NORMANDEAU ASSOCIATES
Environmental Consultants

Eversource Energy
Seacoast Reliability Project

Little Bay Salt Marsh Restoration Monitoring
Year 1

Durham & Newington, NH

Presented To:
Eversource Energy
780 North Commercial Street
Manchester, NH 03101

Submitted:
November 30, 2021

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1.0 INTRODUCTION

Eversource Energy ("Eversource") completed construction of a new 115 kilovolt ("kV") transmission line between their existing Madbury and Portsmouth substations to enhance the electric reliability in the seacoast region. The Seacoast Reliability Project ("SRP") is located in the Towns of Madbury, Durham and Newington as well as the City of Portsmouth, in Strafford and Rockingham Counties, New Hampshire. The SRP transmission line is approximately 12.9 miles long in an existing right-of-way (ROW), and includes a 0.9-mile submarine crossing under Little Bay.

As part of the submarine crossing, salt marshes on both the east and west shore of Little Bay (Gundalow Landing in Newington and Durham Point Rd. in Durham, respectively) were temporarily impacted. The impacted salt marsh areas were restored as specified in the approved SRP Salt Marsh Restoration Plandated April, 2019 (Attachment 1). The restoration plan proposed restoring a total of 189m^2 (2,034 sf) of salt marsh, including 57m^2 (615 sf) on the Newington side and 132 m^2 (1,419 sf) on the Durham side, consisting of 36 m^2 (390 sf) of restoration of the cable area, 53m^2 (568 sf) of restoration of matted salt marsh and 43 m^2 (461 sf) of restoration following removal of existing boulders.

The subgrades for the marshes were established after completion of the cable burial and restoration of the cable house in January 2020. On the Durham side, some of the boulders proposed to be removed were too large for the excavator to reach and move without additional disturbance to the existing salt marshes. A field decision was made to leave the remaining boulders in place, rather than disturb additional salt marsh. Final grading and initial plantings were completed in early summer 2020 by Northeast Wetland Restoration Inc, with additional plantings installed in fall 2020 and spring 2021. Per NHDES's Condition 65 of the NHSEC permit 2015-004, these restored salt marsh areas are to be monitored for a minimum of five (5) years post-construction. The monitoring is to consist of site inspections in the spring and late summer and after large coastal storm events to check for any potential disruption or damage to the restored areas, monitor for any invasive plant species, and document the restoration progress. The results of the annual vegetation survey and representative photographs of the restored salt marshes are to be submitted to NHDES and NHNHB in a monitoring report by December 1st of each monitoring year.

The annual monitoring was conducted on September 21 and 27, 2021. This Year 1 report summarizes the methods, results, and conclusions of the first year of post-construction monitoring of the salt marsh restoration areas.

During an inspection of the salt marshes on October 18, 2021, and after completion of the annual vegetation cover survey, the Project's Environmental Monitor observed that two wooden floats had been tethered in the intertidal zone of the Newington submarine cable landing area. Based on communications with the landowner, it is our understanding that the floats are owned by a neighbor, and that the landowner has given her permission to moor the floats for the remainder of the fall and the winter in the cable landing/salt marsh restoration

area. Eversource requested that the floats to be moved, but the landowned declined. Eversource does not have the authority to compel their removal from the restoration area because the floats are outside the designated cable easement area.

A letter bringing this matter to the attention of NHDES Wetlands Bureau was sent by Eversource, dated October 29, 2021, because the presence of the floats is likely to interfere with Project's ability to successfully achieve salt marsh restoration at this location. During additional field work in the area on November 9, 2021, it was observed that both floats had been moved to different positions in the intertidal zone. At the time of this report, one float is positioned in the upper intertidal zone to the south of the cable landing, while the other remains positioned over the restored salt marsh, but at a higher elevation than observed previously. Please see Attachments 2 and 3: Photos 32-35 for the current mapped position of the floats and associated photodocumentation.

2.0 AS-BUILTS

The perimeters of the graded and planted marshes were surveyed on September 21 and 27, 2021, with a GPS capable of submeter accuracy (Attachment 2). In the Newington marsh, the salt marsh restoration area is approximately 95 m^2 (1023 ft^2) (Table 1). The bayward and southern edges of the restored salt marsh abut mudflat with coir log forming the edge of the marsh. Undisturbed salt marsh abuts the restoration area on its northern end. During the cable installation effort, a portion of pre-existing peat shelf was preserved in the northeastern quadrant of restoration area. The remainder of the restoration area consists of a mineral substrate. During construction of the restoration area, a coarse gravel was placed on the substrate surface on the southern end of the marsh in an effort to counteract wave action, a known issue in the area, and help to hold the mineral substrate in place as vegetation becomes established. Additionally, a small channel was constructed through the southern end of the restoration area to provide a pathway through the marsh for drainage off the lawn upslope.

In the Durham marsh, the salt marsh restoration area is approximately 93 m^2 (998 ft^2) and includes an area over the cables that was excavated and restored, as well as a high marsh area below the cable house that was impacted by timber mats during the cable construction but not excavated (Table 1). The lower edge of the restored salt marsh is bounded by a cobble beach, then mudflat with the concrete mattresses overlaying the cables. The restored marsh is bordered by ledge outcrop to the south and by ledge outcrop and existing salt marsh to the north. The upland side of the marsh is bound by ledge outcrop on the south that transitions to the north to a graded embankment below the restored cable house with the toe of the embankment bound by coir log for stabilization purposes. While a thin layer of peat is present in some sections of the high marsh area, the substrate of the cable installation area is predomininantly mineral fines with native gravel/cobble on the surface. The number of boulders in the restoration area was reduced, but the remaining boulders were too large to be moved without further impacting existing salt marsh or tidal flat. These boulders were left in place, hence the proposed 43m^2 restoration of this area was not achieved. As shown in

Table 1, the loss of this restoration was almost completely offset by an increase in salt marsh restoration area on the Newington side.

Table 1. Size of proposed and built salt marsh restoration areas .

	Proposed (m^2)	As-Built (m^2)
Newington	57	95
Durham Total	132	93*
Total	189	188

3.0 YEAR 1 MONITORING METHODS AND RESULTS

3.1 Methods

Normandeau wetland scientists conducted field work on September 21 and 27, 2021 to assess vegetation coverage in the restored salt marshes. The vegetation percent cover in each restored salt marsh was assessed along four permanent transects that provide approximately 25% coverage of the total restoration area. The permanent transects are oriented perpendicular to the back edge of the given marsh and spaced equidistantly across the back of the marsh. The location of the top and bottom of each transect was recording on a GPS with sub-meter accuracy and photos collected looking down and up transect. When possible, rebar with pink flagging was driven into the substrate to mark the top of each transect. For transects where placement of rebar was not possible due to shallow ledge, orange spray paint on a resilient surface (i.e. a large boulder/exposed ledge) was used to mark the top of the transect. Representative permanent photostation locations for each salt marsh were selected and recorded on the GPS. Overview photos documenting the entire marsh were collected. See Attachment 2 for the site maps showing the salt marsh restoration footprints and locations of the transects and photostations.

