replace dead shrubs with 2'-4' high stock of American hazelnut (*Corylus Americana*).
- 6.) Move any live shrubs from the upland mound to another location for use as supplemental plantings along the stream. These are tall growing shrubs so should not be planted in play over areas.
- 7.) Mulch with weed free straw around the base of all heeled in and replanted/planted shrubs.
- 8.) Move out of bounds stakes 3 feet upslope from all mitigation areas to prevent future mowing.

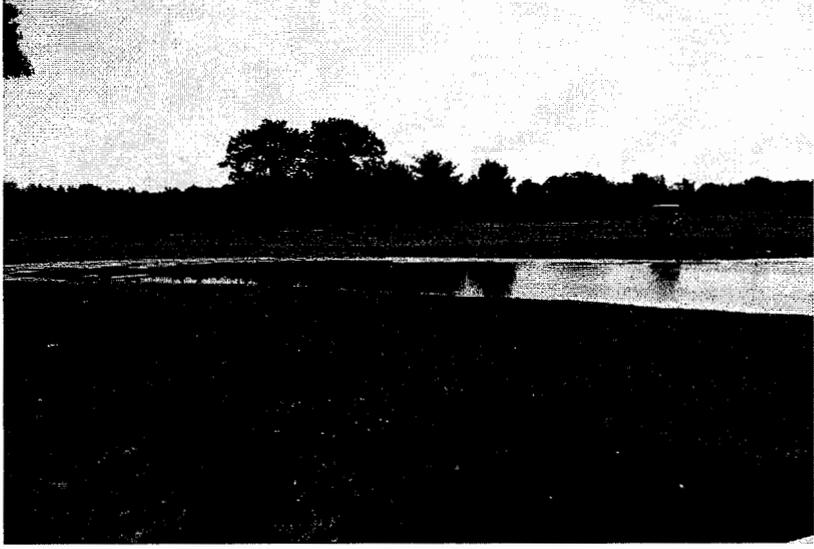
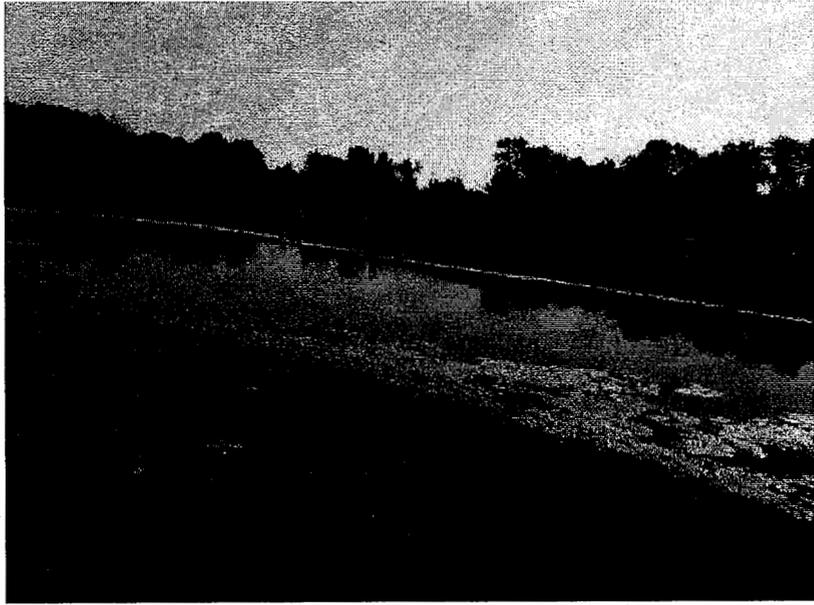
Schedule

At this time Pease Golf Course is expected to proceed with the remedial actions immediately.

Monitoring Photo log

	<p>Date: 8-30-14</p>
	<p>Photographer: Tracy Coolidge</p>
	<p>Comments: Stream bank restoration with planted shrubs along the bank to the left and right</p>
	<p>Date: 8-30-14</p>
	<p>Photographer:</p>
	<p>Comments: Arrowhead (<i>Sagittaria latifolia</i>) and other wetland plant species within the stream buffer area.</p>

	<p>Date: 8-30-14</p> <p>Photographer: Tracy Coolidge</p> <p>Comments: Healthy Meadowsweet (<i>Spirea latifolia</i>) along stream bank.</p>
	<p>Date: 8-30-14</p> <p>Photographer: Tracy Coolidge</p> <p>Comments: Wetland creation area well vegetated with herbs and planted shrubs.</p>

	Date: 8-30-14
	Photographer: Tracy Coolidge
	Comments: Pond 1.
	Date: 8-30-14
	Photographer: Tracy Coolidge
	Comments: Pond 2.

