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To: [Minkin, Paul NAE](#); [Sneeringer, Paul J NAE](#)
Subject: Revised (10.22.12) Invasive Species Monitoring Plan
Date: Wednesday, October 31, 2012 3:32:26 PM
Attachments: [NEW BEDFORD SOUTH TERMINAL. INVASIVE SPECIES MGMT PLAN.10.22.12.docx](#)

Pauls - just wanted to make sure that you have the current Invasive Species Management Plan for review and comment. I've attached a copy of it below. (It can be found at Appendix 12 of the 10/22/12 Final Mitigation Plan submission.)

The format is a little off (artifact of saving to Word from PDF, but it should be legible. It is better formatted on the CD version, which I believe Paul S. has (10/22 Final Mitigation Plan)).

Please let me know if you have any comments on this or the 10/22/12 Final Mitigation Plan if there is anything in addition to what you already sent.

Also, please let me know if you are okay with the latest rough draft of the Rivers End Park grading plan. (I sent a copy last night). The one issue I have is with the limit of work line in the southern portion of the site. Limit of Work needs to go down to the lower elevations in the vicinity of the current swale, where they are tying in the lower contours, but I think it could be demarcated at a higher elevation where they are grading in the southern portion of the site. They have already said they would remove the "island" in the northern portion of the site, and go with low marsh there.

Please let me know if you have further comments these matters.

Thanks,

Mike

(See attached file: NEW BEDFORD SOUTH TERMINAL. INVASIVE SPECIES MGMT PLAN.10.22.12.docx)

(See attached file: REP Mitigation Grading Design.10.30.12 rough draft.pdf)

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**NEW BEDFORD MARINE
COMMERCE TERMINAL
INVASIVE PLANT MONITORING PLAN
MITIGATION LOCATIONS**

October 2012

*STATE ENHANCED REMEDY IN NEW BEDFORD, SOUTH TERMINAL
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION*

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**NEW BEDFORD MARINE COMMERCE TERMINAL
INVASIVE PLANT MONITORING PLAN
MITIGATION LOCATIONS**

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**NEW BEDFORD MARINE COMMERCE TERMINAL
INVASIVE PLANT MONITORING PLAN**

1.0 INTRODUCTION

The New Bedford Marine Commerce Terminal is the site selected by the Commonwealth of

Massachusetts to be one of the primary staging points for future offshore renewable energy projects

in New England. Construction of the New Bedford Marine Commerce Terminal involves the

extension of an existing marine terminal (South Terminal in New Bedford). The site is located in

New Bedford Harbor.

The proposed New Bedford Marine Commerce Terminal is a filled structure adjacent to the

shoreline, bounded by sheet piling, capped by crushed stone. It is currently anticipated that clean sand from navigational dredging would be incorporated into the construction of the facility.

Approximately 1,200 linear feet of berthing space will be available at the facility. As part of the construction of the new marine commerce terminal salt marsh mitigation will be constructed at the River's End Park Mitigation Area. In the upland brackish marshland new native species will be planted in numbers, precipitating a control and monitoring regimen of common invasive species to insure the proliferation of these newly planted native species.

Prepared by Apex

Companies LLC (August 2012).

2.0 GOALS AND OBJECTIVES

The biodiversity and natural processes of the early growing phases of the restored areas will

be susceptible to infestations of neighboring invasive plants. These invasive plant species,

particularly brackish invasive species such as *Phragmites australis* and other known invasive species

(see Attachment: Invasive Plant List) dominant around the periphery of the drainage swale and have

a high potential to spread into the restored areas undermining the ecological integrity of restoration

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efforts. The removal of invasive species beyond the property boundaries of the restoration area is

deemed out of scope for this invasive plant management plan due to adjacent land not being within

the control of the Commonwealth. Where possible, invasive removal will take place on the periphery

of the restoration area; however, the Commonwealth can not commit to removing invasive species on

property not within its control. While removal of all invasive plant species around the periphery of

the restoration is not feasible, early detection and prevention of invasive plant species establishments

in restored vegetation area and monitoring of existing infestations along the perimeter of the area is

the primary objective for this Invasive Plant Management Plan. A unique opportunity exists on the

site to proactively detect infestations of invasive plant communities before they become well

established thus maintaining a high quality restored native vegetated habitat.