Percent cover of vegetation was measured along each transect in consecutive 1-m^2 quadrat plots: 26 plots in the western salt marsh off Durham Point Rd. and 23 plots in the eastern salt marsh off Gundalow Landing. In each 1-m^2 quadrat, absolute percent cover by species and total vegetation cover were estimated in the following cover classes: <1%, 1-5%, 6-15%, 16-25%, 26-50%, 51-75%, >75%. In preparation for the salt marsh restoration effort, blocks of peat containing salt cordgrass (*Spartina alterinflora)* rhizomes were salvaged from the salt marshes prior to construction and "re-planted" in the restored salt marshes. Where possible, the presence of the salvaged peat blocks, as well as partially buried coir logs and bare ground or cobble/gravel cover were noted in each quadrat. Representative quadrat plots in each salt marsh were photodocumented.

In the office, mean percent vegetation cover by transect and for each marsh based on the combined transect data were calculated.

Please see Attachments 3 and 4 for the photodocumentation of each salt marsh and the transect survey data tables, respectively.

3.2 Results

In general, the salt marsh restoration areas on the eastern and western ends of the Little Bay cable crossing have steep gradients directly upslope, a prominent line of deposited wrack (mats of dead cordgrass, eelgrass, *Zostera marina*, and other debris) along its back edge (Plot(s) 1 and/or 2 on all transects), and a trend of increasing vegetation coverage progressing from the back of the marsh towards the bay. Both restoration areas abut undisturbed salt marsh on one or more sides. The vegetation community of both restoration areas is dominated by salt cordgrass, as nursery cultivated cordgrass plugs and salvaged peat blocks containing cordgrass rhizomes were the focus of the restortation planting plan. Many of the cordgrass plants in both restoration areas were observed to be in flower at the time of the vegetation survey with multiple plants over 1-m in height. Evidence of rhizomal development and spread of cordgrass from both the nursery cultivated plugs and the re-planted peat blocks was also observed in both salt marshes, with instances of shoots growing up through portions of coir log in both marshes noted.

Salt cordgrass was the only species identified in the Newington restoration marsh during the 2021 vegetation survey and no other vegetation species were observed in the undisturbed marsh directly adjacent to the north. Total vegetation coverage in the individual 1-m^2 quadrat transect plots ranged from 1-5% to 51-75%. Based on the 23 vegetation plots, a mean coverage by transect ranging from 27 to 35% and an overall mean coverage for the entire restoration area of 33% was determined (Table 2). Please see Attachment 4 - Tables 1 and 2 for the vegetation survey data for the Gundalow Landing salt marsh restoration area in Newington.

Table 2. Mean percent vegetation cover on each transect and for each marsh overall based on the combined transect data.

Transect	Gundalow Landing	Durham Point Rd.
1	35	23
2	36	38
3	27	57
4	34	27
Overall	**33**	**36**

Salt cordgrass was observed across the Durham restoration area although coverage varied significantly. Minimal to no presence of cordgrass was noted in Plot 1 of each transect, but there was a general increase in coverage progressing bayward along each transect from 1-5% to as high as >75%. Slender glasswort (*Salicornia depressa),* was also observed across the restoration area, though at low densities, generally 1-5% cover, and occurred in the middle to lower portions of each transect. Cordgrass and glasswort were the only vegetation species observed in the southern half of the restoration area (Transects 1 and 2). In the northern half

of the restoration area, sea orach (*Atriplex patula)* and sea blight (*Suaeda maritima)* with coverages ranging from 16-25% to 25-50% occurred along the back edge of marsh (Plot 1 on Transects 3 and 4). Sea blight was also observed further downslope along Transects 3 and 4, but at lower densities (1-5% to 6-15%, generally). Seaside goldenrod (*Salidago sempervirens)* and spike grass (*Distichlis spicata)* were observed in the upper portions of Transects 3 and 4, while sea lavender (*Limonium carolinianum)* and salt hay (*Spartina patens)* were noted a little further down in the high marsh. A stand of black grass (*Juncus gerardi)* not captured by the transects was also observed along the back edge of the restored high marsh at its very northern end. Total vegetation coverage in the individual 1-m² quadrats ranged from 0% to >75%. Based on the 26 vegetation plots, the mean coverage by transect ranged 23 to 57% and the overall mean coverage for the entire restoration area was 36% (Table 2). Please see Attachment 4 - Tables 3 and 4 for the vegeation survey data for the Durham Point Rd. salt marsh restoration area in Durham.

4.0 CONCLUSIONS

At the time of the 2021 vegetation survey, both salt marsh restoration areas were stable and showed progress towards satisfying the NHSEC permit condition of 80% vegetation coverage. While overall vegetation coverages of 33% and 36% are well below the required 80%, climate conditions were extremely harsh in the region at the time of salt marsh restoration construction and the growing season which followed. According to the National Drought Mitigation Center the Seacoast region of New Hampshire was experiencing Abnormally Dry conditions in the early summer of 2020 which progressively worsened to Extreme Drought conditions by the end of the growing season (US Drought Monitor, varying dates). Drought conditions improved over the 2020-2021 winter, but the Seacoast again experienced Abnormally Dry conditions at the beginning of the 2021 growing season. In mid-summer 2021 a series of large storm events brought the region out of drought conditions, which coincided with a visible improvement in the status of vegetation growth in both salt marshes in the second half of the growing season. Given the evidence of robust rhizomal development observed during the 2021 vegetation survey , the trajectory is easily on target to achieve 80% vegetation coverage within the next 4 years.

However, these marshes are in challenging locations due to their potential exposure to wind, wave and ice action, and the persistent wrack that is trapped by the geometry of the shorelines. Wrack is a natural part of the high intertidal zone and provides an important source of organics, as well as food and cover for invertebrates. Once established, salt marshes can tolerate periodic wrack deposits, but may experience local smothering events if thick wrack persists for a long period. In 2020 and 2021, the Environmental Monitor was on site weekly to remove thick accumulations of wrack as needed. That will no longer be the case because the stormwater monitoring effort for the SRP is complete, so the effects of wrack, if present, may be more pronounced in future years.