	<p>Date: 8-30-14</p>
	<p>Photographer: Tracy Coolidge</p>
	<p>Comments: Pond 3.</p>
	<p>Date: 8-30-14</p>
	<p>Photographer: Tracy Coolidge</p>
	<p>Comments: Heaved root bulb of Sand Cherry (<i>Prunus depressa</i>).</p>

	Date: 8-30-14
	Photographer: Tracy Coolidge
	Comments: Mowed sweet fern (<i>Comptonia peregrina</i>).
	Date: 8-30-14
	Photographer: Tracy Coolidge
	Comments: Wetland Creation area well vegetated with herbs and shrubs.

	<p>Date: 9-16-2014</p> <p>Photographer: Adele Fiorillo</p> <p>Comments: level spreader adjacent to stream (post remediation).</p>
	<p>Date: 8-30-14</p> <p>Photographer: Tracy Coolidge</p> <p>Comments: Erosion on Pond 1.</p>

Pond 1	Date: 9-16-2014
	Photographer: Adele Fiorillo
	Comments: Erosion smoothed and seeded at Pond 1 showing new germination.
	Date: 9-16-2014
	Photographer: Adele Fiorillo
Comments: Level spreader and bank restoration (post remediation).	



August 12, 2014

VIA EMAIL

Mr. Michael Mates, PE
Pease Development Authority
55 International Drive
Portsmouth, NH 03801

Re: Pease Golf Course
Remedial Measures for Bank Stabilization

Dear Mike:

This letter is being written as a follow up to our site review on 8/11/14. After winter snow melt and spring rain events there is a section of stream bank that has slumped and eroded along a portion of the restored stream that flows across the golf course between holes 13, 15, 8 and 4 (see attached photos). The area of focus is part of the planted shrub buffer to the stream and is associated with the main drainage pipe outlet.

The slumping and erosion into the stream caused upstream flows to be blocked. This has been remedied through the removal of material from the stream. However, erosion of this area will continue if not properly stabilized. Additionally, vegetation has been compromised from erosion and also through cutting and mowing by course maintenance crews. The purpose of this letter is to establish remedial measures for the erosion that is occurring in this area. The mowing of vegetation, including the planted shrubs within the stream buffer will be addressed in a separate report following a complete assessment of the mitigation status.

As discussed during the site review the course of action recommended to address erosion and to stabilize the stream bank it is to re-establish the stream bank, cover it with an erosion control blanket and install a level spreader along its length within the drainage area floodway. The specifications for the level spreader will be developed by the Pease Development Authority Engineering Department. The erosion control blanket shall be Curlex Net Free or AEC Premier Straw or equivalent 100% biodegradable erosion control matting installed in accordance with manufacturers specifications. This is the same matting used in other portions of the stream bank restoration area and it has worked very well. Above the level spreader loam should be hand spread on exposed soils and then reseeded and mulched with weed free straw. Attached is a plan showing the locations for treatments as described, including a recommended seed mix.

30 International Drive, Suite 6, Pease International Tradeport, Portsmouth, NH 03801
Tel. (603) 319-5300 www.normandeau.com

Normandeau Associates, Inc. • Corporate: 25 Nashua Rd., Bedford, NH 03110 • 603.472.5191



Please let me know if this is sufficient for you needs at this time. I realize fixing this area is apriority for the Golf Course and I appreciate your attention to the matter by having the repair completed as quickly as possible.

Sincerely,

A handwritten signature in cursive script that reads "Adele Fiorillo".

Adele Fiorillo, NH CWS, PWS
Principal Wetland Scientist

Attachments

Cc via email: Ms. Lori Sommer, NH DES Wetlands Bureau
Mr. Steve Rickerich, Ransom Environmental