3.0 POST-RESTORATION MONITORING

Post-restoration monitoring will be conducted to gauge the success of the restoration and aid in early detection of invasive species introduced into the restored areas. This is done to measure the long term performance of the restoration. Monitoring post-restoration will take place at or after the first growing season following the completed restoration of each phased area, and then annually thereafter at a minimum of 5 years. Early monitoring also serves to provide baseline conditions against which future control options and adaptive invasive plant management techniques can be implemented to eradicate any invasive, exotic or nuisance species from the restoration areas during the annual monitoring period. Post-restoration invasive species monitoring efforts will constitute the following primary objectives:

1. Plant community composition;
2. Species percent cover; and
3. Establishment of invasive plant species.

3.1 Post-Restoration Vegetation Monitoring

In order to document the baseline conditions, four randomly placed permanent one squared meter (1-m²) vegetation sampling plots will be established within each phased restoration area. These 1-m² plots will be utilized in following the first growing season. Each year these sampling plots will be utilized to monitor the herbaceous stratum.

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A permanent pin (rebar) will be installed in the southeast corner of each plot and marked with marking paint to ensure that sample plots can be easily located during subsequent monitoring. Plot locations will also be marked with a Trimble GEO-XH GPS or other sub-meter accuracy GPS unit. A portable PVC 1-m² plot frame will be used to delineate each of the monitoring plots with the corner of the frame placed over the driven plot stake. At each sample plot, all vegetation present will be identified to species (or to genus or family if species cannot be determined); the percent of the 1-m² area covered by each species will also record as an aerial cover class. Photographs of each monitoring plot will also be taken looking from the southeastern pin. Copies of monitoring data sheets and plot photos will be included as an

appendix to the baseline monitoring report.

Species dominance will be calculated by summing percent (%) aerial coverage estimates for

that species for all plots. From the percent aerial cover estimates, relative dominance and relative

frequency for each species present will be calculated using the following formulas (Cox 1996):

Relative Dominance = Species Dominance X 100

Total dominance for all species

Frequency = Number of plots in which a species occurs

Total number of plots sampled

Relative Frequency = Frequency value of a species X 100

Total of all frequency values

In addition to the investigation of the 1-m² area plots, a more general investigation of the presence of invasive species will also be conducted, which will include both spot checks of random

areas for the potential presence of invasive species, and investigations of specific target areas, if nonnative

or previously unknown native species appear to be present which do not appear to be part of

the original planting plan. This investigation will be conducted in a measured way, in order to

minimize the potential impact that the investigation itself could have on the mitigation area.

Should invasive species be noted either during the more general investigation or within the

permanent plots established to measure species dominance, a survey of the remainder of the

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mitigation area will be conducted in order to target those detected species. Occurrences of those

species will be noted and the species will be removed via methodology discussed in Section 4.0.

3.2 Schedule

This baseline monitoring as well as post-construction effectiveness monitoring shall be completed during the peak growing season (July or August) when vegetation is in full growth and

readily identifiable. The initial (baseline) event will be completed after one full growing season after

the completed restoration efforts to each area. This will give seedlings time to be established, and

will be more readily identifiable. Following the baseline monitoring, inspections will occur on an

annual basis for a minimum of 5 years.

Further monitoring may be required dependent on the success of the mitigation action.

Corrective action will be made to the Mitigation Plan if the initial Mitigation Plan proves

unsuccessful.

