



South Creek Stormwater Outfall Restoration Project
Air Force Road, Everett, Massachusetts

WETLAND RESTORATION PLAN

City of Everett
484 Broadway
Everett, MA 02149

October 2020

Tighe&Bond

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Section 1

Introduction

This *Wetland Restoration Plan* design has been developed by Tighe & Bond on behalf of the City of Everett (City) for the proposed South Creek Stormwater Outfall Restoration Project. The City is seeking to rehabilitate the drainage outfall at South Creek to reinstate and improve stormwater conveyance in the Elton/Tremont Streets and Waters Avenue watershed, help to alleviate chronic flooding concerns in this area of the City, and restore Waters of the United States (WoUS) through mechanical removal of invasive plants and debris and installation of native vegetation. All WoUS within the project area limits will be targeted for restoration and/or enhancement, as described in the following sections of this report.

Section 2

Evaluation of Existing Conditions

2.1 General

The project is located on Air Force Road at 42.408727° N, -71.067253° W in Everett, Massachusetts. South Creek is located on the southern boundary of the Rivergreen site, a former 40-acre General Electric (GE) brownfield site undergoing redevelopment for mixed-use off of Air Force Road in Everett, east of the Elton Street/Tremont Street and Waters Avenue area. South Creek is an unnamed intermittent drainage channel not mapped on the 2015 USGS topographic map. South Creek is abutted by the Rivergreen site to the north, commercial development along Norman Street to the south, Air Force Road to the east, and the Malden River to the west. The existing 30-inch diameter culvert in this area has been neglected and filled in with sediment over time and is now completely buried. Relocation of the outfall has been attempted but was unsuccessful.

The eastern area of South Creek consists of a poorly-maintained detention basin vegetated with *Phragmites* and other invasive species and contains no discernable channel. Approximately 200 feet west of the outfall location a discernable channel becomes visible and connects to an existing double-barrel 60-inch diameter culvert. The double-barrel culvert is located approximately 500 feet west of the basin and serves as the downgradient project arealimit. In many areas, the drainage channel has filled in with sediment, debris, and biological buildup, and has become overgrown with *Phragmites* and other invasive species.

2.2 Waters of the United States

Waters of the United States (WoUS) were delineated by Tighe & Bond on December 7, 2017; February 1, 2018; and February 5, 2018. Boundaries of WoUS within the South Creek project limits were identified using sequentially-numbered day-glow pink flagging tape. Each flag was located by survey and incorporated into the existing conditions base maps. WoUS were named based on the wetland system number and alphabetical letter in the order in which they were observed (i.e., "1A-1" refers to the first resource area delineated within wetland system 1).

Vegetated wetland boundaries were determined by first observing distinct changes in vegetation cover and type, as well as soil conditions, hydrology, and microtopography. Resource areas were delineated in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (Version 2.0, USACE, January 2012).

Areas of vegetated wetlands were identified at the eastern end of the South Creek project area and at the confluence of South Creek with the Malden River and can be characterized as primarily Palustrine Emergent (PEM) wetland to the east (Wetland 1B) and Palustrine Forested (PFO) and PEM wetland to the west (Wetland 2B). The wetland to the east consisted of a monoculture of *Phragmites*. The wetland along the western terminus of South Creek closest to the project area is dominated by glossy buckthorn and green ash, and then transitions into a stand of *Phragmites* along the Malden River.

An intermittent channel with visible field indicators of OHW flows east to west, from flag 2B-1 downgradient to the double barrel culvert near flag 2A-14. The land below OHW is occupied by a significant amount of trash, debris, and discarded furniture. Table 2-1 below summarizes these WoUS by flag series that are targeted for restoration and/or enhancement.