One known hinderance to restoration will be the wooden float observed over the salt marsh restoration in Newington if it stays in place for the period of time the landowner describes (October-April of each year). The float will adversely affect that portion of the restored salt marsh both physically by compressing and disturbing the substrate, and biologically by crushing the the plants. As described above, the Newington marsh is already in a challenging location due to wave action and wrack that accumulates in the cove, and the presence of the float will aggravate both issues. Should this impact continue, achievement of the NHSEC permit requirements in that location may be difficult.

5.0 REFERENCES

Normandeau Associates, Inc. (Normandeau) 2016. Seacoast Reliability Project. Salt Marsh Protection and Restoration Plan FINAL. Durham to Newington, NH. Dated April 16, 2016. Submitted to Public Service Company of New Hampshire, Manchester, NH.

US Drought Monitor. University of Nebraska-Lincoln. Map Archive. State of New Hampshire. Viewed available weekly maps from June 3, 2020 to November 9, 2021. https://droughtmonitor.unl.edu/Maps/MapArchive.aspx.

ATTACHMENT 1
SRP Salt Marsh Protection and Restoration Plan

NORMANDEAU ASSOCIATES
Environmental Consultants

Public Service of New Hampshire
Seacoast Reliability Project

Salt Marsh Protection and Restoration Plan
FINAL

Durham to Newington, NH

Presented To:
Public Service Company of New Hampshire
780 North Commercial Street
Manchester, NH 03101

Submitted:
April 16, 2019

Submitted By:
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Introduction

Public Service Company of New Hampshire d/b/a Eversource Energy ("PSNH") is proposing to construct a new 115 kilovolt ("kV") transmission line between their existing Madbury and Portsmouth substations to enhance the electric reliability in the seacoast region. The Seacoast Reliability Project ("SRP") is proposed to be located in the Towns of Madbury, Durham and Newington as well as the City of Portsmouth, in Strafford and Rockingham Counties, New Hampshire. The SRP transmission line will be approximately 12.9 miles long, including a 0.9 mile crossing under Little Bay. The cable crossing proposed in Little Bay will affect a corridor approximately 100 feet wide within a charted Cable Area approximately 1,000 feet wide.

PSNH has designed the SRP to avoid environmental impacts where possible. Temporary impacts to fringing salt marsh are unavoidable on both the east and west shores of Little Bay. Impacts will result from timber mat placement to allow construction equipment to cross the marsh to reach the work areas, and from burial of the cables underneath the marsh. The latter effort will require salvage of the existing peat where feasible, and replacement of the peat and salt marsh restoration after the cable burial is completed. The following text and plans describe the existing conditions, construction activities, salt marsh protection and restoration methods, and long-term monitoring to document recovery.

Proposed Protection and Restoration Plan

All construction and restoration will be done under the supervision of the Engineer and an Environmental Monitor to ensure minimization of impacts to native vegetation and wildlife, and that all disturbed areas are stabilized. All salt marsh salvage and restoration will be conducted by a contractor experienced in salt marsh restoration, and overseen by the Environmental Monitor.

Because of variable conditions in these fringing marshes, the vegetated portions of the marsh within the impact area will be delineated to capture this year's conditions. Areas that appear capable of supporting salt marsh (evidence of roots and rhizomes but unvegetated at the time of delineation) will also be considered for restoration.

The attached plan set depicts areas of the salt marsh delineated in 2016 that will be temporarily impacted by the underwater cable installation. At a minimum, the marsh will be restored to the extent and elevations identified in the 2019 delineation. On the west shore, the Applicant is also proposing to re-establish an additional 461 sq.ft. of salt marsh after the cable installation is complete (Sheet 2). This re-establishment area appears to be former salt marsh as defined by the extent of boulders to the north of the work corridor. The boulders appear to have been artificially placed on the marsh surface, potentially during either the original cable construction in the early 1900's or during repairs in the 1940's or 1970's. Substrates under the re-establishment area appear to be rocks, and unconsolidated silts, sands and gravels.

Prior to construction, the work areas on the east and west shores will be bounded with temporary fencing to confine construction equipment and staff to the impact area, and to prevent damage to the adjacent marsh. Erosion controls along the upland edge will be put in place to prevent disturbed soils from migrating into the saltmarsh during the work period. Straw wattles will be used to protect any exposed faces of the remaining marsh from erosion. Once installed, the turbidity curtain surrounding the hand jet area will also protect the disturbed salt marsh behind it. Within the work area, timber mats underlain by geotextile will be used to protect the marsh from equipment and foot traffic. Excavation in the marsh will be limited to only the area necessary for burying the cables. Matting and excavation will occur over the briefest time period possible to limit impacts to the salt marsh. In the excavation areas, all suitable salt marsh peat will be salvaged and stockpiled for replacement during restoration. Suitable peat will be determined in the field by the Environmental Monitor and will be thick enough (minimum 6 inches) and intact enough (minimum 4 square feet) to tolerate salvaging, storing and re-planting. In areas where the salt marsh is unsuitable for salvaging as determined by the Environmental Monitor, the marsh will be replanted as described below.

The salvaged peat blocks will be protected from sun, wind, dehydration and freezing in a nearby suitable upland area with a hay bed, sides and loose top. The peat blocks will be checked weekly during the growing season and kept moist with fresh water as needed. Salt water will be applied monthly to maintain the salinity tolerance of the salvaged material. The construction work in the salvage area is expected to be completed with sufficient time to replace the salvaged peat blocks no later than November 1. If the cable installation period extends beyond November 1, the peat blocks will be maintained through the winter with additional bedding and a well-ventilated shelter to protect the plants from extreme cold and warming. The plants will be relocated to the salt marsh in April of the following year.

Upon completion of construction, the underlying substrates will be restored to appropriate subgrades to support either the peat blocks or salt marsh planting, so that final elevations are equal to or up to six inches higher than the pre-construction condition. Where the peat was suitable for salvaging, the peat blocks will be replaced and anchored with stakes driven into the substrates and/or adjacent peat. Any open interstices between the peat blocks will be filled with a clean sandy loam to cover exposed roots and maintain grades. Additional salt marsh cordgrass (*Spartina alterniflora*) will be planted in the interstices if the gap between peat blocks exceeds 4 inches. Planting of cordgrass will not occur until the spring of 2020.

In areas where the peat was unable to be salvaged, the substrates will be restored with a clean sandy loam, and overlain with a biodegradable erosion control blanket if needed to stabilize the sediments. In the spring, the marsh will be replanted at a maximum of 1 sq.ft. intervals with salt marsh cordgrass seedlings in low marsh areas, and salt marsh hay (*Spartina patens*) seedlings in high marsh areas if needed and as determined by the Environmental Monitor. The seaward face of the restored marsh will be protected from ice and wave action with coir logs. This may include placing several boulders in the intertidal zone below the re-establishment area as protection from wave and ice scour.