4.0 METHODS OF CONTROL

Control operations will be based upon invasive species present and suited to the actual site conditions. Manual operation of hand removal, or the use of mechanical enhancement, such as handsaws, chainsaws or brush saws will be employed to cut and remove target species, if necessary.

This control method will be used when targeted species occur in sensitive areas where herbicide use is prohibited. The use mechanical mowing units may be used to cut tall, dense stands of targeted plant species. This method is typically implemented in areas where the use of chemicals is prohibited or to reduce the heights of dense stands of vegetation to a more efficient and effective treatment height where chemical use can more be appropriately and adequately applied to targeted vegetation.

The use of federally-approved, state, and registered herbicides following guidelines set down by MassDEP may be used to eliminate targeted vegetation. This method is used to eliminate the

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targeted plant species through the destruction of the plant's ability to sustain necessary metabolic functions to survive and grow. Herbicide applications will be performed where allowed, to individual shoots. Contractors licensed and certified by the Massachusetts Pesticide Bureau within the Department of Food and Agriculture (MDFA) will apply herbicide applications. Only those herbicides approved by the MDFA and the MassDEP for application in sensitive areas will be used.

Sensitive areas include areas within 400 feet of a public ground water supply well, within 100 feet of a public surface water supply, within 50 feet of private water supplies, within 10 feet of surface waters and wetlands, and within agricultural and habitated areas. All other federal, state, and local regulations will also be followed including the Wetlands Protection Act.

The state-listed invasive species *Phragmites australis* and other known invasive species (see

Attachment: Invasive Plant List) are the primary target vegetation species of concern observed on the

Marine Commerce Terminal property. *Phragmites australis* invades wetland/marsh areas, crowding

out native vegetation, forming monoculture species stands. *Phragmites australis* out compete native vegetation spreading rapidly in brackish soils at full maturity due to an extensive fibrous root system and runners. *Phragmites australis* is known to re-sprout vigorously when cut. A small amount of herbicide can be applied directly to the shoots with a hand-held spray bottle, or hand-operated sprayer. Prior to cutting the *Phragmites*, if efforts are not made to kill the plants using a herbicide applied to a cut, then preparations should be made anticipating substantial root sucker growth within 60 days of the first growing season after the cut. Controlling the spread of *Phragmites australis* on the site will promote the success of the planned restoration efforts. Following the implementation of any removal of invasive species, it may be necessary to replant certain areas where remaining vegetation is sparse or bare soil is exposed. This replanting effort should follow the guidelines and planting recommendations developed in this NBMCT INVASIVE PLANT MONITORING PLAN (August 2012).

5.0 REPORTING

Following each annual monitoring event, a report outlining field results, actions, recommendations, and conclusions will be generated to document the overall success of the restoration efforts at the site. Monitoring and control of invasive species will continue based on the success of initial restoration actions, if attempts prove unsuccessful the corrective measures will be made to the management plan and successive monitoring will follow.

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6.0 LITERATURE CITED

Cox, W.J. 1996. Whole plant physiological and yield responses of maize to plant density. *Agron. J.* 88: 489-496.

APPENDIX A

***PHRAGMITES AUSTRALIS* ID SHEET**

Phragmites australis

Common reed is a tall, perennial grass that can grow to heights of 15 ft. (4.6 m) or more. Broad, pointed leaves arise from thick, vertical stalks. Leaves are 6-23.6 in. (15-60 cm) long, 0.4-2.4 in. (1-6 cm) wide, flat and glabrous. The flower heads are dense, fluffy, gray or purple in color and

5.9-15.7 in. (15-40 cm) long. Flowering occurs from July to October. Common reed is usually found in dense thickets growing in or near shallow water. These thickets displace native wetlands plants, alter hydrology and block sunlight to the aquatic community. Exotic common reed is native to Eurasia and Africa. Native Phragmites do occur in the United States and they are sometimes very difficult to distinguish from the exotics. (Massachusetts - Noxious Weed Law).

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APPENDIX B

The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts-List