Table 2-1
Summary of WoUS by Flag Series at South Creek

Location	Flag Numbers	Resource Area Type
Vegetated wetland in eastern portion of South Creek	1B-1 through 1B-24 1B-100 through 1B-117	WoUS – Vegetated Wetland
Intermittent channel	1B-1 through 1B-5; 2A-1 through 2A-15	OHW – Intermittent Watercourse
Vegetated wetland near center of South Creek	2B-1 through 5 2B-101 through 2B-109	WoUS – Vegetated Wetland
Vegetated wetland in western portion of South Creek	2B-6 through 2B-9	WoUS – Vegetated Wetland

2.3 Hydrology

Hydrology in the vegetated wetland areas targeted for restoration is presented in Table 2-1 and is generally based on the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI), MassDEP wetland layers available through MassGIS, the Cowardin system, and wetland delineation data collected by Tighe & Bond.

TABLE 2-2
Summary of Existing Wetland Restoration Area Hydrology

Impact Area (IA) ID	Habitat/Cover Type ¹	Source(s) of Hydrology
Wetland 1B	PEM1E	periodic inundation; seasonal high groundwater table
Wetland 2A/OHW	R4SB3 & R4SB5	periodic inundation
Wetland 2B	PSS6 & PFO6	periodic inundation; seasonal high groundwater table

2.4 Hydric Soil Structure

According to the USDA NRCS [online] Soil Survey of Middlesex County (MA017), Massachusetts, the project areas containing WoUS are mapped as Urban Land, Wet Substratum (603) and Udorthents, Wet Substratum (655). Brief descriptions of these soil units follow.

Urban Land, Wet Substratum (603) consists of areas where 85 percent of the land surface is covered by structures or impervious surfaces such as buildings, pavement, industrial sites, and railroad yards, and where the underlying soil is dominated by fill material overlying wet soils. The underlying wet soils may include Freetown, Saco, Scarborough, and Swansea. The most extensive areas of this map unit are found along the Charles and Mystic Rivers in the cities of Cambridge, Somerville, and Everett. Smaller areas are mapped throughout the county. The areas are irregular in shape range from 6 to 2,100 acres in size. Because this map unit is covered by structures or impervious surfaces, almost all rainfall becomes runoff. A water table may be present in the lower substratum. Included with this unit in mapping are areas of Udorthents, loamy soils and Udorthents, wet substratum soils where the soil is exposed. These inclusions often reflect the nature of the soil underlying the impervious surfaces. Rock outcrops are present in some units. Minor soils and included areas comprise about 15 percent of the unit.

Udorthents, Wet Substratum (655) This map unit consists of nearly level to hilly areas of poorly drained and very poorly drained soils that have been filled in with various types of soil material, rubble and refuse. Depth of the fill material ranges from two to 20 feet or more. Areas of this unit are irregular in shape and range in size from six to 150 acres. The areas were typically flood plains, meadows, and swamps that were filled for various urban land use purposes. This unit is most extensively mapped in the urbanized areas of the eastern part of the county and adjacent to the Charles and Mystic Rivers. Scattered small areas of this unit are mapped throughout the survey area. Included with this soil in mapping are areas generally smaller than six acres each of Urban land, Swansea, and Freetown soils. Minor soils comprise about 15 percent of this unit. Runoff varies and water tends to pond on the surface in some areas after heavy rainfall.

2.5 Functions and Values

Given the degraded nature of WoUS within the project area as a result of invasive plant colonization, erosion, sedimentation, and illegal dumping, the functions and values provided at this area are quite limited. Based the Corps' *"The Highway Methodology Workbook Supplement: Wetlands Functions and Values,"* the WoUS within the project area likely provide a number of functions and values, including:

- Groundwater Recharge/Discharge
- Floodflow Alteration
- Sediment/Toxicant Retention
- Nutrient Removal/Retention/Transformation
- Wildlife Habitat

Section 3

Restoration Area Design

A primary purpose of the South Creek project, aside from the outfall reinstatement, is the ecological restoration of wetland areas currently impacted by invasive species and sediment/debris fill. Wetland restoration will be completed concurrent with the proposed outfall restoration work. While areas of vegetated wetland will need to be impacted to implement the outfall reconstruction, this provides a unique opportunity to restore and/or otherwise enhance this wetland system to provide increased functions and values through added habitat complexity.

Restoration efforts are comprised of three main elements:

- the removal of debris, trash, and accumulated sediment;
- the mechanical removal of large areas of invasive plant species; and
- planting with native species to restore and enhance habitat.