In the re-establishment area, clean sandy loam will be placed to elevations consistent with the salt marsh bordering the re-establishment area. If recommended by the Environmental Monitor, the substrates will be overlain with a biodegradable erosion control blanket to protect from from wave action. The marsh will be replanted with salt marsh cordgrass seedlings as directed by the Environmental Monitor. The seaward face of the re-established marsh will be protected from ice and wave action with coir logs secured with wooden stakes or rebar, and rocks placed seaward of the marsh area (Sheet 3).

The Environmental Monitor will assure compliance with permit conditions during and after the construction activities, including five (5) years of post-construction monitoring, and preparation of the appropriate compliance reports for submittal to NHDES. The monitoring will include a site inspection in the spring and late summer and after large coastal storm events, growing season vegetation cover estimates by species, and photographs. Areas with less than 80% vegetation cover in late summer of the first year (2020) will require additional planting or other appropriate enhancements. Any areas with erosion will be repaired immediately. All construction fencing, stakes, and erosion control materials will be manually removed as soon as they are no longer necessary.

The restored salt marsh areas will be monitored for invasive species. Potential invasive species will be primarily common reed (*Phragmites australis*). Common reed has not been observed in the vicinity of the work areas, so the likelihood of invasion is relatively low. If found, invasive plants will be hand pulled and removed from the salt marsh restoration areas and disposed of in a manner and location to preclude their survival or spread. A monitoring report will be submitted to NHDES and NHNHB by December 1 of each monitoring year.

ATTACHMENT 1:

Salt Marsh Restoration Plan

Sheets 1 through 4

1)All construction and restoration will be done under the supervision of the Engineer and an Environmental Monitor.

2)All salt marsh salvage and restoration will be conducted by a contractor experienced in salt marsh restoration, and overseen by the environmental monitor.

3)Prior to construction, the work areas will be bounded with temporary fencing to confine construction equipment and staff to the impact area, and to prevent damage to the adjacent marsh.

4)Erosion controls along the upland edge will be put in place to prevent disturbed soils from migrating into the saltmarsh during the work period.

5)Within the work area, timber mats will be used to minimize impacts to the marsh from equipment and foot traffic.

6)Excavation in the marsh will be limited to only the area necessary for burying the cables.

7)Matting and excavation will occur over the briefest time period possible to limit impacts to the salt marsh.

8)In the excavation areas, all suitable salt marsh peat will be salvaged and stockpiled for replacement during restoration. Suitable peat will be defined in the field by the Environmental Monitor, but will be thick enough (6 inches) and intact enough (4 square feet) to tolerate salvaging, storing and re-planting.

9)The salvaged peat blocks will be protected from sun, wind, dehydration and freezing in a suitable upland area

10)Construction in the salvage area will be completed with sufficient time to replace the salvaged peat blocks no later than November 1. If the construction period extends beyond November 1, the peat blocks will be maintained as described in #9 through the winter and replaced in April of the following year, or as directed by the Environmental Monitor.

11)Upon completion of construction, the underlying substrates will be restored to appropriate subgrades to support the peat blocks, so that final elevations are equal to or up to six inches higher than the pre-construction condition.

12)The peat blocks will be replaced and anchored with rebar stakes driven into the substrates and/or adjacent peat. Any open interstices between the peat blocks will be filled with a sandy loam to cover exposed roots and maintain grades. Additional salt marsh cordgrass (Spartina alterniflora) seedlings will be planted in the interstices if the gap between peat blocks exceeds 4 inches.

13)In areas where the salt marsh does not have fully established peat as described in #8, the marsh will be replanted at 1 sq.ft. intervals with salt marsh cordgrass seedlings in low marsh areas, and salt marsh hay (Spartina patens) seedlings in high marsh areas as designated by the Environmental Monitor.

14)In the replanting areas, the substrates will be restored with a sandy loam,and overlain with biodegradable erosion control blanket or otherwise protected to stabilize the sediments. Surface elevations will match preconstruction conditions or as directed by the Environmental Monitor. The seaward face of the restored marsh will be protected from ice and wave action with coir logs.

15)In the salt marsh re-establishment area on the west shore, the boulders will be removed from the intertidal zone and placed in an approved location under the direction of the Environmental Monitor. This may include placing several rocks in the intertidal zone below the re-establishment area as protection from wave and ice scour.

16)Final grades will be re-established to elevations consistent with the bordering low salt marshes north and south of the re-establishment area. The sandy loam will be overlain with a biodegradable erosion control blanket, or otherwise protected to stabilize the sediments.

17)The re-established marsh will be replanted with salt marsh cordgrass seedlings at 1sq.ft intervals.

18)The seaward face of the re-established marsh will be protected from ice and wave action with coir logs, and rocks placed seaward of the marsh area (see note 15).

19)All construction fencing and erosion control materials will be manually removed as soon as they are no longer necessary.

20) The Environmental Monitor will assure compliance with permit conditions during and after the construction activities, including five (5) years of post-construction monitoring, and preparation of the appropriate compliance reports for submittal to NHDES.

Date : 4/18/2019

Drawn By: dpelletier

Project No: 22860.003

EVERSOURCE ENERGY

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Sheet 1 of 4

Path: J:\Projects\PSNH_F107\MXD\SRP_SRP_SaltMarsh_Notes.mxd

DNW2 E2US

DNW2 E2RS

Remove boulders and re-establish salt marsh (461 sq. ft.)

Representative placement of rocks to protect the restored salt marsh

DNW2 E2US

Temporary timber mats (568 sq. ft. to be restored)

DNW2 E2EM

Cable house to be removed and restored

A'

A

Salvage and restore low marsh (390 sq. ft.)