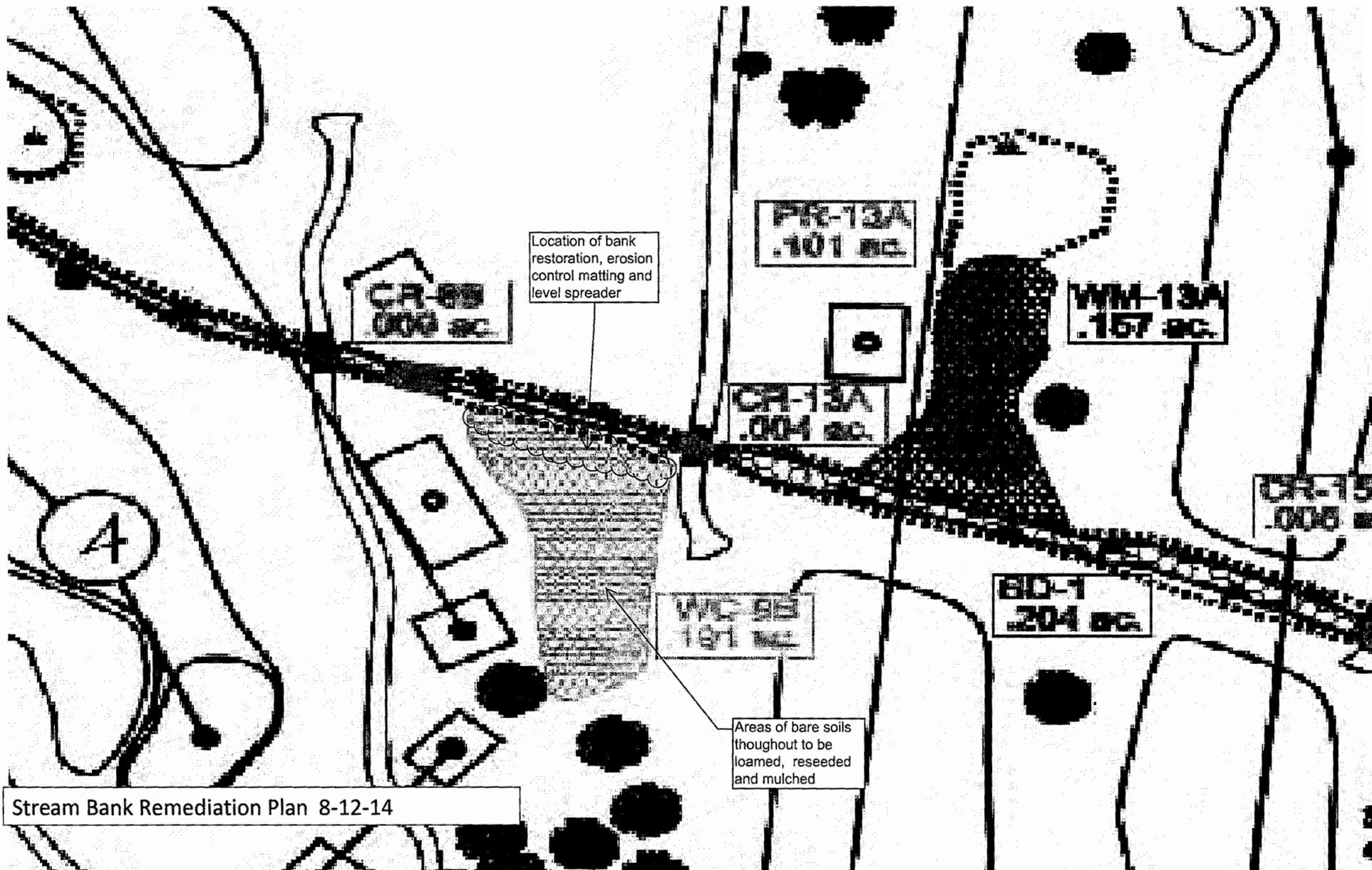


0-0-14.

Photo 1. Eroded stream bank 0-0-14.



Photo 2. Eroded stream bank S.S.14



Stream Bank Remediation Plan 8-12-14



NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002
PHONE: 413.548.8000 FAX: 413.549.4000
EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Erosion Control/Restoration Mix for Detention Basins and Moist

BOTANICAL NAME	COMMON NAME	IND.
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	FACW-
FESTUCA RUBRA	CREEPING RED FESCUE	FACU
SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	FACU
CAREX VULPINOIDEA	FOX SEDGE	OBL
ANDROPOGON GERARDII	BIG BLUESTEM	FAC
PANICUM VIRGATUM	SWITCH GRASS	FAC
AGROSTIS SCABRA	ROUGH BENTGRASS/TICKLEGRASS	FAC
ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	FACW-
EUPATORIUM PERFOLIATUM	BONESET	FACW
EUTHAMIA GRAMINIFOLIA	GRASS LEAVED GOLDENROD	FAC
VERBENA HASTATA	BLUE VERVAIN	FACW
SCIRPUS ATROVIRENS	GREEN BULRUSH	OBL
JUNCUS EFFUSUS	SOFT RUSH	FACW+
SCIRPUS CYPERINUS	WOOL GRASS	FACW

PRICE PER LB. \$26.00

MIN. QUANTITY: 3 LBS.

TOTAL \$78.00

APPLY: 35 LBS/ACRE

MINIMUM QUANTITY: 3 LBS

The New England Erosion Control/Restoration Mix For Detention Basins and Moist Sites contains a selection of native grasses and wildflowers designed to colonize recently disturbed sites where quick growth of vegetation is desired to stabilize the soil surface. It is an excellent seed mix for ecologically appropriate restorations on moist sites that require stabilization as well as long-term establishment of native vegetation. This mix is particularly appropriate for detention basins that do not normally hold standing water. Some plants in this mix can tolerate infrequent inundation, but not

constant flooding. Always apply on clean bare soil. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper seed to soil contact. Best results are obtained with a Spring or late Summer seeding. Early-Mid Summer seeding will benefit with a light mulching of clean weed-free straw to conserve moisture. If conditions are drier than usual, watering will be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not recommended. Preparation of a clean weed free seed bed is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged.

Price is \$/bulk pound. FOB warehouse, plus S&H and applicable taxes.