3.1 Restoration Details

Restoration will involve mechanical removal of large areas of *Phragmites*, sediment, and trash/debris within areas of vegetated wetland and in areas below OHW. These areas will be restored with native plantings and bioengineering practices to create a diverse wetland complex with a native vegetative community structure that is designed to provide improved habitat functions and values. The degraded basin area occupied by a monoculture of *Phragmites* will be excavated, reshaped, and restored to a vegetated wetland/floodplain community along the recreated South Creek channel.

Following grading of the channel and wetland, bank stabilization along the restored South Creek channel will be achieved through the placement of coir fiber logs along the toe of slope. Poor soils on the site, prone to slumping and erosion, have contributed to the present degraded conditions. This bioengineering technique is intended to anchor, or key, the embankment to prevent a recurrence of this condition. The coir logs will be live-staked with willow stakes and then top-dressed with loam. The loam will be covered with coir blankets and then overseeded and planted as shown on the restoration planting plans.

Following grading, coir log installation, and *Phragmites* removal, all other disturbed areas will be spread with loam, covered with straw mulch or coir blankets, and then planted and seeded. Typical species that will be used for the restoration plantings are listed below in Section 3.6. All erosion controls will remain in place until soils are sufficiently stabilized and their removal is authorized by regulatory agencies.

3.2 Waters of the U.S. Restoration Impact Calculations

There will be a total impact area of 45,520 sf within vegetated wetlands for this project entirely as a result of grading/excavation. Of this total impact area, a portion of the vegetated wetlands will be converted to land below OHW (7,200 sf) due to the channel creation, a portion will be restored in-situ to vegetated wetlands (15,730 sf), and a portion is not expected to remain as wetland and will likely function as a riparian upland (22,590 sf). A net loss of 29,790 sf of vegetated wetland is anticipated as a result of this project due to the channel creation, associated grading, and potential hydrologic

effects based upon the current understanding of groundwater elevations and other influencing factors. It is anticipated that the net loss in vegetated wetlands will be offset by the net gain in land below OHW for added habitat complexity. In addition, this net loss will also be mitigated by the removal of invasive plant species and the installation of woody and herbaceous native plantings. Table 3-1 presents an overview of net gains and losses in WoUS at the site.

TABLE 3-1

Waters of the U.S. Impacts, Creation, and Net Loss/Gain

WoUS Type	Existing Areas to be Impacted		Newly Created WoUS	Proposed Area Post-Construction	Net Loss (-)/Gain (+)
	Temporary	Permanent			
Vegetated Wetland	13,140 sf ¹	32,380 sf	2,590 sf	15,730 sf ²	- 29,790 sf ³
Intermittent Watercourse (Land Below OHW)	580 sf	335 sf	10,790 sf	11,370 sf	+ 10,790 sf
Bank	--	840 lf	1,780 lf	1,780lf	+ 940 lf

¹This area is counted as a short-term permanent impact in Table 3-1 as part of the 45,520 sf of wetland grading. However, given that it will continue to function as wetland, it is not counted as a permanent loss in this table and is instead counted as a temporary impact for the purposes of tabulating permanent net loss/gain in resource areas.

²This value includes the 13,140 sf of existing wetland impacted that will continue to function as wetland, plus an additional 2,590 sf of new wetlands anticipated to establish near Station 13+00 as a result of the channel realignment.

³Of the 32,380 sf, approximately 7,200 sf will be converted to stream habitat. While this is still considered a loss in vegetated wetland, there will be a gain in another resource area.

3.3 Restoration Area Hydrology

The hydrology of the proposed restoration area has been designed to mimic that of the existing wetland resource area to the extent practicable. The hydrology is driven primarily by inputs from precipitation events, followed by snowmelt and seasonal high groundwater. The restoration area will be graded to a lower elevation than that of the existing wetland to create a smooth transition into the restored channel to provide floodplain access, allowing the restoration area to maintain a connection to the channel. The graded area will be top-dressed with a high organic content soil for plantings.