DNW2 E2RS

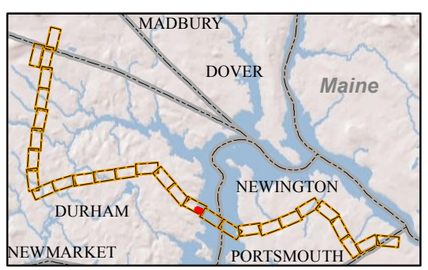
Turbidity Barrier
Straw Wattle
2ft Contour
Underground Cable
Tree Clearing
Timber Mats (to be restored)
Workpad/Access
Wetland

Concrete Mattresses
Temporary Impact
High Marsh Zone
Low Salt marsh
Salvage and restore low marsh
Boulders
808 Rocks

N
E
W
S

0 10 20 40 Feet

1 inch = 20 feet



Date : 4/17/2019

Drawn By: dpelletier

Project No: 22860.003

EVERSOURCE ENERGY

Seacoast Reliability Project
Salt Marsh Restoration Plan

Sheet 2 of 4

NORMANDEAU ASSOCIATES
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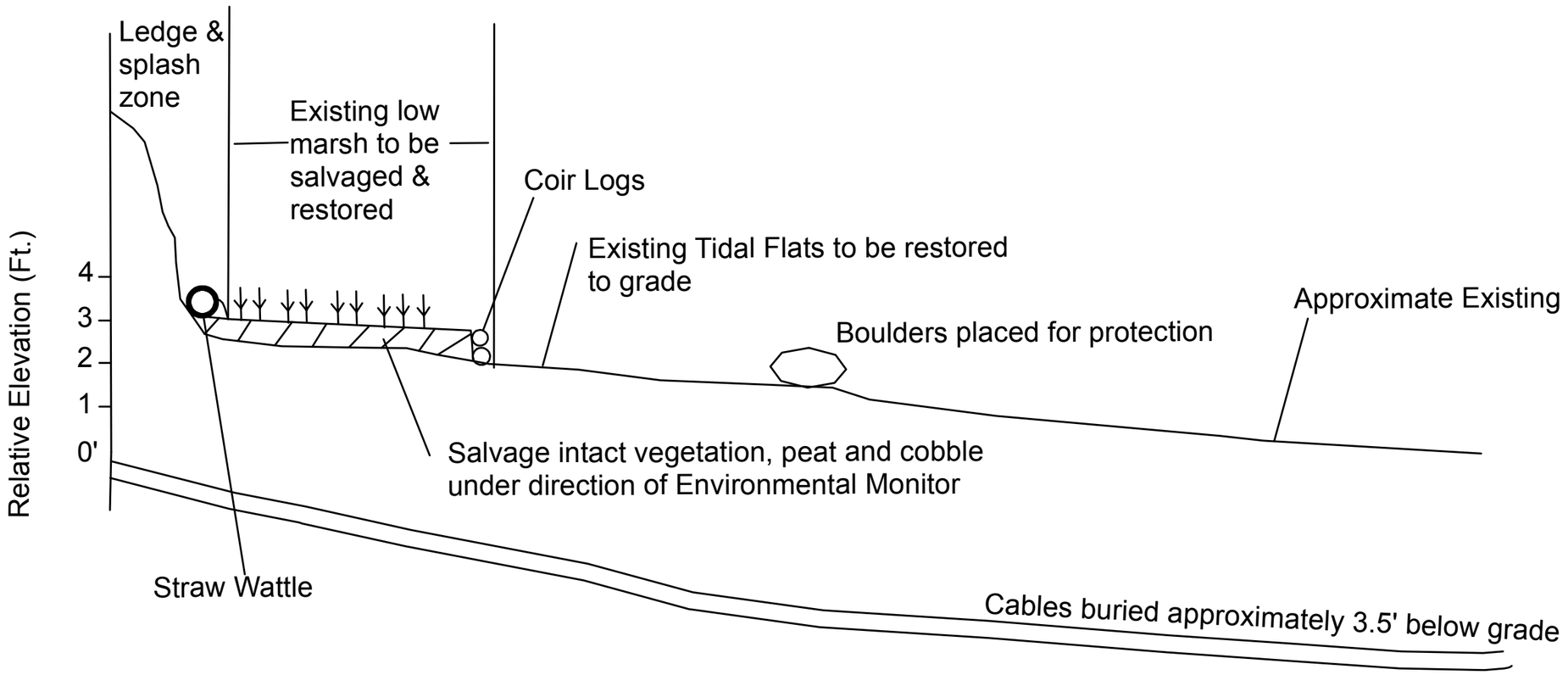
STATE OF NEW HAMPSHIRE
SARAH D. ALLEN
No. 083
CERTIFIED WETLAND SCIENTIST
3/7/19

Path: J:\Projects\PSNH_F107\MXD\SRP_SaltMarsh.mxd

Salt Marsh Restoration Area, West Shore

Section A-A'



Drawn By: dpelletier

Date : 3/27/2019

Project No: 22860.003

EVERSOURCE ENERGY

Seacoast Reliability Project

Salt Marsh Restoration Representative Cross-Section

Sheet 3 of 4

NORMANDEAU ASSOCIATES
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Path: J:\Projects\PSNH_F107\MXD\SRP_SaltMarsh_Xsect.mxd

Man Hole

Salvage & restore low marsh (615 sq. ft.)

DNW2
E2EM

DNW2
E2RS

DNW2
E2US

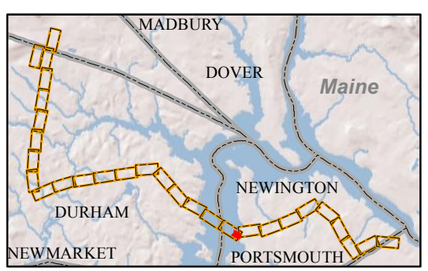
DNW2
E2EM

Turbidity Barrier
Silt Fence, Hay Bale, Erosion Control Mix Berm
Straw Wattle
2ft Contour
Underground Cable
Tree Clearing
Workpad/Access
Wetland

Concrete Mattresses
Temporary Wetland Impact
Low Salt marsh
Salvage and restore low marsh

0 10 20 40 Feet

1 inch = 20 feet



Date : 4/17/2019

Drawn By: dpelletier

Project No: 22860.003

EVERSOURCE ENERGY

Seacoast Reliability Project Salt Marsh (East) Restoration Plan

NORMANDEAU ASSOCIATES
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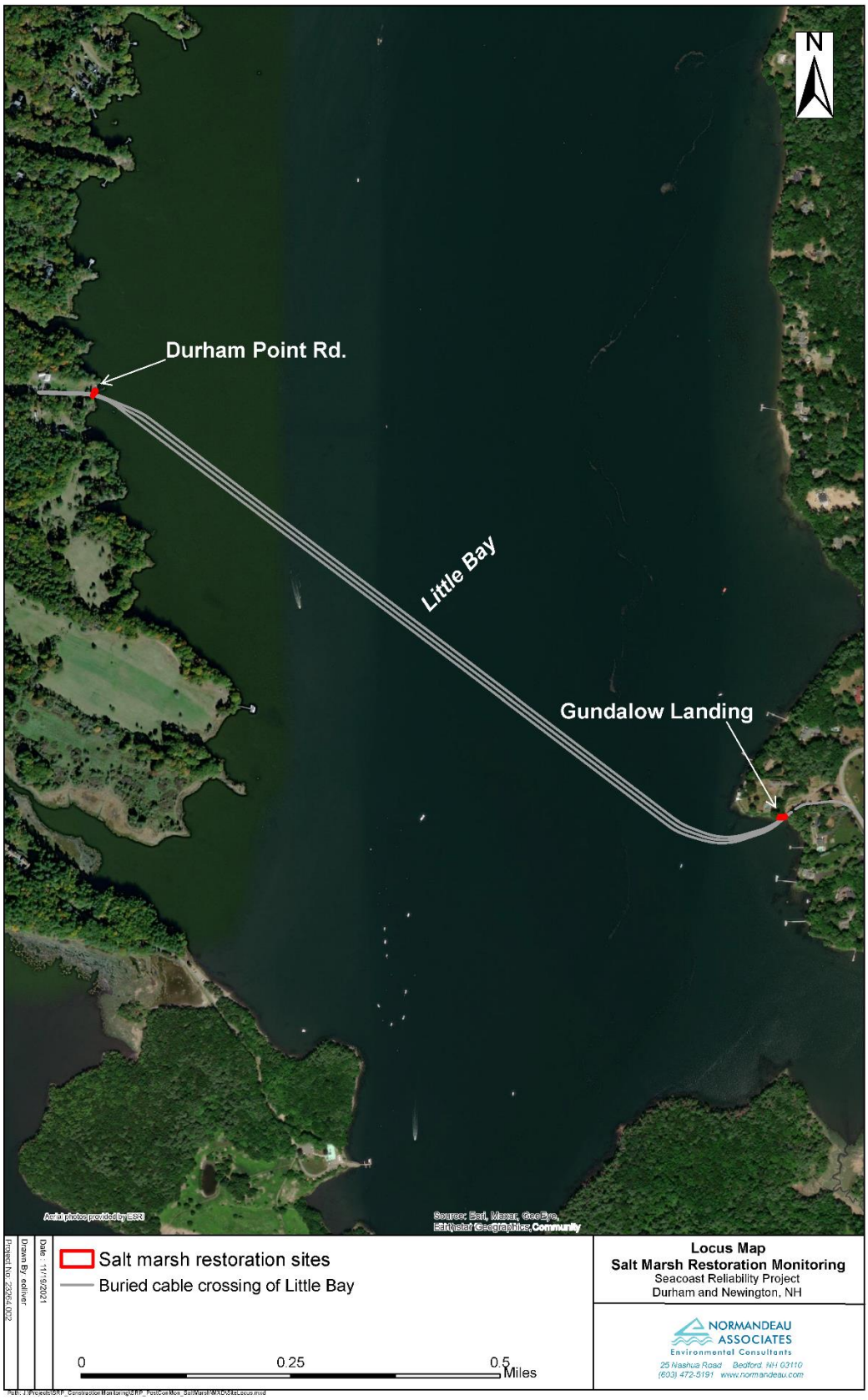
Path: J:\Projects\PSNH_F107\MXD\SRP_SaltMarsh_East.mxd

ATTACHMENT 2
Site Maps


N
Durham Point Rd.
Little Bay
Gundalow Landing
Aerial photos provided by ESRI
Source: Esri, Maxar, GeoEye, Earthstar Geographics, Community
Project No. 23264.002
Drawn By: ecliver
Date: 11/19/2021
Salt marsh restoration sites
Buried cable crossing of Little Bay
0
0.25
0.5
Miles
Locus Map
Salt Marsh Restoration Monitoring
Seacoast Reliability Project
Durham and Newington, NH
NORMANDEAU ASSOCIATES
Environmental Consultants
25 Nashua Road Bedford, NH 03110
(603) 472-5191 www.normandeau.com

PS3
PS4
PS1
PS2
1
2
3
4
Project No: 24612.000
Drawn By: eoliver
Date: 11/30/2021
Photo Locations
Transects
Salt marsh restoration boundary
Approximate footprints of floats on 11/09/21
N
0 25 50 Feet
Note: Imagery dated 2017, before SRP construction.
Service Layer Credits: Esri, granit.edu aerial photos 2017.
Salt Marsh Restoration Monitoring
Gundalow Landing Site
Newington, NH
NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS
25 Nashua Road Bedford, NH 03110
(603) 472-5191 www.normandeau.com
Path: J:\Projects\SRP_ConstructionMonitoring\SRP_PostConMon_SaltMarshMXD\GundalowLanding_SiteMap.mxd

PS1
PS2
PS3
PS4
1
2
3
4
Photo Locations
Transects
Salt marsh restoration boundary
Note: Imagery dated 2017, before SRP construction.
Service Layer Credits: Esri, granit.edu aerial photos 2017.
0 25 50 Feet
N
Project No: 24612.000
Drawn By: edilivier
Date : 11/30/2021
Salt Marsh Restoration Monitoring
Durham Point Rd. Site
Durham, NH
NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS
25 Nashua Road Bedford, NH 03110
(603) 472-5191 www.normandeau.com
Path: J:\Projects\SRP_ConstructionMonitoring\SRP_PostConMon_SaltMarshMXD\DurhamPoint_SiteMap.mxd

ATTACHMENT 3
Photos

Overview Photos from Photo Stations – Gundalow Landing

Fig. 1. Salt marsh overview from Photo Station 1 (PS1) at Gundalow Landing. (09-27-21)

Fig. 2. Salt marsh overview from Photo Station 3 (PS3) at Gundalow Landing. (09-27-21)

Fig. 3. Salt marsh overview from Photo Station 4 (PS4) at Gundalow Landing. (09-27-21)

Transect Photos – Gundalow Landing

Fig. 4. Looking downslope from top of Transect 1 (T1U) at Gundalow Landing. (09-27-21)

Fig. 5. Looking upslope from bottom of Transect 1 (T1D) at Gundalow Landing. (09-27-21)

Fig. 6. Looking downslope from top of Transect 2 (T2U) at Gundalow Landing. (09-27-21)

Fig. 7. Looking upslope from bottom of Transect 2 (T2D) at Gundalow Landing. (09-27-21)

Fig. 8. Looking downslope from top of Transect 3 (T3U) at Gundalow Landing. (09-27-21)

Fig. 9. Looking upslope from bottom of Transect 3 (T3D) at Gundalow Landing. (09-27-21)

Fig. 10. Looking downslope from top of Transect 4 at Gundalow Landing. (09-27-21)

Fig. 11. Looking upslope from bottom of Transect 4 at Gundalow Landing salt marsh. (09-27-21)

Plot Photos – Gundalow Landing

Fig. 12. Plot 3 on Transect 2 at Gundalow Landing. (09-27-21)

Fig. 13. Plot 4 on Transect 2 at Gundalow Landing. (09-27-21)

Fig. 14. *Spartina alterniflora* growing through the coir log at the toe of the salt marsh restoration downslope of Plot 6 on Transect 2 at Gundalow Landing. (09-27-21)

Fig. 15. Plot 1 on Transect 3 at Gundalow Landing. (09-27-21)

Fig. 16. Plot 6 on Transect 3 at Gundalow Landing. (09-27-21)

Overview Photos from Photo Stations – 295 Durham Point Rd.