3.4 Hydric Soil Structure

The restoration area will be graded and finished as shown on the plan. The existing soils within the footprint of the restoration area consist of urban fill and associated debris. Due to the absence of organic matter, the soils will be over-excavated by a depth of approximately one (1) foot and amended with highly organic compost mixed with native silty sands. The final elevations will vary, as shown on the project plans.

3.5 Restoration Area Community Type

The restoration area is proposed to be revegetated as a Palustrine Scrub Shrub (PSS) wetland with pockets of Palustrine Emergent Marsh (PEM) wetland. As there is no existing wetland vegetation of value, stockpiling and transplanting is not proposed. The restoration area will be seeded with native seed mixes mulched with straw. Lists of

species found in the seed mixes are provided Appendix B. Live plantings of herbaceous material are also proposed in this area to augment the vegetation and expedite grow-in while the seed mix establishes. A list of live planting species proposed is provided in the herbaceous species section in Table 3-1 below.

3.6 Proposed Wetland Plant Community

The proposed plantings for the restoration areas consist of a mix of woody and herbaceous plant species. Live plantings are summarized in Table 3-2.

TABLE 3-2

List of Proposed Native Restoration Plantings by Community Type

	Common Name	Scientific Name	Indicator Status¹
Emergent Wetland	Woolgrass	<i>Scirpus cyperinus</i>	OBL
	Sensitive fern	<i>Onoclea sensibilis</i>	FACW
	Joe-pye weed	<i>Eutrochium maculatum</i>	OBL
	Blue vervain	<i>Verbena hastata</i>	FACW
	Swamp Milkweed	<i>Asclepias incarnata</i>	OBL
Higher Wetland Elevations to Wetland Boundary	Silky Dogwood	<i>Cornus amomum</i>	FACW
	Northern arrowwood	<i>Viburnum dentatum</i>	FAC
	Speckled alder	<i>Alnus incana</i>	FACW
Wetland Boundary/ Buffer Zone	Red Maple	<i>Acer rubrum</i>	FAC
	Yellow birch	<i>Betula alleghaniensis</i>	FAC
	Sweet pepperbush	<i>Clethra alnifolia</i>	FAC
	Silky Dogwood	<i>Cornus amomum</i>	FACW
	Speckled alder	<i>Alnus incana</i>	FACW

¹Lichvar, R.W. 2013. *The National Wetland Plant List: 2013 wetland ratings*. Phytoneuron 2013-49: 1-241. Northcentral and Northeast subregion.

In addition, a variety of native seed mixes, available from New England Wetland Plants (www.newp.com) are proposed for general soil stabilization and will be used to overseed all disturbed areas. Seed mixes that have been incorporated into the planting plans include New England Wetmix, New England Conservation/Wildlife Mix, New England Erosion Control/Restoration Mix for Moist Sites, and New England Erosion Control/Restoration Mix for Dry Sites. Specifications for these seed mixes are included in Appendix B and their locations are shown on the restoration planting plans.

3.7 Functions and Values

Successful restoration of the altered areas is anticipated to provide enhanced and additional functions and values, including:

- Groundwater Recharge/Discharge
- Floodflow Alteration
- Sediment/Toxicant Retention

- Nutrient Removal/Retention/Transformation
- Wildlife Habitat
- Fish Habitat
- Recreation
- Educational/Scientific Value
- Visual Quality/Aesthetics

3.8 Criteria for Restoration Success

A number of factors will be considered to evaluate the degree of restoration success for the restoration area. These factors will be the focus of post-construction monitoring events and will serve to inform the need to implement contingencies or other corrective measures.

These criteria include:

- Designed wetland and channel grades achieved following construction
- Coir logs, fiber blanketing, and live staking installed as depicted on project plans
- Plantings installed as proposed on project plans
- Maintain a minimum 70% survival rate for shrub and tree plantings over the monitoring period of five full growing seasons
- Maintain adequate slope cover (material type and coverage) over the monitoring period with minimal signs of erosion
- Increased signs of wildlife utilization
- Additional colonization/recruitment of native plants
- Maintain control of Phragmites over the monitoring period with 5% cover or less over the restoration area

Section 4 Restoration Plan Implementation

4.1 Construction-Phase

A designated wetlands specialist will monitor restoration area construction activities in the field. At a minimum, the wetland restoration specialist (i.e., Environmental Monitor) shall have a minimum of five (5) years of experience with wetlands replication and restoration. If scheduling allows, it is recommended this replication plan be implemented during either the early or late growing season, depending on the construction schedule in order to avoid seasonal high temperatures and/or low precipitation rates that might adversely affect the viability of seed germination.

4.1.1 Construction Sequence

The following steps represent the anticipated sequence of actions necessary to construct the wetland restoration areas in accordance with this plan. Minor variations may be necessary to adjust to field conditions such as weather.

1. Install an erosion control barrier along existing wetland boundary along project area limits-of-work.
2. Complete mechanical removal of vegetation within project area, including Phragmites, taking care to remove as much intact root stock as possible.
3. Properly dispose of mechanically removed plant material off-site.
4. Set grade stakes within the channel and wetland restoration area.
5. Complete grading to restore and enhance the channel, and grade adjacent wetland and riparian areas.
6. Install new outfall.
7. Stockpile excess materials and/or remove from site.
8. Spread compost-amended soils across entirety of restoration area.
9. Set temporary stakes labeled to demarcate planting zones.
10. Broadcast native seed mixes across restoration area as shown on the project plans; work into amended soil as necessary.
11. Install trees, shrubs, and herbaceous plantings in accordance with the site plans; water in as necessary.
12. Apply straw mulch to wetland restoration area (see Section 4.1.2).
13. Set perimeter stakes to demarcate restoration area boundary (see Section 4.1.3).
14. Remove erosion controls following stabilization of soil within the restoration area (75% vegetation cover on exposed soils or greater is considered stabilized).

4.1.2 Mulching

At the discretion of the Environmental Monitor, the Owner and/or Contractor will lightly mulch seeded areas with straw. Straw mulch will not be more than one (1) inch thick. It is anticipated that mulching will serve to protect the soil surface until vegetation is established, as well as to detract songbirds from foraging for the broadcast seed.

4.1.3 Protection

Upon completion of construction of the wetland restoration area, high-visibility pink flagging will be attached to wooden stakes installed at 25-foot intervals around the perimeter of the restoration area to clearly demarcate this area to facilitate monitoring. In addition, permanent bounds, such as boulders, wooden posts, or other features will be installed around the wetland perimeter with signage indicating presence of the sensitive restoration area and that mowing is prohibited.

4.2 Maintenance & Contingencies

While the vegetation becomes established, maintenance may be required. Typical maintenance activities could include providing irrigation (e.g., watering in) woody and herbaceous species or, over time, the hand-removal of non-native and/or invasive species.

4.2.1 Irrigation

As noted above, annual and seasonal variations in temperature, humidity and precipitation (i.e. weather) may necessitate additional measures to provide irrigation. Irrigation, or additional watering in, will be necessary in the event that no natural precipitation occurs for five (5) or more consecutive days during the first growing season (i.e., between April 6 and October 27).

4.2.2 Invasive Species Control

As with any recently disturbed soil surface, there is the potential for colonization by non-native and/or invasive [plant] species. While Phragmites is particularly prevalent within the project area, occurrences of Japanese knotweed (*Fallopia japonica*), purple loosestrife (*Lythrum salicaria*), Oriental bittersweet (*Celastrus orbiculatus*), glossy buckthorn (*Rhamnus frangula*), and tree-of-heaven (*Ailanthus altissima*) were also noted. General site preparation activities will result in mechanical removal of any existing invasive species within the project area. These areas will be replanted with native species, in accordance with the overall project landscape plans in upland areas and in accordance with the restoration planting plans for wetland areas. Monitoring of the restoration area will be required following completion of construction, and the environmental monitor will search for and document establishment of any invasive plants and make recommendations for their removal and any other corrective actions, as needed.