Fig. 17. Salt marsh overview from Photo Station 1 (PS1) at 295 Durham Point Rd. (09-27-21)

Fig. 18. Salt marsh overview from Photo Station 2 (PS2) at 295 Durham Point Rd. (09-27-21)

Fig. 19. Salt marsh overview from Photo Station 3 (PS3) at 295 Durham Point Rd. (09-27-21)

Fig. 20. Salt marsh overview from Photo Station 4 (PS4) at 295 Durham Point Rd. (09-27-21)

Transect Photos – 295 Durham Point Rd.

Fig. 21. Looking downslope from top of Transect 1 (T1U) at 295 Durham Point Rd. (09-27-21)

Fig. 22. Looking upslope from bottom of Transect 1 (T1D) at 295 Durham Point Rd. (09-27-21)

Fig. 23. Looking downslope from top of Transect 2 (T2U) at 295 Durham Point Rd. (09-27-21)

Fig. 24. Looking upslope from bottom of Transect 2 (T2D) looking upslope at 295 Durham Point Rd. (09-27-21)

Fig. 25. Looking downslope from top of Transect 3 (T3U) at 295 Durham Point Rd. (09-27-21)

Fig. 26. Looking upslope from bottom of Transect 3 (T3D) at 295 Durham Point Rd. (09-27-21)

Fig. 27. Looking downslope from top of Transect 4 (T4U) at 295 Durham Point Rd. (09-27-21)

Fig. 28. Looking upslope from bottom of Transect 4 (T4D) at 295 Durham Point Rd. (09-27-21)

Plot Photos – 295 Durham Point Rd.

Fig. 29. Plot 3 on Transect 1 at 295 Durham Point Rd. (09-27-21)

Fig. 30. Plot 7 on Transect 3 at 295 Durham Point Rd. salt marsh restoration. (09-27-21)

Fig. 31. Plot 5 on Transect 4 at 295 Durham Point Rd. (09-27-21)

Fig. 32. Salt marsh overview from Photo Station 1 (PS1) at Gundalow Landing with a float placed on top of a portion of the salt marsh restoration. Red arrow indicates the top of Transect 3 (T3U). (11-09-21)

Fig. 33. Salt marsh overview from Photo Station 2 (PS2) at Gundalow Landing with a float placed on top of a portion of the salt marsh restoration. (11-09-21)

Fig. 34. Overview of float placed in upper tidal zone south of the salt marsh restoration at Gundalow Landing, viewing south. (11-09-21)

Fig. 35. Overview of float placed in upper tidal zone south of the salt marsh restoration at Gundalow Landing, viewing east. (11-09-21)

ATTACHMENT 4
Data Tables

Table 1 – 1-m^2 plot data collected on Transects 1 and 2 in the Gundalow Landing salt marsh restoration area (9/21/21 and 9/27/21).

Transect	Plot	Percent Coverage by Vegetation Species (these numbers may exceed total cover)								Total Percent		Notes	Photo?
		Spartina alterniflora	*Salicornia depressa*	*Suaeda maritima*	*Spartina patens*	*Atriplex patula*	*Salidago sempervirens*	*Limonium carolinianum*	*Distichlis spicata*	Veg Cover	Bare Ground		
1	1	6 - 15	-	-	-	-	-	-	-	6 - 15	>75	Mineral substrate. In the wrack zone.	
	2	51 - 75	-	-	-	-	-	-	-	51 - 75	26 - 50	Mineral substrate. Edge of the wrack zone.	
	3	26 - 50	-	-	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate. Below the wrack zone.	
	4	26 - 50	-	-	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate with transition to existing peat shelf.	
	5	26 - 50	-	-	-	-	-	-	-	26 - 50	51 - 75	Mostly peat shelf with sharp break in slope to lower elevation mineral substrate of accumulated fines.	
	6	16 - 25	-	-	-	-	-	-	-	16 - 25	>75	Mineral substrate of accumulated fines below a sharp break in slope from peat shelf upslope.	
2	1	1 - 5	-	-	-	-	-	-	-	1 - 5	>75	Mineral substrate. In the wrack zone.	
	2	26 - 50	-	-	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate. Edge of the wrack zone.	
	3	26 - 50	-	-	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate with transition to existing peat shelf.	Y
	4	26 - 50	-	-	-	-	-	-	-	26 - 50	51 - 75	50% peat shelf with sharp break in slope to lower elevation mineral substrate of accumulated fines.	Y
	5	51 - 75	-	-	-	-	-	-	-	51 - 75	26 - 50	Mineral substrate with 2 full and 3 partial salvaged peat blocks.	
	6	26 - 50	-	-	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate. Coir log forming the downslope boundary of restored marsh just outside of the plot with *Spartina alterniflora* rhizome shoots growing through the coir.	Y

Table 2 - 1-m^2 plot data collected on Transects 3 and 4 in the Gundalow Landing salt marsh restoration area (9/27/21).

Transect	Plot	Percent Coverage by Vegetation Species (these numbers may exceed total cover)								Total Percent		Notes	Photo?
		Spartina alterniflora	*Salicornia depressa*	*Suaeda maritima*	*Spartina patens*	*Atriplex patula*	*Salidago sempervirens*	*Limonium carolinianum*	*Distichlis spicata*	Veg Cover	Bare Ground		
3	1	6 - 15	-	-	-	-	-	-	-	6 - 15	>75	Mineral substrate. Edge of the wrack zone.	Y
	2	26 - 50	-	-	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate with 2 partial salvaged peat blocks.	
	3	16 - 25	-	-	-	-	-	-	-	16 - 25	>75	Mineral substrate with 3 full and 3 partial salvaged peat blocks.	
	4	51 - 75	-	-	-	-	-	-	-	51 - 75	26 - 50	Mineral substrate with 3 partial salvaged peat blocks.	
	5	16 - 25	-	-	-	-	-	-	-	16 - 25	>75	Mineral substrate with 2 full salvaged peat blocks and a portion of coir log forming one bank of the drainage channel.	
	6	6 - 15	-	-	-	-	-	-	-	6 - 15	>75	Mineral substrate with 1 partial salvaged peat block and coir log bank of the drainage channel and downslope boundary of the restored marsh. Accumulating fines in the drainage channel splay. *S. alterniflora* rhizome shoots growing through the coir outside the plot.	Y
4	1	1 - 5	-	-	-	-	-	-	-	1 - 5	>75	Mineral substrate. Below the wrack zone. Plot contains the upslope mouth of the drainage channel and both coir logs forming its banks. 25% of the plot area is covered by gravel.	
	2	26 - 50	-	-	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate with 3 full salvaged peat blocks and coir log forming the bank of the drainage channel. 60% of the plot area is covered by gravel.	
	3	51 - 75	-	-	-	-	-	-	-	51 - 75	26 - 50	Mineral substrate with 2 full and 1 partial salvaged peat blocks.	
	4	51 - 75	-	-	-	-	-	-	-	51 - 75	26 - 50	Mineral substrate with 2 full and 2 partial salvaged peat blocks.	
	5	1 - 5	-	-	-	-	-	-	-	1 - 5	>75	50% of the plot lies within the restored marsh area with 25% consisting of mineral substrate with a non-native gravel surface and 25% of partially failed coir log forming the downslope boundary of the restored marsh.	Y