In addition, construction period invasive species control measures will be implemented, and will include proper off-site disposal of any vegetation cleared from the site. Construction vehicles and equipment are recommended to be clean and free of any plant or soil debris prior to entering the project site, and are recommended to be cleaned prior to leaving the site to prevent the introduction or off-site transport of invasive plant fragments or seed. In addition, items such as boots or other personal equipment are also recommended to be cleaned prior entering or leaving the site.

4.2.3 Shrub Replacement

Should any shrubs appear to be dead or dying, recommendations for their replacement will be made by the Environmental Monitor. It is recommended plant materials are replaced within two to three weeks of the recommendation for their replacement, so that they are planted during the active growing season and have increased chances of becoming established. Timely shrub replacement will also serve to offset any temporal loss in habitat value that would otherwise occur from retaining dead or dying shrubs on site.

Section 5 Restoration Monitoring

Monitoring of the restoration area will be required at the end of the growing season following construction (Year 0) and then for five full growing seasons following completion of construction (Years 1 through 5). The timing of the proposed monitoring events will allow for documentation of conditions within this area at the beginning and end of the growing season each year. Monitoring will be conducted by a qualified wetland scientist. A report will be prepared following each monitoring event and submitted to the Corps for their review, and will include a quantitative and qualitative assessment of vegetation cover and species present within these areas. The qualitative

vegetation assessment will document if the required 75% cover of native plant species is being achieved.

During or prior to the first monitoring event, permanent photo plots will be established and GPS'ed at several locations within this area. Photos will be taken at each plot from a consistent direction during each monitoring visit to provide visual documentation of the vegetation establishment over time. These photos will be included as part of the monitoring report.

Should any plants be observed to be dead or dying during monitoring, recommendations for their replacement will be made. Should areas of exposed soil become identified, recommendations for additional applications of seed will be made. The monitor will also survey for and document the presence of any invasive plant species and make recommendations for their removal, to prevent establishment of invasive plants within either area.

5.1 Monitoring Schedule – Construction & Post-Construction Phases

The environmental monitor will be present on-site to perform or observe the following tasks:

- Pre-construction wetland flagging inspection. Prior to the installation of erosion and sedimentation controls, wetland flagging within the project area will be inspected and refreshed, as necessary.
- Observe of grading, planting, and seeding of the restoration area.
- Observations will include the proper application rate of prescribed native seed mix and installation of woody plants as outlined in Section 3 of this Plan.
- Post-Construction Monitoring - Observe restoration areas at the end of the construction year growing season (Year 0) to determine vegetation development and to collect data for annual documentation and reporting (see following sections) relative to regulatory compliance.

Observations and data collected during this site inspection will be documented on the approved monitoring form, as well as in color photographs of each area. These materials will support the second annual monitoring report provided to the Corps (see Sections 5.2 and 5.3 for details).

- Observe the restoration area over five full growing season following project completion to determine vegetation development and to collect data for annual documentation and reporting (see following sections) relative to regulatory compliance (i.e., Year 1, 2, 3, 4, and 5).

Observations and data collected during these site inspections will be documented on the approved monitoring form, as well as in color photographs of each area. These materials will support the annual monitoring reports provided to the Corps (see Sections 5.2 and 5.3 for details). These observations will be made two (2) times during the growing season each year. The first will be conducted during the early-to-mid growing season (e.g. June/July) and the second during the mid-to-late growing season (e.g. September/October).

5.2 Documentation

Monitoring reports will include, at a minimum, the following information:

- Narrative description of activities performed to date and observations of the restoration area (e.g., rate of vegetation growth, relative cover, presence/absence of non-native and/or invasive species), as well as recommended corrective actions, if necessary.
- Copies of monitoring forms (see Appendix B of this Plan for a sample form).
- Evaluation of vegetation cover, soils and hydrology for two (2) reference plots within the restoration area.
- Digital color photographs of each reference plot as well as the overall restoration area.
- Assessment of field findings relative to restoration success criteria.

5.3 Reporting

Annual reports will be submitted to the Corps no later than December 15th of each calendar year for a period of five years. The first annual report will document the implementation of this Plan. The subsequent reports will document the relative success of the restoration areas over current and previous full growing seasons.

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APPENDIX A

File #: _____

Project Name: _____

Permittee Name: _____

Permittee Address: _____

Person Completing Form: _____

Date of Monitoring Event: _____

Purpose of Monitoring Event: _____

Weather Conditions: _____

Wetland Resoration Area ID: _____

VEGETATION & COVER¹: **Hydrophytic/Non-Hydrophytic**

% Cover Herbaceous Vegetation _____

% Cover Shrubs _____

% Cover Trees _____

% Cover Vines _____

% Cover Native Vegetation _____

% Cover Non-Native Vegetation^{1,2} _____

HYDROLOGY¹:

SOILS¹:

OTHER OBSERVATIONS:

¹ Refer to attached floristic inventory

² Refer to attached Replacement Area site sketch (below) for location of vegetation cover types



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APPENDIX B

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 Conservation/Wildlife Mix

Botanical Name	Common Name	Indicator
<i>Elymus virginicus</i>	Virginia Wild Rye	FACW-
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Andropogon gerardii</i>	Big Bluestem	FAC
<i>Festuca rubra</i>	Red Fescue	FACU
<i>Sorghastrum nutans</i>	Indian Grass	UPL
<i>Panicum virgatum</i>	Switch Grass	FAC
<i>Chamaecrista fasciculata</i>	Partridge Pea	FACU
<i>Desmodium canadense</i>	Showy Tick Trefoil	FAC
<i>Asclepias tuberosa</i>	Butterfly Milkweed	NI
<i>Bidens frondosa</i>	Beggar Ticks	FACW
<i>Eupatorium purpureum (Eutrochium maculatum)</i>	Purple Joe Pye Weed	FAC
<i>Rudbeckia hirta</i>	Black Eyed Susan	FACU-
<i>Aster pilosus (Symphyotrichum pilosum)</i>	Heath (or Hairy) Aster	UPL
<i>Solidago juncea</i>	Early Goldenrod	

PRICE PER LB. \$39.50 MIN. QUANTITY 2 LBS. **TOTAL:** \$79.00

APPLY: 25 LBS/ACRE :1750 sq ft/lb

The New England Conservation/Wildlife Mix provides a permanent cover of grasses, wildflowers, and legumes for both good erosion control and wildlife habitat value. The mix is designed to be a no maintenance seeding, and is appropriate for cut and fill slopes, detention basin side slopes, and disturbed areas adjacent to commercial and residential projects.

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 SH and applicable taxes.

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 Dry Sites

Botanical Name	Common Name	Indicator
<i>Elymus canadensis</i>	Canada Wild Rye	FACU+
<i>Festuca rubra</i>	Red Fescue	FACU
<i>Lolium multiflorum</i>	Annual Ryegrass	
<i>Lolium perenne</i>	Perrenial Ryegrass	
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Panicum virgatum</i>	Switch Grass	FAC
<i>Sorghastrum nutans</i>	Indian Grass	UPL

PRICE PER LB. \$18.00 MIN. QUANTITY 5 LBS. **TOTAL:** \$90.00 APPLY: 35 LBS/ACRE :1250 sq ft/lb

The New England Erosion Control/Restoration Mix For Dry Sites provides an appropriate selection of native and naturalized grasses to ensure that dry and recently disturbed sites will be quickly revegetated and the soil surface stabilized. It is an appropriate seed mix for road cuts, pipelines, steeper slopes, and areas requiring quick cover during the ecological restoration process. 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 soil-seed contact. Best results are obtained with a Spring or late Summer seeding. Late Spring through Mid-Summer seeding will benefit from a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering will be required. Fertilization is not required unless the soils are particularly infertile. 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 SH and applicable taxes.