Table 3 - 1-m^2 plot data collected on Transects 1 and 2 in the Durham Point Rd. salt marsh restoration area (9/27/21).

Transect	Plot	Percent Coverage by Vegetation Species (these numbers may exceed total cover)								Total Percent		Notes	Photo?
		Spartina alterniflora	*Salicornia depressa*	*Suaeda maritima*	*Spartina patens*	*Atriplex patula*	*Salidago sempervirens*	*Limonium carolinianum*	*Distichlis spicata*	Veg Cover	Bare Ground		
1	1	-	-	-	-	-	-	-	-	0	>75	Mineral substrate. In the wrack zone.	
	2	6 - 15	1 - 5	-	-	-	-	-	-	6 - 15	>75	Mostly mineral substrate with 25% cobble/gravel cover and 1 partial salvaged peat block. Edge of the wrack zone.	
	3	1 - 5	1 - 5	-	-	-	-	-	-	1 - 5	>75	Mineral substrate with 25% cobble/gravel cover. 40% of plot contains salvaged peat blocks or peat-like coir.	Y
	4	26 - 50	1 - 5	-	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate with 10% cobble/gravel cover and 2 partial salvaged peat blocks.	
	5	51 -75	-	-	-	-	-	-	-	51 - 75	26 - 50	Mineral substrate with 10% cobble/gravel and 2 full salvaged peat blocks.	
2	1	1 - 5	-	-	-	-	-	-	-	1 - 5	>75	Mineral substrate. In the wrack zone.	
	2	26 - 50	-	-	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate with 25% cobble/gravel cover. Edge of the wrack zone.	
	3	16 -25	1 - 5	-	-	-	-	-	-	16-25	>75	Mineral substrate with 25% cobble/gravel cover and 10% peat-like coir.	
	4	26 - 50	1 - 5	-	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate with 10% cobble/gravel cover and 1 partial salvaged peat block and peat-like coir.	
	5	51 - 75	1 - 5	-	-	-	-	-	-	51 - 75	26 - 50	Mineral substrate with 2 full salvaged peat blocks.	
	6	51 - 75	1 - 5	-	-	-	-	-	-	51 - 75	26 - 50	Mineral substrate with 5% cobble/gravel cover and 3 full and 1 partial salvaged peat block.	

Table 4 - 1-m^2 plot data collected on Transects 3 and 4 in the Durham Point Rd. salt marsh restoration area (9/27/21).

Transect	Plot	Percent Coverage by Vegetation Species (these numbers may exceed total cover)								Total Percent		Notes	Photo?
		Spartina alterniflora	*Salicornia depressa*	*Suaeda maritima*	*Spartina patens*	*Atriplex patula*	*Salidago sempervirens*	*Limonium carolinianum*	*Distichlis spicata*	Veg Cover	Bare Ground		
3	1	1 - 5	-	16 - 25	-	26 - 50	1 - 5	-	-	26 - 50	51 - 75	Mineral substrate. In the wrack zone.	
	2	16 -25	-	1 - 5	-	-	-	-	1 - 5	16 - 25	>75	Mineral substrate with 25% cobble/gravel cover.	
	3	51 - 75	-	-	-	-	-	-	-	51 - 75	26 - 50	Mineral substrate with 10% cobble/gravel cover.	
	4	51 - 75	-	1 - 5	-	-	-	-	-	51 - 75	26 - 50	Mineral substrate with 10% cobble/gravel cover.	
	5	16 - 25	1 - 5	1 - 5	-	-	-	1 - 5	-	26 - 50	51 - 75	Mineral substrate with <10% cobble/gravel cover and 25% peat-like coir.	
	6	> 75	1 - 5	-	-	-	-	-	-	>75	6 - 15	Mineral substrate composed exclusively of fines.	
	7	>75	1 - 5	1 - 5	-	-	-	-	-	>75	6 -15	Plot is 50% restored salt marsh and 50% cobble beach bayward of the salt marsh. No cobble present in the restored salt marsh portion of the plot. Vegetation coverages provided are representative of the salt marsh restoration half of the plot.	Y
	1	-	-	26 - 50	-	16 - 25	-	-	-	26 - 50	51 - 75	Mineral substrate with 15% cobble/gravel cover. Edge of the wrack zone.	
	2	1 - 5	-	6 - 15	-	-	-	-	1 - 5	6 - 15	>75	Mineral substrate with 25% cobble/gravel cover.	
	3	6 - 15	-	6 - 15	-	-	-	-	1 - 5	16 - 25	51 - 75	Mineral substrate comprised exclusively of fines.	
	4	6 - 15	1 - 5	16 - 25	-	-	-	1 - 5	-	16 - 25	51 - 75	Mineral substrate with 15% cobble/gravel cover.	
	5	1 - 5	6 - 15	6 - 15	16 - 25	-	-	-	-	26 - 50	51 - 75	Mineral substrate with 10% cobble/gravel cover.	Y
	6	1 - 5	1 - 5	6 - 15	26 - 50	-	-	1 - 5	-	51 - 75	26 - 50	Mineral substrate with 25% cobble/gravel cover.	
	7	26 - 50	1 - 5	1 - 5	-	-	-	-	-	26 - 50	51 - 75	Mineral substrate with 10% cobble/gravel and 20% peat-like coir covers.	
	8	16 - 25	1 - 5	1 - 5	-	-	-	-	-	16 - 25	51 - 75	Mineral substrate with 10% cobble/gravel cover.	