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 Sites

Botanical Name	Common Name	Indicator
<i>Elymus riparius</i>	Riverbank Wild Rye	FACW
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Festuca rubra</i>	Red Fescue	FACU
<i>Andropogon gerardii</i>	Big Bluestem	FAC
<i>Panicum virgatum</i>	Switch Grass	FAC
<i>Vernonia noveboracensis</i>	New York Ironweed	FACW+
<i>Agrostis perennans</i>	Upland Bentgrass	FACU
<i>Bidens frondosa</i>	Beggar Ticks	FACW
<i>Eupatorium maculatum (Eutrochium maculatum)</i>	Spotted Joe Pye Weed	OBL
<i>Eupatorium perfoliatum</i>	Boneset	FACW
<i>Aster novae-angliae (Symphyotrichum novae-angliae)</i>	New England Aster	FACW-
<i>Scirpus cyperinus</i>	Wool Grass	FACW
<i>Juncus effusus</i>	Soft Rush	FACW+

PRICE PER LB. \$37.00 MIN. QUANTITY 3 LBS. **TOTAL:** \$111.00

APPLY: 35 LBS/ACRE :1250 sq ft/lb

The New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites contains a selection of native grasses and wildflowers designed to colonize generally moist, recently disturbed sites where quick growth of vegetation is desired to stabilize the soil surface. It is an appropriate seed mix for ecologically sensitive restorations that require stabilization as well as long-term establishment of native vegetation. This mix is particularly appropriate for detention basins that do not hold standing water. Many of the plants in this mix can tolerate infrequent inundation, but not constant flooding. The mix may be applied by hand, by mechanical spreader, or by hydro-seeder. After sowing, lightly rake, roll or cultipack to insure good seed-to-soil contact. Best results are obtained with a Spring or late Summer seeding. Late Fall and Winter dormant seeding requires an increase in the application rate. A light mulching of clean, weed-free straw is recommended

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New England Wetmix (Wetland Seed Mix)

Botanical Name	Common Name	Indicator
<i>Carex vulpinoidea</i>	Fox Sedge	OBL
<i>Carex scoparia</i>	Blunt Broom Sedge	FACW
<i>Carex lurida</i>	Lurid Sedge	OBL
<i>Carex lupulina</i>	Hop Sedge	OBL
<i>Poa palustris</i>	Fowl Bluegrass	FACW
<i>Bidens frondosa</i>	Beggar Ticks	FACW
<i>Scirpus atrovirens</i>	Green Bulrush	OBL
<i>Asclepias incarnata</i>	Swamp Milkweed	OBL
<i>Carex crinita</i>	Fringed Sedge	OBL
<i>Vernonia noveboracensis</i>	New York Ironweed	FACW+
<i>Juncus effusus</i>	Soft Rush	FACW+
<i>Aster lateriflorus (Symphyotrichum lateriflorum)</i>	Starved/Calico Aster	FACW
<i>Iris versicolor</i>	Blue Flag	OBL
<i>Glyceria grandis</i>	American Mannagrass	OBL
<i>Mimulus ringens</i>	Square Stemmed Monkey Flower	OBL
<i>Eupatorium maculatum (Eutrochium maculatum)</i>	Spotted Joe Pye Weed	OBL

PRICE PER LB. \$135.00 MIN. QUANTITY 1 LBS. TOTAL: \$135.00

APPLY: 18 LBS/ACRE :2500 sq ft/lb

The New England Wetmix (Wetland Seed Mix) contains a wide variety of native seeds that are suitable for most wetland restoration sites that are not permanently flooded. All species are best suited to moist ground as found in most wet meadows, scrub shrub, or forested wetland restoration areas. The mix is well suited for detention basin borders and the bottom of detention basins not generally under standing water. The seeds will not germinate under inundated conditions. If planted during the fall months the seed mix will germinate the following spring. During the first season of growth several species will produce seeds while other species will produce seeds after the second growing season. Not all species will grow in all wetland situations. This mix is comprised of the wetland species most likely to grow in created/restored wetlands and should produce more than 75% ground cover in two full growing seasons.

The wetland seeds in this mix can be sown by hand, with a hand-held spreader, or hydro-seeded on large or hard to reach sites. Lightly rake to insure good seed-to-soil contact. Seeding can take place on frozen soil, as the freezing and thawing weather of late fall and late winter will work the seed into the soil. If spring conditions are drier than usual watering may be required. If sowing during the summer months supplemental watering will likely be required until germination. A light mulch of clean, weed free straw is recommended.

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 SH and applicable taxes.



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